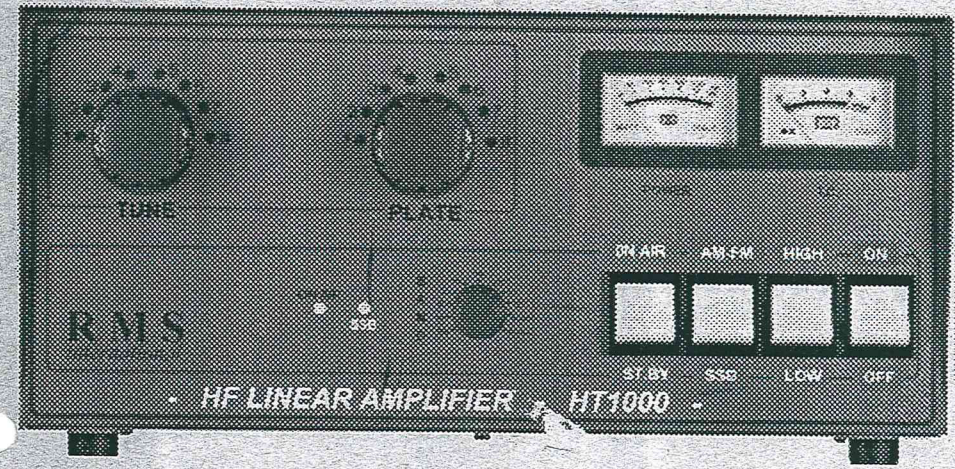


DJ5GX

Model HT 1000
Serial No. <u>960110</u>
Date of Purchase _____
Dealer : _____

# LINEAR AMPLIFIER

## Model HT 1000



A product of

# RMS INTERNATIONAL srl

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## OPERATING MANUAL

FIRST EDITION

Downloaded from [www.cbradio.nl](http://www.cbradio.nl)

Thanks to DH7HA

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## HT 1000 SPECIFICATIONS

Transmit Frequency Range :	160m through 10m Amateur Radio Bands
Excitation Energy Required :	1 to 50 W nominal , 100 W SSB maximum
Mode and Duty Cycle :	SSB , continous for 20 minutes. CW and RTTY , key-down continous for 5 minutes
Rated Plate Input :	800 W pep SSB , 500 W CW RTTY
Plate Voltage at no signal :	1200 V. ; 0.8 A
Circuit Type :	Class AB2 grounded grid linear amplifier
IMD :	Below -45dB at 300 W. power output
Input impedance :	50 ohm
Output Impedance :	50 to 75 ohm unbalanced .
Cooling :	Internal Air Ventilation
Power Tubes Used :	EL519 ( 4 pieces )
Semiconductors :	Diodes, 14 pieces -Transistor , 1 piece
Power Requirement :	120 V, 6.3 A ; 220 V , 6.3 A ; 50-60Hz for max. SSB input
Dimensions :	355mm x 450mm x 170mm (13-3/4 x 17-3/4 x 6-5/8 " )
Weight :	Net 16 Kg. ( 35lbs. ) ; Shipping 18 Kg. ( 39 lbs. )

The above specifications are subject to change without prior notice due to technical improvement .

## SECTION 1.

## FEATURES

1. The HT1000 is a Class AB2 , grounded grid linear amplifier developed and made in Italy by RMS International , through consolidated high-power technology using four sweep-tubes EL519 . It covers all radio amateur bands 160m though 10m for SSB, CW and RTTY modes of operation .
2. **Low I.M.D. and High Suppression**  
IMD is minimized through the use of negative polarization of the grids.  
Harmonic Suppression exceeds FCC and CE normative requirements.
3. **Safety System**  
A special power supply design protects both tubes and it-self if an internal arc occurs and as an added protection feature, the catode circuit of the tubes is fused. Also provided are bleeder resistors for discharging the high voltage capacitors .  
Please observe all warnings, **they are for your protection.**
4. **Adjustable Input Matching Circuit**  
The C-L-C matching input network will achieve a perfect match between your transceiver and the HT1000 for the maximum power transfert ; rear panel accomodation allows to adjust each amateur HF band from 1.8 to 30MHz in 9 steps ; two steps for AUX bands
5. **Exclusive Heavy-Duty Bands**  
Custom manufactured to our exacting standards , rated at 2500 V , the band switch is double sides with solid coin gold contacts .
6. **Dual Front Panel Meters**  
They are dedicated to the output power and to current plate at all times for easy monitoring .
7. **Air Cooling**  
All components are air cooling , a quiet blower is located on the rear side of the chassis to ventilate the tubes and components ; efficient , contribute to your long-term satisfaction.

