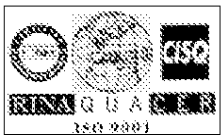
MIRA250S

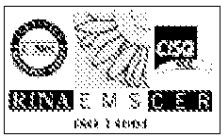
FM Stereo Radio Transmitter

User's manual

ELETTRONIKA	**CODE:** APF009	**TITLE:** MIRA 250S	**REV:** 0	**DATE:** 20/05/02



Registration number: ***IT-17686***



Registration number: ***IT-24436***

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WARNING

The apparatus described in this manual has been designed and manufactured with devices to safeguard the users. In any case it is recommended that during any operation of installation, maintenance, miscellaneous interventions and calibrations requiring the apparatus to be switched on,

THE USER TAKES ALL THE PRECAUTIONS AGAINST INCIDENTS

It is required to use the proper clothes and protection gloves in order to prevent damages from incidental contacts with high-voltage parts.
The manufacturer declines every responsibility in case the recommendations above are not followed.

IMPORTANT

The component lists attached to the relevant electrical diagrams indicate for each item the reference, the description and the type normally used.
The ***Elettronika S.r.l.*** though reserves the right to use or supply as spare parts components with equivalent characteristics but of a different type, assuring anyway the optimal work of the apparatus in accordance with the specifications.

The enclosed monographs are solely owned by ***Elettronika S.r.l.***
The use of anything enclosed in this technical manual without explicit authorization given by ***Elettronika S.r.l.*** will be prosecuted by the law.

The data and technical characteristics of the apparatus described in this manual are not compelling for the manufacturer.
The ***Elettronika S.r.l.*** reserves the right to make, without previous notice, modifications or updates in order to improve the quality of the product.

The general conditions of supply and sale are described in the contracts.

The delivery time are in accordance with the products and quantities ordered.

Summary of warranty

We, ELETTRONIKA S.r.l., SS096 Km 113 Z.I. PALO DEL COLLE (BA) ITALY, warrant to the ORIGINAL PURCHASER of a NEW product, for a period of one (1) year from the date of purchase by the original purchaser (the "warranty period") that the new ELETTRONIKA product is free of defects in materials and workmanship and will meet or exceed all advertised specifications for such a product. This warranty does not extend to any subsequent purchaser or user, and automatically terminates upon sale or other disposition of our product.

Items excluded from this ELETTRONIKA warranty

We are not responsible for product failure caused by misuse, accident, or neglect. This warranty does not extend to any product on which the serial number has been defaced, altered, or removed. It does not cover damage to louds or any other products or accessories resulting from ELETTRONIKA product failure. It does not cover defects or damage caused by use of unauthorized modificstions, accessories, parts, or service.

What we will do

We will remedy any defect, in material or workmanship (except as excluded), in our sole discretion, by repair, replacement, or refund. If a refund is elected, then you must make the defective or malfunctioning component available to us free and clear of all liens or other encumbrances. The refund will be equal to the actual purchase price, not including interest, insurance, closing costs, and other finance charges less a reasonable depreciation on the product from the date of original purchase. Warranty work can only be performed at our authorized service centers or at our factory. Expenses in remedying the defect will be borne by ELETTRONIKA, including one-way surface freight shipping costs within the United States. (Purchaser must bear the expense of shipping the product between any foreign country and the port of entry in the United States and all taxes, duties, and other custom's fee(s) for such foreign shipments).

How to obtain warranty service

You must notify us of your need for warranty service not later than ninety (90) days after the expiration of the warranty period. We will give you an authorization to return the product for service. All components must be shipped in a factory pack or equivalent which, if needed, may

Desclaimer of consequential and incidental damages

You are not entitled to recover from us any consequential or incidental damages resulting from any defect in our product. This includes any damage to another product or products resulting from such a defect.

Warranty alterations

No person has the authority to enlarge, or modify this warranty. The warranty is not extended by the lenght of time for which you are deprived of the use of the product. Repairs and replacement parts are provided under the terms of this warranty shall carry only the unexpired portion of this warranty.

Design changes

We reserve the right to change the design of any product from time to time without notice and with no obligation to make corresponding changes in products previously manufactured.

Legal remedies of purchaser

There is no warranty which extends beyond the terms hereof. This written warranty is given in lieu of any oral or implied warranties not contained herein. We disclaim all implied warranties, including without limitation any warranties of merchantability or fitness for a particular purpose. No action to enforce this warranty shall be commenced later than ninety (90) days after expiration of the warranty period.

Warranty for electronic tubes

The warranty applied for electronic tubes is the one given by the manufacturer of the tube. In the event that the product shows anomalies within the deadline of the validity of the warranty given by the manufacturer of the product itself, the buyer will have to return it to the seller with the needed documents and the written description of the defect. The seller will ship the broken tube to the manufacturer in order to effect the necessary technical tests to find out the cause of the anomaly. Meanwhile the buyer of the tube who needs to use, and as such to replace immediately the product, will have to buy a new one and provide to the relevant payment, further to the issuing by the seller of a regular commercial invoice. After the adequate tests made by the manufacturer, should the result be positive, that is confirm the defect in manufacturing, the seller will issue a regular credit note in the name of the buyer and return the amount paid. Should the result be negative, that is detect a negligence in the installation or use by the buyer, he will have no right against the seller.

INTRODUCTION

The apparatus described in this manual is the latest of this series, offering high performances, remarkable reliability and a wide range of characteristics, it all at a low cost.
Its is easy to install and use. It only takes to follow the installation procedure as shown in this manual: after having removed all from the package, you only have to follow step by step the description in the various sections.
Before starting to use the apparatus, remember to:

- ☐ read carefully the general safety information contained in this section;
- ☐ follow the instructions for the installation and set up of the apparatus;
- ☐ read all the remaining sections of this manual in order to know well the apparatus and learn how to obtain the best of its characteristics.

CONTENTS OF THE MANUAL

The chapter composing this manual contain all the information concerning the use of the apparatus. For more information refer to ELETTRONIKA S.r.l.
This manual is made up of different chapters, each made up of various sections. Each individual chapter represents a single apparatus composing the whole station.

WARNING!

The currents and voltages in this equipment are dangerous!
Personnel must at all times observe safety regulation!

This manual is intended as a general guide for trained and qualified personnel who are aware of the dangers inherent in handling potentially hazaedous electrical and electronic circuits.
It is not intended to contain a complete statement of all safety precautions which should be observed by personnel in using this or other electronic equipment.

The installation, operation, maintenance and service of this equipment involves risks both to personnel and equipment, and must be performed only by qualified personnel exercising due care.
Elettronika S.r.l. shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

During installation and operation of this equipment, local building codes and fire protection standards must be observed.

WARNING!

Always disconnect power before opening covers,
doors, enclosures, gates, panels or shields.
Always use grounding nsticks and short out high
voltage points before servicing. Never make
internal adjustments, perform maintenance or
service when alone or when fatigued.

Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields.
Keep away from live circuits, know your equipment and don't take chances.

WARNING!

In case of emergency ensure that power has been disconnected.

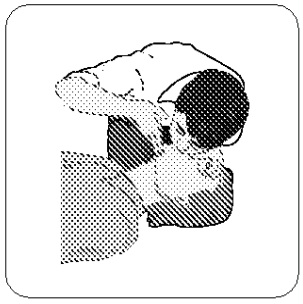
1) If victim is not responsive follow the A, B, C's of basic life support.

PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

A - AIRWAY

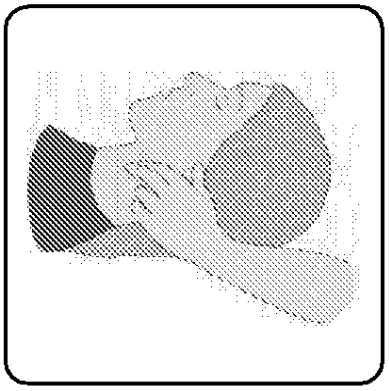
If unconscious, open airway lift up neck, push forehead back, clear out mouth if necessary, observe for breathing.

B - BREATHING

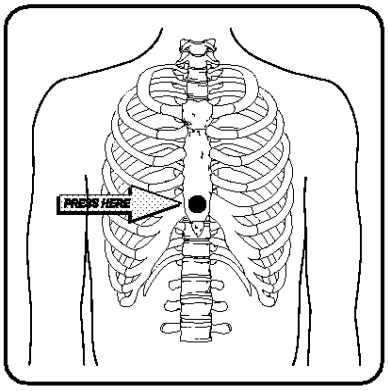


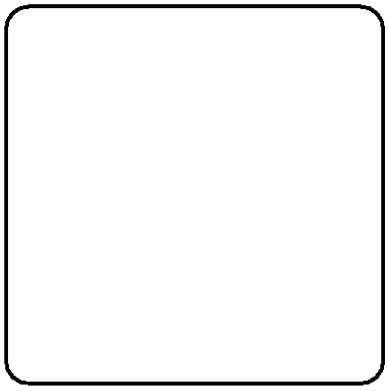
If not breathing, begin artificial breathing. Tilt head, pinch nostrils, make airttght seal, 4 quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

C - CIRCULATION



Check carotid pulse. If pulse absent, begin artificial circulation.





Approx. 80sec.: 1 rescuer, 15 compressions, 2 quick breaths.
Approx. 60sec.: 2 rescuers, 5 compressions, 1 breath.
NOTE: DO NOT INTERRUPT RHYTHM OF COMPRESSIONS WHEN 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).

FIRST-AID

Personnel engaged in the installation, operation, maintenance or servicing of this equipment are urged to become familiar with first-aid theory and practices. The following information is not intended to be a complete first-aid procedure, it is brief and is only to be used as a reference. It is the duty of all personnel using the equipment to be prepared to give adequate Emergency First Aid and thereby prevent avoidable loss of life.

TREATMENT OF ELECTRICAL BURNS

1) Extensive burned and broken skin.

- Cover area with clean sheet or cloth (cleansed available cloth article);
- do not break blisters, remove tissure, 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 effected keep them elevated.

NOTE

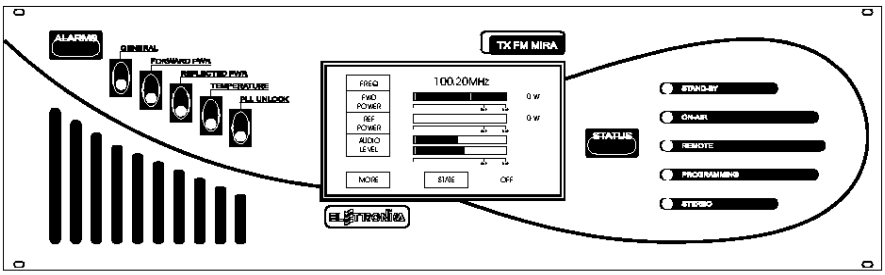
If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).
Allow victim to sip slowly about 4 ounces (half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

2) Less severe burns - (1st & 2nd degree).

- 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 qickly as possible;
- if arms or legs are affected keep them elevated.

ELETTRONIKA

FM STEREO
RADIO TRANSMITTER



MIRA

User's manual

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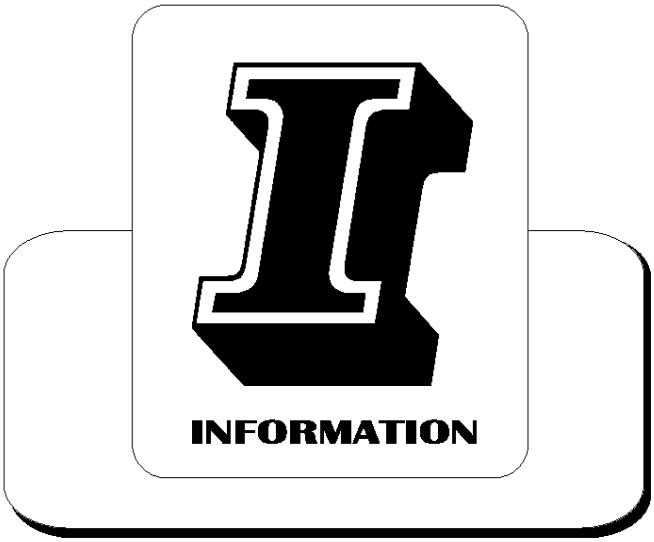
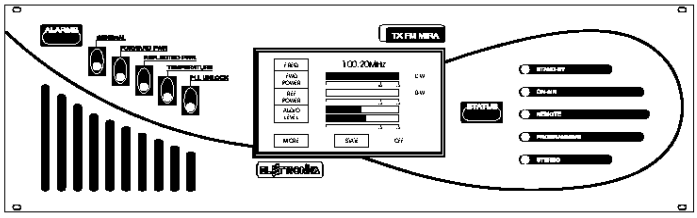


Section 1 - Information

Contents:

MIRA
FM STEREO RADIO TRANSMITTER



1.1 DESCRIPTION

The Mira represents a family of radio transmitters available with 30W, 150W and 250W power, completely controlled by microprocessor, used for radio transmissions in FM band, both stereo and mono.
The high technological content along with the use of surface mounting components allowed the realization of an apparatus with excellent performances and limited dimensions.
The extremely simplified wiring increases the reliability of the whole system and makes testing easier.
Among the main characteristics there are:

- availability of 30W, 150W and 250W version in the same cabinet with extremely simplified wiring;

- repeatability of the performances, guaranteed by the completely mechanized assembling;

- good values of distortion and high S/N ratio;

- lock to external reference with automatic/manual adjustment of the frequency, 5MHz or 10MHz input, with no disturbances during communication;

- analogic telemetry signals available on DB9;

- connections RS232 and RS485 for remote control, I^2C BUS to communicate with output power stages to exchange information reciprocally;

- automatic output power level control;

- hour scheduling of output power;

- control of all the functions via touch-screen display;

- all the final stages with MOSFET technology;

- a stereo coder can be integrated directly on the mother board.

1.2 TECHNICAL CHARACTERISTICS

RF

Frequency range/step:	87.5 - 108MHz/10-50-100kHz (from front panel)
Reference stability:	±2.5ppm (0° - 50°C)
Lockable to external reference:	5/10MHz (from front panel)
Output power:	30W, 150W, 250W
Power level:	0-100% (from front panel)
Automatic power control:	internal/external
Output impedance/connector:	50Ω/N
RF Monitor level/connector:	-30dBc/BNC
Off lock attenuation:	> 60dB
Asynchronous AM S/N ratio:	> 65dB
Synchronous AM S/N ratio:	> 60dB
Spurious and harmonic supp.:	meets or exceeds all FCC and CCIR requirements
Modulation capability:	meets or exceeds all FCC and CCIR requirements

MPX OPERATION

Audio input impedance:	Balanced 600Ω/10kΩ (internal jumper) 10kΩ unbalanced
Audio input connector:	XLR
Audio input level:	0dBm (-6dB / +12dB from front panel)
Frequency amplitude response:	±0.05dB 20-53kHz ±0.1dB 53-100kHz
Harmonic distortion:	0.1% 20-100kHz (0.05% 20-53kHz)
S/N Ratio with CCIR unw.:	83dB
S/N Ratio with CCIR weig.:	80dB
S/N Ratio with RMS Detect.:	90dB

MONO OPERATION

Audio input impedance:	Balanced 600Ω/10kΩ (internal jumper)
Audio input connector:	XLR
Audio input level:	0dBm nominal (-3dB / +12dB from front panel)
Frequency amplitude response:	±0.3dB 30-15kHz
Harmonic distortion:	< 0.01% 30-15kHz
Pre-emphasis:	Flat, 50µS, 75µS (from front panel)
S/N Ratio with CCIR unw. filter:	82dB
S/N Ratio with CCIR weig. filter:	78dB
S/N Ratio with RMS Detect.:	90dB

INTERNAL CODER OPERATION

Audio input impedance:	Balanced 600Ω/10kΩ (internal jumper)
Audio input connector:	XLR
Audio input level:	0dBm nominal (-3dB / +12dB from front panel)
Frequency amplitude response:	±0.3dB 30-15kHz
Harmonic distortion:	< 0.01% 30-15kHz

Pre-emphasis:	Flat, 50µS, 75µS (from front panel)
Stereo separation:	> 50dB (tip. 60dB) 30-15kHz
S/N Ratio with CCIR unw.filter:	76dB
S/N Ratio with CCIR weig. filter:	72dB

SCA OPERATION (2 Inputs)

SCA Input impedance:	10kΩ unbalanced
SCA Input connector:	BNC
Audio input level:	0dBm nominal for ±7.5kHz deviation (-12dB / +12dB from rear panel)
Frequency amplitude response:	±0.1dB 57-100kHz

AUXILIARY

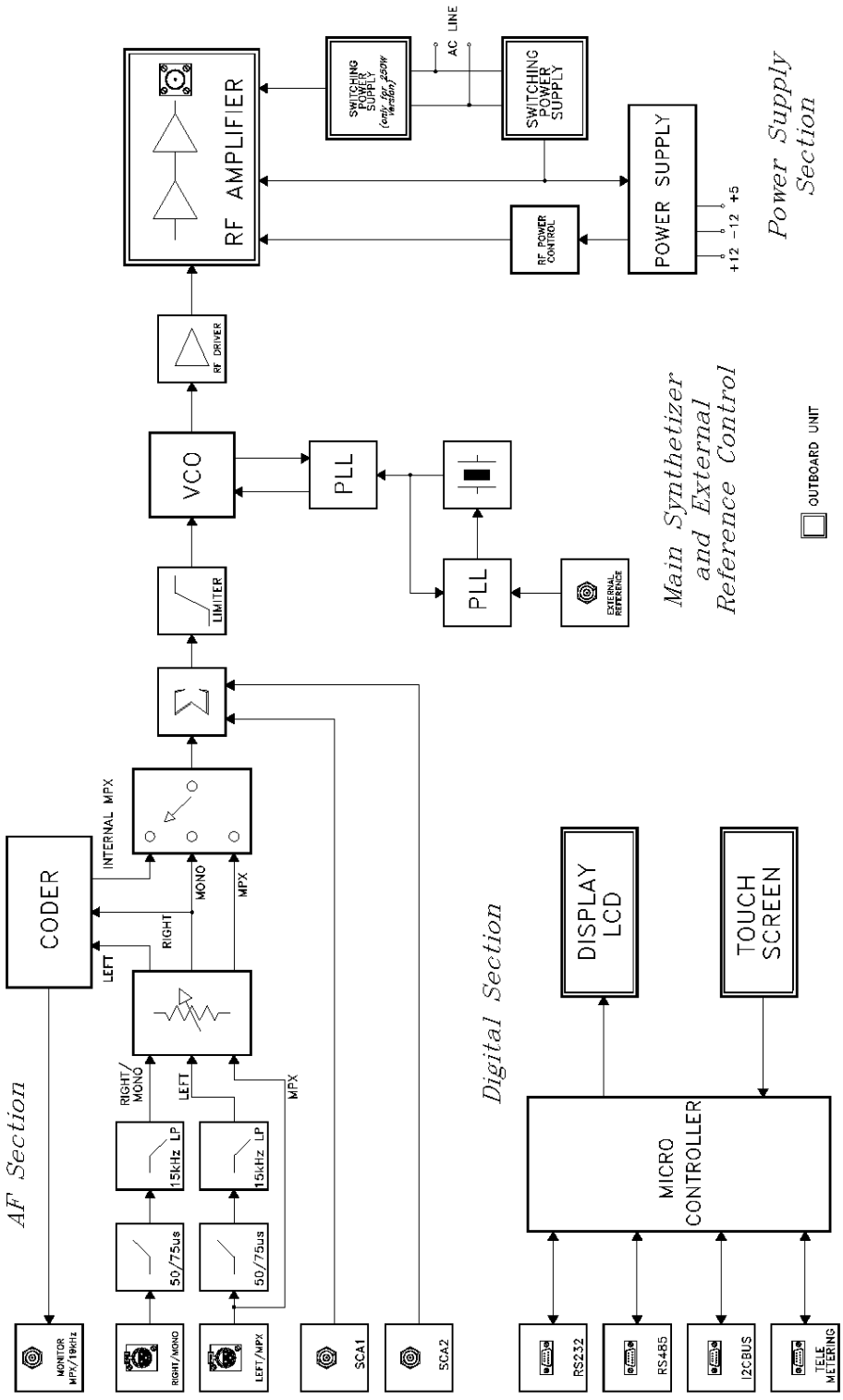
Serial interface:	RS232, RS485 (with host computer/modem)
Remote control/telemetric	

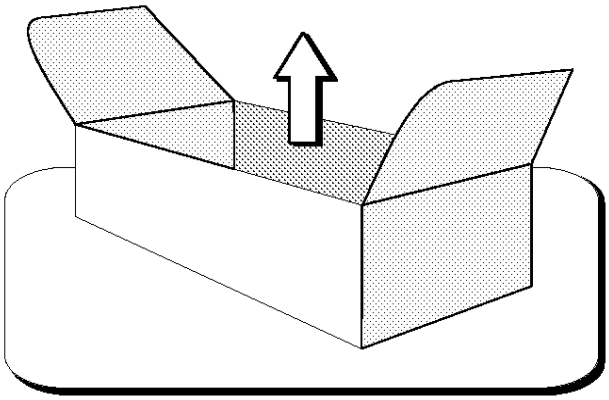
PROTECTION THRS

Forward	MIRA30	35W
	MIRA 150	168W
	MIRA250	270W
Reflected	MIRA30	5W
	MIRA150	10W
	MIRA250	22W
Temperature	75°C with reset at 70°C	

GENERAL

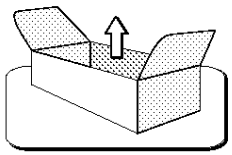
AC Power requirement:	110-230Vac 50/60Hz
Panel size:	Rack 19"-3U
Ambient temperature range:	-5° to -45°C


AF Section
Digital Section
Main Synthetizer and External Reference Control
Power Supply Section
OUTBOARD UNIT
MONITOR MPX/19kHz
RIGHT/MONO
LEFT/MPX
SCA1
SCA2
50/75us
15kHz LP
RIGHT/ MONO
LEFT
MPX
CODER
INTERNAL MPX
LEFT
RIGHT
MONO
MPX
LIMITER
VCO
RF DRIVER
PLL
PLL
EXTERNAL REFERENCE
RF AMPLIFIER
SWITCHING POWER SUPPLY
SWITCHING POWER SUPPLY
AC LINE
RF POWER CONTROL
POWER SUPPLY
+12 -12 +5
DISPLAY LCD
TOUCH SCREEN
MICRO CONTROLLER
RS232
RS485
I2CBUS
TELE METERING



Section 2 - Installation

Contents:



2.1 OPERATING ENVIRONMENT

You can install the apparatus in a standard component rack or on a suitable surface such as a bench or desk. In any case, the area should be as clean and well-ventilated as possible. Do not locate the transmitter directly above a hot piece of equipment. The upper and lower lids can be dismounted to allow an easy internal access. The MIRA is designed with a modular design, that is each circuit is realized inside different modules or boards. All interconnections between modules are made by means of connectable cables which allow an easy and quick maintenance of demaged modules.

2.2 POWER SUPPLY SOCKET AND MAIN SWITCH

In the rear part of the apparatus there is the main power supply socket ***(Ill. 2-1)***, trough which it is possible to connect the apparatus to the public electric network. Make sure that the mains voltage is the same allowed by the apparatus in accordance with the technical specifications. It is also important to use a cable with an adequate section. On the rear panel, next to the power supply socket, there is the main switch of the transmitter ***(Ill. 2-1)***. On the same panel there is the ground bolt, labelled with the symbol ⏚ .

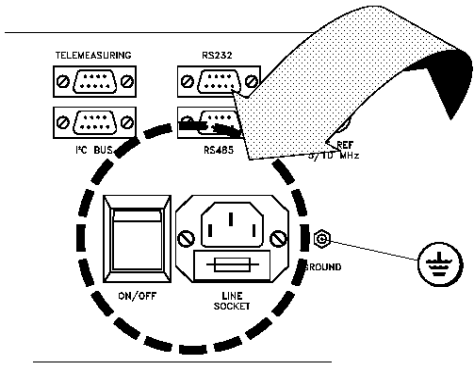


Illustration 2.1 - Power supply socket and Main switch

30W	**88÷132Vac - 175÷264Vac 47÷63Hz**	**Internal switch**
150W	**88÷132Vac - 175÷264Vac 47÷63Hz**	**Internal switch**
250W	**88÷264Vac - 47÷63Hz**	**No setting**

2.3 RF OUTPUT CONNECTOR AND RF MONITOR

In the upper side of the panel there is the RF Output connector *(Ill. 2-2)*. The output load, represented by the antenna, may be connected to this connector. Make sure that this load matches exactly the output impedance of the apparatus. This is a necessary condition not only to obtain the best performances but most of all to prevent the final stages of the apparatus from breaking. Next to the RF Output connector there is the RF Monitor connector which is to monitor the RF signal *(Ill. 2-2)*.

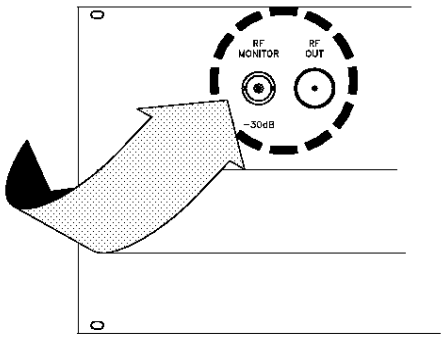


Illustration 2.2 - RF Output connector and RF Monitor

2.4 LEFT/MPX AND RIGHT/MONO CONNECTORS

On the rear panel there are two audio inputs ***(Ill. 2-3)*** to be used for the LEFT and RIGHT or MPX and MONO signals. The use of a balanced line reduces the noise during long connections, anyway it is good practice to use it always. For both inputs the impedance may be selected between 600 and 10kΩ by means of an internal jumper.
The selection of the inpus is made from the frontal panel, as well as the adjustment of the input level. The nominal input level is 2,2Vpp, that is 0dBm (600Ω).

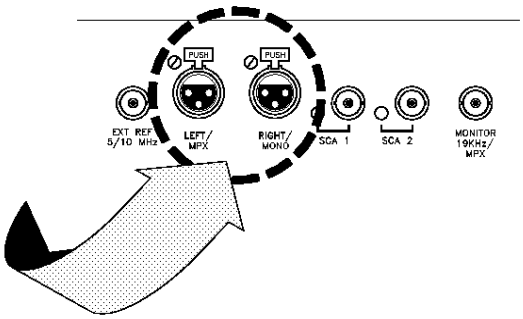
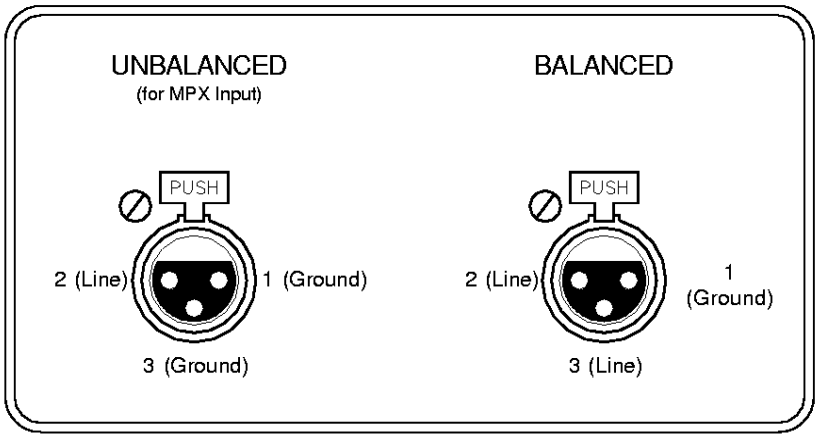


Illustration 2.3 - LEFT/MPX and RIGHT/MONO Connector



2.5 INPUT CONNECTORS SCA1/SCA2

It is possible to connect an external SCA generator to the connectors IN SCA1 and IN SCA2 (BNC) located on the rear panel ***(Ill. 2-4)***. The input is for the range 60-90kHz, but a lower frequency may be used if the transmitter is working in mono mode (the band from 23 to 53kHz is used for stereo transmissions). A 7,5kHz deviation (modulation 10%) an input of about 2,2Vpp is required. The level of the inputs is adjusted by means of the trimmers next to the two connectors.

