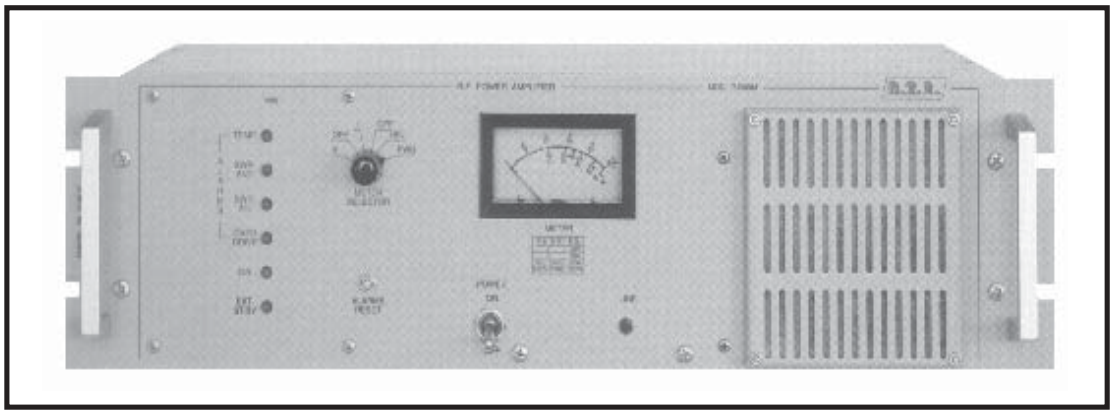
PJRL250



TECHNICAL AND MAINTENANCE MANUAL

R.V.R. ELETTRONICA

Manufactured by R.V.R. Elettronica - Italy

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

INDEX

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 responsability 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-incidental 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

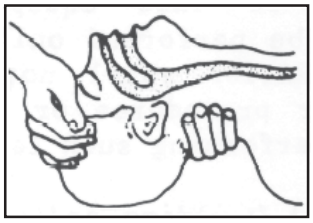
Treatment of electrical Shock

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

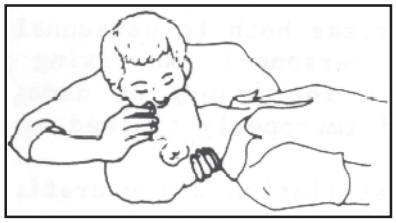
IF UNCONSCIOUS,
OPEN AIRWAY



LIFT UP NECK,
PUSH FOREHEAD BACK,
CLEAR OUT MOUTH IF NECESSARY,
OBSERVE FOR BREATHING

B BREATHING

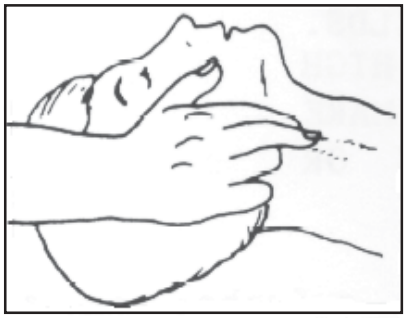
IF NOT BREATHING,
BEGIN ARTIFICIAL BREATHING.



TILT HEAD,
PINCH NOSTRILS,
MAKE AIRTIGHT SEAL,
4 QUICK FULL BREATHS.
REMEMBER MOUTH TO MOUTH RESUSCITATION MUST BE COMMENCED AS SOON AS POSSIBLE.

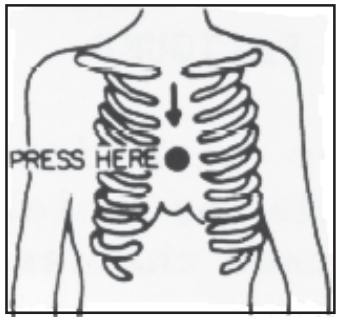
C CIRCULATION

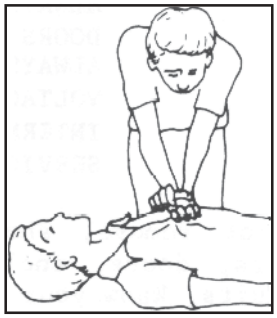
CHECK CAROTID PULSE



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 COMPRESSIONS 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. Ouput Connector	Standard "N" type connector
Spurious & Harmonic Suppression	meets or exceeds all FCC and CCIR requirements

TABLE B

DIMENSIONAL AND ENVIRONMENTAL SPECIFICATIONS

Cabinet Dimension	126 mm (04.96") H 437 mm (17.20") W 340 mm (13.39") D
Panel Size	483 mm (19.00") W 132.5 mm (5.22") H
Operating Temperature	-10°C to 50°C
Humidity	95% Max, Non Condensing
Weight	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 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 actived); 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***	***TELEMETRY 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: V — R.F. Ampl. Module's voltage OFF — Not Used I — R.F. Ampl. Module's current OFF — Not Used REF — Reflected Power FWD — Forward Power
9	METER	Analog meter used to monitor the operating parameters of the amplifier

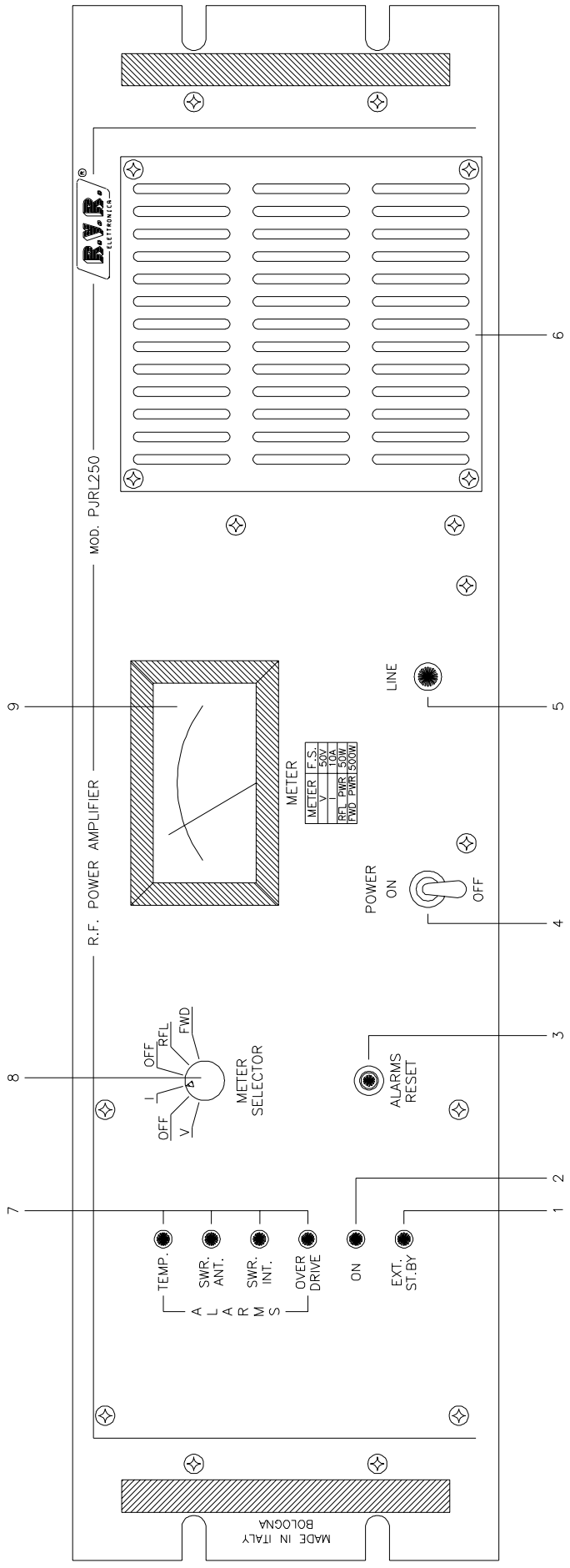

B.V.B.
ELETTRONICA
MOD. PJRL250
R.F. POWER AMPLIFIER
MADE IN ITALY
BOLOGNA
METER
METER F.S.
V 50V
I 10A
RFL PWR 50W
FWD PWR 500W
METER SELECTOR
OFF
RFL
FWD
I
V
OFF
LINE
POWER
ON
OFF
ALARMS RESET
TEMP.
SWR. ANT.
SWR. INT.
OVER DRIVE
ALARMS
ON
EXT. ST.BY
1
2
3
4
5
6
7
8
9

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 & A.C. LINE FUSE — Fuse block and line voltage selector. 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.

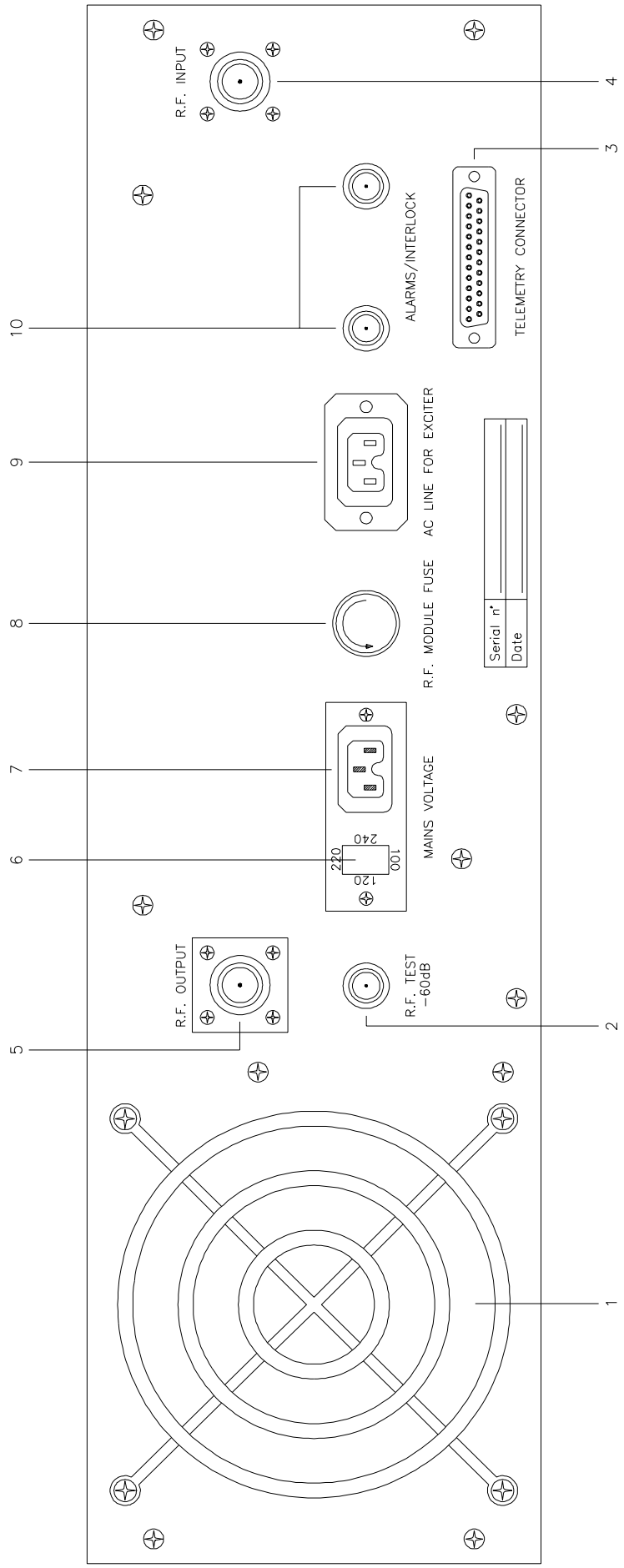

R.F. INPUT
4
3
ALARMS/INTERLOCK
TELEMETRY CONNECTOR
10
9
AC LINE FOR EXCITER
8
R.F. MODULE FUSE
Serial n°
Date
7
MAINS VOLTAGE
6
220
240
100
120
R.F. OUTPUT
R.F. TEST
-60dB
5
2
1

