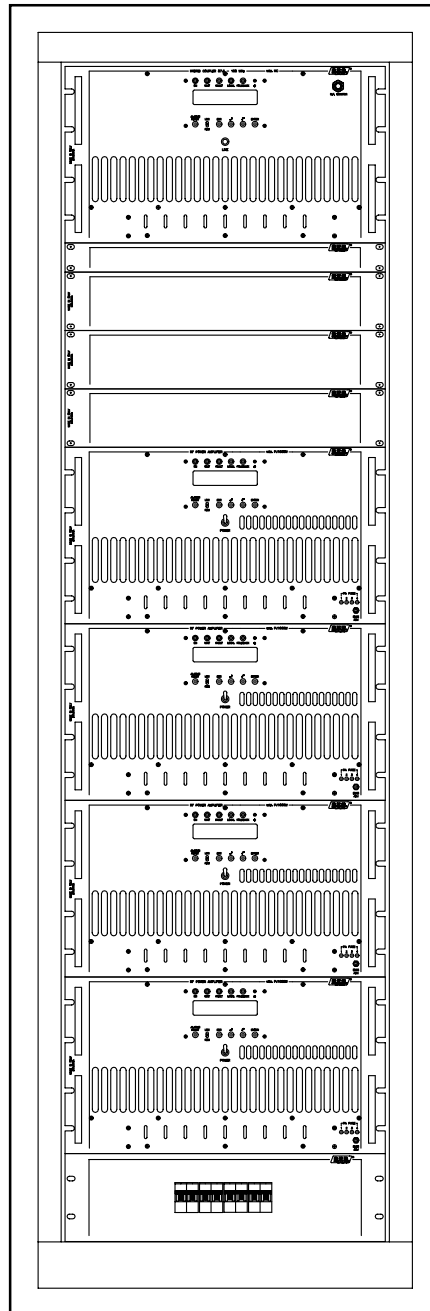

PJ4000M



User Manual

Manufactured by



Italy



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PJ4000M - User Manual
Version 2.0

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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 frequency, 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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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 24 (twentyfour) 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 back on 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

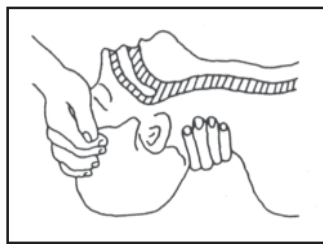


Figure 1



Figure 2

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

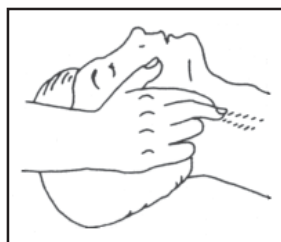


Figura 3



Figura 4

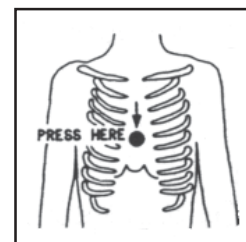


Figura 5

- 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

4.1 External Description

The PJ4000M is a modular power amplifier for audio FM broadcasting.

The PJ4000M comprises four PJ1000M MosFet amplifiers connected using a HC4 hybrid combiner.

The PJ4000M is housed in a standard 19" rack frame, 40HE high, of which 7HE are free and may be used for an exciter or other pieces of equipment.

