

eb104.ru™

**User's Guide**

**Transistor**  
**HF Linear Power Amplifier 500W**  
**5" LCD control**

Model EB500+

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## Introduction

Before using the EB500+ HF linear power amplifier carefully read this manual and the other documentations that came with your amplifier. This allows you to reduce the risks of the product's failure.

EB500 - is a transistor HF linear power amplifier designed for use with amateur radio stations. The features of the EB500+ amplifier are:

- ready for instant operation;
- compact size, light weight;
- no need for component replacements due to wear and tear;
- increased service life;
- absence of high voltage in the high frequency parts;
- automatic control of the operation process

## Operating Precautions for the EB500+

For the proper operation of the power amplifier, it is necessary to observe the following precautions:

- Do not operate the amplifier without a proper electrical grounding system;
- Connect the radio transceiver to a ground system so as to provide the most efficient and stable operation of all the equipments of the amateur radio station. This will reduce potential noise and RF interference;
- It is necessary to switch off the amplifier in order to eliminate the causes of the emergency stop after repeated triggering of the amplifier's protection systems. The repeated activation of the protection devices may damage the expensive MOSFET transistors;
- Do not adjust or tune a matching device installed between the output of the amplifier and the antenna with power that exceeds 30 W, i.e.: 10% of the maximum output power of the amplifier;
- To work in RTTY / FM/Digital mode, you need to lower the output power of the amplifier to 50% of the output power level required for CW / SSB mode;
- Do not drop the amplifier. The mechanical shock due to the impact on the product's casing as well as the possible entry of foreign objects - can lead to the failure of the electronic components of the EB300 power amplifier.

## EB500+ Amplifier Features

The built-in potentiometers in the power protection and BIAS voltage control circuits were adjusted in the correct position during the setup and testing of the equipment. Any spontaneous change in the position of the potentiometers will result in having to re-configure the amplifier using precision instruments.

Before using the power amplifier, you must connect a dummy load of 50 Ohms at 500 Watts or a properly matched antenna system to the antenna output connector. The improper load of the amplifier, however, may not have a negative effect on the output RF transistors (due to the high SWR protection circuit).

For the output power of 500 W, the input power level should be 20 watts. Do not use transmitting devices with a capacity of more than 20 watts with the amplifier.

The operation is designed for 50 ohms impedance. Use antenna-feeder devices with the value of 50 ohms and an SWR that does not exceed the value of 2.0: 1 on all frequencies as much as possible. The operation of the amplifier is possible without any additional matching devices. However, if the SWR is greater than 2.0: 1, it is recommended to use additional matching devices.

Two high-quality SD2933 MOSFET transistors manufactured by Microsemi are installed in the output stage of the power amplifier (see Table 1).

The power rating of a SD2933 transistor (!) - is 300 W at a frequency of 30 MHz. The Broadband Power Amplifier features makes it completely ready to use after selecting the operating range, without any further need of matching at the final stage. The peculiarity of these transistors is the relatively high bias voltage for class AB, which allows disabling it to almost zero power output. This makes it possible to ensure the maximum performance protection of the transistor from breakdown due to a high VSWR value of the antenna and in other critical situations.

The use of High Linearity SD2933 transistors also yielded an IMD<sub>3</sub> of -36 dBc.

The power amplifier is equipped with special high-speed protection circuits. For example, on the excess of output power, high SWR at the antenna, limiting the level of excitation (input) voltage, overheating, etc.

To control the working parameters of the power amplifier there is a digital meter that displays the amplifier's output power level the SWR value.