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

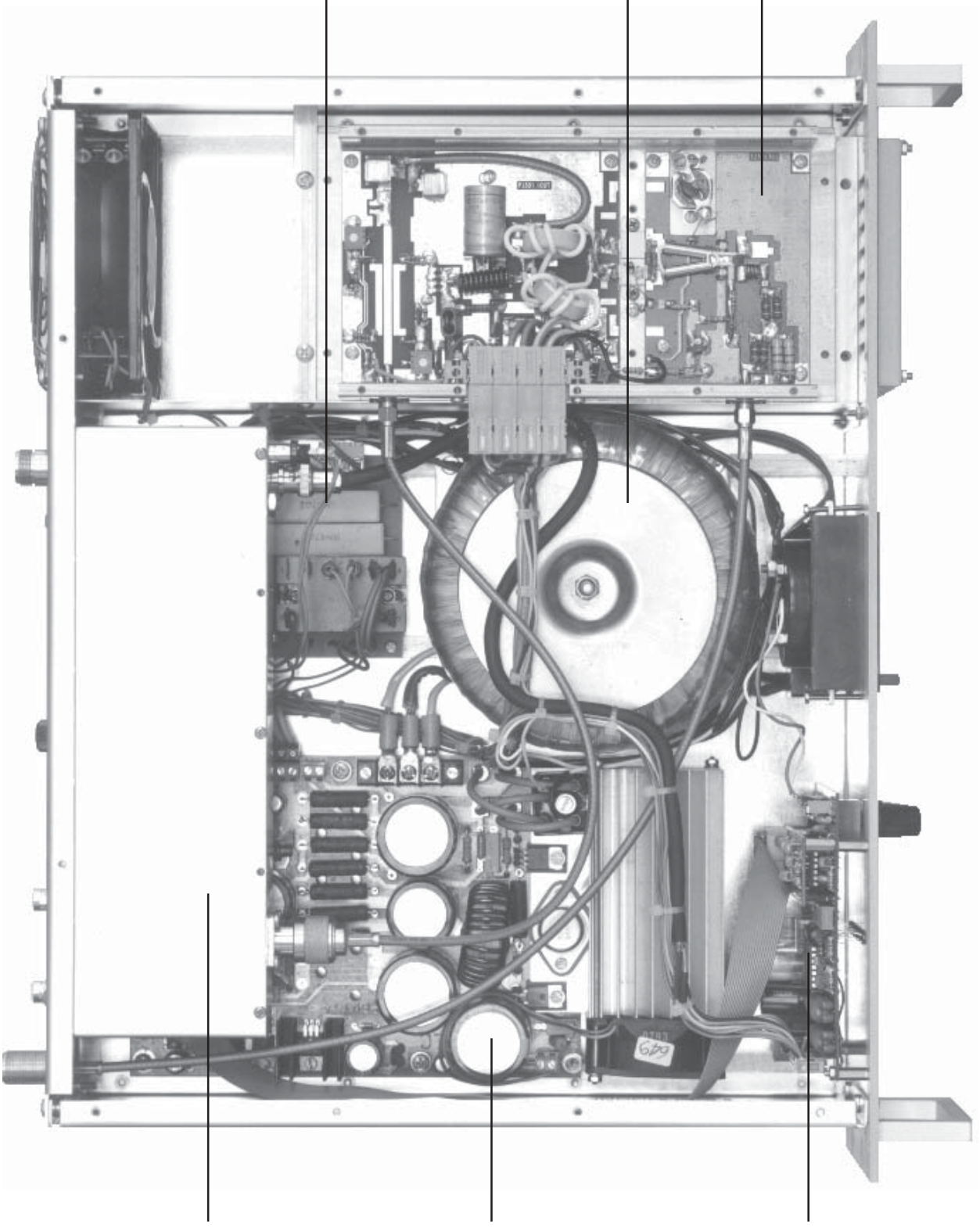


PHOTO 1

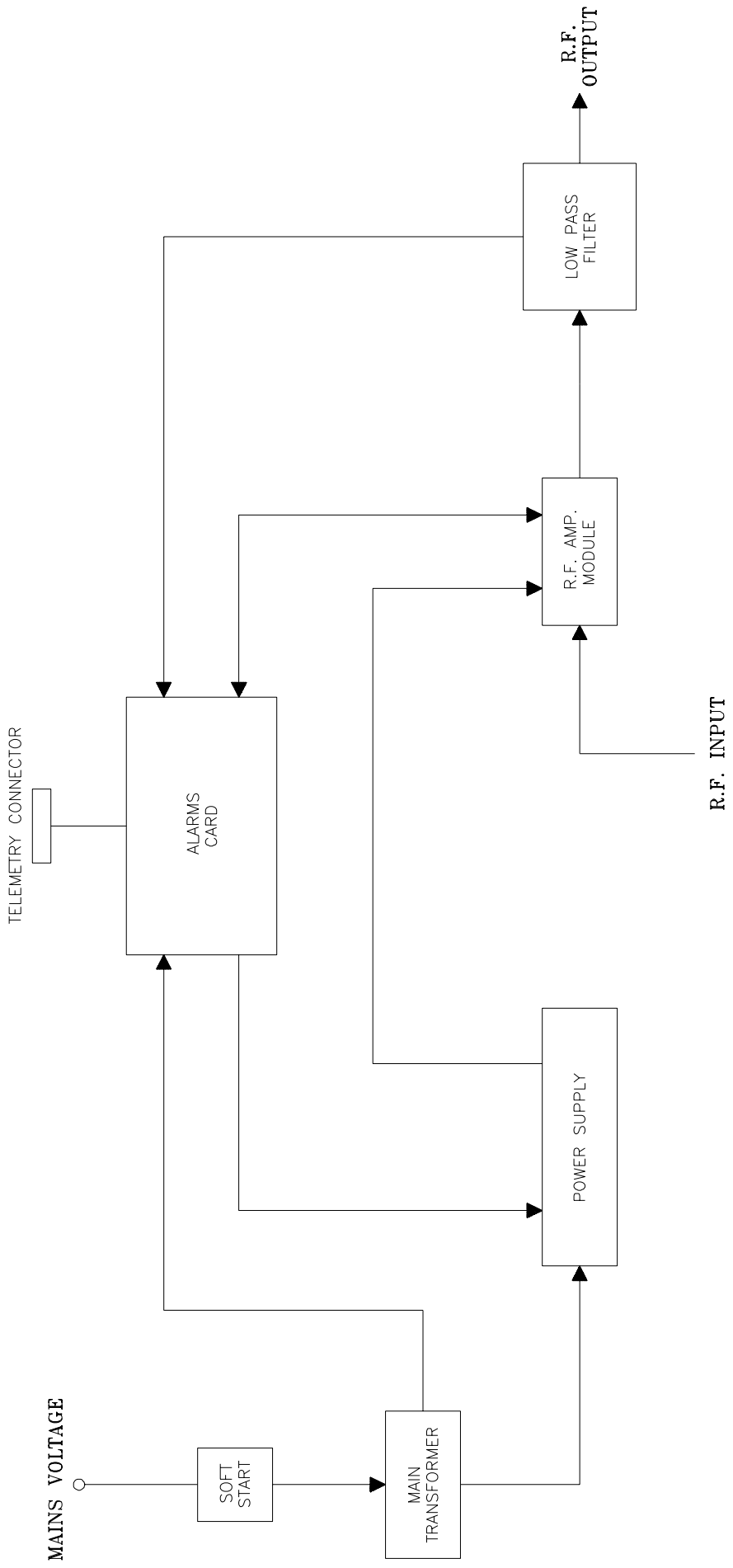

R.F.
OUTPUT
LOW PASS
FILTER
R.F. AMP.
MODULE
R.F. INPUT
TELEMETRY CONNECTOR
ALARMS
CARD
POWER SUPPLY
MAINS VOLTAGE
SOFT
START
MAIN
TRANSFORMER

FIG. 3

TABLE C

RECOMMENDED TEST EQUIPMENT

INSTRUMENT	MODEL	SPECIFICATIONS
Non-inductive dummy load	*Bird*	*50 Ohm P > 300W*
Spectrum Analyzer	*Advantest Mod. R4141D*	*10KHz - 3.5GHz*
Wattmeter	*Bird Mod. 43*	

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.

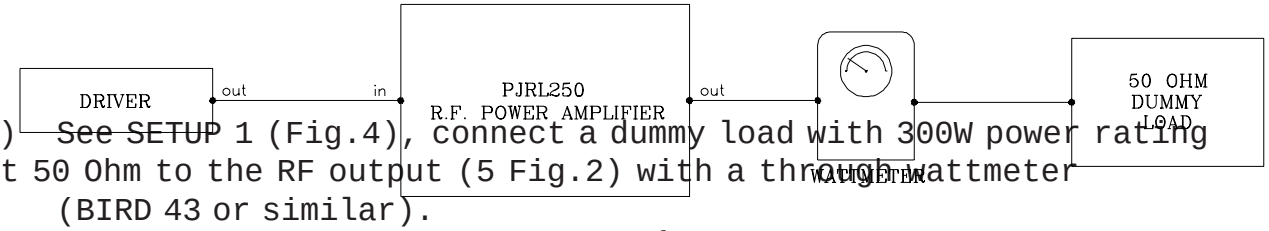
3.3 INSTALLATION

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).



SETUP 1 / FIG. 4

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).
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! WARING! 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 standoofs.

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) Careffully 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 50Ohm) 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 Ohm 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.

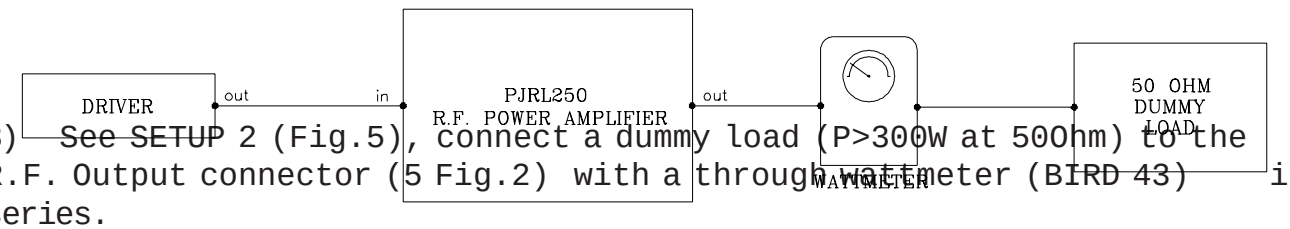
6) Be sure that P2 is turned completely counter clockwise.

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.



SETUP 2 / FIG. 5

3) See SETUP 2 (Fig.5), connect a dummy load (P>300W at 50Ohm) to the R.F. Output connector (5 Fig.2) with a through wattmeter (BIRD 43) in series.

4) Connect an driver able to deliver a power of almost 2W-20W

(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

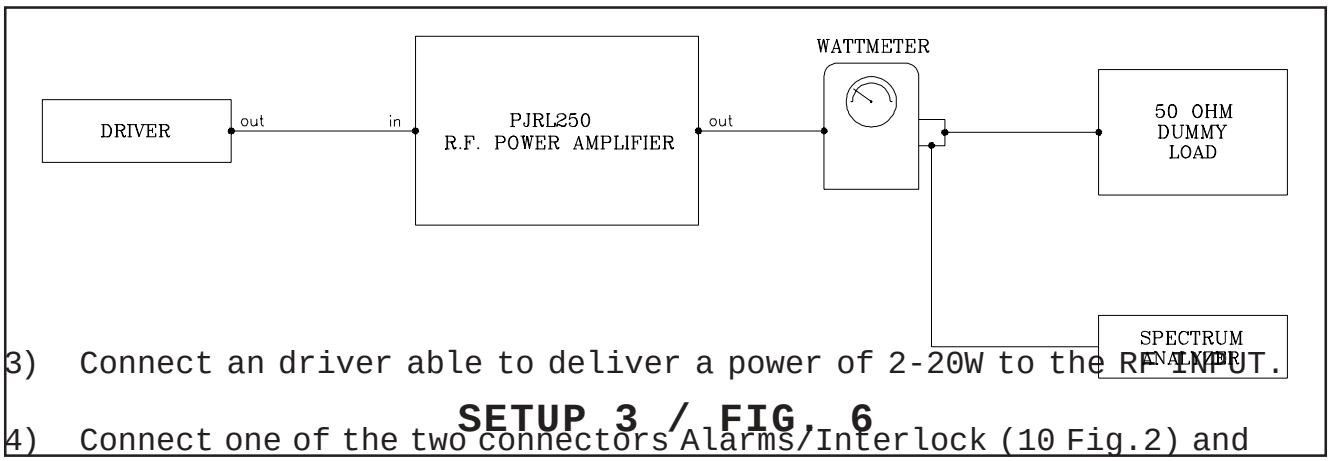
Some differences in the currents drawn are related to the different gains of the Mosfet devices (BLF 378) and must be compensated with the trimmers R20 placed on each power amplifier board.

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).



SETUP 3 / FIG. 6

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

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.

