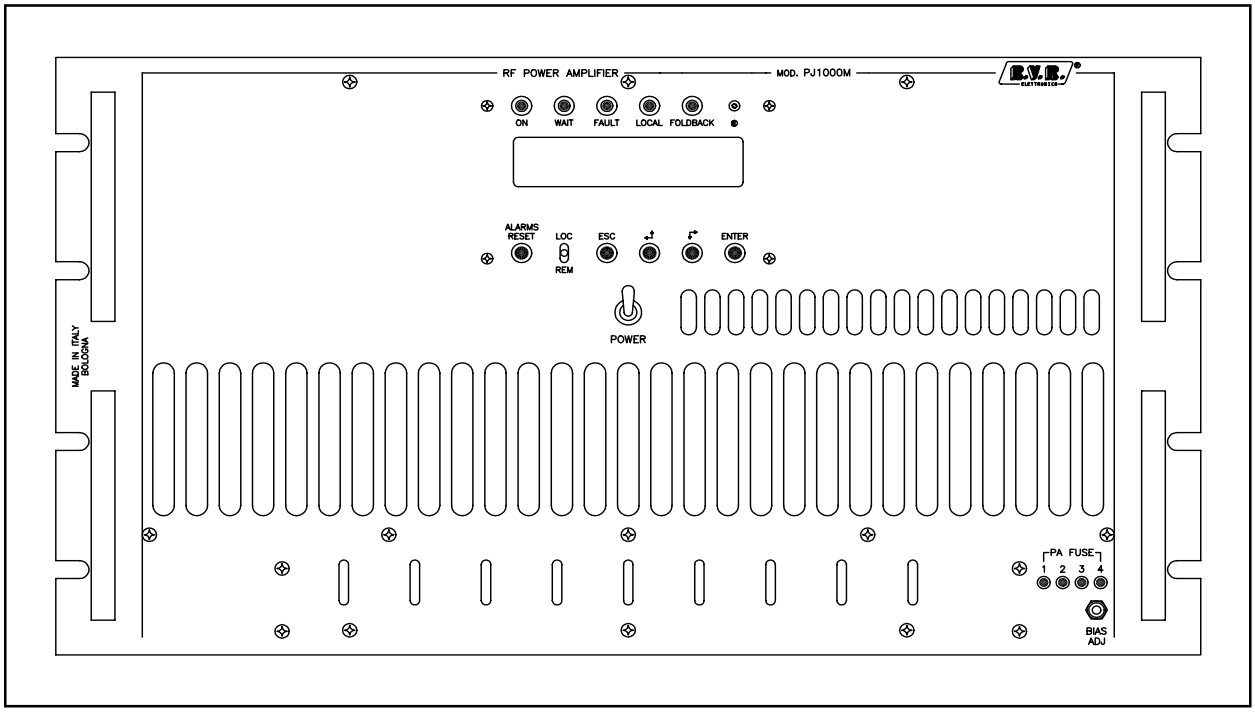
PJ1000M



User Manual

Volume 1

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

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1.2L	18/09/2002	220-380V version Upgrade	J. Berti
1.3L	02/07/2003	Multitension Version Upgrade	J.Berti

PJ1000M - User Manual
Versione 1.3L

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Notification of intended purpose and limitations of product use
This product is a FM transmitter intended for FM audio broadcasting. It utilises operating frequencies not harmonised in the intended countries of use.
The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with.
Limitations of use can apply in respect of operating freuency, transmitter power and/or channel spacing.

Declaration of Conformity
Hereby, R.V.R. Elettronica SpA, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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Table of Content

1. Preliminary instructions

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 rules which should be observed by personnel in using this or other electronic equipment.

The installation, use and maintenance of this piece of equipment involve risks both for the personnel performing them and for the device itself, that shall be used only by trained personnel.

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.

WARNING: 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.

WARNING: This is a "CLASS A" equipment. In a residential place this equipment can cause hash. In this case can be requested to user to take the necessary measures.

R.V.R. Elettronica SpA reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

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2. Warranty

Any product of **R.V.R. Elettronica** is covered by a 12 (twelve) month warranty.

For components like tubes for power amplifiers, the original manufacturer's warranty applies.

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.

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.

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.

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.

a 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 SpA
Via del Fonditore, 2/2c
40138 BOLOGNA
ITALY
Tel. +39 051 6010506

3. First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If victim is not responsive

follow the A-B-C's of basic life support

- Place victim flat on his backon a hard surface.
- Open airway: lift up neck, push forehead back
- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (Figure 2): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible

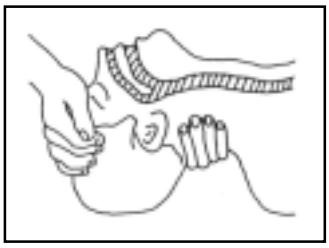


Figure 1

Figure 2

- Check carotid pulse (**Figura 3**); if pulse is absent, begin artificial circulation (**Figura 4**) depressing sternum 1 1/2" TO 2" (**Figure 5**).

Figura 3

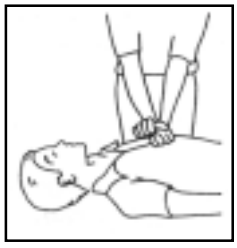


Figura 4

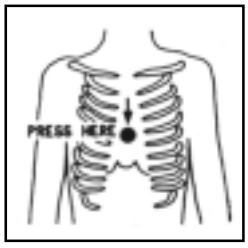


Figura 5

- APPROX. 80 SEC. : ONE RESCUER, 15 COMPRESSIONS
- APPROX. 60 SEC.: TWO RESCUERS, 5 COMPRESSIONS, 1 BREATH
- DO NOT INTERRUPT RHYTHM OF COMPRESSIONS WHEN SECOND PERSON IS GIVING BREATH
- Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

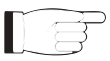
- Keep them warm
- Keep them as quiet as possible
- Loosen their clothing (a reclining position is recommended)
- Call for medical help as soon as possible

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

- Cover area with clean sheet or cloth (Cleansed available cloth article).
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated

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

3.2.2 Less severe burns (1st and 2nd degree)

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

4. General Description

RVR Elettronica's PJ1000M is a 19" Rack-mountable broadband MOSFET RF power amplifier. It works without adjustment on the whole 87.5-108MHZ FM band and its power output is 1000W with a drive level of about 16W.

The RF power section makes use of four modules, able to deliver more than 300W each.

The power supply is a switching mode one and a soft-start circuit is included to minimize the transformer's current spikes when the device is switched on.

The PJ1000M is controlled by a microprocessor system including a LCD display, implementing the following functions:

- measurement and display of the amplifier's working parameters
- activation and deactivation of the RF power output
- protection of the amplifier against dangerous sistuations like exceeding output power or SWR, overdrive or overtemperature
- detection of user-settable attention thresholds (e.g. output power being below a certain value), that are made externally available using the "telemetry" connector
- communication with external devices

The amplifier gives the option for an external 24 V dc power supply: this will automatically be used to supply the CPU section in case the mains power goes off, allowing to interact with the device even in such case.

The user can navigate through the menu system using four buttons, ESC, move LEFT/UP, move RIGHT/DOWN and ENTER. Another button is used to reset the alarms that possibly arose.

