

PLL/CT
FM Radio Transmitter
User's manual



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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 loads or any other products or accessories resulting from ELETTRONIKA product failure. It does not cover defects or damage caused by use of unauthorized modifications, 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

Disclaimer 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 length 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 the firm 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 hazardous 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 sticks 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!

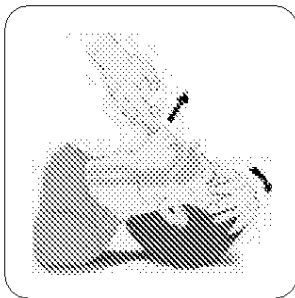
In case of emergency ensure that power has been disconnected.

Treatment of electrical shock

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

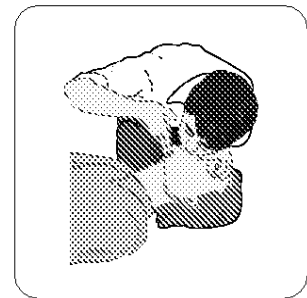
PLACE VICTIM FLAT ON HIS BACK ON A HARD SURFACE

A - AIRWAY



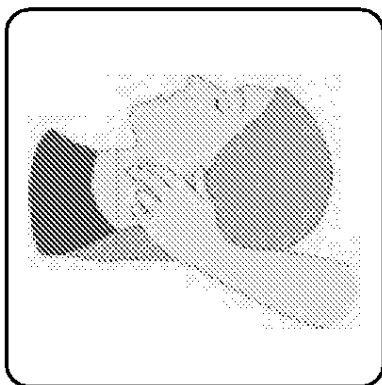
If unconscious, open airway lift up neck, push forehead back, clear out mouth if necessary, observe for breathing.

B - BREATHING

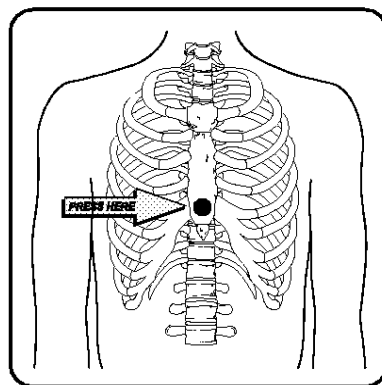


If not breathing, begin artificial breathing. Tilt head, pinch nostrils, make airtight seal, 4 quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

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 tissue, remove adhered particles of clothing, or apply any salve or ointment;
- treat victim for shock as required;
- arrange transportation to a hospital as quickly as possible;
- if arms or legs are 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).

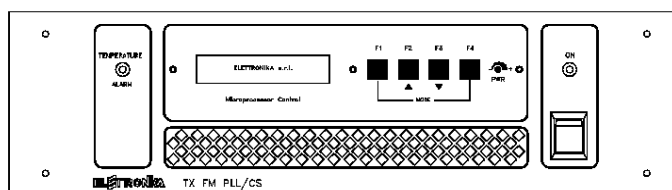
Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.

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

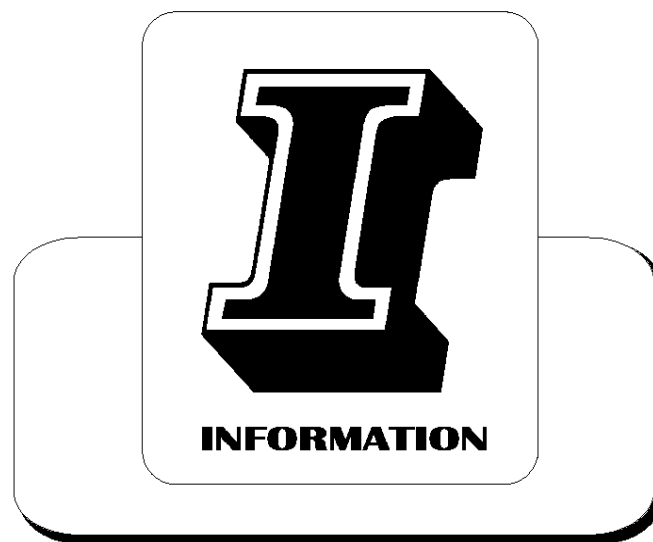
FM RADIO TRANSMITTER



PLL/CT

User's manual

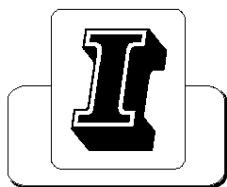
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Section 1 - Information

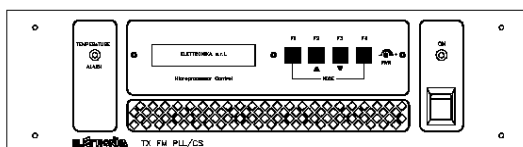
Contents:

- 1.1 Description*
- 1.2 Technical characteristics*



PLL/CT

FM RADIO TRANSMITTER



1.1 DESCRIPTION

The PLL/CT is a Transmitters for Radio communication in the FM band from 87.6 to 107.9MHz.

The apparatus is supplied with four inputs in order to ensure the compatibility with any Audio signal in input. These inputs are: a Mono input with Pre-emphasis always enabled, an MPX input for Stereo multiplexed signals and two SCA inputs for additional digital signals.

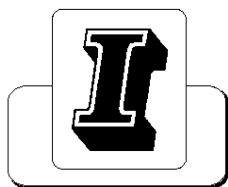
The Mono input contains a series of low-pass filters able to attenuate by more than 30dB all the frequencies included between 20kHz and 100kHz, compared to the level of the 15kHz.

A limiting circuit, acting on all the input signals, works continuously in order to avoid the modulation to be higher than $\pm 75\text{kHz}$.

This family of apparatus uses a Microcontroller which manages the settings of the transmission frequency with 10 or 100kHz steps, as required. Besides, it checks that the set frequency is not outside the band allowed, manages the display for the display of the frequency and the power, and works as protection circuit for the correct functioning of the apparatus. The final stage is made up by an RF transistor amplifier, with adjustable power up to 30W, with Mosfet technology.

The cabinet, 3U height, is designed for the mounting in rack 19". Its internal accessibility is ensured removing the upper panel. The electrical power supply may be selected to be 220 or 110V on the rear panel, in order to fit to the available main voltage.

Options: The transmitter may be supplied, if required, with Stereo Coder (PN417) for the stereo transmission of the audio signal.



1.2 TECHNICAL CHARACTERISTICS

RF

Frequency range	87.6 - 107.9MHz
Output power	30W
RF Output connector / impedance	N Female / 50Ω
Frequency programmability	From panel
Frequency stability	2,5ppm (option 0,05ppm)
Spurious & Harmonic suppression	Meets or exceeds all FCC and CCIR requirements
Modulation capability	Meets or exceeds all FCC and CCIR requirements
Asynchronous AM S/N ratio	60dB
Synchronous AM S/N ratio	50dB

SOUND SECTION

MPX Operation

Audio input	2Vpp, BNC Connector
Frequency amplitude response	± 0,1dB, 30Hz - 100kHz
Harmonic distortion	< 0,15%, 30Hz - 100kHz
S/N Ratio with CCIR unweighted	80dB
S/N Ratio with CCIR weighted	78dB
S/N Ratio with RMS Detector	86dB

MONO Operation

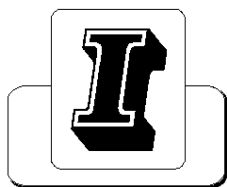
Audio input	2Vpp, XLR Connector
Frequency amplitude	0,5dB, 30Hz - 15kHz
Harmonic distortion	< 0,15%, 30Hz - 15kHz
Pre-emphasis	Flat, 50μs, 75μs
S/N Ratio with CCIR unweighted	80dB
S/N Ratio with CCIR weighted	78dB

Internal Coder

Audio input	2Vpp, XLR Connector
Frequency amplitude	± 0,5dB, 30Hz - 15kHz
Harmonic distortion	< 0,15%, 30Hz - 15kHz
Pre-emphasis	Flat, 50μs, 75μs
Stereo separation	> 45dB (Tip. 55dB)
S/N Ratio with CCIR unweighted	74dB
S/N Ratio with CCIR weighted	70dB

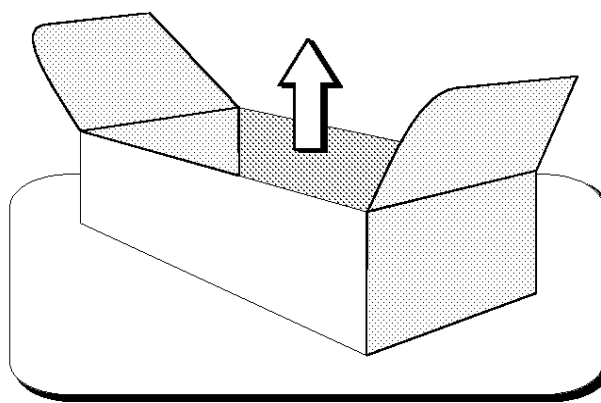
SCA Operation

Audio input	2Vpp, BNC Connector
Frequency amplitude response	± 0,1dB, 40Hz - 100kHz



GENERAL

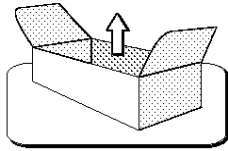
Power supply socket	110/220Vac, $\pm 15\%$, 50/60Hz
Power consumption	100VA
Cabinet	Rack 19"-3U
Dimensions	370x485x130mm
Weight	11kg
Ambient temperature	-10° to +45°C
Humidity	20% - 90%



Section 2 - Installation

Contents:

- 2.1 Operating environment*
- 2.2 Preliminary operations*
- 2.3 Telemeasuring socket connections*
- 2.4 Functioning*
- 2.5 Preventive maintenance*
 - Front panel*
 - Rear panel*



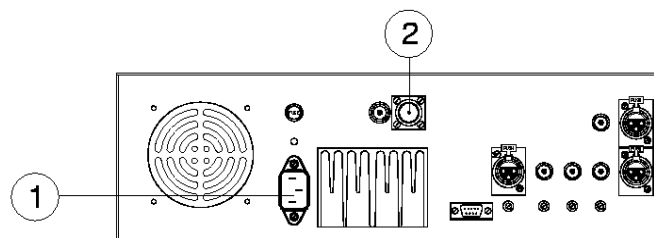
2.1 OPERATING ENVIRONMENT

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. Always allow for at least 2 cm of clearance under the unit for ventilation. If you set the transmitter on a flat surface, install spacers on the bottom cover plate. If you install the transmitter in a rack, provide adequate clearance above and below. Do not locate the transmitter directly above a hot piece of equipment.

2.2 PRELIMINARY OPERATIONS

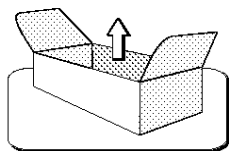
The equipment is made up by modular units enclosed in a strong cadmium metallic container and fixed so that removing the upper cover plate of the apparatus all the internal circuits can be seen by the operator. The connection between modules are made almost only by means of connector, thus allowing an easy replacement of broken-down parts. Correct installation of the equipment is important for maximum performance and reliability. Antenna and earth connections must be installed with the greatest care. The equipment adjustment isn't need, because the unit is completely adjusted by our technical staff. This is the installation procedure:

1. connect the power supply cable of the transmitter to the auxiliary socket on the rear panel of the amplifier (if used) otherwise connect it to public network (220VAC);
2. connect the antenna cable to the RF OUT on the rear panel of the transmitter.