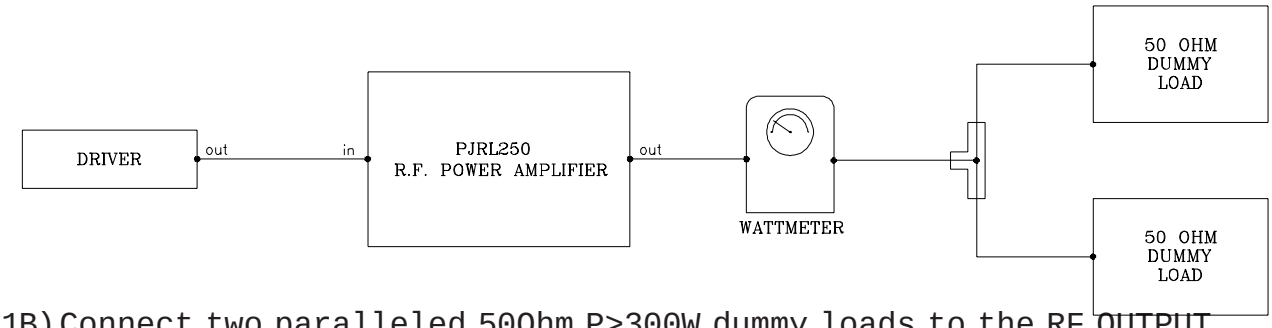
8) Adjust the trimpot TR1 in the L.P. Filter until you obtain a slight output power drop in the PJRL250 amplifier. This power drop tells us that the power limit system is acting.

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.



SETUP 4 / FIG. 7

11B) Connect two paralleled 50Ohm 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

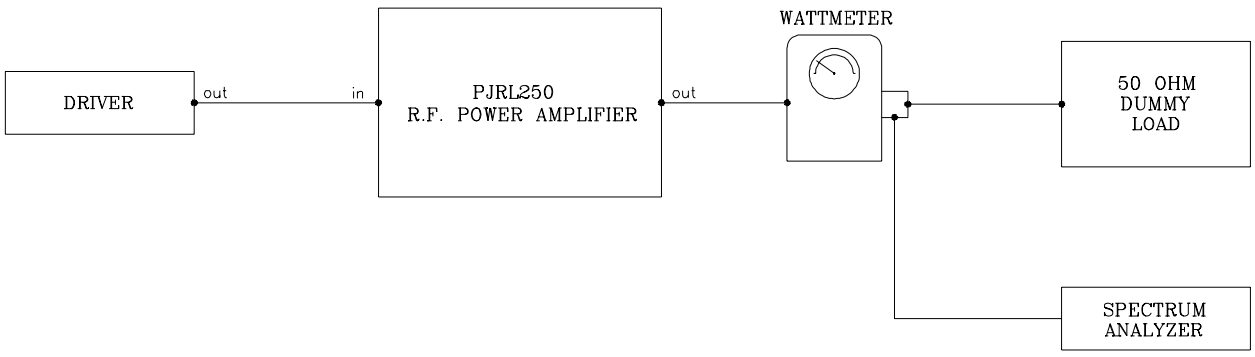
No adjustments are needed after this board has been changed.

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.



SETUP 5 / FIG. 8

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 50Ohm 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

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.

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

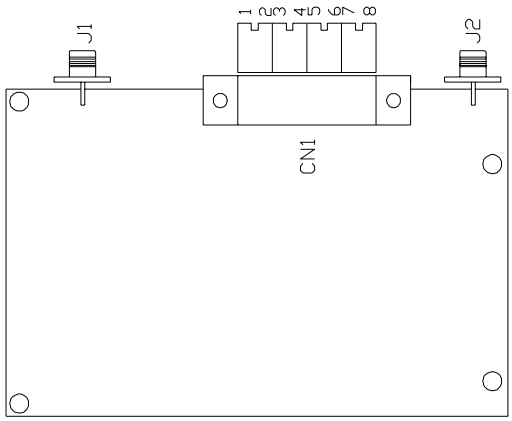
This section contains circuit diagrams, layouts and bills of material of the modules which composing the equipment.
For more information about each module see as reference Section 2.

APPENDICE A
SCHEMI
ELETTRICI, PIANI DI MONTAGGIO E LISTE COMPONENTI

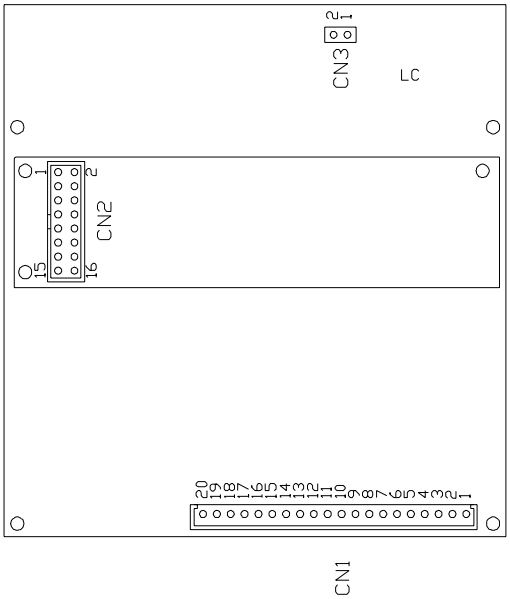
Questo capitolo contiene gli schemi elettrici, i piani di montaggio e le liste componenti delle schede che compongono la macchina.
Per ulteriori informazioni riguardanti le singole schede vedere come riferimento il Capitolo 2.