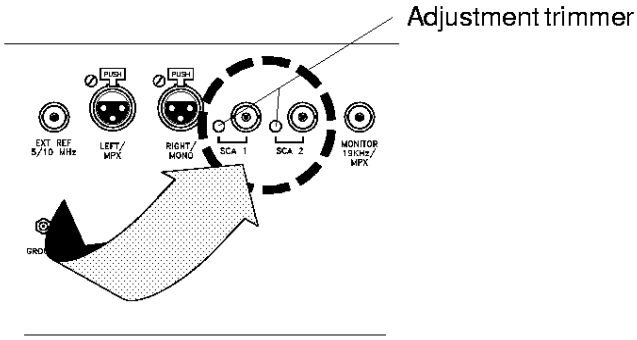
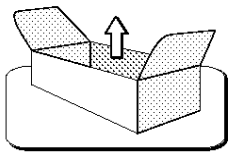


Illustration 2.4 - Input connectors SCA1/SCA2



2.6 MONITOR/MPX CONNECTOR

On the rear panel there is a connector, Monitor 10kHz/MPX ***(Ill. 2.5)***, trough which it is possible to monitor the work of the internal coder. By means of an internal jumper - JPB4 *(see the Annex 2)* - it is possible to select the MPX output or the 19kHz tone to be used for the synchronization with external apparatuses.

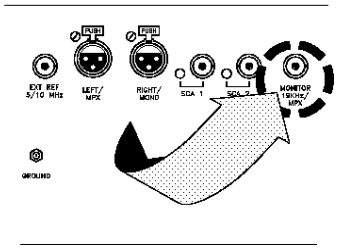


Illustration 2.5 - Monitor/MPX Connector

2.7 TELEMEASURING SOCKET *

On the rear panel there is also the device for remote control and measuring of the transmitter. Such commands are made possible by a D-SUB 9-pin connector ***(Ill. 2-6)***. The following table summarizes the connections of the telemeasuring pin.

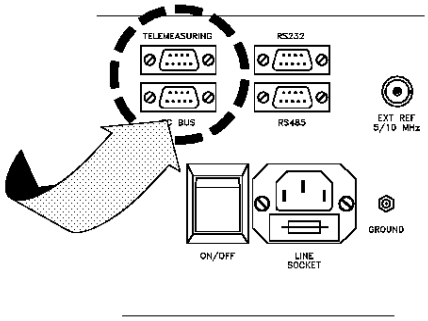
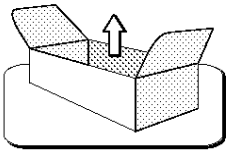
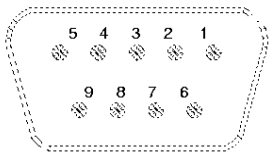


Illustration 2.6 - Telemeasuring socket

** Optional*



PIN N°	SYGNAL TYPE	IN/OUT	FUNCTION
1	Ground	-	-
2	Digital	Input	GND: Power inhibition Floating: Normal operation
3	Analog	Output	FWD Power int
4	Analog	Output	REF Power int
5	N.C.	-	-
6	Analog	Output	Temperature
7	Digital	Output	0V: No Alarm 5V: Alarm
8	Analog	Input	FWD Power ext
9	Analog	Input	REF Power ext



TELEMETERING SOCKET

2.8 I²CBUS SOCKET

This socket allows to connect the equipment to other devices, such as, an power amplifier, with the same socket ***(Ill. 2-7)***.

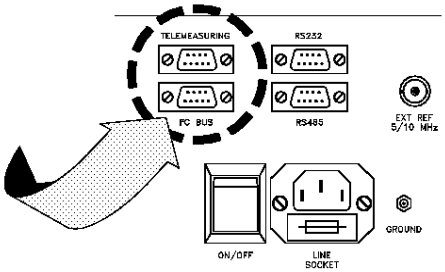


Illustration 2.7 - I²CBUS Socket

PIN	1	2	3	4	5	6	7	8	9
Function	-	CLOCK	GND	DATA	GND	-	-	-	-

2.9 RS232 AND RS485 SOCKET

Connector for the serial connection via standard RS232 ***(Ill. 2-8)***. This allows a direct access via PC and a remote access via modem on commuted telephone line or GSM.
Connector for the serial connection via standard RS485 ***(Ill. 2-8)***. This allows a remote access via modem on cummuted telephone line or GSM. It allows the connection to the Remote Control System, designed to allow the simultaneous control of several apparatuses in the same remote location, even at a great distance from the telephone connection.

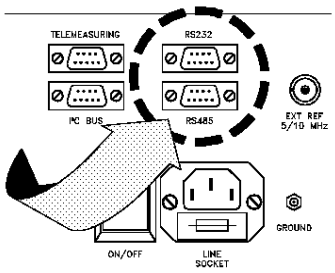


Illustration 2.8 - RS232 and RS485 Socket

RS232 Pin number:

PIN	1	2	3	4	5	6	7	8	9
Function	DCD	RXD/TXD	TXD/RXD	DTR	GND	DSR	RTS	CTS	RI

RS485 Pin number:

PIN	1	2	3	4	5	6	7	8	9
Function	-	RXD -	RXD +		GND	-	TXD -	TXD +	-

2.10 EXTERNAL REFERENCE CONNECTOR

When a frequency stability better than 2,5ppm is selected, a signal with frequency of 5-10MHz, coming from a very stable oscillator or the GPS system, has to be connected to the external reference connector ***(Ill. 2-9)***. The selection of the frequency can be made from the frontal panel. The input level must be between -10 and 10dBm on 50Ω.

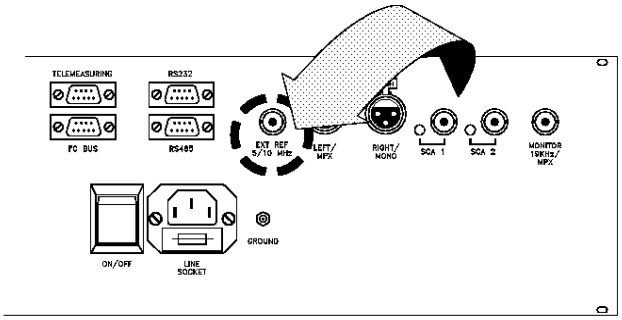
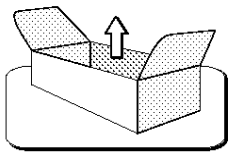


Illustration 2.9 - External reference connector

> ***Note:*** *the plate is pre-set (by means of an SMB connector) to install inside of the apparatus a high-stability oscillator.*

2.11 AGC IMPLEMENTATION AND DETAILS

The use of AGC help the MIRA Transmitter to maintain stable the output power. With a jumper setting you can choose between stabilizing the output power of MIRA transmitter or stabilizing the output power of a bigger transmitter with the MIRA acting as driver/modulator. In this case a cabling is necessary between MIRA and Power section.



- ***Jumper setting***

JPG1	JPG2	AGC SETTING
Closed	Closed	External AGC
Open	Open	NO AGC
Closed	Open	Internal AGC
Open	Closed	NO AGC

- ***Cabling***

In case of AGC stabilizing output power of a transmitter where MIRA acts as Driver, the MIRA needs to be connected to "Amplifier Control" unit on the "Telemeasuring" DB9F socket. The used pins of this socket are:

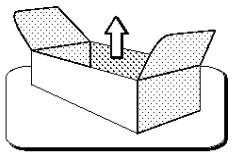
PIN N°	DIRECTION	DESCRIPTION
1	-	GND
8	Input	Forward power (0V to 5V)
2	Input	Alarm (0V= Alarm - 5V= No alarm)

- ***Preliminary settings***

Before starting with AGC is necessary to make the correct setting of the trimmer RF37 labeled FWD EXT located inside MIRA main board.
Instrument needed: Power Supply and Tester.

Procedure:

1. adjust power supply to have 3V output;



2. connect the 3V to pin 8 of 'Telemeasuring' MIRA connector and Power Supply GND to pin 1 of the same connector;
3. with the tester read the voltage on RF34 resistor (the one close to the trimmer RF37 'FWD EXT') on the terminal you prefer;
4. rotate the trimmer in order to have the same power supply voltage and voltage on RF37.

Attention: do not use voltages equal or above 5V.

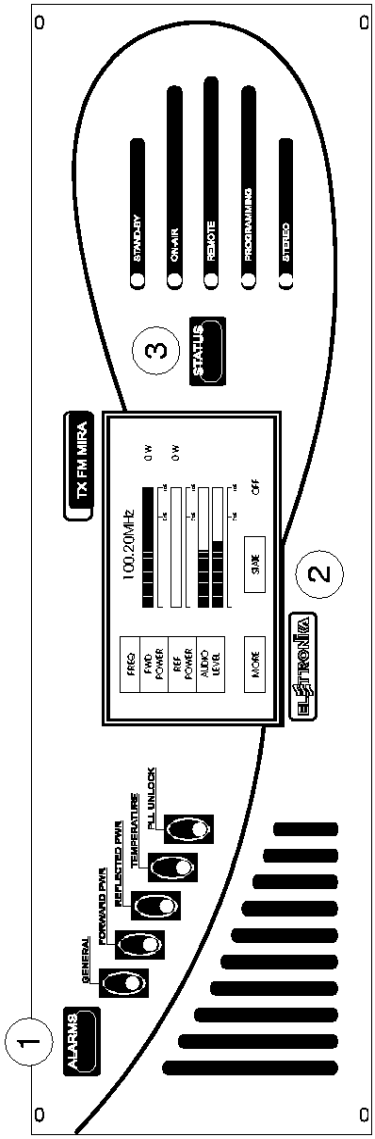
- AGC Implementation

The AGC goal is to maintain stable the output power. Output power in fact can change due to the increase of amplifier temperature. Note that when you change the operating frequency the output power change due to the different gain at different frequency, but this change is not stabilized by this AGC algorithm.
The power to stabilize is read from inside MIRA or from external connector depending on jumper settings.
The AGC algorithm is based on the acquisition of the optimal output power level, stored when you change MIRA output power. To keep the power stable the AGC change the power gain of MIRA. When the goal power nis achieved the AGC stops until the power moves up or down.

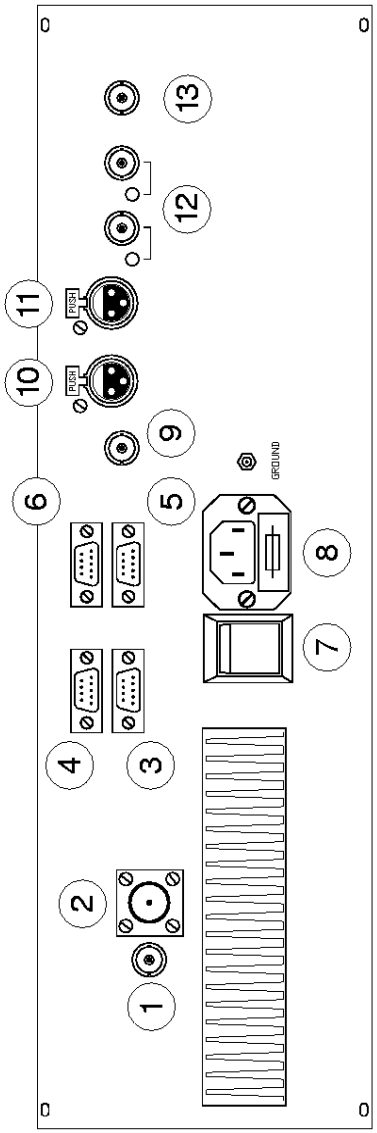
The AGC work is stopped immediately (output power remains blocked to that reached in the moment of the AGC stop) when one of this condition occurs:

- one of MIRA alarms is triggered;
- the MIRA goes in Power Programming in the hours of Power Reduction;
- AGC is chosen as external and 'Amplifier Control' triggers an alarm;
- input power level is to low;
- AGC has change the MIRA output power too much.

Only for the last event the Led 'General' on the front panel of MIRA is lighted.



DESCRIPTION	
1	Alarm LEDs
2	Touch-screen display
3	Status LEDs



	DESCRIPTION
1	Monitor socket
2	RF Output connector
3	I²C BUS Socket
4	Telemeasuring socket
5	RS485 Socket
6	RS232 Socket
7	Main switch
8	Line socket
9	External signal referement
10	LEFT/MPX Input signal
11	RIGHT/MONO Input signal
12	Auxiliary input with trimmers regulation
13	Output monitor socket

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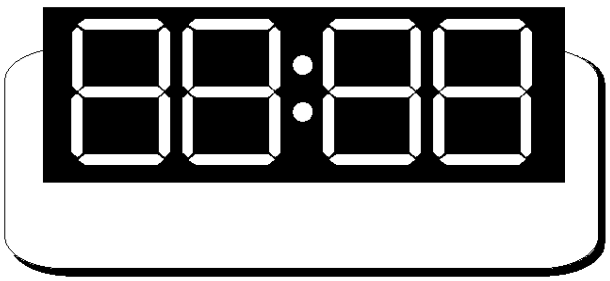
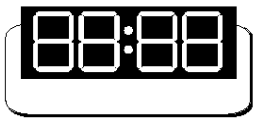


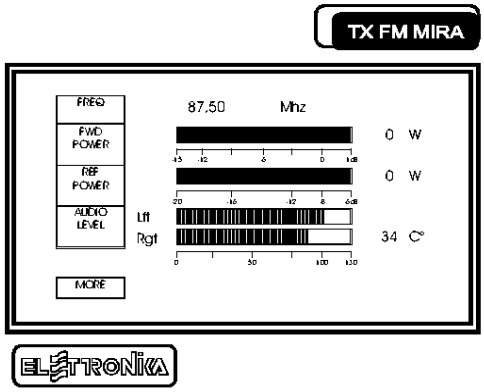
Section 3 - Operations

Contents:

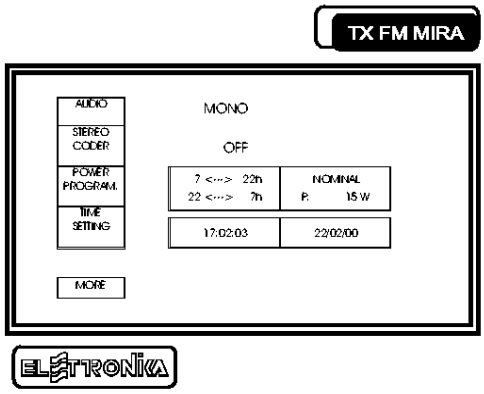


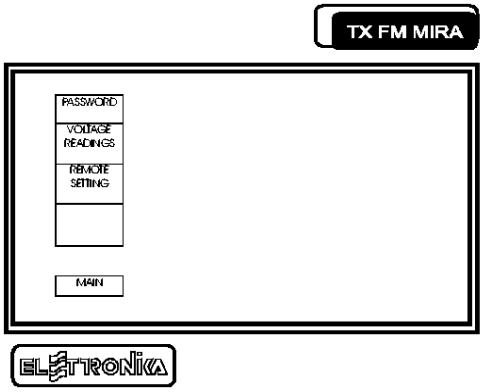
3.1 DESCRIPTION OF THE WORK OF THE MIRA

At startup, after a short introduction, the display of the device shows the following screen:



Touch "MORE" to show the other parameters that can be changed. The main screens can be seen in the ***Pic. 2*** and ***3***.

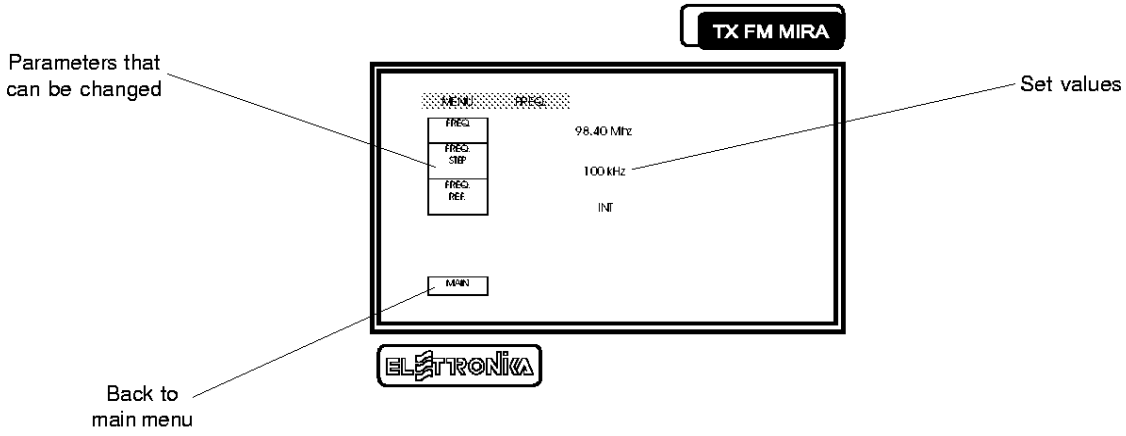




In the main menu touch "OFF" to turn off the equipment. Touching "YES" it goes in "STAND-BY" mode, the screen becomes black and the "STAND-BY" led lights up. Touching "NO" returns to the previous menu. While the apparatus is in "STAND-BY", just touch any location of the display to turn it on. Touching the display in the position of the parameter to be changed opens a submenu.

3.2 FREQUENCIES MENU

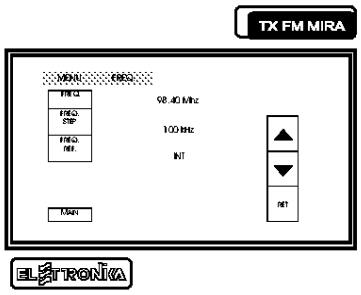
When entering this menu, the display shows the following picture, showing all the values set.



Touching the relevant window on the display the following parameters can be set:

- frequency of the transmitter;
- step;
- reference frequency.

To change the transmission frequency touch the "FREQ.". The display shows the following:



Note: If "STEP" is selected the working frequency is automatically set to 98MHz, thus it has to be set again.

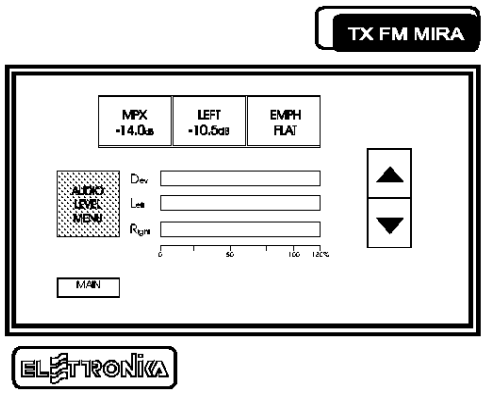
To set the frequency:

- use the arrow key to achieve the desired value;
- press "RET" to confirm the value and exit;
- press "MAIN" to exit without confirming.

To change the step for the variation of the frequency touch the "FREQ. STEP" window and then touch the step to be used. To change the reference frequency touch "FREQ. REF" and then touch the desired reference (Internal, 5MHz External, 10MHz External). To go back to the main menu touch "MAIN".

3.3 AUDIO LEVEL MENU

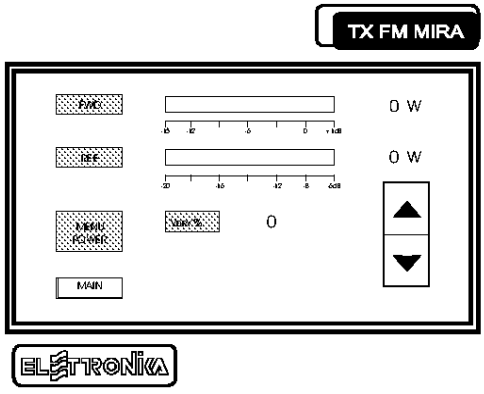
Touching the "AUDIO LEVEL" key opens the following submenu, from which the levels of the inputs can be adjusted.

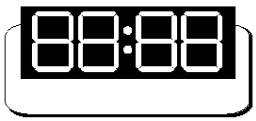


- Choose the channel;
- use the arrow key to set the voltage level or the emphasys type;
- press "MAIN" to go back to the main menu.

3.4 FWD POWER MENU

To enter this menu press "FWD POWE" in the main menu. In this menu the output power can be set.



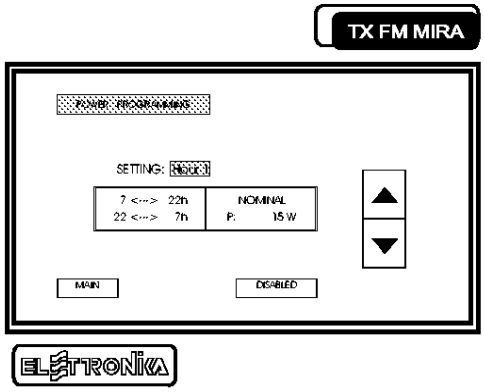


3.5 AUDIO INPUT AND STEREO CODER

The audio input can be either mono, stereo or MPX. This can be set pressing "INPUT AUDIO" in the main menu and choosing one of the three entries. To enable or disable the stereo coder, touch the "STEREO CODER" window in the main menu. If the stereo coder is enabled, the relevant led will be lit.

3.6 POWER PROGRAMMING

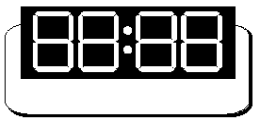
When this function is enabled, the apparatus is programmed to work at different powers at different times of the day (for instance 30W in the day, 15W at night).



The nominal power refers to the power the transmitter is using when the function is enabled. When it is, the "PROGRAMMING" led lights up. It will no longer be possible to change the power manually, that is the "FWD MENU" cannot be accessed.

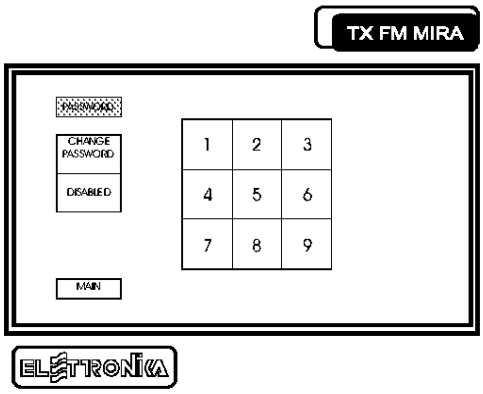
3.7 TIME SETTING

This menu allows to set the current time and date. The figure to be changed must be touched (hour, minutes, seconds, day, month and year) and then set using the arrow keys. Press "MAIN" to save the changes and go back to the previous screen.



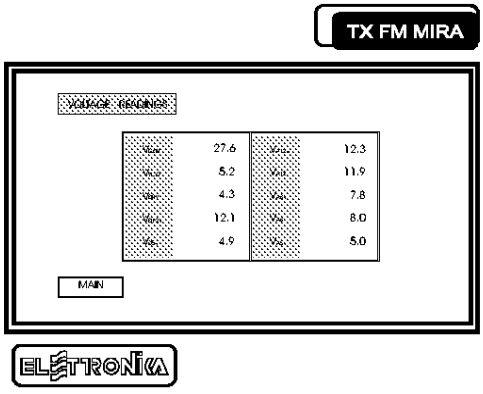
3.8 PASSWORD

The apparatus may be password-protected. When this function is enabled the parameters cannot be changed (actually the submenus cannot be entered). To disable this protection the password must be inserted. It is also possible to change the password (5 digits). This operation is possible only if the apparatus is not protected.



3.9 VOLTAGES READING

It is also possible to display the power supply and driver voltages.



3.10 REMOTE SETTING

This menu allows to set the external connection (RS232, RS485) and the address (0...7).

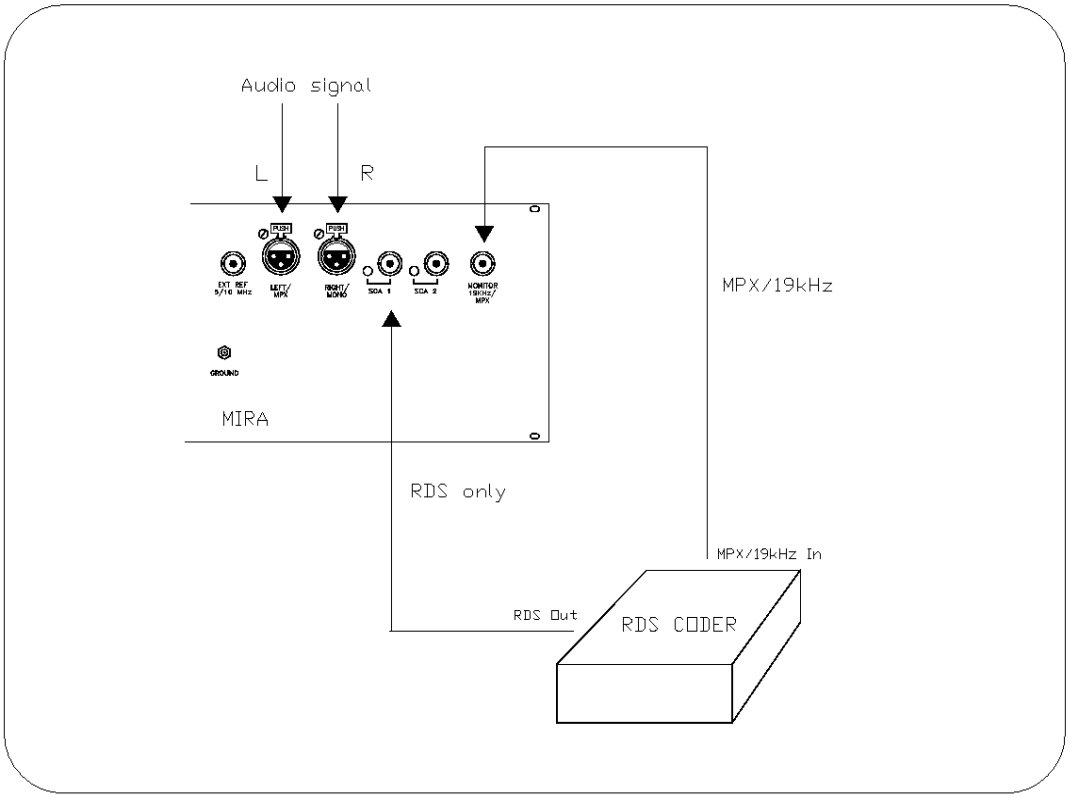
3.11 OTHER LEDS

- Led "ON AIR": turns on when the transmitter sends power to the antenna;
- Led "REMOTE": turns on when the apparatus is connected to a PC by using a given software. This way any local control is disabled.