## SECTION 2.

## PREPARATION FOR USE

### 2.1 INSTALLATION OF POWER TUBES

To protect the power tubes in your HT1000 against vibration and shocks during transport , they were packed separately from the amplifier. For insertion, follow the procedures below ; prepare the following mounting hardware and tools:

Power tube EL519	4 pieces
Phillips screwdriver	1 piece
Fuse 2 A , glass 5x20	1 piece

**WARNING :** Before proceeding, make sure that :

**The power cable is NOT plugged in a outlet**  
**The power switch is OFF and the meter I C read 0 A. ( zero Amperes )**

Proceed as follows :

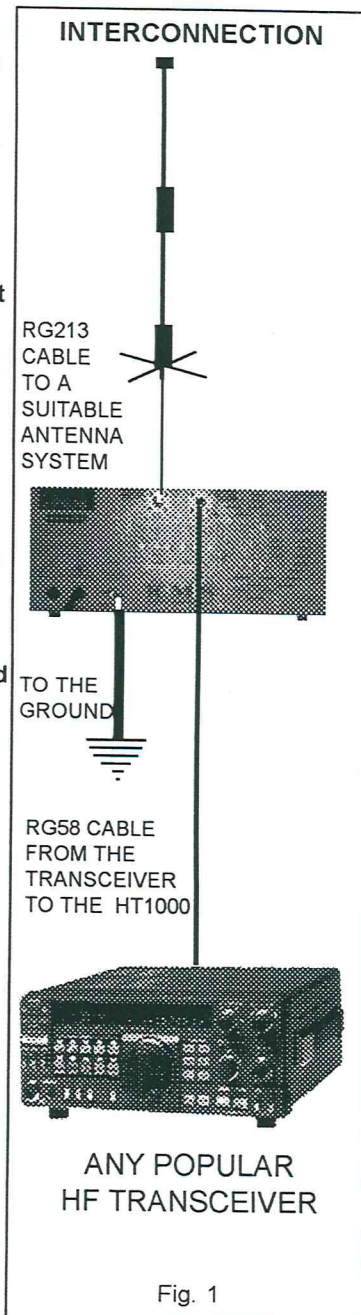
1. Remove the 8 screws holding the upper case cover.
2. Remove the upper case cover.
3. Take the tubes out of their case , in handling be sure to hold the glass envelope, not the plate cap.
4. Insert a tube per each socket in the correct sense .  
**CAUTION : Particular care should be exercised in not applying force to the tubes .**  
**Particular care should be taken not to strike and break the glass tubes during installation.**  
**Tube breakage due to negligence is not warranteed**
5. Apply the plate caps to each tube.
6. Check to assure correct installation of the tubes and caps .
7. Insert Fuse 2 A in her receptacle , located on p.c.b. ( by reference to the internal parts location pictures )

### Tube Installation Checkout

1. To avoid damage necessitating tube replacement, please check
  - a - Power tubes are free from scratches or other physical defects.
  - b - Tubes are fully inserted into their sockets.
  - c - Plate caps inserted securely.
  - d - Unnecessary material is not left inside the unit

### 2.2 GENERAL TIPS ON INSTALLATION

Level your HT1000 in operation, install in a dry and well ventilated area , shaded from direct light.  
Your HT1000 must have a minimum of 30 cm air clearance to the rear to allow an efficient air ventilation system .



ANY POPULAR  
HF TRANSCEIVER

Fig. 1

### 2.3 AC POWER SOURCE

Use an AC power line having sufficient current capacity to supply your HT1000 or the performance of Your HT1000 will be affected by inadequate line force . Do not deviate more than  $\pm 12\%$  from the rated input voltage for which your Amplifier has been set.