WIRING DIAGRAM

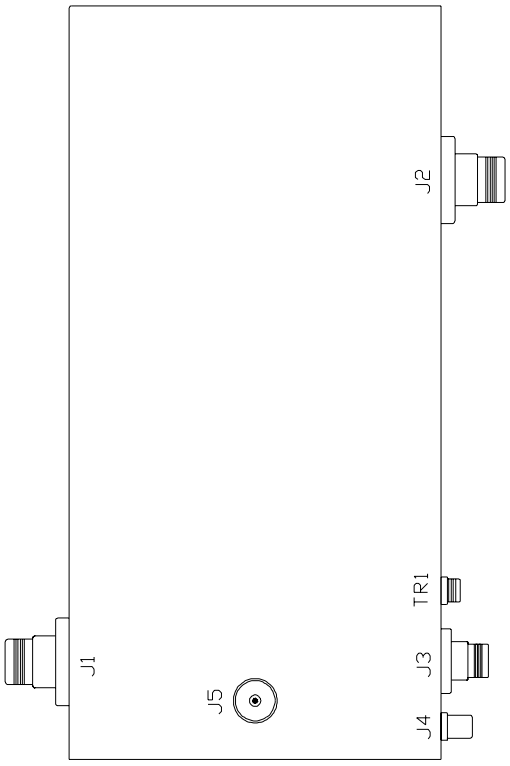
DIAGRAMMI DI CONNESSIONE



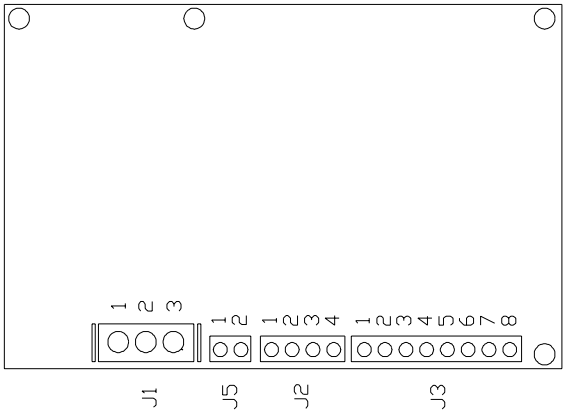
R.F. Power Amplifier Module



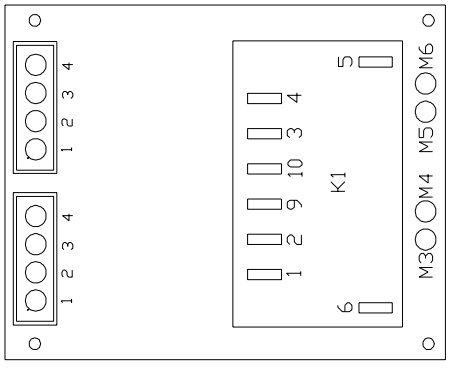
Alarms & Telemetry Card



Low Pass Filter & Directional Coupler

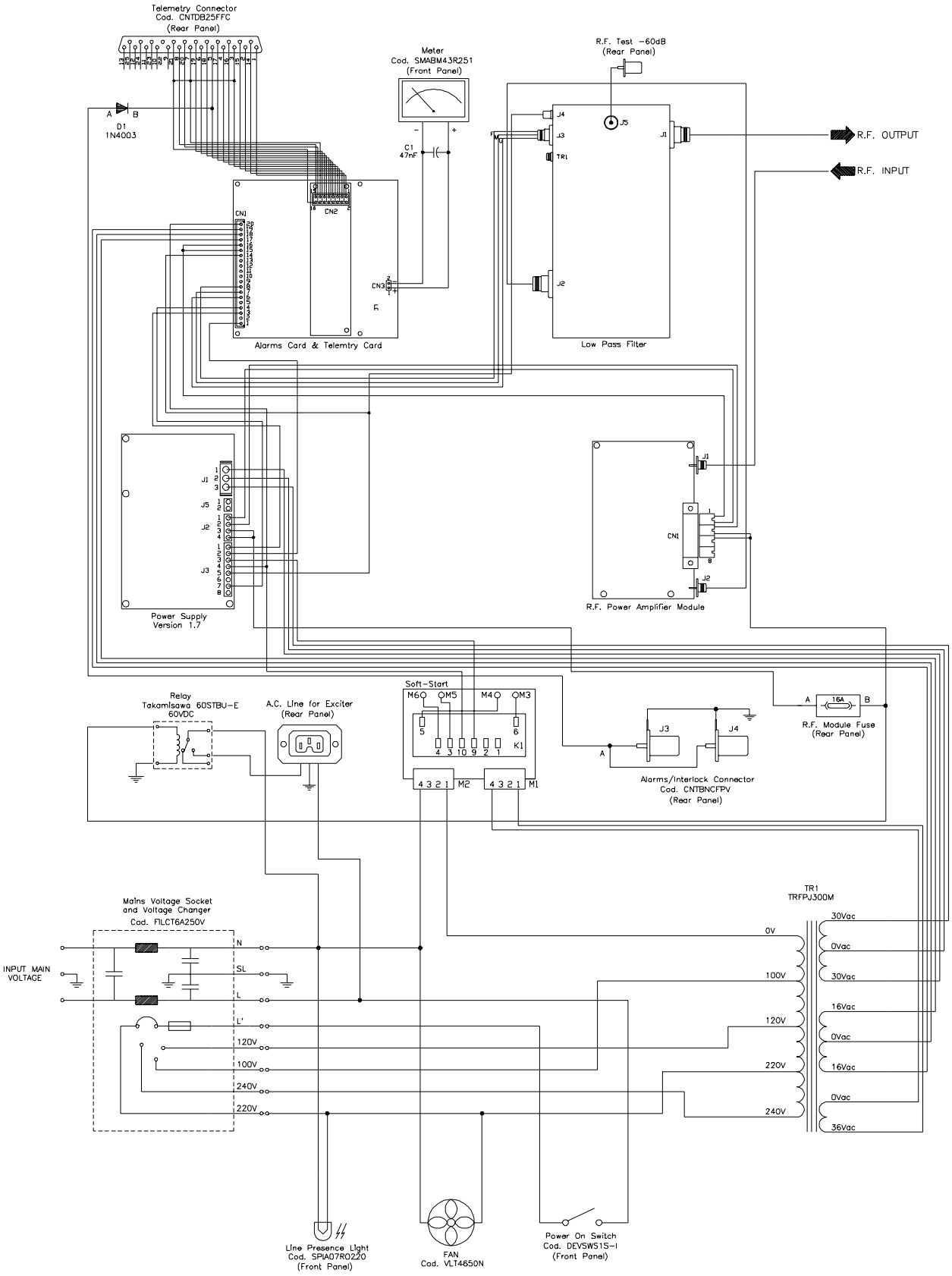


Power Supply



Soft-Start Card

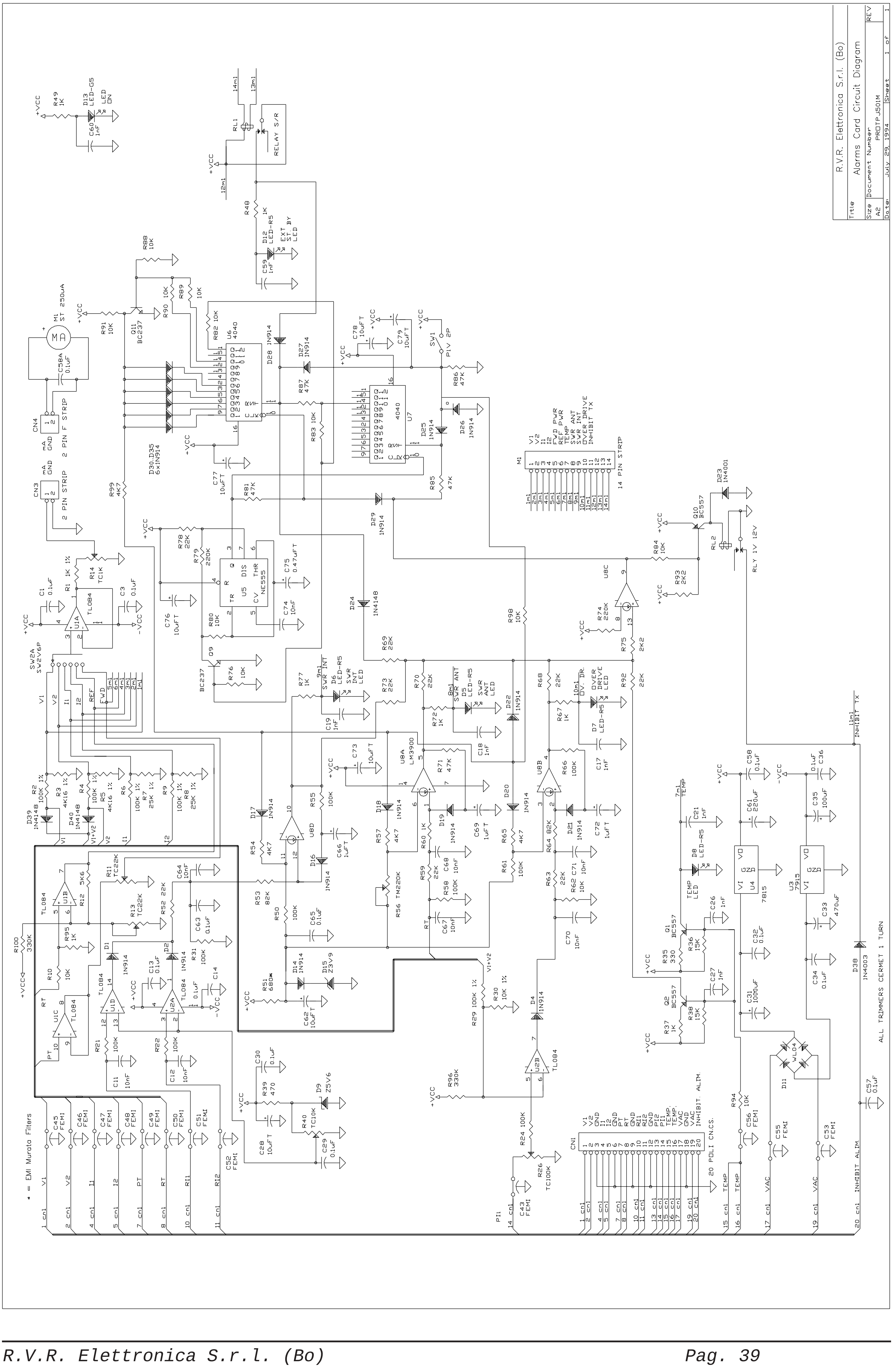
CARD CONNECTORS - CONNETTORI DELLE SCHEDE



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

ALARMS CARD

ALARMS CARD


R.V.R. Elettronica S.r.l. (Bo)
Title Alarms Card Circuit Diagram
Size A2 Document Number PRDTPJS01M
REV 1
Date: July 29, 1994 Sheet 1 of 1
ALL TRIMMERS CERMET 1 TURN
* = EMI Murata Filters

Alarms Card Bill of Materials/Lista Componenti Pag. 1

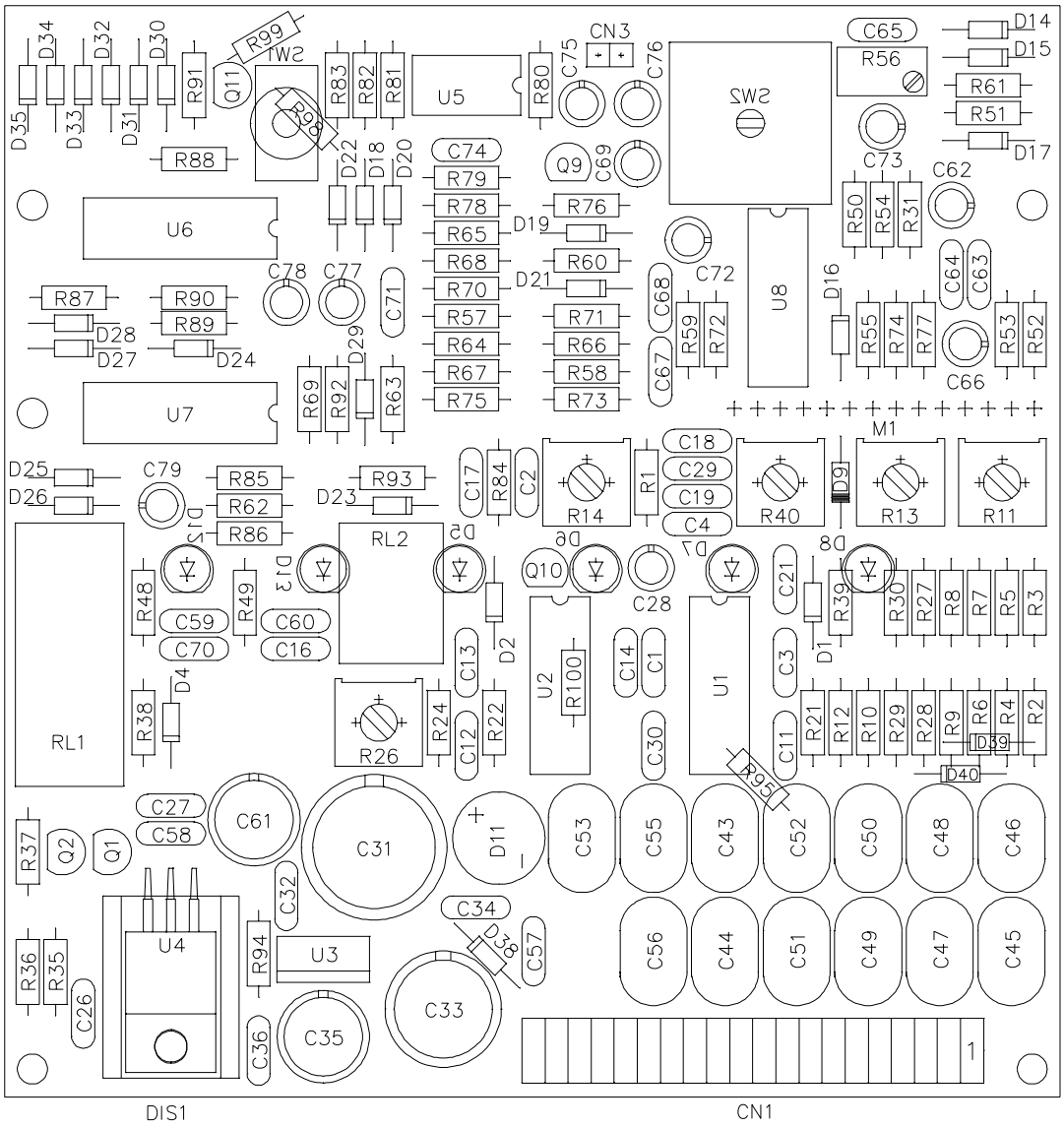
Item	Quantity	Reference	Part	Description	Part Order Code
1	1	R35	330	RESISTOR 1/4W 5%	RSC1/4JH0330
2	1	R39	470	RESISTOR 1/4W 5%	RSC1/4JH0470
3	1	R51	680*	RESISTOR 1/2W 5%	RSC1/2JH0680
4	1	R1	1K 1%	RESISTOR 1/4W 1%	RSM1/4FK0001
5	8	R37,R48, R49,R60, R67,R72, R77,R95	1K	RESISTOR 1/4W 5%	RSC1/4JK0001
6	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, R65,R99	4K7	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, R76,R80, R82,R83, R84,R88, R89,R90, R91,R94,R98	10K	RESISTOR 1/4W 5%	RSC1/4JK0010
12	2	R36,R38	15K	RESISTOR 1/4W 5%	RSC1/4JK0015
13	9	R52,R59, R63,R68, R69,R70, R73,R78, R92	22K	RESISTOR 1/4W 5%	RSC1/4JK0022
14	2	R7,R8	25K 1%	RESISTOR 1/4W 1%	RSM1/4FK0025
15	5	R71,R81, R85,R86,R87	47K	RESISTOR 1/4W 5%	RSC1/4JK0047
16	2	R53,R64	82K	RESISTOR 1/4W 5%	RSC1/4JK0082
17	5	R2,R4,R6, R9,R29	100K 1%	RESISTOR 1/4W 1%	RSM1/4FH0100
18	9	R21,R22, R24,R31, R50,R55, R58,R61,R66	100K	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

Alarms Card Bill of Materials/Lista Componenti Pag. 2

Item	Quantity	Reference	Part	Description	Part Order Code
21	1	R14	TC1K	TRIM. REG. VERT. CERMET	RVTCERVK0001
22	1	R40	TC10K	TRIM. REG. VERT. CERMET	RVTCERVK0010
23	2	R11,R13	TC22K	TRIM. REG. VERT. CERMET	RVTCERVK0022
24	1	R26	TC100K	TRIM. REG. VERT. CERMET	RVTCERVK0100
25	1	R56	TM220K	TRIM. MULT. REG. VERT.	RVTMULVK0220
26	8	C17,C18, C19,C21, C26,C27, C59,C60	1nF	CERAMIC CAPACITOR	CKM102BK600P
27	8	C11,C12, C64,C67, C68,C70, C71,C74	10nF	CERAMIC CAPACITOR	CKM103BK600P
28	14	C1,C3,C13, C14,C29, C30,C32, C34,C36, C57,C58A, C58,C63,C65	0.1µF	CERAMIC CAPACITOR	CKM104BK600P
29	1	C75	0.47µFT	TANTALIUM CAPACITOR	CET474AM350
30	3	C66,C69,C72	1µFT	TANTALIUM CAPACITOR	CET105AM350
31	7	C28,C62, C73,C76, C77,C78,C79	10µFT	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, C46,C47,C48, C49,C50,C51, C52,C53,C55, C56	FEMI	FILTRO EMI MURATA	FEAY5S223500

Alarms Card Bill of Materials/Lista Componenti Pag. 3

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, D14,D16,D17, D18,D19,D20, D21,D22,D25, D26,D27,D28, D29,D30,D31, D32,D33,D34, D35	1N914	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, D8,D12	LED-R5	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

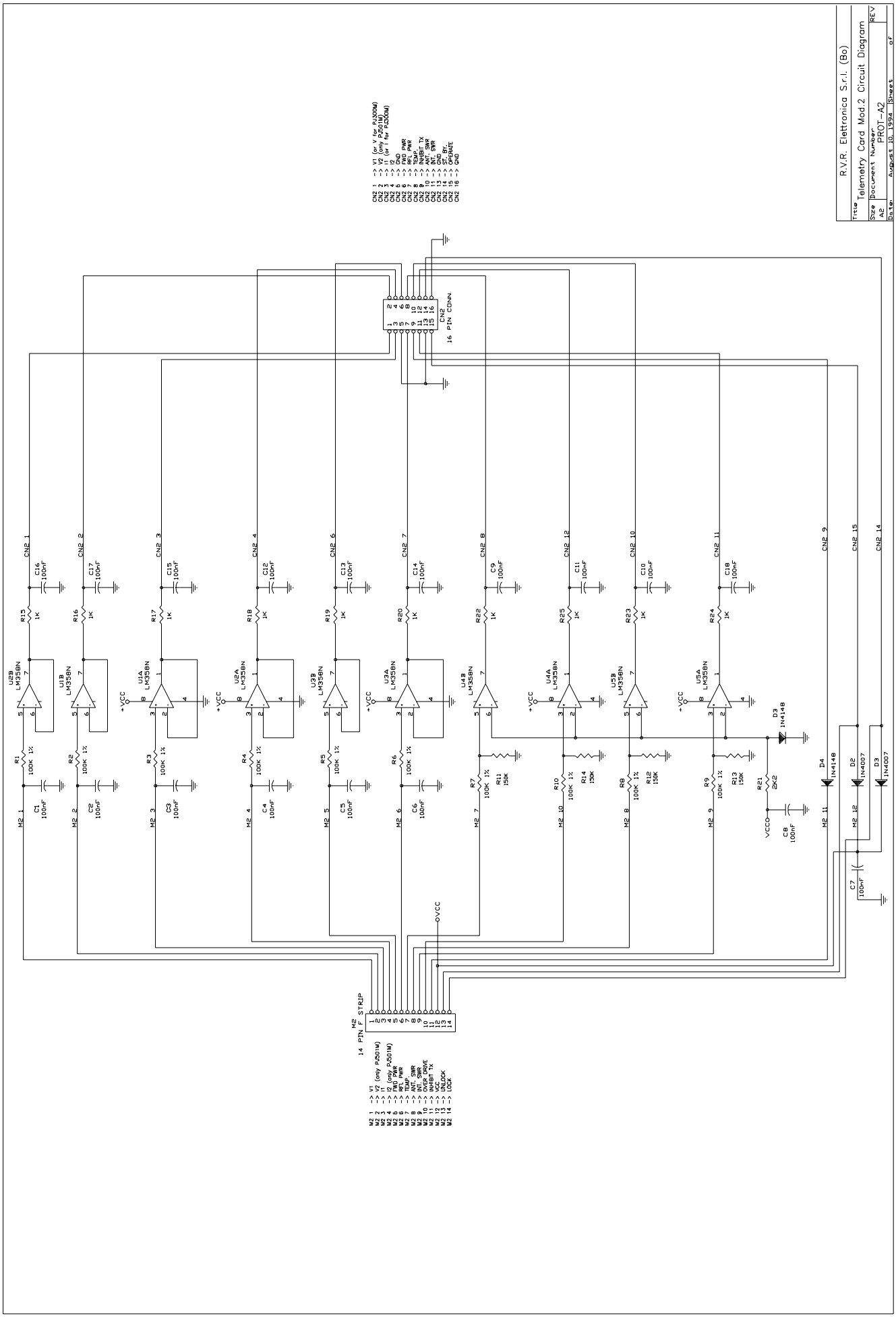


R11 –> FWD PWR (meter reading)
R13 –> RFL PWR (meter reading)
R14 –> Full Scale Reading
R26 –> Over Drive Threeshold
R40 –> SWR. INT. Threeshold
R56 –> SWR. ANT. Threeshold

