

OPERATING MANUAL

ME500-H/-F/-V/-U, ME750-H/-F/-V/-U
ME1200/1500-H/-F/-V/-U

LINEAR AMPLIFIERS
LED BARGRAPH FRONTPAGE VERSION

M+E

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ATTENTION!

Please read this manual carefully before operating the equipment!
The Linear Amplifier is easy to use, and damages can be avoided by following the instructions stated below. Incorrect use may cause the loss of warranty.

1.0 GENERAL OVERVIEW

The Linear Amplifier is produced by M+E Mechanics & Electronics Inc.

During the design of the ME series, the main point was to construct Linear Amplifiers for HF, VHF, and UHF amateur bands with similar mechanical measures and appearance, using ceramic valves easily available on the market.

The ME500-1500 4 LED bargraph frontpage series utilises the advantages of the ceramic valve, and considering the power output and price, is a worthy competitor of similar equipment on the market. The Amplifiers are protected by modern circuits,- specially designed and used only by our company,- providing a very high level of protection. With their low input power and high efficiency they fulfil the requirement of an improved amateur station.

To use the Amplifier with satisfaction and utilising all it's advantages, please read the following general instructions carefully:

- 1.1 Do not use higher driving power as given in the instruction manual. During SSB transmission the 'MIC GAIN' control of the TCVR is not fit for the TCVR is regularly activating the protection of the Linear.
 In case of lately designed equipment the output power of the TCVR is control of the radio.
- 1.2 The SWR protection of the Linear is inactive during STBY mode.
 In case the SWR > 1:3 in QRO mode, the protection is active, the PA can be use only with Antenna Tuner.
- 1.3 The required power supply is 230V 50Hz according to the EU standard. Verify that the rating of the line fuses located in the rear panel fuse holders is suitable for the AC line voltage you will be using. The fuse should be the glass cartridge slo-blow type. The rating should be 10-12 Ampere by 230V AC.
- 1.4 The Amplifier is constructed with a forced air cooling. Free air movement has to be provided and considered during positioning.
 Do not operate the Amplifier in excessively warm locations or near heating vents or radiators. Be sure air can circulate freely around and through the Amplifier cabinet, and can provide an unobstructed air inlet for the internal cooling fan. Do not place any books, magazines, manuals, or equipment that will impede the free flow of air near the sides and the hot air exhaust holes located on the top of the cabinet. The internal fan allows an air flow of approximately 100-180m³/hours. The exhaust air becomes quite warm at high power levels. Do not position any heat-sensitive objects in the exhaust airflow path.

1.5 The PA is constructed with the following protection circuits and useful features:

- Heat up time checking circuit (3 min)
- Protection circuits (Ia, Ig1, temp, SWR>3, overdrive)
- Temperature dependent ventilating speed control
- Cooling fans (2 pcs)
- Function and status indicator LEDs (6 pcs)
- OPTO coupled PTT switch
- 4 LED bargraph in new front page version (FWD, RFL, Ig1, Ia, Ua, tmp)
- Built in PS and RF relays

2.0 SPECIFICATIONS

ME500-V

Frequency coverage	144-146 MHz	
Operating modes	ALL mode	
Output Power	600 W pep	SSB
Driving Power	0-30W max.	
Input WSWR	max 1:1.5	
In/Out impedance	50 Ohm	
Valve(s) T/R System	GI46B opto 12V/8mA appr.	OPEN COLL. OK
Harmonic suppression	>50dB	at 400W RF out
Intermodulation	>35dB	at 400W RF out
Protection	$I_a > .5A$ $I_{g1} > 150mA$ $VSWR > 3$ $Temp > 75C^{\circ}$ Overdrive > 30W	
Dimension	410X185X300 mm	
Weight Mains	24kg 230V/10A 50/60 Hz	

3/a FRONT PANEL

1. POWER ON

Main switch of the equipment.

2. ON LED

The LED indicator glows when the Linear is switched on. Doesn't lit in case the 15V DC – supply for the protection circuits and antenna switch - is missing.

3. OVR LED

The blinking LED indicates the active stage of the protection circuit. The protection might be active due to overdrive, IG1 higher as specified, SWR > 3, or any other case. (See specifications)

If the protection is active, the TCVR power by-pass the PA. To reset the protection release the STBY SWITCH, than push it again. The reason of the trouble has to be cleared first.

4. AIR LED

The indicator glows while transmitting and the T/R relay is switched on. Without driving power the PLATE meter indicates the base current of the PA.

5. OPR LED

Glows when the PA is ready for transmission. During heating up period, when the LED doesn't lit, the driving is blocked. The stby time is >120 sec.

