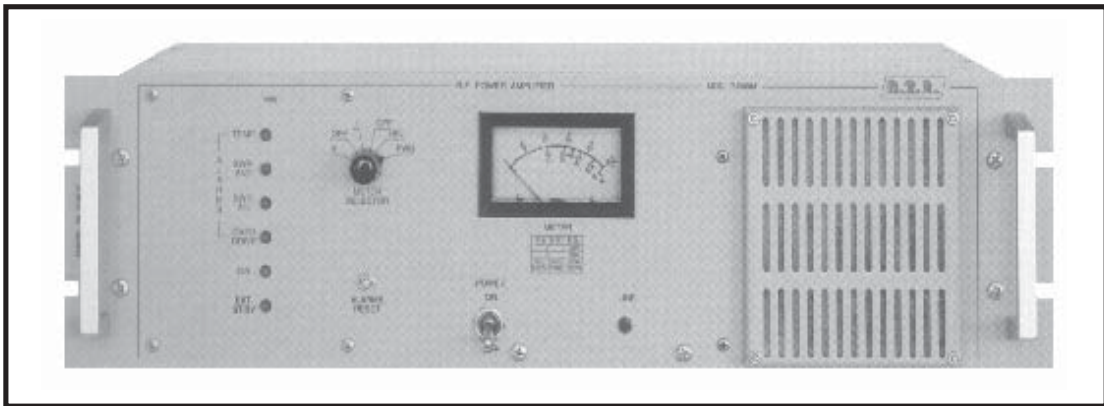


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# PJRL250



## TECHNICAL AND MAINTENANCE MANUAL



Manufactured by R.V.R. Elettronica - Italy

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**PJRL250 POWER MOSFET AMPLIFIER 215-  
225 MHz RANGE  
Technical and Maintenance Manual**

English

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## PRELIMINARY INSTRUCTIONS AND WARRANTY INFORMATION

Please observe safety precautions when handling this unit. This equipment contains dangerous currents and high voltages.

This manual is written as a general guide for those having previous knowledge and experience with this kind of equipment. It is not intended to contain a complete statement of all safety warnings which should be observed by personnel in using this or other electronic equipment.

R.V.R. doesn't assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.

Please observe all local codes and fire protection standards in the operations of this unit.

**CAUTION:** always disconnect power before opening covers or removing any part of this unit. Use appropriate grounding procedures to short out capacitors and high voltage points before servicing.

Any damage to the goods must be reported to the carrier in writing on the shipment receipt.

Any discrepancy or damage discovered subsequent to delivery, shall be reported to R.V.R. within five (5) days from its receipt.

R.V.R. extends to the original end-user purchaser all original manufacturers warranties which are transferable and all claims are to be made directly to R.V.R. per indicated procedures.

All manufacturers warranties will be supported by R.V.R. to ensure precise and speedy service where possible.

R.V.R. shall not be liable for any damage of whatsoever nature, arising out of or in connection with the product or its use thereof.

R.V.R.'s warranty shall not include:

- 1) Re-shipment of the unit to R.V.R. for repair purposes
- 2) Any unauthorized repair/modification
- 3) Incidental/consequential damages as a result of any defect
- 4) Nominal non-incidentual defects
- 5) Re-shipment costs or insurance of the unit or replacement units/parts

Warranty shall come into force from invoice date and for the period of the manufactures warranty.

To claim your rights under this warranty:

- a.** Contact the dealer or distributor where you purchased the unit. Describe the problem and ask if he has an easy solution. Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.
- b.** If your dealer cannot help you, contact R.V.R. in Bologna and explain the problem. If it is decided to return the unit to the factory, R.V.R. will mail you a regular authorization with all the necessary instructions to send back the goods.
- c.** When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e., R.V.R. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by R.V.R.'s service manager on the authorization.

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

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

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

**R.V.R. Elettronica S.r.l. -  
Broadcasting Equipment -  
Via del Fonditore, 2/2c  
40138 Bologna - Italy**

R.V.R. reserves the right to modify the design and specifications of the equipment in this manual without previous notice.

## 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.

**R.V.R. ELETTRONICA 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

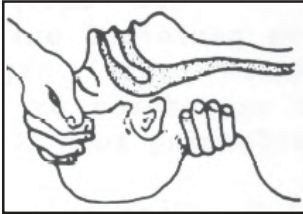
## Treatment of electrical Shock

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.

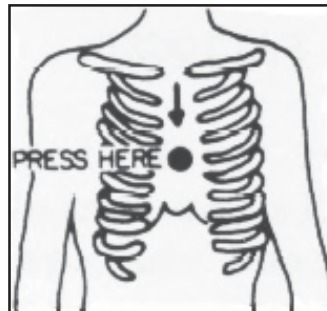
### C CIRCULATION

CHECK CAROTID PULSE

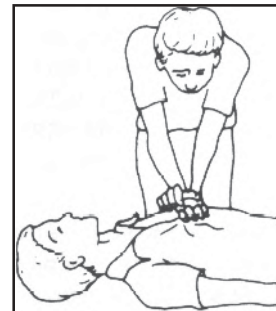


IF PULSE ABSENT,  
BEGIN ARTIFICIAL  
CIRCULATION

DEPRESS STERNUM 1 1/2" TO 2"



APPROX. 80 SEC. : ONE RESCUER, 15 COMPRESSIONS,  
2 QUICK BREATHS.



APPROX. 60 SEC. : TWO RESCUERS, 5 COMPRESSIONS,  
1 BREATH

NOTE: DO NOT INTERRUPT RHYTHM OF COMPRES-  
SIONS WHEN SECOND PERSON IS GIVING BREATH.

**Call for medical assistance as soon as possible.**

2) If victim is responsive:

- a. Keep them warm.
- b. Keep them as quiet as possible.

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

# SECTION 1

## **PJRL250 DESCRIPTION**

### **1.1 EXTERNAL DESCRIPTION**

The PJRL250 is housed in a 3U 19" rack completely assembled with modules fitted on main rails, wired with connectors allowing easy servicing and replacement.

On the front panel the alarm indicators, the mains switch and the meter for the principal parameters.

On the rear panel the RF INPUT and RF OUTPUT connectors are located, together with the telemetry connector, the RF output test connector (directional coupler), the mains socket the fuses and an auxiliary mains line output for the supply of other exciters of a different design and make.

### **1.2 ELECTRICAL DESCRIPTION**

PJRL250 is a MOSFET power amplifier working on the 215-225MHz band with an output power in excess of 250W and a drive level of about 10-12W. This amplifier uses one RF module able to deliver more than 250W, with switching power supplies for high efficiency.

A built in low pass filter suppresses the harmonic content below the FCC and CCIR requirements.

A protection system takes care of the amplifier against thermal problems, excessive input drive power and excessive SWR inside the amplifier or along the feeder. This system provides an automatic reset to initial conditions when the problem ceases.

### **1.3 METERS AND INDICATORS**

The principal parameters of the amplifier are read by the analog multimeter (9 Fig.1) and selected by the rotary switch (8 Fig.1) on the front panel. Various led indicators indicate the alarm conditions (7 Fig.1).

The push-button (3 Fig.1) resets the counting circuit of the protection circuit.

An indicator confirms the presence of the mains voltage (5 Fig.1).

The ON led (2 Fig.1) indicates the amplifier is working, EXT. ST.BY led (1 Fig.1) indicates an external lock and a wait state of the amplifier.

### **1.4 AUTOMATIC LEVEL CONTROL**

An unused characteristic of this amplifier is the outstanding power gain; indeed without preamplifiers we have an output power of 250W with a drive of only 10-12W.

A power limiter stabilizes the output power against input drive fluctuations.

## **1.5 PROTECTION CIRCUITS**

The protection circuits set the amplifier in stand-by in the case of a fault condition.

After 10 seconds the protection reactivates the amplifier if the fault has disappeared.

If not, this process is repeated 4 times at the end of which the amplifier stays disabled for few minutes; after few minutes, if the trouble persists the protection performs other four cycles and then disable the amplifier indefinitely.

If during these cycles the anomaly disappears and the amplifier works regularly for more than few minutes the counting system is reset and the original conditions established.

(NOTE The intervals described are indicative)

The protection acts for excessive SWR (the Internal SWR alarm is not actived), over-temperature and overdrive, indicates the problem with warning lights and disables the pilot exciter.

## **1.6 R.F. POWER AMPLIFIER MODULE**

The amplifier employs the broadband modules with 50 Ohm input/output impedance (SMA connectors).

The output power of module is 250W with 10W of drive.

## **1.7 DEVICE SPECIFICATIONS**

Refer to Table A for electrical specifications, and to Table B for dimensional and environmental specifications.

# SECTION 2

# TABLE A

## TECHNICAL SPECIFICATIONS

A.C. Supply	100-130 V, 50-60 Hz 198-250 V, 50-60 Hz
Cooling	Forced Ventilation
Frequency Range	from 215 to 225 MHz
Power Output	250 W
R.F. Drive Power	approximately 10-12W for Pout=250 W
R.F. Input Connector	Standard "N" type connector
R.F. Input Impedance	50 Ohm
R.F. Output Impedance	50 Ohm
R.F. Output Connector	Standard "N" type connector
Spurious & Harmonic Suppression	meets or exceeds all FCC and CCIR requirements

TABLE B  
**DIMENSIONAL AND  
ENVIRONMENTAL  
SPECIFICATIONS**

<i>Cabinet Dimension</i>	126 mm (04.96") H 437 mm (17.20") W 340 mm (13.39") D
<i>Panel Size</i>	483 mm (19.00") W 132.5 mm (5.22") H
<i>Operating Temperature</i>	-10°C to 50°C
<i>Humidity</i>	95% Max, Non Condensing
<i>Weight</i>	21Kg

# ELECTRICAL DESCRIPTION

This section describes the overall working theory of the PJRL250. For case of description the amplifier is subdivided into subassemblies that will be discussed in detail below. The block diagram is illustrated in Fig.3.

## 2.1 POWER SUPPLY

The switching power supply (2 Photo 1) fitted to the supporting rails and is accessible from the upper part of the amplifier as shown in Photo 1. A mains transformer has a selectable input for voltages between 110,120,220 and 240 Volt and two outputs: A 30+30 Volt, B 18+18 Volt. The A output drive the switching power supply unit that generate the 50 Volt needed by the RF module. Output B supplies the soft-start circuit and the ALARMS CARD. Inside the ALARMS CARD a rectifying and stabilization circuit provides the +15 and -15 Volt needed by the electronics. The 50 Volt switcher regulate the RF output power using a voltage detected by a directional coupler mounted inside the low pass filter box.

## 2.2 SOFT START

The soft start (6 Photo 1) eliminates the current spikes generated by the transformer when it is powered.

## 2.3 R.F. POWER AMPLIFIER MODULE

The R.F. power amplifier module (4 Photo 1) are placed in the right side of the PJRL250. This module is totally shielded and placed on a heat sink as shown Photo 1. The R.F. power amplifier module delivers 250W with 10W of drive and is supplied by an switching power supply.

The quiescent parameters of module are:

$$VDC=50V \quad I_{dq}=400mA$$

The active device employed is a Mosfet (BLF378).

## 2.4 LOW PASS FILTER

This filter (1 Photo 1) is fitted in a metallic box mounted on the internal chassis in the position shown in Photo 1. Thanks to this low pass filter we have a harmonic suppression of more than 75 dB.

## 2.5 ALARMS CARD

This module (3 Photo 1) is composed of a board mounted on the front panel, in left position, as shown in Photo 1. On this board, the electronics detect any system anomaly such as excessive SWR antenna (the internal SWR is not activated); over-temperature etc. This module will also, whenever possible, reset the system to its original conditions, after a fault has accused.

## 2.6 TELEMETRY CONNECTOR

The telemetry connector (3 Fig.2) is placed on the rear panel in the right side as shown in Fig.2. Thanks to this connector the essential parameters of the amplifier are externally available for remote measurements purposes.

### TELEMERY CARD MOD.2 (VER. PROT-A2)

PIN NUMBER	SIGNALS	TELEMERY VOLTAGE LEVEL
4	Reflected Power	1.6V for 40W
5	Inhibit Tx	12V
6	Internal SWR	Not Actived
8	Operate	15V
14	R.F. Module's Voltage	2.0V for 50V
15	R.F. Module's Current	2.0V for 10A
16	Forward Power	1.4V for 300W
17	Temperature	15V when fault
18	Antenna SWR	15V when fault
19	Over Drive	15V when fault
20	Stand By	15V
3,7,21	Ground	0V

The Pin 1-2 are internally connected, the other pin are not used.

## SECTION 3

# INSTALLATION OPERATIONS

# FRONT PANEL VIEW DESCRIPTION (FIG. 1)

- |   |                |   |
|---|----------------|---|
| 1 | EXT. ST. BY    | Led indicating an External Stand-By   |
| 2 | ON             | A.C. ON Power indicator   |
| 3 | ALARMS RESET   | Press-button to reset the alarm status  |
| 4 | ON/OFF POWER   | On/Off Power Switch   |
| 5 | LINE           | A.C. Line Indicator   |
| 6 | AIR FILTER     | Air filter of R.F. Amplifier Module   |
| 7 | ALARMS         | Leds indicating the PJ501-M's alarms status   |
| 8 | METER SELECTOR | Selector to monitor operating parameters:<br>V R.F. Ampl. Module's voltage<br>OFF Not Used<br>I R.F. Ampl. Module's current<br>OFF Not Used<br>REF Reflected Power<br>FWD Forward Power |
| 9 | METER          | Analog meter used to monitor the operating parameters of the amplifier  |



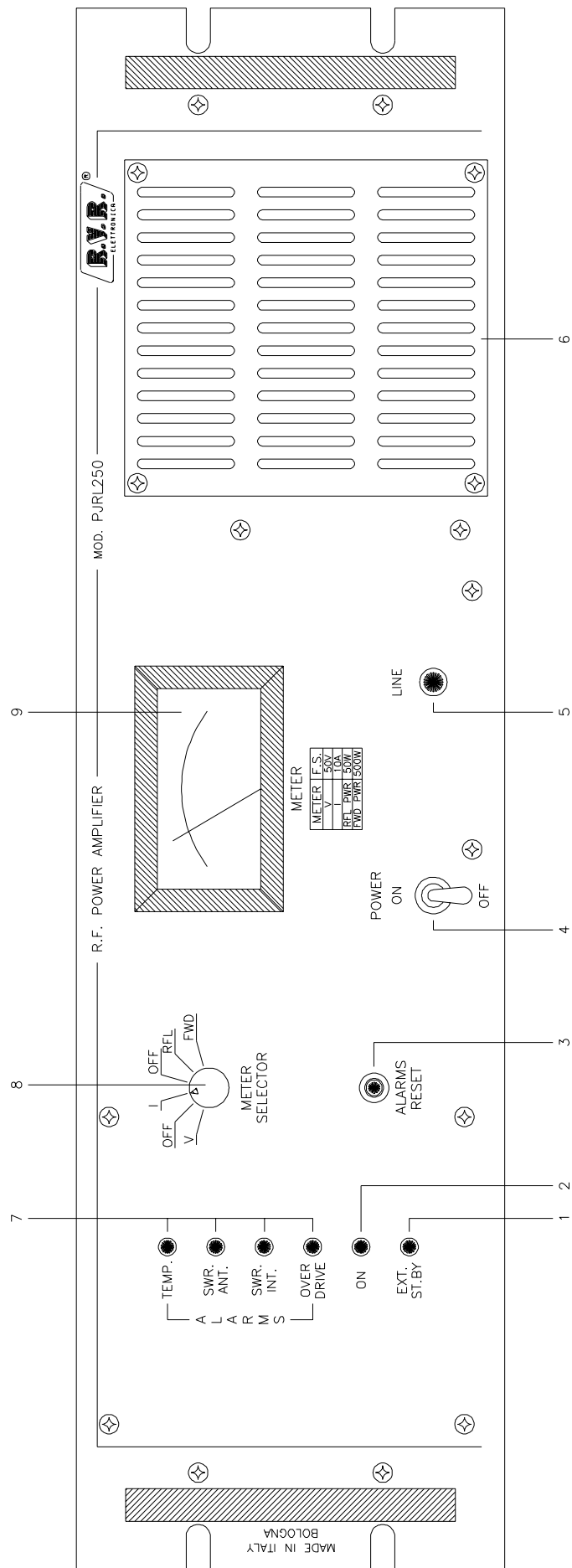
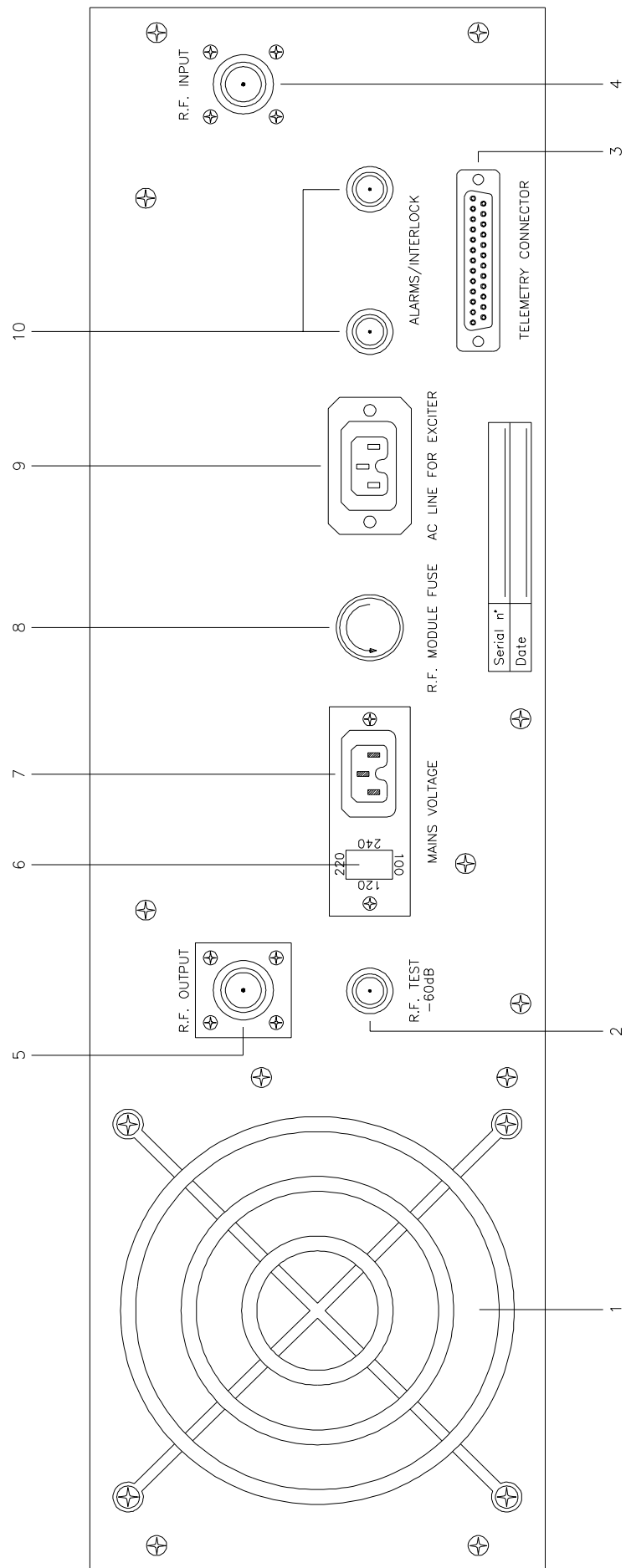