WARNING!!!

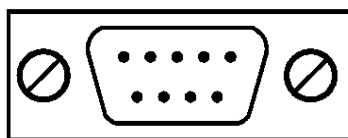
FOR ELECTRICAL SAFETY REASONS AND IN ORDER TO KEEP THE APPARATUS SAFE, THE GROUND TERMINAL OF THE APPARATUS MUST BE CONNECTED TO THE EXISTING GROUNDING SYSTEM AND NOT BY USING THE SHIELD OF THE OUTPUT COAXIAL CABLE.



Now you may connect the power supply and turn on the apparatus. In normal working conditions the grid pilot light will be turned on and the display on its upper line the working frequency, while on the lower line there will be written “PLL UNLOCKED” flashing. In this phase the output power, independently from the position of the regulator on the frontal panel, is kept to zero. After a few seconds, during which the frequency has been stabilized, the flashing writing will disappear and the apparatus will be ready to be powered.

2.3 TELEMEASURING SOCKET CONNECTIONS

The following table summarizes the Telemeasuring pin connections.

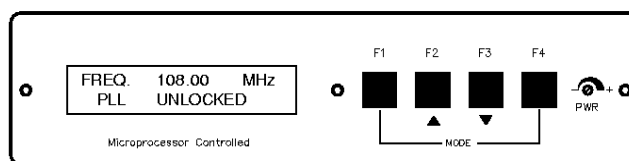


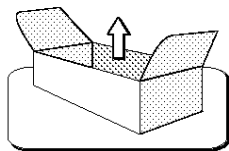
DB9 Socket

PIN N°	SIGNAL TYPE	IN / OUT	FUNCTION
1	Power supply	-	5Vdc
2	Digital	Input	Floating: ON GND: Power inhibition
3	Analog	Output	FWD Power
4	Analog	Output	REF Power
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-

2.4 FUNCTIONING

On the frontal panel of the transmitter there is an LCD Display used to show the working parameters of the apparatus, and four keys allowing to select the readings of these parameters, to set the transmission frequency and to turn the Stereocoder, if any, on and off. When you turn the transmitter, to appear on the display the follow message:





In particular, the keys F2 and F3 allow to scroll subsequently on the upper line of the display the reading of the Direct and the Reflected power, of the transmission frequency, of the model of the apparatus, the name of the producer and the audio level of the left and right channel. The keys F1 and F4, instead, allow to go onto the Programming mode. This operation is described below. In order to change the transmission frequency of the PLL/C it is needed to go into the Programming mode, this is done pressing simultaneously the keys F1 and F4.

Select using the key F2 or F3 the option “OUTPUT FREQUENCY” and confirm using the key F4. Now a new frequency can be set using either the key F2 or F3.

To exit from the programming mode and confirm the new settings press the key F4, to exit without saving the changes press F1. To turn the Stereo Coder ON or OFF, press simultaneously F1 and F4, then select the option “STEREO CODER” using either F2 or F3, and confirm pressing F4.

Now select either “ON STEREO CODER” or “OFF STEREO CODER” using either F2 or F3, and confirm using F4. If there is no Stereo Coder, these settings will have no effect.

On the lower line of the display there is usually a bar showing the peak deviation of the frequency. In case of working anomaly, the same second line of the display will show an alarm message. In detail:

- “**FWD POWER ALARM**”: in case the output power is higher than 35W;
- “**REFL POWER ALARM**”: in case the reflected power is higher than 5W;
- “**PLL UNLOCKED**”: if the PLL is unlocked.

At the same time in which the message is shown, the following also happen:

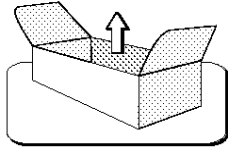
- the maximum output power is limited to 35W;
- the RF power is limited so that the reflected power is not higher than 5W;
- the working of the RF output module is inhibited.

In case of temperature alarm, led “TEMP. ALARM” will lit up and the inhibition of the final module will be performed. Always on the front panel, there is the Output power regulator. Set this control for the desired output power level. Preferably, set the power with an external RF wattmeter connected in the coaxial line to the antenna. You may also use the RF Power reading on the digital multimeter.

2.5 PREVENTIVE MAINTENANCE

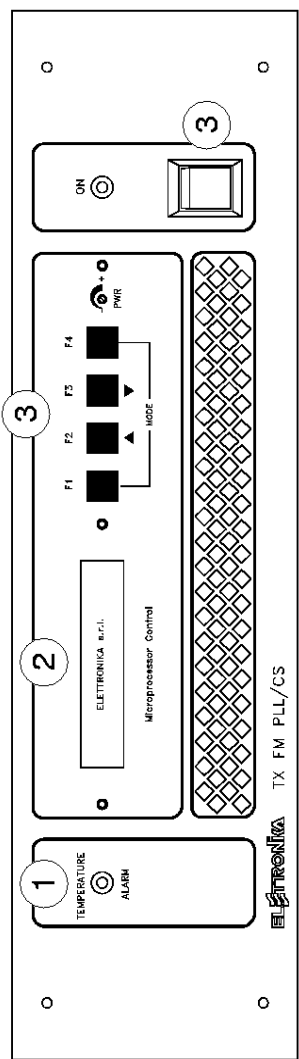
To ensure maximum performance and minimum repair trouble, we strongly recommend you to follow the below stated guidelines for preventive maintenance:

1. check the antenna installation and ground connection at regular intervals;



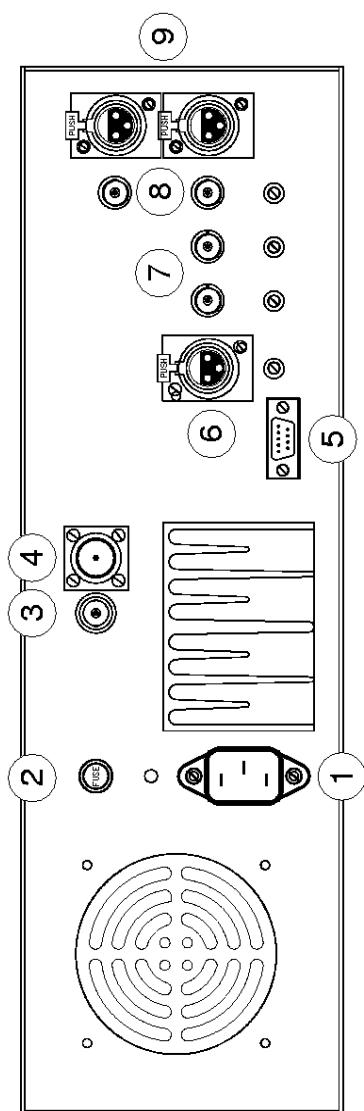
-
2. keep your apparatus clean and dry externally: this will ensure continuous functioning of the front panel controls;
 3. if the apparatus has not been used for a long period of time combined with exposure to extreme environmental conditions, open the unit and make a visual inspection.
Remove salt, water or ice with a moist cloth before turning the apparatus on. Check that the cooling fans are running freely.
 4. for general maintenance and top performance, call an authorized service technician to give the apparatus and the complete antenna/earth connection installation a general check each 12-18 months;
 5. check at regular intervals that the air intake located on the front panel is free of dust. If there is visible dust, remove it by means of a soft brush.

Frontal view



DESCRIPTION	
1	Temperature alarm LED
2	LCD Display
3	Function keys
4	Main switch

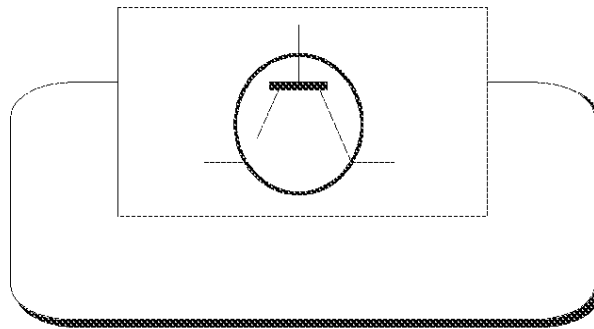
Rear view



DESCRIPTION

1	Power supply socket
2	Fuse
3	Monitor connector
4	RF Output connector
5	Telemeasuring socket
6	MONO Input connector
7	SCA1/SCA2 Input connectors
8	MPX IN/OUT Connectors
9	L and R Input connectors

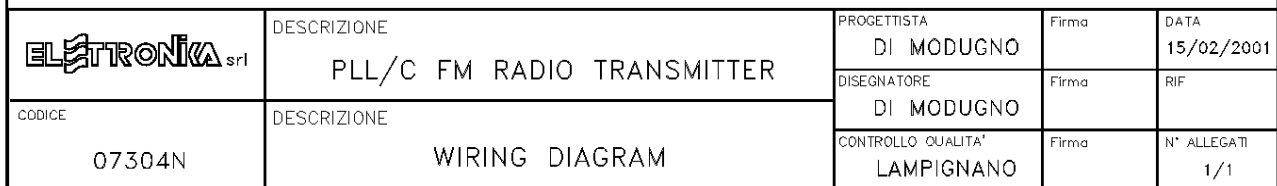
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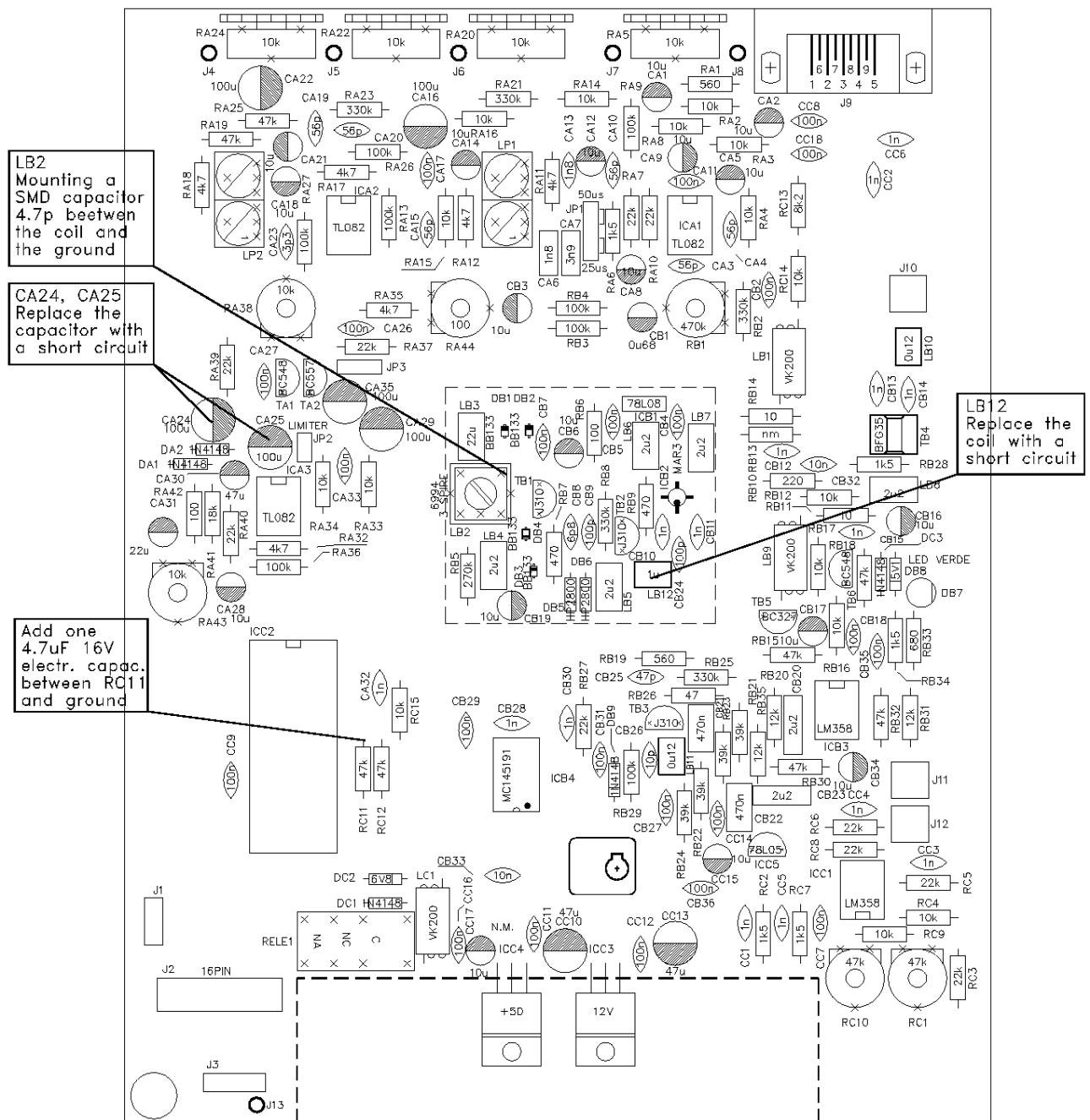
Section 3 - Diagram

