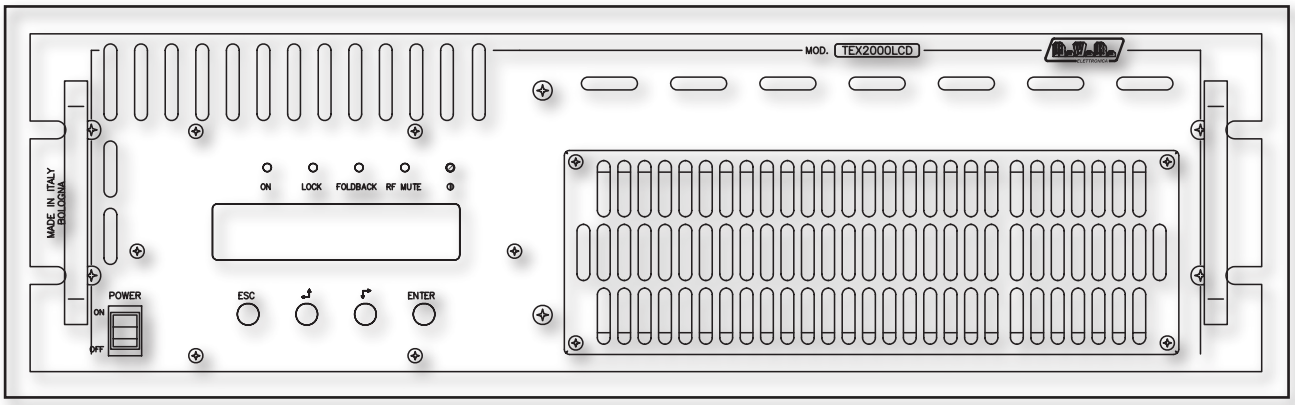
TEX2000LCD



User Manual

Volume 1

Manufactured by R.V.R. ELETTRONICA **Italy**

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13/10/2008	1.0	First Edition	J. H. Berti
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TEX2000LCD - User Manual
Version 1.1

R.V.R. Elettronica SpA
Via del Fonditore 2/2c - 40138 - Bologna (Italia)
Telephone: +39 051 6010506
Fax: +39 051 6011104
Email: info@rvr.it
Web: www.rvr.it

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 freuency, 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.

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IMPORTANT

The lightning flash with arrowhead, within a triangle, is intended to alert the user of the presence of dangerous voltage that may constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

1. Preliminary Instructions

• General Warnings

This equipment should only be operated, installed and maintained by "trained" or "qualified" personnel who are familiar with risks involved in working on electric and electronic circuits. "Trained" means personnel who have technical knowledge of equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment.
"Qualified" means personnel who are trained in and experienced with equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment.

WARNING: Residual voltage may be present inside the equipment even when the ON/OFF switch is set to Off. Before servicing the equipment, disconnect the power cord or switch off the main power panel and make sure the safety earth connection is connected. Some service situations may require inspecting the equipment with live circuits. Only trained and qualified personnel may work on the equipment live and shall be assisted by a trained person who shall keep ready to disconnect power supply at need.

R.V.R. Elettronica shall not be liable for injury to persons or damage to property resulting from improper use or operation by trained/untrained and qualified/unqualified persons.

WARNING: The equipment is not water resistant. Any water entering the enclosure might impair proper operation. To prevent the risk of electrical shock or fire, do not expose this equipment to rain, dripping or moisture.

Please observe local codes and fire prevention rules when installing and operating this equipment.

WARNING: This equipment contains exposed live parts involving an electrical shock hazard. Always disconnect power supply before removing any covers or other parts of the equipment.

Ventilation slits and holes are provided to ensure reliable operation and prevent overheating; do not obstruct or cover these slits. Do not obstruct the ventilation slits under any circumstances. The product must not be incorporated in a rack unless adequate ventilation is provided or the manufacturer's instructions are followed closely.

WARNING: This equipment can radiate radiofrequency energy and, if not installed in compliance with manual instructions and applicable regulations, may cause interference with radio communications.

WARNING: This equipment is fitted with earth connections both in the power cord and for the chassis. Make sure both are properly connected.

Operation of this equipment in a residential area may cause radio interference, in which case the user may be required to take adequate measures.

The specifications and data contained herein are provided for information only and are subject to changes without prior notice. **R.V.R. Elettronica** disclaims all warranties, express or implied.While R.V.R. Elettronica attempts to provide accurate information, it cannot accept responsibility or liability for any errors or inaccuracies in this manual, including the products and the software described herein. **R.V.R. Elettronica** reserves the right to make changes to equipment design and/or specifications and to this manual at any time without prior notice.

• Notice concerning product intended purpose and use limitations.

This product is a radio transmitter suitable for frequency-modulation audio radio broadcasting. Its operating frequencies are not harmonised in designated user countries. Before operating this equipment, user must obtain a licence to use radio spectrum from the competent authority in the designated user country. Operating frequency, transmitter power and other characteristics of the transmission system are subject to restrictions as specified in the licence.

2. Warranty

La **R.V.R. Elettronica** warrants this product to be free from defects in workmanship and its proper operation subject to the limitations set forth in the supplied Terms and Conditions. Please read the Terms and Conditions carefully, as purchase of the product or acceptance of the order acknowledgement imply acceptance of the Terms and Conditions. For the latest updated terms and conditions, please visit our web site at WWW.RVR.IT. The web site may be modified, removed or updated for any reason whatsoever without prior notice. The warranty will become null and void in the event the product enclosure is opened, the product is physically damaged, is repaired by unauthorised persons or is used for purposes other than its intended use, as well as in the event of improper use, unauthorised changes or neglect.
In the event a defect is found, follow this procedure:

1 Contact the seller or distributor who sold the equipment; provide a description of the problem or malfunction for the event a quick fix is available.

Sellers and Distributors can provide the necessary information to troubleshoot the most frequently encountered problems. Normally, Sellers and Distributors can offer a faster repair service than the Manufacturer would. Please note that Sellers can pinpoint problems due to wrong installation.

2 If your Seller cannot help you, contact **R.V.R. Elettronica** and describe the problem; if our staff deems it appropriate, you will receive an authorisation to return the equipment along with suitable instructions;

3 When you have received the authorisation, you may return the unit. Pack the unit carefully before shipment; use the original packaging whenever possible and seal the package perfectly. The customer bears all risks of loss (i.e., R.V.R. shall not be liable for loss or damage) until the package reaches the R.V.R. factory. For this reason, we recommend insuring the goods for their full value. Returns must be sent on a C.I.F. basis (PREPAID) to the address stated on the authorisation as specified by the R.V.R. Service Manager.

units returned without a return authorisation may be rejected and sent back to the sender.

4 Be sure to include a detailed report mentioning all problems you have found and copy of your original invoice (to show when the warranty period began) with the shipment.

Please send spare and warranty replacement parts orders to the address provided below. Make sure to specify equipment model and serial number, as well as part description and quantity.

R.V.R. Elettronica
Via del Fonditore, 2/2c
40138 BOLOGNA ITALY
Tel. +39 051 6010506

3. First Aid

All personnel engaged in equipment installation, operation and maintenance must be familiar with first aid procedures and routines.

3.1 Electric shock treatment

3.1.1 If the victim is unconscious

Follow the first aid procedures outlined below.

- Lay the victim down on his/her back on a firm surface.
- the neck and tilt the head backwards to free the airway system (**Figure 1**).

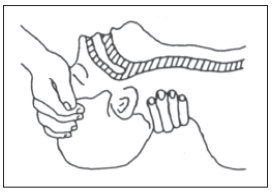


Figure 1

- If needed, open the victim's mouth and check for breathing.
- If there is no breathing, start artificial respiration without delay (**Figure 2**) as follows: tilt the head backwards, pinch the nostrils, seal your mouth around the victim's mouth and give four fast rescue breaths.

Figure 2

- Check for heartbeat (**Figure 3**); if there is no heartbeat, begin chest compressions immediately (**Figure 4**) placing your hands in the centre of the victim's chest (**Figure 5**).