FIG. 1

## REAR PANEL VIEW DESCRIPTION (FIG. 2)

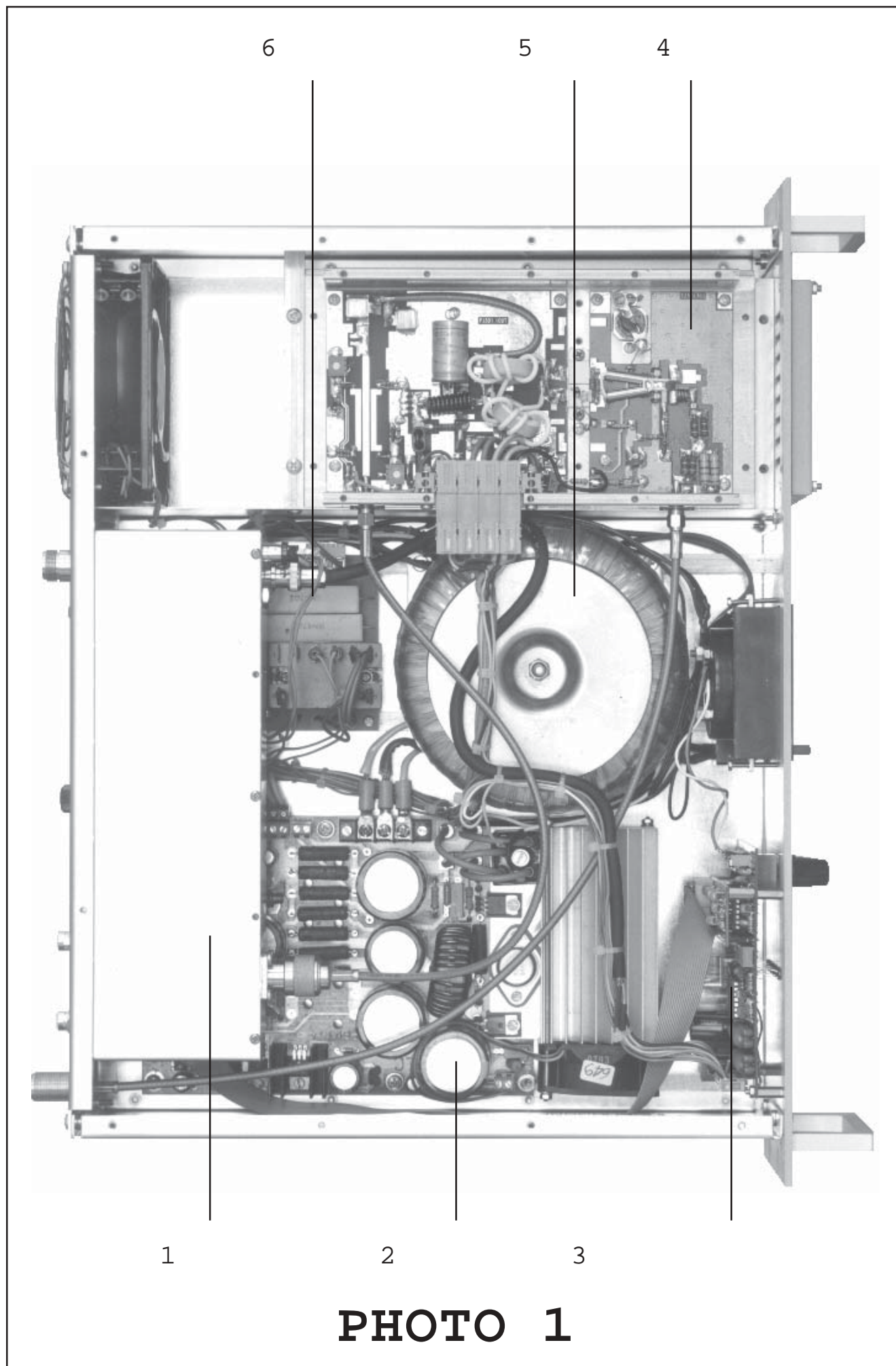
- 1 FAN Forced ventilation
  
- 2 R.F. TEST -60dB -60dB with respect to the Output Level
  
- 3 TELEMETRY CONNECTOR Connectors for remote measurement of operating parameters.
  
- 4 R.F. INPUT Input R.F. connector ("N" Type)
  
- 5 R.F. OUTPUT Output R.F. connector ("N" Type)
  
- 6 VOLTAGE CHANGER & Fuse block and line voltage selector.  
A.C. LINE FUSE Use a small screwdriver to change the fuse or the line voltage. Rotate the block and position it for the desired voltage.
  
- 7 MAINS VOLTAGE A.C. Power Line for amplifier
  
- 8 R.F MODULE FUSE Protection fuse for R.F. Module
  
- 9 A.C. LINE FOR EXCITER A.C. Power Line for exciter
  
- 10 ALARMS/INTERLOCK BNC connector which permits the exciter to be put in stand-by, in case of amplifier fault or in case of EXT.ST.BY.



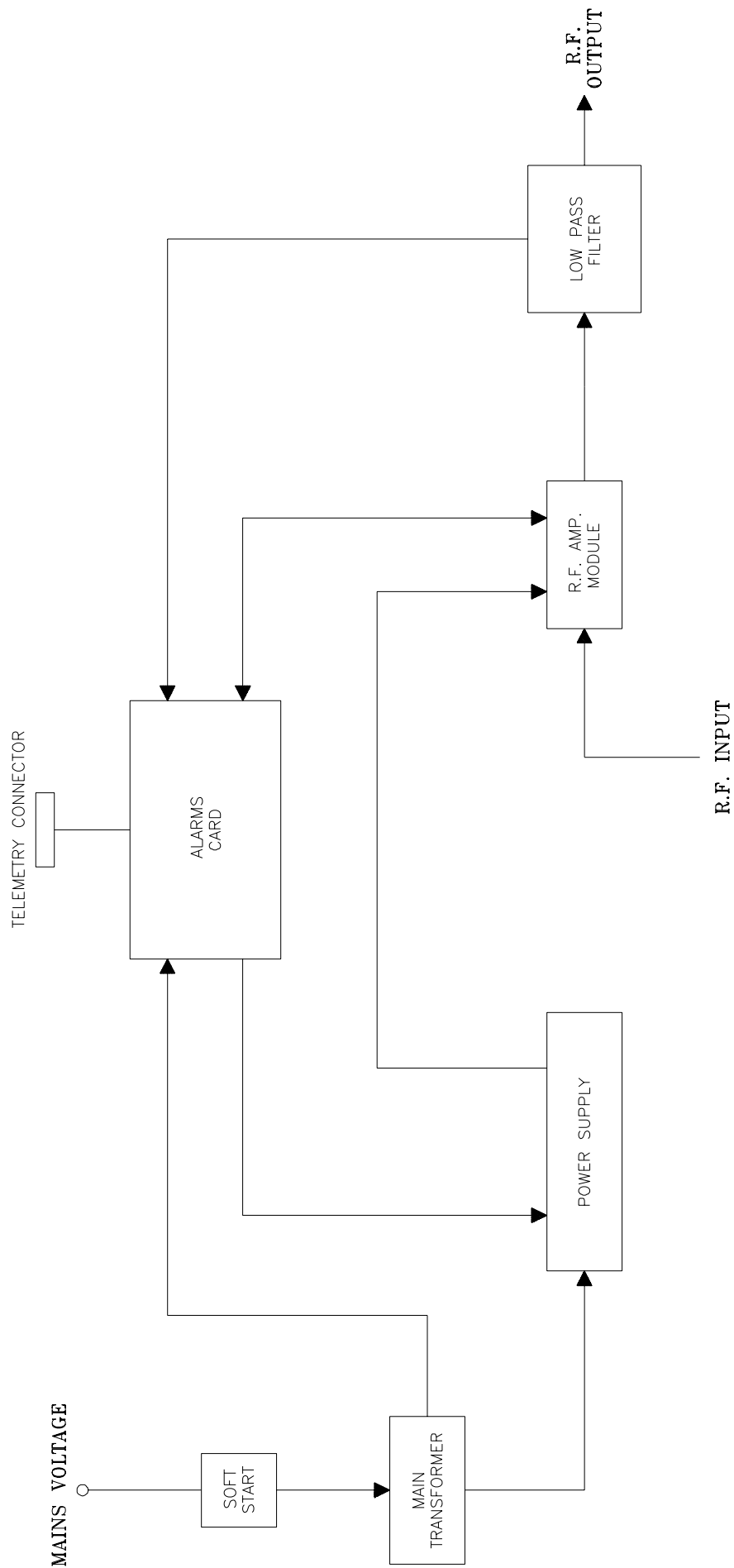
**FIG. 2**

# TOP VIEW DESCRIPTION (PHOTO 1)

- 1 ..... *Low Pass Filter*
  
- 2 ..... *Power Supply*
  
- 3 ..... *Alarms Card*
  
- 4 ..... *R.F. Power Amplifier Module*
  
- 5 ..... *Transformer*
  
- 6 ..... *Soft-Start*



**PHOTO 1**



**FIG. 3**

TABLE C  
**RECOMMENDED TEST EQUIPMENT**

<b>INSTRUMENT</b>	<b>MODEL</b>	<b>SPECIFICATIONS</b>
<i>Non-inductive dummy load</i>	<i>Bird</i>	<i>50 Ohm P &gt; 300W</i>
<i>Spectrum Analyzer</i>	<i>Advantest Mod. R4141D</i>	<i>10KHz - 3.5GHz</i>
<i>Wattmeter</i>	<i>Bird Mod. 43</i>	

### 3.1 INTRODUCTION

This chapter contains necessary information for the preliminary checks and installation of the PJRL250.

### 3.2 UNPACKING

Unpack the amplifier and, before any other operation, check that the amplifier isn't damaged and that all controls on the front and rear panel are in good condition.

### 3.3 INSTALLATION

1) Check that the line voltage selector is correctly set for the local supply.

If not, remove the cover on which the voltages are printed and rotate it until the required value corresponds to the arrow, and reinsert it.

Check also that the fuse (6 Fig.1) mounted inside the cover is present and in order.

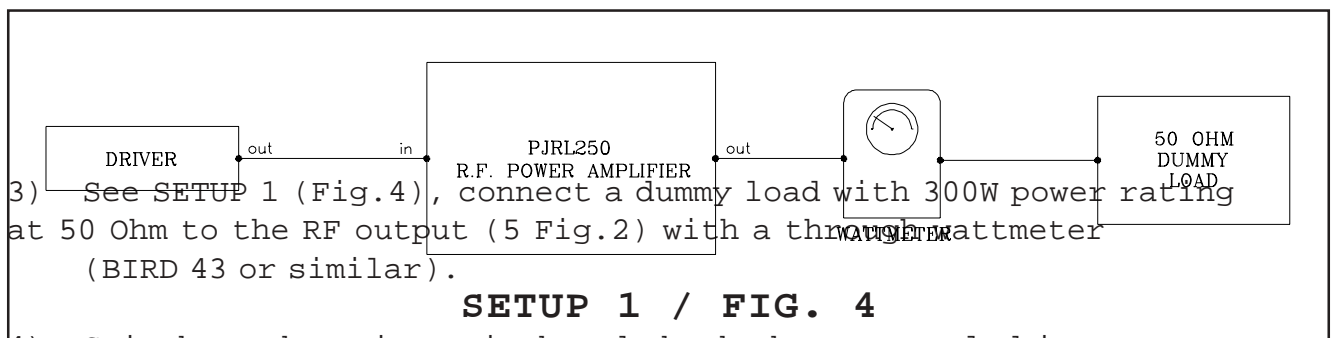
The current capacity of the fuse are as follows:

220-240V - 4.0A

110-120V - 6.3A

For this equipments it's necessary to use delayed fuses.

2) Place the Mains power switch in the off position (4 Fig.1).



3) See SETUP 1 (Fig.4), connect a dummy load with 300W power rating at 50 Ohm to the RF output (5 Fig.2) with a through wattmeter (BIRD 43 or similar).

#### SETUP 1 / FIG. 4

4) Switch on the mains switch and check the proper led is on.

5) Internal parameters control.

Select with the Meter Selector (8 Fig.1) the internal supply voltage "V" and check the value of 50Vdc.

Select the current "I" and check that the value is between 0 and 400mA.



In the same way check FWD and REF powers are 0.

- 6) Connect to the R.F. INPUT (4 Fig.2) a suitable driver able to deliver a power of between 2W and 20W.
- 7) Connect the Alarms/Interlock Connector (10 Fig.2) to the BNC on the rear panel of the exciter (Remote Control).
- 8) Switch on the exciter with the output power set to the minimum value. Tune the exciter to a middle band frequency e.g. 215Mhz, wait for the PLL to lock then gradually raise the output power of the exciter. Verify the increase in the output power the of PJRL250 and simultaneously monitor the current "I"; they should increase proportionally and assume about the some final value. Continue this operation until a 250W output value is obtained. At this condition the working parameters are:

V=about 50V

I=about 10A

- 9) Check the reading of the internal wattmeter with that of the external one (a discrepancy of about 10% is tolerable).
- 10) With the amplifier at full power, push and keep pushed the RESET switch (3 Fig.1), and check that output power, "V" and "I", go to 0 and that the output power of the exciter goes to 0 too. Release the switch and all the previous parameters will go back to their original values.
- 11) Increase the drive power until the Over Drive led lights (7 Fig.1). At this point, the lock condition should disable the amplifier and exciter for about 10 sec, after which the amplifier will try to restart. If the drive power setting has not changed, another lock condition will occur, otherwise the amplifier will restart normally. In the case of another lock condition, the protection circuit will make 4 attempts at a restart. Should this fail the amplifier will wait for a longer periods and make 4 more attempts. Should this not be successful, the amplifier will remain disabled indefinitely.

## SECTION 4

# **MAINTENANCE**

This section provides general maintenance information and electrical adjustment procedures for the PJRL250 Amplifier. Maintenance is divided into categories dependent upon the complexity of the procedure and the test equipment required to complete the maintenance.

#### 4.1 SAFETY CONSIDERATIONS

WARNING! WARNING! WARNING! WARNING! WARNING! WARNING! WARNING! WARNING!

When the amplifier is operated with the top cover removed, hazardous voltages are accessible on the AC line voltage selector and heavy currents are accessible on the exposed terminals of the power supply filter capacitor and power transistors mounted on the RF amplifier heat sink assembly.