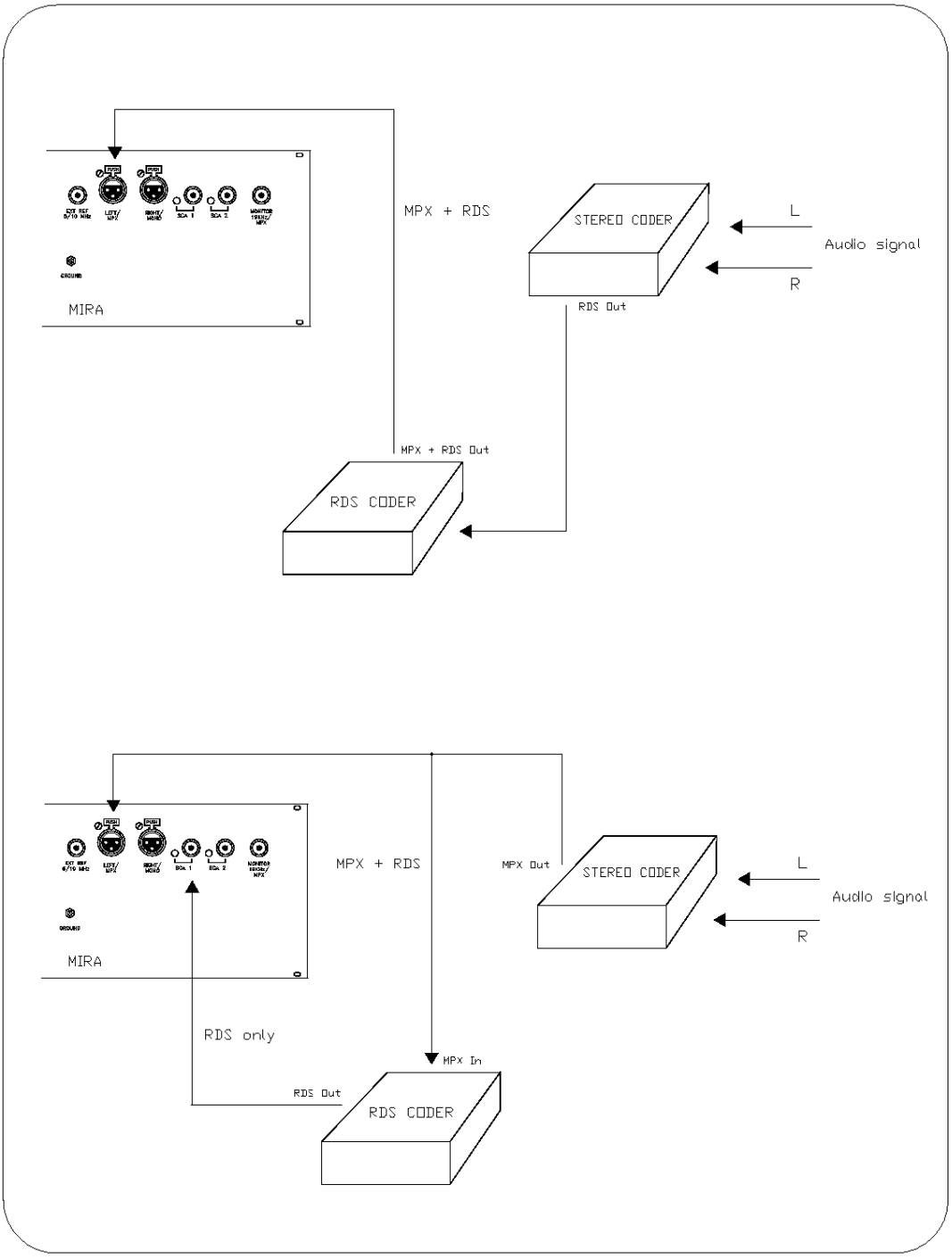
If no operation is made for about 5 minutes, the blacklinght turns off. To turn it on again, touch any location of the display.

3.12 CONNECTIONS WITH RDS CODER

1) Connection with internal Stereo Coder



2) Connection with external Stereo Coder



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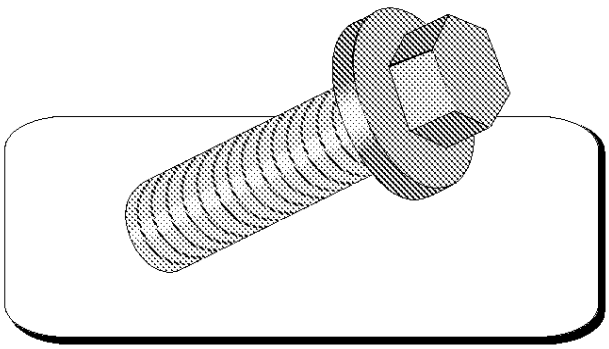
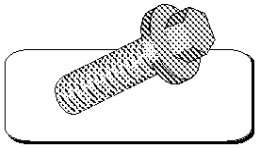


Section 4 - Adjustments

Contents:



4.1 ADJUSTMENT POINTS

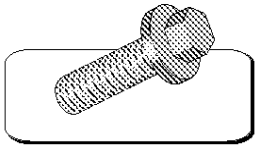
This section contains the indication for the testing of the transmitter MIRA in the versions 30, 150 and 250W. It includes:

- Indication of the calibration points;
- Indication of the setting point;
- Electrical characteristics;
- List of instruments;
- Testing procedure;
- Main characteristics of functioning and quality.

4.2 ELECTRICAL CHARACHTERISTICS

The table below lists the absorption of the Main Board and the Final Stage of the transmitter MIRA in the various versions and the overall performance of the apparatus. All the characteristics are referred to the nominal output power

	MHz	MIRA 30W	MIRA 150W	MIRA 250W
AC Current (220Vac)	88	0.60A	-	2.43A
	98	0.55A	-	2.20A
	108	0.52A	-	2.0A
RF Final Idc/Vdc	88	2.3A/27.2Vdc	-	9.0A/48.2Vdc
	98	2.0A/27.2Vdc	-	8.0A/48.2Vdc
	108	1.9A/27.2Vdc	-	7.5A/48.2Vdc
Main Board (27Vdc)		1.5/0.9A (light off)		
Min-Max performance of MIRA		23-26%	-	47-57%
Thermic protection		high 75°C / low 70°C		



4.3 LIST OF TEST EQUIPMENT SUGGESTED

INSTRUMENT	MEASURE
Spectrum Analyser	*Check of the RF emission spectrum*
Network Analyser	*Calibration of the low-pass filter (f_{-3dB}=115MHz) at the output of the final stage*
Wattmeter	*Reading of the output power*
Dummy Load	
Oscilloscope	*Checking of the corrent functioning of the audio limitation circuit*
FMAB ROHDE & SWARTZ	*Used as audio generator and modulation analyser (noise and audio characteristics)*
Multimeter	*Reading of the power supply voltages*

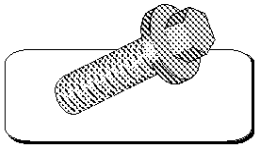
4.4 CALIBRATION STEPS FOR THE MIRA 30W

1. POWER SUPPLY

- Insert a 2A/250V 5x20mm FAST fuse in the rear fuse-holder (*).
- Adjust the voltage of the switching power supply to 27V.

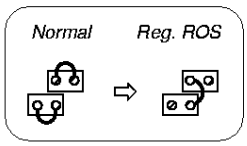
2. FINAL STAGE

- Calibrate the low-pass filter acting on the air coils so to ensure an attenuation >44dB at 176MHz frequency and an input ROS better than 20dB in the band 88÷108MHz.
- Adjust the polarization currents of the final and the driver respectively to 200mA and 120mA with a drain voltage of 27V (*).



3. MAIN BOARD *(Check of the RF power and calibration of the readings)*

- Make sure that the board generates a RF signal with a level of about 24dBm on the whole band.
- Disconnect the RF cable from the board of the final, bring the power regulation to the maximum level from the touch screen and adjust RA8 so to read 20V at the testpoint JA2, verify that with the regulation at the minimum the same point reads 5V (*).
- Set the transmitter to 98MHz frequency, adjust RF 25 so to match the indication on the display (direct power) with the one on the wattmeter.
- Position the jumper of the adaptation plate of the final stage as per indication on the left of this page, bring the transmitter to a power of about 4W and adjust RF58 until the ROS protection intervenes. Return the jumpers to the original position (*).

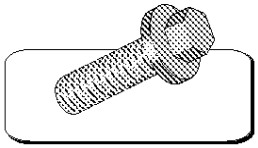


4. MOTHER BOARD *(Modulation/Limitation circuit)*

- Select the MONO input, FLAT emphasis, give an input tone of 1kHz with 2,2Vpp (0dBm @ 600Ω) and adjust the input attenuator to -6dB from the touch screen.
- Connect the oscilloscope on the central point of the jumper JPC2, check the amplitude of the tone which must be 5,6Vpp and the intervention of the limitation circuit for level increase of the input signal. Adjust the intervention symmetry by means of RC6.
- Adjust the frequency deviation to the nominal levels (usually ±75kHz) by means of RC17.
- By means of RC24 adjust the vu-meter of the deviation so that it indicates 0dB at the nominal deviation.
- Characterise the MONO and MPX inputs by measuring passing band, distortion, emphasis curve (50 and 75μs) and noise.

5. MOTHER BOARD *(Internal Stereo Coder)*

- Enable the internal coder and calibrate the pilot tone deviation to ±7.0kHz by means of RB84, if needed use CB68 for the fine adjust of the frequency of the driver.



- Measure the L↔R crosstalk and if needed improve it by acting on the trimmer RB75 (R→L) and RB79 (L→R) and on the compensator CB69 for the adjustment of the 19kHz phase.
- Measure the M↔L crosstalk and if needed improve it by acting on the adjustment of the LEFT/RIGHT balancing by means of RB20 and on the elliptical low-pass filters of the LEFT channel (LPB1-2).
- Characterise the work of the stereo coder by measuring passing band, distortion, emphasis curve (50 e 75μs) and noise.
- Adjust the vu-meters for the LEFT and RIGHT input levels respectively by means of RB23 and RB62.
- Check that the monitor output of the coder works.

6. MOTHER BOARD *(External reference)*

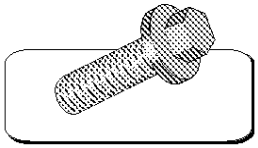
- Solder the SMD jumper JPE1 and connect a very stable 5 or 10MHz signal to the input of the external reference. Enable the external reference from the touch screen and adjust the compensator on the VC-TCXO in order to read 2.5V on the testpoint VC.
- Make sure that the lock to the external reference is stable by looking at the LED in the section which should light up.

7. MOTHER BOARD *(SCA Inputs)*

- Adjust RC21 and RC26 to obtain a deviation of ±7.5kHz with an input of 2.2Vpp with a 57kHz tone. Check the frequency response in the band 57÷75kHz.

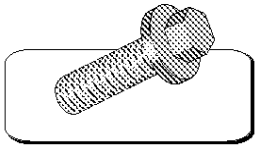
8. MOTHER BOARD *(Serial outputs)*

- Check that the serial outputs (RS232, RS485, I^2C BUS) and the signals available for remote measuring work.



(*) Note: for MIRA 150 and 250W the marked points must be modified as follows:

		MIRA 150W	MIRA 250W
1) a.	Network fuse	8A	8A
2) b.	RF Final Polarization RF Driver Polarization	50mA @ 50V 220mA @ 28V	50mA @ 50V 220mA @28V
3) b.	RA8 for voltage on JA2	5÷23V	5÷23V
3) d.	ROS Protection threshold	20W	30W



4.5 MAIN CHARACTERISTICS OF THE FM TRANSMITTERS

	ITALIAN REGULATION (MPT decr n°311 09/03/94)	ETS 300384 (07/95)
Frequency band of the carrier	**87.6÷107.9MHz**	87.6÷108MHz
Channelling	**100kHz**	100kHz
Deviation	**±75kHz**	±75kHz
Pre-emphasis	**50us**	50us
Variation of the power compared to the nominal value	**±1dB**	±1dB -3÷+2dB (*)
Frequency tolerance	**±2kHz (20ppm ref. 100MHz)**	±2kHz, drift in three months <300Hz
Spurious emissions (Pn>25W)	**60dBc e <1mW**	mask
Environment conditions	**Temp. 15°÷35°C Temp. -5°÷+45°C (6-7) Power supply temp. ±10% (6-7)**	Temp. 15°÷30°C Temp. 0°÷+40°C (6-7) (*) Power supply temp. -10÷+6% (6-7)
Limitation circuit	**at ±75kHz the deviation must not be increased by more that 1dB (9kHz) for a 6dB increase of the audio signal**	mask
Low-pass filter	**>30dB attenuation between 19÷100kHz compared to 15kHz**	40dB attenuation to 19kHz, >30dB beyond 19kHz compared to15kHz
Warm up	**15 minutes minimum**	20 minutes minimum

Audio frequency band	**40Hz÷15kHz**	40Hz÷15kHz
Frequency response audio input	**±1dB with 50us pre-emphasis 40Hz÷15kHz (rif 400Hz ±75kHz)**	±1dB con preenf. 50us 40Hz÷15kHz (a ±75kHz)
Frequency response MPX input	**±0.5dB 40Hz÷53kHz (rif 400Hz±75kHz)**	
Distortion	**<1% 40Hz÷15kHz (no de-emphasis)**	<0.5% 40Hz÷15kHz (no de-emphasis)
S/N Ratio[1]	**≥70dB weighted ≥68dB stereo weighted**	≥72dB weighted/unweighted at coder output
Synchronous AM (due to FM)		≤2% ref. 500Hz a ±40kHz
Residual AM (buzz and noise)		≤1% in the band 20Hz÷20kHz (unweighted)
L-R Crosstalk		≥46dB 100Hz÷5kHz, for freq. <100Hz and >5kHz also -6dB/octave
M-S Crosstalk		≥38dB
AF Inputs		imped.≥2kΩ, balanced, 0÷12dBm difference ≤1dB (no emphasis)
Auxiliary inputs		imped. ≥2kΩ, unbalanced, 53÷75kHz ±0.5dB ref. 57kHz

[1] The regulation prescribes the measure in compliance with the recommendation CCIR 468-4: "ratio between the effective value of a 400Hz frequency signal causing a deviation of the carrier of ±75kHz and the value of the residual background noise measured with a quasi-peak detector, weighted with a CCIR weight filter".

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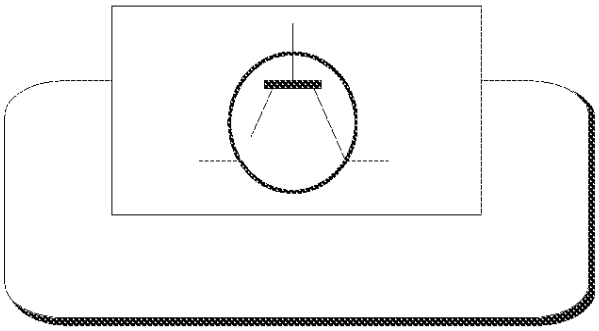
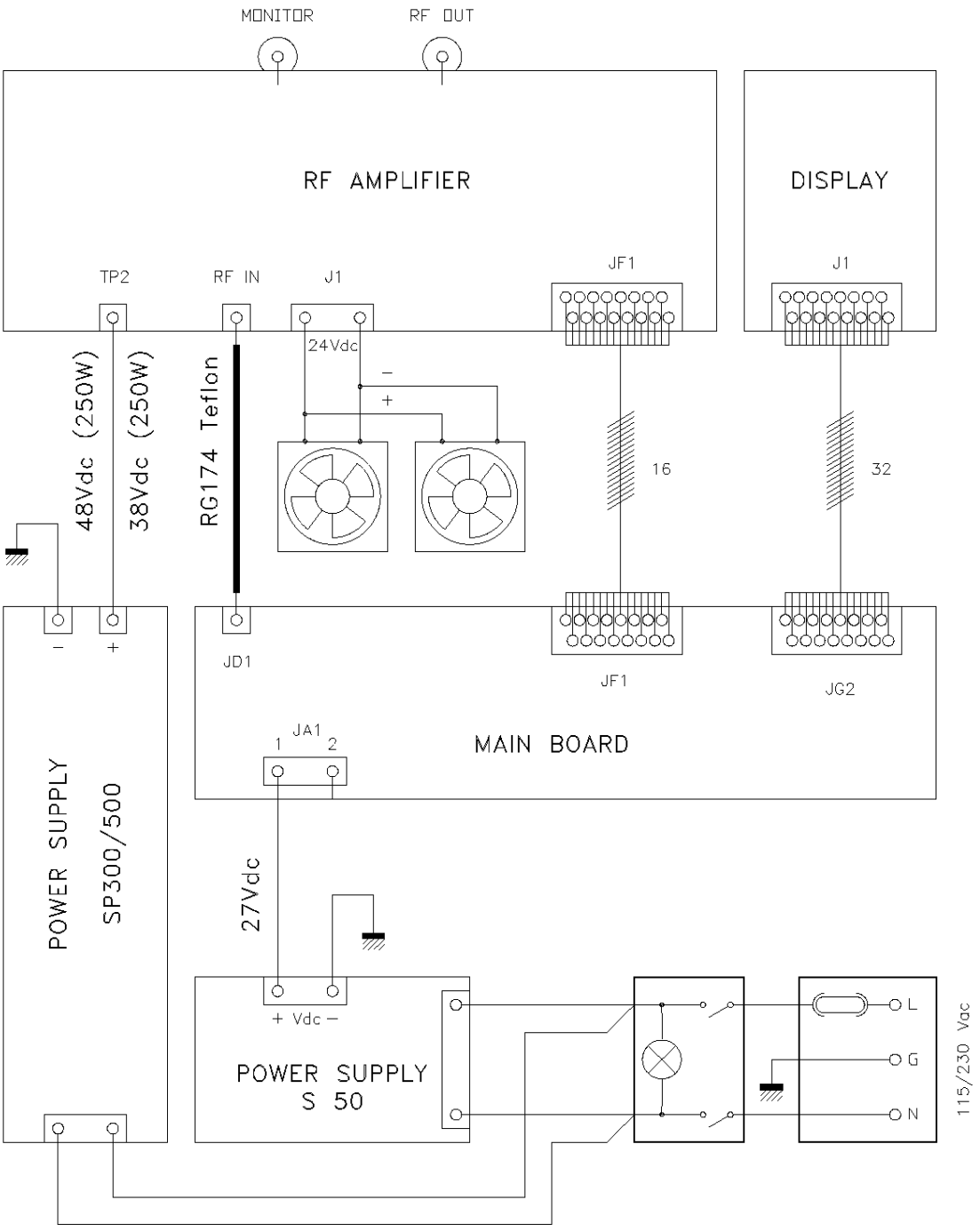


Section 5 - Diagram

Contents:



ELETTRONIKA srl	DESCRIPTION Schema Cablaggio TX FM MIRA 250W	DESIGNER COLASUONNO	Sign.	DATE 21/02/2000
		PCB DESIGNER	Sign.	REF
CODE APT006AR0	TITLE 250W MIRA TX FM Cable Diagram	QUALITY CONTROL	Sign.	SHEET 1 OF 1

5.1 GENERAL DESCRIPTION

There are four distinct modules in the apparatus.

1. Power supply

The integrated switching power supplies allow the apparatus to work with an extended range of power supply voltage. They have inside themselves the overvoltage-protection dischargers and the most powerful version include as well a correction circuit for the power factor.

2. Final R.F. Module

The R.F. amplifier, the heat sink and the cooling fans are a single block. The R.F. board is enclosed in a metal cabinet to ensure a high level of shielding against unwanted emissions in the environment.
The R.F. signals exits from the motherboard at a level of about 23dBm, then it is amplified by the driver, realized with a MOS BLF242, and enters the final stage – it also with a MOS that can be wither the BLF245 for the 30W or the MRF151 for the 150W and 250W - at a level of about 1÷2W.
Using MOS technology allows to realize more compact stages thanks to the higher gains and the simplicity of the polarization circuits: indeed such devices have no thermic drift problems.
The variation of the output power is made acting on the polarization of the driver. After the final amplification stage there is a 9^{th} order low-pass filter rejecting the unwanted signals to regular levels, a directional coupler to sample the direct and reflected power, send to the motherboard for the check and the indication on the display, follows.
A –30dB monitor socket monitors the R.F. signal coming from the output connectors.

3. Display boards

On this board the touch screen display, the buzzer for sound alerts and two rows of LEDs – the STATUS one and the ALARMS one, directly controlled by the microprocessor trough Shift-register - are mounted.

4. Motherboard

This is the central part of the whole apparatus. On it there are all the input/output ports and all the electronic parts of the apparatus.
To simplify its description we enclose the complete drawing of the plate ***(Fig. 1)***.

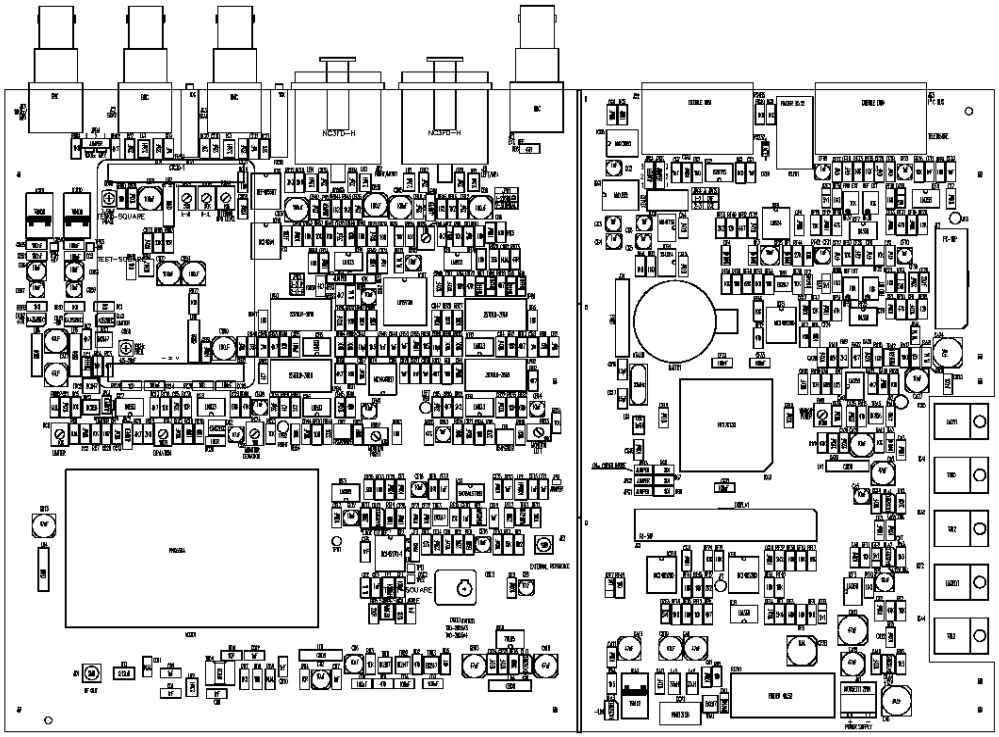
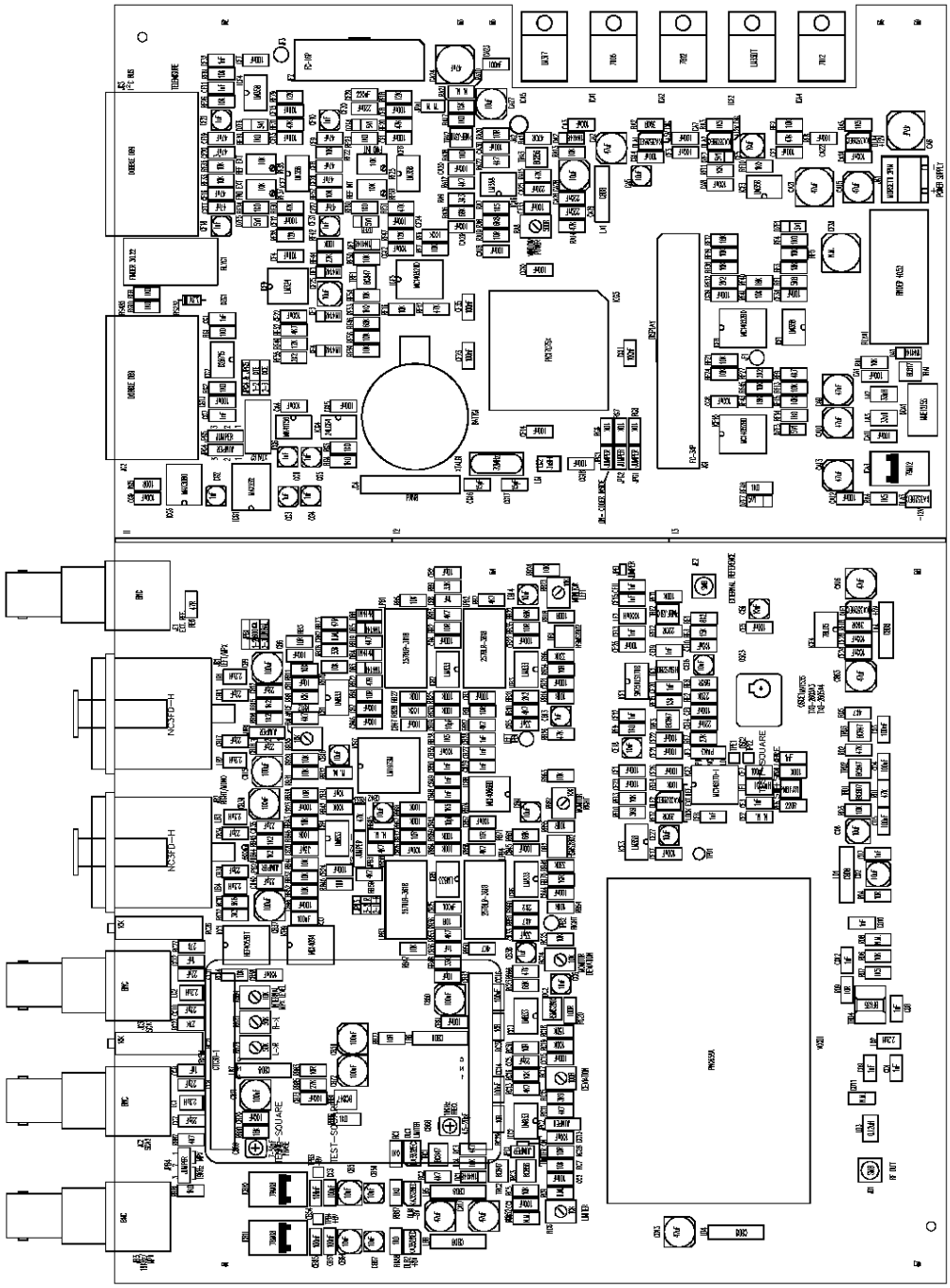