R.V.R. ELETTRONICA	DENOMINAZIONE: Alarms Card Component Layout / Piano di Monatggio
	DISPOSITIVO:
SEMILAVORATO	DISEGNATO: li
MATERIALE	SCALA:
TRATTAMENTO	DISEGNO: TAVOLA n di

TELEMETRY CARD (VERS. PROT-A2)

TELEMETRY CARD (VERS. PROT-A2)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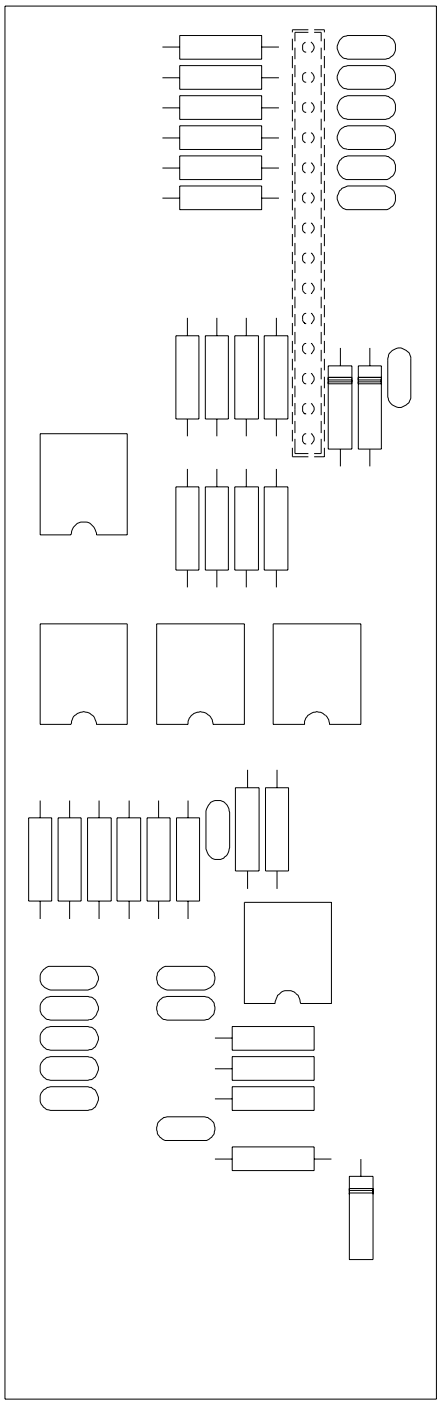
Title Telemetry Card Mod.2 Circuit Diagram
Size A2
Document Number PROT-A2
REV
Date August 10, 1994
Sheet of
CN2 1 -> V1 (only PJ300W)
CN2 2 -> V2 (only PJ501M)
CN2 3 -> I1 (or I for PJ200W)
CN2 4 -> I2
CN2 5 -> GND
CN2 6 -> FWD PWR
CN2 7 -> REF PWR
CN2 8 -> TEMP.
CN2 9 -> ANT. SWR
CN2 10 -> OVER DRIVE
CN2 11 -> MAINBIT TX
CN2 12 -> UNLOCK
CN2 13 -> ST. BY.
CN2 14 -> OPERATE
CN2 15 -> GND
CN2
16 PIN CONN
M2
14 PIN STRIP
+VCC
-VCC
VCC
C1 100nF
C2 100nF
C3 100nF
C4 100nF
C5 100nF
C6 100nF
C7 100nF
C8 100nF
C9 100nF
C10 100nF
C11 100nF
C12 100nF
C13 100nF
C14 100nF
C15 100nF
C16 100nF
C17 100nF
C18 100nF
R1 100K 1%
R2 100K 1%
R3 100K 1%
R4 100K 1%
R5 100K 1%
R6 100K 1%
R7 100K 1%
R8 100K 1%
R9 100K 1%
R10 100K 1%
R11 150K
R12 150K
R13 150K
R14 150K
R15 1K
R16 1K
R17 1K
R18 1K
R19 1K
R20 1K
R21 2K2
R22 1K
R23 1K
R24 1K
R25 1K
U1A LM358N
U1B LM358N
U2A LM358N
U2B LM358N
U3A LM358N
U3B LM358N
U4A LM358N
U4B LM358N
U5A LM358N
U5B LM358N
D1 1N4148
D2 1N4007
D3 1N4007
D4 1N4148

Telemetry Card Mod.2 Bill of Materials/Lista Componenti Pag. 1

Item	Quantity	Reference	Part	Description	Part Order Code
1	10	R15,R16, R17,R18, R19,R20, R22,R23, R24,R25	1K	RESISTOR 1/4W 5%	RSC1/4JK0001
2	1	R21	2K2	RESISTOR 1/4W 5%	RSC1/4JK02,2
3	10	R1,R2,R3, R4,R5,R6, R7,R8,R9, R10	100K 1%	RESISTOR 1/4W 1%	RSM1/4FH0100
4	4	R11,R12 R13,R14	150K 1%	RESISTOR 1/4W 5%	RSM1/4JK0150
5	18	C1,C2,C3, C4,C5,C6, C7,C8,C9, C10,C11, C12,C13, C14,C15, C16,C17, C18	100nF	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, U4,U5	LM358N	DOUBLE OP. AMP.	CILLM358N

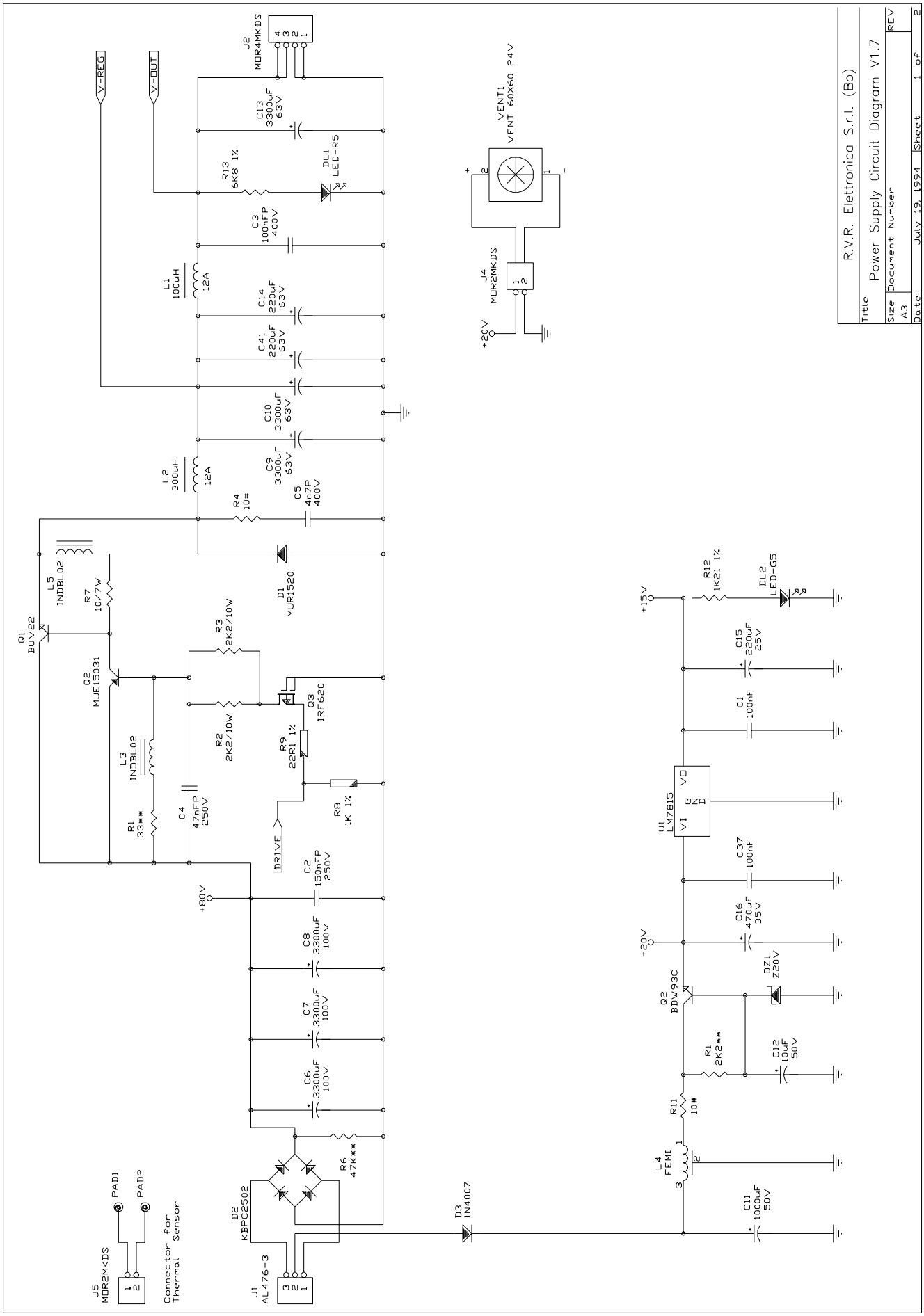


POWER SUPLLY (VERS. 1.7)

POWER SUPPLY

POWER SUPLLY (VERS. 1.7)