Use the insulated tuning tool provided for any adjustment and do not touch any component within the amplifier when power is applied. Ensure all primary power is disconnected from the amplifier before attempting equipment maintenance.

#### FIRST LEVEL MAINTENANCE

##### 4.2 ORDINARY MAINTENANCE

The only regular maintenance needed by PJRL250, is the periodic replacement of the blowers, and the cleaning of dust filters and any dust accumulated inside the amplifier.

The time between overhauling of the blowers depends upon several environmental factors, temperature, humidity, dust pollution etc.

Blowers should be checked every 6 months and replaced if noisy. They should be replaced any way after 18 months of service.

#### SECOND LEVEL MAINTENANCE

##### 4.3 CARDS SUBSTITUTION

This section contains useful information for card replacement.

WARNING! TO RE-INSTALL THE CARDS IS ENOUGH TO EXECUTE OPERATIONS SEQUENCE IN THE OPPOSITE WAY.

##### 4.4 POWER SUPPLY REPLACEMENT

- 1) Open the top cover.
- 2) Take note of the wiring of J2, J3, J4, and J5 Low Pass Filter's connectors.

- 3) Disconnect the Low Pass Filter's connector.
- 4) Unscrew two screws securing the low pass filter to rear panel.
- 5) Carefully remove the low pass filter.
- 6) Take note of the wiring of J1, J2 and J3 Power Supply's connectors.
- 7) Disconnect J1, J2 and J3 connectors of the Power Supply
- 8) Unscrew six screws securing the Power Supply the the hex standoffs.
- 9) Carefully remove the Power Supply.

#### **4.5 R.F. POWER AMPLIFIER MODULE REPLACEMENT**

- 1) Open the top cover.
- 2) Take note of the wiring of CN1, J1, and J2 R.F. Power Amplifier Module connectors.

#### **WARNING! INCORRECT CONNECTIONS CAN DESTROY THE R.F. MODULE**

- 3) Disconnect CN1, J1 and J2 R.F. Module's connectors.
- 4) Remove the air filter of the R.F. Module from the front panel unscrewing four fixing hexagon nuts.
- 5) Unscrew two screws securing the R.F. Module to the front panel.
- 6) Unscrew the screws securing the R.F. module on the rear rail, the right side and internal chassis.
- 7) Carefully remove the R.F. Module.

#### **4.6 LOW PASS FILTER REPLACEMENT**

- 1) Open the top covers.
- 2) Take note of the wiring of J2, J3, J4, and J5 Low Pass Filter's connectors.
- 3) Disconnect the Low Pass Filter's connector.
- 4) Unscrew two screws securing the low pass filter to rear panel.
- 5) Carefully remove the low pass filter.

#### **4.4 SOFT-START REPLACEMENT**

- 1) Open the top cover.
- 2) Take note of the wiring of J2, J3, J4, and J5 Low Pass Filter's connectors.
- 3) Disconnect the Low Pass Filter's connector.
- 4) Unscrew two screws securing the low pass filter to rear panel.
- 5) Carefully remove the low pass filter.
- 6) Take note of the wiring of M1, M2 Soft-Start's connectors.
- 7) Disconnect M1, M2 Soft-Start's connectors.
- 8) Disconnect the fastons placed on Pins 9 and 10 on K1 relay.
- 9) Dismount the four securing screws and remove thr board.

#### **4.8 ALARMS CARD REPLACEMENT**

- 1) Open the top cover.
- 2) Take note of the position of CN1, CN2 and CN3 Alarms Card's connectors.
- 3) Disconnect the Alarms Card's connector.
- 4) Remove the knob of the Meter Selector loosening the screw inside the knob.
- 5) Dismount the screws of the Meter Selector switch and Alarm Reset push-button.
- 6) Remove the four screws securing the board to the front panel.
- 7) Carefully remove the Alarms Card.

## SECTION 5 **INTERNAL ADJUSTMENTS**

### 5.1 POWER SUPPLY ADJUSTMENT

After changing the power supply module and having reconnected all the connectors, make the following tests and adjustments:

- 1) Disconnect CN1 from the appropriate RF power module.
- 2) Connect a suitable dummy load ( $P > 300W$  on  $50\Omega$ ) to the amplifier output.
- 3) Switch the amplifier on.
- 4) Check the 50V output of the new power supply using the analog meter and selecting the appropriate reading with the Meter Selector switch.

Confirm the reading measuring the output voltage with a digital multimeter connected to pins 1-2 and 3-4 of the power supply; if needed adjust the value with P1.

- 5) Connect a  $50\Omega$   $P > 300W$  power resistor to the male connector CN1 coming from J2 of the power supply.

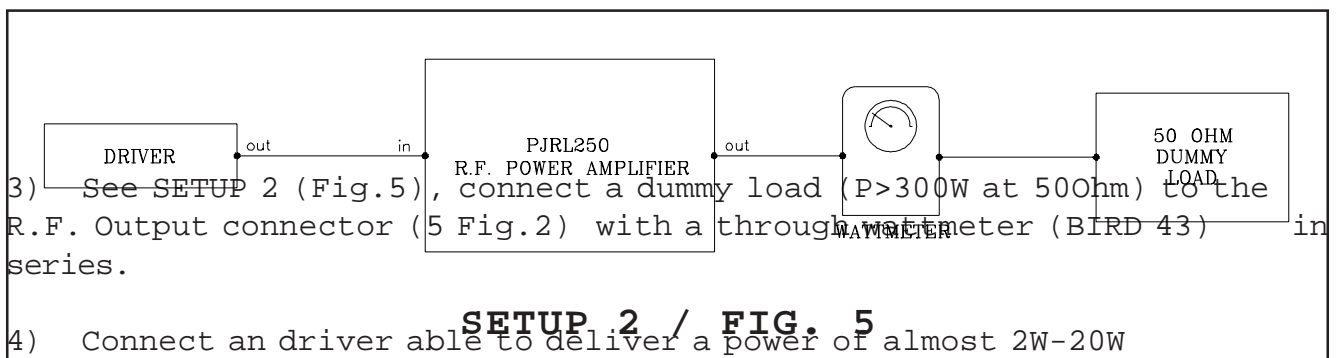
Select "I" parameter with the Meter Selector (8 Fig.1) switch; you should read a current of 10A, if not adjust P3 on the power supply board for the correct reading.

- 6) Be sure that P2 is turned completely counter clockwise.

### 5.2 R.F. POWER AMPLIFIER MODULE ADJUSTMENT

After you have changed the module perform the following operations.

- 1) Connect CN1 (coming from the power supply) to the RF module.
- 2) Connect the input connector J1 to PJRL250 R.F. Input Connector and output connector "J2" to input connector "J1" of low pass filter.



(adjustable) to the R.F. Input (4 Fig.2).

- 5) Connect the Alarms/Interlock connector (10 Fig.2) to the appropriate connector on the exciter.
- 6) Set the output power of the exciter to its minimum value.
- 7) Switch on the PJRL250 and the exciter and wait for the PLL to lock.
- 8) Now slowly increase the drive checking that the output power rises progressively, with an increase of "I" current.

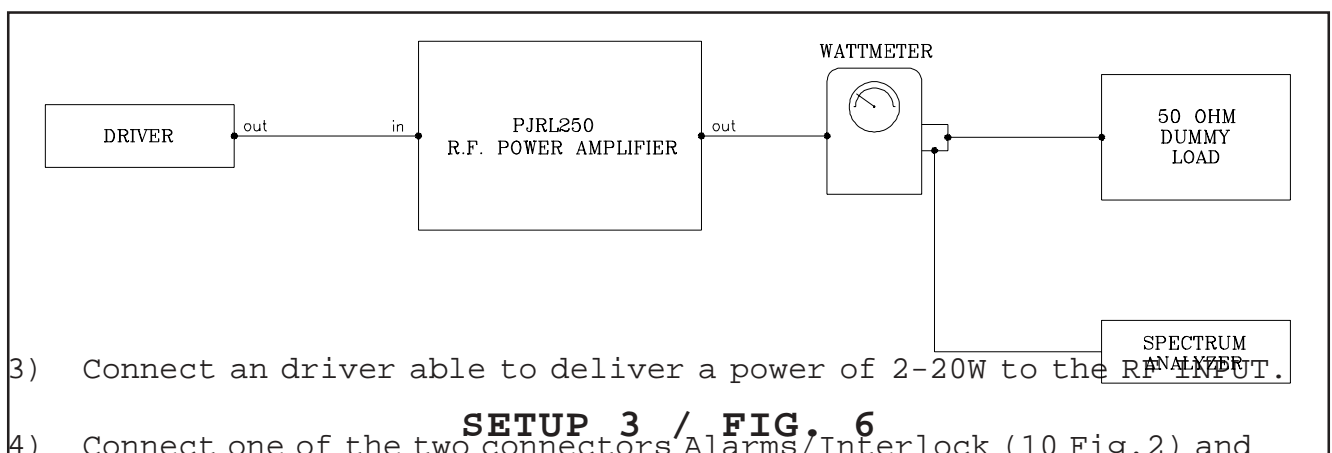
**NOTE: with  $P_{out}=250W$  we have  $10W < P_{in} < 12W$  and  $9.5A < "I" < 10A$**

Some differences in the currents drawn are related to the different gains of the Mosfet devices (BLF 378) and must be compensated with the trimmers R20 placed on each power amplifier board.

### 5.3 L.P. FILTER ADJUSTMENT

No adjustments are requested inside the L.P.F. Module because it's a factory adjusted device. In case of replacement of a unit, perform the following operations:

- 1) Reconnect all the modules and turn the trimmer TR1 on the L.P.F. completely clockwise.
- 2) Connect a through wattmeter and a dummy load to the R.F. Output (see SETUP 3/Fig.6).



- 3) Connect an driver able to deliver a power of 2-20W to the R.F. INPUT.

### SETUP 3 / FIG. 6

- 4) Connect one of the two connectors Alarms/Interlock (10 Fig.2) and the appropriate connector on the exciter.
- 6) Switch on the amplifier and the exciter PJRL250 and exciter and wait for the PLL to lock.

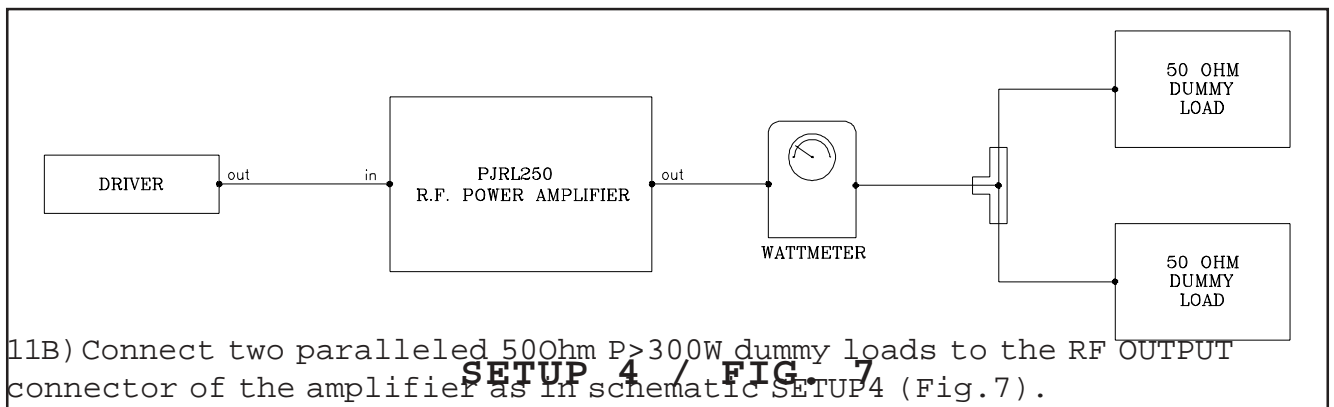
- 6) Slowly increase the drive power to obtain 250W of output power.
- 7) Check with a spectrum analyzer connected to a suitable directional coupler (e.g. the BIRD tap) that the harmonics level is be -75dB.
- 8) Adjust the trimpot TR1 in the L.P. Filter until you obtain a slight output power drop in the PJRL250 amplifier. This power drop tells us that the power limit system is acting.
- 9) Now increase again the drive until "V" decrease and you obtain a lock condition of the amplifier due to the Overdrive Protection; this protection is adjustable by means of trimpot R26 on the Alarms Card.

This protection must come on when "V" voltage is at about 48VDC.

- 10) Verify that for an output power of 250W the readings on the internal wattmeter (9 Fig.1) and the external wattmeter coincide (if not, adjust R11 on the Alarms Card).

11) ANTENNA S.W.R. CALIBRATION

- 11A) Reduce the drive power to the minimum value, switch off the amplifier and the exciter.



- 11B) Connect two paralleled 500hm P>300W dummy loads to the RF OUTPUT connector of the amplifier as in schematic SETUP4 (Fig.7).

- 11C) Switch on the amplifier and the driver and wait for the PLL to lock.

- 11D) Select REF with the meter selector, and set the external wattmeter for reflected power reading.

- 11E) Increase the output power to obtain a reading of 25W REF on the external wattmeter. Now adjust trimpot R13 on the ALARMS CARD to obtain the same reading on the PJRL250 meter.

- 11F) Increase again the power, until you read 30W of reflected power, adjust R56 on the Alarms Card (remove the metallic shield that covers the alarm cards) until the SWR ANTENNA protection acts.

NOTE: This setting may vary with the working frequency, it's preferable to make this adjustment at the operating frequency.

#### 5.4 SOFT-START ADJUSTMENT

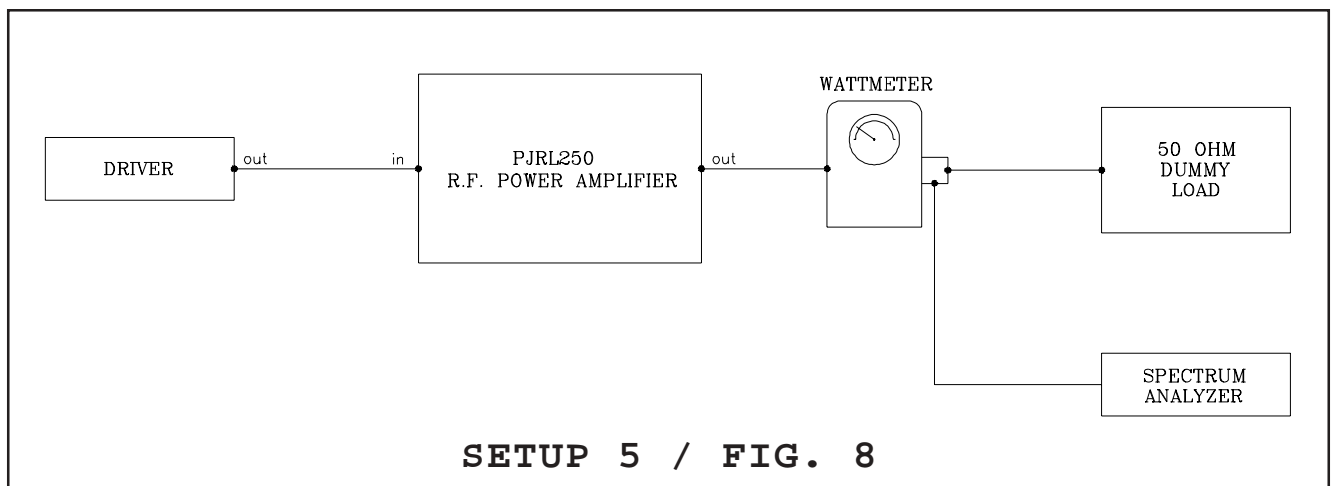
No adjustments are needed after this board has been changed.

NOTE: Pay attention to the correct insertion of the connectors.

#### 5.5 ALARMS CARD ADJUSTMENT

NOTE: Make sure that this replacement is really necessary.

1) After changing the board, connect the amplifier as shown in the SETUP5 (Fig.8) schematic.



- 2) Switch on PJRL250.
- 3) Place the Meter Selector (8 Fig.1) on "V".
- 4) Adjust trimpot R14 to obtain a f.s.d. reading of 50V (check that the output voltage of the power supply is really 50V).  
To check this, refer to step 4 of power supply adjustment.
- 5) Place the Meter Selector (8 Fig.1) on "I".
- 6) Insert a 500hm P>300W power resistor at the output of the power supply and follow step 5 of the power supply adjustment procedure.
- 7) Switch on the exciter and wait for PLL lock.
- 8) Increase the output power to a level of 250W.
- 9) Adjust the FWD reading with trimpot R11.



10) Perform the adjustment of the Overdrive trip point as indicated in step 9 of L.P. FILTER ADJUSTMENT.

Note: If the L.P. Filter has not been changed, DON'T move trimmer TR1 inside the filter.