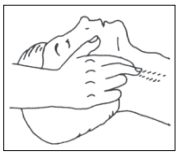


Figure 3

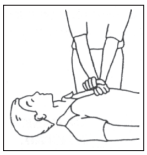


Figure 4

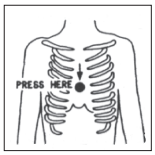


Figure 5

- One rescuer: give 2 quick rescue breaths after each 15 compressions.
- Two rescuers: one rescue breath after each 5 compressions.
- Do not stop chest compressions while giving artificial breathing.
- Call for medical help as soon as possible.

3.1.2 If the victim is conscious

- Cover victim with a blanket.
- Try to reassure the victim.
- Loosen the victim's clothing and have him/her lie down.
- Call for medical help as soon as possible.

3.2 Treatment of electric burns

3.2.1 Large burns and broken skin

- Cover affected area with a clean cloth or linen.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.

If medical help is not available within an hour, the victim is conscious and is not retching, administer a solution of table salt and baking soda (one teaspoon of table salt to half teaspoon of baking soda every 250 ml of water).

Have the victim slowly drink half a glass of solution for four times during a period of 15 minutes.

Stop at the first sign of retching.

Do not administer alcoholic beverages.

3.2.2 Minor burns

- Apply cold (not ice cold) strips of gauze or dress wound with clean cloth.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- If needed, have the victim change into clean, dry clothing.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.

4. Unpacking

The package contains:

- 1 **TEX2000LCD**
- 1 User Manual
- 1 Mains power cable

The following accessories are also available from Your R.V.R. Dealer:

- **Accessories, spare parts and cables**

4.1 General Description

TEX2000LCD are **compact FM transmitters** manufactured by **R.V.R. Elettronica SpA for audio radio broadcasting** in the 87.5 to 108 MHz band in 10kHz steps, featuring adjustable RF output up to 2000 W, respectively, under 50 Ohm standard load.

TEX2000LCD have been designed for installation in a 3HE box for 19" rack.

These transmitters incorporate a low-pass filter to keep harmonics below the limits provided for by international standards (CCIR, FCC or ETSI) and can be connected directly to the antenna.

Major features of **TEX2000LCD** is compact design and user-friendliness. Design is based on a modular concept: the different functions are performed by modules that, for the most part, are connected through male and female connectors or through flat cables terminated by connectors. This design facilitates maintenance and module replacement.

The RF power section of **TEX2000LCD** uses six MOSFET modules delivering up to 500W output power each.

Operating frequency stability is ensured by a temperature-compensated reference oscillator and is maintained by a PLL (Phase Locked Loop) system. The transmitters will go into frequency lock within 30 seconds after power-on.

TEX2000LCD can operate throughout the frequency bank with no need for calibration or set-up.

An LCD on the front panel and a push-button board provide for user interfacing with the microprocessor control system, which offers the following features:

- Output power setup.
- Operating frequency setup.

- Power output enable/disable.
- Power Good feature (User-selectable output power alarm threshold).
- Measurement and display of transmitter operating parameters.
- Communication with external devices such as programming or telemetry systems via RS232 serial interface or I2C.

Four LEDs on the front panel provide the following status indications: **ON**, **LOCK**, **FOLDBACK** and **RF MUTE**.

The exciter management firmware is based on a menu system. User has four navigation buttons available to browse submenus: **ESC**,  , and **ENTER**.

The rear panel features the mains input connectors with a mains voltage switch to select the appropriate mains input voltage, as well as audio input connectors and RF output connector, telemetry connector, protection fuses and two inputs for signals modulated onto subcarriers by suitable external coders, such as RDS (Radio Data System) signals commonly used in Europe.

5. Installation and configuration procedure

This section provides a step-by-step description of equipment installation and configuration procedure. Follow these procedures closely upon first power-on and each time any change is made to general configuration, such as when a new transmission station is added or the equipment is replaced.

Once the desired configuration has been set up, no more settings are required for normal operation; at each power-up (even after an accidental shutdown), the equipment defaults to the parameters set during the initial configuration procedure.

The topics covered in this section are discussed at greater length in the next sections, with detailed descriptions of all hardware and firmware features and capabilities. Please see the relevant sections for additional details.

IMPORTANT: *When configuring and testing the transmitter in which the equipment is integrated, be sure to have the Final Test Table supplied with the equipment ready at hand throughout the whole procedure; the Final Test Table lists all operating parameters as set and tested at the factory.*

5.1 Preparation

5.1.1 Preliminary checks

Unpack the exciter and immediately inspect it for transport damage. Ensure that all connectors are in perfect condition.

Provide for the following (applicable to operating tests and putting into service):

√ Single-phase 230 VAC or 115 VAC (-15% / +10%) mains power supply with adequate earth connection

√ For operating tests only: dummy load with 50 Ohm impedance and adequate capacity (2000W as a minimum)

√ Connection cable kit including:

- Mains power cable
- Coaxial cable with BNC connectors for interlock signal connection
- RF cable for output to load / antenna (50 Ohm coaxial cable with 7/16” connector)
- Audio cables between transmitter and audio sources.

5.1.2 Mains power supply

Warning: Disconnect mains power supply before beginning these procedures.

Both power supply units (please see section 8.1 for a detailed description) are equipped with fuses and voltage selection blocks; **check all fuses and voltage selection blocks to ensure their are properly rated for the power mains and change them as required to match mains voltage**.

All mains power supply protection fuses are conveniently located on the rear panel and are easily accessed (see figure 6.2): to check or replace a fuse, disconnect **equipment from power mains**, unscrew fuse cover and pull fuse out of socket.

The following fuses are used:

	TEX2000LCD @ 230 Vac/115 Vac
Main power supply *(fig. 6.2 - items [18] and [33])*	**(2x) 25A type 10x38**
Alimentatore principale 230V *(fig. 6.2 - items [18] and [33])*	**(2x) 16A type 10x38**

Table 5.1: ***Fuses***

Ensure that the equipment is appropriately set for available mains voltage (supply voltage rating is reported in the Final Test Table) as follows: **disconnect equipment from mains** and ensure that the voltage selection block of the power supply located on the rear panel (see fig. 6.2) is set to the appropriate voltage; change setting as required.

The main power supply unit is the full-range type and requires no voltage setup.

When supply voltage is other than 230 Vac and might cause erratic operation (say, less than 200 Vac), it may help to move jumper JP3 on the PFC controller board from position 2-3 to 1-2 (see PFCPSL5060 diagram, in figure 5.1 below).

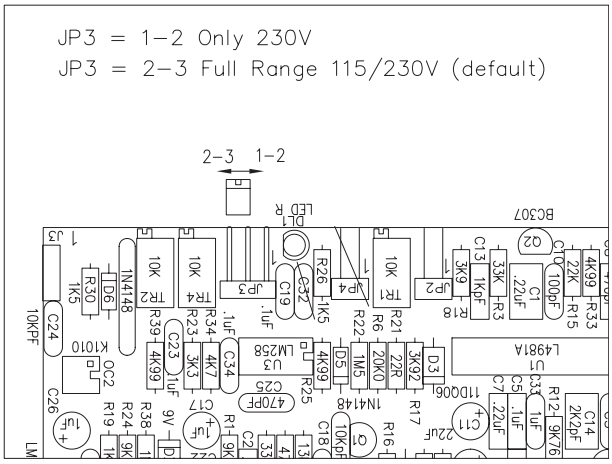


Figure 5.1: ***Voltage selection jumper on PFC***

5.1.3 Connections

Connect the RF output of the transmitter (see figure 6.2 - note [21]) to the antenna cable or a dummy load capable of dissipating amplifier output power. To begin with, set exciter to minimum output power and switch it off.

Connect the transmitter INTERLOCK IN input to the matching INTERLOCK OUT output fitted on R.V.R. Elettronica equipment to act as hybrid couplers. If your equipment is a different brand, identify an equivalent output.

WARNING: Electric shock hazard! Never handle the RF output connector when the equipment is powered on and no load is connected. Injury or death may result.

Ensure that the **POWER** switch on the front panel is set to “**OFF**”.