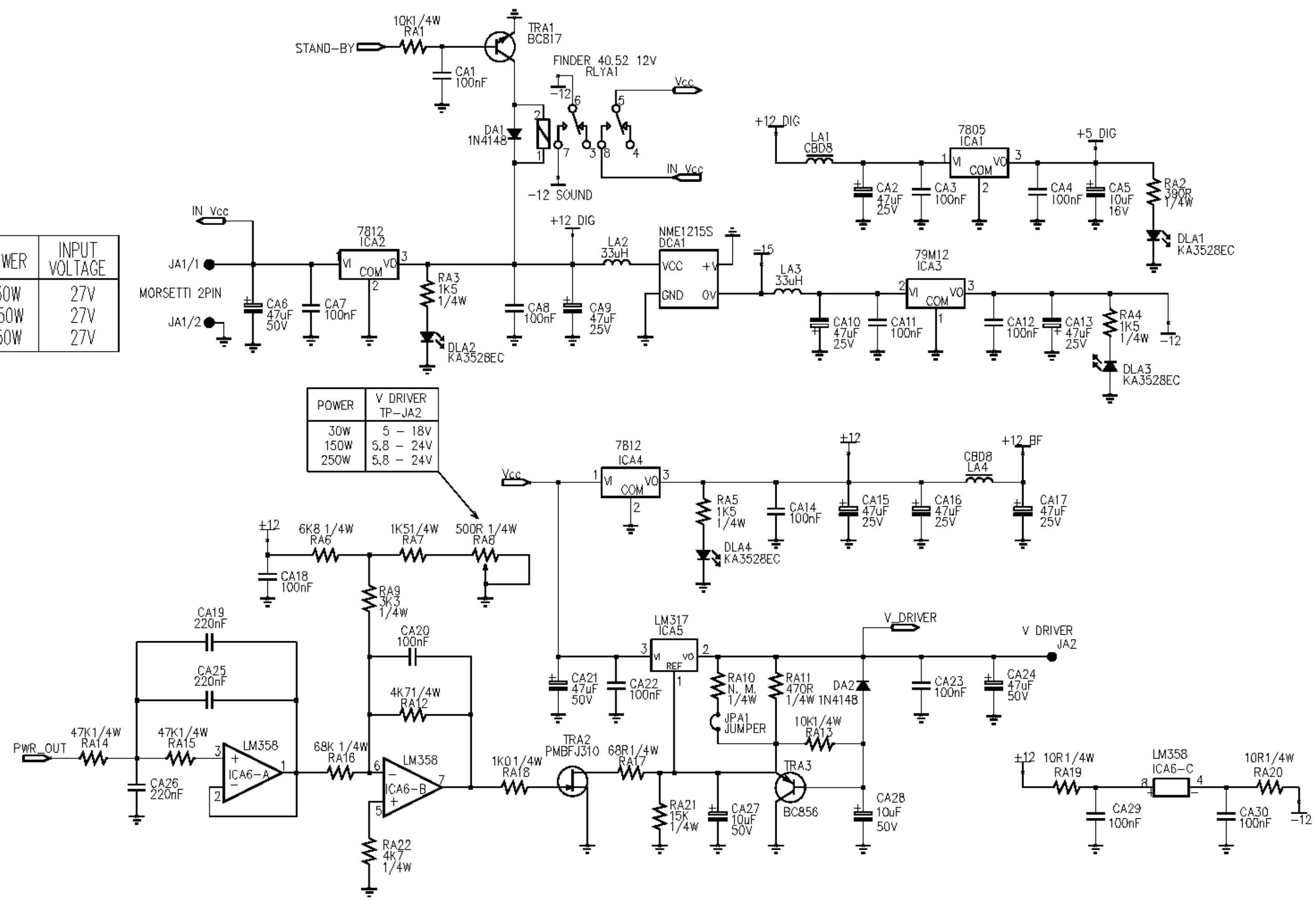
Fig. 1 - Mother board

The following parts can be seen: BF section, synthesizer and external reference control section, power supply section and digital section with the microcontroller.
In the BF section there are the 4 connectors for the input signals, the two BNC for the SCA inputs and two XLR connectors for the LEFT and RIGHT or the external MPX and MONO signals
Every input has a low-pass filter to improve the rejection of unwanted signals.
After the XLR connectors there are the balanced/unbalanced conversion circuits (IC1/A – IC8/A); only for the RIGHT channel it is possible to invert the phase by 180° (IC8/B). After this there is the low-pass filter stage, with two stages of elliptical filters, and the pre-emphasis network (IC2, IC9) which selection is controlled by a microcontroller.
IC31 is the digital regulator of the level; at its output there are the LEFT, RIGHT and MPX (external) signals, LEFT and RIGHT proceed to the stereo coder, to generate the internal MPX. The external MPX signal and part of the RIGHT signal (used as MONO in this case) reach the input selector to be sent to the V.C.O. At the output of the selector the two SCA (IC3/A) signals are added. Then there is the limiting stage (TR2, TR3) which may or may not be enabled. Finally IC3/B which acts as a buffer for

the VCO. Three peak detectors provide the microcontroller with the information needed to indicate the levels of the input signals (IC38/A, IC40/A) and the modulation (IC5/A). The synthesizer section contains the VCO and the PLL for the synthesis, both in a single metal cabinet. The RF signal in output is about 5dBm and is brought to 23dBm by means of an amplification stage (TR6). When the PLL doesn't lock the set frequency it automatically reduces the RF output level preventing the work of both the internal output stage and Q6. Q6 may also be turned off by the microcontroller.
The external reference section is connected to the synthesis stage. A VC-TCXO (voltage-controlled temperature-compensated quartz oscillator) is used as a base for the synthesis times. When the control with external reference signal (which may be either 5 or 10MHz) is enabled, the VC-TCXO is closed in a PLL ring (IC19). This way the oscillator is locked to the external reference.
If the ring can't lock, the microcontroller disables the external control; the operations on the reference do not affect the system anyway.
The whole plate is powered with a 20Vdc tension supplied by the switching power supply. This tension is reduced by integrated stabilizers in order to obtain the tensions needed for the plate to work, in particular +5 and +12 for the digital section, -12 and +12 for the BF section and synthesizer.
IC23, controlled by the microcontroller, adjusts the output power of the apparatus changing the polarization tension of the driver in the final stage. The negative tensions are generated by a DC-DC converter mounted on the plate.

Component layout SCH0006BR1

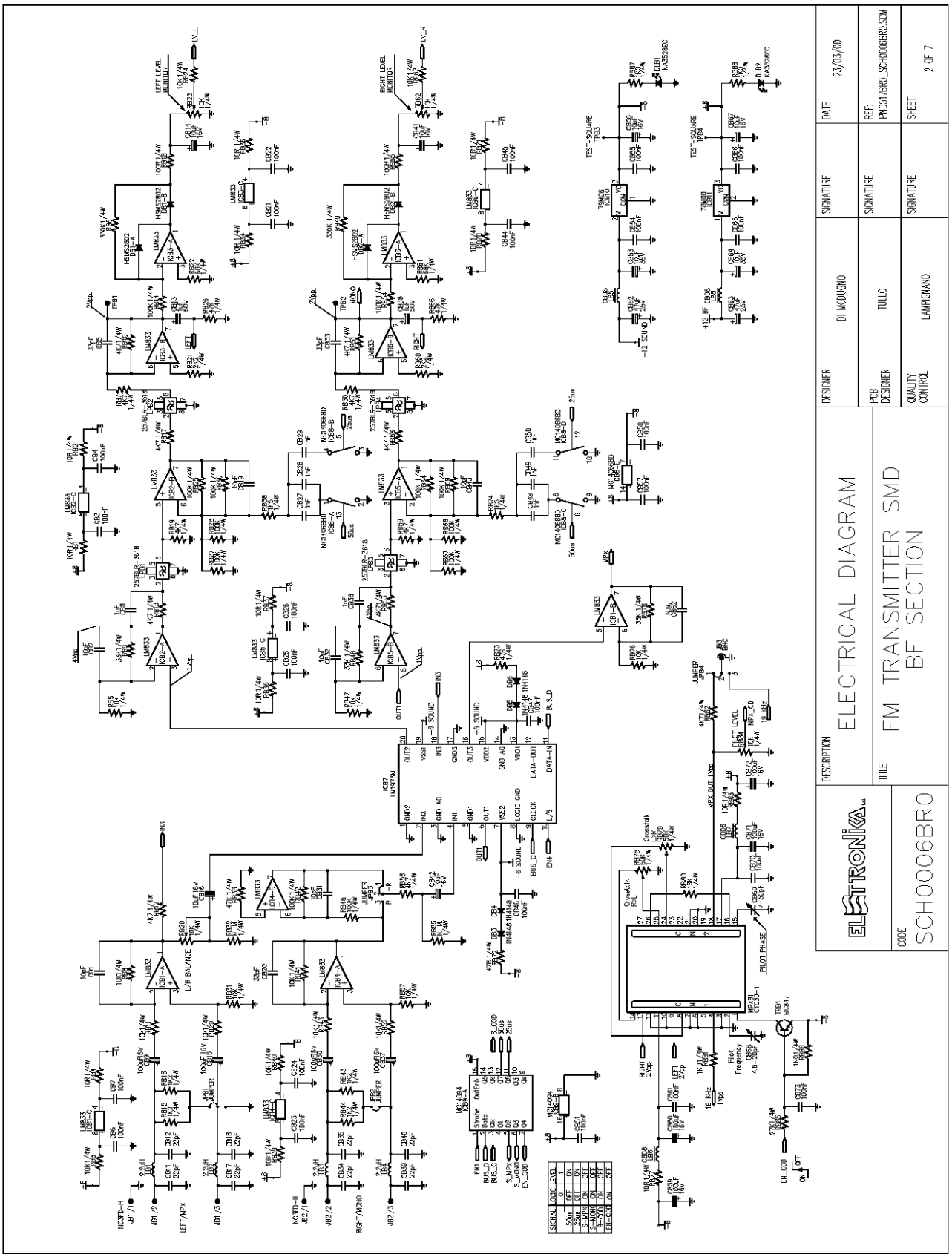




POWER	INPUT VOLTAGE
30W	27V
150W	27V
250W	27V

POWER	V DRIVER TP-JA2
30W	5 - 18V
150W	5.8 - 24V
250W	5.8 - 24V

ELETTRONIKA S.r.l.	DESCRIPTION ELECTRICAL DIAGRAM	DESIGNER DI MODUGNO	SIGNATURE	DATE 12/12/2000
	TITLE SMD FM TRANSMITTER POWER SUPPLY	PCB DESIGNER TULLO	SIGNATURE	REF: PN0517BR2_SCH0006BR1.SCH
CODE SCH0006BR1		QUALITY CONTROL LAMPIGNANO	SIGNATURE	SHEET: A 1 OF 7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FM TRANSMITTER SMD
BF SECTION
ELSTRONIKA
DESCRIPTION
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DESIGNER
DI MODUGNO
PCB DESIGNER
TULLO
QUALITY CONTROL
LAMPIGNANO
SIGNATURE
DATE
23/03/00
REF:
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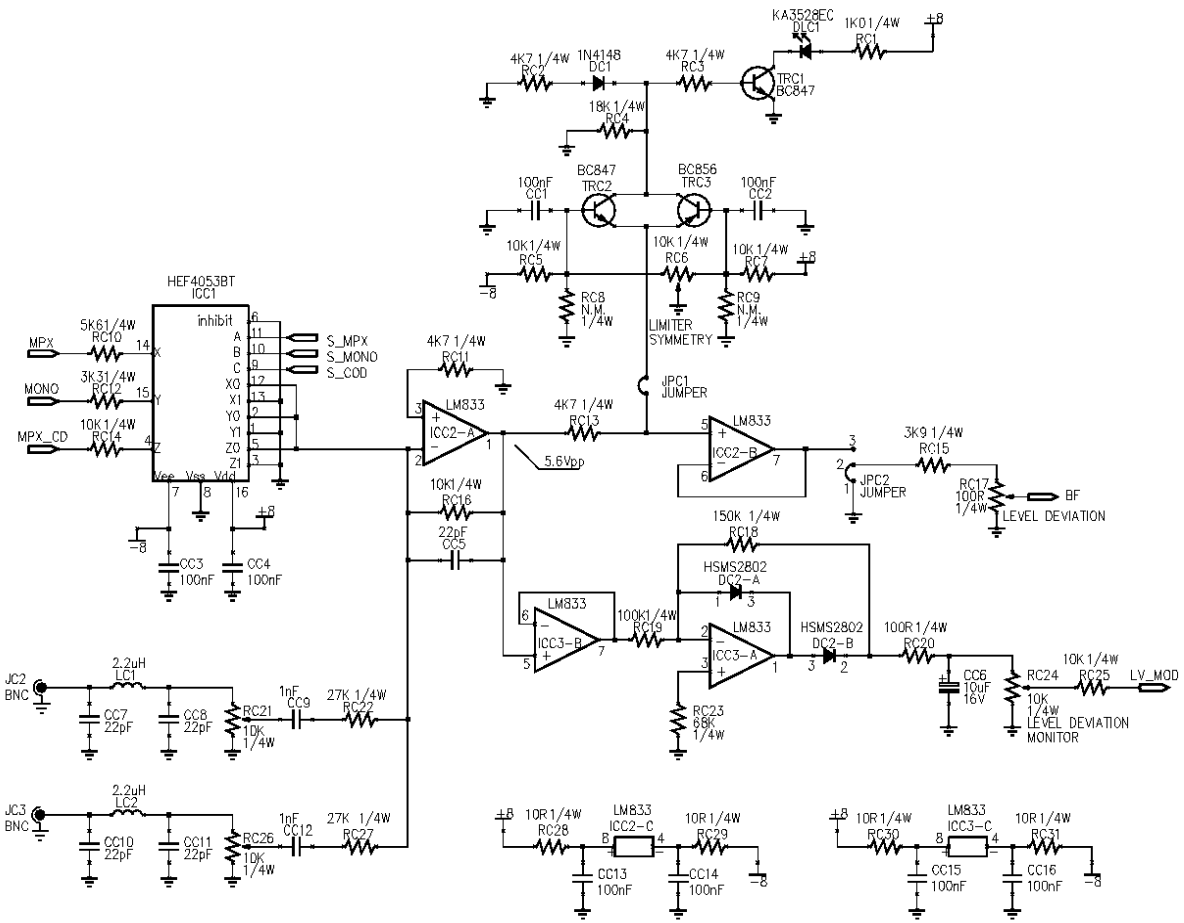
2 OF 7



ELETTRONIKA S.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER: DI MODUGNO	SIGNATURE	DATE: 23/03/00
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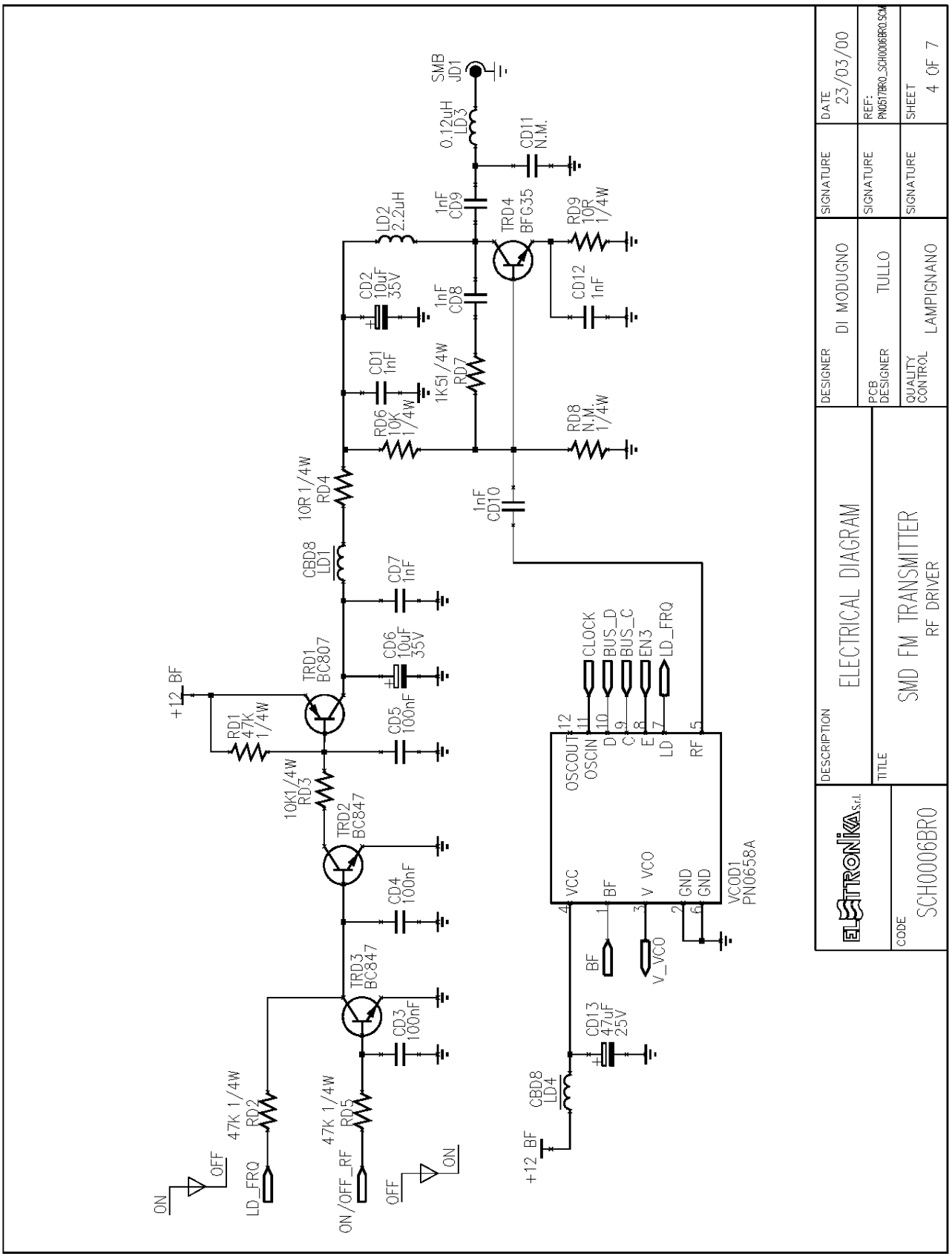
		QUALITY CONTROL: LAMPIGNANO	SIGNATURE	SHEET: 3 OF 7


SMB JD1
0.12uH LD3
CD11 N.M.
LD2 2.2uH
1nF CD9
TRD4 BFG35
RD9 10R 1/4W
CD2 10uF 35V
1nF CD8
CD12 1nF
CD1 1nF
1K5I /4W RD7
RD6 10K 1/4W
RD8 N.M. 1/4W
1nF CD10
10R 1/4W RD4
CBD8 LD1
CD7 1nF
TRD1 BC807
CD6 10uF 35V
CD5 100nF
+12 BF
RD1 47K 1/4W
10K1/4W RD3
TRD2 BC847
CD4 100nF
TRD3 BC847
CD3 100nF
47K 1/4W RD2
47K 1/4W RD5
ON
OFF
LD_FRQ
ON/OFF_RF
OFF
ON
CLOCK
BUS_D
BUS_C
EN3
LD_FRQ
OSCOUT
OSCIN
LD
RF
VCC
BF
V VCO
GND
GND
VCOD1 PN0658A
CD13 47uF 25V
CBD8 LD4
+12_BF
BF
V_VCO
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RF DRIVER
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DESIGNER
DI MODUGNO
PCB DESIGNER
TULLO
QUALITY CONTROL
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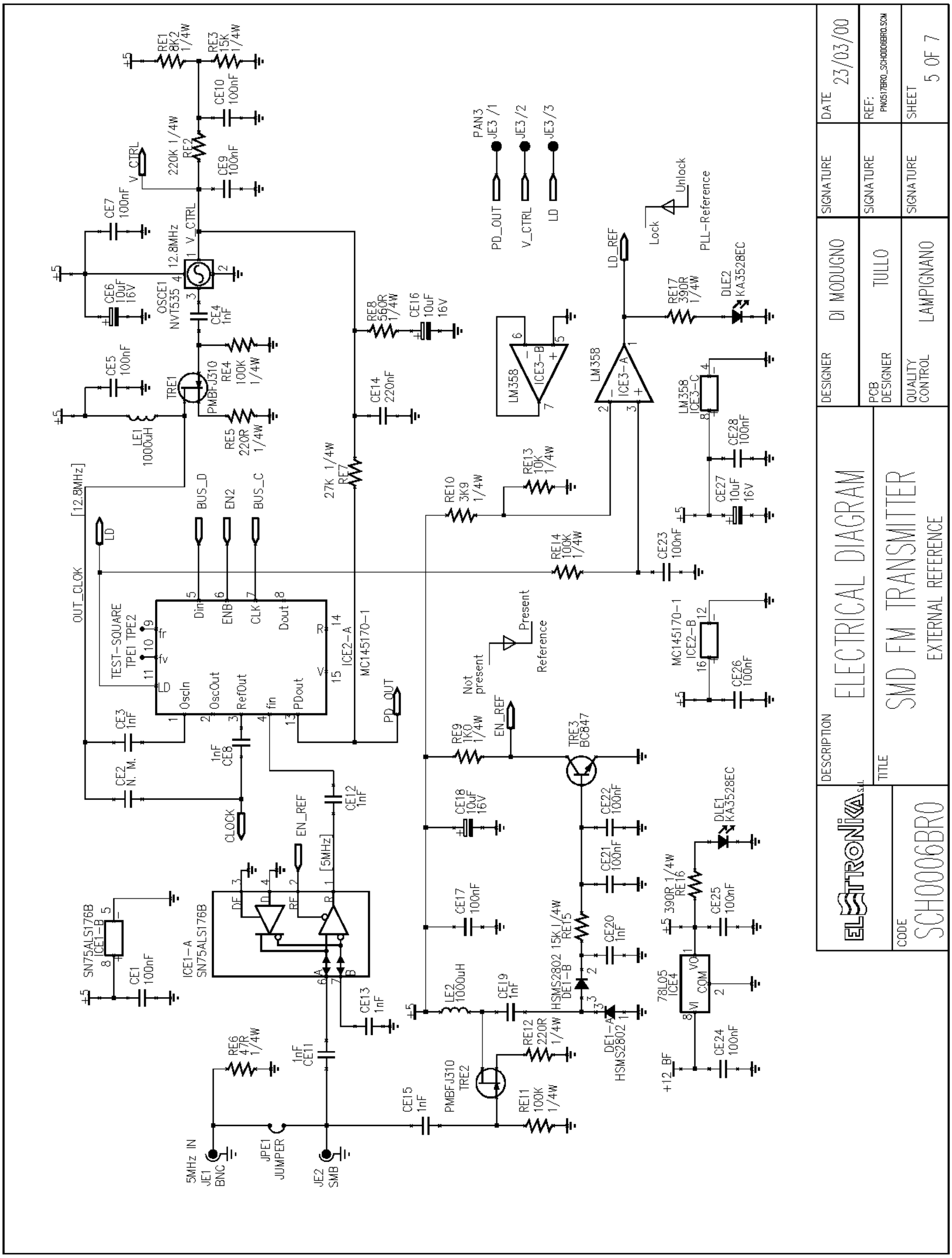
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DI MODUGNO
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QUALITY CONTROL
LAMPIGNANO
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SIGNATURE
DATE
23/03/00
REF:
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5 OF 7
MC145170-1
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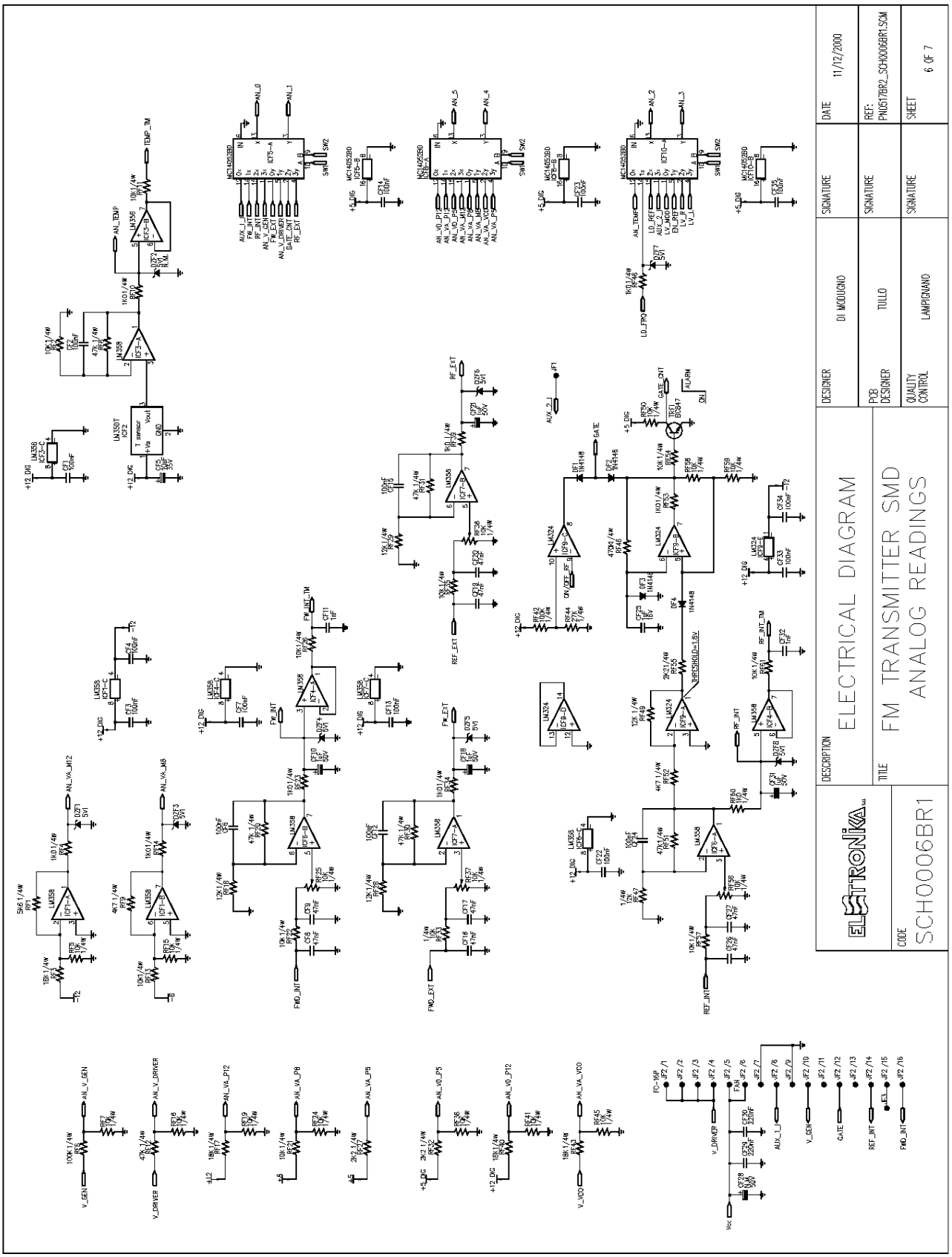
SN75ALS176B
ICE1-A
LM358
ICE3-A
ICE3-B
78L05
ICE4
OSCE1
NV7535
12.8MHz
PMBFJ310
TRE1
TRE2
BC847
TRE3
HSMS2802
KA3528EC
DLE1
DLE2
5MHz IN
JE1
BNC
JE2
SMB
JPE1
JUMPER
PAN3
JE3 /1
JE3 /2
JE3 /3
PD_OUT
V_CTRL
LD
LD_REF
EN_REF
BUS_D
EN2
BUS_C
CLOCK
OUT_CLOK
TEST-SQUARE
TPE1 TPE2
Lock
Unlock
PLL-Reference
Present
Not present
Reference
+12_BF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PCB DESIGNER
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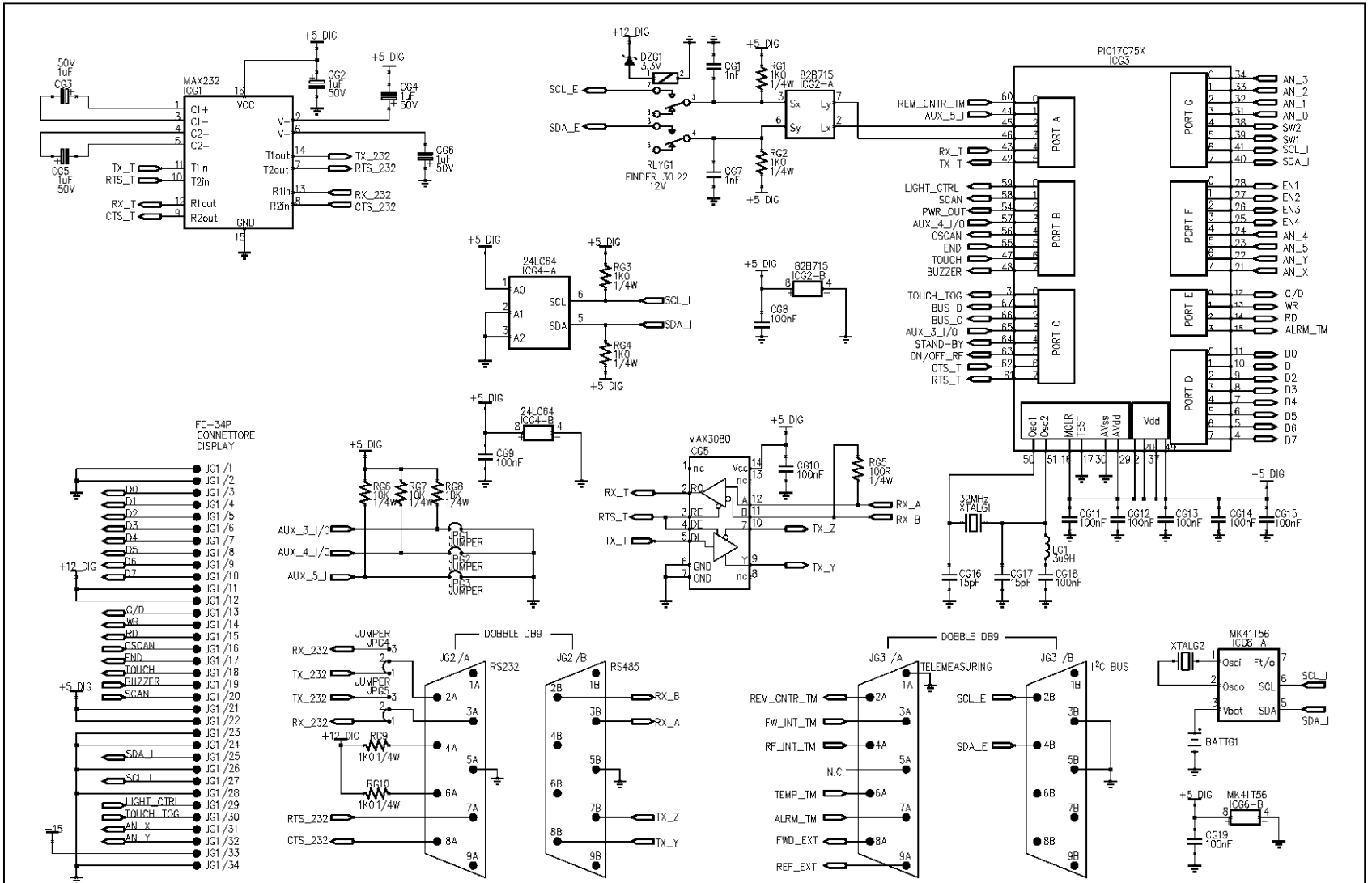