Five LEDs on the front panel of the amplifier show the current status of the machine: ON/OFF, WAIT, FAULT, LOCAL and FOLDBACK

A switch allows to select the LOCAL or REMOTE mode. LOCAL mode permits to control the machine using the buttons on the front panel, while remote control (that is using the telemetry connector) is disabled. In REMOTE mode, the buttons on the panel can be used only to read the parameters, but they can be changed only remotely.

Different working parameters are made available for the user on the telemetry connector, as voltage levels that are proportional to the value of the parameter under consideration.

A built-in low-pass filter keeps the harmonic emission level below the CCIR and FCC permitted levels.

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5. Installation and Use

This chapter is intended to summarize the necessary points for the installation of the device. In case any of the arguments is unclear, for example when you use the amplifier for the first time, please read carefully the whole manual.

5.1 Preparation

Unpack the amplifier and before any other operation check that all the controls and connectors on the front and rear panel are in good conditions.

Check the mains voltage selector on the rear panel: the position of the jumpers to chose between 220 V o 110 V is indicated on the panel.

Check also the presence and integity of the fuses. The required value for the 220/ 110 V version fuses are:

- PS 1, PS 2 2 x 25 A 10X38
- AC Line 16 A 10X38
- Service 10 A 6,3X32
- Aux 4 A 6,3X32

Verify that the mains switch is in the OFF positon.

Connect to the RF Input the RF Output of a suitable exciter (for example the RVR Elettronica's PTX30) using a N-connectors terminated cable; the exciter shall be set for minimum power and OFF.

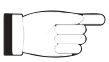
Link one of the Alarms/Interlock connectors of the PJ1000M to the Interlock connector of the exciter, if available (it is in RVR Elettronica's exciters).

Connect the RF output to the antenna cable or to a suitable dummy load.

Finally, connect a proper cable to the amplifier's mains input.
ATTENTION: the cable has to be disconnected from the mains outlet!

After the cable has been safely connected to the amplifier's mains plug, it is possible to plug it into the mains outlet.

It is essential that the unit is properly installed in a Rack that contains a anti-strap device to ensure that mains conductors are not exposed accidentally.



ATTENTION: It is essential that the unit is properly earthed to ensure both the safety of operaton as well as the correct working of the equipment.

5.2 Operation

Switch ON the amplifier and verify the green “ON” LED being it.

Switch the exciter on (to minimum power level) and wait for it to lock on the working frequency. When the locked condition is reached, progressively increase its output power, while controlling the amplifier's display. Keep increasing the exciter output until the amplifier reaches the desired level, at most 1000W. (Please note that, as result of the digitalization of measurements, it could happen that the displayed value is not exactly 1000W, but a value comprised between 995 and 1005; this is perfectly normal.)

At this point, it is possible for the user to verify all the working parameters of the amplifier using the management software.

Normally, the device doesn’t require any human supervision for its normal operation. If any alarm condition arise, these are automatically managed by the embedded protection system, and notified to the user with the LEDs on the panel or via messages on the LCD display.

5.3 Software

This chapter describes the way the microprocessor system controls the amplifier, and how the user can interact with it.

Please note that the user can give commands to the device only when it's set in LOCAL mode using the switch. Otherwise, the user will only be allowed to read the parameters, but not to change any of them.

The flow diagram in figure 3 gives an overall view of the user interface of the software.

At power on, the LCD display will show the following presentation screen, with the name of the device and the indication of the switch-on power limiter device called Soft Start:

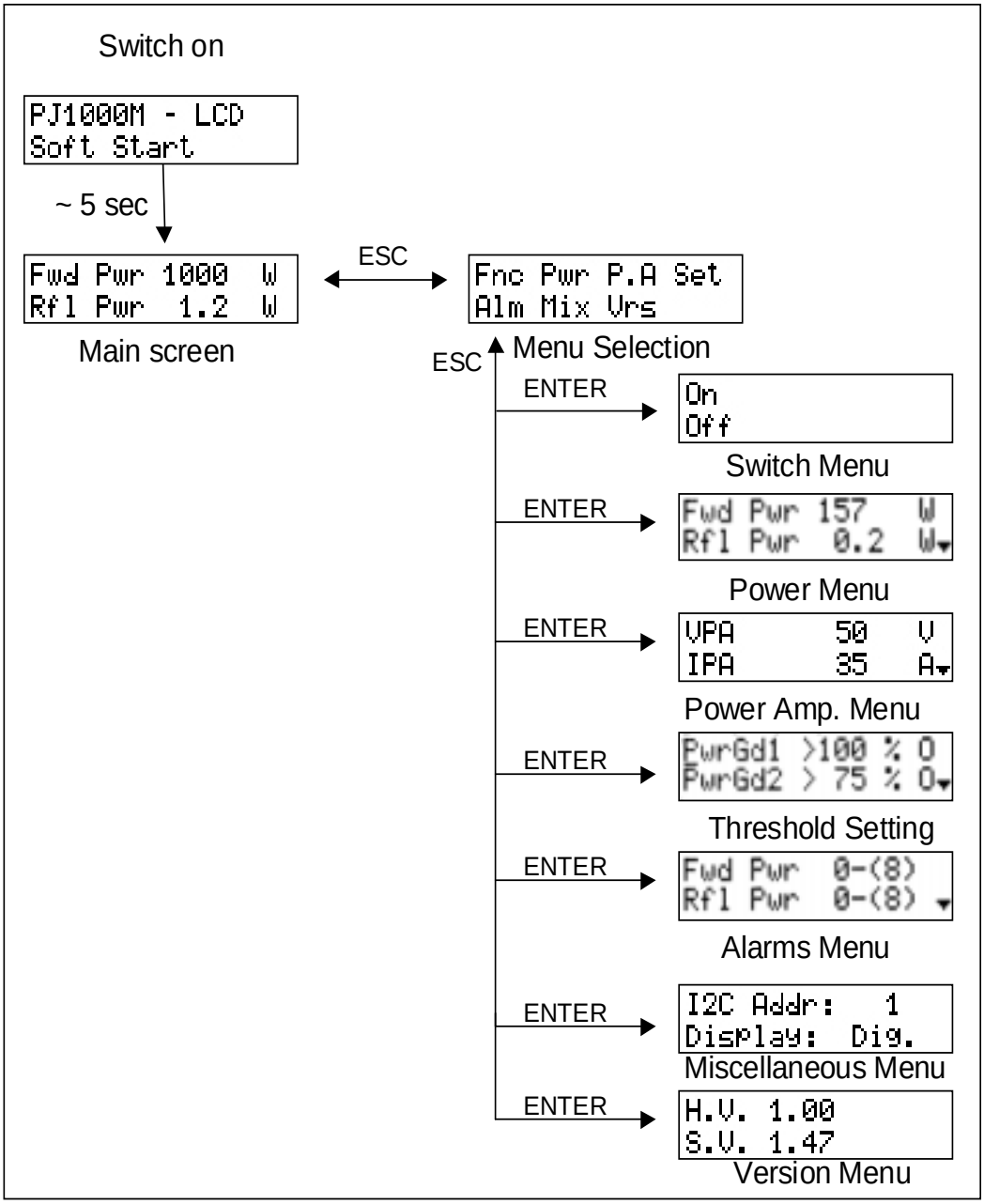
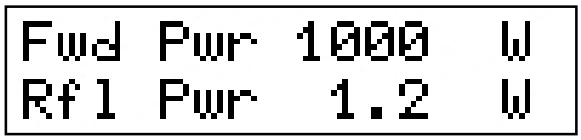
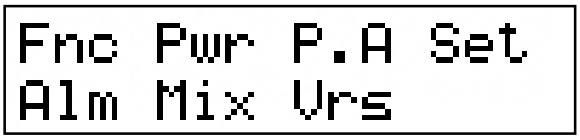


Figure 3 - Flow diagram of the software

After a few seconds, the main screen will be displayed, reporting the values of forward power and reflected power:



Pushing the ESC button, the user will be presented with the menu selection screen, from which the other screens can be accessed:



To enter into another menu, just select the corresponding name (that will be indicated by a blinking underscore) with the LEFT and RIGHT buttons, and then push ENTER.