### 2.4 POWER CABLE AND PLUG

The power cable on the rear of your HT1000 have Germany-French plug at this end , if it is not adequate for the wall outlet used in your house you may use an adaptor or you may change the plug with an other suitable . Connecting a plug mating with the wall outlet you must consider that blue and brown are power which blue is the neutral , brown is live and green/yellow is the earth.

### 2.5 EXCITER

An HF amateur band CW or SSB transmitter or transceiver having an RF output impedance of 50 ohm and output power of 1W to 60 W CW is enough to drive the HT1000 . Exceeding 60 W. CW will cause overdrive , resulting in shortened power tube life and overcharge the input matching circuit ( Input Network ) ; at maximum you can drive the HT1000 with 100 W. SSB for short periods only . All the popular transceiver are compatible with the HT1000.

### 2.6 ANTENNA

Your HT1000 requires an antenna having 50 ohm impedance and providing it is rated for 1 KW p.e.p. input power and exhibit a low voltage standing-wave ratio (SWR). Admissible SWR is 1,5 to 1. or less for FM-AM-RTTY . A higher SWR , 2 or more to 1. , may cause difficult matching with your HT1000 . Excessive SWR could melt the coaxial cable and antenna . To protect your HT1000 against persistent SWR effects , use an suitable antenna tuner. Mismatching will cause TVI, BCI or similar RFI.

### 2.6 INTERCONNECTION

All the popular HF transceiver are compatible with your HT1000 , no ALC is required .

#### 2.7.1 GROUNDING

A good earth connection is required to prevent RFI and electric shock , connect the GND posts of the HT1000 and exciter by means of a wire , it should be thick and short as possible .

If earth connection is not suitable , harmonics suppressor circuit inside to your HT1000 may not be able to exercise his function , following FCC and CE normatives.