6. WAIT LED

Blinking during the heating up period, indicating that the heating is in progress. Required time is > 120 sec, when the light goes out and the OPR led lit up.

7. QRO LED

Indicates the high power mode of the PA. Can be activated by the STBY/OPR switch. In case the mode is not active, only the TCVR power is on the aerial. (Small PWR STBY mode)

8. STBY SWITCH

The PA can be driven only if switch is on OPR, otherwise the TCVR power by-passes the PA (STBY). In case the overload protection is active, switch to STBY, and switch to OPR again.

9. RF FORWARD POWER BARGRAPH

Indicate RF output power in KW.

10. REFLECTED POWER BARGRAPH

Indicate the reflected power in Watts.

11. Ig1/TEMP BARGRAPH

Indicate grid 1 current, when you push the TMP pushbutton indicate outlet air temperature in Celsius.

12. Ip/Ua BARGRAPH

Indicate the I_a current. When you push the HV pushbutton indicate the U_a voltage in KV.

13. Tune knob

Tuning knob of the anode plate capacitor. Use for tuning the PA for max output.

3/b REAR PANEL

1. **230V**
Power cord fit for standard 230V-50/60Hz mains. The colour of the protective earth is green/yellow.
2. **FUSE1-2**
Main fuses, 230V max. 10A,MAX 12A.
3. **FUSE3**
Cathode fuse of the power tubes.
4. **FUSE4**
Fuse for the 18V AC. Value range 1.6A.
5. **FAN 1**
Cooling fan for the main transformer. 12V - 0.2A DC.
6. **FAN 2**
Cooling fan for the power valves. 12 - 18V/ 0.3A DC, or 230V AC 18W.
7. **PTT**
Connection for PTT RCA. The relays are closed by earth connection. Low voltage, low current opto entry. Fit for open collector control as well (15V, 10mA;24V 10mA on case HF PA's).
Use a sequencer circuit for long life of coaxial relays!
8. **INPUT**
Input connection for the driver TCVR. 50 Ohm ("N" connector, SO239 on case HF PA's).
9. **OUTPUT**
Aerial connection. 50 Ohm ("N" connector, SO239 on case HF PA's).
10. **GND**
Ground connection.
11. **ALC**
ALC output, maximum level -10V. (only HF PA's, if you need,option).

4.0 INSTALLATION

- 4.1 Connect your TCVR to the Linear using a short, 50 Ohm coaxial cable.
- 4.2 Connect your TCVR ground giving socket to the PTT RCA socket on the rear panel of the Linear, using a screened cable.
In case your TCVR has an open collector PA controller output, you can use it without difficulties. This RCA give 15V DC, 10mA. (24V 10mA on case ME1200-H)
- 4.3 Connect your aerial to the OUT connector of the Linear. VSWR must be better than 1:2.
- 4.4 Using a flexible cable at least 6mm², connect your PA to a suitable grounding point and to the grounding point of the transceiver.
- 4.5 Connect the power cord to the mains and switch on the equipment. The ON led glows and the WAIT led start blinking for a period of > 120 sec, during the heating period.
The readiness of the Linear is indicated by the OPR LED. If the PA was out of use for a longer period (2- 3 month), it would be advisable to keep the PA heated without driving for a few hours.
- 4.6 When the OPR LED is light push on the OPR switch. The PA is ready to work.
- 4.7 Using the tuning mode of the TCVR (CW) give driving power to reach 200-400 mA indication on the Ip bargraph. Tune for maximal output power with TUNE knob. Increase the driving power until maximum anode current, than carry out fine tuning using the TUNE knob. You can indicate the reflected power on RFL LED bargraph.

REMEMBER THIS AMPLIFIER DOES NOT REQUIRE MUCH DRIVE POWER. SO START WITH LOW DRIVE POWER, AND THEN TUNE TO RESONANCE AS OUTLINED ABOVE. OTHERWISE, ARCING MAY OCCUR INSIDE YOUR AMPLIFIER.

NEVER RUN YOUR AMPLIFIER FOR ANY SUSTAINED PERIOD WITH A SCREEN CURRENT READING GREATER THAN SPECIFIED. IF YOU DO, POSSIBLE DAMAGE AND FAILURE OF THE TUBE(S) WILL RESULT, AND THEY WILL NOT BE COVERED BY WARRANTY!

- 4.8 Check the grid 1 current . Reduce the driving power or make fine tuning in case the grid current would exceed THE SPECIFIED VALUE!
- 4.9 During SSB transmission the peak power of the TCVR may exceed the allowed maximum driving power of the transceiver! Use The POWER knob on the TCVR in this case.

5.0 TROUBLESHOOTING

Malfunctions are mostly due to improper handling, overload or similar reason.