11) Perform the adjustment of SWR/ANT indicator and protection as indicated in step 11 of L.P. ADJUSTMENT in-

12) Check the over-temperature protection by short circuiting the terminals of the temperature sensor placed on the R.F. Power Amplifier Module; the appropriate led will light, and the amplifier will stop. w i l l

13) Short circuit Pin 8 and 22 on the Telemetry Connector (3 Fig.2), and verify that the EXT.ST.BY led lights and the amplifier stops.

14) Short circuiting Pin 21 and 22 on Telemetry Connector, and verify that the PJRL250 will regularly restart.

NOTE: The operations performed in steps 13 and 14 will reset all the alarm memories returning the amplifier to the conditions of the first power on.

## APPENDIX A

# **CIRCUIT DIAGRAMS, LAYOUTS AND BILLS OF MATERIAL**

This section contains circuit diagrams, layouts and bills of material of the modules which composing the equipment.

For more information about each module see as reference Section 2.

## APPENDICE A

# **SCHEMI ELETTRICI, PIANI DI MONTAGGIO E LISTE COMPONENTI**

Questo capitolo contiene gli schemi elettrici, i piani di montaggio e le liste componenti delle schede che compongono la macchina.

Per ulteriori informazioni riguardanti le singole schede vedere come riferimento il Capitolo 2.

# WIRING DIAGRAM

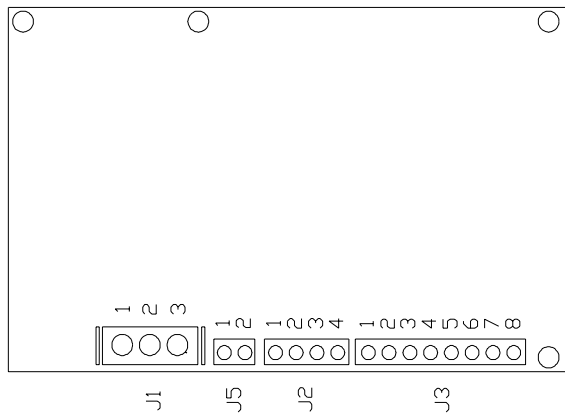
1 Cards Conectors Pag. 36

2 Power Amplifier Wiring Diagram (Power Suppply V1.7) Pag. 37

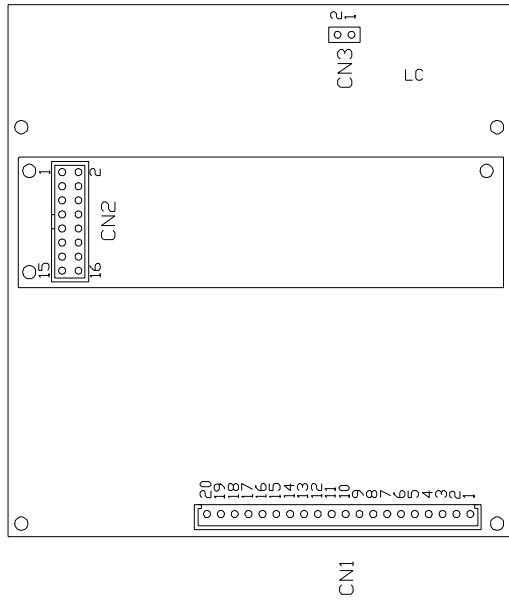
# DIAGRAMMI DI CONNESSIONE

1 Connettori delle varie schede Pag. 36

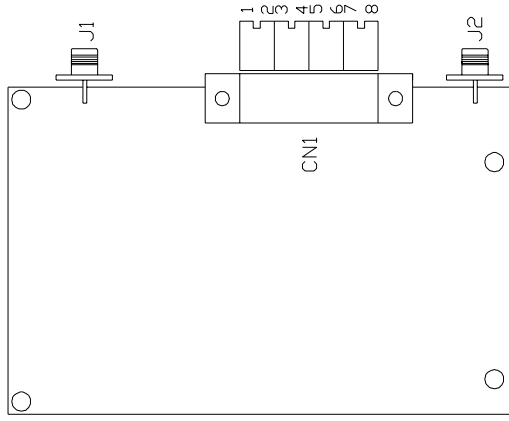
2 Diagramma di connessione dell'amplific. (Power Supply V1.7) Pag. 37



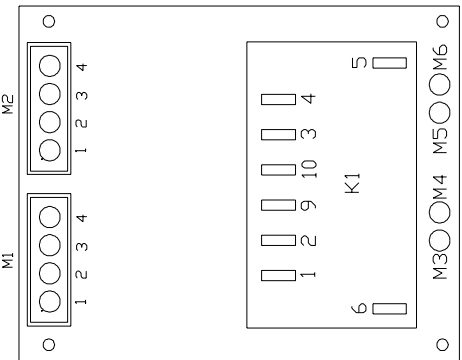
Power Supply



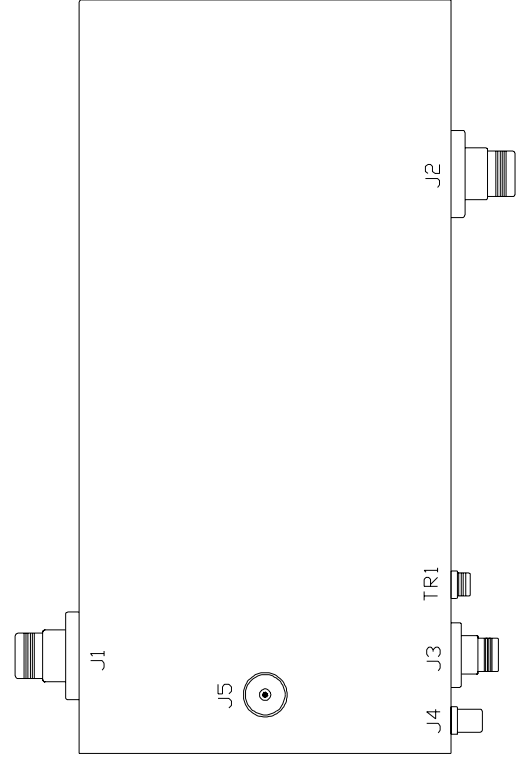
Alarms & Telemetry Card



R.F. Power Amplifier Module

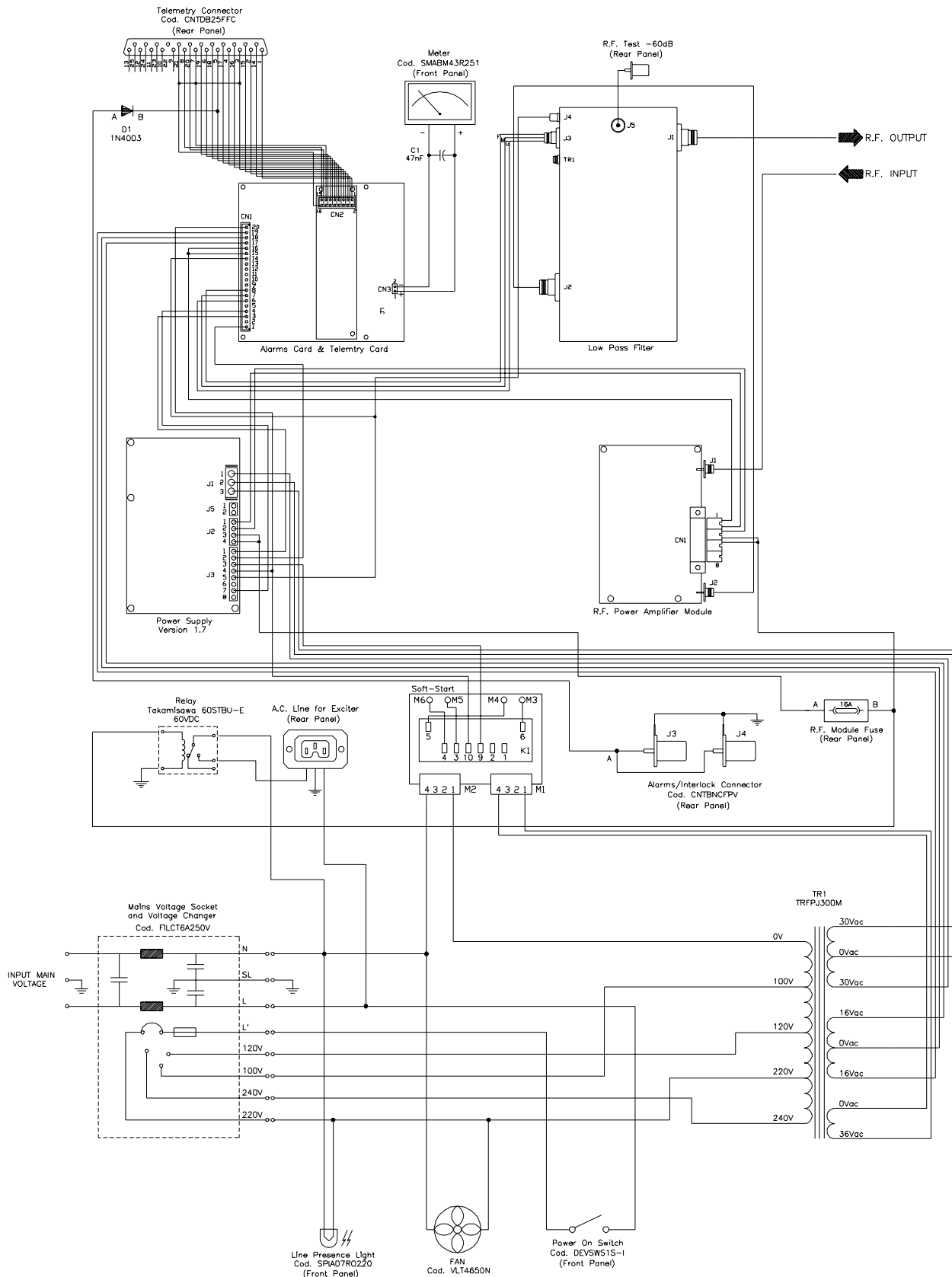


Soft-Start Card



Low Pass Filter & Directional Coupler

**CARD CONNECTORS - CONNETTORI DELLE SCHEDE**



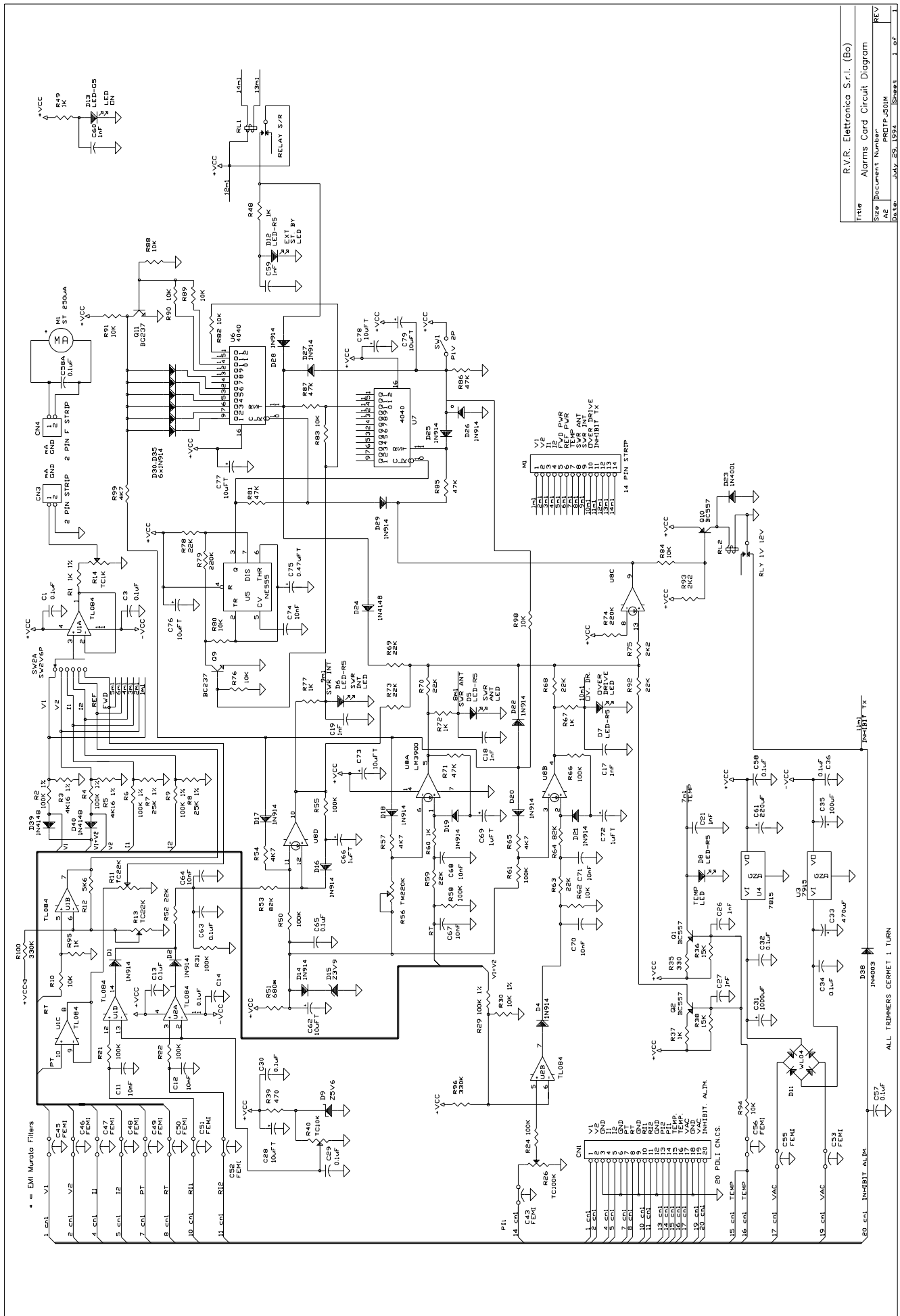
**POWER AMPLIFIER WIRING DIAGRAM (POWER SUPPLY V1.7)**  
**DIAGRAMMA DELLE CONNESIONI DELL'AMPLIFICATORE (POWER SUPPLY V1.7)**

**ALARMS CARD**

<u>1</u>	<u>Circuit Diagram</u>	<u>Pag. 39</u>
<u>2</u>	<u>Bill of Materials</u>	<u>Pag. 40</u>
<u>3</u>	<u>Layout</u>	<u>Pag. 43</u>

**ALARMS CARD**

<u>1</u>	<u>Schema Elettrico</u>	<u>Pag. 39</u>
<u>2</u>	<u>Lista dei Componenti</u>	<u>Pag. 40</u>
<u>3</u>	<u>Piano di Montaggio</u>	<u>Pag. 43</u>



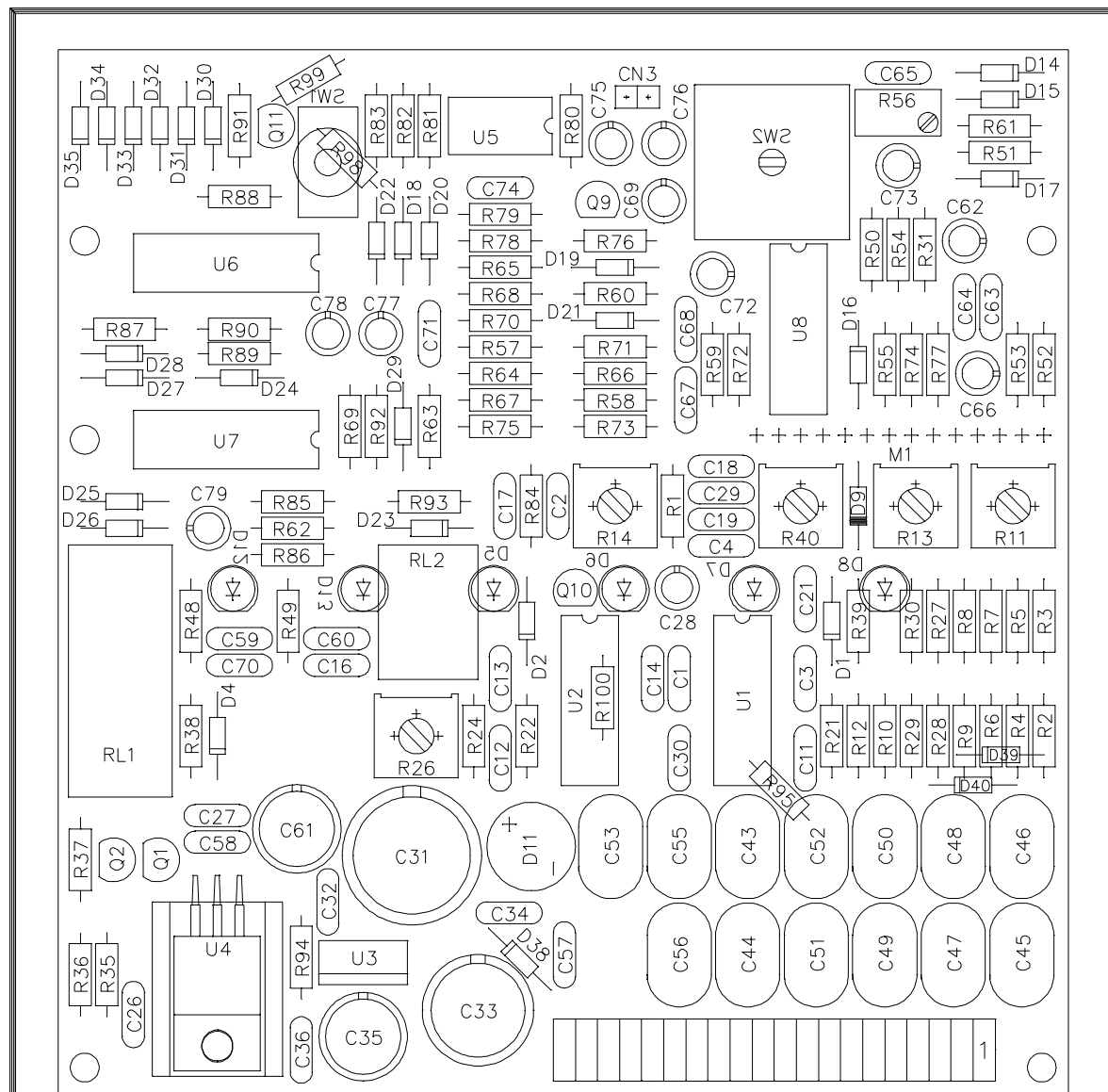
R.V.R. Elettronica S.r.l. (Bo)	
Title	Alarms Card Circuit Diagram
Size	Protoplotium
REV	A2
Date	JULY 23, 1994
Sheet	1 of 1