Fig.22

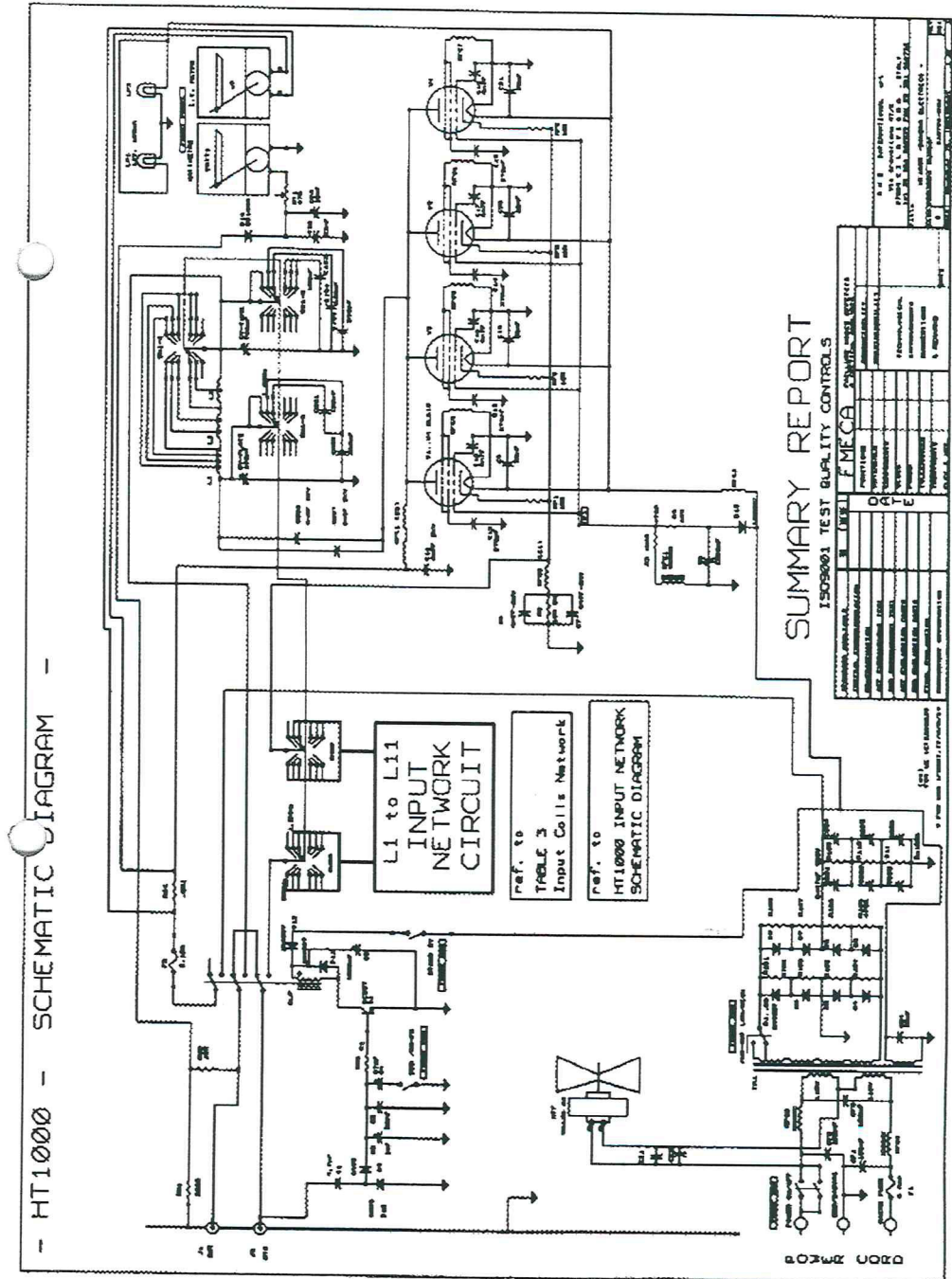


Fig. 3

Front Panel View

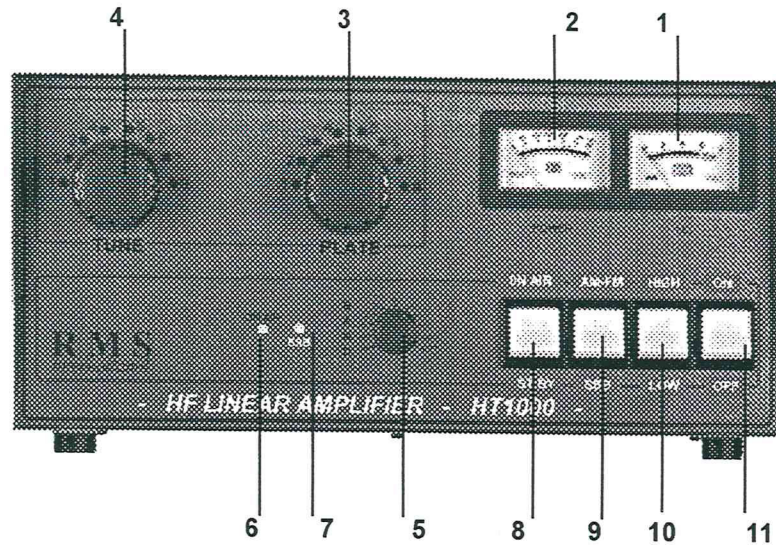
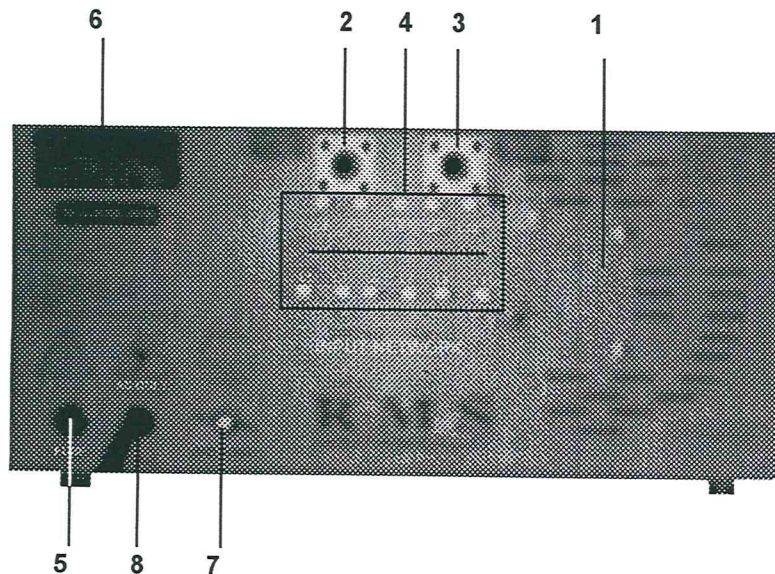


