



Instruction Manual

OM2500 HF



SHORTWAVE POWER AMPLIFIER WITH GU84B

General description of the short wave power amplifier

The linear power amplifier is designed for all short wave bands 1.8 to 29 MHz (including WARC - bands) and all modes.

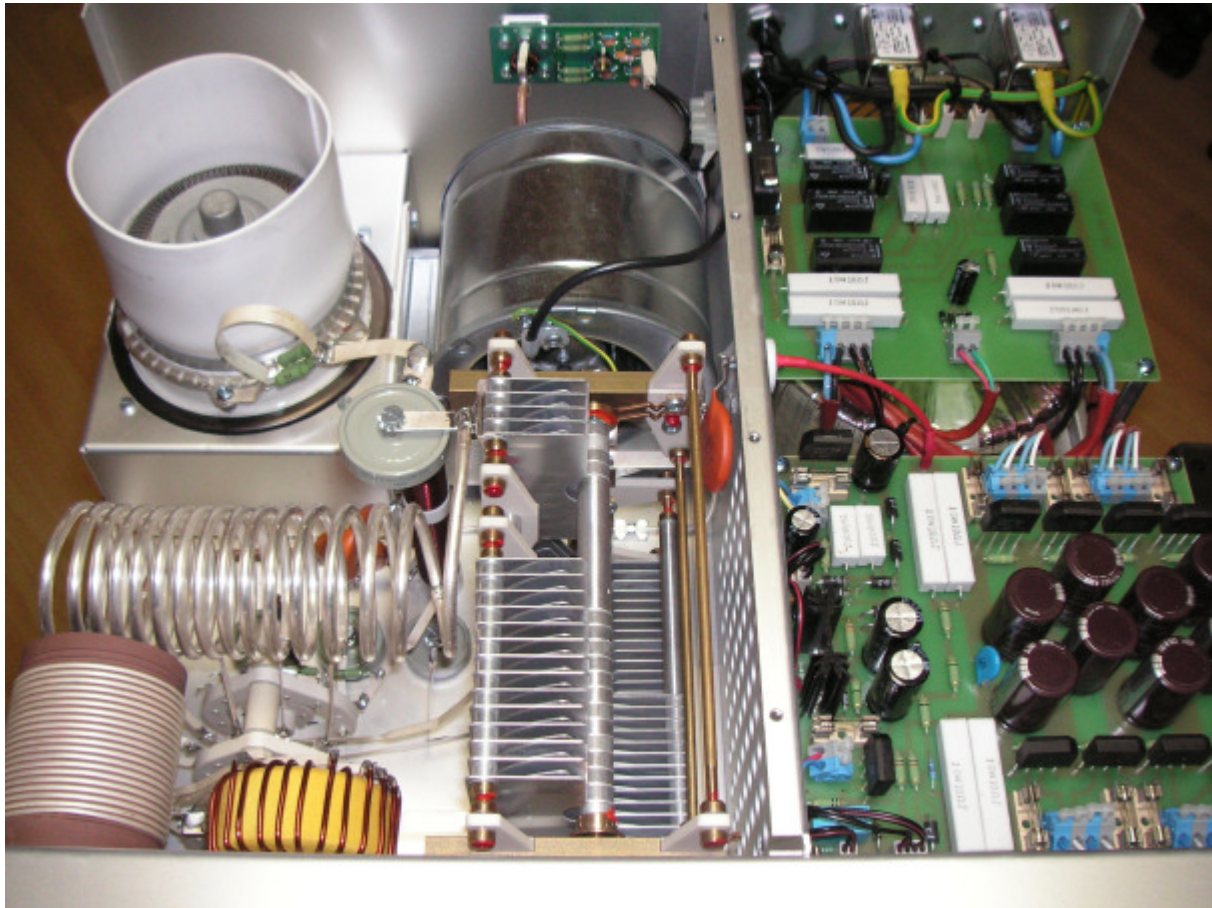
A Russian GU84b tetrode is used to generate power output up to 2700W.

That's PEP of more than 4 kW !