Note that some of the parameters that are measured and can be read may be, in some circumstances, not available. This situation arises when, for physical reasons, the measured values are not significant to be used in the control software.

When the value for a parameter is not available for such reasons, it's substituted with the symbol “==”.

5.3.1 RF Power switch menu (Fnc)

From this screen the user can switch on and off the power amplifier.

When the amplifier is set in the OFF state, the inner conductor of the INTERLOCK connector will be grounded to force the exciter in stand-by mode(if it is fitted with such an option, as RVR exciters are, and if the devices are correctly linked). At the same time, the auxiliary AC power output circuit is opened to shut off the exciter if it is connected to this plug.

A few seconds after the amplifier is set in OFF mode, the software sends a signal to the relays of the blowers to turn them off too (the delay allows for the proper cooling of the amplifier).

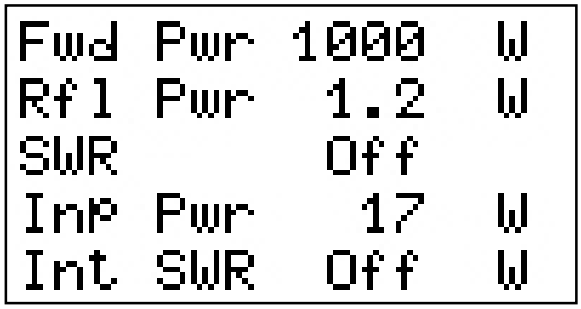
5.3.2 Power menu (Pwr)

In this multi-line scrollable screen it is possible to read all the measurements related to the status of the power section of the amplifier:

- Forward Power (Fwd Pwr)
- Reflected Power (Rfl Pwr)
- Standing Wave Ratio (SWR)
- Input Power (Inp Pwr)
- Internal SWR (Int SWR)

Depending on the configuration, some of the measurements can be disabled.

The complete aspect of the screen is the following (please note that only two lines at a time are visible, use the UP and DOWN buttons to scroll):

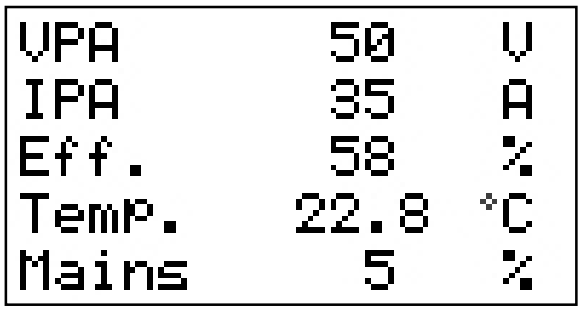


5.3.3 Power Amplifier menu (P.A.)

In this multi-line scrollable screen it is possible to read the values of the parameters related to the RF amplifier section of the device:

- voltage (VPA)
- current (IPA)
- efficiency
- temperature
- mains voltage (Percentage variation referred to nominal voltage)

The complete aspect of the screen is the following (only two lines at a time are visible, use the UP and DOWN buttons to scroll):



5.3.4 Threshold setting menu

As it has been said in the introduction, the amplifier offers a maximum of three user settable alarms. For each of them, one of the working parameters is compared against a threshold value that can be be modified by the user. The results of the comparisons are available as an open collector stastes on an telemetry connector or as dry contacts on the optional external telemetry board, and can be read on the display as "O" (open, i.e. the result is false) or "C" (closed, i.e. the result is true).

Two setteble thresholds (**Pow**e**r G**oo**d**) regard the emitted power level, the third is used to verify the level of reflected power (**Refl**ected **War**ning).

The thresholds are shown as percentage of full-scale value.

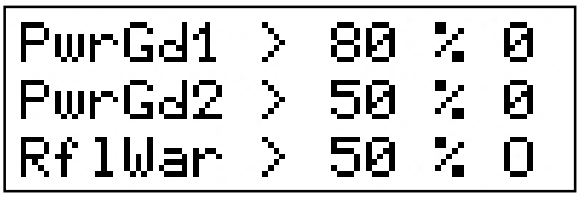
The full-scale value for PJ1000M are:

- Forward Power 1000W
- Reflect Power 100W

It is also possible to change those values executing the following procedure:

- Select the line to modify (UP and DOWN buttons)
- Push the ENTER button
- Modify the value of the threshold (UP and DOWN buttons)
- Push the ENTER button to confirm

The following figure shows an example of configuration for this menu



In this example, the thresholds of the warnings are:

- PwrGd 1 800W (80% X 1000W)
- PwrGd2 500W (50% X 1000W)
- RflWar 50W (50% X 100W)

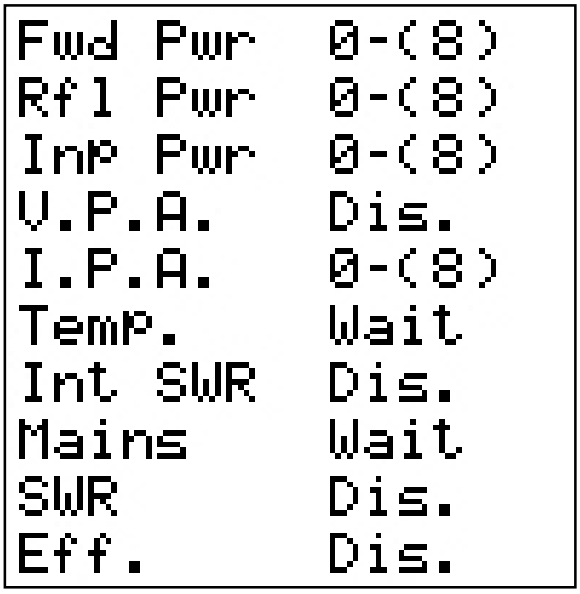
5.3.5 Alarms menu

This screen gives to the user information regarding the status of the protection system included in the amplifier.

It consists in a number of lines, each of wich holds the name of the quantity that is checked by the protection system and the kind of intervention that is undertaken.

The latter can have the values **X - (Y)**, **Wait**, or **Disabled** (see 5.3.8).

The aspect of this multi-line screen is the following (only two lines at a time are visible, use the UP and DOWN buttons to scroll):



This menu mainly represents a diagnostic support for the technician to detect the cause of possible problems in the power amplifier.