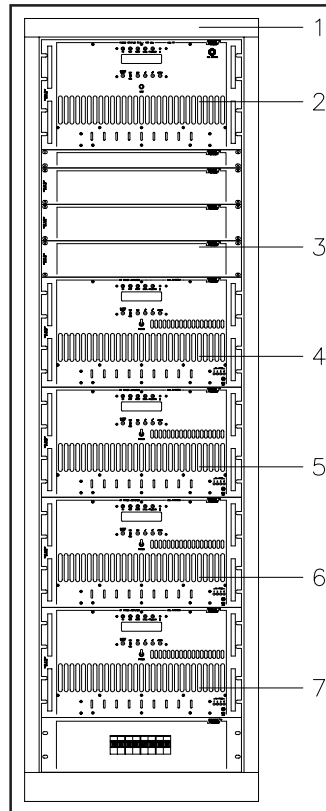


Figure 1

- [1] 19" Rack Cabinet (40HE)
- [2] HC4 4KW Hybrid Combiner
- [3] 7HE Free Space
- [4] PJ1000M-"A" 1000W FM MosFet Amplifier
- [5] PJ1000M-"B" 1000W FM MosFet Amplifier
- [6] PJ1000M-"C" 1000W FM MosFet Amplifier
- [7] PJ1000M-"D" 1000W FM MosFet Amplifier

4.2 Electrical Description

The PJ4000M is a MosFet amplifier for FM audio broadcasting, operating without the necessity of adjustments in the 87.5-108MHz band. It produces an output power in excess of 4000W and a drive level of about 80-100W.

The HC4 hybrid coupler has the function of splitter of the driver power coming from the exciter, and of combiner of the power output of the PJ4000M, to generate the global output of the amplifier.

The diagram of the connections between the components of the PJ4000M is shown in Figure 2.

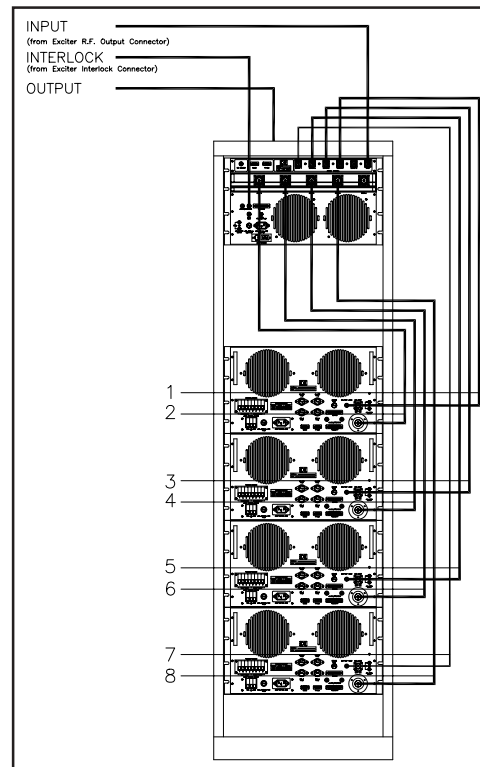


Figure 2

[1]	HC5-1 OUT4	-	PJ1000M "A" RF IN
[2]	HC5-1 IN1	-	PJ1000M "A" RF OUT
[3]	HC5-1 OUT3	-	PJ1000M "B" RF IN
[4]	HC5-1 IN2	-	PJ1000M "B" RF OUT
[5]	HC5-1 OUT2	-	PJ1000M "C" RF IN
[6]	HC5-1 IN3	-	PJ1000M "C" RF OUT
[7]	HC5-1 OUT1	-	PJ1000M "D" RF IN
[8]	HC5-1 IN2	-	PJ1000M "D" RF OUT

4.3 Meters and Indicator

PJ4000M doesn't own indicators: all the measurements and indications are given by the instruments of its components. For all the details, see as reference the manuals of the amplifier PJ1000M and of the coupler HC4.

5. Technical Specifications

The electrical and the physical specifications of the PJ4000M are given below. For details about the of the amplifier module (PJ1000M) and the hybrid combiner (HC4) see the relative manuals.

