Model HT 1000
Serial No. 960110
Date of Purchase
Dealer:

LINEAR AMPLIFIER
Model HT 1000

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© 2992356/96 Printed in Italy

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OPERATING MANUAL
FIRST EDITION

Downloaded from www.cbradio.nl
Thanks to DH7HA
SAFETY PRECAUTION: PLEASE READ BEFORE USE

This unit is a RF device, do not attempt to apply live voltage before have read diligently this instruction. There are no user serviceable parts inside, do not attempt to repair or replace internal components, or open the cover. This unit should never be connected or disconnected while the power is on. Disconnect the set from the mains supply line, before attempting to gain access. Only use 50 ohm coaxial cable for hookup.

PLEASE NOTE:
When operating high RF power of 150 Watts or more, the potential of the center conductor of the RF line can exceed 100 Volts. (Lethal voltage)

WARNING:
- DO NOT CONTACT THE CENTER CONDUCTOR - LETHAL VOLTAGE -
- NEVER EXCEED 140 WATTS ON ANY FREQUENCY WHERE THE SWR READING IS GREATER THAN 2 TO 1

FCC & CE REGULATIONS

This equipment has been tested and found to comply with the limits for Class A device, pursuant to Part 15 of the FCC Rules and the ETS300339. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This 300 W R.F. Legal Limit Linear Amplifier radiates radio frequency energy and, if not installed and used in accordance with the instruction and Rules, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation when this is not used following the instruction and Rules. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorienting the input network
- Reorienting the output Plate/Load
- Increasing the ground connection
- Increasing the separation between the L.A. and receiver
- Consulting the dealer or an experienced radio/TV technician for help

Shielded interface cables must be used in order to comply with emission limits.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

AFTER UNPACKING

It is advisable to save all original packing cartons (inner and outer) to prevent your valuable Linear Amplifier from damage should you wish to transport it for remote operation or ship it after-sales service. The following explicit definitions apply in this manual. Be sure to read these definitions carefully:

NOTE = inconvenience only if disregarded - no damage or personal injury.
CAUTION = equipment damage may occur, but not personal injury.
WARNING = personal injury may occur - do not disregard.

- CAUTION -
Read Operating Manual Section 2 before proceeding to unpack and assemble your amplifier.

- WARNING -
LETHAL VOLTAGE PRESENT.

NOTE
This manual covers both the 220/120V and 240V versions of the HT1000. Please disregard those sections not pertaining to your model.

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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 IMD 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 itself if an internal arc occurs and as an added protection feature, the cathode circuit of the tubes is fused. Also provided are bleeder resistors for discharging the high voltage capacitors.

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 transfer; rear panel accommodates allow 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 2500V, 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.

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

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 an 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.
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.
2.3 A C 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 ±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.
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 heavier, suitable to the output power of your HT1000.

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 of the 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 advises 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 efficiency.
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 serials 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 switch 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

<table>
<thead>
<tr>
<th>Control</th>
<th>Position To:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINEAR</td>
<td>STBY</td>
</tr>
<tr>
<td>MODE</td>
<td>AM-FM</td>
</tr>
<tr>
<td>PLATE</td>
<td>Center Rotation</td>
</tr>
<tr>
<td>LOAD</td>
<td>Center Rotation</td>
</tr>
<tr>
<td>BAND</td>
<td>Same to Exciter</td>
</tr>
</tbody>
</table>

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 rotating.
Power and IC meters will illuminate.
Turn the STBY/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.

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. SW, 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**

<table>
<thead>
<tr>
<th>Band</th>
<th>Freq. MHz</th>
<th>Exciter W.</th>
<th>Output W.</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>1.8 - 1.9</td>
<td>50</td>
<td>550</td>
</tr>
<tr>
<td>80</td>
<td>3.5 - 4.0</td>
<td>50</td>
<td>650</td>
</tr>
<tr>
<td>40</td>
<td>7.0 - 7.3</td>
<td>50</td>
<td>650</td>
</tr>
<tr>
<td>20</td>
<td>14.0 - 14.4</td>
<td>50</td>
<td>650</td>
</tr>
<tr>
<td>15</td>
<td>21.0 - 21.5</td>
<td>50</td>
<td>650</td>
</tr>
<tr>
<td>12</td>
<td>24.8 - 24.9</td>
<td>50</td>
<td>650</td>
</tr>
<tr>
<td>10</td>
<td>28.0 - 29.7</td>
<td>50</td>
<td>650</td>
</tr>
</tbody>
</table>

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. RF input from L1, L2, L3, L11 for max. RF power output step by step, in each band.

**TABLE 3 - Input Network Coils**

<table>
<thead>
<tr>
<th>Coil</th>
<th>Band</th>
<th>Frequency Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>160 m</td>
<td>from 1.8 MHz to 2.0 MHz</td>
</tr>
<tr>
<td>L2</td>
<td>80 m</td>
<td>from 3.6 MHz to 4.0 MHz</td>
</tr>
<tr>
<td>L3</td>
<td>40 m</td>
<td>from 6.6 MHz to 7.5 MHz</td>
</tr>
<tr>
<td>L4</td>
<td>30 m</td>
<td>from 7.9 MHz to 10.3 MHz</td>
</tr>
<tr>
<td>L5</td>
<td>20 m</td>
<td>from 13.9 MHz to 14.9 MHz</td>
</tr>
<tr>
<td>L6</td>
<td>16 m</td>
<td>from 17.9 MHz to 18.5 MHz</td>
</tr>
<tr>
<td>L7</td>
<td>15 m</td>
<td>from 20.8 MHz to 21.9 MHz</td>
</tr>
<tr>
<td>L8</td>
<td>12 m</td>
<td>from 24.8 MHz to 25.5 MHz</td>
</tr>
<tr>
<td>L9</td>
<td>10 m</td>
<td>from 27.9 MHz to 29.9 MHz</td>
</tr>
<tr>
<td>L10</td>
<td></td>
<td>option any freq. 1.8-30 MHz</td>
</tr>
<tr>
<td>L11</td>
<td></td>
<td>option any freq. 1.8-30 MHz</td>
</tr>
</tbody>
</table>

* Optionals  * **** Auxiliaries

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 which 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 down, 10 minutes.

To use a radioteletype writer (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

A 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 minutes of transmission and few minutes of stand-by or reception, in a high ambient 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.
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 supplies 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 RFC4, 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.

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.

Locate 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 dedicate 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.
### TROUBLESHOOTING HINTS

<table>
<thead>
<tr>
<th>TROUBLE</th>
<th>COMMON CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
| 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 |
| 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 by 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.