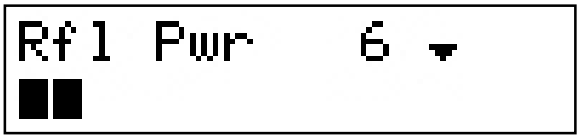
5.3.6 Various menu

This menu permits to effect two operation:

- Setup the address of the I^2C serial bus type connection.
- Setup the kind of visualitation in the default menu.

The address of I^2C communication is fundamental when the amplifier is connected with other RVR devices that use this protocol. It's reccomended to not change this parameter if not necessary.

The visualitation mode can be digital (the default mode described in chapter 5.3) or analogic:

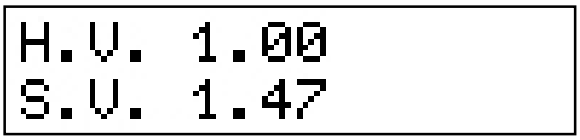


In analogic mode, a little triangole indicates the reflected power level setting in threshold setting menu (RflWar), and the bar below it shows the reflected power in real time.

This kind of visualitation is best used when the amplifier output is connected to a device that needs to be tuned, because the analog representation gives an immediate feedback of the effect of the tuning action.

5.3.7 Version menu

This screen shows the release version of hardware (H.V.) and software (S.V.) of the unit.



5.3.8 Protection system

The protection system implemented by the software is based on two kinds of reaction.

The first reaction is called "Foldback", and consists in lowering the RF power stage voltage in case the forward or reflected power surpass a certain value. In this way, the gain of the amplifier gets smaller, and the overall effect is an opposition to the increase of both the forward and the reflected power. A yellow LED on the front panel signals the intervention of the foldback circuit.

The second kind of reaction consists in shutting off the power stages of the amplifier when a certain quantity exceeds the configured value.

Depending on the kind of problem that caused the failure, after the amplifier has been shut off, it will either be reactivated after a fixed time interval, or only when the impeding condition has been solved. In the Alarm menu, the first kind of configuration is noted by **X - (Y)**, wile the second is indicated with **Wait.** The third possibility is that the configuration of the sistem does not implement any protection based on a certain parameter: this would be noted with **Dis**. (Disabled).

While the amplifier is temporarily shut off for an alarm, the yellow WAIT LED is lit, and the cause of the intervention of the protection system is written on the display.

When the protection intervenes for a parameter of "cyclic" kind, a counter is incremented (the value **X** in the alarm screen). If the value of the counter reaches the maximum admitted value **(Y)**, the amplifier is definitively switched off, and the red LED "fault" on the front panel is lit.

The button ALARMS RESET gives the user the opportunity to interact with the protection system. Its effect is different depending on the status the amplifier is when the button is pushed:

- If the system is off, waiting for the cycle time to be reached, or if it is definitively off in FAULT state, pushing the ALARMS RESET button will immediately turn the

amplifier on and reset the alarm counters

- If the system is transmitting, but some alarm occurred before, so that the alarm counters are not all at "0", pushing the ALARMS RESET button will have no effect unless the button is pushed wile the user is reading the Alarm menu. In this way it is assured that the user doesn't reset the possible alarms without being conscious of them

The alarm counters are reset by the system itself without the need for an external intervention after half an hour of undisturbed (i.e. without alarms) working of the amplifier

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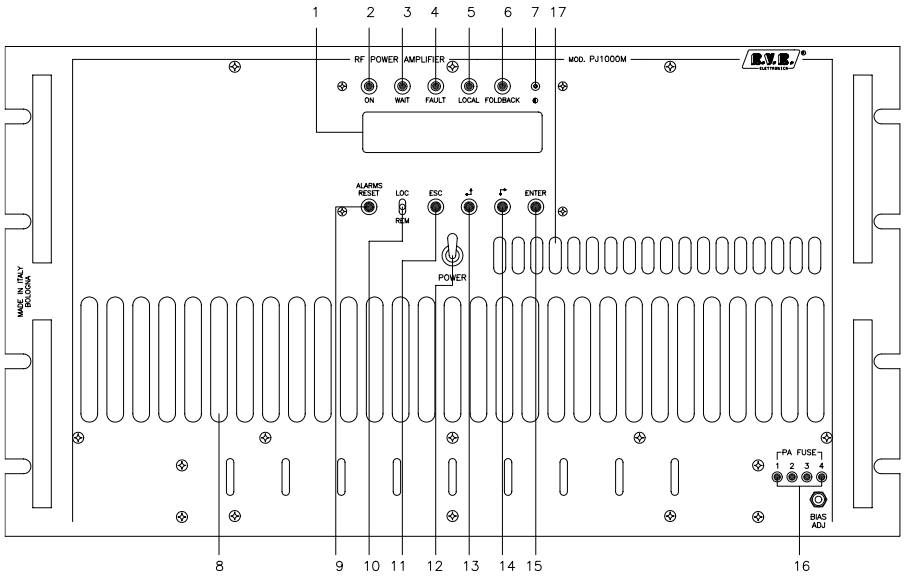
6. Controls, Indicators and Connectors

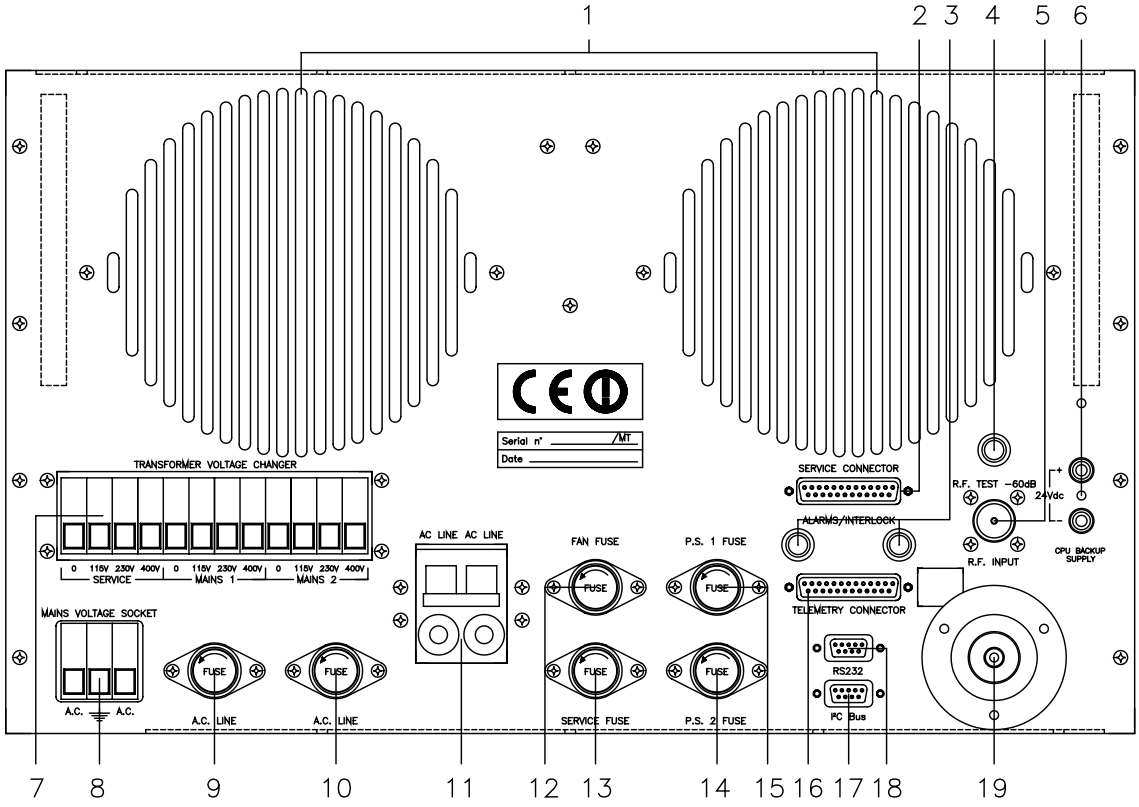
This chapter describes the front and rear panels of the PJ1000M, with a brief indication of all the different components.