Characteristics:

Frequency:	1.8 – 29.7 MHz (incl. WARC)
Power output:	2 500 W in CW and SSB 2 000 W in RTTY, AM and FM
Power input:	40 to 60W for full Output
Input resistance:	50 Ohms VSWR < 1.5:1
Power amplification:	typically 16 dB (= factor 40)
Output resistance:	50 Ohms asymmetrically
Maximum output – SWR:	2:1
SWR-protection:	Automatic switching to STBY, when reflected power is 350W or higher.
Intermodulation distance:	36 dB below nominal power
Suppression of harmonics:	< -55 dBc
Tube:	Ceramic GU84b tetrode
Cooler:	Centrifugal blower
Power supply:	230 V - 50Hz, one or two phases
Transformers:	2 pieces of toroidal transformer, 2 kVA each!
Protection circuits :	<ul style="list-style-type: none">- SWR too high- Anode current too high- current at screen too high- mistuning of power amplifier- Soft start for protecting your fuses- “switch-in blocking” at opened amplifier
Bar graph indications :	<ul style="list-style-type: none">- Power output (Bar graph 50 LED)- Reflected power (Bar graph 20 LED)- Current at screen (Ig2 - Bar graph 10 LED)- Anode voltage, anode current, tuning (Bar graph 30 LED)
LED indications:	Current at control grid (Ig1 - 2 LED) WAIT – preheating of tube (150 sec) STBY - standby OPR - operating condition FAULT - failure, switching off for abt. 4sec
Dimensions:	485 x 200 x 455 mm (B x H x D)
Weight:	38 kg = 84 pounds

General Description of OM2500 HF POWER AMPLIFIER



Top view of the opened amplifier

HF PART

In this amplifier a tetrode GU 84b is used in a grounded-cathode circuit (input into control grid). This amplifier achieves excellent linearity by the voltage stabilization of the control grid bias and the screen voltage. The power input is given to the control grid, using a broadband power transformer with an input impedance of 50 Ohms. This input circuitry ensures a good input SWR of lower than 1.5:1 on all short-wave bands.

The output of the amplifier is a Pi-L circuit. The ceramic capacitor for TUNE and LOAD was specially made for this amplifier ! This enables the amplifier to be tuned exactly and makes it possible to easily return to the previously set positions after band change.

POWER SUPPLY

Power supply of the amplifier is effected by two 2kVA toroidal transformers. A soft start is realized with the help of relays and resistors.

The high anode voltage consists of 8 times 300V and 2A. Each of them has its own rectifier and filter. In the high voltage circuit safety resistors are employed so protect the amplifier

against overload. The screen voltage is stabilized by a MOSFET circuit with IRF830 and delivers a voltage of 360V at 100mA.

The -120V for the control grid is stabilized by means of zener diodes.