ELETTRONIKA S.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER: ZEZZA	SIGNATURE	DATE: 23/03/00
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		QUALITY CONTROL: LAMPIGNANO	SIGNATURE	SHEET: 7 OF 7

COMPONENT LIST *SCH0006BR1*

Part Name/Number	Description	Qty.	Comps. Page 1/10
257BLR-3618N 05010	FILTRO AUDIO TOKO	4	LPB1-4
BATT BH-001RB 03093	BATTERY HOLDER	1	BATTG1
CC 100nF-S 01065B	Y5V 1206 COND	88	CA1
			CA3-4
			CA7-8
			CA11-12
			CA14
			CA18
			CA20
			CA22-23
			CA29-30
			CB3-4
			CB6-7
			CB21-26
			CB44-47
			CB51
			CB54-55
			CB57-58
			CB61
			CB65-66
			CB70
			CB73
			CC1-4
			CC13-16
			CD3-5
			CE1
			CE5
			CE7
			CE9-10
			CE17
			CE21-26
			CE28
			CF1-4
			CF6-7
			CF12-15
			CF22-24
			CF33-35
			CG8-15
			CG18-19
CC 10pF-S 01086	SMD 1206 COND	6	CB1-2
			CB19
			CB31-32

Part Name/Number	Description	Qty.	Comps. Page 2/10
			CB43
CC 1206 NOT MOUNTED	SMD 1206 COND	3	CB62
			CD11
			CE2
CC 15pF-S 01088	SMD 1206 COND	2	CG16-17
CC 1nF-2%-S 01041D	SMD 1206 COND	6	CB27-29
			CB48-50
CC 1nF-S 01096	SMD 1206 COND	23	CB8
			CB36
			CC9
			CC12
			CD1
			CD7-10
			CD12
			CE3-4
			CE8
			CE11-13
			CE15
			CE19-20
			CF11
			CF32
			CG1
			CG7
CC 1uF16V-S 01760A	Y5V 1206 COND	1	CF25
CC 220nF-S 1069A	Y5V 1206 COND	6	CA19
			CA25-26
			CE14
			CF29-30
CC 22pF-S 01090	SMD 1206 COND	13	CB11-12
			CB17-18
			CB34-35
			CB39-40
			CC5
			CC7-8
			CC10-11
CC 33pF-S 1023A	SMD 1206 COND	3	CB5
			CB20
			CB33
CC 47nF-S 01061A	SMD 1206 COND	8	CF8-9
			CF16-17
			CF19-20
			CF26-27
CE 100uF16V-S 01792A	ELETTR SMD COND	8	CB9
			CB15
			CB30

Part Name/Number	Description	Qty.	Comps. Page 3/10
			CB37
			CB59-60
			CB71-72
CE 10uF16V-S 01776A	ELETTR SMD COND	12	CA5
			CB14
			CB16
			CB41-42
			CB56
			CB67
			CC6
			CE6
			CE16
			CE18
			CE27
CE 10uF35V-S 01778A	ELETTR SMD COND	6	CB53
			CB64
			CD2
			CD6
			CF5
CE 10uF50V-S 01779A	ELETTR SMD COND	2	CA27-28
CE 1uF50V-S 01763A	ELETTR SMD COND	11	CB13
			CB38
			CF10
			CF18
			CF21
			CF31
			CG2-6
CE 47uF25V-S 01789A	16V ELETTR. SMD	10	CA2
			CA9-10
			CA13
			CA15-17
			CB52
			CB63
			CD13
CE 47uF50V-S 01791C	ELETTR SMD COND	3	CA6
			CA21
			CA24
CE D8 NOT MOUNTED	ELETTR SMD COND	1	CF28
CV 4.5-20pF-S 01481	VARIABLE COND	1	CB68
CV 7-50pF-S 01474	VARIABLE COND	1	CB69
D 1N4148-S 03002	SMD DIODE	11	DA1-2
			DB3-6
			DC1
			DF1-4
D HSMS2802 03207	SMD DIODE	4	DB1-2

Part Name/Number	Description	Qty.	Comps.	Page 4/10
			DC2	
			DE1	
DL KA-3528EC 03056	RED SMD LED DIODE	9	DLA1-4	
			DLB1-2	
			DLC1	
			DLE1-2	
DZ 3V3 03105	ZENER DIODE	1	DZG1	
DZ 5V1-S 03128	SMD ZENER DIODE	1	DZF1	
DZ Not mounted		1	DZF2	
DZ 5V1-S 03128	SMD ZENER DIODE	6	DZF3-8	
IC 24LC64 04815	SMD INTEG CIRCUIT	1	ICG4	
IC 7805 04315	VOLTAGE REGULATOR	1	ICA1	
IC 7812 04321	VOLTAGE REGULATOR	2	ICA2	
			ICA4	
IC 78L05-S 04301A	SMD VOLTAGE REGULATOR	1	ICE4	
IC 78M08 04303B	SMD VOLTAGE REGULATOR	1	ICB11	
IC 79M08 04304A	SMD VOLTAGE REGULATOR	1	ICB10	
IC 79M12 04308B	SMD VOLTAGE REGULATOR	1	ICA3	
IC 82B715-S 04734A	SMD INTEG CIRCUIT	1	ICG2	
IC HEF4053BT 04710A	SMD INTEG CIRCUIT	1	ICC1	
IC LM1973M 04825A	SMD INTEG CIRCUIT	1	ICB7	
IC LM317 04340	INTEG CIRCUIT	1	ICA5	
IC LM324M-S 04658A	SMD INTEG CIRCUIT	1	ICF9	
IC LM358M-S 04660	SMD INTEG CIRCUIT	7	ICA6	
			ICE3	
			ICF1	
			ICF3-4	
			ICF6-7	
IC LM35DT 00664	INTEG CIRCUIT	1	ICF2	
IC LM833-S 04643A	SMD INTEG CIRCUIT	8	ICB1-6	
			ICC2-3	
IC MAX232-S 04804B	SMD INTEG CIRCUIT	1	ICG1	
IC MAX3080-S 04770	SMD INTEG CIRCUIT	1	ICG5	
IC MC14052BD 04708C	SMD INTEG CIRCUIT	3	ICF5	
			ICF8	
			ICF10	
IC MC14066BD-S 4708B	SMD INTEG CIRCUIT	1	ICB8	
IC MC14094BD 04718	SMD INTEG CIRCUIT	1	ICB9	
IC MC145170-S 04683A	SMD INTEG CIRCUIT	1	ICE2	
IC MK41T56 04611	SMD INTEG CIRCUIT	1	ICG6	
IC NME1215S 04832	INTEG CIRCUIT	1	DCA1	
IC PIC17C75X 04807A	SMD INTEG CIRCUIT	1	ICG3	
IC SN75176B-S 04720	SMD INTEG CIRCUIT	1	ICE1	
IND 0u12H-NE45 05032	INDUCTOR	1	LD3	
IND 1mH-NE45-S 05077	INDUCTOR	2	LE1-2	

Part Name/Number	Description	Qty.	Comps. Page 5/10
IND 2u2H-S 05020A	INDUCTOR	7	LB1-4
			LC1-2
			LD2
IND 33uH-S 05024A	INDUCTOR	2	LA2-3
IND 3u9H-S 05030	INDUCTOR	1	LG1
IND CBD8 05072	INDUCTOR	8	LA1
			LA4
			LB5-8
			LD1
			LD4
J BNC-90G-PCB 2034	PCB CONNECTOR	4	JB3
			JC2-3
			JE1
J CDF18AUN15SN 02872	PCB CONNECTOR	2	JG2-3
J FC-16P 02701-02700	PCB CONNECTOR POL	1	JF2
J FC-34P 02696	PCB CONNECTOR POL	1	JG1
J NC3FD-H 02862	XLR-90G-PCB SOCKET	2	JB1-2
J PAN3 02707	PCB CONNECTOR	1	JE3
J SCREWCONN2 02853	PCB SCREW CONNECTOR	1	JA1
J SMB-PCB 02516	PCB CONNECTOR	2	JD1
			JE2
J TESTP1.3mm 07913	TEST POINT	5	JA2
			JF1
			JF3
			TPB1-2
JU JUMP2 02739-02742	MASCHIO PAN2	6	JPA1
			JPB2
			JPC1
			JPG1-3
JU JUMP2-SMD	MASCHIO PAN2 COD.	1	JPE1
JU JUMP3 02707-02742	MASCHIO PAN3	6	JPB1
			JPB3-4
			JPC2
			JPG4-5
MPX CTC30-01 04894	STEREO ENCODER	1	MPXB1
OSC NVT535 05168	TCXO	1	OSCE1
PN0658A SCH0007AR0	VCO FM INTEGRATED	1	VCOD1
R 100K-1%-S 00065B	RES 1/4W 1% SMD 1206	18	RB14
			RB25
			RB27-28
			RB30
			RB42
			RB46
			RB54
			RB64

Part Name/Number	Description	Qty.	Comps. Page 6/10
			RB67-69 RC19 RE4 RE11 RE14 RF6 RF42
R 100R-1%-S 00029D	RES 1/4W 1% SMD 1206	4	RB18 RB55 RC20 RG5
R 10K-1%-S 00053B	RES 1/4W 1% SMD 1206	49	RA1 RA13 RB5 RB8 RB11 RB24 RB29 RB31 RB41 RB43 RB47 RB52 RB57 RB63 RB76 RC5 RC7 RC14 RC16 RC25 RD3 RD6 RE13 RF2 RF5 RF7 RF11 RF13 RF15-16 RF19 RF21-22 RF24 RF26 RF33

Part Name/Number	Description	Qty.	Comps. Page 7/10
			RF35-36
			RF41
			RF45
			RF50
			RF54
			RF56-57
			RF59
			RF61
			RG6-8
R 10R-1%-S 00017D	RES 1/4W 1% SMD 1206	22	RA19-20
			RB1-4
			RB34-37
			RB39-40
			RB70-71
			RB77
			RB83
			RC28-31
			RD4
			RD9
R 1206 NOT MOUNTED	RES 1/4W 5% SMD 1206	6	RA10
			RB32
			RB65
			RC8-9
			RD8
R 12K-1%-S 00054B	RES 1/4W 1% SMD 1206	5	RF18
			RF28-29
			RF47
			RF49
R 150K-S	RES 1/4W 5% SMD 1206	1	RC18
R 15K-1%-S 00055B	RES 1/4W 1% SMD 1206	3	RA21
			RE3
			RE15
R 18K-1%-S 00056C	RES 1/4W 1% SMD 1206	6	RB80
			RC4
			RF3
			RF17
			RF40
			RF43
R 1K0-1%-S 00041B	RES 1/4W 1% SMD 1206	21	RA18
			RB81
			RB86
			RC1
			RE9
			RF4
			RF10

Part Name/Number	Description	Qty.	Comps. Page 8/10
			RF14
			RF23
			RF34
			RF39
			RF48
			RF53
			RF60
			RG1-4
			RG9-10
R 1K0-S 00041A	RES 1/4W 5% SMD 1206	2	RB87-88
R 1K2-1%-S 00042A	RES 1/4W 1% SMD 1206	4	RB15-16
			RB44-45
R 1K5-1%-S 00043B	RES 1/4W 1% SMD 1206	7	RA3-5
			RA7
			RB38
			RB74
			RD7
R 220K-1%-S 00069D	RES 1/4W 1% SMD 1206	1	RE2
R 220R-1%-S 00033C	RES 1/4W 1% SMD 1206	2	RE5
			RE12
R 27K-1%-S 00058B	RES 1/4W 1% SMD 1206	5	RB85
			RC22
			RC27
			RE7
			RF44
R 2K2-1%-S 00045B	RES 1/4W 1% SMD 1206	5	RB21
			RB60
			RF27
			RF32
			RF55
R 330K-1%-S 00071D	RES 1/4W 1% SMD 1206	2	RB6
			RB49
R 33K-1%-S 00059B	RES 1/4W 1% SMD 1206	3	RB9
			RB48
			RB78
R 390R-1%-S 00036B	RES 1/4W 1% SMD 1206	3	RA2
			RE16-17
R 3K3-1%-S 00047B	RES 1/4W 1% SMD 1206	2	RA9
			RC12
R 3K9-1%-S 00048B	RES 1/4W 1% SMD 1206	2	RC15
			RE10
R 470R-1%-S 00037B	RES 1/4W 1% SMD 1206	1	RA11
R 470K-S 00073A	RES 1/4W 5% SMD 1206	1	RF46
R 47K-1%-S 00061B	RES 1/4W 1% SMD 1206	14	RA14-15
			RB26

Part Name/Number	Description	Qty.	Comps. Page 9/10
			RB33
			RB66
			RD1-2
			RD5
			RF8
			RF12
			RF20
			RF30-31
			RF51
R 47R-1%-S 00025C	RES 1/4W 1% SMD 1206	3	RB72-73
			RE6
R 4K7-1%-S 00049B	RES 1/4W 1% SMD 1206	21	RA12
			RA22
			RB7
			RB10
			RB12-13
			RB17
			RB19
			RB50-51
			RB53
			RB56
			RB58-59
			RB82
			RC2-3
			RC11
			RC13
			RF9
			RF52
R 560R-1%-S 00038B	RES 1/4W 1% SMD 1206	1	RE8
R 5K6-1%-S 00050B	RES 1/4W 1% SMD 1206	2	RC10
			RF1
R 68K-1%-S 00063B	RES 1/4W 1% SMD 1206	5	RA16
			RB22
			RB61
			RC23
R 68R-S 00027A	RES 1/4W 5% SMD 1206	1	RA17
R 6K8-1%-S 00051B	RES 1/4W 1% SMD 1206	1	RA6
R 8K2-1%-S 00052B	RES 1/4W 1% SMD 1206	1	RE1
RL FINDER30.22 07564	RELE	1	RLYG1
RL FINDER40.52 7567A	RELE	1	RLYA1
RV 100R-S-H/S 00796	SMD VARIABLE RESISTOR	1	RC17
RV 10K-3266W 00810	VARIABLE RESISTOR	4	RF25
			RF37-38
			RF58
RV 10K-M-H 00777	VARIABLE RESISTOR	2	RC21

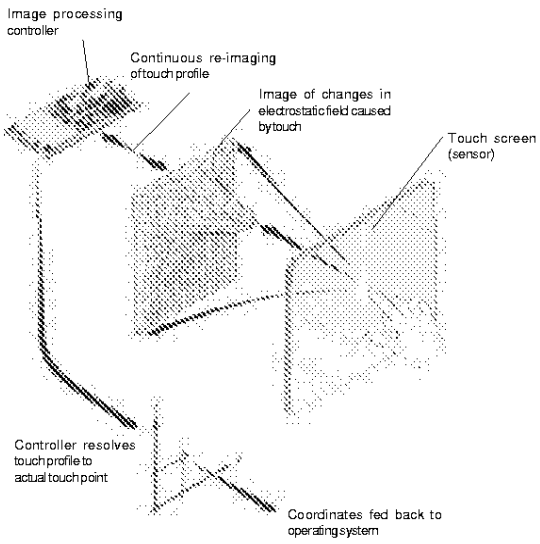
Part Name/Number	Description	Qty.	Comps.	Page 10/10
			RC26	
RV 10K-S-H/S 00793	SMD VARIABLE RESISTOR	6	RB20	
			RB23	
			RB62	
			RB84	
			RC6	
			RC24	
RV 500R-S-H/S 00798	SMD VARIABLE RESISTOR	1	RA8	
RV 50K-S-H/S 00797	SMD VARIABLE RESISTOR	2	RB75	
			RB79	
TR BC807 03453	PNP SMD TRANSISTOR	1	TRD1	
TR BC817 03454	NPN SMD TRANSISTOR	1	TRA1	
TR BC847 03456	NPN SMD TRANSISTOR	7	TRB1	
			TRC1-2	
			TRD2-3	
			TRE3	
			TRF1	
TR BC856 03455	PNP SMD TRANSISTOR	2	TRA3	
			TRC3	
TR BFG35 03990	NPN SMD TRANSISTOR	1	TRD4	
TR PMBFJ310 04105A	NFET SMD TRANSISTOR	3	TRA2	
			TRE1-2	
XTAL 32.768k-S 05146	QUARTZ	1	XTALG2	
XTAL 32MHz-S 05291	QUARTZ	1	XTALG1	

DESCRIPTION AND FUNCTIONING

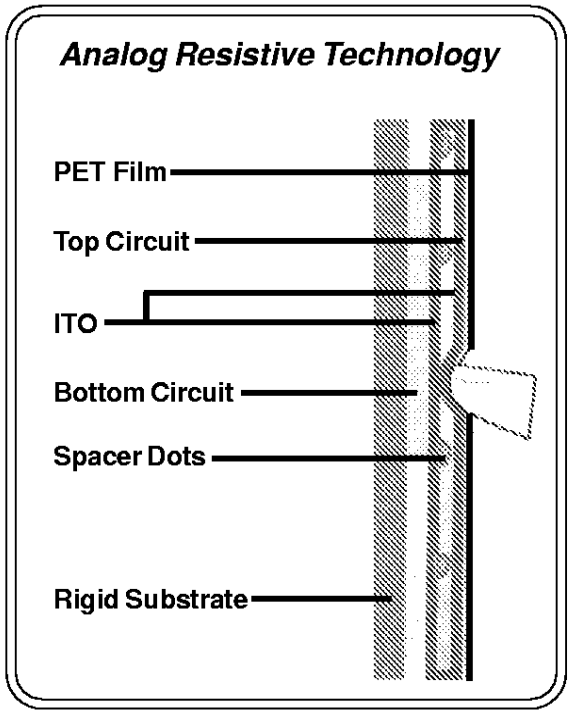
These are the 4-wire analogic Touch Screens composed by two layers separated by an insulating spacer. A pressure applied with a finger or a pen causes an electrical contact of the two layers which may be detected just like closing a switch. Extremely accurate information concerning the position of the switch may be obtained measuring the resistive level at the X and J axis.

- Trasparent Resistive Layer: an Indium Tin Oxde (ITO) film deposit with a value between 150 and 500 ohm/sq.
- Bus bars: silver past tipically 1000 times more conductive than ITO.
- Spacer (Separator): between the higher and lower layers there is a biadhesive element which covers and separates the Bus bars.
- Substrate: typically this is a thin material such as glass or polyester. The lower layer is rigid. The higher one has to be flexible enough to work as a switch.

The principle of the Touch panel is applying a tension gradient trough one of the layers measuring the voltage at the contact point with the opposite one. The lower layer is made up by a substrate, bus bars and a transparent resistive deposit (shown as resistor) connecting the two bus bars.



Near Field Imaging

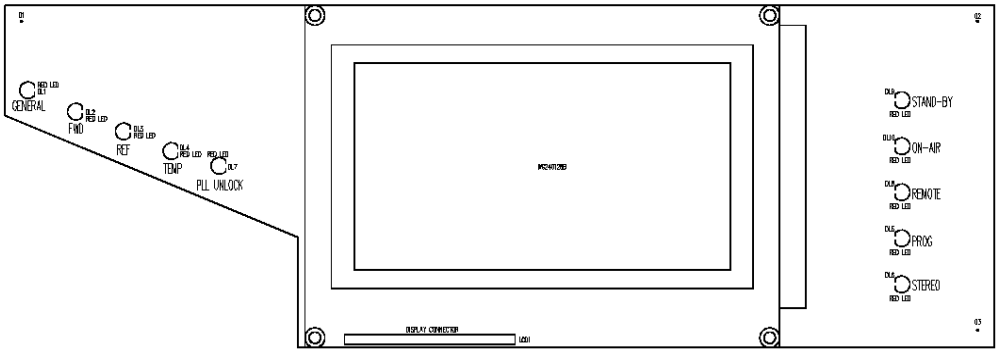


USE AND MAINTENANCE

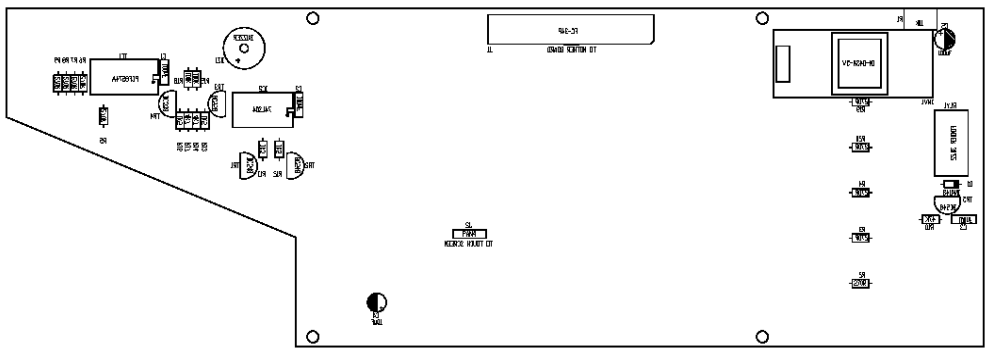
Clean regularly the surface of the Touch Screen to remove dust, dirt, fingerprints and other materials affecting its optycal qualities. For a better result use a moist and clean cloth along with any non-abrasive commercial cleaner. Prolonged contact with abrasive or dry materials may scratch the surface, eventually affecting the quality of the image.