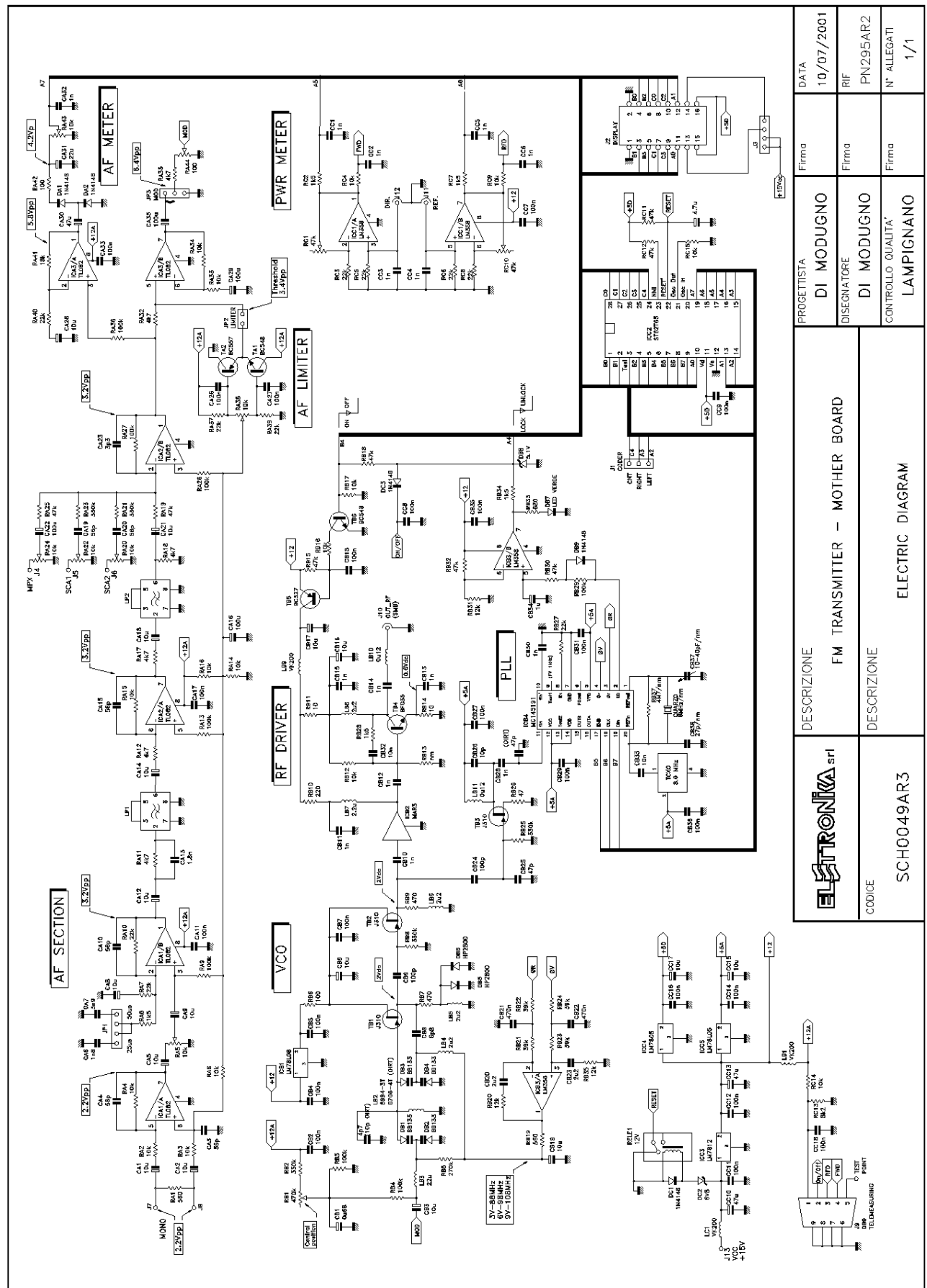
Contents:

- *Cable diagram*
- *SCH0049AR3 (FM Transmitter board)*
- *PN396 (Display board)*
- *PN417 (MPX Stereocoder)*
- *PN457/B (10W FM Amplifier)*
- *PN438/A (Directional coupler and Low-Pass filter)*
- *PN450/C (150W Amplifier module)*
- *PN0515 (Power regulator)*
- *SP500-27/48 (Switching power supply)*
- *Appendix (Adjustment and tests)*



Component layout SCH0049AR3





ELTRONIKA srl

FM TRANSMITTER - MOTHER BOARD

DESCRIZIONE

DESCRIZIONE

DI MODUGNO

DI MODUGNO

DATA

10/07/2001

Firma

RIF

PROGETTISTA

PN295AR2

DI MODUGNO

CONTROLLO QUALITA'

LAMPIGNANO

N° ALLEGATI

1/1

COMPONENT LIST SCH0049AR3

Part Name - Code	Description	Qt	Component	Page 1/3
0017	10Ω 0.25W RESISTOR	2	RB11, RB14	
0025	47Ω 0.25W RESISTOR	1	RB26	
0029	100Ω 0.25W RESISTOR	2	RA42, RB6	
0033	220Ω 0.25W RESISTOR	1	RB10	
0037	470Ω 0.25W RESISTOR	2	RB7, RB9	
0038	560Ω 0.25W RESISTOR	2	RA1, RB19	
0039	680Ω 0.25W RESISTOR	1	RB33	
0043	1k5Ω 0.25W RESISTOR	5	RA6, RB28, RB34, RC2, RC7	
0049	4k7Ω 0.25W RESISTOR	6	RA11, RA12, RA17, RA18, RA32, RA35	
0052	8k2Ω 0.25W RESISTOR	1	RC13	
0053	10kΩ 0.25W RESISTOR	16	RA2, RA3, RA4, RA8, RA14, RA15, RA16, RA33, RA34, RB12, RB16, RB17, RC4, RC9, RC14, RC15	
0054	12kΩ 0.25W RESISTOR	3	RB20, RB31, RB35	
	18kΩ 0.25W RESISTOR	1	RA41	
0057	22kΩ 0.25W RESISTOR	10	RA7, RA10, RA37, RA39, RA40, RB27, RC3, RC5, RC6, RC8	
0060	39kΩ 0.25W RESISTOR	4	RB21, RB22, RB23, RB24	
0061	47kΩ 0.25W RESISTOR	8	RA25, RA19, RB15, RB18, RB30, RB32, RC11, RC12	
0065	100kΩ 0.25W RESISTOR	8	RA9, RA13, RA26, RA27, RA36, RB3, RB4, RB29	
0070	270kΩ 0.25W RESISTOR	1	RB5	
0071	330kΩ 0.25W RESISTOR	5	RA21, RA23, RB2, RB8, RB25	
0703	100Ω TRIMMER	1	RA44	
0715	10kΩ TRIMMER	2	RA38, RA43	
0719	47kΩ TRIMMER	2	RC1, RC10	
0725	470kΩ TRIMMER	1	RB1	
0751	10 kΩ TRIMMER	4	RA5, RA20, RA22, RA24	
	3p3F CERAMIC CAPACITOR	1	CA23	
	4p7F 1206 SMD CAPACITOR	1		
	6p8F CERAMIC CAPACITOR	1	CB8	
1017	10pF CERAMIC CAPACITOR	1	CB26	
	47pF CERAMIC CAPACITOR	1	CB25	
1026	56pF CERAMIC CAPACITOR	6	CA3, CA4, CA10, CA15, CA19, CA20	
1029	100pF CERAMIC CAPACITOR	2	CB9, CB24	
1041	1nF CERAMIC CAPACITOR	15	CA32, CB10, CB11, CB12, CB13, CB14, CB15, CB28, CB30, CC1, CC2, CC3, CC4, CC5, CC6	
	1n8F CERAMIC CAPACITOR	1	CA6	
	1n8F CERAMIC CAPACITOR	1	CA13	
1048B	3n9F CAPACITOR	1	CA7	
1053	10nF CERAMIC CAPACITOR	2	CB32, CB33	