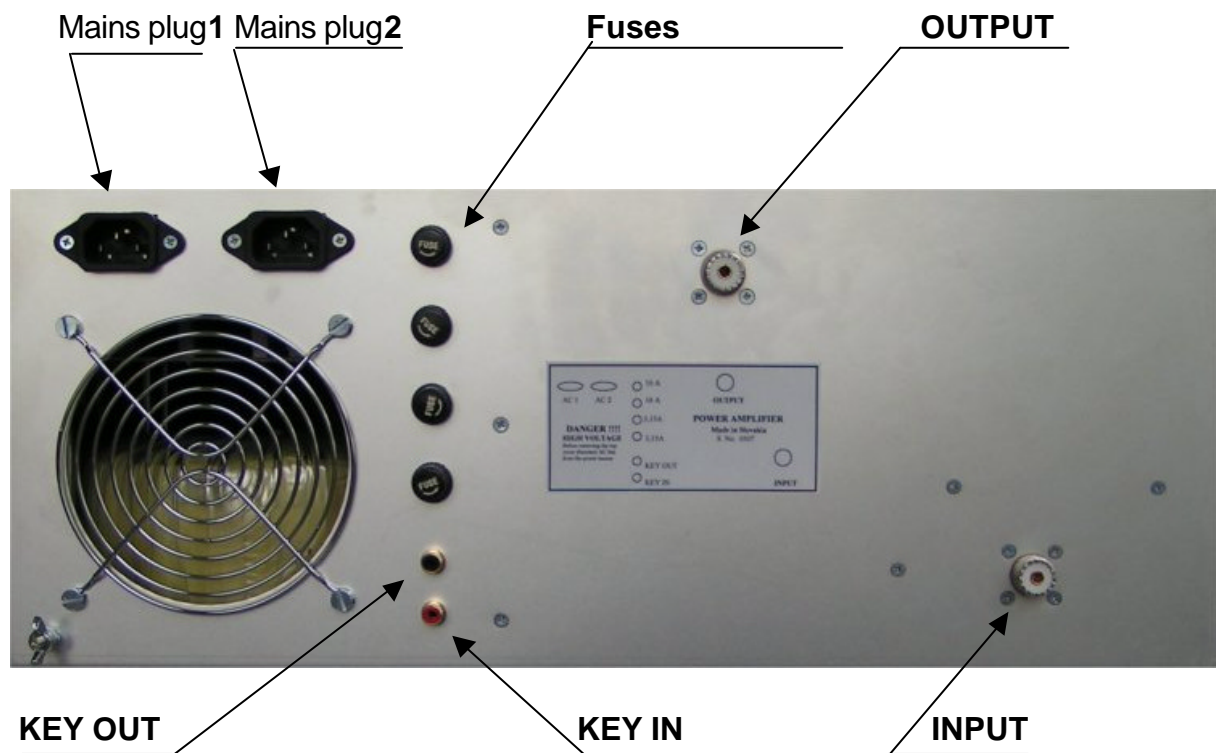
SAFETY DEVICES

Safety devices and the corresponding indicators ensure proper operations and prevent the malfunctioning of the power amplifier. They are placed on a separate printed board behind the front panel.

Putting the power amplifier into operation

Coaxial cable

The output of the transceiver is to be connected with the input of the amplifier via RG58 or a similar cable. For the connection between the power amplifier and the antenna RG213 or a similar coaxial cable suited for this high power is to be used. For INPUT and OUTPUT PL-259-sockets with Teflon isolation are used.



Rear view of the amplifier

Control cable

With the control cable (included if you buy an OM2500) you switch from reception to transmission. The cable is shielded. On the side of the power amplifier an CINCH-socket is used. On the side of your transceiver you have to use the socket, which belongs to your transceiver. During transmitting the middle pin is connected to the ground.

The relays of the power amplifier have to be switched earlier than HF is applied (cold switching).

Modern transceivers have a time delay between PTT switching and power output.

If you use older transceivers or transmitters without time delay we recommend to connect the PA in such a way that the transmit / receive switch is connected with the KEY IN socket of the amplifier. The KEY OUT socket is to be connected with the PTT socket at the transceiver.

The amplifier is equipped with two safety devices, which ensure that the Output relay is not switched over under power mistakenly (hot switching).

MAIN SUPPLY:

The amplifier is connected to the mains with 2 cables. Each cable is to be switched to another phase of your main supply system !

Both of them have to be able to deliver a power of 2.5 kVA !

If you use only one phase, you have to connect both cables to this one phase ! Your main supply has to be able to deliver 4.5 kVA on this one phase ! In this case the power amplifier can't deliver the full output!

ATTENTION:

In each case the power amplifier has to be connected to your main supply system with the 2 cables ! Normally the amplifier is used at 2 phases. If there is only one phase give the 2 cables to this one !

Grounding

The amplifier has to be grounded properly ! Connect the screw at the rear panel of the amplifier to your local grounding system with a copper-cable, use a cross-section of 4 mm² at least.

Connect your transceiver to the same grounding system of your shack carefully !

If you use a power amplifier with higher output you have to be aware that your grounding system works properly. **All parts have to be grounded to the same system.** Use short cables and make sure that there are good contacts ! Otherwise you run the risk of damaging your equipment, having problems with TVI/BCI or your signal may be distorted.