5.1 Dimensional and Environmental Specifications

Rack Dimensions	565.0 mm (22,24") x 850.0 mm (33,46") x 1935.0 mm (76,18")
Weight of each separated PJ1000M	54 Kg
Weight of HC4	30 Kg
Total Weight	300 Kg
Operating temperature range	-10 °C ÷ 50 °C
Humidity	95% Maximum, without condensation

5.2 Electrical Specifications

A.C. power supply	Mono phase:	100-130 V, 50-60 Hz 198-250 V, 50-60 Hz
	Tri phase:	360-423V (Plus N), 50-60Hz 200-250V (No N), 50-60Hz
Cooling system	Forced ventilation	
Frequency range	87.5 MHz ÷ 108 MHz	
Output power	4000 W	
Power consumption	Approx. 9200 W at full power	
Drive power	Approx. 80-100 W for Pout = 4000 W	
Input connector	"N" type connector	
Input impedance	50 Ohm	
Output connector	Standard 1+5/8" EIA Flange	
Output impedance	50 Ohm	
Harmonic and spurious soppression	Respect all requirments FCC and CCIR	
Layout description	Four separate PJ1000M amplifier modules and one HC4 4KW Hybrid Combiner.	

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6. Installation Procedure

6.1 Introduction

This section contains the necessary informations for the installation and preliminary checks on the PJ4000M.

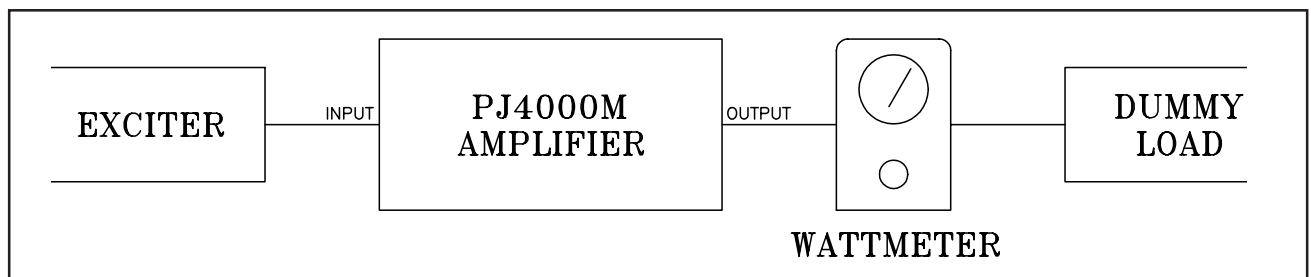
6.2 Unpacking

Unpack the amplifier and before any other operation check that the amplifier hasn't been damaged during transport and all the controls and connectors on the front and rear panels are in good condition.

6.3 Installation

To install the PJ4000M, it is necessary to perform the following operations:

- 1) With the help of Figure 2, verify that all the connections are in perfect condition. Possible errors can damage the amplifier modules.



- 2) As shown in the figure above, connect a 4KW 50 Ohm dummy load to the HC4's output connector with a through wattmeter in series.
- 3) Connect an exciter with a output power not less than 150W to the R.F. input of the HC4.
- 4) Set the output power of the exciter to the minimum value.
- 5) Switch on the four PJ1000M and the exciter, and then wait until the exciter is locked onto the operating frequency.
- 6) Increase gradually the output power of the exciter, verifying at the same time a proportional increase of output power of the PJ1000M (PWR FWD of the four amplifiers) and an increase of the output power on the meter of the hybrid combiner with the selector on the FWD position; the output power on the meter of the HC4 hybrid combiner is, apart from the instruments reading errors and the little loss in the combiner, the sum of the output power of each amplifier.

This value can be compared with the value read on the external wattmeter.

- 7) Increase the exciter output power in order to have 4000W power on the PJ4000M.
- 8) Switch the meter selector of the HC4 to the RFL position and verify that the meter needle is at zero.
- 9) To verify the correct balancing of the four PJ1000M modules, do switch the meter selector of the HC4 to UNBAL position and verify that the power isn't more than 150-200W.

7. Maintenance

7.1 Introduction

This section provides general maintenance information and electrical adjustment for the PJ4000M Amplifier.

Maintenance is divided into categories depending upon the complexity of the procedure and the test equipment required to complete the maintenance.

7.2 Safety Consideration

When the amplifier is operational, hazardous voltages and high currents are accessible internally, and there are high power R.F. signals.

Don't remove any cover without switching off the system first and close all covers before restarting the system.