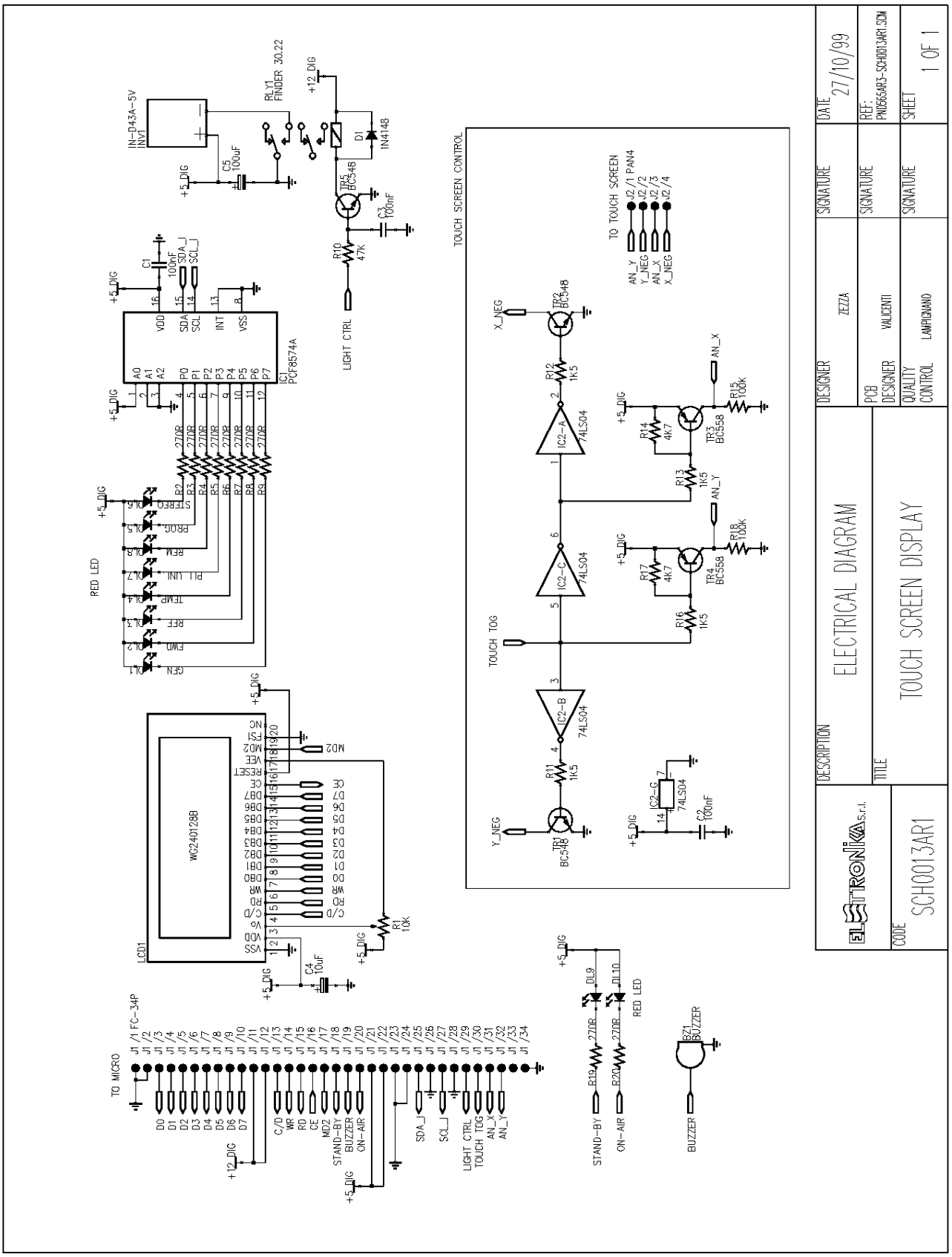
Component layout SCH0013AR1

Top Layer



Bottom Layer

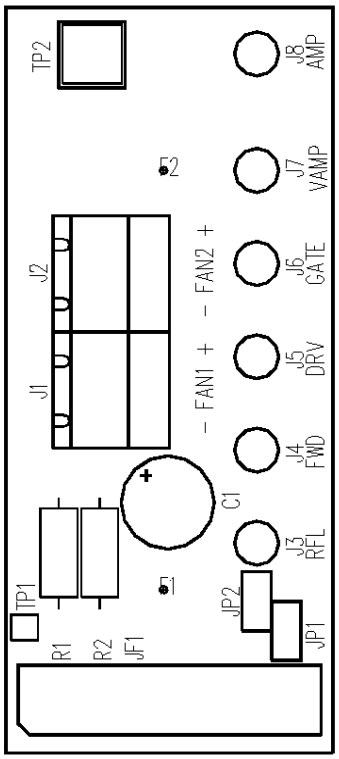



ELETTRONIKA s.r.l.
CODE
SCH0013AR1
DESCRIPTION
ELECTRICAL DIAGRAM
TITLE
TOUCH SCREEN DISPLAY
DESIGNER
ZEZZA
PCB DESIGNER
VALICENTI
QUALITY CONTROL
LAMPIGNANO
SIGNATURE
SIGNATURE
SIGNATURE
DATE
27/10/99
REF:
PMD65AR3-SCH0013AR1.SCH
SHEET
1 OF 1
TOUCH SCREEN CONTROL
TO TOUCH SCREEN
TO MICRO
RED LED
LIGHT CTRL
BUZZER
STAND-BY
ON-AIR
LCD1
WG240128B
IC1
PCF8574A
IC2-A
IC2-B
IC2-C
IC2-G
74LS04
TR1
TR2
TR3
TR4
TR5
BC548
BC558
RLY1
FINDER 30.22
IN1
IN-D43A-5V
D1
1N4148
B21
BUZZER

COMPONENT LIST *SCH0013AR1*

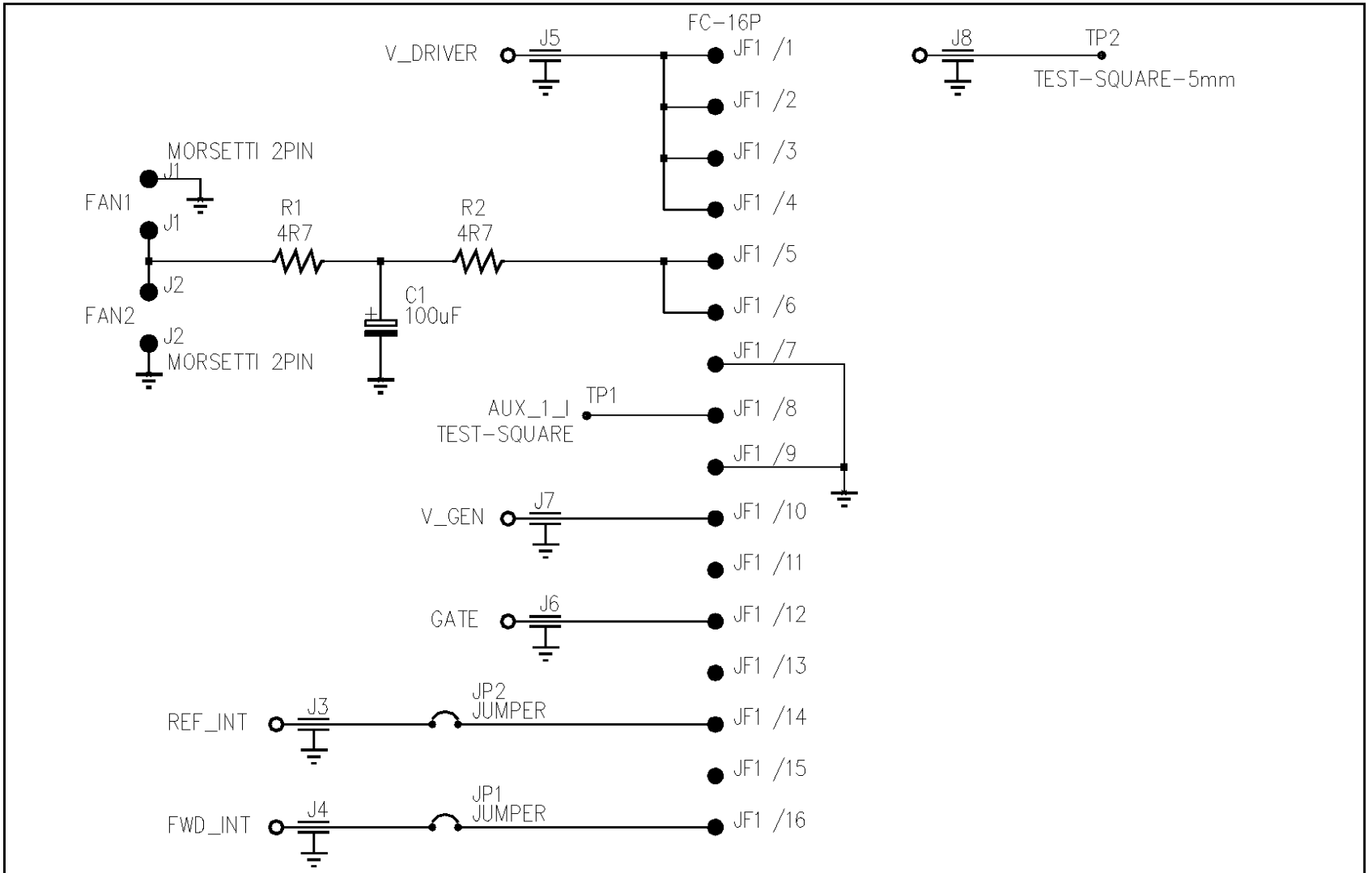
Part Name/Number	Description	Qty.	Comps.
BZ AI-155 03705	5VDC BUZZER	1	BZ1
CC 100nF 01065	CERAMIC COND	3	C1-3
CE 100uF25V 01793	ELETT. COND.	1	C5
CE 10uF63V 01779	ELETT. COND.	1	C4
D 1N4148 03001	DIODE	1	D1
DIS WG240128B	240/128 DOT MATRIX LCD	1	LCD1
DL LEDR5 03061	RED LED DIODE 5mm	10	DL1-10
IC 74LS04 04722A	INTEG CIRCUIT	1	IC2
IC PCF8574A 04829	INTEG CIRCUIT	1	IC1
INV IN-D43A-5V	DC/AC MODULE	1	INV1
J FC-34P 02696	PCB CONNECTOR POL	1	J1
J PAN4 02710	PCB CONNECTOR	1	J2
R 100K 0065	RES 1/4W 5%	2	R15 R18
R 1K5 0043	RES 1/4W 5%	4	R11-13 R16
R 270R 0034	RES 1/4W 5%	10	R2-9 R19-20
R 47K 0061	RES 1/4W 5%	1	R10
R 4K7 0049	RES 1/4W 5%	2	R14 R17
RL FINDER30.22 07564	RELE	1	RLY1
RV 10K-S-V 00750	VARIABLE RESISTOR	1	R1
TR BC548 03423	NPN TRANSISTOR	3	TR1-2 TR5
TR BC558 03410	NPN TRANSISTOR	2	TR3-4

Component layout SCH0020AR0



COMPONENT LIST *SCH0020AR0*

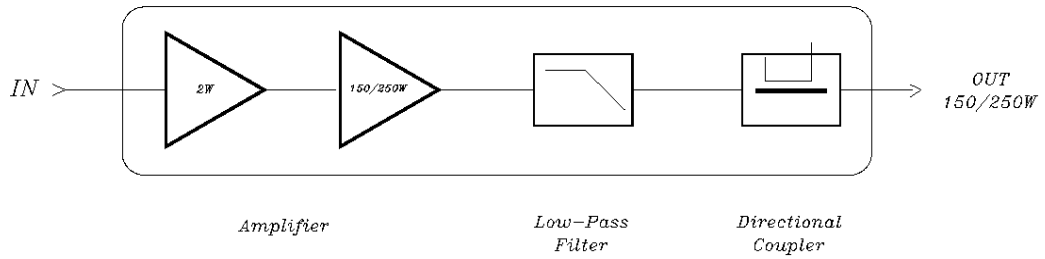
Part Name/Number	Description	Qty.	Comps.
CE 100uF50V 01795	ELETT. COND.	1	C1
J FC-16P 02702	PCB CONNECTOR POL	1	JF1
J SCREWCONN2 02853	PCB SCREW CONNECTOR	2	J1-2
J TESTPOINT-P	TEST POINT	6	J3-8
JU JUMP2 02739-02742	MASCHIO PAN2	2	JP1-2
R 4R7-1/2W 00123	RES 1/2W 5%	2	R1-2


FC-16P
V_DRIVER
J5
JF1 /1
JF1 /2
JF1 /3
JF1 /4
JF1 /5
JF1 /6
JF1 /7
JF1 /8
JF1 /9
JF1 /10
JF1 /11
JF1 /12
JF1 /13
JF1 /14
JF1 /15
JF1 /16
J8
TP2
TEST-SQUARE-5mm
MORSETTI 2PIN
J1
FAN1
J1
R1
4R7
R2
4R7
J2
FAN2
J2
MORSETTI 2PIN
C1
100uF
AUX_1_I
TP1
TEST-SQUARE
V_GEN
J7
GATE
J6
REF_INT
J3
JP2
JUMPER
FWD_INT
J4
JP1
JUMPER
ELETTRONIKA
DESCRIPTION
ELECTRICAL DIAGRAM
TITLE
RF ADAPTER
CODE
SCH0020AR0
DESIGNER
DI MODUGNO
SIGNATURE
DATE
09/11/99
PCB DESIGNER
TULLO
SIGNATURE
REF:
PN0680AR4_SCH0020AR4.SCM
QUALITY CONTROL
LAMPIGNANO
SIGNATURE
SHEET
1 OF 1

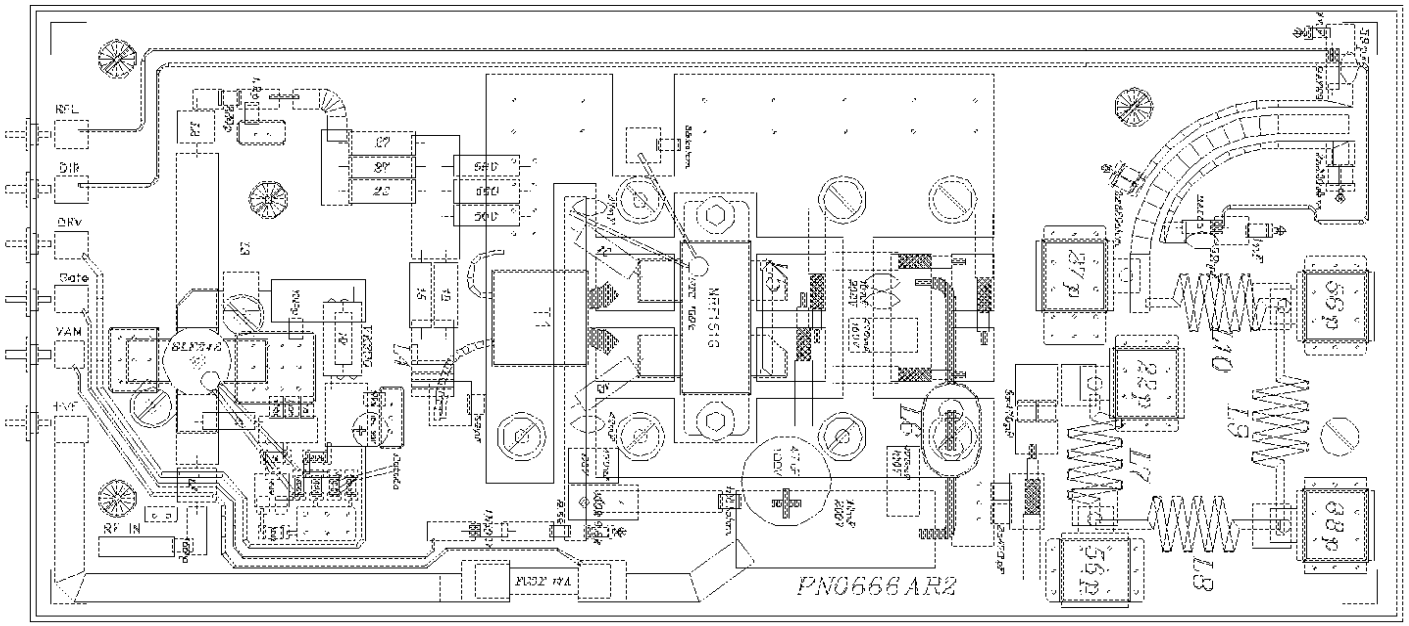
TECHNICAL CHARACTERISTICS

Output Power	250W
Gain	31dB
RF Input Impedance	50Ω
RF Output Impedance	50Ω
DC power	50Vcc
Driver power supply	10-25Vdc
Frequency Range	87.5 - 108MHz

MFF0002AR0 Block Diagram



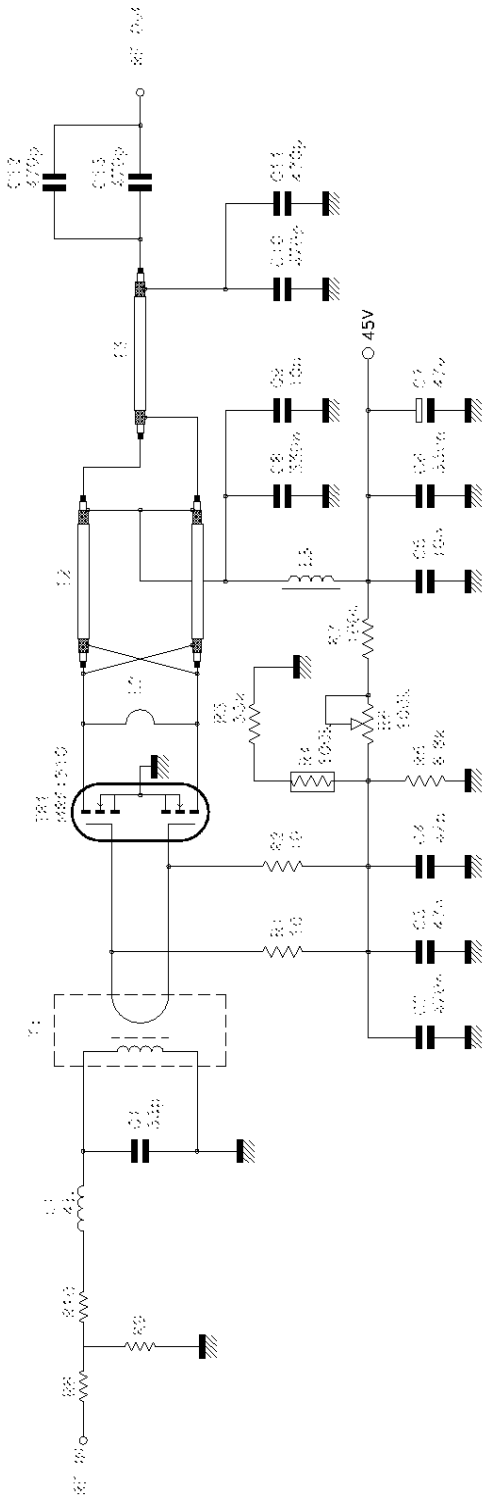
L1 = L2 = 6-Turns coil (Cod. 5043) slightly loosened
L3 = Coil Cod. 5045
L4 = 4-Turns on D=4.6mm (change 6-Turns coil cod. 5043)
L5 = See attachment
L6 = RF Choke (1/2-Turn on ferrite core)



L7 = L8 = L9 = L10 = 4-Coil
D = 8mm Silvered wire 1.2mm

Final polarization: Vdd=50V, Idd=50mA
Driver polarization: Vdd=28V, Idd=200mA

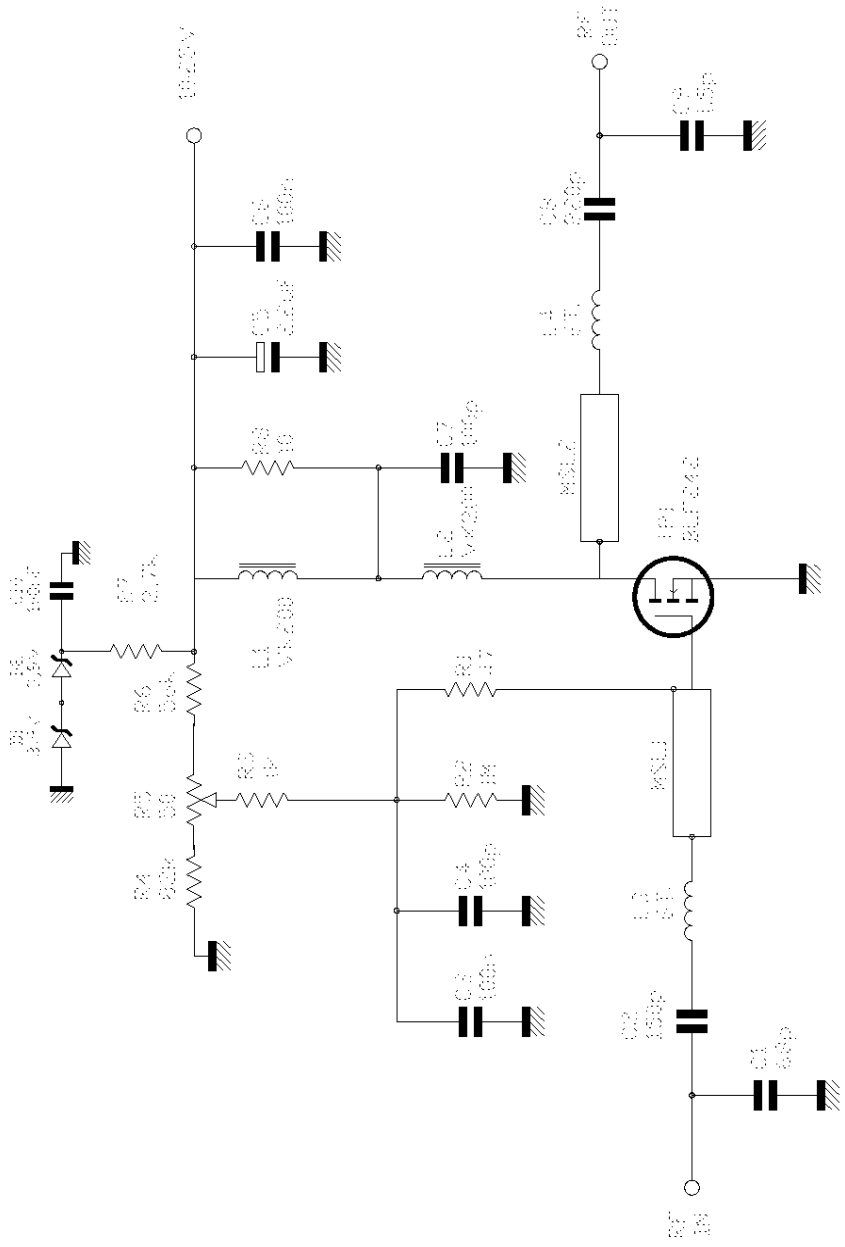
elettronica	DESCRIPTION: FM 250W MOSFET POWER MODULE FOR MIRA	DESIGNER: LAPIETRA	SIGNATURE:	DATE: 12/04/01
CODE: PN0666AR2	TITLE: COMPONENT LAYOUT	PCB DESIGNER:	SIGNATURE:	REF:
		QUALITY CONTROL: LAMPIGNANO	SIGNATURE:	SHEET: 1/1



ELETTRONIKA s.r.l.	Modulo Finale 150/250W FM	
	150/250W FM Final Module	

COMPONENT LIST *150/250W FM Final Module*

REFER.	TYPE	DESCRIPTION
R1	10Ω 1/2W	RESISTOR
R2	10Ω 1/2W	RESISTOR
R3	33kΩ 1/4W	SMD RESISTOR
R4	100kΩ	NTC
R5	6,8Ω 1/4W	SMD TRIMMER
R6	100kΩ	MULTITURN TRIMMER
R7	100kΩ 1/4W	RESISTOR
R8	27+27+22 1/2W	RESISTOR
R9	560x4 1/2W	RESISTOR
R10	15+18 1/2W	RESISTOR
C1	33pF	MULTILAYER CERAMIC CHIP CAPACITOR (TYPE ATC-100B)
C2	470pF	MKT CAPACITOR
C3	56pF	PHILIPS SMD CAPACITOR
C4	56pF	PHILIPS SMD CAPACITOR
C5	10nF	200V PHILIPS SMD CAPACITOR
C6	330nF	MKT CAPACITOR
C7	47uF 63V	ELECTROLYTIC CAPACITOR
C8	330nF	MKT CAPACITOR
C9	10nF	200V PHILIPS SMD CAPACITOR
C10	470pF	MULTILAYER CERAMIC CHIP CAPACITOR (TYPE ATC-100B)
C11	470pF	MULTILAYER CERAMIC CHIP CAPACITOR (TYPE ATC-100B)
C12	470pF	MULTILAYER CERAMIC CHIP CAPACITOR (TYPE ATC-100B)
C13	470pF	MULTILAYER CERAMIC CHIP CAPACITOR (TYPE ATC-100B)
L1		4 TURNS COIL
L2		1/2 TURN COIL
L3		RF CHOKE
TR1	MRF151G	RF TRANSISTOR
T1		RF 9:1 *balun* TRANSFORMER
T2		RF 4:1 *ba-ba* TRANSFORMER
T3		RF 1:1 *balun* TRANSFORMER



ELETTRONIKA s.r.l.	Pilota 2W FM	
	2W FM Pilot	

COMPONENT LIST *2W Pilot*

REFER.	TYPE	DESCRIPTION
R1	47Ω 1/2W	RESISTOR
R2	1MΩ 1/4W	SMD RESISTOR
R3	1kΩ 1/4W	SMD RESISTOR
R4	82k	SMD RESISTOR
R5	50k	SMD TRIMMER
R6	56kΩ 1/4W	SMD RESISTOR
R7	2,7k 1/4W	SMD RESISTOR
R8	10Ω 1/2W	RESISTOR
C1	68pF	SMD CAPACITOR
C2	150pF	SMD CAPACITOR
C3	100nF	SMD CAPACITOR
C4	100pF	SMD CAPACITOR
C5	2.2uF	ELECTROLYTIC CAPACITOR
C6	100nF	SMD CAPACITOR
C7	100pF	SMD CAPACITOR
C8	220pF	SMD CAPACITOR
C9	1.5pF	SMD CAPACITOR
C10	100nF	SMD CAPACITOR
L1	VK200	RF CHOKE
L2	VK200	RF CHOKE
L3		6 TURN COIL
L4		6 TURN COIL
TR1	BLF242	RF TRANSISTOR
D1	3,9V	ZENER DIODE
D2	3,9V	ZENER DIODE

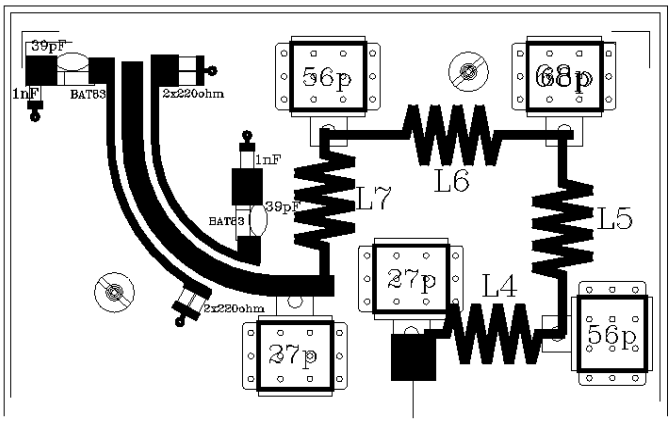
DESCRIPTION

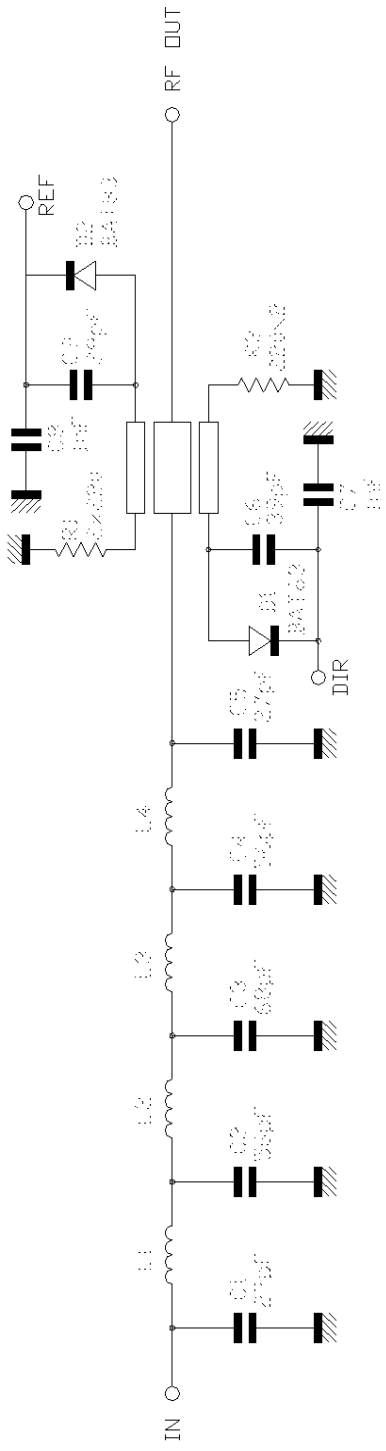
The module contains the direction copuler which measure the incident and reflected RF signals. These signals are elaborated to be used by protection module for SWR and Power protection. The low-pass filter remove the harmonics.

SPECIFICATIONS

Return loss	> = 30dB
Insertion loss	< 0,2dB
Attenuation at 176MHz	> 40dB

Component layout Directional Coupler and L.P.F.