POWER SUPPLY

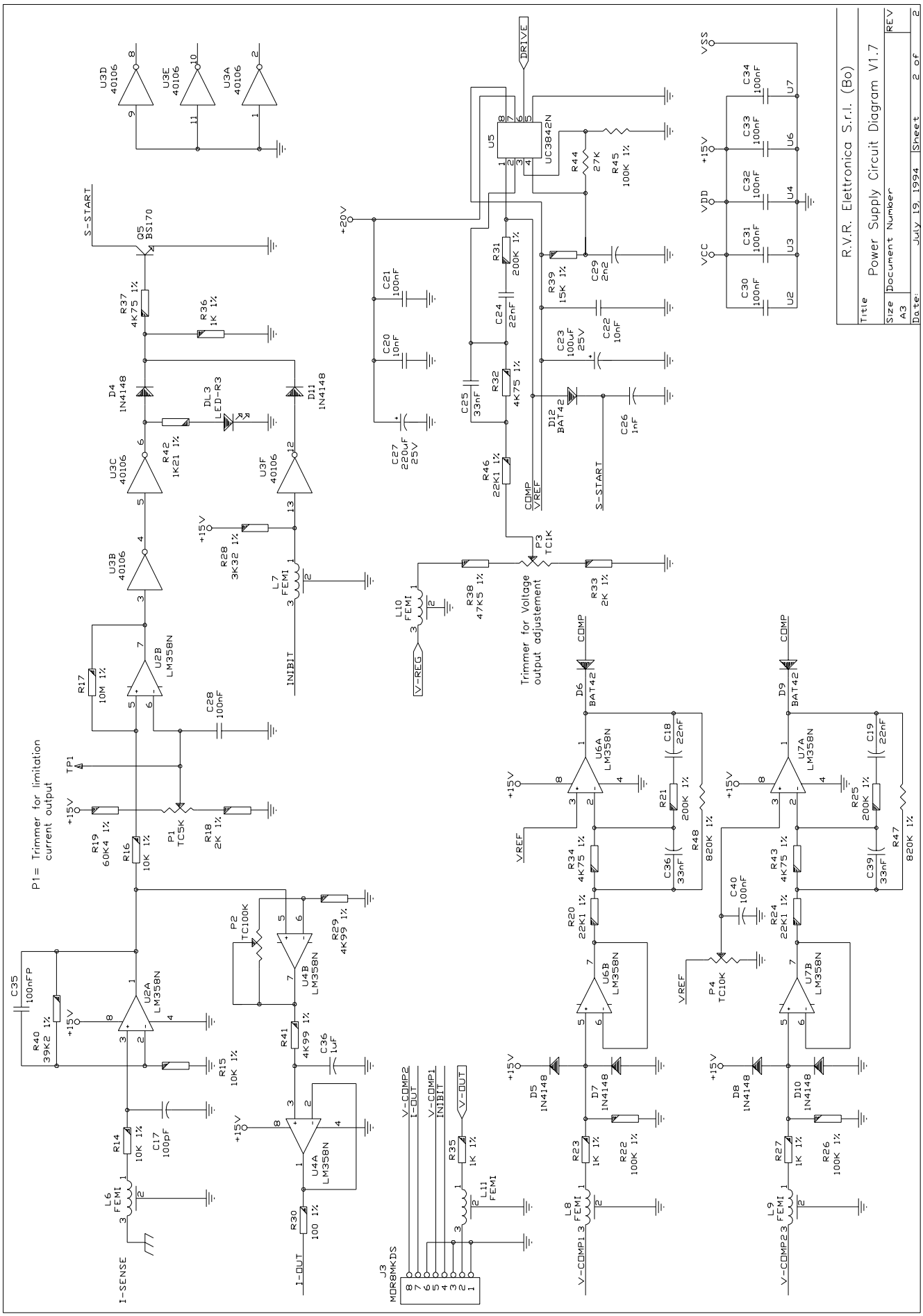

R.V.R. Elettronica S.r.l. (Bo)
Power Supply Circuit Diagram V1.7
Size A3
Document Number
REV
Date: July 19, 1994
Sheet 1 of 2
V-REG
V-OUT
J2 MDR4MKDS
C13 3300uF 63V
DL1 LED-R5
R13 6K8 1%
C3 100nFP 400V
L1 100uH 12A
C14 220uF 63V
C41 220uF 63V
C10 3300uF 63V
C9 3300uF 63V
L2 300uH 12A
C5 47P 400V
R4 10#
D1 MUR1520
VENT1 VENT 60X60 24V
J4 MDR2MKDS
+20V
L5 INDBL02
R7 10/7W
Q1 BUV22
Q2 MJE15031
R3 2K2/10W
R2 2K2/10W
Q3 IRF620
R9 22R1 1%
L3 INDBL02
R1 33**
C4 47nFP 250V
R8 1K 1%
DRIVE
C2 150nFP 250V
+80V
C8 3300uF 100V
C7 3300uF 100V
C6 3300uF 100V
R6 47K**
D2 KBPC2502
D3 IN4007
J1 AL476-3
J5 MDR2MKDS
PAD1
PAD2
Connector for Thermal Sensor
+15V
R12 1K21 1%
DL2 LED-G5
C15 220uF 25V
C1 100nF
U1 LM7815
VI GND VO
C37 100nF
C16 470uF 35V
+20V
DZ1 220V
Q2 BDW93C
R1 2K2**
C12 10uF 50V
R11 10#
L4 FEMI
C11 1000uF 50V

Power Supply V1.7 Bill of Materials/Lista Componenti Pag. 1

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

Power Supply V1.7 Bill of Materials/Lista Componenti Pag. 2

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 24VDCVTL606024V	
40	2	PAD1,PAD2	N.C.	NOT CONNECTED	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Power Supply Circuit Diagram V1.7
Size
A3
Document Number
REV
Date: July 19, 1994
Sheet 2 of 2
P1= Trimmer for limitation current output
Trimmer for Voltage output adjustement
S-START
DRIVE
I-SENSE
I-OUT
V-REG
INIBIT
COMP
VREF
V-COMP1
V-COMP2
V-COMP23
U5 UC3842N
U2A LM358N
U2B LM358N
U4A LM358N
U4B LM358N
U6A LM358N
U6B LM358N
U7A LM358N
U7B LM358N
U3C 40106
U3D 40106
U3E 40106
U3A 40106
U3B 40106
U3F 40106
Q5 BS170
D4 1N4148
D11 1N4148
DL3 LED-R3
D12 BAT42
D6 BAT42
D9 BAT42
D5 1N4148
D7 1N4148
D8 1N4148
D10 1N4148
L6 FEMI
L7 FEMI
L8 FEMI
L9 FEMI
L10 FEMI
L11 FEMI
J3 MDR8MKDS
P1 TC5K
P2 TC100K
P3 TC1K
P4 TC10K
TP1
R16 10K 1%
R17 10M 1%
R18 2K 1%
R19 60K4 1%
R20 22K1 1%
R21 200K 1%
R22 100K 1%
R23 1K 1%
R24 22K1 1%
R25 200K 1%
R26 100K 1%
R27 1K 1%
R28 3K32 1%
R29 4K99 1%
R30 100 1%
R31 200K 1%
R32 4K75 1%
R33 2K 1%
R34 4K75 1%
R35 1K 1%
R36 1K 1%
R37 4K75 1%
R38 47K5 1%
R39 15K 1%
R40 39K2 1%
R41 4K99 1%
R42 1K21 1%
R43 4K75 1%
R44 27K
R45 100K 1%
R46 22K1 1%
R47 820K 1%
R48 820K 1%
R14 10K 1%
R15 10K 1%
C17 100pF
C18 22nF
C19 22nF
C20 10nF
C21 100nF
C22 10nF
C23 100uF 25V
C24 22nF
C25 33nF
C26 1nF
C27 220uF 25V
C28 100nF
C29 2n2
C30 100nF
C31 100nF
C32 100nF
C33 100nF
C34 100nF
C35 100nFP
C36 1uF
C36 33nF
C39 33nF
C40 100nF
+15V
+20V
VDD
VCC
VSS

Power Supply V1.7 Bill of Materials/Lista Componenti Pag. 1

Item	Quantity	Reference	Part	Description	Part Order Code
1	1	R30	100 1%	RESISTOR 1/4W 1%	RSM1/4FH0100
2	4	R23,R27, R35,R36	1K 1%	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, R37,R43	4K75 1%	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

Power Supply V1.7 Bill of Materials/Lista Componenti Pag. 2

Item	Quantity	Reference	Part	Description	Part Order Code
29	8	C21,C28, C30,C31, C32,C33, C34,C40	100nF	CERAMIC CAPACITOR	CKM104BK600P
30	1	C35	100nFP	POLIESTER 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, L9,L10,L11	FEMI	FILTRO EMI MURATA	FEAY5S223500
35	1	J3	MOR8MKDS	MORS. 8MKDS PHOENIX	MORS8MKDS
36	6	D4,D5,D7, D8,D10,D11	1N4148	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

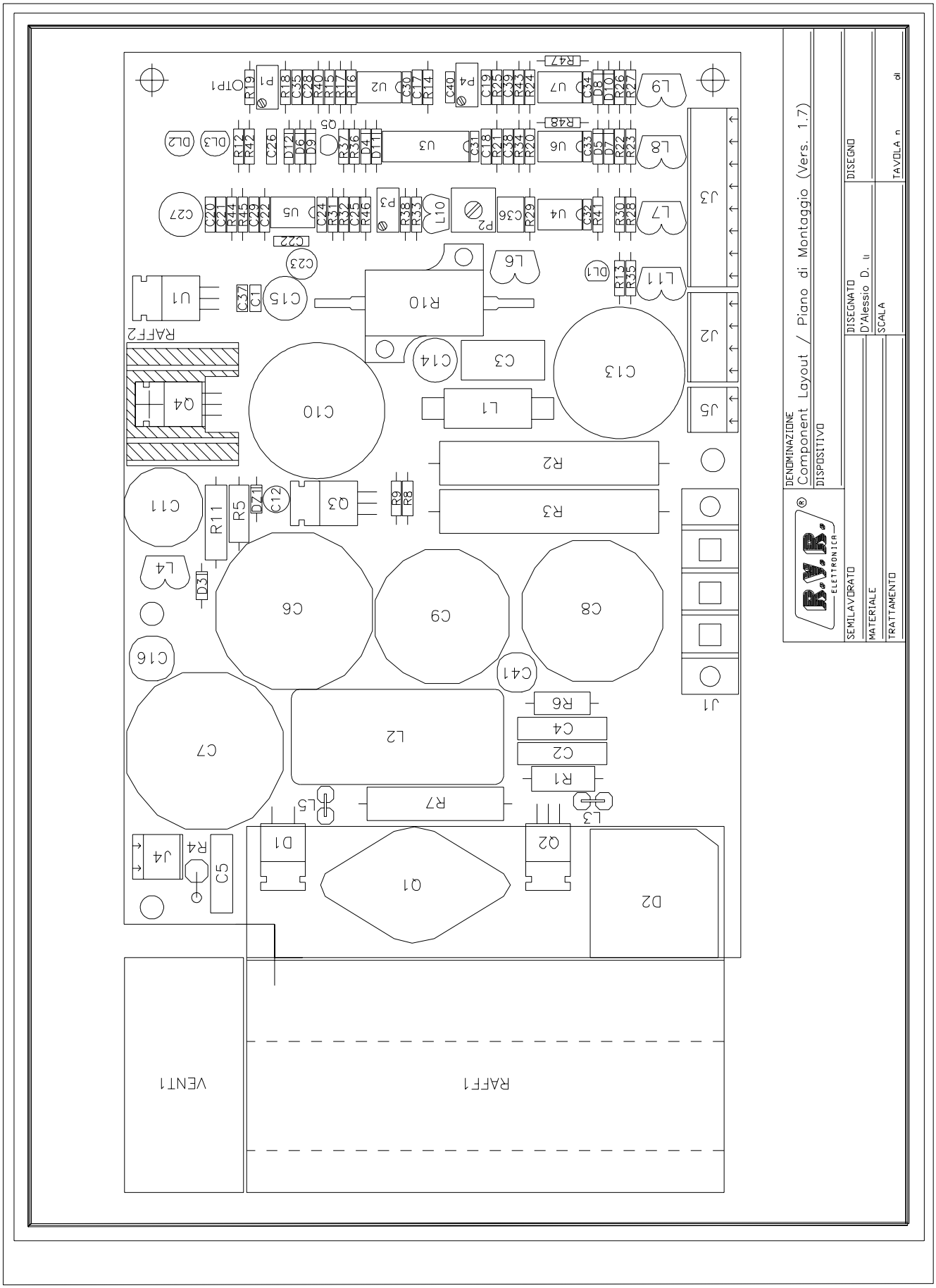
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TAVOLA n
SEMILAVORATO
MATERIALE
TRATTAMENTO
R.V.R.
ELETTRONICA
RAFF1
RAFF2
VENT1
J1
J2
J3
J4
J5
Q1
Q2
Q3
Q4
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D2
U1
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R48
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P2
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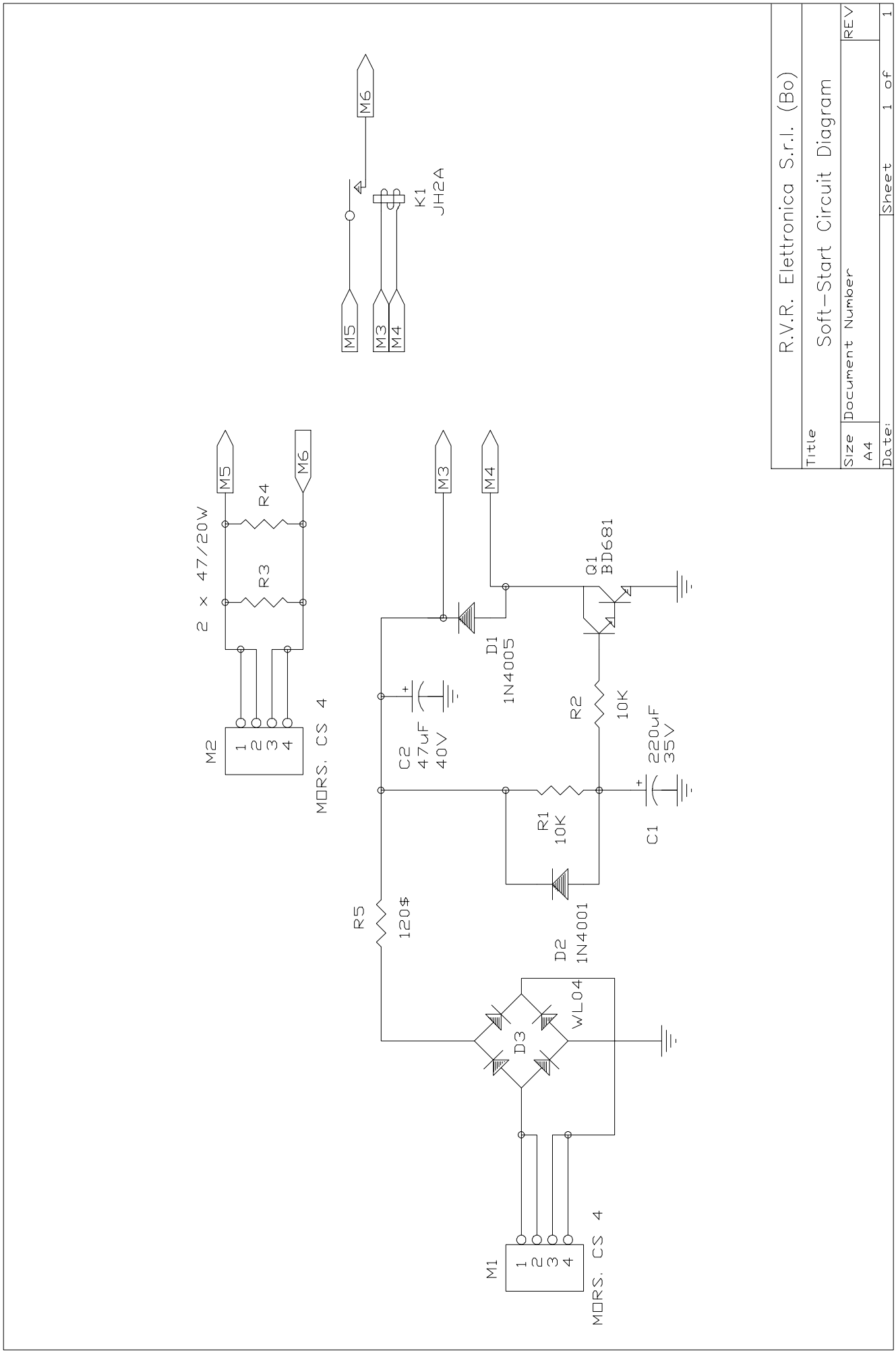
DL1
DL2
DL3
OTP1
Q5