Ensure all primary power is disconnected from the amplifier before attempting equipment maintenance.

FIRST LEVEL MAINTENANCE

7.3 Ordinary Maintenance

The only regular maintenance needed by PJ4000M, is the periodic substitution 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.

It's advisable to check the unit every 6 months, and to substitute noisy blowers.

Blowers should be changed as a matter of course at least every 18 months.

SECOND LEVEL MAINTENANCE

7.4 Equipment's Card Replacement

See as reference the card replacement section of the manuals of the relative device.

7.5 Equipment Replacement

If it's necessary to replace a power amplifier or the hybrid coupler, it is advisable to perform the adjustment of the sytem. Refer to chapter 8 for directions.

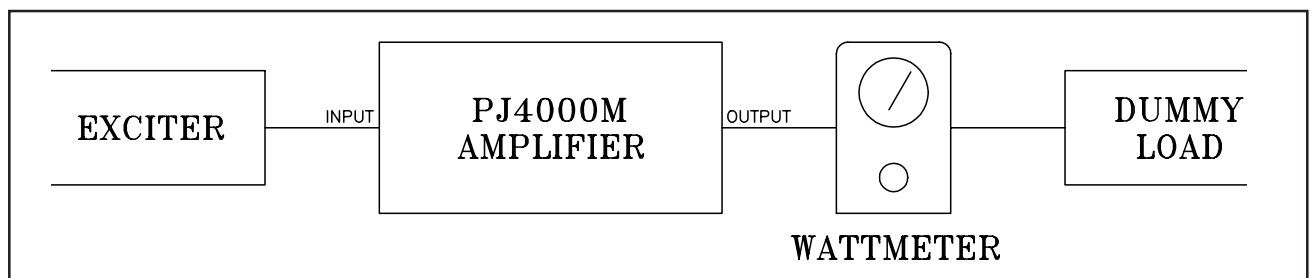
8. PJ4000M Adjustment

8.1 Adjustment Procedure

NOTE: Before any adjustment operation (such as a dummy load substitution or an interconnection cable replacement) switch off the system.

To obtain a correct configuration it is necessary to perform the following operations:

- 1) Verify that the four PJ1000M amplifiers have the same gain (for the same input they have the same output power), and verify the output is 1000W or more.
- 2) If the connection cables between the four amplifiers and the hybrid combiner have to be substituted, they shall be the same length.
- 3) Make the connections of the cables as shown in Figure 2.
- 4) Perform the setup below.



- 5) Connect a 4KW 50 Ohm dummy load to the HC4's output connector with a through wattmeter in series.
- 6) Connect an exciter with a output power not less than 150W to HC4's Input connector.
- 7) Set the output power of the exciter to the minimum value.
- 8) Switch the meter selector of the HC4 to the FWD position.
- 9) Switch on the four PJ1000M and the exciter, and then wait until the exciter is locked onto the operating frequency.
- 10) Increase gradually the output power of the exciter, verifying at the same time a proportional increase of output power of the PJ1000M (PWR FWD of the five amplifiers) and an increase of the output power on the meter of the hybrid combiner with the selector on the FWD position; the output power on the meter of the HC4 hybrid combiner is, apart from the instruments reading errors and the little loss in the combiner, the sum of the output power of each amplifier.

This value can be compared with the value read on the external wattmeter.

- 11) Increase the exciter output power in order to have 4000W power on the PJ4000M, if the output power is less than 4000W proceed with the compensation of the system.

8.2 System Compensation

- 1) On the coupler instrument, select the forward power measurement mode.
- 2) Remove the coupler's upper cover.
- 3) Set the desired system working frequency on the exciter.
- 4) Set the output power of the exciter so that the system output forward power is at 80% of the nominal value.
- 5) Regulate all the variable capacitors to their middle position (Figure 3).