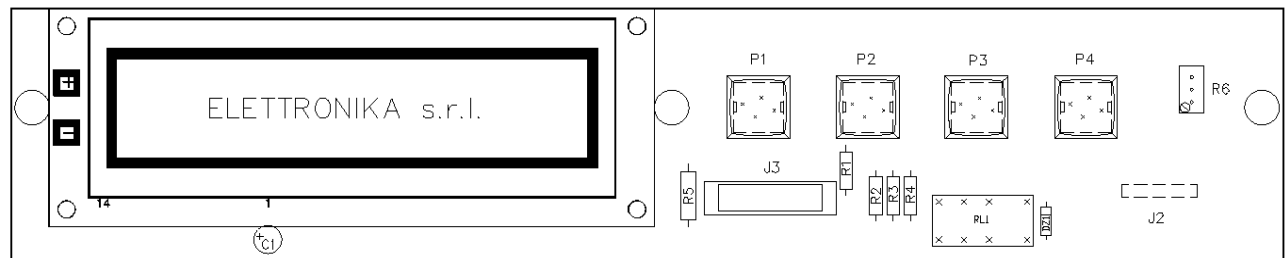
Part Name - Code	Description	Qt	Component	Page 2/3
1065	100nF CERAMIC CAPACITOR	23	CA11, CA17, CA26, CA27, CA33, CB2, CB4, CB5, CB7, CB18, CB27, CB29, CB31, CB35, CB36, CC7, CC8, CC9, CC11, CC12, CC14, CC16, CC18	
1073	470nF CERAMIC CAPACITOR	2	CB21, CB22	
1759	0u68F 63V ELECT. CAPACITOR	1	CB1	
1763	1uF 63V ELECT. CAPACITOR	1	CB34	
	2u2F CAPACITOR	2	CB20, CB23	
	4u7F 25V ELECT. CAPACITOR	1		
1779	10uF 63V ELECT. CAPACITOR	17	CA1, CA2, CA5, CA8, CA9, CA12, CA14, CA18, CA21, CA28, CB3, CB6, CB16, CB17, CB19, CC15, CC17	
	22uF 25V ELECT. CAPACITOR	1	CA31	
1791	47uF 50V ELECT. CAPACITOR	2	CC10, CC13	
	47uF 16V ELECT. CAPACITOR	1	CA30	
1793A	100uF 25V ELECT. CAPACITOR	4	CA16, CA22, CA29, CA35	
5032	0u12H 1812 SMD COIL	2	LB10, LB11	
5020	2u2H COIL	5	LB4, LB5, LB6, LB7, LB8	
5023	22uH COIL	1	LB3	
5013	VK200	3	LB1, LB9, LC1	
5014	6994 3 TURNS SHIELDED COIL	1	LB2	
	6706 (for OIRT Model)			
5010	257BLR-3618N	2	LP1, LP2	
3001	1N4148 DIODE	5	DA1, DA2, DC1, DC3, DB9	
3205	HP280 SCHOTTKY DIODE	2	DB5, DB6	
3109	5V1 0.5W ZENER DIODE	1	DB8	
3111	6V8 0.5W ZENER DIODE	1	DC2	
3220	BB133 SMD VARICAP DIODE	4	DB1, DB2, DB3, DB4	
3053	GREEN LED 3mm	1	DB7	
3423	BC548 NPN TO92 TRANSISTOR	2	TA1, TB6	
3410	BC558 PNP TO92 TRANSISTOR	1	TA2	
BC327	PNP TO92 TRANSISTOR	1	TB5	
3990	BFG35 SMD TRANSISTOR	1	TB4	
4105	J310 FET TO92	3	TB1, TB2, TB3	
4796	TL082 OPERAT. AMPLIFIER	3	ICA1, ICA2, ICA3	
4659	LM358 OPERAT. AMPLIFIER.	2	ICB3, ICC1	
4367	MAR3 MMIC AMPLIFIER	1	ICB2	
4303	LM78L08 STABILIZER TO92	1	ICB1	
4301	LM78L05 STABILIZER TO92	1	ICC5	
4321	LM7812 STABILIZER TO220	1	ICC3	
4315	LM7805 STABILIZER TO220	1	ICC4	
4690	MC145191 C.I. PLL	1	ICB4	
4750	ST62T65 MICRONCONTR.	1	ICC2	
7564	12V RELÈ	1		
2710	4 PAN MALE	1	JP1	

Part Name - Code	Description	Qt	Component	Page 3/3
2707	3 PAN MALE	2	JP3, J1	
4315	LM7805 STABILIZER TO220	1	ICC4	
4690	MC145191 C.I. PLL	1	ICB4	
4750	ST62T65 MICRONCONTR.	1	ICC2	
7564	12V RELÈ	1		
2710	4 PAN MALE	1	JP1	
2707	3 PAN MALE	2	JP3, J1	
2739	2 PAN MALE	1	JP2	
2742	JUMPER	4		
2701	16P MALE CONNECTOR	1		
2516	SMB CS CONNECTOR	3		
7913	1.3mm TEST POINT	6		
Z0106	HEATSINK S41	1		
7501	8 PIN SOCKET	5		
7508	28 PIN SOCKET	1		
5690A	TEKO BOX	1		
2797	DB9 90° SOCKET	1		
5171	TCXO 8MHz 2.5ppm	1		
PN295AR2	PRINTED CIRCUIT BOARD	1		

*Note: for the **OIRT** standard*

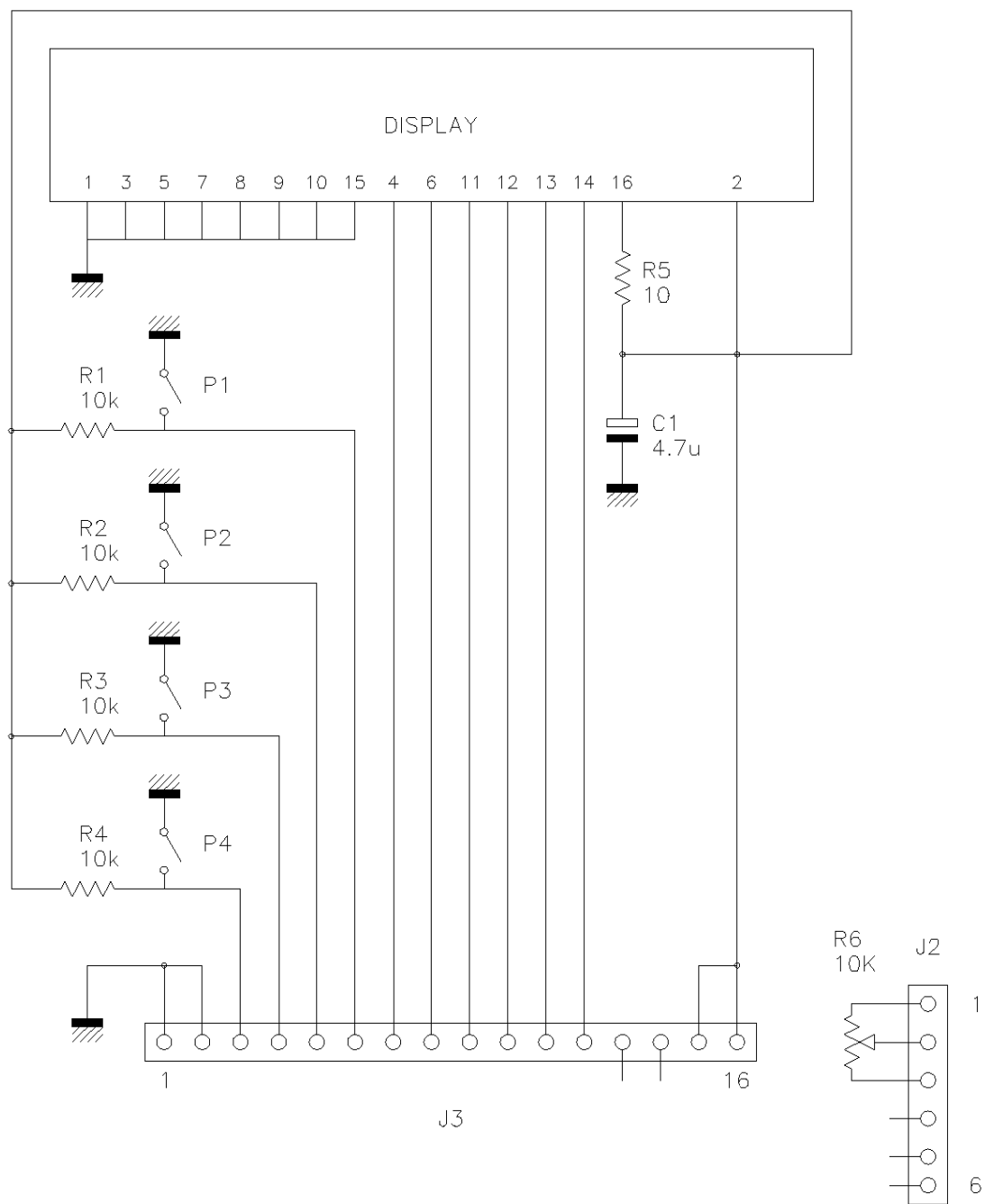
- 1. replace the 4.7p SMD capacitor with a 10p one;*
- 2. insert the 47p SMD 1206 capacitor (between pin 11 and ground of the MC145191).*

Component layout PN396



COMPONENT LIST *pn396*

REFER.	TYPE	DESCRIPTION
R1	10k Ω 1/4W	RESISTOR
R2	10k Ω 1/4W	RESISTOR
R3	10k Ω 1/4W	RESISTOR
R4	10k Ω 1/4W	RESISTOR
R5	6.8 Ω 1/2W	RESISTOR
R6	10k Ω	TRIMMER
C1	4.7uF 35V	ELECTROLYTIC CAPACITOR
	PN396	PRINTED CIRCUIT BOARD



ELATRONIKA
s.r.l.

Schema Elettrico SCHEDA DISPLAY

rev.

DISPLAY BOARD Electrical Diagram

ref. SE396

DESCRIPTION

The Stereocoder plate PN417 allows the multiplexer codification of the stereo signal, the pre-emphasis and the needed filtering.

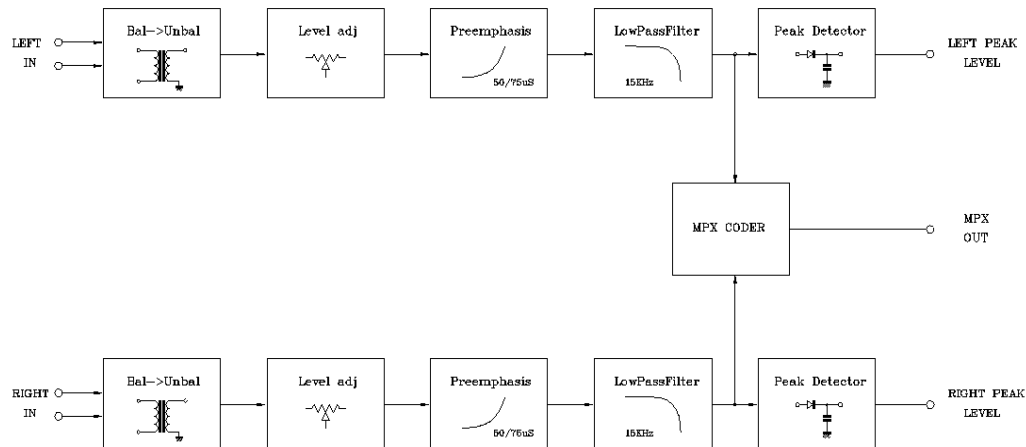
In particular, with reference to the block diagram:

- The block "Bal-Unbal" does the conversion from balanced to unbalanced, obviously with active circuit.
- The block "Level adj" allows the adjustment of the input level by means of a potentiometer placed on the rear panel of the apparatus.
- The block "Preemphasis" activates (or deactivates) the 50 or 75 μ s pre-emphasis, which may be selected on the printed circuit.
- The block "Low Pass Editor" does the filtering beyond 15kHz, according to the rules in force, by means of two cascaded stages made up with elliptical filter.
- The block "Peak Detector" reveals the peak of the signal, before being codified MPZ.
- The block "MPC Coder" is the heart of the Multiplexer stereo codification. It mixes the left and right signal to create the MPX signal which will be modulated by the FM exciter.