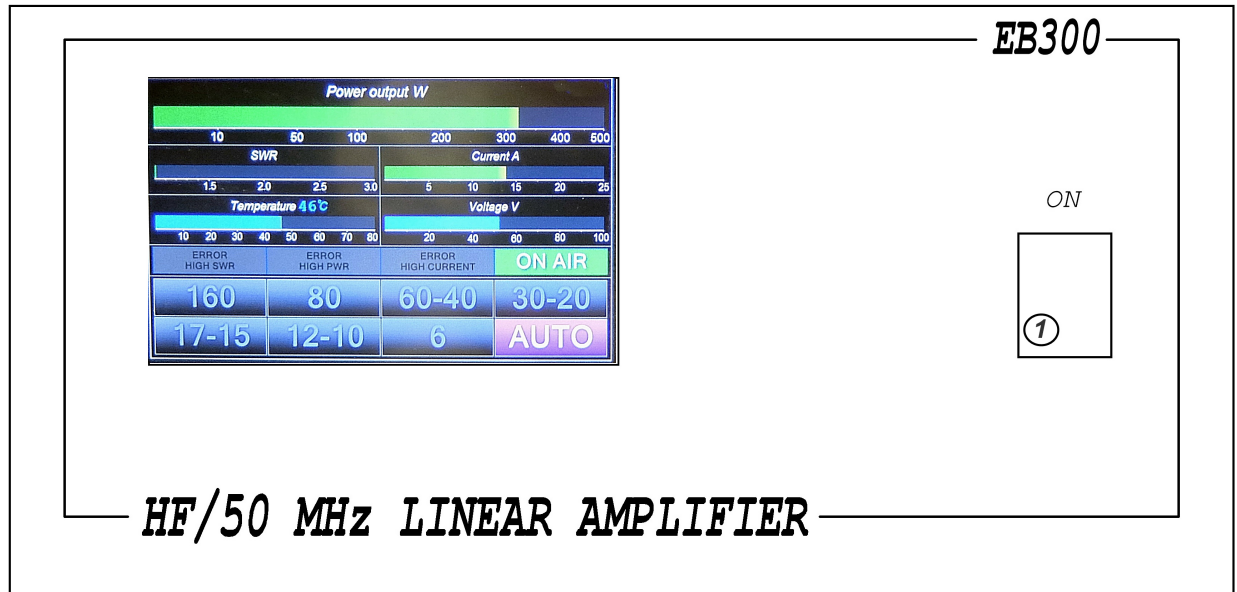
## EB300 Specifications

Frequency range	1,8 - 54 MHz (including WARC)
Types of radiation	SSB, CW, RTTY
Input Power	20 W
Output power	500 W
SWR max.	2.0: 1
Supply voltage	48-53V, +13,8V (1A)
Current consumption	10-12 A
Input impedance	50 ohms (unbalanced)
Output impedance	50 ohms (unbalanced)
Input / Output connectors	UHF SO-239
Amplifier circuit	push-pull, class AB
Output/Final stage transistors	2xMOSFET

Equipment:

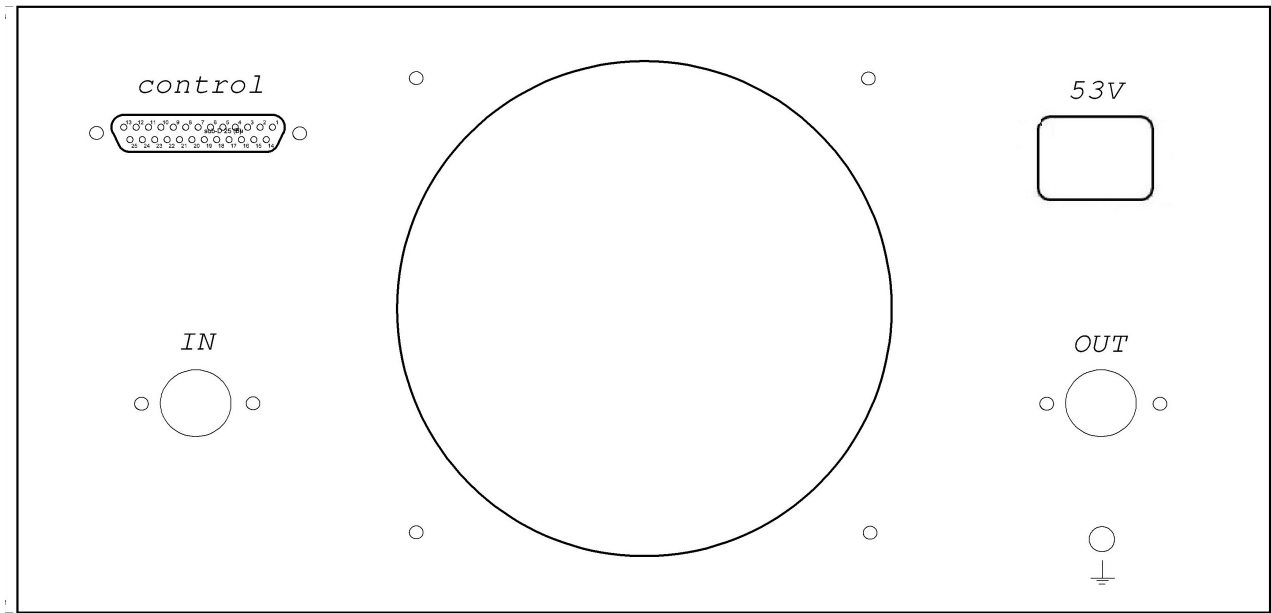
HF power amplifier EB500+	1 pc.
Power cable	1 pc.
SunSDR2 control cable (optional)	optional
User's Manual	1 pc.