Fig. 4

Rear Panel View



6

## 2.7.2 CABLE CONNECTION

An SWR meter may be connected between the HT1000 and the exciter if occur , total coaxial cable length must not exceed 1,7 mt.  
Use RG-58 or RG-213 between exciter and HT1000 but antenna cable must be havier , suitable to the output power of your HT 1000 .

## SECTION 3. CONTROLS & FUNCTIONS

### 3.1 FRONT PANEL

1. **I.C. Meter**  
The I.C. meter reads the plate current flowing through the power tubes.
2. **POWER Meter**  
The Power Meter shows the power supplied to the antenna system.
3. **PLATE Knob**  
This control permits you to tune the plate circuit to the desired transmitting frequency .
4. **TUNE Knob**  
This control matches the impedance PI network to the antenna.
5. **BAND Selector**  
Set for the amateur band in which operation is desired.
6. **ON AIR Indicator**  
The ON AIR Led Indicator lights in the transmitting stage , of your HT1000 .
7. **SSB Indicator**  
The SSB Led Indicator lights advise that RTX operation is delayed .
8. **ON AIR / STBY Switch**  
In the STBY position , the exciter runs straight through . In the ON AIR position , the Amplifier automatically keys with the exciter
9. **SSB / AM-FM Switch**  
This switch permits to choose delayed RTX operation in SSB position and not in the AM-FM position
10. **HIGH / LOW Switch**  
This switch permits full power or low power output operation .
11. **POWER Switch**  
A double pole switch completely disconnects the AC input from the transformer .

### 3.2 REAR PANEL

1. **BLOWER**  
The blower cools the power tubes , components and effectively keeps the inside temperature for increasing
2. **ANTENNA OUTPUT Connector**  
This UHF type connector feeds the RF output to the antenna system.
3. **EXCITER INPUT Connector**  
This UHF-type connector inputs the RF signal fed from the exciter , please use a suitable cable length
4. **MATCHING INPUTS Access**  
These serial holes permits to achieve a perfect match input signal between your exciter and the input network
5. **FUSE HOLDER**  
Contain a 6 A. fuse , if either is blown determine the cause before replacement
6. **SERIAL DATA**  
In this space is stamped Serial No. and Line Voltage of your HT1000
7. **GND Post**  
Use this post to ground the HT1000 to your exciter and station ground system.
8. **POWER CABLE and PLUG**  
AC power is supplied to the Amplifier by a Germany/French plug with a three-wire cable ( See section 2.4 )

## SECTION 4.

### 4.1 PRECHECKS

If you are a newcomer to this type of equipment , or if you have replaced one or more power tubes , you should first assure yourself of the following **before connection of power and turn-on** .

- a - **Power tubes are installed correctly.** Verify tube installation checkout with section 2.1
- b - **The upper case cover is correctly fixed with the 10 screws**
- c - **Local Line Voltage is the same as stamped in the Serial Data located in the rear panel**
- d - Make sure that the exciter , antenna and ground wires are connected properly. Verify that the POWER witch on your HT1000 is in the OFF position **BEFORE CONNECTING the AC power cable** .
- e - Set the front panel controls as follows.

Table 1 Front Panel Controls Set-Up

Control	Position To :
LINEAR	STBY
MODE	AM-FM
PLATE	Center Rotation
LOAD	Center Rotation
BAND	Same to Exciter

Be sure to set the BAND Switch to the same band as that of the exciter before operation is attempted.