6.1 Front Panel



[1]	DISPLAY	LCD display
[2]	ON	Green LED, lit when the amplifier is switched on.
[3]	WAIT	Yellow LED indicating that the amplifier is waiting for a condition that is blocking the power output to be removed
[4]	FAULT	Red LED indicating that a fault that cannot be automatically reverted
[5]	LOCAL	Yellow LED indicating that the amplifier is in local control mode
[6]	FOLDBACK	Yellow LED indicating the intervetion of the foldback function (automatic reduction of the output power)
[7]	BRIGHTNESS	Trimmer to regulate the brightness of the LCD display
[8]	HEAT-SINK	Heat sink
[9]	ALARM RESET	Button used to manually reset the protection system
[10]	LOC/REM	Switch to select the local or remote control modes
[11]	ESC	Button used to exit from a menu
[12]	ON/OFF	Mains Switch
[13]	LEFT/UP	Button used to navigate in the menu system and to modify the changeable parameters
[14]	RIGHT/DOWN	Button used to navigate in the menu system and to modify the changeable parameters
[15]	ENTER	Button used to accept a parameter's value or to enter into a menu
[16]	P.A. PROTECTION	This four LEDs shown the fuse status of each protection modules of the RF power amplifier
[17]	HEAT-SINK	Power amplifier's heat sink

6.2 Rear Panel



[1] FAN — Fan with forced ventilation

[2] SERVICE CONNECTOR
Connector for research all processed parameters of the RF secion

[3] ALARMS/INTERLOCK
BNC connectors to inhibit an external device, as an exciter. In case of fault, the inner connector is shorted to ground

[4] R.F TEST -60dB — -60dB referred to output level

[5] R.F. INPUT — RF input connector (“N” type)

[6] 24 V — External 24V dc power supply input for CPU backup power supply

[7] VOLTAGE CHANGER
Voltage changer:

Voltage	Mains	Service
110 Vac	1-2 / 3-4	5-6 / 7-8
220 Vac	2-3	6-7

[8] MAINS VOLTAGE SOCKET
Mains voltage socket

[9] A.C. LINE FUSE — A.C. protection fuse

[10] A.C. LINE FUSE — A.C. protection fuse

[11] A.C. LINE — Mains switch

[12] FAN FUSE — Fuse protecting the Fan

[13] SERVICE FUSE — Service protection fuse

[14] P.S. 2 FUSE — Protection fuse of power supply 2

[15] P.S. 1 FUSE — Protection fuse of power supply 1

[16] TELEMETRY CONNECTOR
DB25 telemetry connector

[17] I^2C BUS — DB9 connector for I^2C bus networking

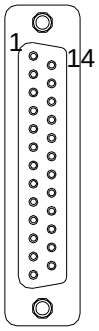
[18] RS232 — DB9 connector to link the amplifier with external devices

[19] R.F. OUTPUT — RF output connector (7/8” EIA flange)

6.3 Connectors description

6.3.1 Telemetry Connector

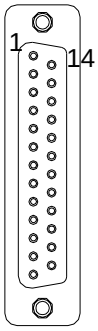
Tipo: DB25 Female



1	Internal SWR	3.9V x 1/2W
2	RF power amplifier voltage	3.9V x 50V
3	GND	GND
4	Reflected power	4.3V x 100W
5	Interlock	
6	Set 4	
7	GND	GND
8	“On” command	
9	Set 1	
10	WAIT	
11	Alarms reset	
12	OFF	
13	Interlock	
14	Temperature	3.9V x 100°
15	RF power amplifier current	3.9V x 50A
16	Forward power	4.3V x 1000W
17	FAULT	
18	Set 3	
19	Input power	3.9V x 20W
20	“OFF” command	
21	GND	GND
22	Set 2	
23	LOC	
24	+Vcc	
25	ON	

6.3.2 Service Connector

Tipo: DB25 female



1	1° RF module voltage	5.0V x 50V
2	3° RF module voltage	5.0V x 50V
3	RF modules wais voltage	5.0V x 50V
4	GND	GND
5	1° RF module current	5.0V x 10A
6	2° RF module current	5.0V x 10A
7	3° RF module current	5.0V x 10A
8	4° RF module current	5.0V x 10A
9	Not used	
10	Not used	
11	Not used	
12	Not used	
13	Not used	
14	2° RF module voltage	5.0V x 50V
15	4° RF module voltage	5.0V x 50V
16	Not used	
17	V gate voltage of the RF module	5.0V x 10V
18	Not Used	
19	RF modules total current	5.0V x 40A
20	GND	GND
21	GND	GND
22	GND	GND
23	Not used	
24	Not used	
25	Not used	

7. Technical Specifications

7.1 Dimensional and Environmental Specifications

Cabinet Dimensions	454.0 mm (17,87”) x 265.0 mm (10,43”) x 507.0 mm (19,98”)
Panel dimensions	483 mm (19”) x 266 mm (10,47”)
Depth	344 mm (26 1/2”)
Weight	PJ1000M 54 Kg
Operating temperature range	-10 °C ÷ 50 °C
Umidity	95% Maximum, without condensation

7.2 Electrical Specifications

A.C. power supply	100-130 V, 50-60 Hz 198-250 V, 50-60 Hz
Cooling system	Forced ventilation, posticipated auto-OFF system in stand-by mode
Frequency range	87.5 MHz ÷ 108 MHz
Output power	1000 W
Drive power	< 20 W for Pout = 1000 W, typical 12 W
Input connector	“N” type standard connector
Input impedance	50 Ohm
Output connector	Standard 7/8” EIA Flange
Output impedance	50 Ohm
Harmonic and spurious soppression	Respect all requirments FCC and CCIR