Item	Quantity	Reference Part	Description	Part Order Code
1	1	R35 330	RESISTOR 1/4W 5%	RSC1/4JH0330
2	1	R39 470	RESISTOR 1/4W 5%	RSC1/4JH0470
3	1	R51 680*	RESISTOR 1/2W 5%	RSC1/2JH0680
4	1	R1 1K 1%	RESISTOR 1/4W 1%	RSM1/4FK0001
5	8	R37,R48, 1K R49,R60, R67,R72, R77,R95	RESISTOR 1/4W 5%	RSC1/4JK0001
6	2	R75,R93 2K2	RESISTOR 1/4W 5%	RSC1/4JK02,2
7	2	R3,R5 4K16 1%	RESISTOR 1/4W 1%	RSM1/4FK4,16
8	4	R54,R57, 4K7 R65,R99	RESISTOR 1/4W 5%	RSC1/4JK04,7
9	1	R12 5K6	RESISTOR 1/4W 5%	RSC1/4JK05,6
10	1	R30 10K 1%	RESISTOR 1/4W 1%	RSM1/4FK0010
11	13	R10,R62, 10K R76,R80, R82,R83, R84,R88, R89,R90, R91,R94,R98	RESISTOR 1/4W 5%	RSC1/4JK0010
12	2	R36,R38 15K	RESISTOR 1/4W 5%	RSC1/4JK0015
13	9	R52,R59, 22K R63,R68, R69,R70, R73,R78, R92	RESISTOR 1/4W 5%	RSC1/4JK0022
14	2	R7,R8 25K 1%	RESISTOR 1/4W 1%	RSM1/4FK0025
15	5	R71,R81, 47K R85,R86,R87	RESISTOR 1/4W 5%	RSC1/4JK0047
16	2	R53,R64 82K	RESISTOR 1/4W 5%	RSC1/4JK0082
17	5	R2,R4,R6, 100K 1% R9,R29	RESISTOR 1/4W 1%	RSM1/4FH0100
18	9	R21,R22, 100K R24,R31, R50,R55, R58,R61,R66	RESISTOR 1/4W 5%	RSC1/4JK0100
19	2	R74,R79 220K	RESISTOR 1/4W 5%	RSC1/4JK0220
20	2	R96,R100 330K	RESISTOR 1/4W 5%	RSC1/4JK0330



Item	Quantity	Reference Part	Description	Part Order Code
21	1	R14 TC1K	TRIM. REG. VERT. CERMET RVTCEVVK0001	
22	1	R40 TC10K	TRIM. REG. VERT. CERMET RVTCEVVK0010	
23	2	R11,R13 TC22K	TRIM. REG. VERT. CERMET RVTCEVVK0022	
24	1	R26 TC100K	TRIM. REG. VERT. CERMET RVTCEVVK0100	
25	1	R56 TM220K	TRIM. MULT. REG. VERT. RVTMULVK0220	
26	8	C17,C18, 1nF C19,C21, C26,C27, C59,C60	CERAMIC CAPACITOR	CKM102BK600P
27	8	C11,C12, 10nF C64,C67, C68,C70, C71,C74	CERAMIC CAPACITOR	CKM103BK600P
28	14	C1,C3,C13, 0.1µF C14,C29, C30,C32, C34,C36, C57,C58A, C58,C63,C65	CERAMIC CAPACITOR	CKM104BK600P
29	1	C75 0.47µFT	TANTALIUM CAPACITOR	CET474AM350
30	3	C66,C69,C72 1µFT	TANTALIUM CAPACITOR	CET105AM350
31	7	C28,C62, 10µFT C73,C76, C77,C78,C79	TANTALIUM CAPACITOR	CET106AM350
32	1	C35 100µF	ELECTROLYTIC CAPACITOR	CEA107BM350
33	1	C61 220µF	ELECTROLYTIC CAPACITOR	CEA227BM350
34	1	C33 470µF	ELECTROLYTIC CAPACITOR	CEA477BM350
35	1	C31 1000µF	ELECTROLYTIC CAPACITOR	CEA108SCM350
36	1	M1 ST 250µA	STRUMENTO 250uA	SMABM42RQ251
37	1	CN3 2P STRIP	STRIP M P 2.54 2 PIN	CNTSTRIPMCS
38	1	M1 14P STRIP	STRIP M P 2.54 14 PIN	CNTSTRIPMCS
39	1	CN4 2P F STRIP	STRIP F P 2.54 2 PIN	CNTSTRIPFCS
40	1	CN1 20P CN.CS.	CON. STR. 20P M. CS P.	CNTSRMCS20PO
41	12	C43,C45, FEMI C46,C47,C48, C49,C50,C51, C52,C53,C55, C56	FILTRO EMI MURATA	FEAY5S223500

Item	Quantity	Reference Part	Description	Part Order Code
42	1	RL2	RLY 1V 12V RELAY 1 VIA 12V	RLD112
43	1	RL1	RELAY S/R RELAY SET / RESET 12V	RLDMZP-R2
44	1	SW1	P1V 2P PULSANTE 1 VIA 2 POS	PLS1V11M03CS
45	1	SW2	SW2V6P COMM. 2 VIE 6 POS FEME	COMR2V6PCS
46	3	D24,D39,D40	1N4148 SILICON DIODE	DIS1N4148
47	22	D1,D2,D4, 1N914 D14,D16,D17, D18,D19,D20, D21,D22,D25, D26,D27,D28, D29,D30,D31, D32,D33,D34, D35	SILICON DIODE	DIS1N914
48	1	D23	1N4001 SILICON DIODE 50V	DIS1N4001
49	1	D38	1N4003 SILICON DIODE 200V	DIS1N4003
50	1	D11	WL04 DIODE BRIDGE 1.5A	PNRWL04
51	5	D5,D6,D7, LED-R5 D8,D12	RED LED DIODE	LEDRO05
52	1	D13	LED-G5 GREEN LED DIODE	LEDVE05
53	1	D15	Z3V9 ZENER DIODE 3.9V 0.4W	DIZ3V90W4
54	1	D9	Z5V6 ZENER DIODE 5.6V 0.4W	DIZ5V60W4
55	1	U4	7815 POS. STABILIZER 1A	CIL7815P
56	1	U3	7915 NEG. STABILIZER 1A	CIL7915P
57	2	Q9,Q11	BC237 NPN TRANSISTOR	TRNBC237
58	3	Q1,Q2,Q10	BC557 PNP TRANSISTOR	TRNBC557
59	2	U1,U2	TL084 QUAD OP. AMP.	CILTL084
60	1	U5	NE555 TIMER	CIL555
61	2	U6,U7	4040 CMOS DIVIDER	CID4040
62	1	U8	LM3900 NORTON QUAD AMP.	CILLM3900



- R11 -> FWD PWR (meter reading)
- R13 -> RFL PWR (meter reading)
- R14 -> Full Scale Reading
- R26 -> Over Drive Threshold
- R40 -> SWR. INT. Threshold
- R56 -> SWR. ANT. Threshold



DENOMINAZIONE  
Alarms Card Component Layout / Piano di Montaggio

DISPOSITIVO

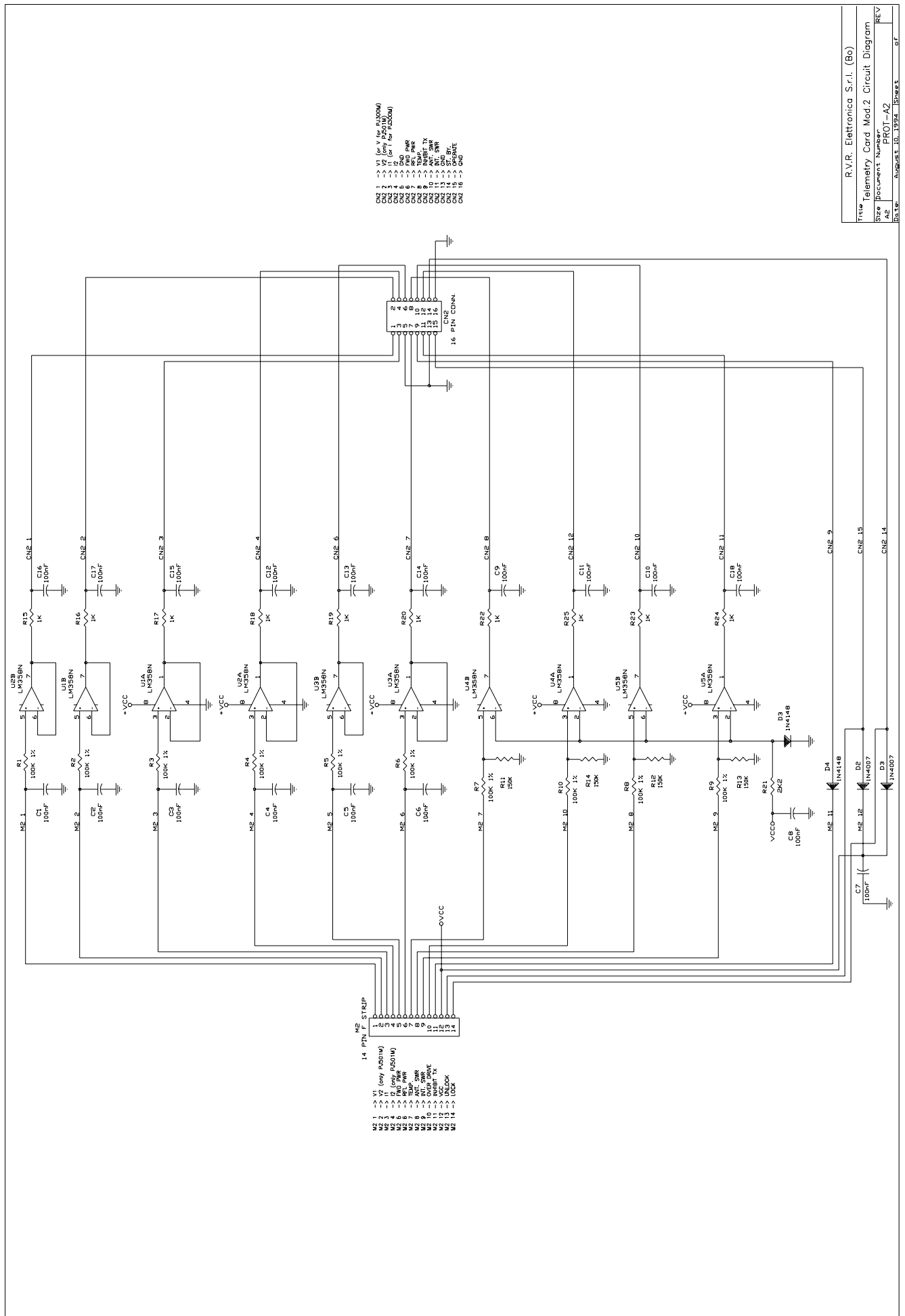
SEMILAVORATO	DISEGNATO	DISEGNO
MATERIALE	li	
TRATTAMENTO	SCALA	TAVOLA n di

**TELEMETRY CARD (VERS. PROT-A2)**

<u>1</u>	<u>Circuit Diagram</u>	<u>Pag. 45</u>
<u>2</u>	<u>Bill of Materials</u>	<u>Pag. 46</u>
<u>3</u>	<u>Layout</u>	<u>Pag. 47</u>

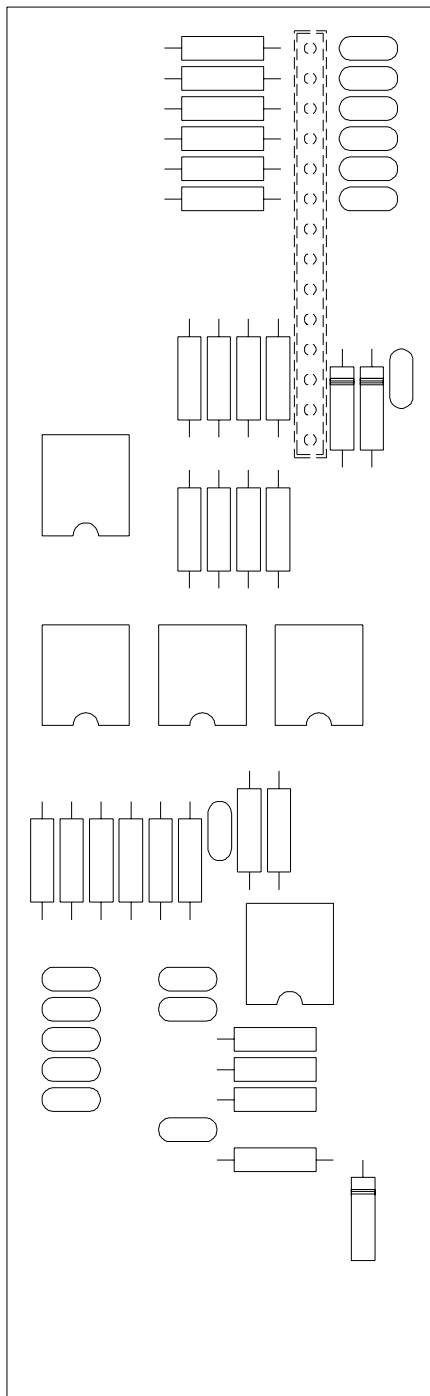
**TELEMETRY CARD (VERS. PROT-A2)**

<u>1</u>	<u>Schema Elettrico</u>	<u>Pag. 45</u>
<u>2</u>	<u>Lista dei Componenti</u>	<u>Pag. 46</u>
<u>3</u>	<u>Piano di Montaggio</u>	<u>Pag. 47</u>



R.V.R. Elettronica S.r.l. (Bo)	
Title	Telemetry Card Mod.2 Circuit Diagram
Size	A2
Document Number	PROT-A2
Date	August 10, 1994
Sheet	1
of	

Item	Quantity	Reference Part	Description	Part Order Code
1	10	R15,R16, 1K R17,R18, R19,R20, R22,R23, R24,R25	RESISTOR 1/4W 5%	RSC1/4JK0001
2	1	R21 2K2	RESISTOR 1/4W 5%	RSC1/4JK02,2
3	10	R1,R2,R3, 100K 1% R4,R5,R6, R7,R8,R9, R10	RESISTOR 1/4W 1%	RSM1/4FH0100
4	4	R11,R12 150K 1% R13,R14	RESISTOR 1/4W 5%	RSM1/4JK0150
5	18	C1,C2,C3, 100nF C4,C5,C6, C7,C8,C9, C10,C11, C12,C13, C14,C15, C16,C17, C18	CERAMIC CAPACITOR	CKM104BK600P
6	1	M2 14P F STRIP	STRIP F P 2.54 14 PIN	CNTSTRIPFCS
7	1	CN2 16P CONN. CONN. M 2*8 P 2.54	CNTMCSFC16P	
8	2	D3,D4 1N4148	SILICON DIODE	DIS1N4148
9	2	D2,D3 1N4007	SILICON DIODE 1000V	DIS1N4007
10	5	U1,U2,U3, LM358N U4,U5	DOUBLE OP. AMP.	CILLM358N