SPECIFICATIONS

Input Audio Level	2Vpp
Input Impedance	600 Ω Balanced 30k Ω Unbalanced
Bandwith	20Kz - 15kHz
MPX Output Imp.	100 Ω (Unbal) Free of DC
MPX Output Level	5.6Vpp
Pilot Output Level	560mVpp
Output Load	> 10k Ω
Crosstalk L/R	> 59dB @ 40Hz > 70dB @ 1kHz > 53dB @ 15kHz
Pilot Frequency Accuracy	< 1Hz
Preenphasis	50 μ s / 70 μ s / FLAT
Weighted S/N ratio (400Hz)	> 80dB
Unweighted S/N ratio (400Hz)	> 81dB
THD	0.03%
IMD (7&8kHz)	0.013% (D2) 0.110% (D3)
Power Supply	15Vdc

STEREOCODER Block Diagram



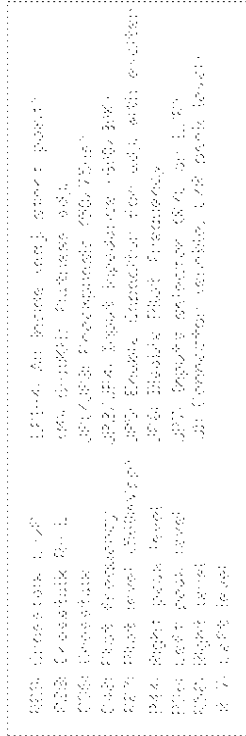
For the operations described in this paragraph, refer to th diagram SP417 at the following page;

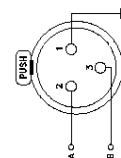
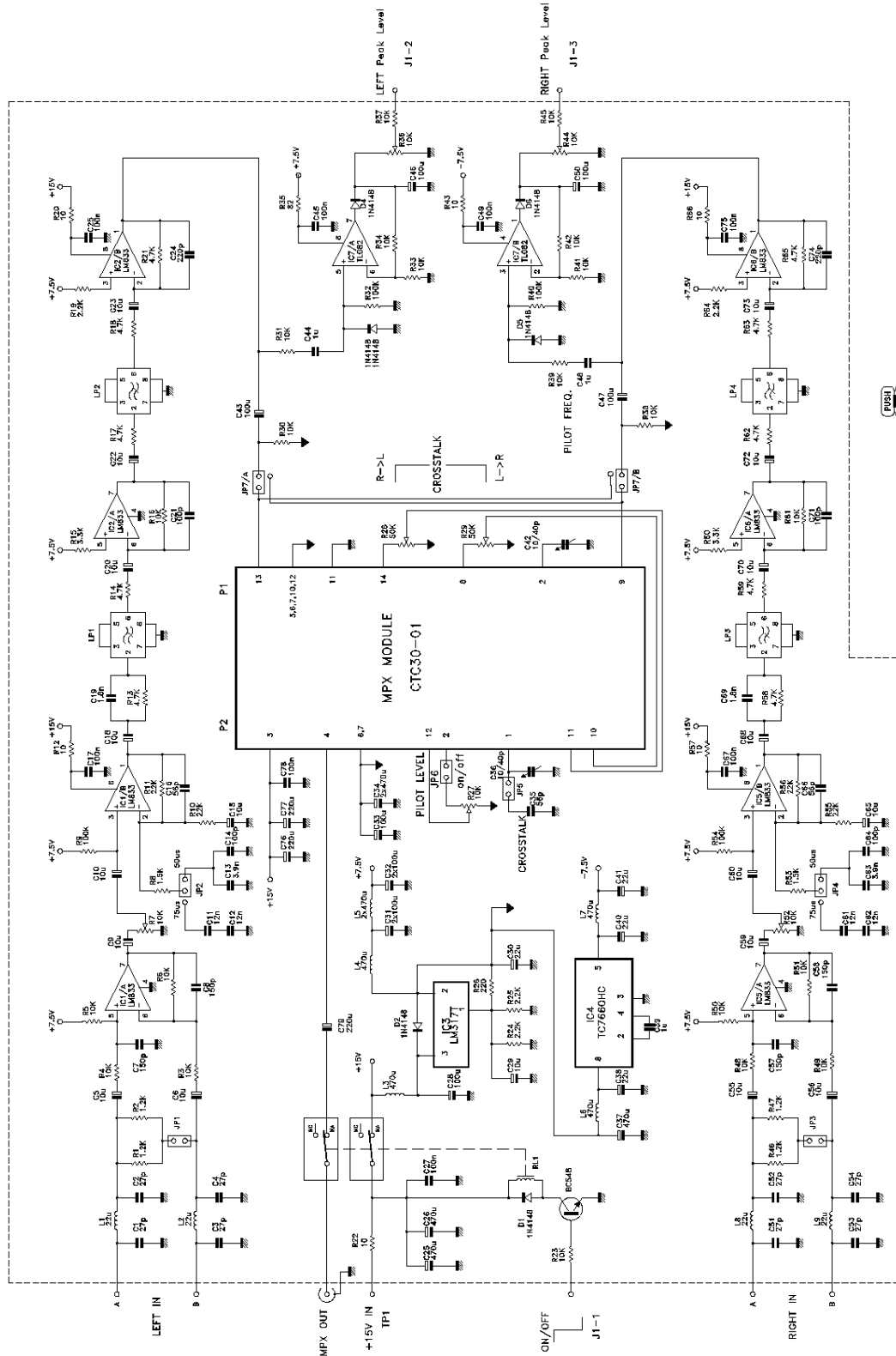
SETTINGS

- JP2/JP4: Allows to select the preemphasis between 50 and 75 μ s or to completely exclude it removing the jumper;
 JP1/JP3: Allows to select the inputn impedance between 600 and 30k Ω ;
 JP5: Insert an auxiliary condenser needed to calibrate the crosstalk with the exciter connected;
 JP6: Disables the carrier of the pilot;
 JP7: Allows to exchange the left and right channels with each other.

ADJUSTMENTS

- R29: Allows to adjust the crosstalk L->R;
 R28: Allows to adjust the crosstalk R->L;
 C36: Allows to adjust the crosstalk;
 C42: Allows to adjust the pilot frequency;
 R27: Allows to adjust the pilot level (560mVpp);
 R44/R36: Allows to adjust the peak level of the left/ right channel;
 R52/R7: Allows to adjust the input signal for the left/ right channel;
 LP4/LP3: Allows to adjust the passing band for the right channel;
 LP2/LP1: Allows to adjust the passing band for the left channel.





XLR Female Socket

ELSTRONIKA
s.r.l.

Scheda StereoCoder
StereoCoder board

DATA
31/03/98
ref.
SE417

COMPONENT LIST *pn417*

REFER.	TYPE	DESCRIPTION	Page 1/5
R1	1.2k Ω 1/4W	RESISTOR	
R2	1.2k Ω 1/4W	RESISTOR	
R3	10k Ω 1/4W	RESISTOR	
R4	10k Ω 1/4W	RESISTOR	
R5	10k Ω 1/4W	RESISTOR	
R6	10k Ω 1/4W	RESISTOR	
R7	10k Ω	TRIMMER	
R8	1.5k Ω 1/4W	RESISTOR	
R9	100k Ω 1/4W	RESISTOR	
R10	22k Ω 1/4W	RESISTOR	
R11	22k Ω 1/4W	RESISTOR	
R12	10 Ω 1/4W	RESISTOR	
R13	4.7k Ω 1/4W	RESISTOR	
R14	4.7k Ω 1/4W	RESISTOR	
R15	3.3k Ω 1/4W	RESISTOR	
R16	10k Ω 1/4W	RESISTOR	
R17	4.7k Ω 1/4W	RESISTOR	
R18	4.7k Ω 1/4W	RESISTOR	
R19	2.2k Ω 1/4W	RESISTOR	
R20	10 Ω 1/4W	RESISTOR	
R21	4.7k Ω 1/4W	RESISTOR	
R22	10 Ω 1/4W	RESISTOR	
R23	10k Ω 1/4W	RESISTOR	
R24	2.2k Ω 1/4W	RESISTOR	
R25	2.2k Ω 1/4W	RESISTOR	
R26	220 Ω 1/4W	RESISTOR	
R27	10k Ω	TRIMMER	
R28	50k Ω	TRIMMER	
R29	50k Ω	TRIMMER	
R30	10k Ω 1/4W	RESISTOR	
R31	10k Ω 1/4W	RESISTOR	
R32	100k Ω 1/4W	RESISTOR	
R33	10k Ω 1/4W	RESISTOR	
R34	10k Ω 1/4W	RESISTOR	
R35	82 Ω 1/4W	RESISTOR	
R36	10k Ω	TRIMMER	
R37	10k Ω 1/4W	RESISTOR	
R38	10k Ω 1/4W	RESISTOR	
R39	10k Ω 1/4W	RESISTOR	
R40	100k Ω 1/4W	RESISTOR	

REFER.	TYPE	DESCRIPTION	Page 2/5
R41	10k Ω 1/4W	RESISTOR	
R42	10k Ω 1/4W	RESISTOR	
R43	10 Ω 1/4W	RESISTOR	
R44	10k Ω	TRIMMER	
R45	10k Ω 1/4W	RESISTOR	
R46	1.2k Ω 1/4W	RESISTOR	
R47	1.2k Ω 1/4W	RESISTOR	
R48	10k Ω 1/4W	RESISTOR	
R49	10k Ω 1/4W	RESISTOR	
R50	10k Ω 1/4W	RESISTOR	
R51	10k Ω 1/4W	RESISTOR	
R52	10k Ω	TRIMMER	
R53	1.5k Ω 1/4W	RESISTOR	
R54	100k Ω 1/4W	RESISTOR	
R55	22k Ω 1/4W	RESISTOR	
R56	22k Ω 1/4W	RESISTOR	
R57	10 Ω 1/4W	RESISTOR	
R58	4.7k Ω 1/4W	RESISTOR	
R59	4.7k Ω 1/4W	RESISTOR	
R60	3.3k Ω 1/4W	RESISTOR	
R61	10k Ω 1/4W	RESISTOR	
R62	4.7k Ω 1/4W	RESISTOR	
R18	4.7k Ω 1/4W	RESISTOR	
R64	2.2k Ω 1/4W	RESISTOR	
R65	4.7k Ω 1/4W	RESISTOR	
R66	10 Ω 1/4W	RESISTOR	
C1	27pF	CERAMIC CAPACITOR	
C2	27pF	CERAMIC CAPACITOR	
C3	27pF	CERAMIC CAPACITOR	
C4	27pF	CERAMIC CAPACITOR	
C5	10 μ F 35V	ELECTROLYTIC CAPACITOR	
C6	10 μ F 35V	ELECTROLYTIC CAPACITOR	
C7	150pF	CERAMIC CAPACITOR	
C8	150pF	CERAMIC CAPACITOR	
C9	10 μ F 35V	CERAMIC CAPACITOR	
C10	10 μ F 35V	CERAMIC CAPACITOR	
C11	12nF	CERAMIC CAPACITOR	
C12	12nF	CERAMIC CAPACITOR	
C13	3.9nF	CERAMIC CAPACITOR	
C14	100pF	CERAMIC CAPACITOR	
C15	10 μ F 35V	ELECTROLYTIC CAPACITOR	
C16	56pF	CERAMIC CAPACITOR	
C17	100nF	CERAMIC CAPACITOR	