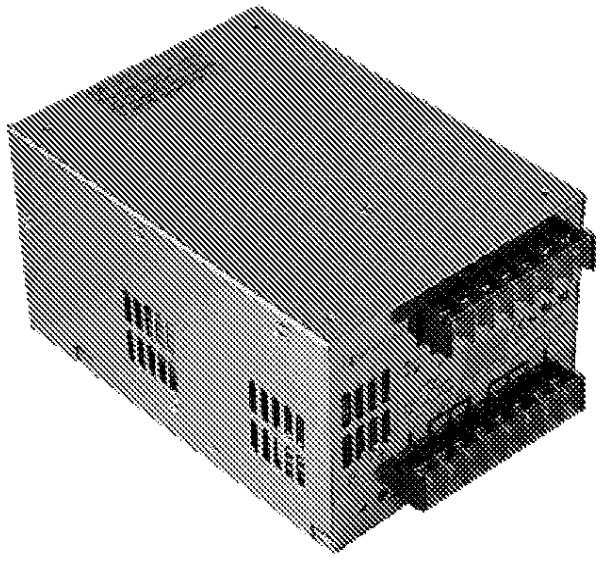
ELETTRONIKA s.r.l.	FM 30W Low-Pass Filter	
	Filtro Passa-Basso 30W FM	

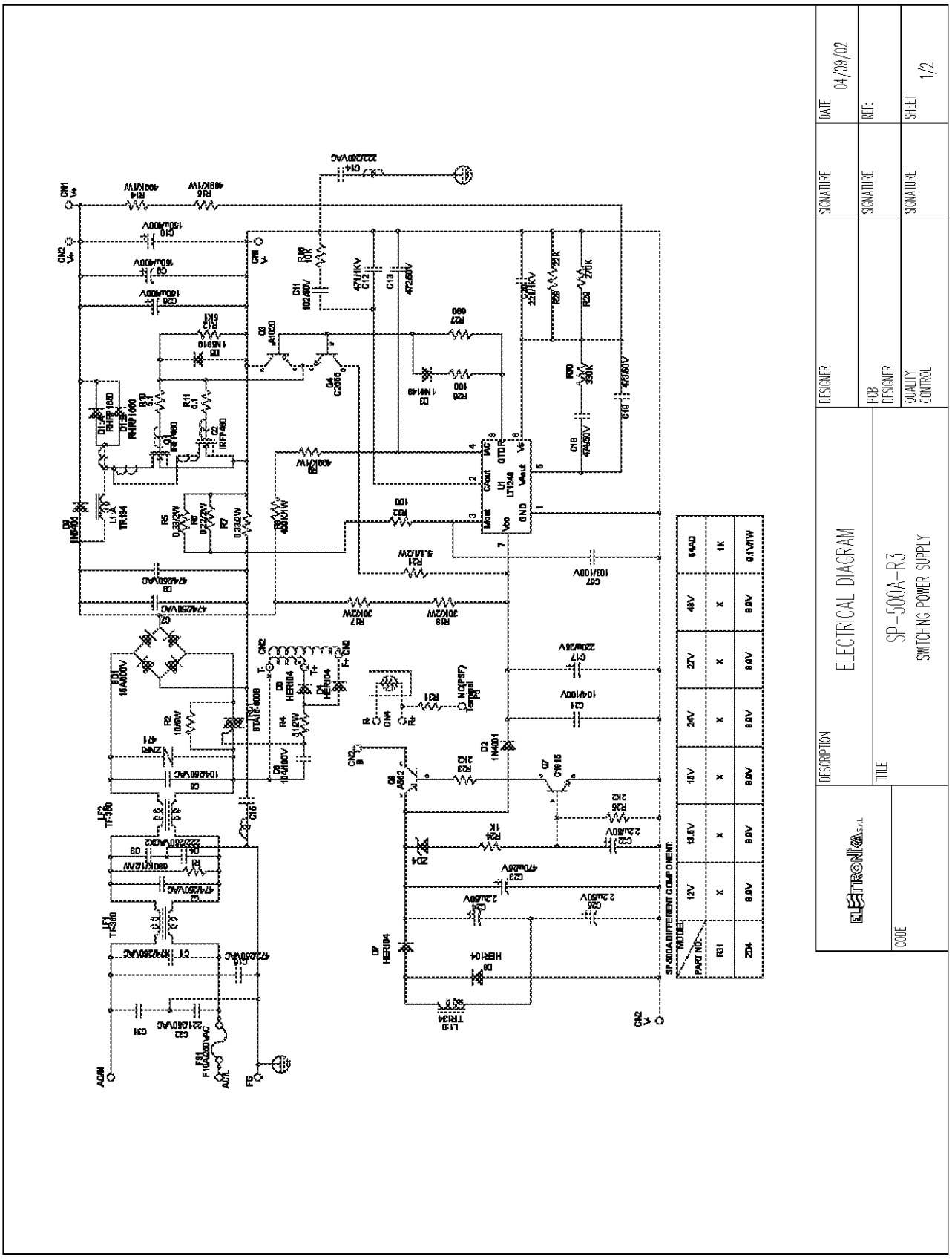
COMPONENT LIST *Low-Pass Filter*

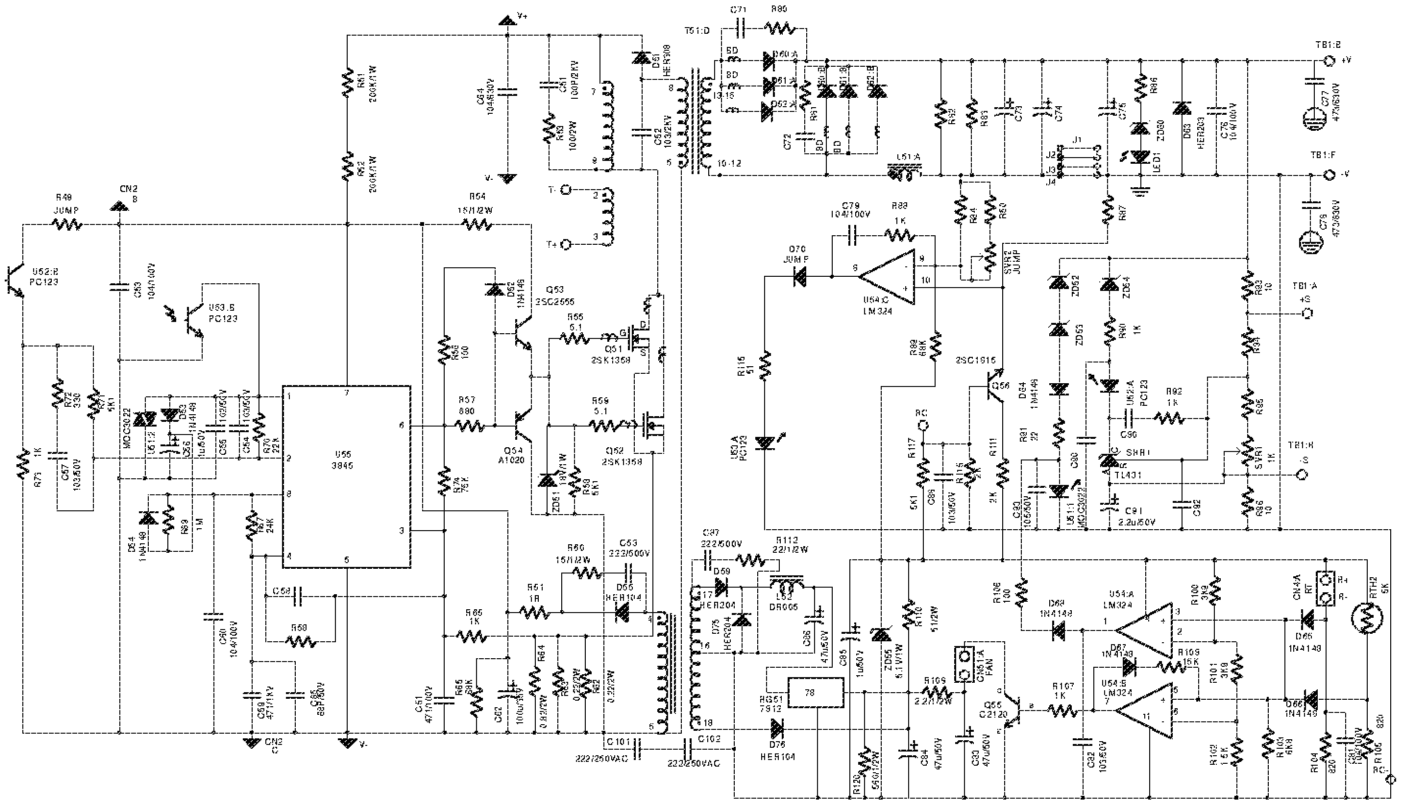
REFER.	TYPE	DESCRIPTION
R1	2x220Ω 1/4W	SMD RESISTOR
R2	2x220Ω 1/4W	SMD RESISTOR
C1	27pF	SEMCO CAPACITOR
C2	56pF	SEMCO CERAMIC CAPACITOR
C3	68pF	SEMCO CERAMIC CAPACITOR
C4	56pF	SEMCO CERAMIC CAPACITOR
C5	27pF	SEMCO CERAMIC CAPACITOR
C6	39pF	CERAMIC CAPACITOR
C7	1nF	PHILIPS SMD CAPACITOR
C8	1nF	PHILIPS SMD CAPACITOR
C9	39pF	CERAMIC CAPACITOR
D1	BAT 83	DIODE
D2	BAT 83	DIODE
L1		4T, d=1,2mm, D=8mm
L2		4T, d=1,2mm, D=8mm
L3		4T, d=1,2mm, D=8mm
L4		4T, d=1,2mm, D=8mm

SPECIFICATION

MODEL	SP-500-27	SP-500-48
DC Output Voltage	27Vdc	48Vdc
Output Rated Current	18A	10A
Output Current Range	0-18A	0-10A
Ripple & Noise (p-p)	200mVp-p	240mVp-p
DC Output Power	486W	480W
Efficiency	87%	87%
DC Voltage Adj.	24-30V	41-56V
Over V. Protection	31V-36.5V	57.6V-67.2V
Input Voltage Range	88-264Vac	
Input Frequency	47-63Hz	
Power Factor	0.95/100-240Vac	
Overload Protection	105%-135% Type: Foldback current limiting Recovery: Auto	
Over Temp. Protection	> =70°C Output Shutdown	
Fan Control	Temp. > =60°C Fan On < =50°C Fan Off	
Working Temp., Humidity	-10°C/+50°C, 20%-90% RH	
Dimension	185x120x93	
Weight	1.8Kg.	




ELETTRONIKA S.r.l.
DESCRIPTION
ELECTRICAL DIAGRAM
TITLE
SP-500A-R3
SWITCHING POWER SUPPLY
CODE
DESIGNER
PCB DESIGNER
QUALITY CONTROL
SIGNATURE
SIGNATURE
SIGNATURE
DATE
04/09/02
REF:
SHEET
1/2
SP-500A DIFFERENT COMPONENT
MODEL
PART NO.
R51
ZD4
12V
X
8.6V
15.6V
X
8.6V
18V
X
8.6V
24V
X
8.6V
27V
X
8.6V
48V
X
8.6V
54AD
1K
0.1W1W



SP-500B DIFFERENT COMPONENT:

PART NO / MODEL	C71,72	R90,91	D60,61 62	L51	R82,83	C73,74 75	R88	R94	R95	C80	R97	T51	L40 10mm	ZD52	ZD53	ZD54	ZD60	R84	R59	C82			
12V	222 /500V	10/1W	C25P06Q	TR127	220 /2W	1000u /35V	1K	6K8	1K5	1u/50V	910	TF407	J1,J2 J3,J4	12.8V	JUMP	JUMP	5.4V	1K8	10K	X			
13.5V	222 /500V	10/1W	C25P06Q	TR127	220 /2W	1000u /35V	1K	10K	1K8	1u/50V	1K2	TF400	J1,J2 J3,J4	16.1V	JUMP	JUMP	5.4V	1K8	6K8	X			
15V	222 /500V	15/1W	D9202	TR129	270 /2W	1000u /35V	1K	10K	1K5	1u/50V	1K2	TF401	J1,J2 J3,J4	18V/1W	JUMP	JUMP	5.4V	1K5	8K2	X			
24V	471 /1KV	22/1W	D9202	TR130	560 /2W	1000u /35V	2K2	20K	2K	1u/50V	910	TF402	J1,J2 J3	15V/1W	12.8V	12V/1W	10.6V	1K2	10K	X			
27V	331 /1KV	27/1W	D9202	TR131	1K /2W	470u /50V	2K2	24K	2K	224 /100V	820	TF403	J1,J2 J3	18V/1W	15V/1W	18V/1W	10.6V	1K1	6K8	X			
48V	221 /1KV	39/1W	D9202	TR132	3K3 /2W	220u /63V	6K8 /1/2W	36K	1K5	224 /100V	910	TF404	J2,J3	33V/1W	27V/1W	33V/1W	18.1V	820	10K	221/1KV			

ELETTRONIKA s.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER	SIGNATURE	DATE 04/09/02
		PCB DESIGNER	SIGNATURE	REF:
CODE	TITLE: SP-500A-R3 SWITCHING POWER SUPPLY	QUALITY CONTROL	SIGNATURE	SHEET 2/2

COMPONENT LIST *SP-500-27-C*

SPECIFICATIONS	QUANTITY	POSITION
CASE 910-D-R3	1	
CASE 910-T-R3	1	1
1208PTB1;L;20cm+TUBE/TYPE:B;	1	CASE
PIN KS-1	3	+S+V -S-V G-RC
MYLAR FILM 910-R1	2	
BOX PS-300 194x127x103mm	1	1
SCREW P 3x6 ISO NI	4	PCBA PCBB
SCREW F 5.0x12 TP1 NI	2	FAN
SCREW F 3x6 TP2 NI	5	CASE
LABEL UP SP-500-27-R2	1	
LABEL INDCON UL E010-R2 FAN CONT.	1	
CARTON PS-300 1CUFT	1	8
261x18mm	1	1 TB1
327x18mm	1	TB2
BOM FOR SP-500-27A ON PCB	1	
R/C 1/4W 5.1Ω 5% HP=10 T-52mm	2	R10, R11
R/C 1/4W 100Ω 5% HP=10 T-52mm	2	R26, R32
R/C 1/4W 680Ω 5% HP=10 T-52mm	1	R27
R/C 1/4W 1kΩ 5% HP=10 T-52mm	1	R24
R/C 1/4W 2.2kΩ 5% HP=10 T-52mm	2	R23, R25
R/C 1/4W 5.1kΩ 5% HP=10 T-52mm	1	R12
R/C 1/4W 10kΩ 5% HP=10 T-52mm	1	R16
R/C 1/4W 270kΩ 5% HP=10 T-52mm	1	R29
R/C 1/4W 330kΩ 5% HP=10 T-52mm	1	R30
R/C 1/2W 5.1Ω 5% T-52mm	1	R21
R/C 1/2W 680kΩ 5% T-52mm	1	R1
R/MO 2W 51Ω 5%	1	R4
R/MO 2W 30kΩ 5%	2	R17, R18
R/M 1/4W 22kΩ 1% T-52mm	1	R28
R/M 1W 499kΩ 1% MFR-1WS	4	R14, R15, R8,R9
R/NW 2W 0.22Ω 5%	1	R6
R/NW 2W 0.33Ω 5%	2	R5, R7
R/FS 5W 10Ω 10% T=130°C	1	R2
NTC 5kΩ 10% TSC-502	1	RT
MOV 0.6W 470V 14 TNR15G471K	1	ZNR1
C/Y2 221/250VAC 20% P=7.5 AC	1	C32
C/Y2 222/250VAC 20% P=7.5 AC	3	C14, C3, C4
C/Y2 472/250VAC 20% P=7.5 AC	1	C16
C/X2 104/250VAC 20% P=15 KNB153X	1	C5
C/X2 474/250VAC 20% P=22 KNB153X	4	C1, C2, C17, C8
C/M 104/63V 10% P=5	1	C21
C/M 104/100V 10% P=5	1	C6
C/M 474/50V 10% P=5	1	C18

SPECIFICATIONS	QUANTITY	POSITION
C/C 221/1KV 10% P=5 Y5P	1	C20
C/C 471/1KV 10% P=5 Y5P	1	C12
C/ML 102/100V 5% P=3	1	C11
C/ML 472/100V 5% P=3	1	C13
C/ML 103/100V 5% P=3	1	C67
C/ML 473/100V 5% P=5	1	C19
C/E 150u/400V 85°C 22x30 HP3	3	C10, C26, C9
C/E 2.2u/50V 105°C 5x11 KM	3	C22, C24, C25
C/E 220u/25V 105°C 8x11.5 KM	1	C17
C/E 470u/25V 105°C 10x16 MHA	1	C23
RD 15/A/600V GLASS D15XB60	1	BD1
RD 1A/50V 1N4001 T-52mm	1	D2
RD 3A/600V 1N5406 DO-201	1	D9
SFRD HER104 1A/300V T-52mm	4	D4, D6, D7, D8
SFRD RHRP1560 15A/600V TO220	1	D1
SBD 1N5819 1A/40V T-52mm	1	D5
HIGH-SPEED DIODE 1N4148 T-52mm	1	D3
ZD 1/2W 8.9V 2% 9B3 T-52mm	1	ZD4
BJT 2SA1020 -2A/50V TO92M	1	Q3
BJT 2SA562Y -0.5A/-30V TO92	1	Q8
BJT 2SC1815GR 0.1A/40V TO92	1	Q7
BJT 2SC2655 2A/50V TO92M	1	Q4
FET IRFP460 20A/500V TO3P	2	Q1, Q2
TRIAC BTA16-600B 16A TO220	1	TRC1
CONTROL LT1249CN8	1	U1
TR134-R2 Ku130125x2	1	L1
LF TF360 ET-28 3.12mH	2	LF1, LF2
BEAD CORE BD-001A-M4S RH3.5x3x1.5	5	C14F, D1A, Q1D, Q1G, Q2D
BEAD CORE BD-001A-M4S RH3.5x3x1.5	1	Q2G
FUSE F10 L 250 5x20 G- U GFE	1	FS1
FUSE CLIP 5x20	2	FS1
TB DT-4C-B14W(1171)-07	1	TB1
WAFER 8822-02 P=2.5	2	CN2, CN3
WAFER 8822-04 P=2.5	1	CN4
WAFER JS-1120-03N2 UL P=3.96	1	CN1
WIRE 07#18 90mm 52Tx2	2	F-F
HS YS032W-048 71431W-048	2	HS1, HS3
HS YS032W-070B 71431W-070B	1	HS2
MHS013-R1 SP-500	1	RT
TO220-A 11.4x21.5x5.8	1	RT
TO3P-A 17.5x28.5x5.9	1	RT
CORE MS-130125 HKH-130	2	L1
PCB SP-500A-R9 FR-4 2OZ DS	1	PCB
TW 3.0 NI	1	RT

SPECIFICATIONS	QUANTITY	POSITION
SCREW P 3x8 ISO NI	2	D1, TRC1
SCREW P 3x10 ISO NI	3	BD1, Q1, Q2
SCREW P 3x6 TP2 ZN	6	HS1, HS2, HS3
SCREW P 3x16 TP2 ZN	1	RT
10 1M (20mm)	20/100	RT
BOM FOR SP-500-27B ON PCB	1	
R/C 1/4W 1Ω 5% HP=10 T-52mm	1	R61
R/C 1/4W 5.1Ω 5% HP=10 T-52mm	2	R55, R59
R/C 1/4W 10Ω 5% HP=10 T-52mm	2	R93, R96
R/C 1/4W 22Ω 5% HP=10 T-52mm	1	R91
R/C 1/4W 51Ω 5% HP=10 T-52mm	1	R115
R/C 1/4W 100Ω 5% HP=10 T-52mm	2	R106, R56
R/C 1/4W 330Ω 5% HP=10 T-52mm	1	R72
R/C 1/4W 680Ω 5% HP=10 T-52mm	1	R57
R/C 1/4W 820Ω 5% HP=10 T-52mm	3	R104, R105, R87
R/C 1/4W 1kΩ 5% HP=10 T-52mm	5	R107, R66, R73, R88, R90
R/C 1/4W 1kΩ 5% HP=10 T-52mm	1	R92
R/C 1/4W 1.1kΩ 5% HP=10 T-52mm	1	R84
R/C 1/4W 1.5kΩ 5% HP=10 T-52mm	1	R102
R/C 1/4W 2kΩ 5% HP=10 T-52mm	3	R111, R116, R95
R/C 1/4W 2.2kΩ 5% HP=10 T-52mm	1	R86
R/C 1/4W 3.9kΩ 5% HP=10 T-52mm	2	R100, R101
R/C 1/4W 5.1kΩ 5% HP=10 T-52mm	3	R117, R58, R71
R/C 1/4W 6.8kΩ 5% HP=10 T-52mm	2	R103, R50
R/C 1/4W 15kΩ 5% HP=10 T-52mm	1	R108
R/C 1/4W 22kΩ 5% HP=10 T-52mm	1	R70
R/C 1/4W 24kΩ 5% HP=10 T-52mm	1	R94
R/C 1/4W 68kΩ 5% HP=10 T-52mm	2	R65, R89
R/C 1/4W 75kΩ 5% HP=10 T-52mm	1	R74
R/C 1/4W 1MΩ 5% HP=10 T-52mm	1	R69
R/C 1/2W 2.2Ω 5% T-52mm	1	R109
R/C 1/2W 15Ω 5% T-52mm	2	R54, R60
R/C 1/2W 22Ω 5% T-52mm	1	R112
R/C 1/2W 560Ω 5% T-52mm	1	R120
R/C 1W 27Ω 5%	2	R80, R81
R/C 1W 200kΩ 5% CFR-1WS	2	R51, R52
R/MO 2W 51Ω 5%	1	R110
R/MO 2W 100Ω 5%	1	R53
R/MO 2W 1kΩ 5%	2	R82, R83
R/M 1/4W 24kΩ 1% T-52mm	1	R67
R/NW 2W 0.22Ω 5%	2	R62, R63
R/NW 2W 0.82Ω 5%	1	R64
MVR 0.W 1kΩ 10% 6 VP=5x2.5	1	SVR1
NTC 5kΩ 10% TSC-502	1	RTH2

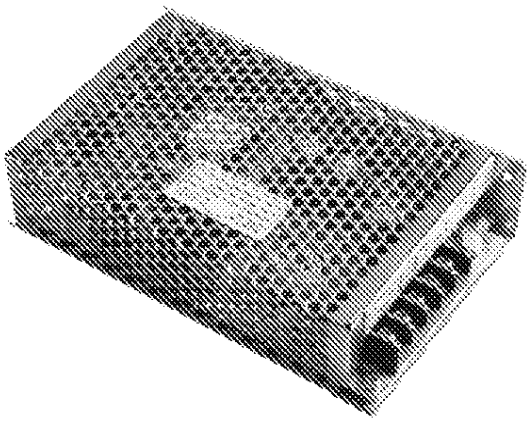
SPECIFICATIONS	QUANTITY	POSITION
JUMP 0.6 P=5	1	SVR2
JUMP 0.6 P=10	2	D70, R49
JUMP 1.4 P=10 9A	3	J1, J2, J3
C/Y2 222/250VAC 20% P=7.5 AC	2	C101, C102
C/M 473/630V 10% P=15	2	C77, C78
C/M 104/63V 10% P=5	5	C53, C60, C76, C79, C81
C/M 104/630V 10% P=15	1	C64
C/M 224/63V 10% P=5	1	C80
C/C 68P/50V 10% P=5 NPO	1	C65
C/C 331/1KV 10% P=5 Y5P	2	C71, C72
C/C 471/100V 10% P=5 Y5P	1	C61
C/C 471/1KV 10% P=5 Y5P	1	C59
C/C 222/500V 20% P=5 Z5U	2	C63, C87
C/C 103/100V 20% P=5 Z5U	1	C88
C/ML 102/100V 5% P=3	1	C55
C/ML 103/100V 5% P=3	3	C54, C57, C82
C/MC 105/50V80, -20%P=5 Y5V	1	C93
C/C 101/2KV EPOXY 10% P=5 Y5P	1	C51
C/C 103/2KV EPOXY 80, -20% P=10 Y5V	1	C52
C/E 1u/50V 105°C 5x11 KM	2	C56, C85
C/E 2.2u/50V 105°C 5x11 KM	1	C91
C/E 47u/50V 105°C 6.3x11 KM	3	C83, C84, C86
C/E 100u/35V 105°C 8x11.5 KM	1	C62
C/E 470u/50V LL5K 12.5x25 YXG	3	C73, C74, C75
SFRD ESAD92-02 20A/200V TO3P	3	D60, D61, D62
SFRD HER104 1A/300V T-52mm	2	D55, D76
SFRD HER203 2A/200V T-52mm	1	D63
SFRD HER204 2A/300V T-52mm	2	D69, D75
SFRD HER308 3A/1KV	1	D51
HIGH-SPEED DIODE 1N4148 T-52mm	5	D52, D53, D54, D64, D65
HIGH-SPEED DIODE 1N4148 T-52mm	3	D66, D67, D68
ZD 1/2W 10.6V 2% 11B2 T-52mm	1	ZD60
ZD 1W 5.1V 2% 1N4733 T-52mm	1	ZD55
ZD 1W 15V 2% 1N4744 T-52mm	1	ZD53
ZD 1W 18V 2% 1N4746 T-52mm	3	ZD51, ZD52, ZD54
LED A264B/G A264B/G/F14-9	1	LED1
BJT 2SA1020 -2A/50V TO92M	1	Q54
BJT 2SC1815FGR 0.1A/40V TO92	1	Q56
BJT 2SC2120 0.8A/30V TO92	1	Q55
BJT 2SC2655 2A/50V TO92M	1	Q53
FET 2SK1358 9A/900V TO3P	2	Q51, Q52
SHR 431 2.5V 2% MM1431AT	1	SHR1