## Front Panel Description



1. 1. Key switch on and off the power amplifier.
2. 2. Indication and control:
3. Power output W - power output indication
4. SWR - SWR level
5. Current A - current in amperes
6. Temperature - amplifier temperature in degrees Celsius
7. Voltage V - Volt supply voltage
8. Error HIGH SWR - lights up red when the protection is turned on when the permissible SWR is exceeded
9. Error HIGH PWR - lights up red when the protection is turned on when the permissible output power is exceeded
10. Error HIGH CURRENT - lights up red when the protection is turned on after exceeding the permissible current
11. ON AIR - green in transmit mode
12. 160 - 1.8 MHz
13. 80 - 3.5 MHz
14. 40 - 7 MHz
15. 30-20 - 10/14 MHz
16. 17-15 - 18/21 MHz
17. 12-10 - 24/28 MHz
18. 6 - 54 MHz
19. AUTO - automatic range switching mode when using an external device (automatic decoder)
20. Turn the amplifier off and on again to reset the protection circuit.

**Rear Panel Description**



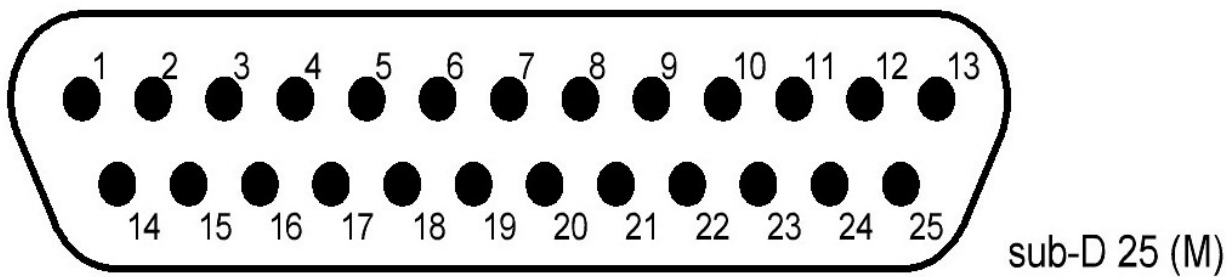
OUT – RF connector for antenna

CONTROL – connector for supplying linear power amplifier control signals (band decoder or LPF frequency selector setting).

IN – connector for the coaxial cable from the transceiver

50V – connector for power supply 48-53V (10 to 12 A)

**Control Cable Connector**



**Pins Descriptions of the Control Terminal**

Pins	Wiring Description
1	160 M. Selects LPF 160M Band when connected to ground
2	40 M. Selects LPF 40M Band when connected to ground
3	6 M. Selects LPF 6M Band when connected to ground
4	15 M. Selects LPF 15M and 17M Bands when connected to ground
6	80 M. Selects LPF 80M Band when connected to ground

8	20 M. Selects LPF 20M and 30M Bands when connected to ground
9	10 M. Selects LPF 10M and 12M Bands when connected to ground
15	PTT switch. Transmit Mode when connected to ground
12,13	+13.8V
22,23,24,25	Ground

## EB300+ Power Amplifier Protection Circuits

### 1. Overheating Protection

In case of excessive temperature of more than + 50 ° C, the inner surface of the cooling radiator will trigger a bimetallic thermal switch, located on the radiator (heat sink) to engage the forced cooling mode. In case of excessive temperature of more than + 65 ° C, the inner surface of the cooling radiator will trigger another bimetallic thermal switch and PTT line will be disconnected. The power amplifier cannot be turned on again until the radiator cools back to the normal temperature. Wait until the heat sink has cooled down and switch on the amplifier.

### 2. Excessive Allowable Maximum Output Power Protection

If the RF output voltage level exceeds a set threshold, the protection circuitry mounted at the EB300 output will be tripped. The protection warning LED marked **P** lights up .

### 3. High SWR Protection

If the SWR of the load exceeds the value of 2.0: 1, it will trigger the protection system. The protection warning LED marked **SWR** lights up.

In the case of tripping, be sure to check the antenna VSWR. If you cannot match the antenna, it is efficient to use an antenna tuner.

### 4. Excessive Allowable Maximum Drain current Protection

If the Drain current level exceeds a set threshold, the protection circuitry mounted at the EB500 output will be tripped. The protection warning LED marked **I** lights up .

**Attention!** To reset the amplifier to normal operation, turn off the power button «power» and turn it on again after 3-5 seconds. Restarting the system does not apply to the safety shutdown of the amplifier caused by excessive temperature. The hysteresis thermal switch will enable the amplifier to be switch on when the radiator (heat sink) will cool down to + 45C.