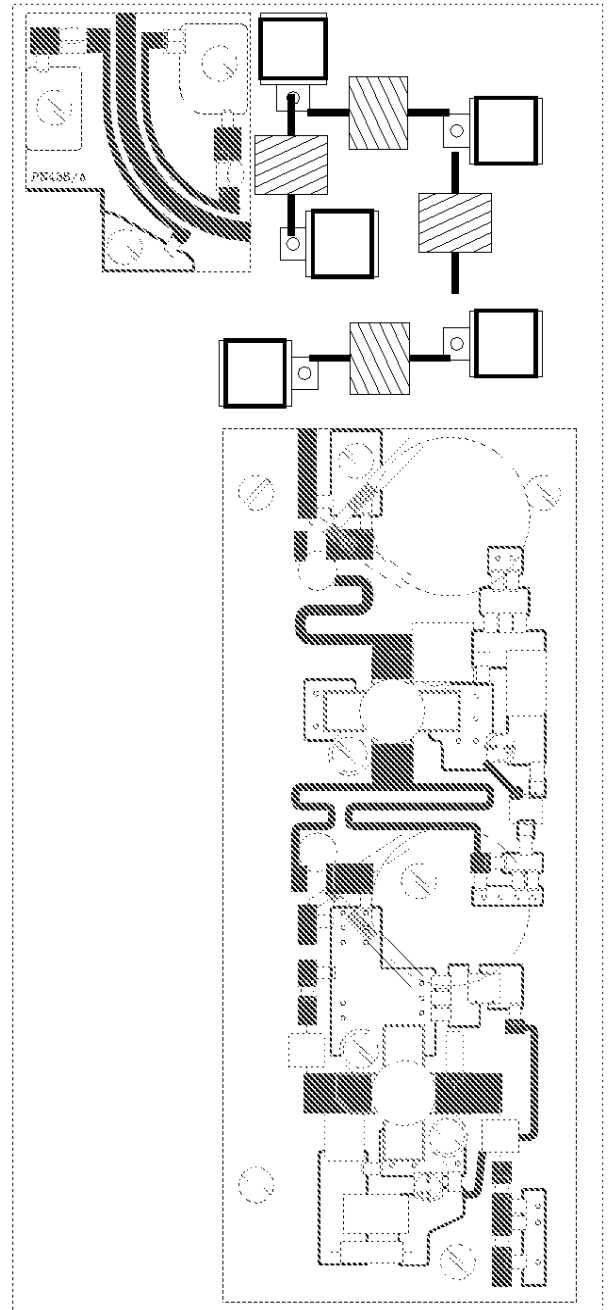
REFER.	TYPE	DESCRIPTION	Page 3/5
C18	10uF 35V	ELECTROLYTIC CAPACITOR	
C19	1.8nF	CERAMIC CAPACITOR	
C20	10uF	ELECTROLYTIC CAPACITOR	
C21	100pF	CERAMIC CAPACITOR	
C22	10uF 35V	ELECTROLYTIC CAPACITOR	
C23	10uF 35V	ELECTROLYTIC CAPACITOR	
C24	220pF	CERAMIC CAPACITOR	
C25	100nF	CERAMIC CAPACITOR	
C26	2x470uF 35V	ELECTROLYTIC CAPACITOR	
C27	100pF	CERAMIC CAPACITOR	
C28	100uF 35V	ELECTROLYTIC CAPACITOR	
C29	10uF 35V	ELECTROLYTIC CAPACITOR	
C30	22uF 35V	ELECTROLYTIC CAPACITOR	
C31	2x100uF 35V	ELECTROLYTIC CAPACITOR	
C32	2x100uF 35V	ELECTROLYTIC CAPACITOR	
C33	100uF 35V	ELECTROLYTIC CAPACITOR	
C34	2x470uF 35V	ELECTROLYTIC CAPACITOR	
C35	56pF	CERAMIC CAPACITOR	
C36	10/40pF	TRIMMER CAPACITOR	
C37	470uF 35V	ELECTROLYTIC CAPACITOR	
C38	22uF 35V	ELECTROLYTIC CAPACITOR	
C39	1uF	CERAMIC CAPACITOR	
C40	22uF 35V	ELECTROLYTIC CAPACITOR	
C41	22uF 35V	ELECTROLYTIC CAPACITOR	
C42	10/40pF	TRIMMER CAPACITOR	
C43	100uF 35V	ELECTROLYTIC CAPACITOR	
C44	1uF	CERAMIC CAPACITOR	
C45	100nF	CERAMIC CAPACITOR	
C46	100uF 35V	ELECTROLYTIC CAPACITOR	
C47	100uF 35V	ELECTROLYTIC CAPACITOR	
C48	1uF	CERAMIC CAPACITOR	
C49	100nF	CERAMIC CAPACITOR	
C50	100uF 35v	ELECTROLYTIC CAPACITOR	
C51	27pF	CERAMIC CAPACITOR	
C52	27pF	CERAMIC CAPACITOR	
C53	27pF	CERAMIC CAPACITOR	
C54	27pF	CERAMIC CAPACITOR	
C55	10uF 35v	ELECTROLYTIC CAPACITOR	
C56	10uF 35v	ELECTROLYTIC CAPACITOR	
C57	150pF	CERAMIC CAPACITOR	
C58	150pF	CERAMIC CAPACITOR	
C59	10uF 35V	CERAMIC CAPACITOR	
C60	10uF 35v	CERAMIC CAPACITOR	

REFER.	TYPE	DESCRIPTION	Page 4/5
C61	12nF	CERAMIC CAPACITOR	
C62	12nF	CERAMIC CAPACITOR	
C63	3.9nF	CERAMIC CAPACITOR	
C14	100pF	CERAMIC CAPACITOR	
C65	10uF 35V	ELECTROLYTIC CAPACITOR	
C66	56pF	CERAMIC CAPACITOR	
C67	100nF	CERAMIC CAPACITOR	
C68	10uF 35v	ELECTROLYTIC CAPACITOR	
C69	1.8nF	CERAMIC CAPACITOR	
C70	10uF 35V	ELECTROLYTIC CAPACITOR	
C71	100pF	CERAMIC CAPACITOR	
C72	10uF 35V	ELECTROLYTIC CAPACITOR	
C73	10uF 35V	ELECTROLYTIC CAPACITOR	
C74	220pF	CERAMIC CAPACITOR	
C75	100nF	CERAMIC CAPACITOR	
C76	220uF 35V	ELECTROLYTIC CAPACITOR	
C77	220uF 35v	ELECTROLYTIC CAPACITOR	
C78	100nF	CERAMIC CAPACITOR	
C79	220uF 35v	ELECTROLYTIC CAPACITOR	
L1	22uH	IMPEDANCE	
L2	22uH	IMPEDANCE	
L3	470uH	IMPEDANCE	
L4	470uH	IMPEDANCE	
L5	2X470uH	IMPEDANCE	
L6	470uH	IMPEDANCE	
L7	470uH	IMPEDANCE	
L8	22uH	IMPEDANCE	
L9	22uH	IMPEDANCE	
LP1			
LP2			
LP3			
LP4			
RL1			
D1	1N4148	DIODE	
D2	1N4148	DIODE	
D3	1N4148	DIODE	
D4	1N4148	DIODE	
D5	1N4148	DIODE	
D6	1N4148	DIODE	
IC1	LM833	I.C.	
IC2	LM833	I.C.	
IC3	LM317T	I.C.	
IC4	TC7660HC	I.C.	

REFER.	TYPE	DESCRIPTION	Page 5/5
IC5	LM833	I.C.	
IC6	LM833	I.C.	
IC7	TL082	I.C.	
	CTC30-1	MPX MODULE	
	PN417	PRINTED CIRCUIT BOARD	

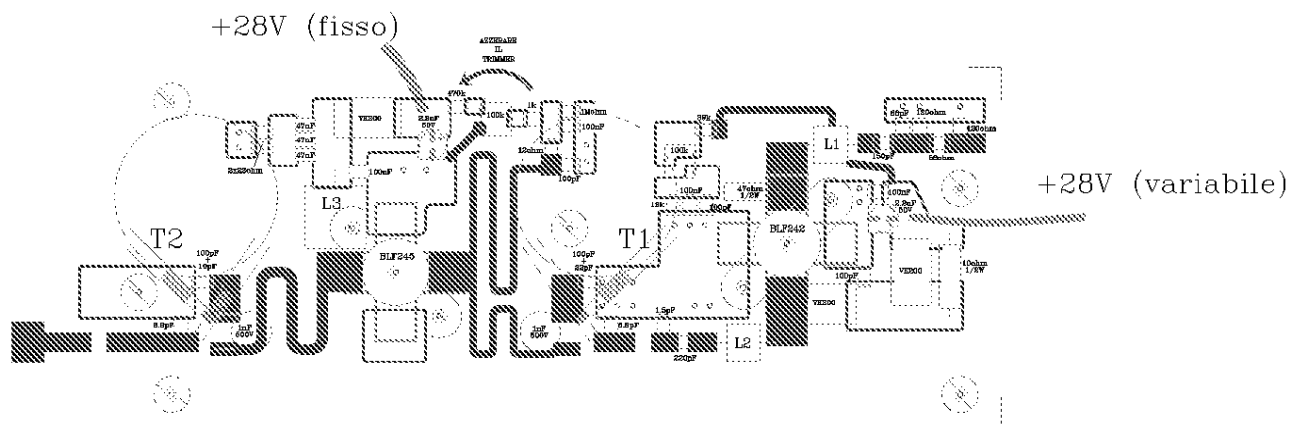
TECHNICAL CHARACTERISTICS

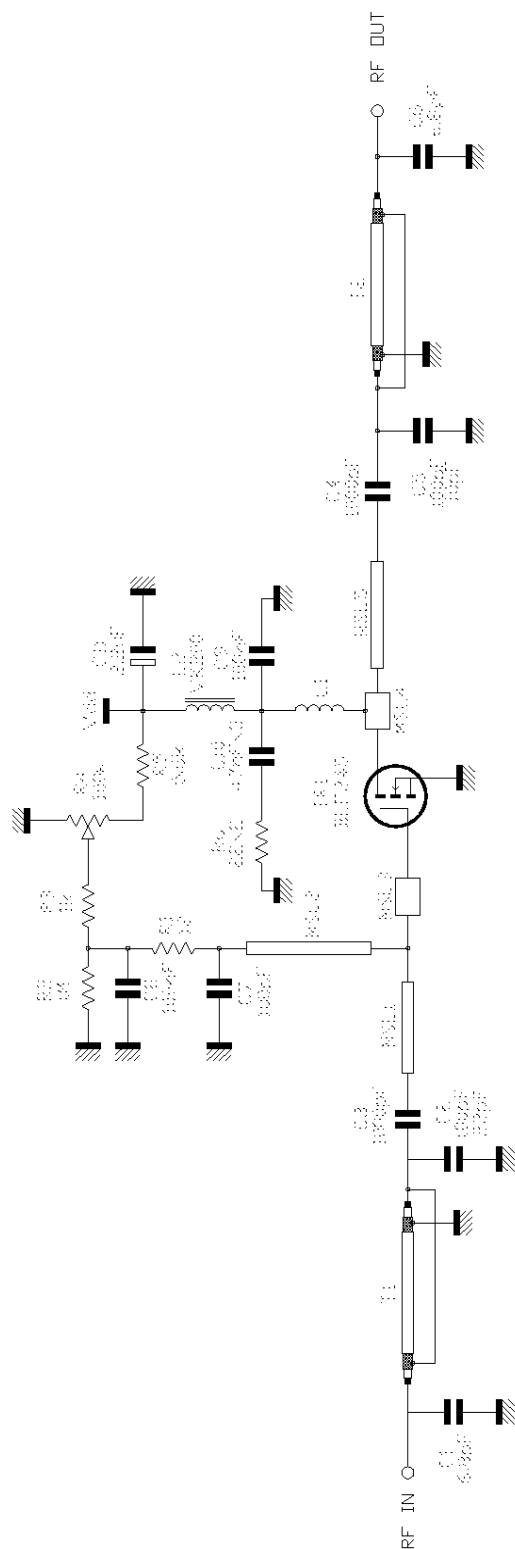
Output Power	30W
Gain	29dB
RF Input Impedance	50Ω
RF Output Impedance	50Ω
DC power	28Vdc
Driver power supply	10-25Vdc
Frequency Range	87.5 - 108MHz