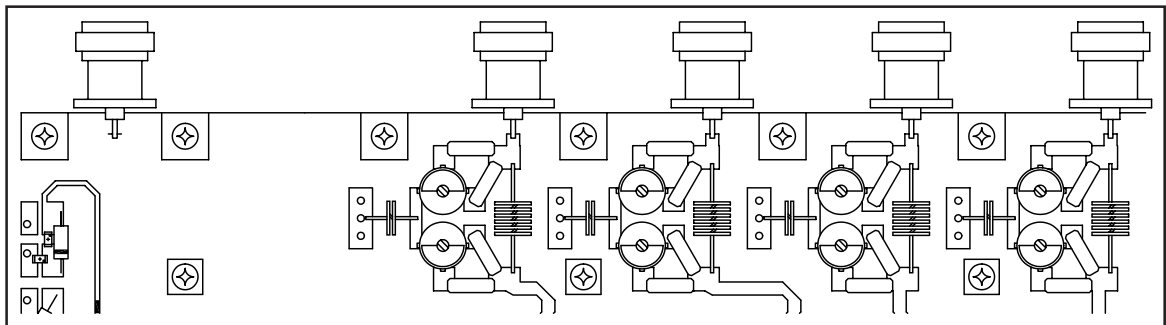


Figure 3

- 6) Adjust the variable capacitors (1) and (2), relative to the first amplifier output (Figure 4), to maximize the power level measured by the coupler's instrument.

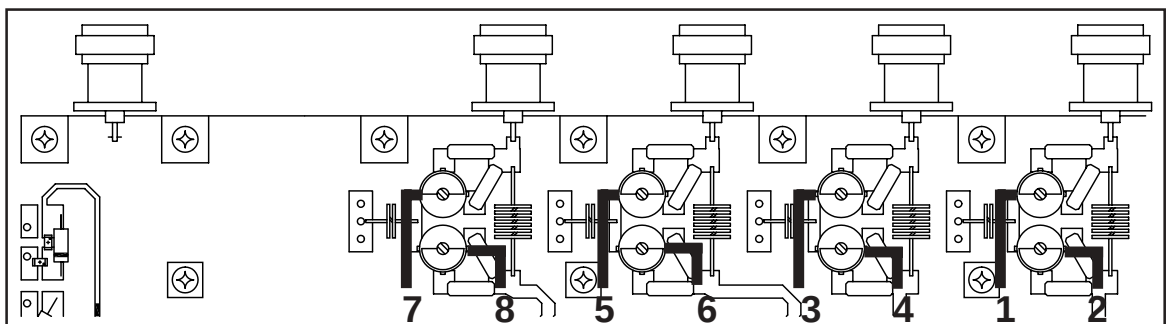


Figure 4

- 7) Adjust the variable capacitors (3) and (4), relative to the second amplifier output, to maximize the power level measured by the coupler's instrument.
- 8) Adjust the variable capacitors (5) and (6), relative to the third amplifier output, to maximize the power level measured by the coupler's instrument.

- 9) Adjust the variable capacitors (7) and (8), relative to the fourth amplifier output, to maximize the power level measured by the coupler's instrument.
- 10) Repeat steps 6, 7, 8 and 9 until the system power reaches its maximum.
- 11) Reassemble the coupler's upper cover.
- 12) Adjust the system output forward power to the nominal value.
- 13) If the compensation is done because one PJ1000M was replaced, it is normally necessary to operate only on the capacitors related to the substituted amplifier.

8.3 Trouble Shooting

A) Anomaly: Overdrive protections light up on one or more the PJ1000M amplifiers.

Solutions:

- 1) Decrease the driver power through the Power adjust control situated on the exciter.

B) Anomaly: SWR protections light up on one or more PJ1000M amplifiers.

Solutions:

- 1) Verify the correct operation of the antenna ($SWR < 1.5$).
- 2) Verify the integrity of the connection cables between the outputs of the four PJ1000M amplifiers and the HC4 Hybrid Combiner (absence of short circuits and correct connector mating).
- 3) Verify the correct connection of the interconnection cables between modules.

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