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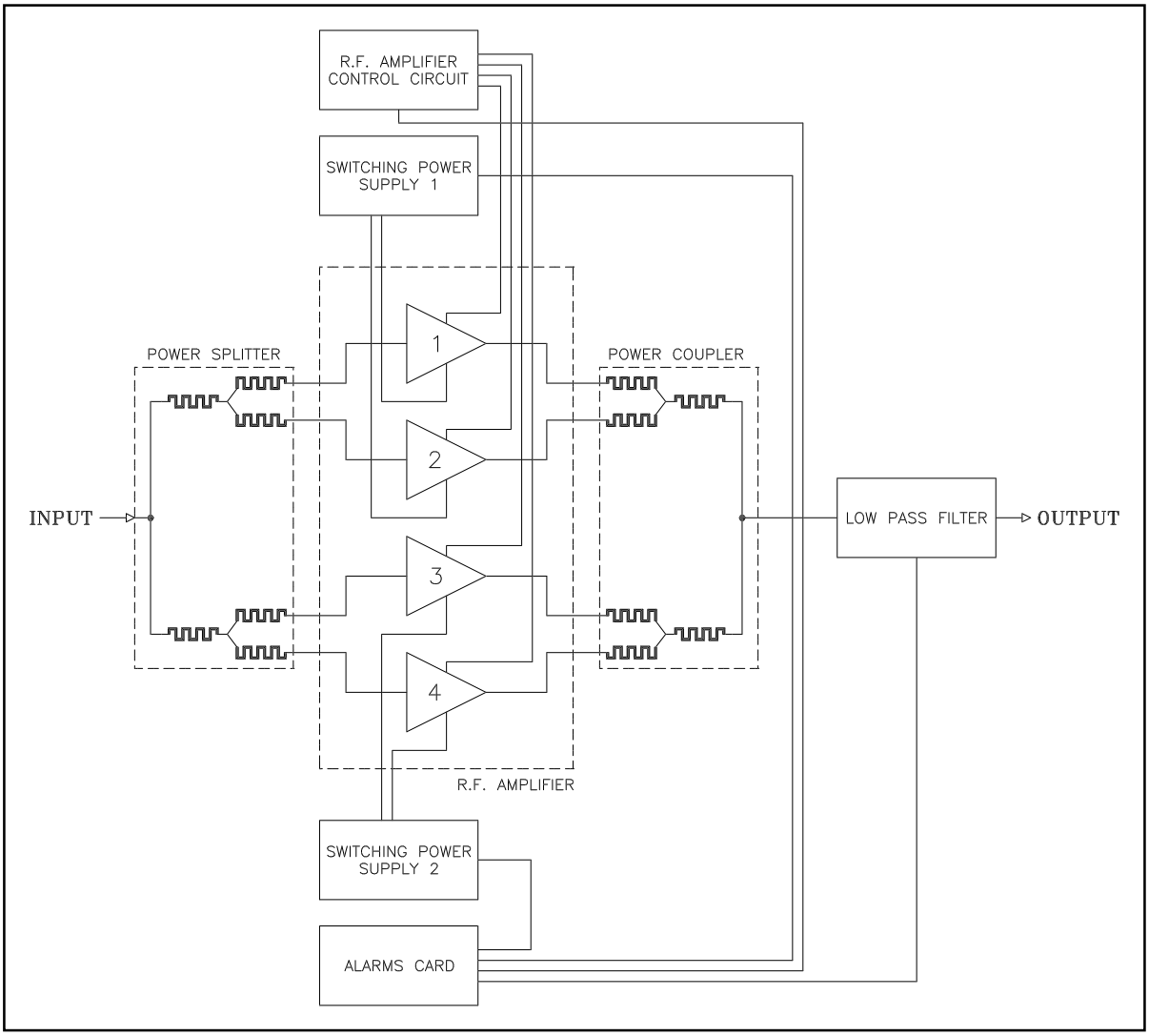
8. Theory of Operation

The figure shows the block diagrams of PJ1000M. The blocks are described in the following chapter:



8.1 Power supply

The PJ1000M contains two main transformers, both with input voltage selectable between 115, 230 and 400 Volt and with secondaries of 61-0-61 V, assigns to the PSSW5040 switching power supply, that generates a stabilized voltage of 50 V for supply the RF power amplifiers modules.

The service transformer have an input voltage of 115, 230, 400 Volt and four secondaries outputs: A) 18-0-18 V, B) 0-11,5 V, C) 0-26 V and D)15-0-15 V that supply the other cards of the PJ1000M.

The machine supply voltage comes externally selected through clevises on clamps, accessible on the rear panel.

The various electronic cards that compose the machine contain the necessary rectifiers and stabilizers for the own supply.

8.2 Soft Start

The soft-start card is a board placed on the left side of the amplifier.

This circuit imposes a resistive load when the amplifier is activated and excludes it after a certain delay. In this way, the current spikes due to the transformer at power-on are reduced.

8.3 RF Power Amplifier

The R.F. power amplifier section is composed of the four power modules coupled with a Wilkinson splitter and combiner realized with "Strip Line Technology".

The four R.F. modules, splitter card and cobiner card are housed in the top side of the equipment.

All R.F. section is mounted on a heat-sink that allows its cooling through forced ventilation.

Each module delivers 300W with 4-6W of drive and is supplied by an switching power supply.

The quiescent parameters of each module are:

VDC=50V Vgs=3.5V Idq=200mA

The active device employed is a Mosfet (BLF278).

8.4 Wilkinson Splitter and Combiner

Both the splitter and the combiner are realized in “Strip-Line technology".

The splitter card is used to split the RF power of the exciter and provide a quarter of it to each of the R.F. Power Amplifier moudules.

The combiner card is then used to combine the output power of the R.F. power amplifier moudules to obtain the total rated power.

These two circuits garantee equal phases of the power of each R.F. power amplifier module. A power resistor placed on each circuit is used to dissipate any power due to unabalancement of the power paths in case of fault of one of the modules.

The splitter also hosts the temperature sensor, that is monitored by the software too.

8.5 Bias Card

This card has the function to control and if necessary to correct the polarization current of each Mosfet of the R.F. section.

It is also able to supply measurements as: currents, voltages for each R.F. amplifier module, total current and average voltage.

8.6 Low-pass Filter

This filter is housed in the right side of the equipment. Its role is to suppress the harmonic components generated by the amplifier below the levels required by regulations.

8.7 Directional Coupler

The function of this circuit is to provide the measurement of the forward and reflected output power.

8.8 CPU

This subsystem is composed by three cards: the CPU card, the display card and the analog section card.

This subsystem implements all the software functions (measurements, protection, control, data display, communications) described in the previous chapters.

8.9 Telemetry connector

The telemetry connector is a DB25 type one placed on the rear panel. This connector provides seven analog outputs, eight open-collector digital outputs and four digital inputs.

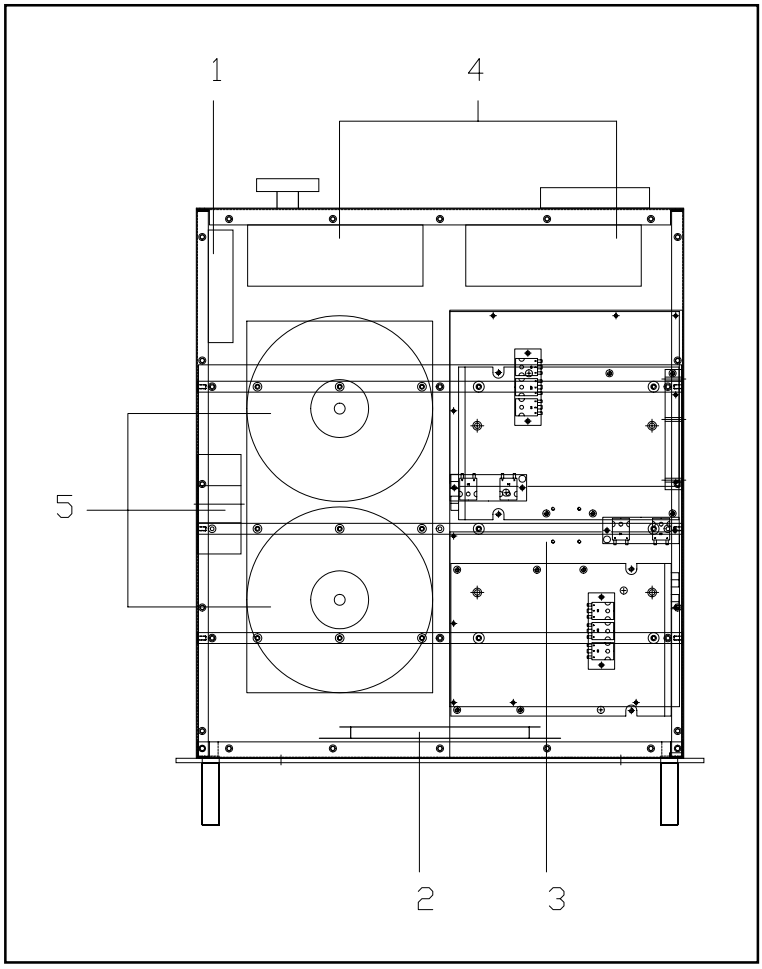
8.10 External telemetry card (optional)