Cooling

The centrifugal blower provides the necessary cooling of the amplifier, even during long contests !

If you want to use modes like AM, FM, RTTY or digital mode with transmitting longer than 5 minutes you have to add an additional blower. This blower has to be mounted at the ventilating aperture at the rear .

Operating elements (see photo)

- BAND -** band selector switch
- TUNE -** Anode capacitor for tuning, tuning of higher frequencies to "0", lower frequencies to „100“.
- LOAD -** Output capacitor tunes antenna load resistance to amplifier. Capacity is low at „0“ and high at "100" on the scale.
- OFF -** You switch off the amplifier by pressing this button.
- ON -** You switch on the amplifier by pressing this button. Heating of tube is on and after 3min of delay the amplifier will be ready for operation.
- OPR/STBY -** „OPERATE“ you will be ready for operation. At STBY, if WAIT-LED is on or the amplifier is off your transceiver is in bypass-mode directly connected to antenna. Maximum 200Watts ! 400Watts version is possible (FT9000). Please tell us at order !

RF OUTPUT - Bar graph – shows output power .

REFLECTED

POWER- Bar graph – shows reflected power of the antenna. 350W maximum or amplifier switches to STANDBY-mode

TUNING

The amplifier is operated in class AB. Thus its possible to obtain a maximum output power and an excellent linearity. For this purpose the amplifier has to be tuned carefully.

The operation of a mistuned PA will cause malfunctions, the increase of grid current (the GRID-MAX-LED will light up) and problems with TVI/BCI.

The grid-current is shown with 2 LED. Its normal if the green LED is flashing or may be shining a little bit. If you increase the output power the grid current is increasing very small and the red GRID-MAX-LED is shining. You have maximum output power if this LED lights up from time to time. If the red GRID-MAX-LED lights up with full intensity, you have overloaded the amplifier and must decrease the output.

In SSB you will have a good output power if the green LED lights up a bit and the red LED is only flashing at the highest peaks of your voice. The current of screen grid is measured and shown in a Bar graph indicator. The amplifier has to be tuned in such a way that the current is between - 30 mA to +50 mA. At currents beyond this values the operating point will be shifted and IM-products will be generated. If a value of + 70mA is exceeded, the safety devices will switch the amplifier to STBY mode.

Tuning instruction :

Please note :

Before starting tuning you have to check if the right antenna or a 50 Ohms load resistance is connected at the antenna output !

Switching on the amplifier:

- put the switch at the multimeter to HV position
- put the OPR/STBY switch to STBY position
- press the „ON“ button

Within the amplifier operation is prepared with the following steps:

- the toroidal transformers are switched step by step.
- the blower of tube is switched on.
- the multimeter bar graph measures the high voltage; the normal value is 2.4-2.8 kV
- the WAIT LED lights up

After switching on you have to check the functioning of the blower. Air must be blown out of the ventilating apertures above the tube.

(If there is any failure you have to press the „OFF“-button immediately !)

Heating the tube takes about 150 seconds. After this time the WAIT LED goes out and the amplifier is ready for operation.

Tuning the amplifier to an output of 2500W

1. A tuning table is delivered with the amplifier. Select a band with band switch and choose the setting of "TUNE" und "LOAD" according to your table.

(You will find my tuning table at: www.dl3jj.de/etunetable.html !)

Band	Tuning	Load
1.8	70	40
3.5	75	30
7	30	85
10	25	45
14	70	70
18	32	50
21	25	60
24	60	66
28	40	70

**The tuning table available to you is made by using a dummy load!
Each amplifier will have other values depending on used
frequency and antenna! Make your own list for your own
antennas!**

Use tuning position (see later)!

2. Reduce the power output of your transceiver to the **minimum!**
3. Switch **OPR/STBY** to „OPR“ position (OPR LED lights up)

4. Choose **TUNE** position of multimeter.
5. Use **CW** and give about **10W** (OUTPUT PA abt. 500W)

Please note!