Assicu rarsi che l’interruttore **POWER** nel pannello frontale sia regolato in posizione “**OFF**”.

Connect the mains power cable to the MAINS connector on the rear panel.

Note: *The mains must be equipped with adequate earth connection properly connected to the equipment. This is a pre-requisite for ensuring operator safety and correct operation.*

WARNING: The power supply connector is a terminal box. Ensure that the wire is not live before performing the connection.

Connect the audio and RDS/SCA signals from user’s sources to the transmitter input connectors.

5.2 First power-on and setup

Perform this procedure upon first power-up and each time you make changes to the configuration of the transmitter this component is integrated into.

Note : Standard factory settings are RF output power off (***Pwr OFF***) and regulated output power set to upper limit (unless otherwise specified by customer).

5.2.1 Power-on

When you have performed all of the connections described in the previous paragraph, power on the exciter using the suitable power switch on the front panel.

5.2.2 Power check

Ensure that the **ON** LED turns on. Equipment name should appear briefly on the display, followed by forward power and modulation readings. If the RF output is disabled, those readings will be zero.

When the PLL locks to operating frequency, the **LOCK** LED will turn on.

5.2.3 How to enable the RF output

Check output power level and set it to maximum level (unless it has already been set) from the *Power Setup* menu that you will have accessed by pressing the following sequence of key: **ESC** (opens Default Menu) ⇒ **ENTER** (hold down for 2 seconds) ⇒ **SET** ⇒ use keys to set bar to upper limit.

5.2.4 Ouput power level control

IMPORTANT: *The exciter incorporates Automatic Gain Control (AGC) and output power is modulated based on the power level set by the user and actual operating conditions, such as temperature, reflected power and other parameters. Please read section 5.3 for more details of RF power modulation.*

Access the **Power Setup Menu** pressing the following keys in the order:

ESC (opens **Default Menu**) ⇒ **ENTER** (hold down for two seconds)

Use the keys  and  in the **SET** menu to set exciter output power; the setting bar at the side of **SET** provides a graphic indication of power setting; please consider that the forward power readout provided on the display (**FWD: xxxx W**) reflects

actual output power reading, **which may be lower than regulated power supply when Automatic Gain Control is running in power supply limitation mode** (please read section 5.3 about RF power supply modulation for more details).

Note : *Output power may be set using the* **Pwr OFF** *control. In this condition, the output power readout (***Fwd***) on the display will read 0 (zero); the* **SET** *bar will reflect any adjustments you make using the keys and provides a graphic indication of how much power supply will be delivered the moment you return to* **Pwr On** *state.*

5.2.5 Changing the *Power Good* alarm threshold

Change Forward Power Good alarm setting **PgD** from the **Fnc** menu as desired (factory setting is 50%).

Please read section 5.4.1 for more details.

5.2.6 Setting equipment I^2C address

Change the **IIC** address in the **MIX** (Miscellaneous) menu as desired (factory setting is 01).

Please read section 5.4.1 for more details.

5.2.7 Adjustments and calibration

The only manual adjustments are the level adjustments and the audio mode adjustment.

The rear panel holds the trimmers for all exciter inputs. Trimmer identification is printed on the rear panel. Input sensitivity can be set within the limits set out in the tables below through the trimmers:

Input sensitivity in Mono mode:

Input	Figure 6.2	Trimmer	Sensitivity	Note
SCA1	[9]	[13]	- 8 ÷ +13 dBu	Input level for 7,5 kHz deviation (-20 dB)
SCA2	[8]	[11]	- 8 ÷ +13 dBu	
MPX	[10]	[12]	-13 ÷ +13 dBu	Input level for 75 kHz deviation (0 dB)
Mono	[32]	[31]	-13 ÷ +13 dBu	

Input sensitivity in Stereo mode:

Input	Figure 6.2	Trimmer	Sensitivity	Note
MPX	[10]	[12]	-13 ÷ +13 dBu	Input level for 75 kHz deviation (0 dB)
SCA1	[9]	[13]	- 8 ÷ +13 dBu	Input level for 7,5 kHz deviation (-20 dB)
SCA2	[8]	[11]	- 8 ÷ +13 dBu	
Left	[32]	[31]	-13 ÷ +13 dBu	Input level for 75 kHz deviation (0 dB)
Right	[15]	[14]	-13 ÷ +13 dBu	

When setting input sensitivity, please consider that the default menu reports instantaneous modulation level and an indicator provides a 75 kHz reading. To ensure correct adjustment, apply a signal with the same level as user's audio broadcast maximum level and then adjust using the trimmer until instantaneous deviation matches the 75 kHz reading.

To set subcarrier input levels, you may use the same procedure and option "x10" available in the **Fnc** menu. With this option, modulation level is multiplied by a factor of 10, which means that default menu bar meter reflects a 7.5 kHz deviation.

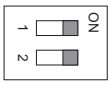
A special menu with separate indications of Left and Right channel levels and relating indicators of nominal levels for maximum deviation (75 kHz) is provided.

- Preemphasis (switch [6] Figure 6.2):

50 μs

75 μs

- L and R (tipo XLR) input impedance (switch [16] Figure 6.2):



Switch 1: R XLR input impedance, ON = 600 Ω, OFF = 10 kΩ

Switch 2: L XLR input impedance, ON = 600 Ω, OFF = 10 kΩ

- MPX input operation mode/impedance (switch [7] Figure 6.2):

Switch 1: mode of operation ON = Mono, OFF = Stereo

Switch 2: MPX input impedance, ON = 50 Ω, OFF = 10 kΩ

5.3 Operation

1) Power on the exciter and ensure that the **ON** light turns on. Equipment name should appear briefly on the display, quickly followed by modulation and forward power readings (Menu 1), provided that the exciter is delivering output power.

Menu 1

1b) To **modify power level setting**, hold down the **ENTER** button until opening the **power setup menu**.

The edit screen will look like this:

Menu 2

Next to **SET** indication, a bar provides a graphic display of preset output power. The filled portion of the bar is proportional to set power level.

Example		
100% output power	**Full bar**	≅ **2kW output**
50% output power	**Half-full bar**	≅ **1000W output**
25% output power	**Quarter-full bar**	≅ **500W output**

The bottom line provides instantaneous power reading (in this example 1.97kW, falling below 1.6kW the reading back to Watt. As result of hysteresis power up , exceeding1400W the reading back to kWatt); press button ↓ to increase level, press ↵ to decrease it. When you have achieved the desired level, press **ENTER** to confirm and exit the **default menu**. Please note that the setting is stored automatically; in other words, if you press **ESC** or do not press any keys before the preset time times out, the latest power level set will be retained.

NOTE: This feature prevents the equipment from delivering maximum power as soon as output is enabled from menu 4, or in the event the equipment is already set to **ON** when you energise it.

2) Ensure that the equipment is not in a locked-out state. Press **ESC** to call up the **sselection screen** (menu 3). Highlight **Fnc**and press **ENTER** to confirm and access the selected menu (menu 4).

   If **PWR** is set to **OFF**, i.e. power output is disabled, move cursor to PWR. Press **ENTER** and label will switch to ON, i.e. power output is enabled.

   Press **ESC** twice to go back to the **default menu** (menu 1).

3) Fine tune power setting from menu 2 (see description of item 1b) until achieving the desired value.

WARNING: Equipment is capable of delivering more than rated output power of 2000W; however, never exceed the specified power rating.

NOTE: If power is set to 0 W in the **Power Setup Menu**, the INTERLOCK OUT contact is activated and any external appliances connected to it are immediately inhibited.

Next, you can review all operating parameters of the equipment through the management firmware.

Normally, the equipment can run unattended. Any alarm condition is handled automatically by the safety system or is signalled by the LED indicators on the panel or by display messages..

NOTE: Standard factory settings are output power set to upper limit (unless otherwise specified by customer) and **OFF**.

5.4 Management Firmware

The equipment features an LCD with two lines by 16 characters that displays a set of menus. Figure 5.2 below provides an overview of equipment menus.