Now you may turn the POWER Switch " ON " Make certain that the fan motor is revolving. Power and IC meters will illuminated . Turn the ST.BY/ON AIR Switch in ON AIR position; now the exciter will control the HT1000 for automatic transmit / receive operation. In SSB mode you may place **HIGH / LOW** switch in HIGH position but in the other mode of transmission this switch must be placed in LOW position.

**CAUTION :** Tune-up should be made quickly or tubes life will be shortened , maximum key-down 10 seconds .

## OPERATION

### 4.2 TRANSMITTING

- A - Adjust the exciter carrier control for medium output , about 30 W.
  - B - Adjust the exciter in CW mode and push key-down
  - C - Adjust PLATE and TUNE knobs for the maximum output power of the HT1000
  - D - Increase exciter to the maximum power , about 50 W. CW or 100 W. SSB repeat step C several times for the highest RF power output ; if the IC meter exceeds .8 reduce the RF input from the exciter .
- CAUTION : Never change the BAND Switch while transmitting .**

TABLE 2 - Power Output vs. Exciter

Band	Freq. MHz	Exciter W.	Output W
160	1.8 - 1.9	50	550
80	3.5 - 4.0	50	650
40	7.0 - 7.3	50	650
20	14.0 - 14.4	50	650
15	21.0 - 21.5	50	650
12	24.8 - 24.9	50	650
10	28.0 - 29.7	50	650

Typical R.F. Output Power ( not modulated ).

### 4.2 ADJUSTING R. F. RTX INPUT

Tuning procedures as in PRECHECKS do not exceed to 50 W. R F input from ter . **If necessary** , adjust L1,L2,L3 ..L11 for max. RF power output step by step , in each band.

Table 3 - Input Network Coils -

Coil	Band	Frequency Coverage
L 1	160 m	from 1.8 MHz to 2.0 MHz
L 2	80 m	from 3.6 MHz to 4.0 MHz
L 3	40 m	from 6.6 MHz to 7.5 MHz
L 4	* 30 m	from 9.9 MHz to 10.3 MHz
L 5	20 m	from 13.9 MHz to 14.9 MHz
L 6	* 16 m	from 17.9 MHz to 18.5 MHz
L 7	15 m	from 20.8 MHz to 21.9 MHz
L 8	* 12 m	from 24.8MHz to 25.5 MHz
L 9	10 m	from 27.9 MHz to 29.9 MHz
L 10	* ****	option any freq. 1.8-30 MHz
L 11	* ****	option any freq. 1.8-30 MHz

\* Optionals \* \*\*\*\* Auxiliars

### 4.4 CW - SSB OPERATION

Tune up as in Prechecks following . Place the **exciter carrier to 50 W maximum in the CW operation** .

In SSB you can drive HT1000 at maximum RF power of 100 W only , to get suitable maximum SSB power output .

#### CAUTION :

- FIRST , BE SURE ON THE RIGHT POSITION OF THE BAND SWITCH . DO NOT key the linear in CW mode with full CW power ; ( 50 W. max. )**

Failure to heed this warning may cause immediate , extensive damage to the input network of the amplifier , repair of wich will not covered by your warranty . Set the front panel SSB / AM-FM Switch in SSB position for SSB and CW , both .

### 4.5 RTTY - AM - FM OPERATION

**CAUTION :** Maximum key dow , 10 minutes.

To use a radioteletypewriter ( RTTY ) and or AM-FM with your HT1000 follow CW tune up procedures outlined in Section 4.4 Set the front panel SSB / AM-FM Switch in AM-FM position for RTTY too .