TECHNICAL CHARACTERISTICS

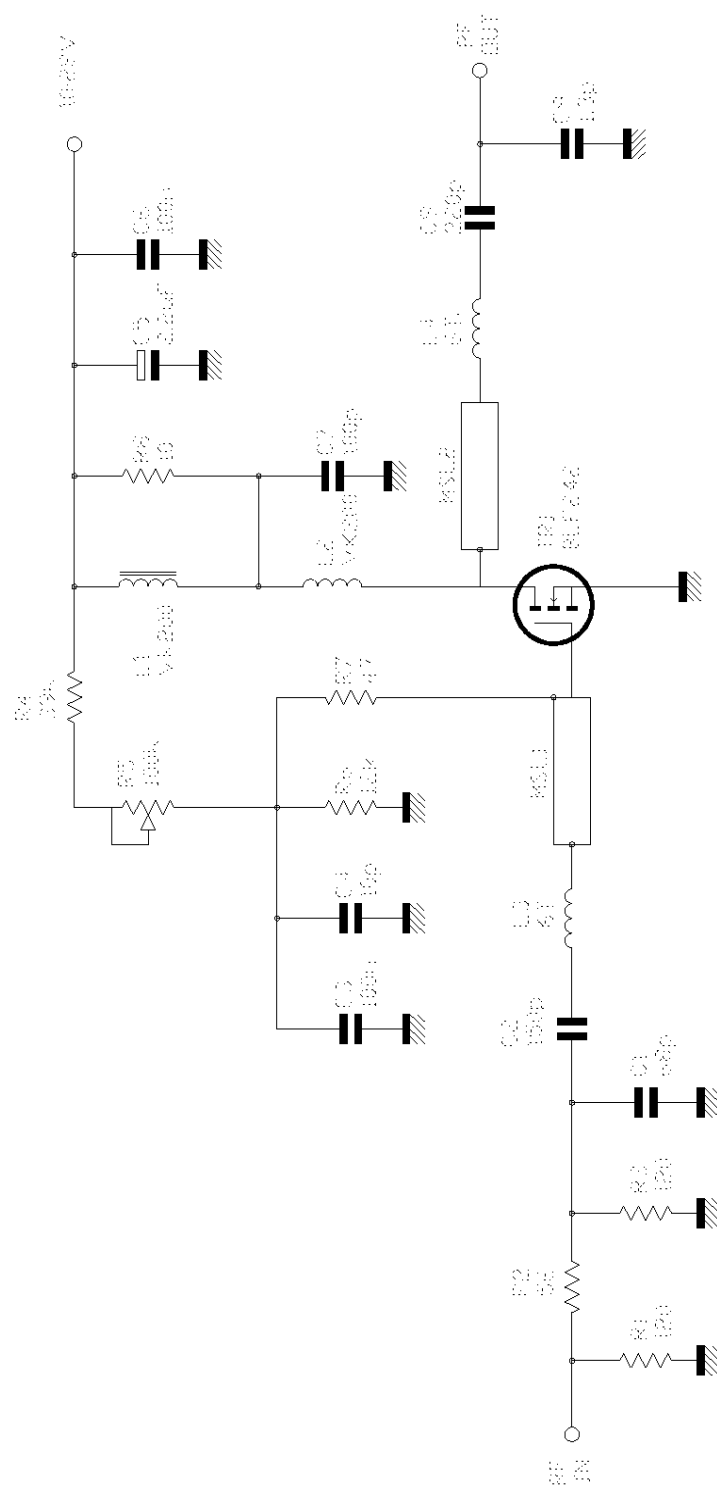
Output Power	0-30W
Gain	22dB
RF Input Impedance	50 Ω
RF Output Impedance	50 Ω
DC Power	28Vdc
Driver power supply	10-25Vdc
Frequency Range	87.5 - 108MHz

Component layout PN448/I




COMPONENT LIST - *30W FM AMPLIFIER*

REFER.	TYPE	DESCRIPTION
R1	12 Ω ¼W	SMD RESISTOR
R2	1M Ω ¼W	SMD RESISTOR
R3	1k Ω ¼W	SMD RESISTOR
R4	100k	SMD TRIMMER
R5	5.6k Ω ¼W	SMD RESISTOR
R6	22 Ω ¼W	SMD RESISTOR (2x)
C1	6.8pF	SMD CAPACITOR
C2	100pF	SMD CAPACITOR
C3	1000pF 500V	SMD CAPACITOR
C4	1000pF 500V	SMD CAPACITOR
C5	100pF	SMD CAPACITOR
C6	6.8pF	SMD CAPACITOR
C7	100pF	SMD CAPACITOR
C8	100nF	SMD CAPACITOR
C9	100nF	SMD CAPACITOR
C10	47nF	SMD CAPACITOR (3x)
C11	2.2uF	ELECTROLYTIC CAPACITOR
C12	22pF	SMD CAPACITOR
C13	10Pf	SMD CAPACITOR
L1		8 TURN COIL
L2	VK200	RF CHOKE
TR1	BF245	RF TRANSISTOR
	PN448/I 1/2	PRINTED CIRCUIT BOARD



COMPONENT LIST - 2W PILOT MODULE

REFER.	TYPE	DESCRIPTION
R1	120 Ω ¼W	SMD RESISTOR
R2	56 Ω ¼W	SMD RESISTOR
R3	120 Ω ¼W	SMD RESISTOR
R4	39k Ω ¼W	SMD RESISTOR
R5	100k	SMD TRIMMER
R6	12k Ω ¼W	SMD RESISTOR
R7	47 Ω ½W	SMD RESISTOR
R8	10 Ω ½W	SMD 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
L1	VK200	RF CHOKE
L2	VK200	RF CHOKE
L3		6 TURN COIL
L4		6 TURN COIL
TR1	BLF242	RF TRANSISTOR
	PN448/I 2/2	PRINTED CIRCUIT BOARD

DESCRIPTION

The PN438/C contains two stages, the first stage is a directional coupler which measures the incident and reflected RF signals.

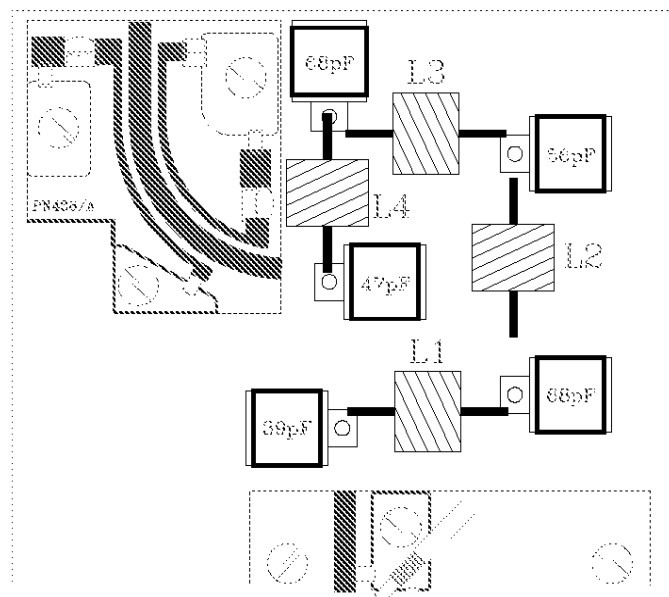
These signals are elaborated to be used by the protection module for SWR and Power protection.

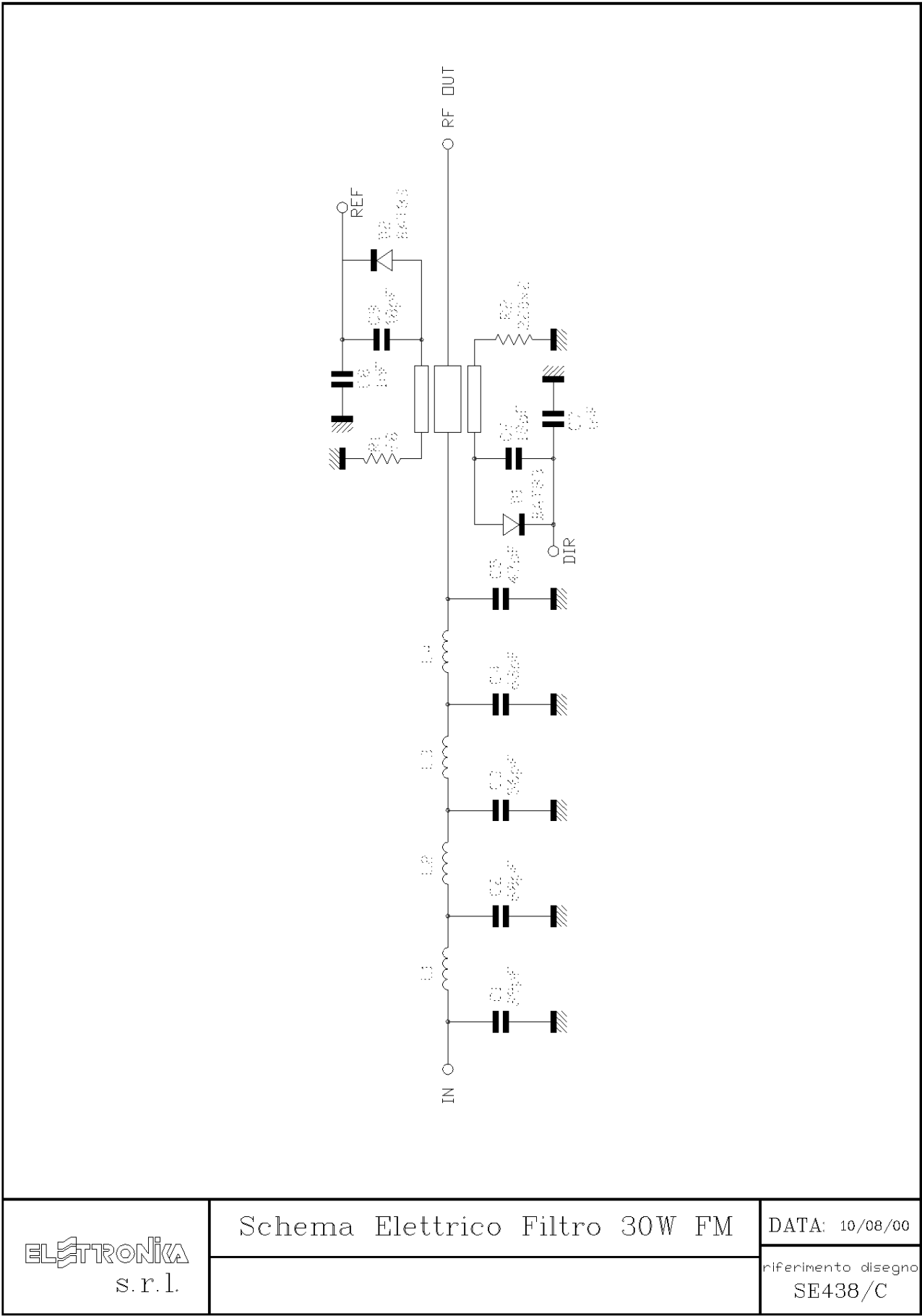
The second stage is a low-pass filter which removes the harmonics.