The symbols listed below appear in the left portion of the display as appropriate:

- _ (Cursor) - Highlights selected (i.e. accessible) menu.
- ▶ (Filled arrow) - Editable parameter marker. This symbol appears in menus that take up more than two lines to aid browsing
- ▷▷▷ (Three empty arrows) - Parameter is being edited.
- ▷ (Empty arrows) - Current line marker; the parameter in this line cannot edited. This symbol appears in menus that take up more than two lines to aid browsing.

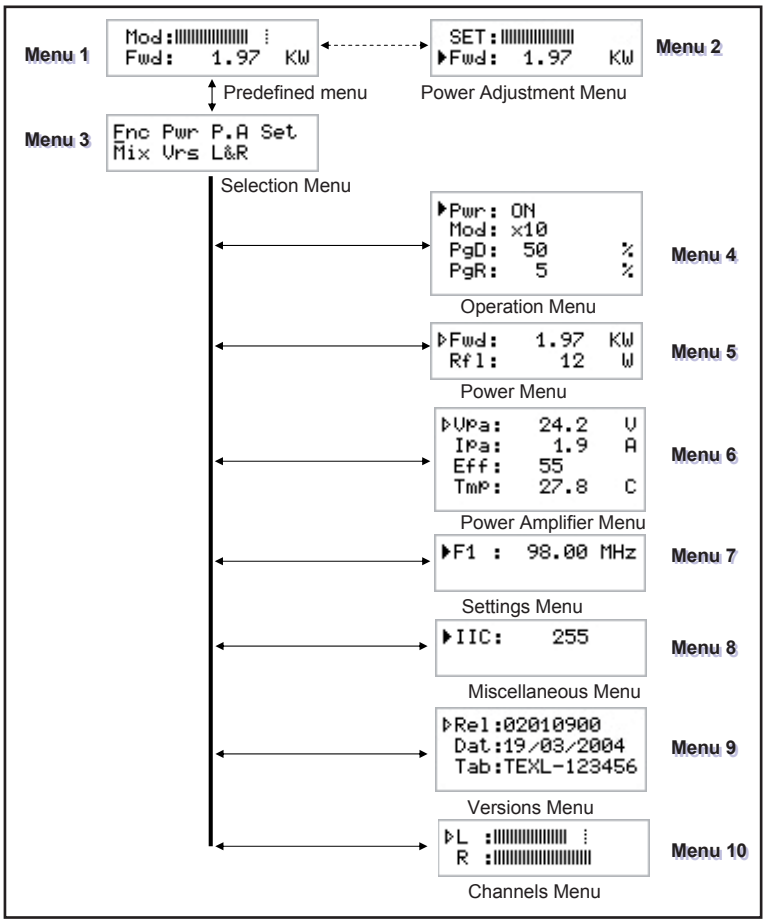


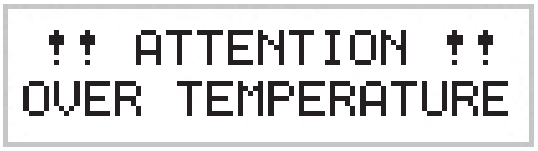
Figure 5.2

When the display is off, touching any key will turn on backlighting.

When the display is on, pressing the **ESC** button from the **default menu** (menu 1) calls up the **selection screen** (menu 3), which gives access to all other menus:

Menù 3

If the temperature alarm is enabled and the alarm threshold is exceeded, the following screen will be displayed (only if you are in the default screen):



State 1

As soon as operating conditions are restored, power output is re-enabled with the same settings in use prior to the alarm condition.

Under 20kHz, no modulation occurs. After a preset time of about 5 minutes (not editable), a NO AUDIO condition is indicated in the main screen, but power is not inhibited.

State 2

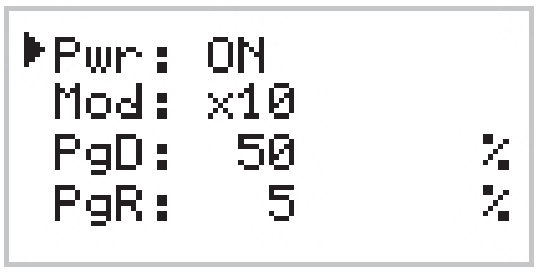
To gain access to a submenu, select menu name (name is highlighted by cursor) using button ↓ or ↑ and press the **ENTER** button.

To return to the **default menu** (menu 1), simply press **ESC** again.

5.4.1 Operation Menu (Fnc)

In this menu, you can toggle exciter **power output** On/Off, set **deviation display mode** and the threshold rate for **Forward** (**PgD**) or **Reflected** (**PgR**) **Power Good**.

To operate on one of this voices, select the relative line by the ↑ and ↓ buttons, then press and keep pressed the **ENTER** button until the command doesn't come accepted. In this way the Pwr setting will become from On to Off, or viceversa, and the Mod setting from "x1" to "x10" or viceversa. To modify the Power Good value percentage is sufficient, after to have selected the "PgD" or "PgR" voice, set up the value through the ↑ and ↓ buttons, then confirm with **ENTER**.



Menu 4

`Pwr` Enables (ON) or disables (OFF) exciter power output.

`Mod` Modifies modulation display (toggles between "x1" and "x10"). In "x10" mode, instantaneous deviation indication is multiplied by a factor of 10, and the bar meter on the default menu will reflect 7.5 kHz instead of

75 kHz. This display mode is convenient when you wish to display low deviation levels, such as those caused by pilot tone or subcarriers.

`PgD` Modifies Power Good threshold for forward power. The Power Good rate is a percent of equipment rated power, that is 2000W, not of forward output power. This means that this threshold set at 50% will give 1000 W, respectively, regardless of set power level. The Power Good feature enables output power control and reporting. When output power drops below set Power Good threshold, the equipment changes the state of pin [7] of the DB15 “Remote” connector located on the rear panel.

`PgR` Modifies Power Good threshold for reflected power. The Power Good rate is a percent of equipment rated power, that is 200 W, not of reflected output power. This means that this threshold set at 10%, will give 5W regardless of set power level. The Power Good feature enables output power control and alarm management.

NOTE: This alarma does not trip any contacts in the DB15 “Remote” connector and is only available in systems equipped with telemetry.

5.4.2 Power menu (Pwr)

This screen holds all readings related to equipment output power:

Menu 5

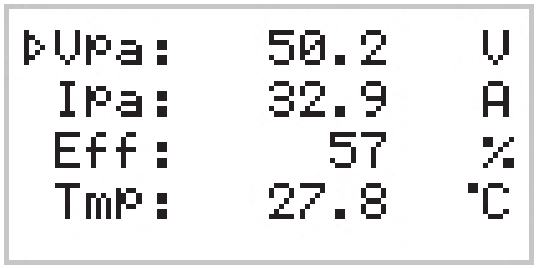
`Fwd` Forward power reading.

`Rfl` Reflected power reading.

Note that these are readings, rather than settings, and cannot be edited (note the empy triangle). To change power setting, go to the **default menu** as outlined earlier.

5.4.3 Power Amplifier (P.A) Menu

This screen is made up of four lines that can be scrolled using the ↵ and ↓ buttons and shows the readings relating to final power stage:



Menu 6

Note that these are readings, rather than settings, and cannot be edited (note the empty arrow).

`VPA` Volt age supplied by amplifier module.

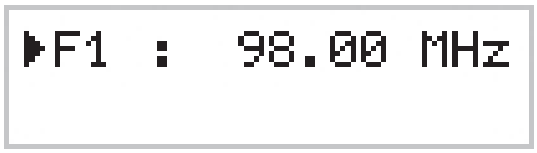
`IPA` Current draw of amplifier module.

`Eff` Efficiency based on ratio of forward power to amplifier module power, in percent (FWD PWR/(Vpa x Ipa) %).

`Tmp` Equipment internal temperature reading.

5.4.4 Setup Menu (Set)

This menu lets you view and set operating frequency.



Menu 7

`F1` Operating frequency setup. Set a new frequency value and then press the **ENTER** button to confirm your selection; the exciter unlocks from current frequency (the **LOCK** LED turns off) and will lock to the new operating frequency (**LOCK** turns back on again). If you press ESC or let the preset time time out, the previous frequency setting is retained.