**POWER SUPPLY (VERS. 1.7)**

**POWER SUPPLY**

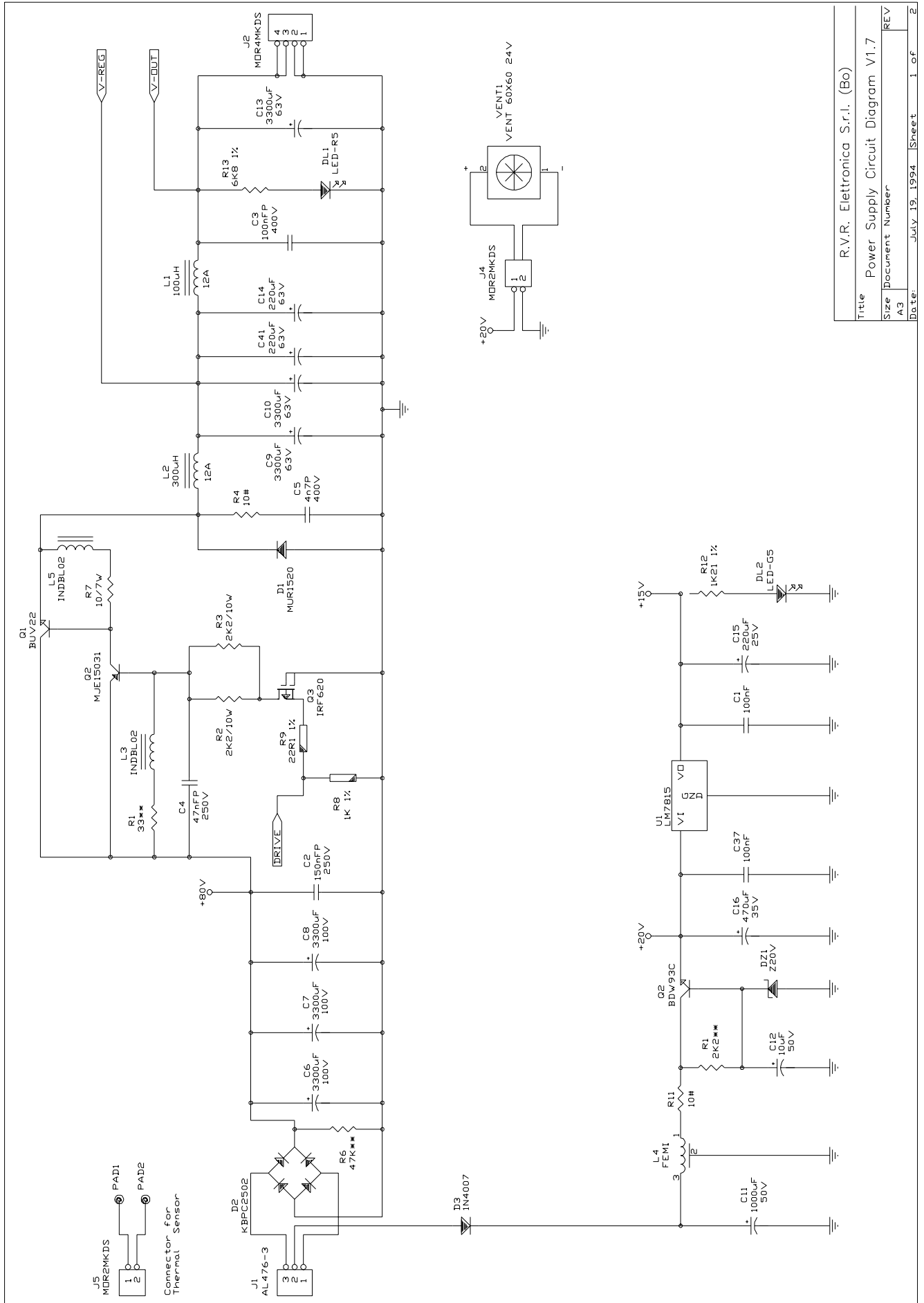
<u>1</u>	<u>Circuit Diagram (Sheet 1 of 2)</u>	<u>Pag. 49</u>
<u>2</u>	<u>Bill of Materials (Sheet 1 of 2)</u> <u>Pag. 50</u>	
<u>3</u>	<u>Circuit Diagram (Sheet 2 of 2)</u>	<u>Pag. 52</u>
<u>4</u>	<u>Bill of Materials (Sheet 2 of 2)</u> <u>Pag. 53</u>	
<u>5</u>	<u>Layout</u>	<u>Pag. 55</u>

**POWER SUPPLY (VERS. 1.7)**

**POWER SUPPLY**

<u>1</u>	<u>Schema Elettrico (Tav. 1 di 2)</u>	<u>Pag. 49</u>
<u>2</u>	<u>Lista Componenti (Tav. 1 of 2)</u>	<u>Pag. 50</u>
<u>3</u>	<u>Schema Elettrico (Tav. 2 di 2)</u>	<u>Pag. 52</u>
<u>4</u>	<u>Lista Componenti (Tav. 2 di 2)</u>	<u>Pag. 53</u>
<u>5</u>	<u>Piano di Montaggio</u>	<u>Pag. 55</u>





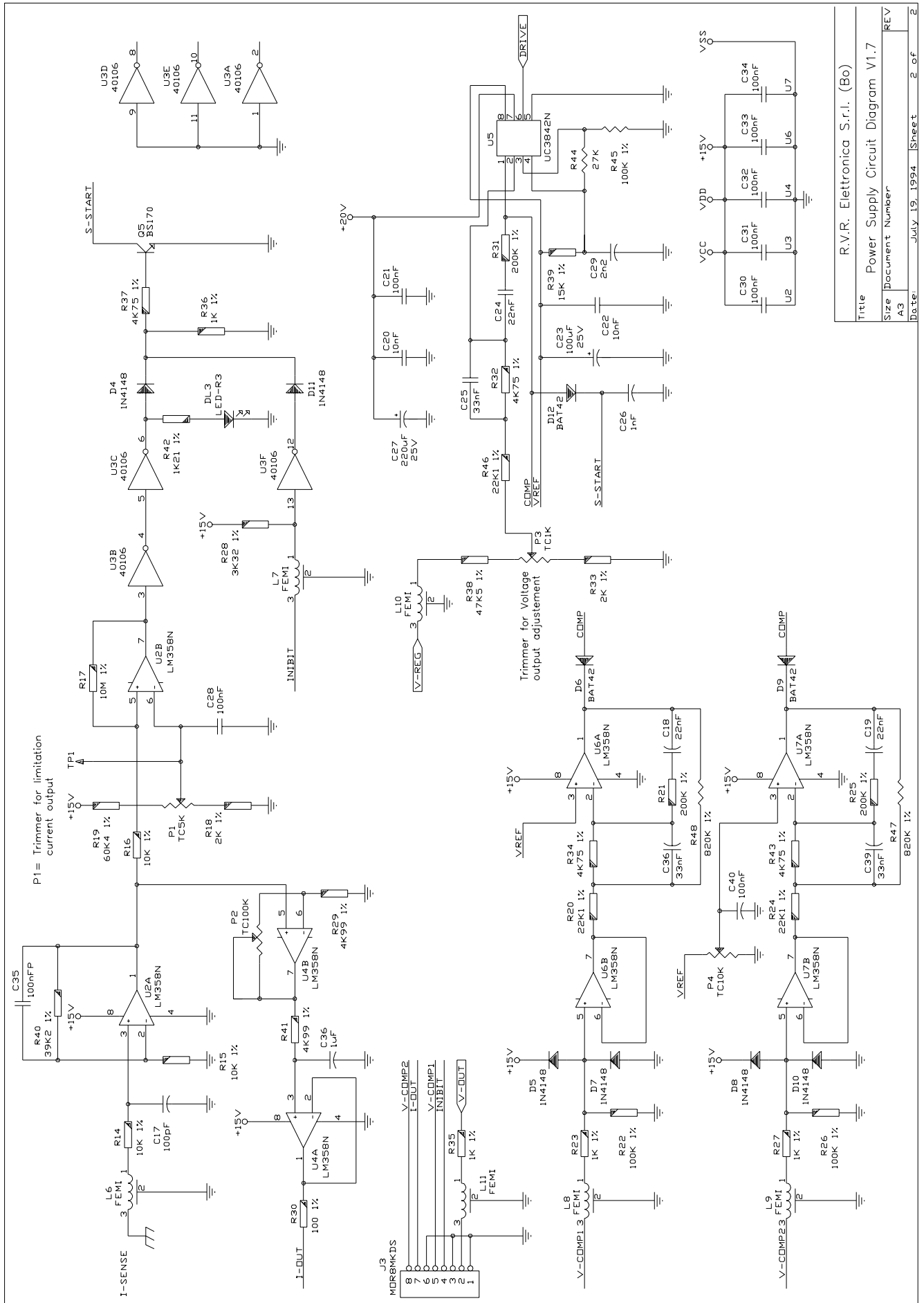
Title		R.V.R. Elettronica S.r.l. (Bo)
Size		Power Supply Circuit Diagram V1.7
REV		
A3	Document Number	
Date:	July 19, 1994	Sheet 1 of 2

Item	Quantity	Reference Part	Description	Part Order Code
1	2	R4,R11	10# RESISTOR 2W	RSC002JH0010
2	1	R7	10/7W RESISTOR 7W	RAF007JH0010
3	1	R9	22R1 1% RESISTOR 1/4W 1%	RSM1/4FH22,1
4	1	R1	33** RESISTOR 1W 5%	RSC001JH0033
5	1	R8	1K 1% RESISTOR 1/4W 1%	RSM1/4FK0001
6	1	R12	1K21 1% RESISTOR 1/4W 1%	RSC1/4FK1,21
7	1	R1	2K2** RESISTOR 1W 5%	RSC001JK02,2
8	2	R2,R3	2K2/10W RESISTOR 10W	RAF010JK02,2
9	1	R13	6K8 1% RESISTOR 1/4W 1%	RSM1/4FK06,8
10	1	R6	47K** RESISTOR 1W 5%	RSC001JK0047
11	1	C5	4n7P POLIESTER CAPACITOR	CPE472BJ101
12	1	C4	47nFP POLIESTER CAPACITOR	CPE473BJ101
13	2	C1,C37	100nF CERAMIC CAPACITOR	CKM104BK600P
14	1	C3	100nFP POLIESTER CAPACITOR	CPE104DK101
15	1	C2	150nFP POLIESTER CAPACITOR	CPE154DK101
16	1	C12	10µF ELECTROLYTIC CAPACITOR	CEA106AM350
17	3	C14,C15,C41	220µF ELECTROLYTIC CAPACITOR	CEA227BM350
18	1	C16	470µF ELECTROLYTIC CAPACITOR	CEA477BM350
19	1	C11	1000µF ELECTROLYTIC CAPACITOR	CEA108SCM350
20	6	C6,C7,C8, C9,C10,C13	3300µF ELECTROLYTIC CAPACITOR	CEA338EM350
21	1	L1	100µH RF CHOKE	IMP100UA
22	1	L2	300µH RF CHOKE	IMP300UA
23	2	L3,L5	INDBL02 BL02 IND. P.S. PJ501M	IMPBL02
24	1	L4	FEMI FILTRO EMI MURATA	FEAY5S223500
25	1	J1	AL476-3 MORS. HT P. S. PJ501M	MORSAL476-2
26	2	J4,J5	MOR2MKDS MORS. 2MKDS PHOENIX	MORS2MKDS
27	1	J2	MOR4MKDS MORS. 4MKDS PHOENIX	MORS4MKDS
28	1	D3	1N4007 SILICON DIODE 1000V	DIS1N4007
29	1	D1	MUR1520 MOTOROLA DIODE UR1520	DIRMUR1520

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Item	Quantity	Reference Part	Description	Part Order Code
30	1	D2	KBPC2502 DIODE BRIDGE 25A	PNRKBPC2502
31	1	DL1	LED-R5 RED LED DIODE	LEDRO05
32	1	DL2	LED-G5 GREEN LED DIODE	LEDVE05
33	1	DZ1	Z20V ZENER DIODE 20V 0.5W	DIZ20V0W5
34	1	U1	LM7815 POS. STABILIZER	CILLM7815
35	1	Q2	BDW93C DARLINGTON 15A	TRNBDW93C
36	1	Q1	BUV22 NPN SILICON POWER TRN	TRNBUV22
37	1	Q2	MJE15031 8A SILICON POWER TRANS.	TRNMJE15031
38	1	Q3	IRF620 HEXFET N-CHANNEL TO-220	TRNIRF620
39	1	VENT1	VENT 60X60 VENTOLA 60 x 60 24VDC	VTL606024V
40	2	PAD1, PAD2	N.C. NOT CONNECTED	

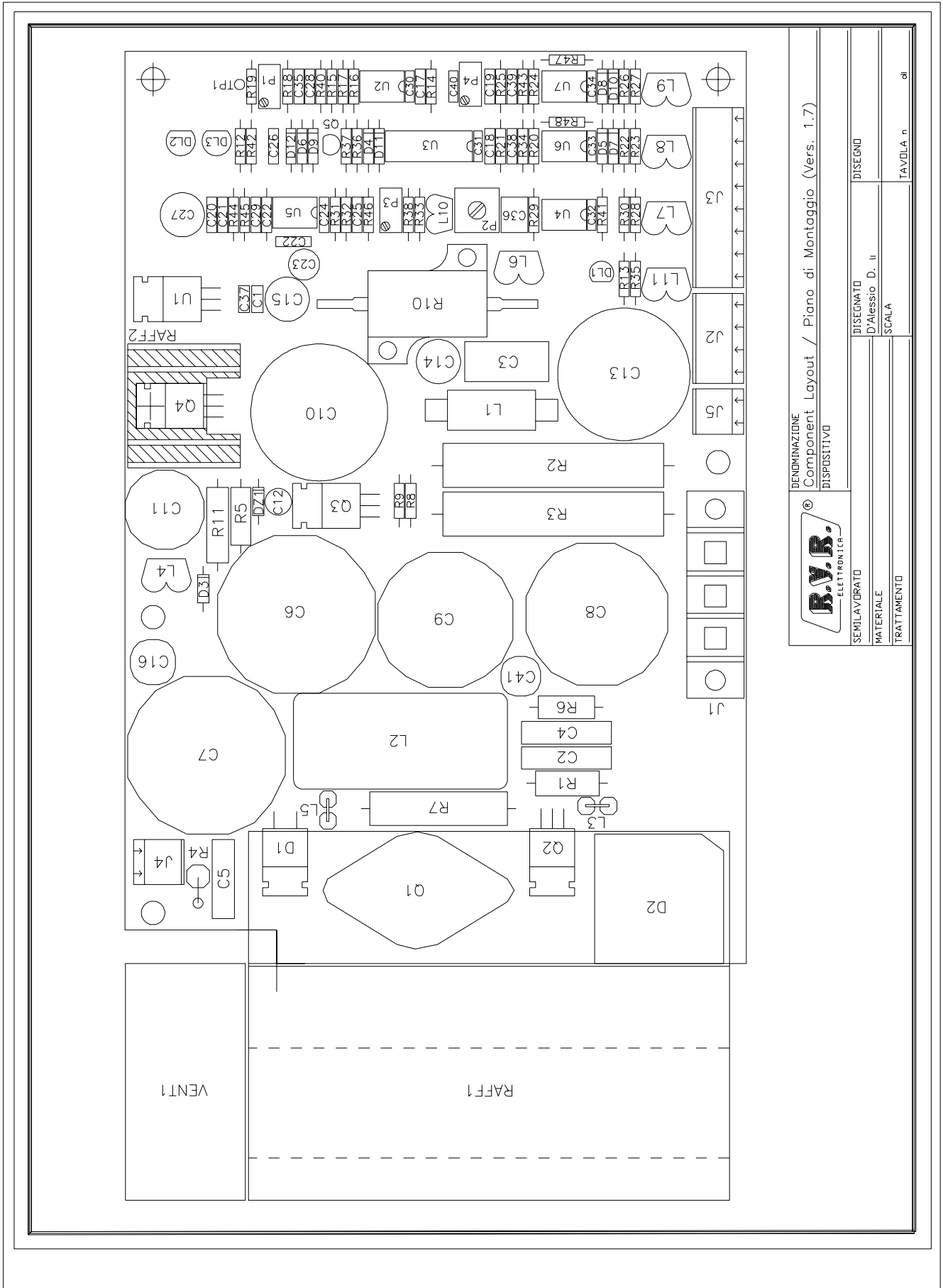
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Title		R.V.R. Elettronica S.r.l. (Bo)	
Size		Document Number	
A3	REV	July 19, 1994	Sheet 2 of 2