SOFT START CARD

SOFT START CARD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Size
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REV
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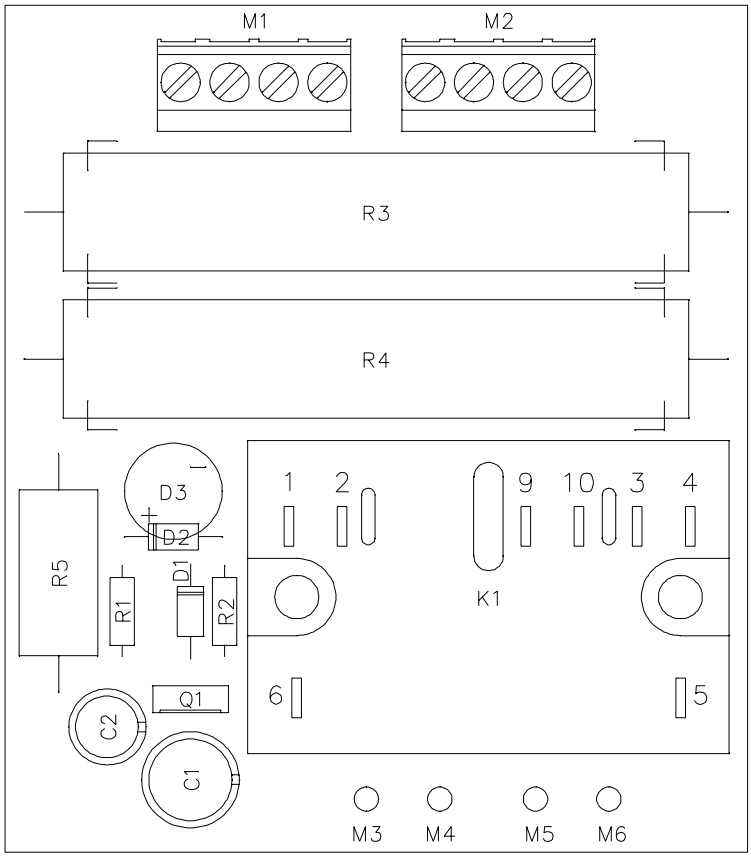
K1
JH2A
M5
M3
M4
M5
R4
M6
2 x 47/20W
R3
M3
M4
Q1
BD681
D1
1N4005
M2
1
2
3
4
MORS. CS 4
C2
47uF
40V
R2
10K
220uF
35V
R1
10K
C1
R5
120$
D2
1N4001
D3
WL04
M1
1
2
3
4
MORS. CS 4

Soft-Start Card Bill of Materials/Lista Componenti Pag. 1

Item	Quantity	Reference	Part	Description	Part Order Code
1	2	R3,R4	47/20W	RESISTOR 20W 10%	RAF020KH0047
2	1	R5	120$	RESISTOR 5W	RSC005JH0120
3	2	R1,R2	10K	RESISTOR 1/4W 5%	RSC1/4JK0010
4	1	C2	47µF	ELECTROLYTIC CAPACITOR	CEA476BM630
5	1	C1	220µF	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



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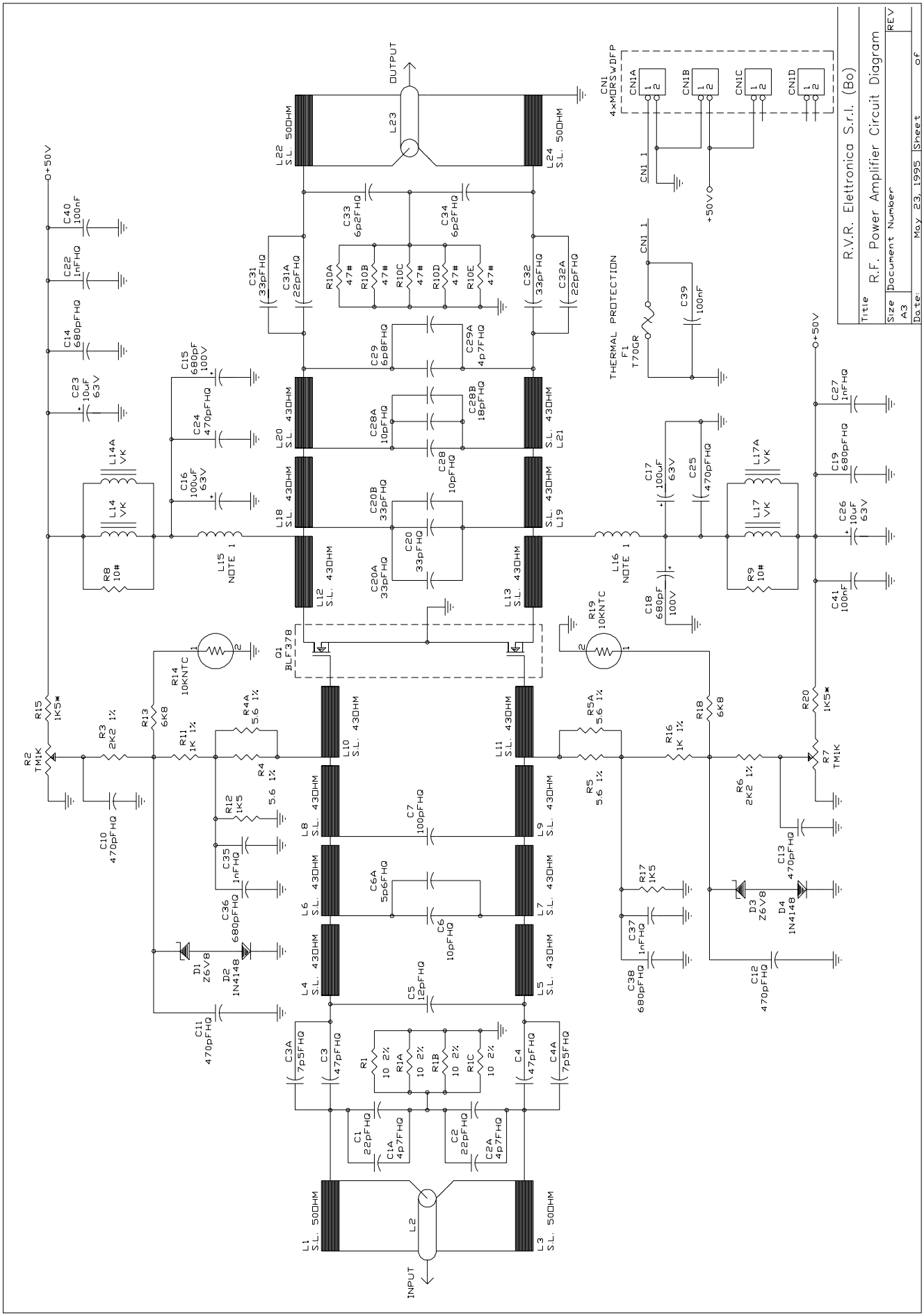
SEMILAVORATO	DISEGNATO: li	DISEGNO
MATERIALE	SCALA	
TRATTAMENTO		TAVOLA n di

R.F. POWER AMPLIFIER

R.F. POWER AMPLIFIER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R.F. Power Amplifier Circuit Diagram
Size A3
Document Number
REV
Date: May 23, 1995
Sheet
of
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OUTPUT
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THERMAL PROTECTION
F1 T70GR
CN1 4xMORSWDFP
Q1 BLF378
L1 SL. 50OHM
L2
L3 SL. 50OHM
L4 SL. 43OHM
L5 SL. 43OHM
L6 SL. 43OHM
L7 SL. 43OHM
L8 SL. 43OHM
L9 SL. 43OHM
L10 SL. 43OHM
L11 SL. 43OHM
L12 SL. 43OHM
L13 SL. 43OHM
L18 SL. 43OHM
L19 SL. 43OHM
L20 SL. 43OHM
L21 SL. 43OHM
L22 SL. 50OHM
L23
L24 SL. 50OHM
L14 VK
L14A VK
L15 NOTE 1
L16 NOTE 1
L17 VK
L17A VK
R1 10 2%
R1A 10 2%
R1B 10 2%
R1C 10 2%
R2 TM1K
R3 2K2 1%
R4 5.6 1%
R4A 5.6 1%
R5 5.6 1%
R5A 5.6 1%
R6 2K2 1%
R7 TM1K
R8 10#
R9 10#
R10A 47#
R10B 47#
R10C 47#
R10D 47#
R10E 47#
R11 1K 1%
R12 1K5
R13 6K8
R14 10KNTC
R15 1K5*
R16 1K 1%
R17 1K5
R18 6K8
R19 10KNTC
R20 1K5*
C1 22pFHQ
C1A 4p7FHQ
C2 22pFHQ
C2A 4p7FHQ
C3 47pFHQ
C3A 7p5FHQ
C4 47pFHQ
C4A 7p5FHQ
C5 12pFHQ
C6 10pFHQ
C6A 5p6FHQ
C7 100pFHQ
C10 470pFHQ
C11 470pFHQ
C12 470pFHQ
C13 470pFHQ
C14 680pFHQ
C15 680pF 100V
C16 100uF 63V
C17 100uF 63V
C18 680pF 100V
C19 680pFHQ
C20 33pFHQ
C20A 33pFHQ
C20B 33pFHQ
C22 1nFHQ
C23 10uF 63V
C24 470pFHQ
C25 470pFHQ
C26 10uF 63V
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C28A 10pFHQ
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C31 33pFHQ
C31A 22pFHQ
C32 33pFHQ
C32A 22pFHQ
C33 6p2FHQ
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C36 680pFHQ
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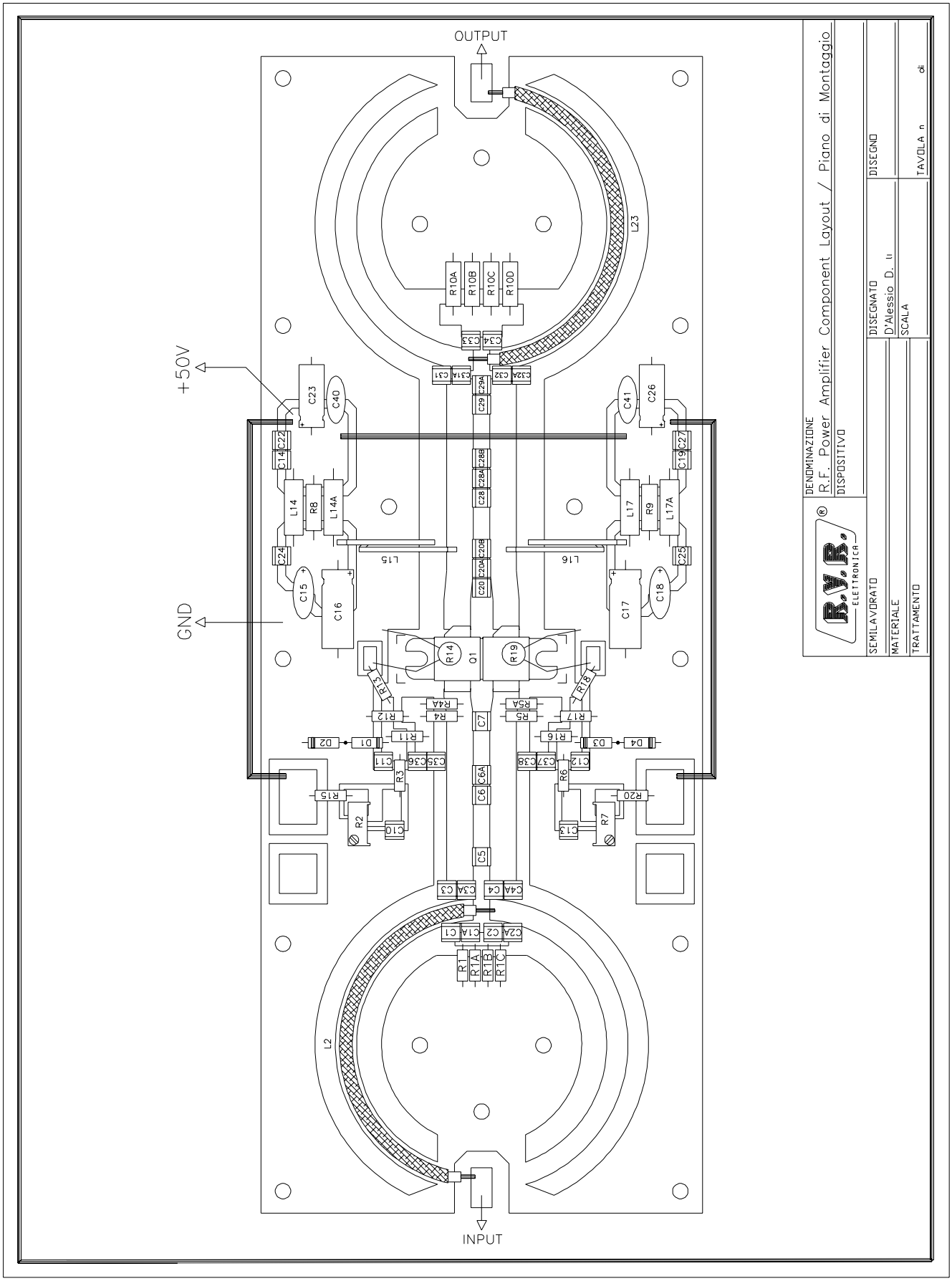
C39 100nF
C40 100nF
C41 100nF
D1 Z6V8
D2 1N4148
D3 Z6V8
D4 1N4148