5.4.5 Miscellaneous Menu (Mix)

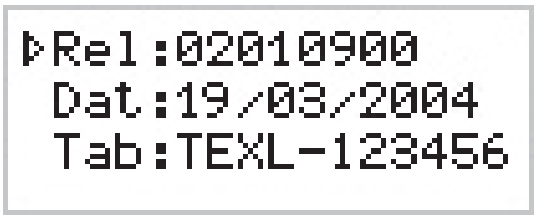
This menu allows you to set the machine's address in a serial bus connection (I^2C type):

Menu 8

IIC Regulation of the I2C address. The I2C network address is important when the exciter is connected to a company's transmission system that envisages use of this protocol. We recommend you do not modify it without a good reason.

5.4.6 Versions Menu (Vrs)

This screen shows the version and the release date of the software.



Menu 9

Note that these are readings, rather than settings, and cannot be edited (note the empty arrow).

Rel Visualization of the firmware release.

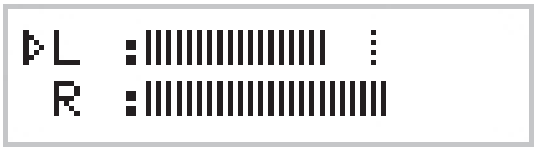
Dat Visualization of the date release.

Tab Visualization of the release of the configurations table loaded in memory.

5.4.7 Channels Menu (L&R)

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

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.



Menu 10

L Visualization of the Left channel Vmeter.

R Visualization of the Right channel Vmeter.

5.5 Optional Functions

Optional functions can be added and/or modified for the equipment described in this manual. The available functions are carried in the continuation and can be requested to R.V.R. Elettronica at the moment of the order.

5.5.1 FSK Option

The FSK function, generates periodic shifts of the transmission carrier frequency, realizes in way to generate a Morse code that carried the Radio Identification Code.

NOTE: ***This function is tipically used in the United States.***

By factory the amplitude of the frequency shifts is +10 KHz and the time lag of the code repeat is 60 minutes (for values different from these parameters, please contact R.V.R. Elettronica SpA). As regards the Radio code, it can be set by the user following the indications described in chapter 5.5.1.1.

The **selection screen**, in presence on FSK option, adds the indication to FSK submenu.

```
Fnc Pwr P.A Set
Mix Vrs L&R FSK
```

Menu 11

The pressure of **ENTER** button, on FSK entry in the selection screen, serves in order to access to all the relative submenu:

```
▶FSK:      ON
 Cod: 012345
```

Menu 12

`FSK` Enable or disable the transmission of the FSK code.

`Cod` Visualization of the code normally transmitted.

5.5.1.1 Code Modification

In every moment the user is able to make changes to the Radio code transmitted in FSK.

In order to make the operation is necessary to have:

- 1 RS232 male - female cable;
- Hyper Terminal Interface (verify that it has been installed together to the own copy of Windows®) or equivalent serial communication sofware

The procedure to execute comes shortly described in the following:

- Connect a standard serial cable (DB9 Male - DB9 Female) the **COM** serial port place on PC to **SERVICE** connector placed on the rear panel of the **TEX2000-LCD**.
- Turn on the exciter;
- Start up the serial communication software;
- Set up the following parameters for the communication:

  Baud Rate: 19200

  Data Bit: 8

  Parity: None

  Stop Bit: 1

  Flow control: None;
- Through the communication software activate the Caps-Lock key (capital), send the CODE string followed from the 6 characters of the station code and then confirm pressing Enter.

NOTE: The code is considered only if is complete of 6 characters (alphanumeric and without spaces). In case the code is accepted, it comes repeated in echo towards the program, in contrary case the echo of the code does not come made.

5.5.2 UP/DOWN Power Option

The UP/DOWN Power modifies the function to receive signals present on the telemetry connector.

In this particular situation the control signals uses to enable or to disable the RF section, become control signals of the RF power level, allowing one regulation of UP/DOWN type.

The UP or DOWN command is supplied connecting the relative signal on the Remote connector to the ground, at least for 500mS (the pin has an inner pull-up towards feeding).

Configuration of the telemetry DB15F connector (Remote):

Pin	Standard Function	UP/DOWN Power Function
14	On cmd	Up cmd
	Enables the RF power supply	*Increases the RF power supply*
15	Off cmd	Down cmd
	Disables the RF power supply	*Reduces the RF power supply*

6. External Description

This chapter reports the elements of the front and rear panels of the **TEX2000LCD** with a brief description of each of them.

6.1 Frontal Panel

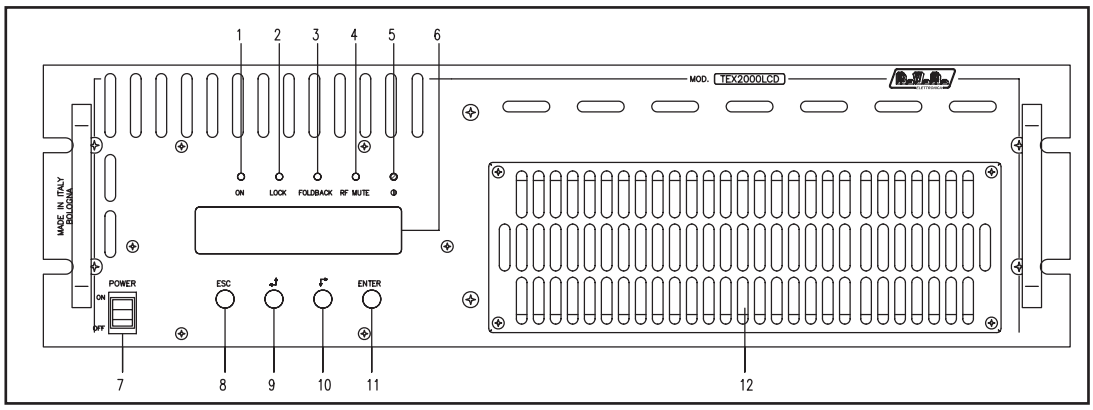


Figure 6.1

[1]	ON	Green LED - lit when the exciter is working.
[2]	LOCK	Green LED - lit when the PLL is locked on the working frequency.
[3]	FOLDBACK	Yellow LED - lit when the foldback function is operating (automatic reduction of the delivered RF power).
[4]	R.F. MUTE	Yellow LED - lit when the exciter's power output is inhibited by an external interlock command.
[5]	CONTRAST	Display contrast adjusting trimmer.
[6]	DISPLAY	Liquid crystals display.
[7]	POWER	ON/OFF switch.
[8]	ESC	Push button to exit from a menu.
[9]		Push button to move in the menu system and to modify the parameters.
[10]		Push button to move in the menu system and to modify the parameters.
[11]	ENTER	Push button to confirm a parameter and to enter in a menu.
[12]	AIR FLOW	Air flow for the forced ventilation.