This optional device is designed to interface to the telemetry connector of the PJ1000M, and its main role is to give to the user a number of dry contacts related to the status of the amplifier. The contacts can be configured as normally open or closed, and are triggered by the four user settable thresholds plus LOC/REM, WAIT, FAULT, ON, OFF, INHIBIT.

The analog signals produced by the amplifier are replicated on a DB9 connector.

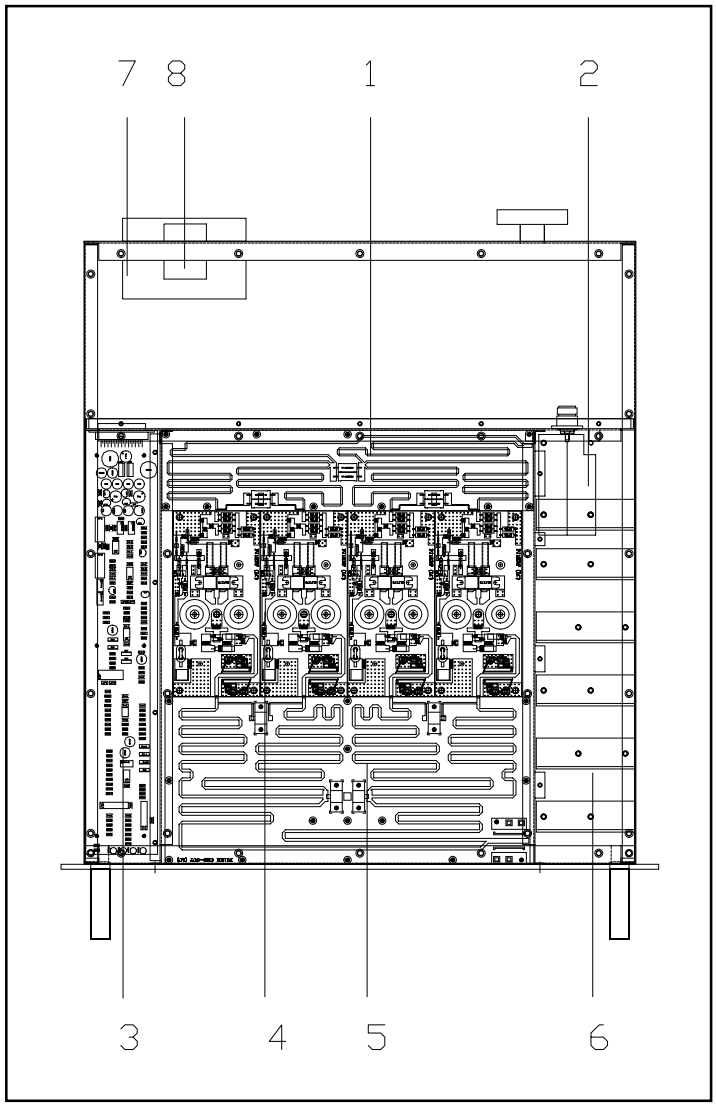
9 Identification and Access to Modules

9.1 Modules Identification (top view)



[1] Soft Start Card
[2] Alarms Card
[3] Power Supply (PSSW5040)
[4] Fans
[5] Transformers

9.2 Modules Identification (bottom view)



[1] Wilkinson Splitter Card
[2] Directional Coupler Card
[3] Bias Card
[4] RF modules of power amplifier
[5] Wilkinson Combiner Card
[6] Low Pass Filter
[7] Voltage changer
[8] Mains voltage box

9.3 Removal of the Modules

ATTENTION: When the amplifier is operated with the cover removed, hazardous voltages and heavy current are accessible. Ensure all primary power is disconnected from the amplifier before attempting equipment maintenance.

To reinstall a module, it is enough to execute the indicated operations in opposite sequence.

Remove all the screws that are located on the top and bottom covers of the machine. After that the covers have been removed, identify, with the help of the chapters 9.1 and 9.2, all amplifier modules.

9.3.1 Power Supply Replacement

- With the help of the wiring diagram included in the Appendix, take note of the cable position inside the terminal boards JP1, JP2, JP3, JP4, JP5, JP7 e JP14.
- Disconnect the external teminal boards loosening just the screws of the connectors mounted on the board.
- Remove the nine screws that fix the power supply to the heat sink.
- Carefully remove the power supply.

9.3.2 R.F. Power Amplifier Module Replacement

- With the help of the wiring diagram included in the Appendix, take note of the wiring.
- Disconnect all wires (supply, gain control, input RF and output RF).
- Remove the five screws that fix the RF power amplifier Module to the heat sink.
- Carefully remove the RF power amplifier.

9.3.3 Wilkinson Splitter Card Replacement

- Unsolder the wire that connect the input of the splitter to RF input connector of RF section
- Unsolder the wires that connect the input and output of the splitter to the other devices.
- Unsolder the four wires that connect the four outputs of the splitter to the inputs of RF power amplifier modules.
- Remove the ten screws that fix the card to the heat sink.
- Carefully extract the card.

9.3.4 Wilkinson Combiner Card Replacement

- Unsolder the wire that connect the output of the combiner to the low pass filter.
- Unsolder the four wires that connect the four inputs of the combiner to the outputs of RF power amplifier module.
- Take note of the wiring of the directional coupler, after unsolder the three wires.
- Remove the screws that fix the four power resistor to the heat sink.

- Remove the screws thatfix the combiner card to heat sink.
- Carefully extract the card.

9.3.5 Directional Coupler Replacement

- With the help of the wiring diagram shown in Appendix, unsolder the wires of the directional coupler.
- Unsolder the wire connecting the directional coupler card to RF output connector.
- Unsolder thewire connecting the directional coupler card to low pass filter.
- Remove the four screws that fix the directional coupler ard to the hex standoffs and remove the board.

9.3.6 Soft Start Card Replacement

- Disconnect M1 and M2 soft start ‘s connectors.
- Disconnect M3.
- Dismount the four securing screws and remove the board.