5.1 Do not use higher input power as stated in the specification. The grid protector circuit will usually safe the power valves, but OVERLOAD alarm will appear regularly. This may happening often in SSB mode, especially in case of old transceivers, when the output power in SSB mode is not adjustable. The 'MIC GAIN' knob is not fit for power reduction!

5.2 INPUT SWR

The input SWR of the Linear is max. 1:1,5.

A well adjusted TCVR will tolerate these values without any trouble.

5.3 OUTPUT SWR

The protection of the Linear will block the transmission in case the SWR of the aerial exceed 1:2.

5.4 FAILURES

- The PA not turn on, nothing happens ON switch is pushed.
 - External AC wiring, fuse or circuit breaker may be open.
 - Amplifier power connector not in place - cover safety interlock open.
 - Fuse F1, F2, F4 open or missing - check fuses with an ohmmeter.
- The PA turns ON but no HV is indicated by the LED bargraph.
 - Possible HV circuit fault.
 - Fuse in power supply damaged.
- No idle current when you push the PTT (about 100 mA on the IP bargraph).
 - No Ua voltage. Check the protection resistor on side of RF box or fuse on HV PCB. (6,8 Ohm, 1.25A) Check F3 catode fuse of tube in the rear panel.
- The idle current is too low or too high.
 - Check the Q1 (BD249C transistor and the zener stabilizer unit on UCU-01 PCB, you can set the needed value with poti P6). Please set 80- 100mA idle current. Check Q7,Q8 transistors on UCU-01 board if you not able to set the idle current.
- You can indicate normal Ip current on LED bargraph when drive PA but no output power.
 - Check the output coaxial relay.

5.5 LIMITED WARRANTY

The M+E *Mechanics & Electronics* will warrant that the equipment will perform substantially in accordance with the written materials for a period of 12 month from the date of receipt and will be free from defects in material and workmanship under normal use. This Limited Warranty is void if failure of the equipment has resulted from accident or misapplication, any kind of modification done, overvoltage, shipping, and in case the damage of the power valve(s).

Warranty repairs done only on the base of the M+E *Mechanics & Electronics*. Return cost will be covered by the owner.

5.6 ALWAYS THINK - SAFETY

THIS LINEAR AMPLIFIER DESCRIBED IN THIS MANUAL CONTAINS VOLTAGE HAZARDOUS TO HUMAN LIFE AND SAFETY WHICH IS CAPABLE OF INFLICTING PERSONAL INJURY. NEVER OPERATE THE AMPLIFIER WITH THE TOP COVER REMOVED AND THE TOP COVER SAFETY SWITCH DEFEATED. BEFORE REMOVING THE TOP COVER MAKE SURE THE AC LINE POWER CORD HAS BEEN DISCONNECTED FROM THE AC POWER SOURCE. ALLOW A MINIMUM OF 5 MINUTES TO ELAPSE BEFORE REMOVING THE TOP COVER AFTER POWER HAS BEEN REMOVED. THIS IS NECESSARY TO ALLOW THE PLATE VOLTAGE FILTER CAPACITORS TO BLEED DOWN TO A SAFE LEVEL.

Before operating this unit ensure that the protection conductor (green/yellow wire) is connected to the ground (earth) protective conductor of the power outlet. Do not defeat the protective features of the third protective conductor in the power cord by using a two conductor extension cord or a three-prong/two-prong adapter.

Before operating this unit:

- 1. Ensure that the instrument is configured to operate on the voltage available at the power source. (See Installation Section)**
- 2. Ensure that the proper fuses are in place in the amplifier's AC line fuse holders located on the rear panel.**
- 3. Ensure that all other devices connected to or in proximity to this amplifier are properly grounded or connected to the protective third-wire earth ground.**

If at any time the amplifier shows visible damage, has sustained stress, emits a foul smell, fails to operate satisfactorily, it should not be used until its performance has been checked by qualified service personnel.

Connect a good earth or water pipe ground to the ground post on the rear of the Amplifier. Use the heaviest and shortest connection possible. Before you use a water pipe ground, inspect the connections around your water meter and make sure that no plastic or rubber hose connections are used. These connections interrupt the continuity to the water supply line. Install a jumper around any insulating water connectors you may find. Use heavy copper wire and pipe clamps.

It is best to ground all equipment to one point at the operating position and then ground this point as described above.

5.7 SAFETY INTERLOCK SWITCH

While the Amplifier's top cover is in place, the interlock switch closes to allow AC line voltage to reach the power transformer. When the top cover is removed, the interlock switch opens and disconnects the line voltage. This does not discharge the bank of power supply filter capacitors. Be sure to allow the filter capacitors to discharge before you touch anything inside the Amplifier. You can select the High Voltage function of the Multimeter to check the high voltage potential.