6.2 Rear panel

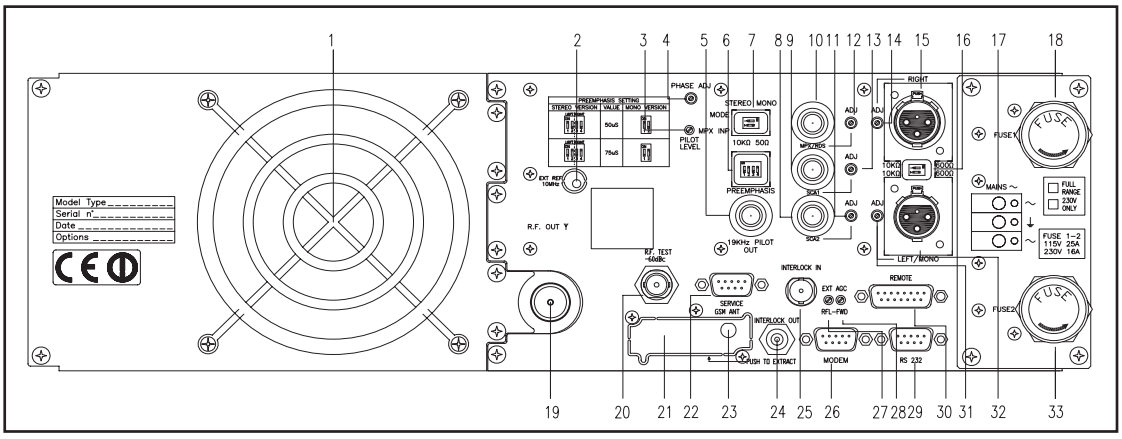


Figure 6.2

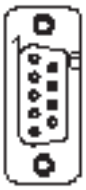
[1] AIR FLOW	Air flow for the forced ventilation.
[2] EXT REF 10MHz	Reserved for future implementations.
[3] PILOT LEVEL	Pilot tone level adjustment trimmer.
[4] PHASE ADJ	Pilot tone phase adjustment trimmer.
[5] 19 kHz PILOT OUT	BNC output for the 19 kHz pilot tone. This can be used for external devices (e.g. RDS coders) synchronization.
[6] PREEMPHASIS	Dip-switch to set the preenphasys at 50 or 75 µs. The preenphasys setting is relevant only for the Left and Right inputs in stereo mode and for the mono input in mono mode, while MPX input is unaffected by this setting.
[7] MODE/MPX IMP	Dip-switch to set the operation mode (STEREO or MONO) and the MPX input impedance, 50Ω or 10kΩ.
[8] SCA2	BNC connector, SCA2 unbalanced input.
[9] SCA1	BNC connector, SCA1 unbalanced input.
[10] MPX/RDS	BNC connector, MPX/RDS unbalanced input.
[11] SCA2 ADJ	Adjustment trimmer for SCA2 level input.
[12] MPX/RDS ADJ	Adjustment trimmer for MPX/RDS level input.
[13] SCA1 ADJ	Adjustment trimmer for SCA1 level input.
[14] RIGHT ADJ	Adjustment trimmer for the Right channel level input.
[15] RIGHT	XLR connector, balanced Right channel input.
[16] IMPEDANCE	Dip-switch to set the balanced input impedance, 600Ω or 10kΩ.
[17] MAINS	Mains supply plug, 115-230V 50-60 Hz.
[18] FUSE 1	Fuse for mains power supply [chap. 5.1 - Table1].
[19] R.F. OUTPUT	RF output connector 7/8”.
[20] R.F. TEST	RF test output, -60 dB wrt the RF output power level, suitable for modulation monitoring. Not suitable for spectral analysis.
[21] GSM SLOT-IN	Reserved for future implementations.
[22] SERVICE	DB9 connector for interconnection with other devices and for factory parameters programming (only for factory programming).
[23] GSM ANT	Reserved for future implementations.
[24] INTERLOCK OUT	BNC interlock output connector: when the transmitter enters into stand-by mode, the inner conductor, tipically floating, is forced to ground.
[25] INTERLOCK IN	BNC interlock output connector: the exciter is forced in stand-by mode when the inner conductor is grounded.
[26] MODEM	Reserved for future implementations.
[27] RFL EXT. AGC	Trimmer for the control of the delivered power in function of the RFL fold input (chap.6.3.5 - [10]).
[28] FWD EXT. AGC	Trimmer for the control of the delivered power in function of the FWD fold input (chap.6.3.5 - [2]).
[29] RS232	Reserved for future implementations.

[30] REMOTE	DB15 connector for telemetry of the machine.
[31] LEFT ADJ	Adjustment trimmer for the Left channel level input.
[32] LEFT	XLR connector, balanced Left channel input.
[33] FUSE 2	Fuse for mains power supply (chap. 5.1 - Table 1).

6.3 Connectors description

6.3.1 RS232

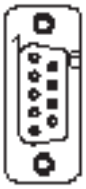
Type: Female DB9



1	NC
2	SDA
3	SCL
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

6.3.2 Service (**for factory parameters programming**)

Type: Female DB9



1	NC
2	TX_D
3	RX_D
4	Internally connected with 6
5	GND
6	Internally connected with 4
7	Internally connected with 8
8	Internally connected with 7
9	NC

6.3.3 Left (MONO) / Right

Type: Female XLR

1	GND
2	Positive
3	Negative

6.3.4 Remote

Type: Female DB15

Pin	Name	Type	Meaning
1	Interlock	IN	By passes power if closed at GND
2	Ext AGC FWD	IN	Ext. signal,1-12V, for forward power limitation (AGC)
3	GND		Ground
4	SDA IIC	I/O	IIC communication serial data
5	VPA Tlm	ANL OUT	PA power supply voltage: 3.9V F.S.
6	FWD Tlm	ANL OUT	Forward power: 3.9V F.S.
7	Power Good	DIG OUT	Open collector, enabled whenpower exceeds the set threshold (chap. 5.4.1)
8	GND		Ground
9	GND		Ground
10	Ext AGC RFL	IN	Ext. signal,1-12V, for reflected power limitation (AGC)
11	SCL IIC	I/O	IIC communication clock
12	IPA Tlm	ANL OUT	PA power supply current: 3.9V F.S.
13	RFL Tlm	ANL OUT	Reflected power: 3.9V F.S.
14	On cmd	DIG IN	One grounded pulse (500 ms) enables power supply
15	OFF cmd	DIG IN	One grounded pulse (500 ms) disables power supply