9.3.7 CPU Group Replacement

- Disconnect J1 and J2 alarms card’s connectors.
- Disconnect JP1 alarms card’s connector.
- Remove the screws securing the board to the front panel.
- Carefully extract the card.

9.3.8 Bias Card Replacement

- Remove the screws that fix the two voltage regulators (U9, U10) to the internal separator.
- Dismount the screw that fix P1 and P2 bias card’s connectors to the internal separator.
- Disconnect JP1 and JP2 bias card’s connectors.
- Carefully extract the card.

10. Internal Adjustment

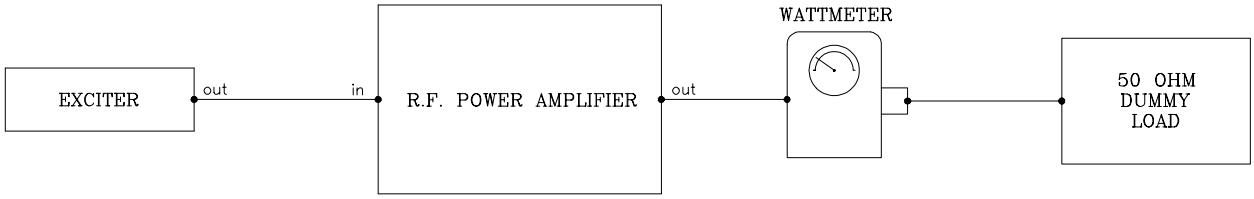
This chapter describe the adjustment to do after the substitution of a module.

10.1 Power Supply Adjustment (PSSW5040)

No adjustments are required on this module.

10.2 R.F. PA Module Adjustment

After a PA module has been substituted and all the connections have been reestablished, follow these steps:



- Set up the system as described in the figure: a wattmeter is inserted in series with the amplifier to verify the RF power generated by it.
- Connect to the RF input connector a suitable exciter able to deliver a variable power of 20 W max.
- Connect the Alarms/Interlock connector to the appropriate connector on the exciter.
- Set the output power of the exciter to its minimum value.
- Switch the PJ1000M on, keeping off the exciter (switched OFF or in stand-by mode) and measure the quiescent current of the module. At working temperature, a RF module has to drain 200 mA. If the current is different from this value, use the trimmer R15 on the module to compensate the difference.

At this point, it is possible to verify how the module works at nominal power:

- Enable the power output from the exciter (switching it on and waiting for the PLL to lock, or exiting from the stand-by mode).
- Gradually rise the power of the exciter and monitor the power output of the amplifier, until it reaches its nominal value of 1000W.

A correctly adjusted amplifier has:

Pout= 1000W we have 15W< Pin< 18W and 32A< Ipa< 40A

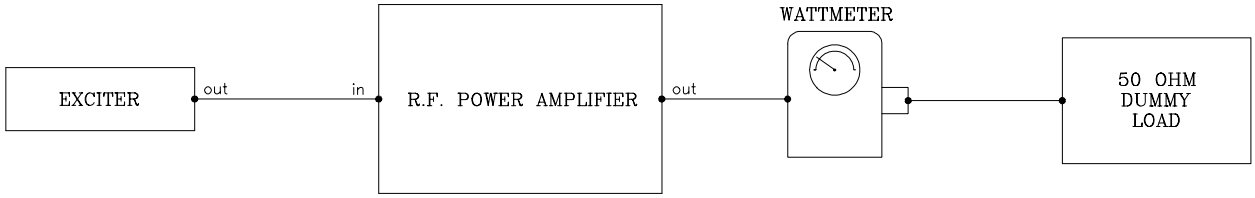
Verify that the current drawn by the modules have about the same value. Little differences are due to the differnet gain of the MOSFET. Differences not exceeding 800 mA have to be seen as normal.

10.3 Wilkinson Spiltter Card Adjustment

No adjustment are required on this module. (Be very carefully to correctly reconnect the splitter Card, since incorrect connections will destroy the RF power modules).

10.4 Wilkinson Combiner Card Adjustment

No adjustment are required on this module. (Be very carefully to correctly reconnect the splitter Card, since incorrect connections will destroy the RF power modules).



10.5 CPU Assembly Adjustment

NOTE: Make sure that this replacement is really necessary.

- After changing the assembly, connect the amplifier as shown in the figure below.
- Switch ON the PJ1000M LCD.

Temperature lecture adjustment

- Measure the temperature with a thermometer.
- Enter on the P.A. menu.
- Adjust the trimmer TR6 to read on the display the same temperature measured with the thermometer.

Mains lecture adjustment

- Measure the main voltage with a multimeter.
- Enter on the P.A. menu.
- Adjust the trimmer TR8 to read on the display the value of 100% (the main voltage is visualizated as percentage variation and the value 100% representes 220V).

Trimmer TR7 adjustment

- The trimmer TR7 must be turned completely counter-clockwise, to protect the input channel to the CPU.

VPA lecture adjustment

- Verify, with a multimeter, that the power amplifier voltage is of 50V.
- Enter on the P.A. menu.
- Adjust the trimmer TR4 to read on the display the same voltage measured with the multimeter.

IPA measurement adjustment

- With the amplifier switched OFF, detach from the RF PA modules the faston connectors that give them the 50 V voltage from the switching power supply.
- Connect between one of the Faston connectors and ground a resistive load able to drain 8 A at 50 V (and to dissipate the relative power). An amperometer with suitable full-scale value has to be inserted, in series with the load, an amperometer with suitable full-scale has to be inserted.
- Switch the amplifier ON.
- Go into the PA menu.
- Adjust trimmer TR5, so that the reading of IPA on the display is the same as the one on the amperometer.
- Switch the amplifier OFF.
- Reestablish the connections of the PA modules.

FOLBACK intervention adjustment

- Be sure that the exciter is not operative.
- Measure the voltage on the PIN1 of JP7 on the power supply card with a multimeter, than rotate the trimmer TR9 to obtain a voltage of 0V.

Forward power lecture adjustment

- Increase the PJ1000M to 1000W at 98MHz, using as a reference the reading on the wattmeter that possibly has been connected at the end of the attenuation chain at the RF output.
- Rotate TR1 to read on the display the same value measured with the wattmeter.

Reflected power adjustment

- Apply an unbalanced load in series with a 50 Ohm load and apply in series a by-pass wattmeter BIRD.
- Increase slowly the exciter power to obtain a reflected power of 100W at 98MHz.
- Adjust TR2 to read on the display the same value measured with the wattmeter.

Input power lecture adjustment

- Connect to the PJ1000M' s RF input a by-pass wattmeter BIRD with a full-scale of 10 W.
- Connect a 50Ohm load to the exit and increase slowly the exciter power to obtain 5W on the instrument in series to the input.
- Rotate TR3 on the CPU assembly to read on the display the correct value measured with the wattmeter.

10.6 Directional Coupler Card Adjustment

The directonal coupler card doesn't need any adjustment, perhaps it is necessary to execute the following checkings after the replacing of the card:

- Verify the "AGC control".
- Verify the Antenna S.W.R. calibration.
- Verify FWD PWR lecture.
- Verify RFL PWR lecture.

10.7 Soft-start Card Adjusment

No adjustment are needed after this board has been changed.

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

10.8 Bias Card Adjustment

No adjustment are required inside the Bias Card beacause it's a factory adjusted device.

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