If the input power is higher than 15 W and the power amplifier is not correctly tuned, the safety devices will switch to STBY for about 4 seconds!

After switching off the PTT, the amplifier will automatically switch back to OPR mode after approximately 4 seconds.

6. Set TUNE in such a way, that the TUNE-LED lights up maximum left.
7. Set load in such a way, that the TUNE LED on the TUNE scale lights up under the "V" sign. If it is possible to obtain the LOAD in 2 positions, set the position that the father to the right.
8. Repeat tuning several times according to 6 and 7.
9. Increase the input power until an output power of approximately 2500 W is reached. (You will need abt. 50W input)
10. Repeat this operation two times according to 6 und 7.

Then the amplifier will be tuned correctly and ready to deliver 2500 Watts of HF power in CW und SSB to your antenna.

If you use modes like AM, FM, RTTY or digital modes, please use „only“ 2000 Watts!

If you use more than 2 kW, the red LEDs of OUTPUT - POWER will light up.

Please note: Shoned the amplifier exhibit any malfunctions during tuning or should it not behave in accordance witch the description, interrupt the tuning procedure immediatly and check the amplifier!

Be sure to have not done any mistakes in choosing bands or TUNE/LOAD values!

**Be sure that SWR is not higher than 1:2 and input power is LOW!
After cancelling human mistakes you will be able to work for long time with this amplifier!**

Indication of fault conditions

OM3500 HF has the following indication LED on the front panel:

GRID MIN	- indication of first grid current
GRID MAX	- max. First grid current exceeded
HV	- measuring of anode voltage by bargraph
IP	- measuring of anode current by bargraph
FAULT	- fault
OPR	- amplifier in operation mode
STBY	- amplifier in standby mode
WAIT	- heating of tube after switching on the amplifier

Should a fault condition appear during the tuning or operation of the amplifier the safety circuits of OM3500 HF will react. The amplifier will be turned to STBY mode. After approx. 1 sec the control circuits will switch the amplifier back to OPR. If the fault will repeat 3 times after each other the control circuits will turn the amplifier to STBY. Bringing the amplifier to OPR is enabled by using the OPR/STBY switch.

After the reaction of safety circuits the FAULT LED will be lit up for approx. 5 sec depending on the nature of the fault.

Flashing LED signalizes:

IP	- anode current exceeded
HV	- low anode voltage
FAULT	- reflected output exceeded
GRID MAX	- first grid current exceeded
	- second grid current exceeded
GRID MAX + HV	- maximum load power exceeded
GRID MAX + IP	- zero output power during tuning
HV + IP	- tuning fault, incorrect tuning of the Pi-L output circuit

IMPORTANT WARNING

- The amplifier contains high voltage circuits. Never turn the amplifier on without the upper lid in place.
- The OM2500HF amplifier is not to be used in a wet or humid environment nor to be exposed to rainfall.
- The amplifier must be installed in such a way that free flow of hot air from the tube is allowed. The amplifier must not be installed in a constrained surrounding (i.e. tight shelves etc.)
- During long operation the upper lid and the vent grid of the amplifier can reach high temperatures that can cause burn injuries. Do not touch these parts of the amplifier during operation.
- The amplifier must be grounded during operation.
- During operation the amplifier must be installed in such a way that the rear power supplies are accessible.
- The amplifier can be operated only if both supply cables are connected. OM2500HF reaches optimal parameters when it is connected to 2 phases.
- Do not turn the amplifier on without having connected the antenna. A hazardous HF voltage may built up on the antenna connector after turning the amplifier on with no antenna connected.
- Before opening the upper lid of the amplifier make sure that both power supplies have been disconnected for at least 5 minutes allowing the electrolytic capacitors to discharge fully. Never turn the amplifier on without the upper lid in place.
- Make sure that all screws holding the case together are properly in place and tied before carrying the amplifier by the handles.

The amplifier is an A category product. In a household it can influence other electric appliances. In such cases the user is to take proper actions to mitigate this disturbance.

We are interested in any kind of response!
Please look at www.om-power.com for contact and send any kind of stimulation!

Thanks!

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