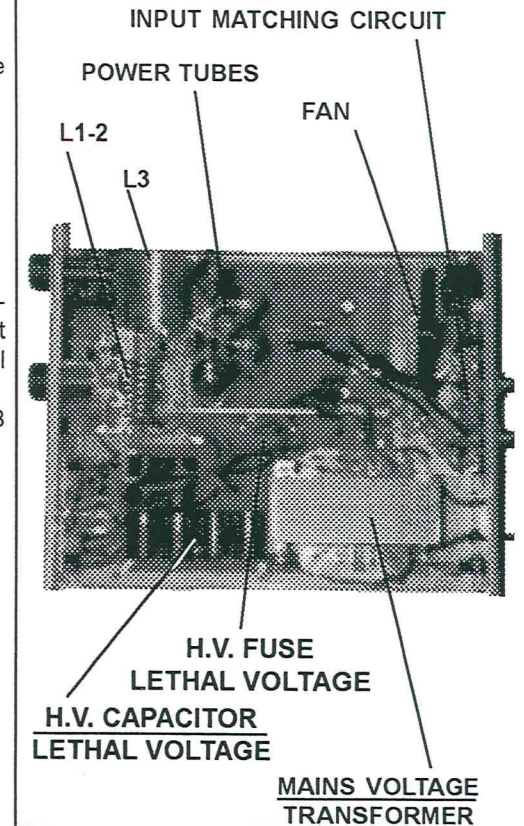
### 4.6 MAINS VOLTAGE TRANSFORMER

The high voltage transformer in your HT1000 has not thermal protection circuit , therefore , a full power CW-AM-FM-RTTY continuous transmission is permitted only for short periods of ten minuts of transmission and few minuts of stand-by or reception , in a high ambient temperature environment .

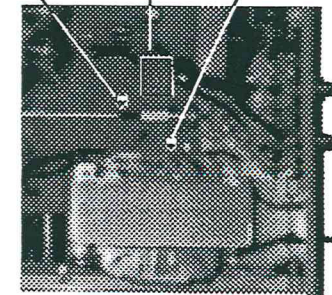
### 4.7 CARRYING YOUR HT1000

Your HT1000 weighs 16Kg ( 35lbs. ) To carry , use the handles on the side escutcheons . Remove the power tubes Do not slide or drop it , as the plastic legs could be damaged . Do not apply excess stress to the case .

## - PARTS LOCATION -



SSB -DELAY ADJUSTEMENT RELAY POWER METER READING ADJUSTEMENT



## SECTION 5. CIRCUIT DESCRIPTION

### 5.1 LINEAR R.F. AMPLIFIER

The linear RF power amplifier in your HT1000 is a grounded grid (g1, grid control polarized) class AB2 consisting of four sweep tubes EL519, providing the following features :

1. Low IMD through negative grid control
2. The grounded grid circuit does not require neutralization
3. Cathode-swamping resistors.
4. High stability at any frequency

Figure 2 shows a circuit diagram of the Linear Power Amplifier HT1000.

The input network matching circuit comprised of CV1 to CV-AUX2, L1 to L11 and C101 to C1103 matches the exciter impedance with the input circuit impedance to efficiently feed exciter energy into the power tubes, for each band by means of the band switch selector SW2-A, SW2-B.

Transformer TR1 supply the voltage filaments, to heat the tubes, supply the high anode voltage and the low voltage to the fan for an efficiently and silent ventilation.

The choke coils RFC3, isolate the filament from the transformer, the bias voltage which determines the operating point of the tubes is produced across the circuit D13, C8, R3, R4 and RFC1. The grids are DC grounded through RFC 4,5,6,7 and high frequency grounded by C10,12,13,14,15,16,17,18. The p.i. network RFC2-C6-C7-R2 matches and level the tube input impedance to the exciter output network.

Stand-by circuit cut off the relay operation and do not permit to the high voltage to reach plate circuit applied to the tubes.

### 5.2 POWER SUPPLY

The plate high voltage is supplied from a voltage rectifier comprised of a large-capacity, small size transformer TR1, eight high-voltage rectifier diodes rated 1000 PIV and six 50mF electrolytic capacitors rated 500 volt surge. A secondary coil of the transformer energizing voltage in common with the tube cut-off bias voltage and pilot lamps High voltage line is fused by F2 of 1A if to protect transformer and tubes if an tube or capacitor arc occurs.

### 5.3 FAN MOTOR

The blower, to cool the power tubes and other components inside the amplifier, start when the POWER Switch is turned on.

### 5.4 METERS CIRCUIT

The power tube IC plate current and R.F. Power Output can be read on the individual meters.

Power output meter circuit comprised of a strip-line of capture, a diode D14, two capacitor C22, C23 and a variable resistor RT1 which adjust reading meter. The plate current is measured through precise shunt resistor RIC, and deflects the IC meter exactly without adjustment. These meters are dedicated for easy monitoring of the HT1000.