Item	Quantity	Reference Part	Description	Part Order Code
1	1	R30 100 1%	RESISTOR 1/4W 1%	RSM1/4FH0100
2	4	R23,R27, 1K 1% R35,R36	RESISTOR 1/4W 1%	RSM1/4FK0001
3	1	R42 1K21 1%	RESISTOR 1/4W 1%	RSC1/4FK1,21
4	2	R18,R33 2K 1%	RESISTOR 1/4W 1%	RSM1/4FK0002
5	1	R28 3K32 1%	RESISTOR 1/4W 1%	RSC1/4FK3,32
6	4	R32,R34, 4K75 1% R37,R43	RESISTOR 1/4W 1%	RSM1/4FK4,75
7	2	R29,R41 4K99 1%	RESISTOR 1/4W 1%	RSM1/4FK4,99
8	3	R14,R15,R16 10K 1%	RESISTOR 1/4W 1%	RSM1/4FK0010
9	1	R39 15K 1%	RESISTOR 1/4W 1%	RSC1/4FK0015
10	3	R20,R24,R46 22K1 1%	RESISTOR 1/4w 1%	RSC1/4FK22,1
11	1	R44 27K	RESISTOR 1/4W 5%	RSC1/4JK0027
12	1	R40 39K2 1%	RESISTOR 1/4W 1%	RSM1/4FK39,2
13	1	R38 47K5 1%	RESISTOR 1/4W 1%	RSM1/4FK47.5
14	1	R19 60K4 1%	RESISTOR 1/4W 1%	RSC1/4FK60,4
15	3	R22,R26,R45 100K 1%	RESISTOR 1/4W 1%	RSM1/4FH0100
16	3	R21,R25,R31 200K 1%	RESISTOR 1/4W 1%	RSM1/4FK0200
17	2	R47,R48 820K 1%	RESISTOR 1/4W 1%	RSM1/4FK0820
18	1	R17 10M 1%	RESISTOR 1/4W 1%	RSM1/4FM0010
19	1	P3 TC1K	TRIM. REG. VERT. CERMET	RVTCERVK0001
20	1	P1 TC5K	TRIM. REG. VERT. CERMET	RVTCERVK0005
21	1	P4 TC10K	TRIM. REG. VERT. CERMET	RVTCERVK0010
22	1	P2 TC100K	TRIM. REG. VERT. CERMET	RVTCERVK0100
23	1	C17 100pF	CERAMIC CAPACITOR NP0	CKM101BJ600C
24	1	C26 1nF	CERAMIC CAPACITOR	CKM102BK600P
25	1	C29 2n2	CERAMIC CAPACITOR	CKM222BK600P
26	2	C20,C22 10nF	CERAMIC CAPACITOR	CKM103BK600P
27	3	C18,C19,C24 22nF	CERAMIC CAPACITOR	CKM223BK600P
28	3	C25,C36,C39 33nF	CERAMIC CAPACITOR	CKM333BK600P

Item	Quantity	Reference Part	Description	Part Order Code
29	8	C21,C28, 100nF C30,C31, C32,C33, C34,C40	CERAMIC CAPACITOR	CKM104BK600P
30	1	C35 100nFP	POLIELSTER CAPACITOR	CPE104DK101
31	1	C36 1µF	ELECTROLYTIC CAPACITOR	CEA105AM630
32	1	C23 100µF	ELECTROLYTIC CAPACITOR	CEA107BM350
33	1	C27 220µF	ELECTROLYTIC CAPACITOR	CEA227BM350
34	6	L6,L7,L8, FEMI L9,L10,L11	FILTRO EMI MURATA	FEAY5S223500
35	1	J3 MOR8MKDS	MORS. 8MKDS PHOENIX	MORS8MKDS
36	6	D4,D5,D7, 1N4148 D8,D10,D11	SILICON DIODE	DIS1N4148
37	3	D6,D9,D12 BAT42	HOT CARRIER DIODE	DHCBAT42
38	1	DL3 LED-R3	RED LED DIODE 3mm	LEDRO03
39	1	U5 UC3842N	CURRENT MODE PVM CONTR.	CILUC3842N
40	1	Q5 BS170	TMOS FET SWITCHING	TRNBS170
41	4	U2,U4,U6,U7 LM358N	DOUBLE OP. AMP.	CILLM358N
42	1	U3 40106	HEX SCHIMTT TRIGGER	CID40106



DENOMINAZIONE Component Layout / Piano di Montaggio (Vers. 1.7)	
DISPOSITIVO	
SEMILAVORATO	DISEGNATO D'Alessio D. U.
MATERIALE	SCALA
TRATTAMENTO	TAVOLA n. di



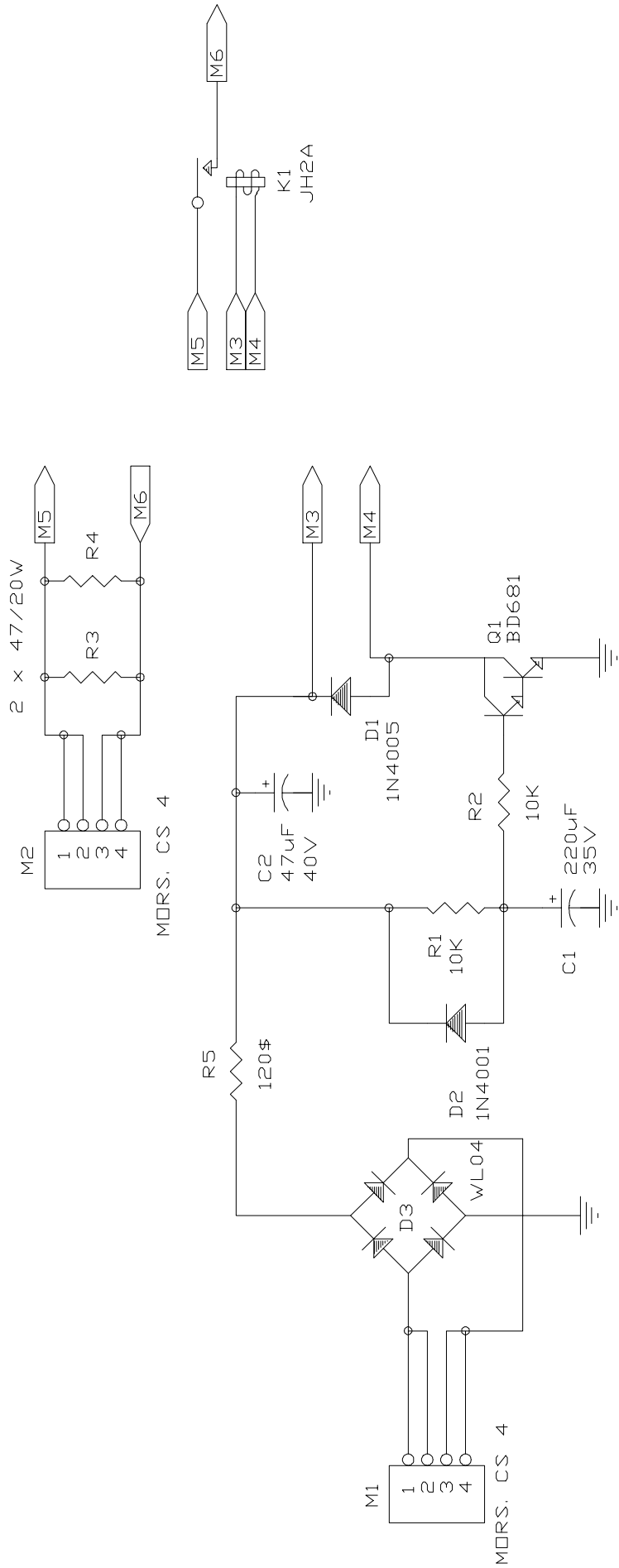
**SOFT START CARD**

<u>1</u>	<u>Circuit Diagram</u>	<u>Pag. 57</u>
<u>2</u>	<u>Bill of Materials</u>	<u>Pag. 58</u>
<u>3</u>	<u>Layout</u>	<u>Pag. 59</u>

**SOFT START CARD**

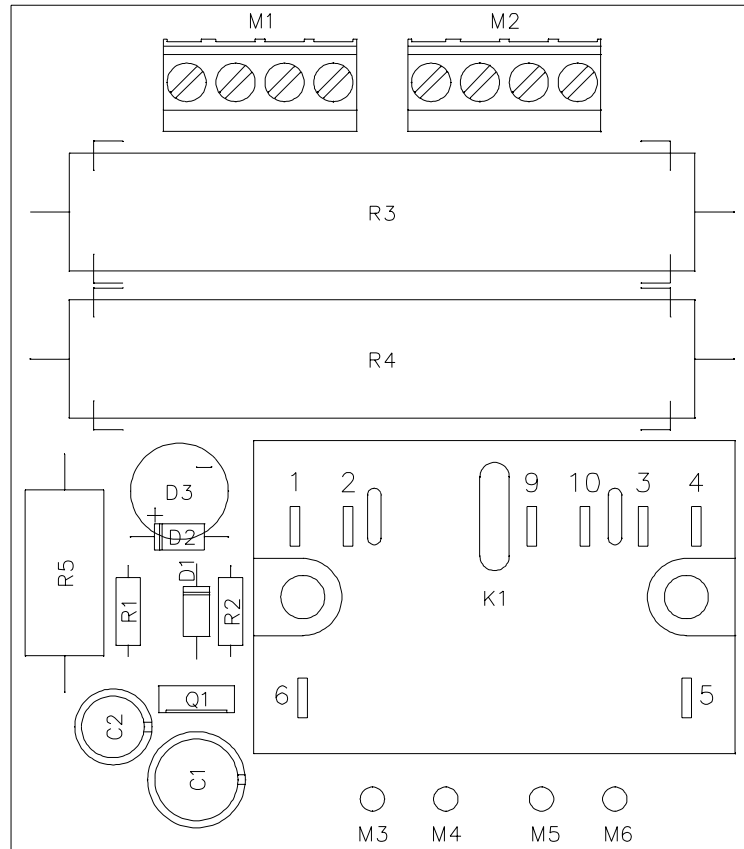
<u>1</u>	<u>Schema Elettrico</u>	<u>Pag. 57</u>
<u>2</u>	<u>Lista dei Componenti</u>	<u>Pag. 58</u>
<u>3</u>	<u>Piano di Montaggio</u>	<u>Pag. 59</u>






Title		R.V.R. Elettronica S.r.l. (Bo)	
Size		A4	
Document Number		REV	
Date:	Sheet	1	of 1

Item	Quantity	Reference Part	Description	Part Order Code
1	2	R3,R4	47/20W RESISTOR 20W 10%	RAF020KH0047
2	1	R5	120 $\Omega$ RESISTOR 5W	RSC005JH0120
3	2	R1,R2	10K RESISTOR 1/4W 5%	RSC1/4JK0010
4	1	C2	47 $\mu$ F ELECTROLYTIC CAPACITOR	CEA476BM630
5	1	C1	220 $\mu$ F ELECTROLYTIC CAPACITOR	CEA227BM350
6	2	M1,M2	MORS. CS 4 MORSETTIERA CS 4 CONT.	MORSKB04PPO
7	1	K1	JH2A RELAY MATHSUSH. 2CA1CC	RLDJH2AB24
8	1	D2	1N4001 SILICON DIODE 50V	DIS1N4001
9	1	D1	1N4005 SILICON DIODE 600V	DIS1N4005
10	1	D3	WL04 DIODE BRIDGE 1.5A	PNRWL04
11	1	Q1	BD681 NPN DARLINGTON	TRNBD681



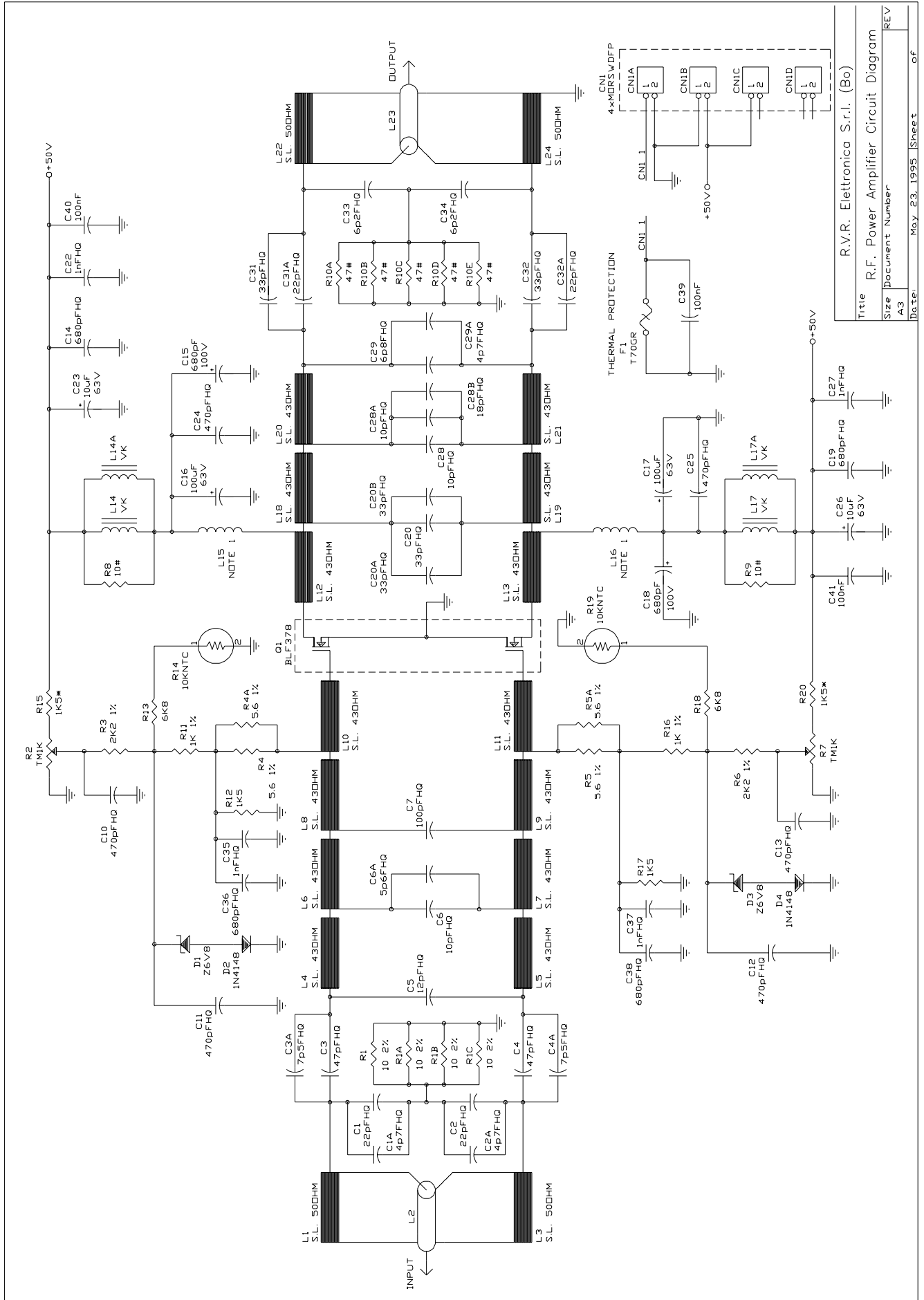
	DENOMINAZIONE	
	Soft-Start Component Layout / Piano di Montaggio	
DISPOSITIVO		
SEMILAVORATO	DISEGNATO	DISEGNO
MATERIALE	li	
TRATTAMENTO	SCALA	TAVOLA n di

**R.F. POWER AMPLIFIER**

<u>1</u>	<u>Circuit Diagram</u>	<u>Pag. 61</u>
<u>2</u>	<u>Bill of Materials</u>	<u>Pag. 62</u>
<u>3</u>	<u>Layout</u>	<u>Pag. 64</u>