TECHNICAL CHARACTERISTICS

Return Loss	$\geq 30\text{dB}$
Insertion Loss	$< 0,2\text{dB}$
Attenuation at 176MHz	$> 40\text{dB}$

Component layout pn438/C

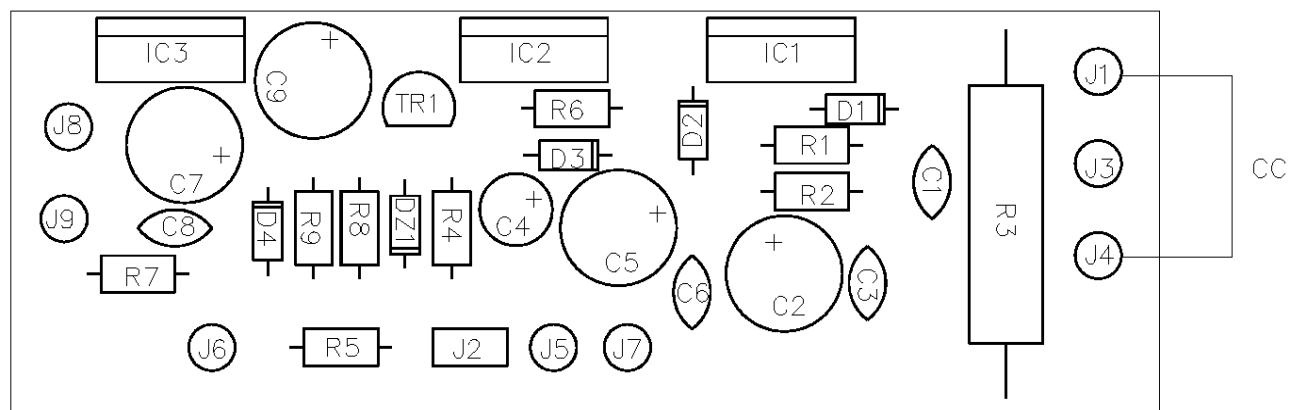




COMPONENT LIST *pn438/C*

REFER.	TYPE	DESCRIPTION
R1	68 Ω 1/4W	SMD RESISTOR
R2	220 Ω 1/4W	SMD RESISTOR (2x)
C1	39pF	SEMCO CAPACITOR
C2	56pF	SEMCO CERAMIC CAPACITOR
C3	68pF	SEMCO CERAMIC CAPACITOR
C4	56pF	SEMCO CERAMIC CAPACITOR
C5	47pF	SEMCO CERAMIC CAPACITOR
C6	18pF	CERAMIC CAPACITOR
C7	1nF	PHILIPS SMD CAPACITOR
C8	1nF	PHILIPS SMD CAPACITOR
C9	18pF	CERAMIC CAPACITOR
D1	BAT 83	DIODE
D2	BAT 83	DIODE
L1		4T, d=1mm, D=8mm
L2		4T, d=1mm, D=8mm
L3		4T, d=1mm, D=8mm
L4		4T, d=1mm, D=8mm
	PN438/C	PRINTED CIRCUIT BOARD

Component layout PN0515

COMPONENT LIST *pn0515*

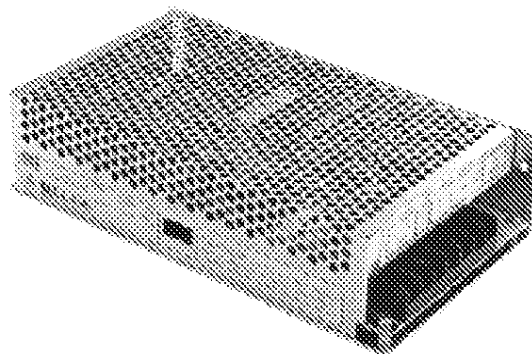
REFER.	TYPE	DESCRIPTION
C1	100nF	50V DISCO COD. 1065 (Unmounted in PLL/C and PLL/CS-2)
C3	100nF	50V DISCO COD. 1065
C6	100nF	50V DISCO COD. 1065
C8	100nF	50V DISCO COD. 1065
C2	100uF-50V	50V ELET. VERT. COD. 1795
C5	100uF-50V	50V ELET. VERT. COD. 1795
C7	100uF-50V	50V ELET. VERT. COD. 1795
C4	10uF-63V	63V ELET. VERT. COD. 1779
R5	15R	RES 1/4W 5% COD. 0019
R7	1K5	RES 1/4W 5% COD. 0043
D1	1N4007	(Unmounted in PLL/C and PLL/CS-2)
D2	1N4007	
D3	1N4007	
R1	220R	RES 1/4W 5% COD. 0033 (Unmounted in PLL/C and PLL/CS-2)
R6	220R	RES 1/4W 5% COD. 0033 (Unmounted in PLL/C and PLL/CS-2)
R4	470R	RES 1/4W 5% COD. 0037
R3	390Ω 2W	RESISTENZA A FILO 2W 5% (Unmounted in PLL/C and PLL/CS-2)
R2	5600Ω 1/4W	RES 1/4W 5% COD. 0049
IC3	7815	15V 1A COD. 4325
IC1	LM317-H	STABILIZZATORE (Unmounted in PLL/C and PLL/CS-2)
IC2	LM317-H	STABILIZZATORE
J2	PETTINE-PCB-2	PER PCB 2 PIN A PETTINE
J1	SGN CIRCLE	PAD CIRCOLARE 2.54mm
J3-9		



SPECIFICATIONS

MODEL	S-150-24
Input voltage	88~132VAC/176~264VAC selected by sw.
Input frequency	47-63Hz
Inrush current	Cold star, 35A
Output voltage	24V, 6.5A
Overload protection	105%~150% output shutdown
Over voltage protection	115%~135% of output voltage (S-150-24 125%~145%)
Setup, rise, hold up time	100ms, 50ms, 20ms
Withstand voltage	I/P-O/P: 3KV, I/P-FG: 1.5KV, 1min.
Working temp	0-30°C@100%, 50°C@100% with cooling fan, -10°C@80% (15V&24V 0-50°C@100%, 60°C@60%)
Safety standards	UL 1012, TUV EN60950
EMC standards	(EN55022), IEC801-2, 3, 4, IEC555-2
Connection	7P/9.5mm pitch terminal block
Weight	0.8kgs
Packing	20PCS/1.4CUFT
Dimensions	199x110x50mm

Type No	Output	Tol.	R&N	Effi.	P.P.
S-150-5	5V, 30A	+/-2%	150mV	78%	87
S-150-7.5	7.5V, 20A	+/-1%	150mV	80%	87
S-150-9	9V, 16.7A	+/-1%	180mV	80%	87
S-150-12	12V, 12.5A	+/-1%	180mV	82%	87
S-150-15	15V, 10A	+/-1%	180mV	84%	87
S-150-24	24V, 6.5A	+/-1%	240mV	85%	87
S-150-48	48V, 32A	+/-1%	240mV	86%	87



TEST PROCEDURE

The table below shows the typical technical characteristics of the board used as FM radio transmitter. The measures have been taken at 98MHz frequency.

PARAMETER		VALUE
Power supply		15Vdc/400mA
RF Output level		+25dBm (± 0.3 dB)
RF Output connector/Impedenza		SMB/50 Ω
Attenuation with PLL		>50dB
Audio limitation circuit		ON/OFF
Mono input	Input impedance	600 Ω Balanced
	Emphasis	FLAT/50us/75us
	Frequency response	40Hz÷15kHz (± 0.3 dB)
	Distortion	<0.1%
	S/N Weighted CCIR	>78dB
	S/N Unweighted CCIR	>81dB
	AM Synchronous	<-68dB (<0.04%)
	AM Asynchronous	<-73dB (<0.03%)
	Intermodulation dist. d_2/d_3	<-66dB/<-60dB
MPX Input	Input impedance	10k Ω
	Frequency response	40Hz÷100kHz/ ± 0.2 dB
	Distortion	<0.2%
SCA Input	Input impedance	10k Ω
	Frequency response	40Hz÷100kHz/ ± 0.1 dB
	Distortion	<0.2%
External coder (MPX Input)	(L-R) Crosstalk 40/1k/15kHz	-40/-55/-48dB
	S/N Weighted CCIR	>68dB
	S/N Unweighted CCIR	>73dB

1. RF SECTION

- Remove the ferrite core from the coil in the oscillator section and check that it is locked (green LED lit) in all the working range (typically the tension on the varicap at 98MHz is 4.0V);
- check the output level of the RF signal, typically 25dBm, in the concerned band (87÷108MHz);
- adjust the indication of the direct and reflected power by means of the trimmers RC1 and RC2.

2. MOTHER BOARD (Modulation/Limitation circuit)

- Connect the oscilloscope on the middle point of the jumper JP3;
- on the MONO input insert a 1kHz tone with 2,2Vpp (0dBm@600Ω)disable the emphasis (FLAT response) by removing the two bridges from the jumper JP1 and adjust the input attenuator RA5 until 6.8Vpp can be read on the oscilloscope;
- check the intervention of the limitation circuit in case the input signal increases. Adjust its symmetry by means of RA36;
- adjust the frequency deviation to the normal levels (usually +/-75kHz) by means of RA44;
- characterize the MONO and MPX input by measuring the passing band, distortion, emphasis curve (50 and 75μs) and noise;
- adjust RB1 to improve the distortion;
- input SCA1-2. Adjust RA22 and RA20 to obtain a +/-75kHz deviation with input 2.2Vpp with a 57kHz tone. Check the frequency response in the band 57÷75kHz;
- adjust the deviation indication on the display by means of RC24.

MAIN CHARACTERISTICS OF THE FM TRANSMITTERS

	ITALIAN REGULATION (MPT decr n° 311/03/94)	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 to 15kHz
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".