### 5.5 INPUT MATCHING CIRCUIT

Each operating band of the HT1000 have a circuit to match the output impedance of the exciter to the

variable impedance of the linear amplifier HT1000.

An C-L-C circuit is specially designed to achieve a perfect match SWR input between the exciter and the Linear Amplifier for maximum power transfer.

Located in the rear panel, each band can be adjusted in the range 1.8 MHz to 30 MHz in nine portion, covering all amateur bands, including WARC (\*); WARC bands are installed as option.

Additional options (\* \*\*\*\*), AUX1 and AUX2 position of the band switch are dedicated to install two bands outside the amateur bands.

### 5.6 OTHERS

To meet ETS 300339 Normative, this Linear Amplifier must operate until 300 W. R.F. output, DO NOT EXCEED THIS LEGAL LIMIT.

## SECTION 6. MAINTENANCE

### WARNING

Your HT1000 USES VERY HIGH VOLTAGE SUPPLY. DISCONNECT ALL POWER FROM THE HT1000 BEFORE REMOVING OR REPLACING ANY PARTS.

### 6.1 REPLACING POWER FUSE

Power fuse is located at the rear of the HT1000. In the event of blown fuse, first determine the cause: For replacement, use 6 A fuse only, either in 120 V., 220 v. or 240 line operation.

### WARNING

Be sure to disconnect the power cable before replacing fuses.

### 6.2 REPLACING H.V. FUSE

Refer to Section 2.1 " Installation of Power Tubes ". Refer to point 6.1.

### 6.3 REPLACING THE POWER TUBES

Refer to Section 2.1 " Installation of Power Tubes "

### 6.4 INPUT MATCHING CIRCUIT

Each operating band of the HT1000 have a circuit to match the output impedance of the exciter to the input impedance of the Linear Amplifier. These circuits are preset at the factory and can easily re-adjusted from the rear of the HT1000 ( see Input Network ) Do not re-adjust the coils of the Input Circuits; for this operation contact your nearest RMS authorized service facility.

### 6.5 OUTPUT MATCHING CIRCUIT

The blower, cooling fan system, in your HT1000 pulls air in through the bottom and side walls. Every three months, vacuum clean all the areas inside the HT1000 especially the vanes of the plate and load tuning capacitor to prevent arcing and overheating.

## SECTION 7 .

## TROUBLESHOOTING HINTS

TROUBLE	COMMON CAUSE	REMEDY
1. No power output 1) Relay will not activate  2) Relay is activated a. Exciter RF meter swing off scale b. IC meter will not swing (no plate current) blower inoperative .	a. Proof cable , disconnected. b. LINEAR Switch in STBY  Defective coaxial cable connection  Mains fuse blow HV fuse blow  Antenna coaxial cable disconnected EXCITER INPUT and ANTENNA OUTPUT coaxial connectors reversed.	Secure control cable Switch On- AIR the STBY switch Refer to Section 4.1 2C Correct reverse cables   Correct connection  Correct reverse cables .
2. Output power too low 1) IC ( plate current ) below 400mA (.4)	a. Low exciter output (except 10m band . ) b. Different position of BAND switch between exciter and HT1000  Low line voltage ( Mains Line ).	Readjust exciter  Set both BAND switches to same position  Check Mains Supplier
3. POWER meter swing too high or low.	Improve RF control setting	Adjust RF control until POWER meter reads . Calibration may be possible inside the amplifier
4. Fuse blows when POWER switch is turned " ON "	Inside short circuit line to the ground or uncorrect tubes installation.	Check tubes , reinstall and replace fuse , refer Section 6.1 6.2 .
5. Upper case and cabinet too hot .	Over-load utilization or overdrive power from exciter	Reduce time of utilization Reduce power from exciter

**BE SURE ON THE RIGHT POSITION OF THE BAND SWITCH , IT IS IMPERATIVE TO NOT DAMAGE THE AMPLIFIER**

**Do not exceed 300 W. R.F. output , to comply with Rules and ETS 300339 Normative .**

## PACKING FOR SHIPMENT