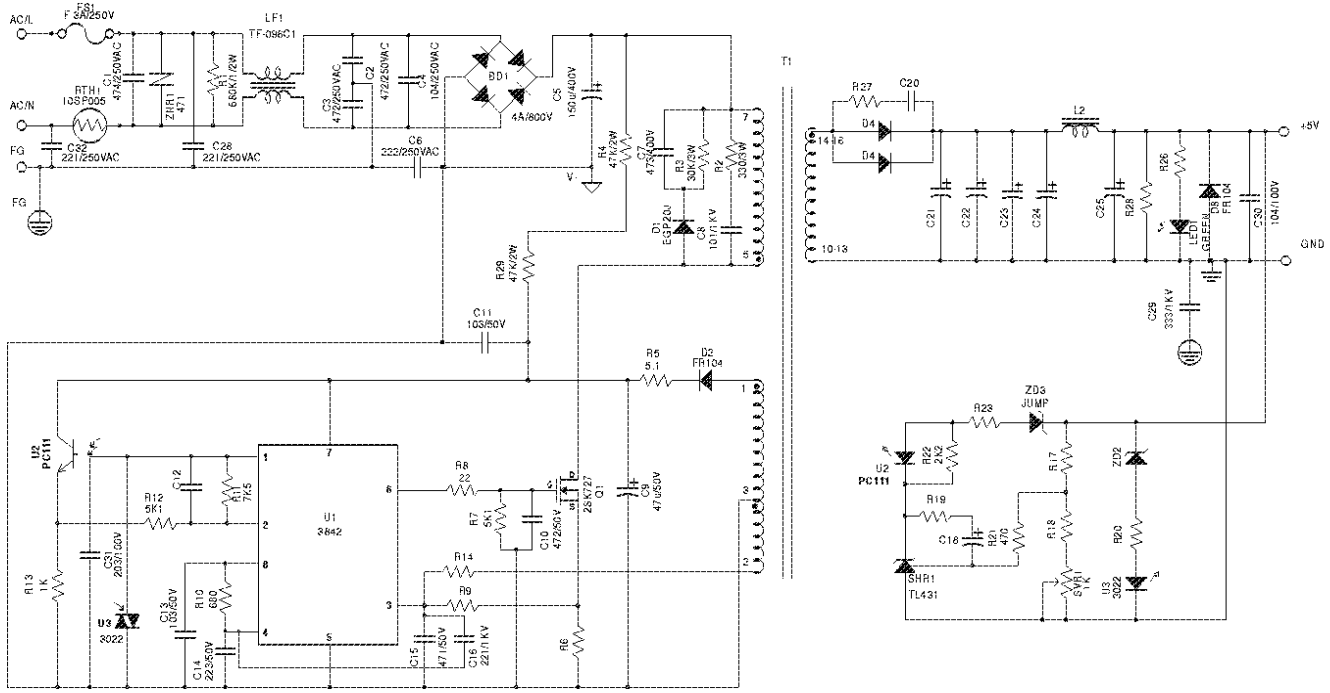
SPECIFICATIONS	QUANTITY	POSITION
RG MC7812CT 1.0A/12V TO220	1	RG51
PHOTO-TRIAC MOC3022	1	U51
PHOTO PC123 TLP721F(04-GR)	2	U52, U53
PWM TL3845P TI	1	U55
OP LM324 LA6324N	1	U54
DR-COIL DR005A 9x12 0.35 498uH	1	L52
TR131-R4 Ku130125x2 91.6u SP500-27	1	L51
MT TF403-R1 ETD-44 SP-500-27	1	T51
BEAD CORE BD-001A-M4S RH3.5x3x1.5	10	D60, D61, D62, Q51, Q52
TB DT-4C-B14W(1172)-08	1	TB1
WAFER 8822-02 P=2.5	1	CN51
I/O WIRE PSP300-CN1-R1	1	CN1
I/O WIRE PSP300-CN6-R2	1	CN3
I/O WIRE SP500-CN1-R1	1	CN2
I/O WIRE SP500-CN2-R3	1	CN4
HS YS021W-3 72020-3 h=25m/m	1	HS53
HS YS032W-070 71431W-070	2	HS51, HS52
CORE MS-130125 HKH-130	2	L51
PCB SP-500B-R10 FR4 20Z DS	1	PCB
TW 30. NI	1	RTH2
SCREW P 3x10 ISO NI	5	D60, D61, D62, Q51, Q52
SCREW P 3x6 TP2 ZN	5	HS51, HS52, RTH2
SCREW T 3x6 TP2 NI H	1	HS53

SPECIFICATION

MODEL	S-60-24
Input voltage	85~264VAC; 120~370VAC
Input frequency	47-63Hz
Inrush current	Cold start, 30A/115V, 60A/230V
Output voltage	Refer to below table (±10% ADJ.)
Overload protection	105% ~ 150% output pulsing code
Over voltage protection	115% ~ 135% of output voltage
Setup, rise, hold up time	800ms, 50ms, 10ms/115VAC 300ms, 50ms, 80ms/230VAC
Withstand voltage	I/P-O/P:3kV, I/P-FG:1.5KV, 1min.
Working temp	0-50°C@100%, -10°C@80%, 60°C@60%
Safety standards	UL1012, UL1950, TUV EN60950
EMC Standards	EN55022 class B, EN61000-4-2,3,4,5, EN60555-2,3
Connection	5P/9.5mm pitch terminal block
Weight/Packing	0.55kgs/pcs; 30pcs/ 17kgs/ 1CUFT

Type No	Output	Tol.	R&N	Effi.	P.P.
S-60-5	5V, 12A	± 2%	120mV	73%	58
S-60-12	12V, 5A	± 1%	120mV	76%	58
S-60-15	15V, 4A	± 1%	150mV	77%	58
S-60-24	24V, 2.5A	± 1%	150mV	79%	58





S-60N DIFFERENT COMPONENT

PART NO. / MODEL	C18	C20	C21	C22	C23	C24	C25	D4	L2	R14	R17	R16	R20	R23	R26	R27	R28	R6	R9	T1	ZD2	R19	C12
5V	1U/50V	103/50V	2200U/10V	2200U/10V	2200U/10V	2200U/10V	2200U/10V	CTB34M	RB016	10K	2K	1K5	22	100	560	5.1/1/2W	39/2W	0.33/2W	680	TF158-1	5.1V	3K3	103/50V
12V	0.47U/50V	472/100V	1000U/25V	1000U/25V	X	1000U/25V	470U/25V	BYQ28X-200	RB009	15K	7K5	1K5	22	220	2K7	5.1/1/2W	270/2W	0.39/2W	820	TF159-1	13.8V	10K	222/50V
15V	0.47U/50V	222/500V	470u/25V	470U/25V	X	470u/25V	470U/25V	BYQ28X-200	RB009	15K	12K	2K	22	220	2K7	5.1/1/2W	270/2W	0.39/2W	820	TF160-1	17.9V	10K	222/50V
24V	104/100V	471/1KV	330U/35V	X	X	330U/35V	330U/35V	BYQ28X-200	RB009	15K	20K	2K	100	390	4K7	47/1/2W	680/2W	0.39/2W	820	TF161-1	26.9V	20K	222/50V
30V	104/100V	471/1 KV	330U/35V	X	X	330U/35V	330U/35V	BYQ28X 200	RB009	22K	24k	2K	100	390	10K	47/1/2W	1K/2W	0.39/2W	820	TF161-1	33V/1W	20K	222/50V

ELETTRONIKA S.r.l.	DESCRIPTION: ELECTRICAL DIAGRAM	DESIGNER	SIGNATURE / DATE: 04/09/02
CODE	TITLE: S-60-R8 SWITCHING POWER SUPPLY	PCB DESIGNER	SIGNATURE / REF:
		QUALITY CONTROL	SIGNATURE / SHEET: 1/2

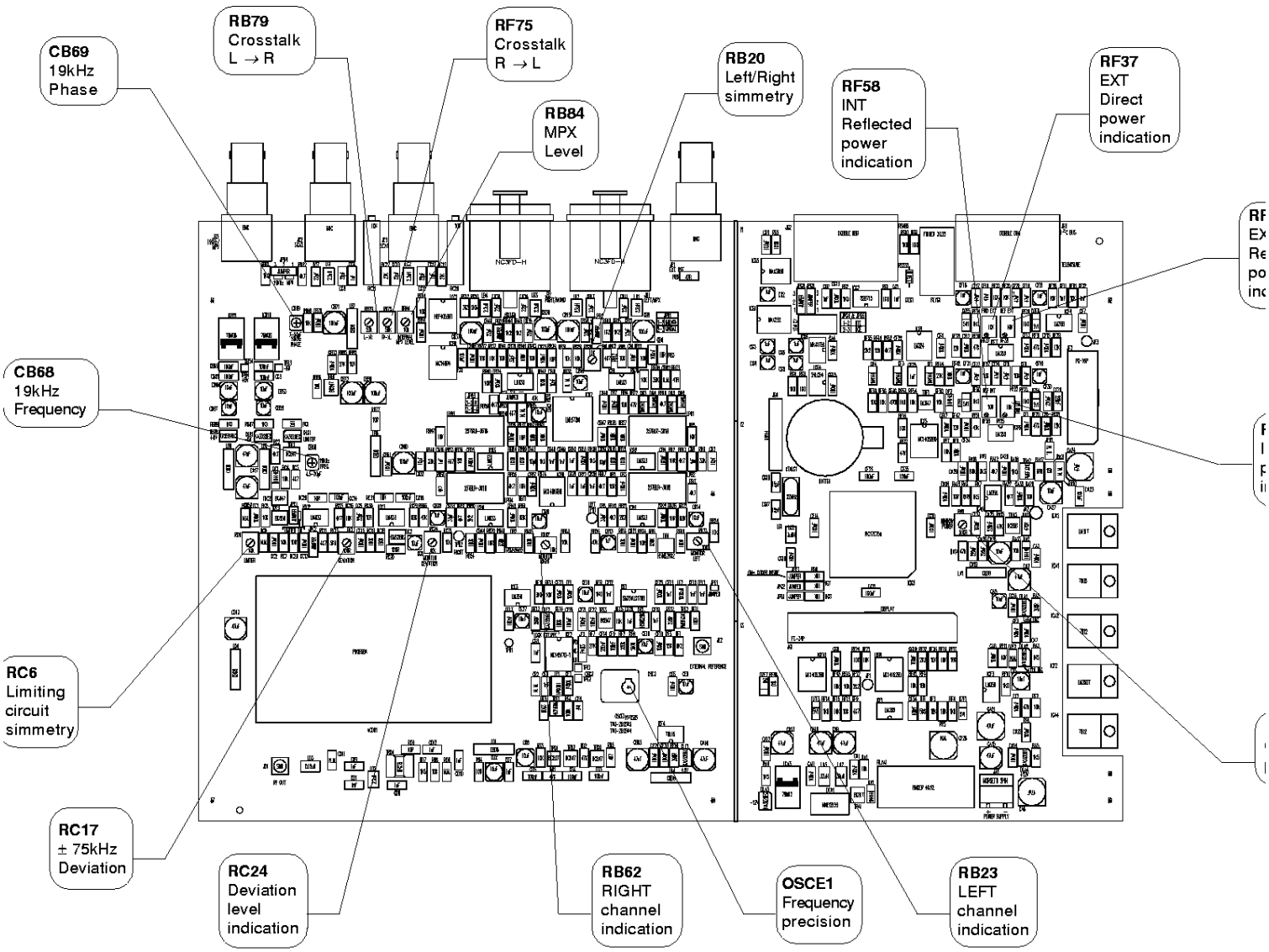
COMPONENT LIST *S-60-24*

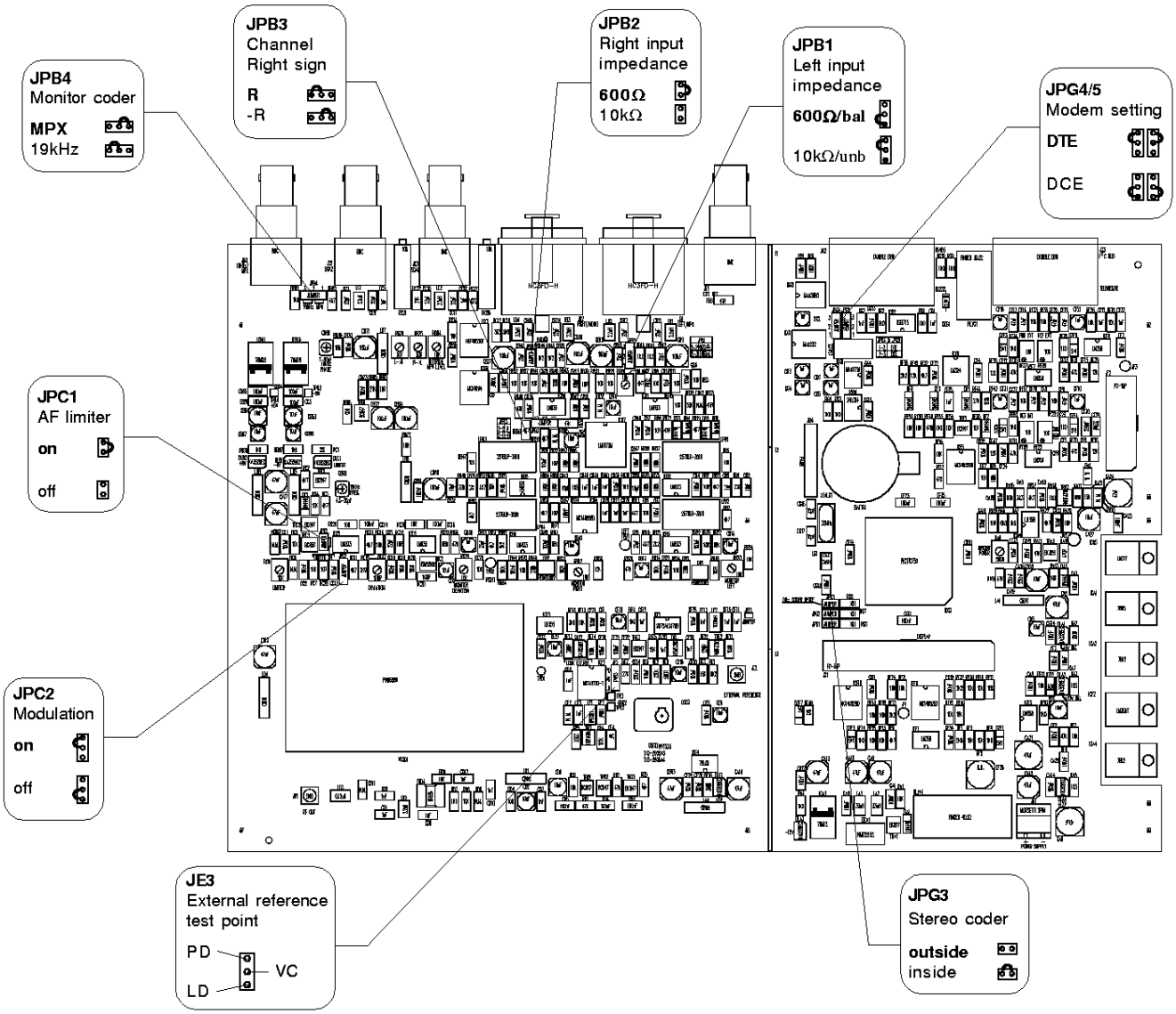
SPECIFICATIONS	QUANTITY	POSITION
BOM FOR S-60-24 ON CASE	1	
CASE 901-D-R1 M	1	
CASE 901-T-R2 M	1	
HS YS004W-055-R4 71268W-055	1	HS3
MHS002-R1 25mm	1	HS3
MYLAR FILM 901-R2	1	
PR-7.5	1	
BOX 901 168x105x45mm	1	1
SCREW F 3x6 ISO NI	2	HS3, HS3
SCREW F 3x18 ISO NI	1	HS3
SCREW T 3x6 ISO NI	2	HS1
SCREW P 3x6 ISO NI	1	CASE
LABEL UL S-60N-24-R2	1	
LABEL IN/OUT UL BO17-R1 S-60N	1	
CARTON 901 0.97CUFT	1	30
BOM FOR S-60-24 ON PCB	1	
R/C 1/4W 5.1Ω 5% HP=10 T-52mm	1	R5
R/C 1/4W 22Ω 5% HP=10 T-52mm	1	R8
R/C 1/4W 100Ω 5% HP=10 T-52mm	1	R20
R/C 1/4W 390Ω 5% HP=10 T-52mm	1	R23
R/C 1/4W 470Ω 5% HP=10 T-52mm	1	R21
R/C 1/4W 680Ω 5% HP=10 T-52mm	1	R10
R/C 1/4W 820Ω 5% HP=10 T-52mm	1	R9
R/C 1/4W 1kΩ 5% HP=10 T-52mm	1	R13
R/C 1/4W 2kΩ 5% HP=10 T-52mm	1	R18
R/C 1/4W 2.2kΩ 5% HP=10 T-52mm	1	R22
R/C 1/4W 4.7kΩ 5% HP=10 T-52mm	1	R26
R/C 1/4W 5.1kΩ 5% HP=10 T-52mm	2	R12, R7
R/C 1/4W 7.5kΩ 5% HP=10 T-52mm	1	R11
R/C 1/4W 15kΩ 5% HP=10 T-52mm	1	R14
R/C 1/4W 20kΩ 5% HP=10 T-52mm	2	R17, R19
R/C 1/2W 47Ω 5% T-52mm	1	R27
R/C 1/2W 680kΩ 5% T-52mm	1	R1
R/MO 2W 680Ω 5% KINK	1	R28
R/MO 2W 47kΩ 5%	2	R29, R4
R/MO 3W 330Ω 5% MINI	1	R2
R/MO 3W 30kΩ 5% MINI	1	R3
R/NW 2W 0.39Ω 5%	1	R6
MVR 0.3W 1kΩ 10% HP=5x5	1	SCR1
NTC 4A 5Ω SCK054 KINK	1	RTH1
MOV 0.6W 470V TNR15G471K	1	ZNR1
JUMP 0.6 P=10	5	J1, J2, J3, J4, ZD3
JUMP 0.6 P=15	1	J5

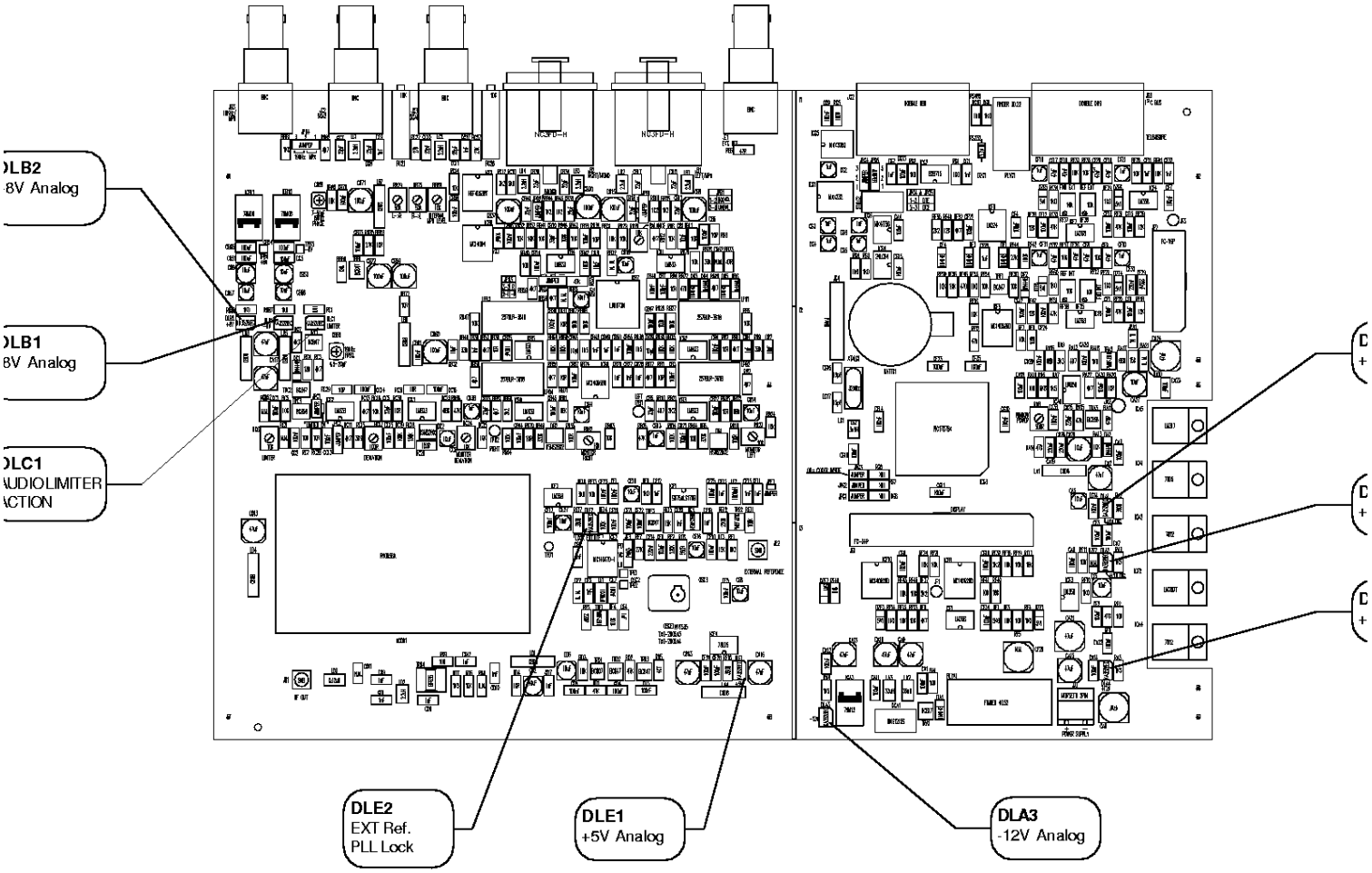
SPECIFICATIONS	QUANTITY	POSITION
C/Y2 221/250VAC 20% P=7.5 AC	2	C28, C32
C/Y2 222/250VAC 20% P=7.5 AC	1	C6
C7Y2 472/250VAC 20% P=7.5 AC	2	C2, C3
C/X2 104/250VAC 20% P=15 KNB153X	1	C4
C/X2 474/250VAC 20% P=22 KNB153X	1	C1
C/M 473/400V 10% P=10	1	C7
C/M 104/63V 10% P=5	2	C18, C30
C/C 101/1KV 10% P=5 Y5P	1	C8
C/C 221/1KV 10% P=5 Y5P	1	C16
C/C 471/100V 10% P=5 Y5P	1	C15
C/C 471/1KV 10% P=5 Y5P	1	C20
C/ML 222/100V 5% P=3	1	C12
C/ML 472/100V 5% P=3	1	C10
C/ML 103/100V 5% P=3	2	C11, C13
C/ML 203/100V 5% P=5	1	C31
C/ML 223/100V 5% P=4.5	1	C14
C/C 333/1KV EPOXY 20% P=10 Z5V	1	C29
C/E 150u/400V 85°C 30x25 HP3	1	C5
C/E 47u/50V 105°C 6.3x11 KM	1	C9
C/E 330u/35V LL3K 10x16 YXG	3	C21, C24, C25
BD 4A/600V GLASS D3SB60	1	BD1
FRD 1A/400V FR104 T-52mm	2	D2, D8
SFRD BYQ28X-200 10A/200V TO220F	1	D4
SFRD EGP20J 2A/600V T-52mm	1	D1
ZD 1/2W 26.9V 2% 27-2 T-52mm	1	ZD2
LED GREEN 204GD-A	1	LED1
FET 2SK2652 6A/900V TO3P	1	Q1
SHR 431 2.5V 2% MM1431AT	1	SHR1
PHOTO CNX82A PC111	1	U2
PHOTO-TRIAC MOC3022	1	U3
PWM TL3842P TI	1	U1
RB-COIL RB009A 6x25 10. 1.5uH	1	L2
LF TF096C1 EE-25 0.5 23mH	1	LF1
MT TF161-1-R3 EER-35	1	T1
FUSE F3 L 250 5x20 G- U GFE/GMA	1	FS1
FUSE CLIP 5x20	2	FS1
TB HB 951-05P/DT49-B01W-05P	1	TB1
WIRE 07#18 100mm 05x05	1	F-F
HS HS001-R2	1	HS1
MHS002-R1 25mm	1	HS1
PCB S-60N-R5 CEM-1 20Z SS M1	1	PCB
SCREW F 3x12 ISO NI	1	Q1
SCREW P 3x6 ISO ZN	2	HS1

Part Name Code	Description	Qty
05616	COD.125S084 BARRETTA ANTERIORE M 2.5	2
05552B	KIT MANIGLIE 3-4U cod 235.012	2
CON0035	CON0035R1 PANNELLO POSTERIORE MIRA	1
05626	COD.312T000 VITI SPECIALI	8
05625	COD.122Z000 FERMA VITE NORYL	8
V0367	VITI 4X8 INOX A FLANGIA TBF4X8A2	20
07522	INTERRUTTORE LUM. COD. I4715	1
07926	PROTEZIONE IN GOMMA PVC PG 987	1
07918	FILTRI DI RETE 60ET2 519042-10	1
E0013	ALIM. SWITCHING SP-500-48	1
02513	R114186000 PRESA SMB 90	2
08502	CAVO RG 316 50OHM	0,6
07613	VENTOLA PAPST mod. 8414NH	2
07602	GRIGLIE VENTOLE mod. LZ 221	2
DET0114	DET0114R1 SUPPORTO INT.E PRESA MIRA	1
DET0159	DET0159R1 SOSTEGNO ALIM.X MIRA 250W	2
DET0138	DET0138R0 DISTANZ.X ISOL.X MIRA 23X2	1
SCH0013AR0	SCHEDA DISPLAY MIRA PN0565	1
MFF0002AR0	MOD.APLIFICATORE 150W/250W FM MIRA	1
PAN0005	PAN0005R1 PANNELLO FRONTALE MIRA	1
07925	PROTEZIONE IN GOMMA PVC PG 075	1
DET0117	DET0117R0 PARTIC.X CONVOGLIAT.MIRA	1
DET0118	DET0118R1 PARTICOL.2 X CONVOGL.MIRA	1
DET0119	DET0119R2 CONVOGLIATORE X MIRA	1
SCH0006BR0	SCHGEDA PLLC MIRA PN517 STEREO R2	1
03084	TOUSCH PANEL DY95649 5.5”	1
02698	CONNETTORE COD.534-2306 FEMM.34 VIE	2
DET0163	DET0163R1 CHIUSURA X CONT.MIRA P.2459 ZN	1
DET0122	DET0122R3 CONT.X SCHEDA MIRA P.2453 ZN	1
04807A	C.I. PIC 17C756-33/L	1
02710	PAN MFSS 100.4 MASCHIO P.	1
02711	PAN CE100F28.4 FEMMINA P.	1
02712	PAN EC100F4 COPERCHIO P.	1
E0031	ALIM. SWITCHING S-60-24	1
DET0137	DET0137R2 SUPPORTO ALIMENT.MIRA	1
05636	COD. 369H084 COP. RACK CHIUSA	2
05611A	COD.010S084 BARRE ANTERIORI	2
05611B	COD.012S085 BARRE POSTERIORI	2
CON0037	CON0037R0 LATER.DX PLL MIRA SATINATO	1
05609A	COD.252S300 TIPO ELET.ANGOL.X MANIGLIA	2
CON0038	CON0038R2 LATER.SX PLL MIRA SATINATO	1
05617	COD.125S085 BARRETTA POSTERIORE M 2.5	2
03054	LED VERDE CILINDRICO L-483 GDT	5
03055	LED ROSSO CILINDRICO L-483 IDT	5

Part Name Code	Description	Qty
04301C	STABYLIZATION CIRCUIT 3480-5 SMD	1
04367	HYBRID MODULE MAR 3	1
04690	C.I. MC 145191F = MC 145193F	1
05090	0.22uH SMD 1008 MLEM COIL	1
05023D	22uH SMD 1008 MLEM25 COIL	5
04987	VARIABLE INDUCT. SMD E558HN-1	1
04105A	FET SMD MMBJ310LT1	3
PN0658B	C.S. PN658BR1 VCO WITH INTEGRATED PLL	1
05020A	2.2uH SMD 1210 NL32252 COIL	3
04638	C.I. LMC 7101BIM SMD SOT-23	1


CB69 19kHz Phase
RB79 Crosstalk L → R
RF75 Crosstalk R → L
RB84 MPX Level
RB20 Left/Right simmetry
RF58 INT Reflected power indication
RF37 EXT Direct power indication
CB68 19kHz Frequency
RC6 Limiting circuit simmetry
RC17 ± 75kHz Deviation
RC24 Deviation level indication
RB62 RIGHT channel indication
OSCE1 Frequency precision
RB23 LEFT channel indication


JPB4
Monitor coder
MPX
19kHz
JPB3
Channel
Right sign
R
-R
JPB2
Right input
impedance
600Ω
10kΩ
JPB1
Left input
impedance
600Ω/bal
10kΩ/unb
JPG4/5
Modem setting
DTE
DCE
JPC1
AF limiter
on
off
JPC2
Modulation
on
off
JE3
External reference
test point
PD
LD
VC
JPG3
Stereo coder
outside
inside


DLB2
8V Analog
DLB1
8V Analog
DLC1
AUDIO LIMITER
ACTION
DLE2
EXT Ref.
PLL Lock
DLE1
+5V Analog
DLA3
-12V Analog