**R.F. POWER AMPLIFIER**

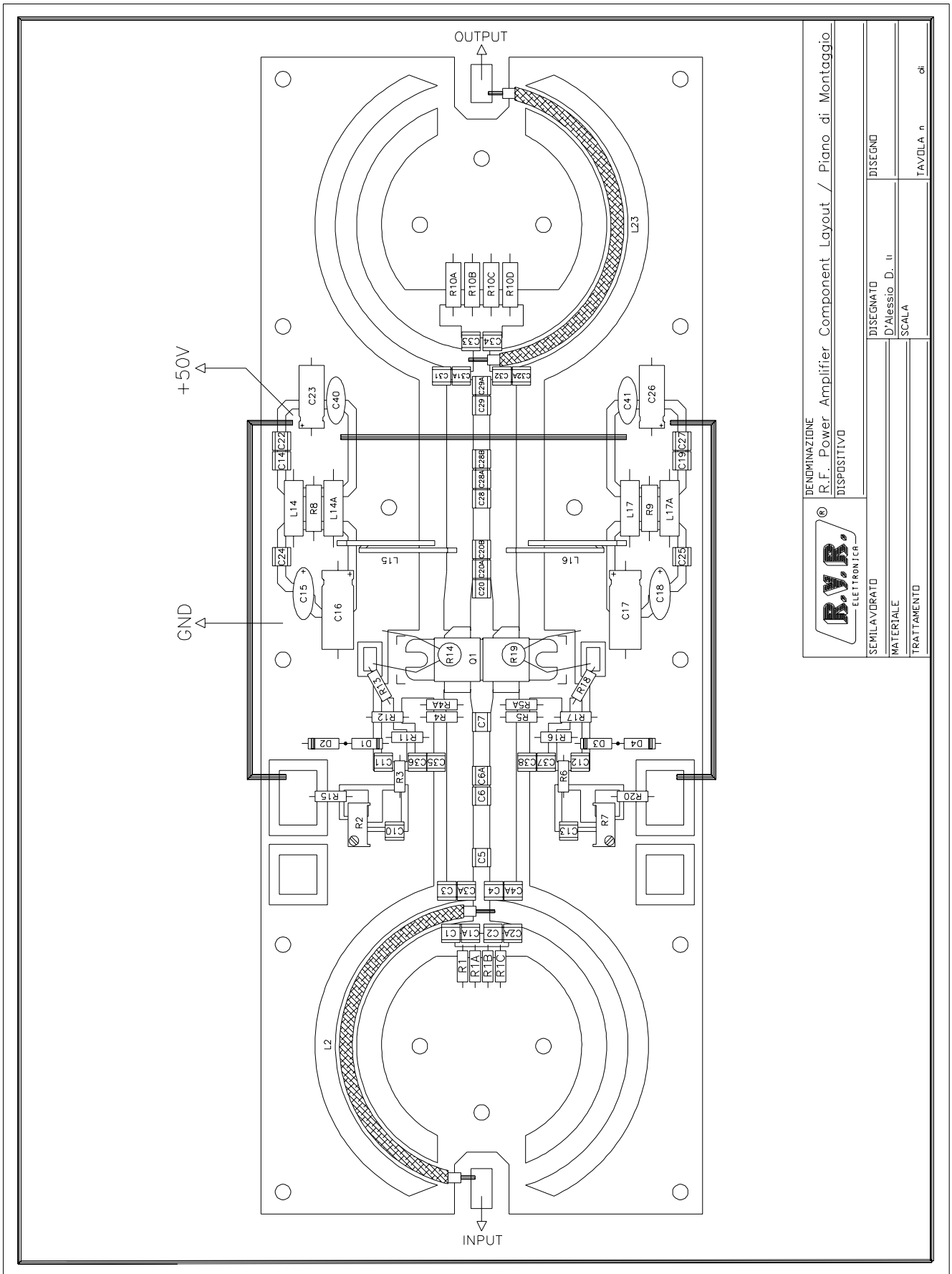
<u>1</u>	<u>Schema Elettrico</u>	<u>Pag. 61</u>
<u>2</u>	<u>Lista dei Componenti</u>	<u>Pag. 62</u>
<u>3</u>	<u>Piano di Montaggio</u>	<u>Pag. 64</u>



Title		R.V.R. Elettronica S.r.l. (Bo)	
Size	Document Number	REV	
A3			
Date:	May 23, 1995	Sheet	of

Item	Quantity	Reference Part	Description	Part Order Code
1	4	R4A,R4,R5A, R5	5.6 1% RESISTOR 1/4W 1%	RSML/4FH05,6
2	4	R1C,R1B, R1A,R1	10 2% RESISTOR 1/4W 2%	RSML/4GH0010
3	2	R8,R9	10# RESISTOR 2W	RSC002JH0010
4	5	R10E,R10D, R10C,R10B, R10A	47# RESISTOR 2W	RSC002JH0047
5	2	R11,R16	1K 1% RESISTOR 1/4W 1%	RSML/4FK0001
6	2	R12,R17	1K5 RESISTOR 1/4W 5%	RSC1/4JK01,5
7	2	R15,R20	1K5* RESISTOR 1/2W 5%	RSC1/2JK01,5
8	2	R3,R6	2K2 1% RESISTOR 1/4W 1%	RSC1/4FK02,2
9	2	R13,R18	6K8 RESISTOR 1/4W 5%	RSC1/4JK06,8
10	2	R14,R19	10KNTC NTC RNTCPAKK0010	
11	2	R2,R7	TM1K TRIMM. MULT. REG. VERT.	RVTMULVK0001
12	3	C1A,C2A, C29A	4p7FHQ HIGHT Q CAPACITOR	CHQ4,7AJ500
13	1	C6A	5p6FHQ HIGHT Q CAPACITOR	CHQ5,6AJ500
14	2	C33,C34	6p2FHQ HIGHT Q CAPACITOR	CHQ6,2AJ500
15	1	C29	6p8FHQ HIGHT Q CAPACITOR	CHQ6,8AJ500
16	2	C4A,C3A	7p5FHQ HIGHT Q CAPACITOR	CHQ7,5AJ500
17	3	C6,C28A,C28	10pFHQ HIGHT Q CAPACITOR	CHQ100AJ500
18	1	C5	12pFHQ HIGHT Q CAPACITOR	CHQ120AJ500
19	1	C28B	18pFHQ HIGHT Q CAPACITOR	CHQ180AJ500
20	4	C1,C2,C31A, C32A	22pFHQ HIGHT Q CAPACITOR	CKM220AJ500
21	5	C20B,C20A, C20,C31,C32	33PFHQ HIGHT Q CAPACITOR	CHQ330AJ500
22	2	C4,C3	47pFHQ HIGHT Q CAPACITOR	CHQ470AJ500
23	1	C7	100pFHQ HIGHT Q CAPACITOR	CHQ101AJ500
24	6	C10,C11, C12,C13, C24,C25	470pFHQ HIGHT Q CAPACITOR	CHQ471AJ500
25	2	C15,C18	680pF CERAMIC CAPACITOR	CKM681BK600P

Item	Quantity	Reference Part	Description	Part Order Code
26	4	C14,C19, 680pFHQ C36,C38	HIGHT Q CAPACITOR	CHQ681AJ500
27	4	C22,C27, 1nFHQ C35,C37	HIGHT Q CAPACITOR	CHQ102AJ500
28	3	C39,C40,C41 100nF	CERAMIC CAPACITOR	CKM104BK600P
29	2	C23,C26 10µF	ELECTROLYTIC CAPACITOR	CEA106AM350
30	2	C16,C17 100µF	ELECTROLYTIC CAPACITOR	CEA107BM350
31	4	L14A,L14, VK L17A,L17	RF CHOKE	IMPVK00A
32	4	CN1D,CN1C, CN1B,CN1A	MORSWDFP MORS. WEID. F. DA PANN. MORSWDFP	
33	1	F1 T70GR	DISG. TERMICO 70 GRADI	SETBIMETAL
34	2	D2,D4 1N4148	SILICON DIODE	DIS1N4148
35	2	D1,D3 Z6V8	ZENER DIODE 6.8V 0.4W	DIZ6V80W4
36	2	Q1 BLF378	VHF PUSH-PULL POWER MOS	TRNBLF378
37	4	L1,L3, S.L. 50 OHM L22,L24	50 OHM STRIP LINE	
38	14	L4,L5,L6, S.L. 43 OHM L7,L8,L9, L10,L11, L12,L13, L18,L19, L20, L21	43 OHM STRIP LINE	
39	2	L2,L23 80mm	RG303	
40	2	L15,L16	1-3/4 turns enamelled 2mm copper wire space 1mm int. dia. 10mm leads 2x7mm	



<b>B.V.R.</b> ELETTRONICA	
DENOMINAZIONE R.F. Power Amplifier Component Layout / Piano di Montaggio DISPOSITIVO	
SEMILAVORATO	DISEGNATO
MATERIALE	D'Allesio D. U.
TRATTAMENTO	SCALA
	TAVOLA n. di

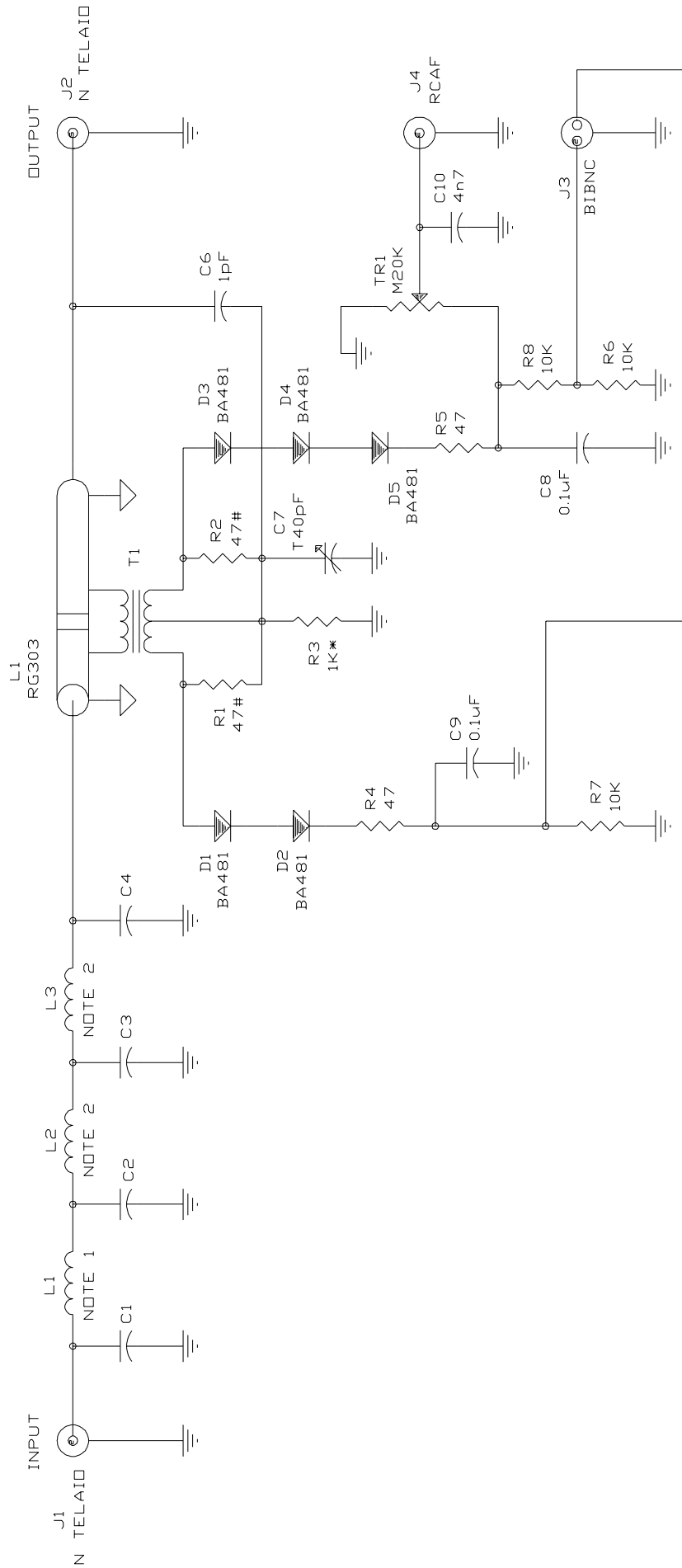


**LOW PASS FILTER & DIRECTIONAL COUPLER**

<u>1</u>	<u>Circuit Diagram</u>	<u>Pag. 66</u>
<u>2</u>	<u>Bill of Materials</u>	<u>Pag. 67</u>
<u>3</u>	<u>Layout</u>	<u>Pag. 68</u>

**LOW PASS FILTER & DIRECTIONAL COUPLER**

<u>1</u>	<u>Schema Elettrico</u>	<u>Pag. 66</u>
<u>2</u>	<u>Lista dei Componenti</u>	<u>Pag. 67</u>
<u>3</u>	<u>Piano di Montaggio</u>	<u>Pag. 68</u>

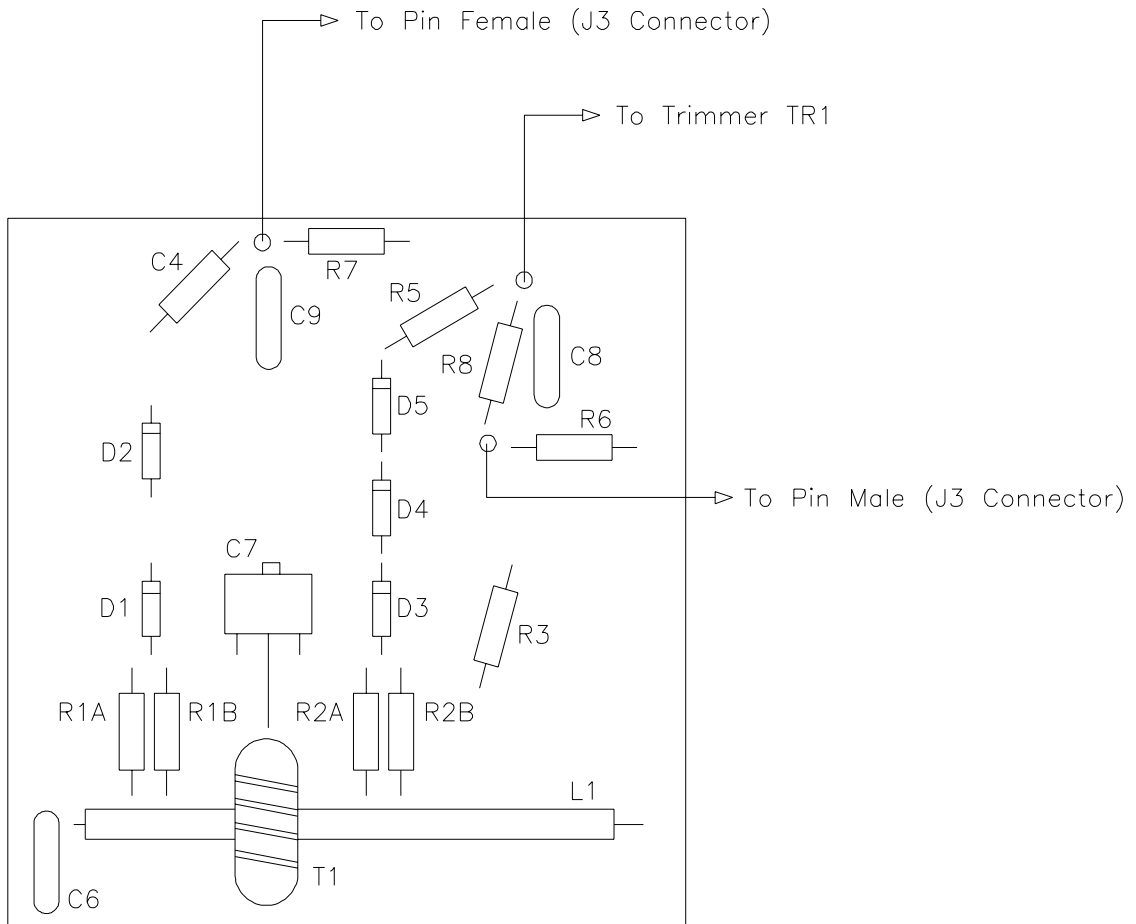



NOTE 1: 1 turns enamelled 2mm copper wire  
int. diam. 9.5mm

NOTE 1: 2 turns enamelled 2mm copper wire  
int. diam. 9.5mm

Title		R.V.R. Elettronica S.r.l. (Bo)	
Size		Document Number	
A4	REV		
Date:	May 23, 1995	Sheet	1 of 1

Item	Quantity	Reference Part	Description	Part Order Code	
1	2	R4,R5	47	RESISTOR 1/4W 5%	RSC1/4JH0047
2	2	R1,R2	47#	RESISTOR 2W	RSC002JH0047
3	1	R3	1K*	RESISTOR 1/2W 5%	RSC1/2JK0001
4	3	R6,R7,R8	10K	RESISTOR 1/4W 5%	RSC1/4JK0010
5	1	TR1	M20K	TRIMMER MULTIGIRI	RVTMULAK0020
6	1	C6	1pF	CERAMIC CAPACITOR NP0	CKM010BJ600C
7	1	C1	13pFT	COND. BAND. RAME TEFLON	CBRT130RVR
8	3	C2,C3,C4	27pFT	COND. BAND. RAME TEFLON	CBRT270RVR
9	1	C7	T40pF	TRIMMER CAPACITOR	CVF400BK
10	1	C10	4n7	CERAMIC CAPACITOR	CKM472BK600P
11	2	C8,C9	0.1µF	CERAMIC CAPACITOR	CKM104BK600P
12	1	T1	TOROIDE	TOROIDE DIA. 10 MM	FTR10N
13	1	L1	RG303	COAX CABLE RG303	CAVRG303V
14	1	J3	BIBNC	CONN. BNC F PAN TWINAX	CNTBNCFTXPV
15	1	J4	RCAF	CONN. RCA DA TELAIO	CNTRCAFP
16	2	J1,J2	N TELAIO	CONN. N A TELAIO	CNTNFPFL
17	5	D1,D2,D3, D4,D5	BA481	HOT CARRIER DIODE	DHCBA481
18	1	L1	NOTE 1	1 turns enamelled 2mm copper wire int. diam. 9.5mm	
19	2	L2,L3	NOTE 2	2 turns enamelled 2mm copper wire int. diam. 9.5mm	



	DENOMINAZIONE	
	Directional Coupler Component Layout / Piano di Montaggio	
DISPOSITIVO		
SEMILAVORATO	DISEGNATO	DISEGNO
MATERIALE	D'Alessio D. U.	
TRATTAMENTO	SCALA	TAVOLA n di

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