7. Technical Specifications

			TEX2000LCD	
Parameters	***Conditions***	***U.M.***	***Value***	***Notes***
GENERALS				
Frequency range		MHz	87.5 ÷ 108	
Rated output power		W	2000	Continuously variable by software from 0 to maximum
Modulation type			Direct carrier frequency modulation	
Operational Mode			Mono, Stereo, Multiplex	
AC Supply Voltage	Mains input voltage range	VAC	230 ±15%	(*) Full range (**) Internal switch
DC Supply Voltage	Backup Input Voltage	VDC		
AC Apparent Power Consumption		VA	2620	
Active Power Consumption		W	2600	
Input device			4 pushbutton	
Display			Alphanumerical LCD - 2 x 16	
Phisical Dimensions	Front panel width	mm	483	19" EIA rack
	Front panel height	HE	3	
	Overall depth	mm	675	
Ambient working temperature		°C	-10 to + 50	Whithout condensing
Frequency programmability			From software, with 10 kHz steps	
Frequency stability	WT from -10°C to 50°C	ppm	±1	
Modulation capability		kHz	150 Stereo, 180 Mono/MPX	Meets or exceeds all FCC and CCIR rules
Pre-emphasis mode		µS	0, 50 (CCIR), 75 (FCC)	selectable by rear panel dip switches
Spurious & harmonic suppression		dBc	<75 (80 typical)	Meets or exceeds all FCC and CCIR rules
Asynchronous AM S/N ratio	Referred to 100% AM, with no de-emphasis	dB	≥ 65 (typical 70)	
Synchronous AM S/N ratio	Referred to 100% AM, FM deviation 75 kHz by 400Hz sine, without de-emphasis	dB	≥ 50 (typical 60)	
MONO OPERATION				
S/N FM Ratio	RMS @ ± 75 kHz peak, HPF 20Hz - LPF 23 kHz, 50 µS de-emphasis	dB	> 78 (typical 83)	
	Qpk @ ± 75 kHz peak, CCIR weighted, 50 µS de-emphasis	dB	>70	
	Qpk @ ± 40 kHz peak, CCIR weighted, 50 µS de-emphasis	dB	>67	
Frequency Response	30Hz ÷ 15kHz	dB	better than ± 0.5 dB (typical ± 0.2)	
Total Harmonic Distortion	THD+N 30Hz ÷ 15kHz	%	< 0.1 (Typical 0.07%)	
Intermodulation distortion	Measured with a 1 KHz and 1.3 KHz tones, 1:1ratio, at FM 75 kHz	%	< 0.02	
Transient intermodulation distortion	Measured with a 3.18 kHz square wave and a 15 kHz sine wave at 75 kHz FM	%	< 0.1 (typical 0.05)	
MPX OPERATION				
Composite S/N FM Ratio	RMS @ ± 75 kHz peak, HPF 20Hz - no LPF, 50 µS de-emphasis	dB	> 78 (typical 83)	
Frequency Response	30Hz ÷ 53kHz	dB	± 0.2	
	53kHz ÷ 100kHz	dB	± 0.5	
Total Harmonic Distortion	THD+N 30Hz ÷ 53kHz	%	< 0.1	
	THD+N 53kHz ÷ 100kHz	%	< 0.15	
Intermodulation distortion	Measured with a 1 KHz and 1.3 KHz tones, 1:1, modulation at FM 75 kHz	%	< 0.05	
Transient intermodulation distortion	Measured with a 3.18 kHz square wave and a 15 kHz sine wave at 75 kHz FM	%	< 0.1 (typical 0.05)	
Stereo separation	30Hz ÷ 53kHz	dB	> 50 dB (typical 60)	
STEREO OPERATION				
Stereo S/N FM Ratio	RMS @ ± 75 kHz peak, HPF 20Hz - LPF 23 kHz, 50 µS de-emphasis, L & R demodulated	dB	> 73 (75 typical)	
	Qpk @ ± 75 kHz peak, CCIR weighted, 50 µS de-emphasis, L & R demodulated	dB	> 65 dB	
	Qpk @ ± 40 kHz peak, CCIR weighted, 50 µS de-emphasis, L & R demodulated	dB	> 58 dB	
Frequency Response	30Hz ÷ 15kHz	dB	± 0.5	
Total Harmonic Distortion	THD+N 30Hz ÷ 15kHz	%	< 0.05	
Intermodulation distortion	Measured with 1 KHz and 1.3 KHz tones, 1:1 ratio, modulation at FM 75 kHz	%	≤ 0.03	
Transient intermodulation distortion	Measured with a 3.18 kHz square wave and a 15 kHz sine wave at 75 kHz FM	%	< 0.1 (typical 0.05)	
Stereo separation		dB	> 50 (typical 55)	
Main / Sub Ratio	30Hz ÷ 15kHz	dB	> 40 (typical 45)	
SCA OPERATION				
Frequency response	40kHz ÷ 100kHz	dB	± 0.5	
Crosstalk to main or to stereo channel	RMS, ref @ ± 75 kHz peak, no HPF/LPF, 0µS de-emphasis, with 67 kHz tone on SCA input @ 7,5kHz FM deviation	dB	> 75 (typical 78)	
	RMS, ref @ ± 75 kHz peak, no HPF/LPF, 0µS de-emphasis, with 92 kHz tone on SCA input @ 7,5kHz FM deviation	dB	> 78 (typical 80)	
AUDIO INPUTS				
Mono balanced/Left	Connector		XLR F	
	Type		balanced or externally unbalanced	
	Impedance	Ohm	10 k or 600	Selectable by rear panel dip switches
	Input Level /Adjust	dBu	-13 to +13	continuosly variable
		dB		
		dB		
Right	Connector		XLR F	
	Type		balanced or externally unbalanced	
	Impedance	Ohm	10 k or 600	Selectable by rear panel dip switches
	Input Level	dBu	-13 to +13	continuosly variable
		dB		
		dB		
MPX unbalanced/RDS	Connector		BNC	
	Type		unbalanced	
	Impedance	Ohm	10 k or 50	Selectable by rear panel dip switches
	Input Level / Adjust	dBu	*-13 to +13	for 75 KHz FM, externally adjustable
		dB		
		dB		
SCA/RDS	Connector		2 x BNC	
	Type		unbalanced	
	Impedance	Ohm	10 k	
	Input Level / Adjust	dBu	*-8 to +13	for 7,5 KHz FM, externally adjustable
		dB		
		dB		
OUTPUTS				
RF Output	Connector		7/16"flange type	
	Impedance	Ohm	50	
RF Monitor	Connector		BNC	
	Impedance	Ohm	50	
	Output Level	dB	approx. -60	Referred to the RF output
Pilot output	Connector		BNC	For RDS and isofrequency synchronizing purpose
	Impedance	Ohm	>5 k	
	Output Level	Vpp	1	
MPX Monitor	Connector			
	Impedance	Ohm		
	Output Level	dBu		
AUXILIARY CONNECTIONS				
Interlock	Connector		2 x BNC	Input and output for remote power inhibition (short is RF off)
Ext ref. 10 MHz	Connector		SMA	
RS232 Serial Interface	Connector		DB9 F (**)	(**) DCE for optional PC telemetry SW
Service	Connector		DB9 F	Factory reserved for firmware program
I^2Cbus	Connector		DB9 F	I2Cbus communication for optional telemetry
Modem	Connector		DB9 F	Optional telemetry modem RS232
RS485 Serial Interface	Connector			
Remote Interface	Connector		DB15F	IIC + 5 analog / digital inputs, 5 analog / digital outputs
Telemetry Interface	Connector			

Parameters	Conditions	U.M.	Value	Notes
POWER REQUIREMENTS				
AC Power Input	AC Supply Voltage	VAC	230 ±15%	(*) Full range (**) Internal switch
	AC Apparent Power Consumption	VA	2620	
	Active Power Consumption	W	2600	
	Power Factor		0,99	
	Connector		morsettiera	
DC Power Input	DC Supply Voltage	VDC		
	DC Current	ADC		(*)max 25W (**) max 140W
FUSES				
On Mains		A	16 T - 10 x 38 mm	N° 2 External fuse
On PA Supply		A	N° 4 Internal fuses 16 F - 10 x 38 mm	
On Driver Supply		A	Not Present	N° 1 Internal fuse
MECHANICAL DIMENSIONS				
Phisical Dimensions	Front panel width	mm	483 (19")	19" EIA rack
	Front panel height	mm	132 3HE	convertire in pollici
	Overall depth	mm	675	compresi i connettori , compreso il pannello, escluse le maniglie, convertire in pollici
	Chassis depth	mm	650	escluso il pannello, esclusi i connettori, convertire in pollici
Weigh		kg	about 31	
TELEMETRY / TELECONTROL				
Remote connector inputs	Analogical level		FWD fold	For P.A. A.G.C. purpose, min 0,5 Vcc
	Analogical level		REF fold	For P.A. A.G.C. purpose, min 0,5 Vcc
	pulse		RF ON	
	pulse		RF OFF	
	ON/OFF level		Interlock	for remote power inhibition (short is RF off)
Remote connector outputs	Analogical level		FWD	max 5 Vcc
	Analogical level		REF	max 5 Vcc
	Analogical level		VPA	max 5 Vcc
	Analogical level		IPA	max 5 Vcc
	ON / OFF level		Power Good	open collector
Remote connector others			I2Cbus	
TELEMETRY-TELECONTROL SW				
Telecon			Yes, if /TLM option is present Yes, via TLC300 or TLC2000 if /TLM option is not present	
VARIOUS				
Cooling			Forced, with internal fan	
Acoustic Noise		dBA	<75	
STANDARD COMPLIANCE				
Safety			EN 60215:1989 + EN60215/A1:1992-07 + EN60215/A2:1994-09	
EMC			EN 301 489-1 V1.4.1 (2002-08) + EN 301 489-11 V1.2.1 (2002-11)	
Spectrum Optimization			EN 302 018-2 V1.2.1 (2005-06)	

8. Working Principles

The figures below provide an overview of **TEX2000LCD** (fig. 8.1) modules and connections.