R.F. Power Amplfier Bill of Materials/Lista Componenti Pag. 1

Item	Quantity	Reference	Part	Description	Part Order Code
1	4	R4A,R4,R5A, R5	5.6 1%	RESISTOR 1/4W 1%	RSM1/4FH05,6
2	4	R1C,R1B, R1A,R1	10 2%	RESISTOR 1/4W 2%	RSM1/4GH0010
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%	RSM1/4FK0001
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

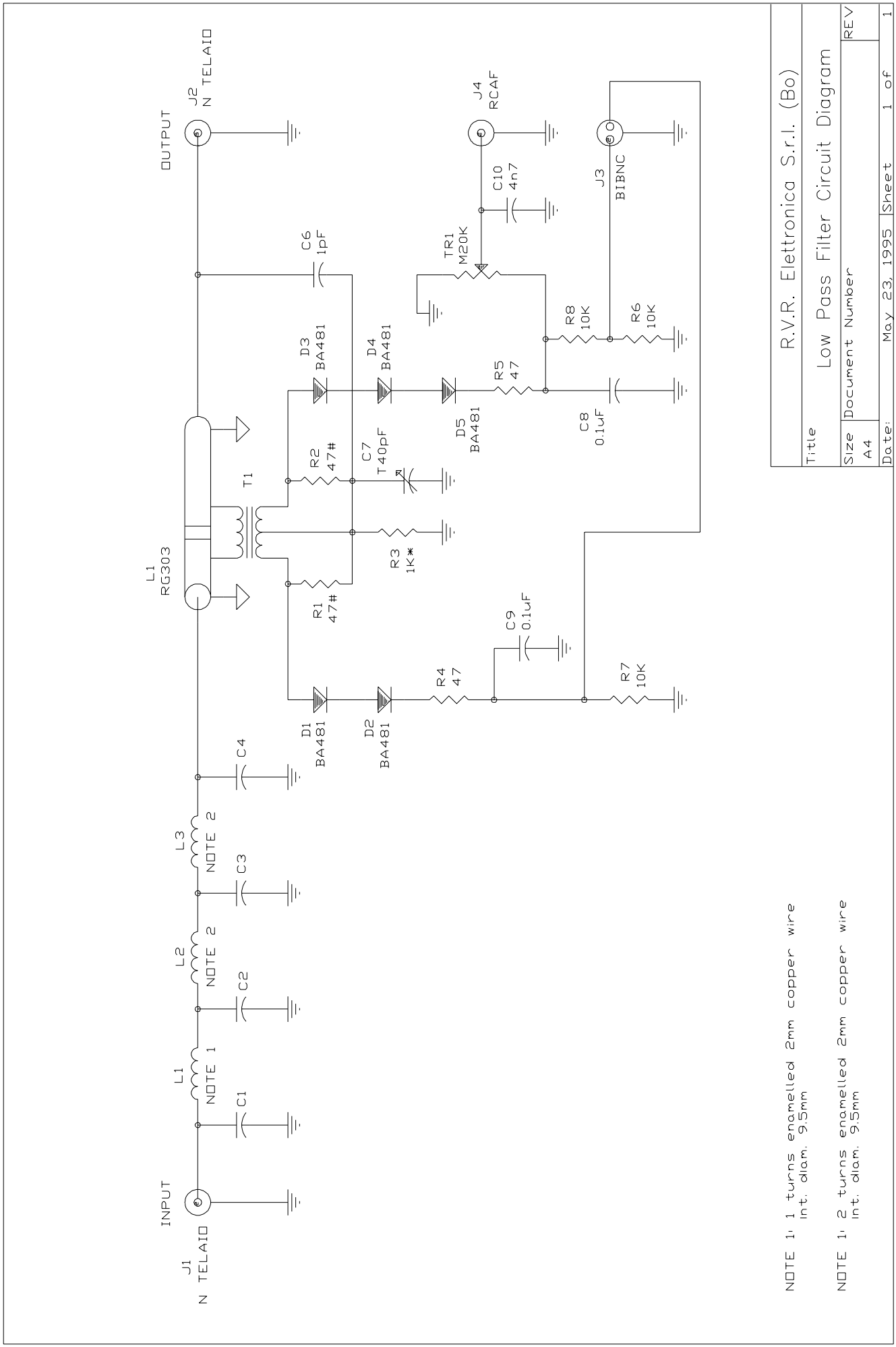
R.F. Power Amplfier Bill of Materials/Lista Componenti Pag. 2

Item	Quantity	Reference	Part	Description	Part Order Code
26	4	C14,C19, C36,C38	680pFHQ	HIGHT Q CAPACITOR	CHQ681AJ500
27	4	C22,C27, C35,C37	1nFHQ	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, L17A,L17	VK	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, L22,L24	S.L. 50 OHM	50 OHM STRIP LINE	
38	14	L4,L5,L6, L7,L8,L9, L10,L11, L12,L13, L18,L19, L20, L21	S.L. 43 OHM	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		


OUTPUT
INPUT
+50V
GND
L23
L2
L15
L16
Q1
R10A
R10B
R10C
R10D
DENOMINAZIONE
R.F. Power Amplifier Component Layout / Piano di Montaggio
DISPOSITIVO
DISEGNATO
D'Alessio D.
DISEGNO
SEMILAVORATO
MATERIALE
SCALA
TRATTAMENTO
TAVOLA n
di

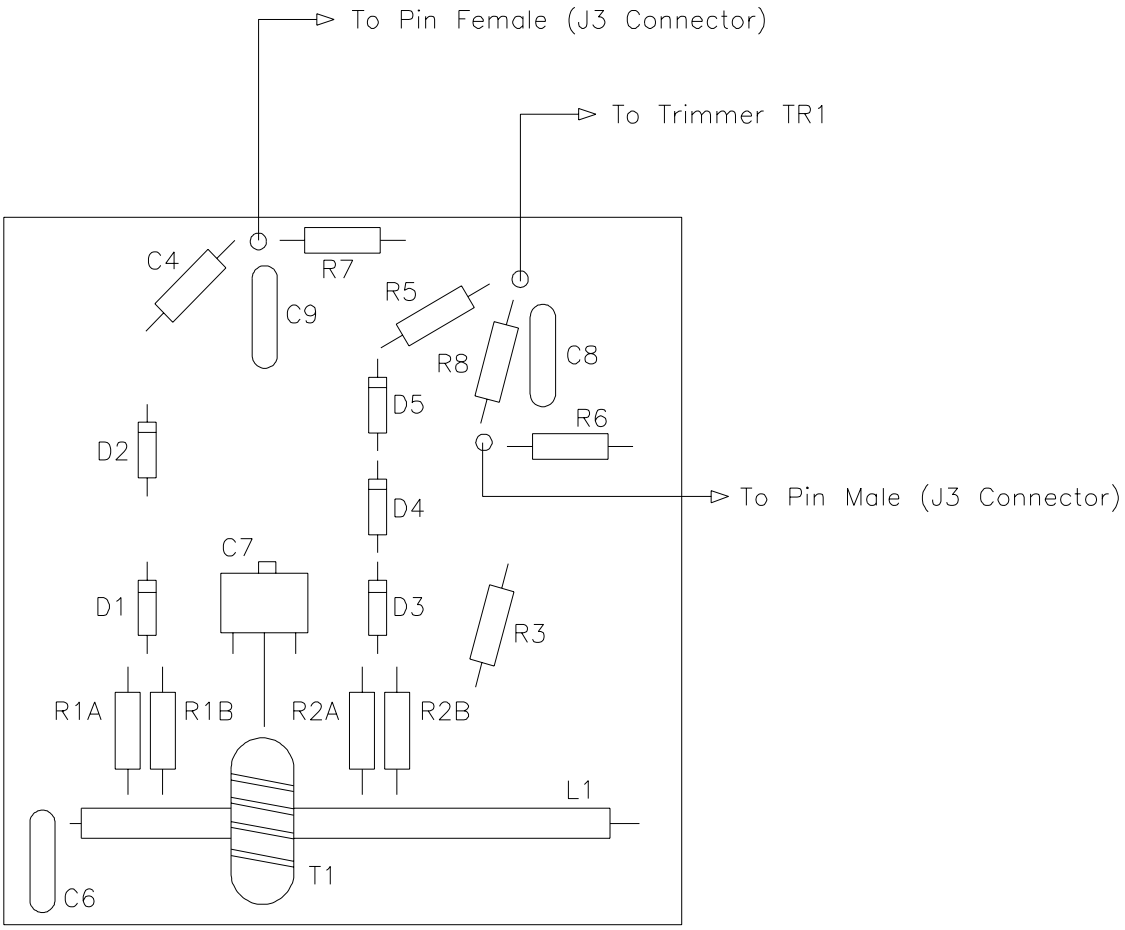
LOW PASS FILTER & DIRECTIONAL COUPLER

LOW PASS FILTER & DIRECTIONAL COUPLER


R.V.R. Elettronica S.r.l. (Bo)
Title
Low Pass Filter Circuit Diagram
Size A4
Document Number
REV
Date: May 23, 1995
Sheet 1 of 1
INPUT
J1 N TELAIO
OUTPUT
J2 N TELAIO
J3 BIBNC
J4 RCAF
L1 RG303
T1
L1 NOTE 1
L2 NOTE 2
L3 NOTE 2
C1
C2
C3
C4
C6 1pF
C7 T40pF
C8 0.1uF
C9 0.1uF
C10 4n7
R1 47#
R2 47#
R3 1K*
R4 47
R5 47
R6 10K
R7 10K
R8 10K
TR1 M20K
D1 BA481
D2 BA481
D3 BA481
D4 BA481
D5 BA481
NOTE 1: 1 turns enamelled 2mm copper wire
Int. diam. 9.5mm
NOTE 1: 2 turns enamelled 2mm copper wire
Int. diam. 9.5mm

Low Pass Filter & Directional Coupler — Bill of Materials/Lista Componenti — Pag. 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	



R.V.R. ELETTRONICA

DENOMINAZIONE
Directional Coupler Component Layout / Piano di Montaggio

DISPOSITIVO

SEMILAVORATO	DISEGNATO D'Alessio D.	DISEGNO
MATERIALE	SCALA	
TRATTAMENTO		TAVOLA n di

Second Edition - May '95
Created By D'Alessio D. & Morotti M.

R.V.R. Elettronica S.r.l. (Bo)
Via del Fonditore 2/2c - 40138 - Bologna (Italy)
National: Phone 051/601.05.06 r.a. Fax 051/601.11.04
International : Phone +39 51-601.05.06 Fax +39 51-601.11.04