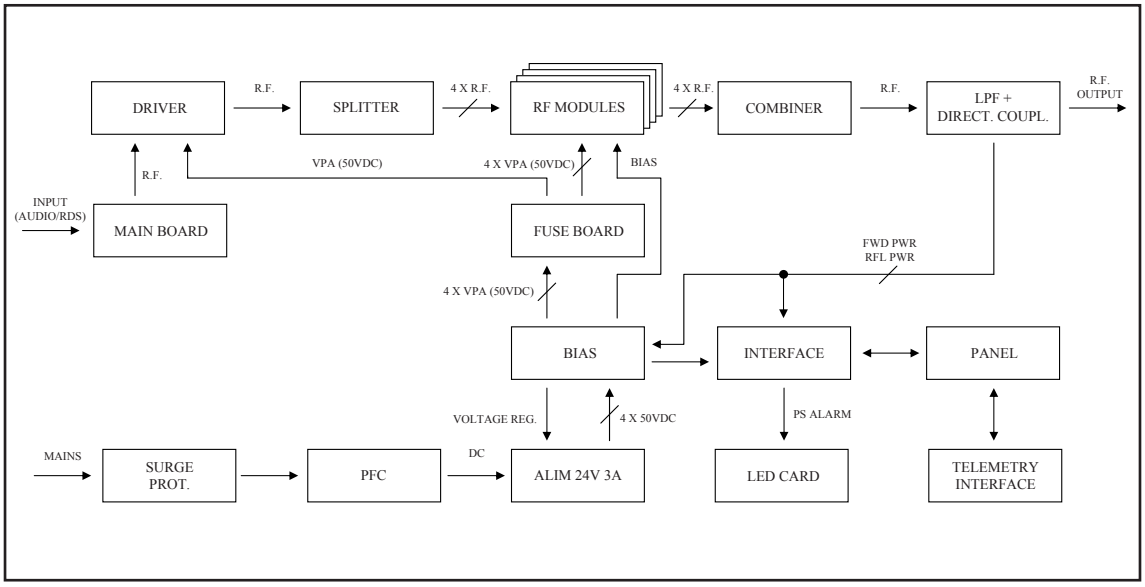


Figure 8.1

Following is a brief description of the different module functions; all diagrams and board layout diagrams are included in the “Technical Appendix” Vol.2.

8.1 Power supply

TEX2000LCD power supply sections are made up of a surge protection module and two power supply units:

1. **Surge Protection module** (see description in sect. 8.1.1)**:** protects the equipment from possible voltage surge events and electric discharges in the power mains.
2. **Power amplifier supply unit:** provides adequate power supply for RF power amplifier modules. It is a switching power supply unit with PFC full range; for details of the PFC and converter modules, please see sections 8.1.2 and 8.1.3, respectively.
3. **Service power supply unit:** provides adequate power supply for all modules except RF power modules. Major components of this 50-Hz transformer-based power supply unit are:
   - Power Switch
   - Service fuse
   - Mains voltage selector
   - Service transfromer

NOTE: Please see section 5.1 for power supply unit settings.

8.1.1 Mains power supply pulse protection (SLSRGPRPJ1KM)

This module is enclosed in a sealed metal case; it features two externally mounted mains fuses (figure 6.2 - [18] and [33]) and accommodates a bank of surge arresters that protect the equipment from any surge events in the power mains.

Mains voltage is brought from this module to the main Power switch on the front panel (figure 6.1 - [7]), which relays it to the service transformer TR1.

Inside the surge protection module, a suitable 24VDC relay controlled via the interface board isolates (single line) mains voltage to be fed to the power amplifier power supply unit (PFC module). As a result, the interface board enables mains power supply to PFC when these requirements are met:

- POWER switch on front panel (figure 6.1 - [7]) set to ON;
- No alarm or fault events present (see section 5.4);
- Power output enabled (set to ON) in FNC operation menu (menu 4, see section 5.4.1);
- RF output power set to over 0W using the edit mode (menu 2, see section 5.3).

8.1.2 PFC unit (PFCPSL5060)

The PFC unit is a rectifier that modulates drawn current to ensure it is drawn sinusoidally (as far as possible) and achieve a 99% power factor.

The PFC unit can operate on 115 VAC or 230 VAC input voltage. It features a voltage selection block that normally does not require setting: see section 5.1.2 for a detailed description.

8.1.3 Switching power supply (PSL5060)

The switching power supply incorporated in this amplifier feeds 50 VDC to the RF power modules with 60 A maximum current.

This module has a control input that enables output voltage reduction when needed (for instance, in the event of RF output power reduction). Another input signal is used to shut down the power supply (0V output voltage) when one of the following conditions is verified:

- Power output disabled (set to OFF) by user in FNC operation menu (menu 4, see section 5.3.1);
- Regulated power set to 0 Watt using the edit mode (menu 2, see section 5.3);
- An alarm or fault condition has occurred (see section 5.4).

8.2 Interface Board (SL010IN5001)

This board performs the following tasks:

- It uses AC voltage to generate and distribute service power supply over the panel board;
- It controls and provides interfacing of the mains surge protection module (SLSRGPRPJ1KM);
- It controls and provides interfacing of the power amplifier supply module (PSL5060);
- It processes and provides interfacing of the control signals to/from the Bias Board (SLBIASTEX2K);
- It processes and provides interfacing of the control signals to/from the Panel Board (SL007PC2003).
- It acquires and processes the input signals from the Main board (SLMBDTEXLC06);
- It feeds and operates the cooling fans;
- It feeds and controls the LED indicator board.

8.3 Panel board - CPU (SL007PC2003)

The panel board accommodates the microcontroller that runs equipment firmware and all user interface elements (display, LEDs, keys, …).

This board is interfaced with other equipment modules via flat cables and provides for power supply, control signals and measurement distribution.

8.4 Main Board (SLMBDTEXLC06)

The main board performs the following tasks:

- Audio and SCA input processing;
- Carrier generation;
- Modulation.

Both measurements are adequately processed and sent to the interface board that controls the protection modules and relays the signals to the CPU board to enable readings to be displayed.

8.4.1 Audio input section

The audio input section accommodates the circuitry that performs the following tasks:

- Input impedance selection
- 15 kHz filtering for R and L channels

- Stereophonic coding
- Preemphasis
- Mono, MPX and SCA channel mixing
- Clipper (limits modulating signal level so that frequency deviation never exceeds 75kHz)
- Modulating signal measurement.

8.4.2 PLL/VCO section

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

8.5 Driver Board (SL176DR1001)

This section accommodates a BLF177 transistor that preamplifies the RF signal before it is relayed to the final power amplifier. When the exciter is placed into stand-by mode, the driver is inhibited, too.

8.6 Power Amplifier

The RF power amplification section consists in four power modules coupled through a Wilkinson splitter and combiner using strip-line technology.

Each RF module provides 500 W rated power using a single active element built using MOS technology. RF modules are fed by the switching power supply via the Bias board.

The splitter (Splitter Board code SL176SP1001) splits the incoming power input signal equally to all RF modules. The combiner (Combiner Board code SL176CM1001) combines the power output signals available at module outputs to obtain total amplifier power.

Splitter, amplifiers and combiner have been designed to sum amplifier output power signals in phase, so as to keep unbalance and power dissipation to a minimum.

The whole RF section is mounted on a finned heat sink with fan cooling.

8.7 LPF Board (SLLPFTEX1KL)

This board incorporates a low-pass filter to keep amplifier harmonics within permissible limits as specified by international standards.

A directional coupler is provided at filter output to measure forward and reflected RF output power; power readings are relayed to the Interface and Bias boards to enable processing and display.

The LPF board incorporates an RF output (having a level about -60 dB lower than output level) which is brought to a BNC connector (figure 6.2 - [20]). This provides a convenient test point to check carrier characteristics, **but does not ensure accurate assessment of higher harmonics**.

8.8 BIAS Board (SLBIASTEX2K)

The main purpose of this board is to control and correct the bias voltage of the RF amplification section MOSFETs.
It also provides a measure of the total current drawn by the RF modules and incorporates a dedicated circuit for power supply fault reporting.

Under normal conditions, bias voltage is adjusted according to set output power using feedback based on actual output power reading (AGC).
Abnormal conditions affecting bias voltage so as to trigger foldback current limiting are:

- Reflected output power too high
- External AGC signals (Ext. AGC FWD, Ext. AGC RFL)
- Temperature too high
- Current draw of one RF module too high

8.9 External Telemetry Interface Board (SLTLMTXLCD03)

This board provides an I/O interface for the CPU with the outside environment. All available equipment input and output signals are brought to the REMOTE DB15 connector (sect. 6.3.4).

Also mounted on this board is the INTERLOCK IN BNC connector (figure 6.2 - [25]) which can disable device power output. When the central pin is closed to ground, output power is limited to zero until ground connection is removed.