MADE IN SLOVAKIA

OM2000A+

SHORTWAVE PLUS 50 MHz POWER AMPLIFIER

WWW.OM-POWER.COM

OM Power, s.r.o. 93030 Báč 126, SLOVAKIA

Contact : +421 905 321 410

e-mail : om-power@om-power.com

TABLE OF CONTENTS

FCC ID: X8NX8NOM2000 for US Market

1. GENERAL INFORMATION

1.1. Introduction

The OM Power model OM2000A+ is designed for all short wave amateur bands from 1.8 to 29.7 MHz (including WARC bands) plus 50 MHz and all modes. It is equipped with a ceramic tetrode FU-728F.

1.2. Specification

1.2.1. Parameters

Frequency Coverage	Amateur Bands 1.8 – 29.7 MHz including WARC + 50 MHz
Power Output	2000+ W in SSB/CW on HF bands, 1500 W in CW/SSB on 6m
	1500 W in RTTY, 1500W for US models
Input Power	Usually 40 to 60W for full Output Power
Input Impedance	50 Ohm, VSWR < 1.5 : 1
Power Gain	15 dB
Output Impedance	50 Ohm unbalanced
Maximum Output SWR	3 : 1
SWR protection	Automatic switching to STBY, when reflected power
	is 350W or higher
Intermodulation distortion	32dB below nominal output
Suppression of harmonics	< -50 dBc ; <-70dBc on 50 MHz
Tubes	FU-728F Ceramic tetrode
Cooler	Centrifugal blower + Axial blower
Power supply	switchable 220V, 230V, 240V, 50/60 Hz or other primary
	voltages…. (200V 50/60Hz for Japan, 230, 240, 250V for US models)
Transformers	One toroidal transformer 3kVA
Dimensions	390 x 195 x 370 (width x height x depth in mm), 15.3” x 7.7”x 14.5”.
Weight	24 kg (53 lb)

1.2.2. Protection Circuits

There are several protection circuits used in the amplifier. They are activated when one or more of next parameters exceed defined values or some unwanted occasion occurs.

- VSWR too high
- Anode current too high
- Anode voltage error
- Screen current too high
- Screen voltage error
- Grid current too high
- Grid voltage error
- Heating voltage error
- Mistuning of PA
- Temperature to high
- Soft start for fuses protection
- "switch-on blocking " at opened amplifier

1.2.3. Features

The manufacturer implemented some of the company's newest development results with most wanted operating and safety features into this new model:

- High level of protection
- Memory for faults and warnings, easy maintenance
- Automatic set-up anode current (BIAS) – no need to adjust manually after changing the tube
- Three programmable working modes of the centrifugal blower (turbine) + axial blower
- Full QSK with silent relay
- Many operational parameters to display
- Easy transport due to detachable HV transformer
- The smallest and lightest 2000 W Power Amplifier on the market

1.2.4. The Advantages of OM2000A+

- Full compatibility with: ICOM, ELECRAFT, KENWOOD, TEN-TEC ORION, YAESU, Icom transceive protocol using by MicroHAM devices (CI-V output), FLEX Radios and Anan.
- RF sensitive, that is why the PA is usable also with radios, which doesn´t have CAT. By NO CAT using we recommend to use BAND DATA information due to the much faster band changing. Possibility of using BAND DATA information.
- Automatic switching between bands. Automatic tuning within the band according to segments.
- Automatic switching of Band Pass Filter – BAND DATA output compatible with YAESU radios (BCD code).
- Automatic switching of Antenna switches. The maximum number of antennas is 10, controlled by BCD output code.
- Remote control possibility (remote software as accessory – no extra price) **http://www.om-power.com/download/HF PA_Manager**

2. SAFETY INSTRUCTIONS

DANGEROUS HIGH VOLTAGE INSIDE!

The power amplifier is using high voltage up to 3200V DC, which is very dangerous for human life! Read next safety instructions carefully first, before you will start to install and operate power amplifier! NEVER VIOLATE NEXT RULES!

NEVER ALLOW CHILDREN to play around PA or to touch power amplifier or connected cables in working condition, or to push anything into the case holes!

Never turn the amplifier on without the upper lid in place. DO NOT ATTEMPT TO SHORT OR BYPASS safety switch under upper lid!

The OM2000A+ amplifier is neither to be used in a WET or HUMID environment nor to be exposed to RAINFALL!

Do not turn the amplifier ON without having connected the ANTENNA or properly rated DUMMY LOAD! A hazardous HF voltage may build up on the antenna connector after turning the amplifier on with no antenna or dummy load connected!

Before opening the upper lid of the amplifier make sure that power supply has been disconnected AT LEAST 10 minutes allowing the electrolytic capacitors to discharge fully. Disconnect power cord from the outlet!

Any work inside the PA (internal fuses replacement, tube replacement, etc.) can be carried out only by professionally qualified person!

CAUTION

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 time operation ventilation grid can reach high temperature. Do not touch it!

The amplifier must be properly grounded during operation.

During operation the amplifier must be installed in such a way that the rear side remains accessible.

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.

Read this manual carefully. Fallow all of instructions during installation and operation to avoid damage to the amplifier not covered by manufacturer´s warranty! Do not attempt to perform any change of hardware or software!

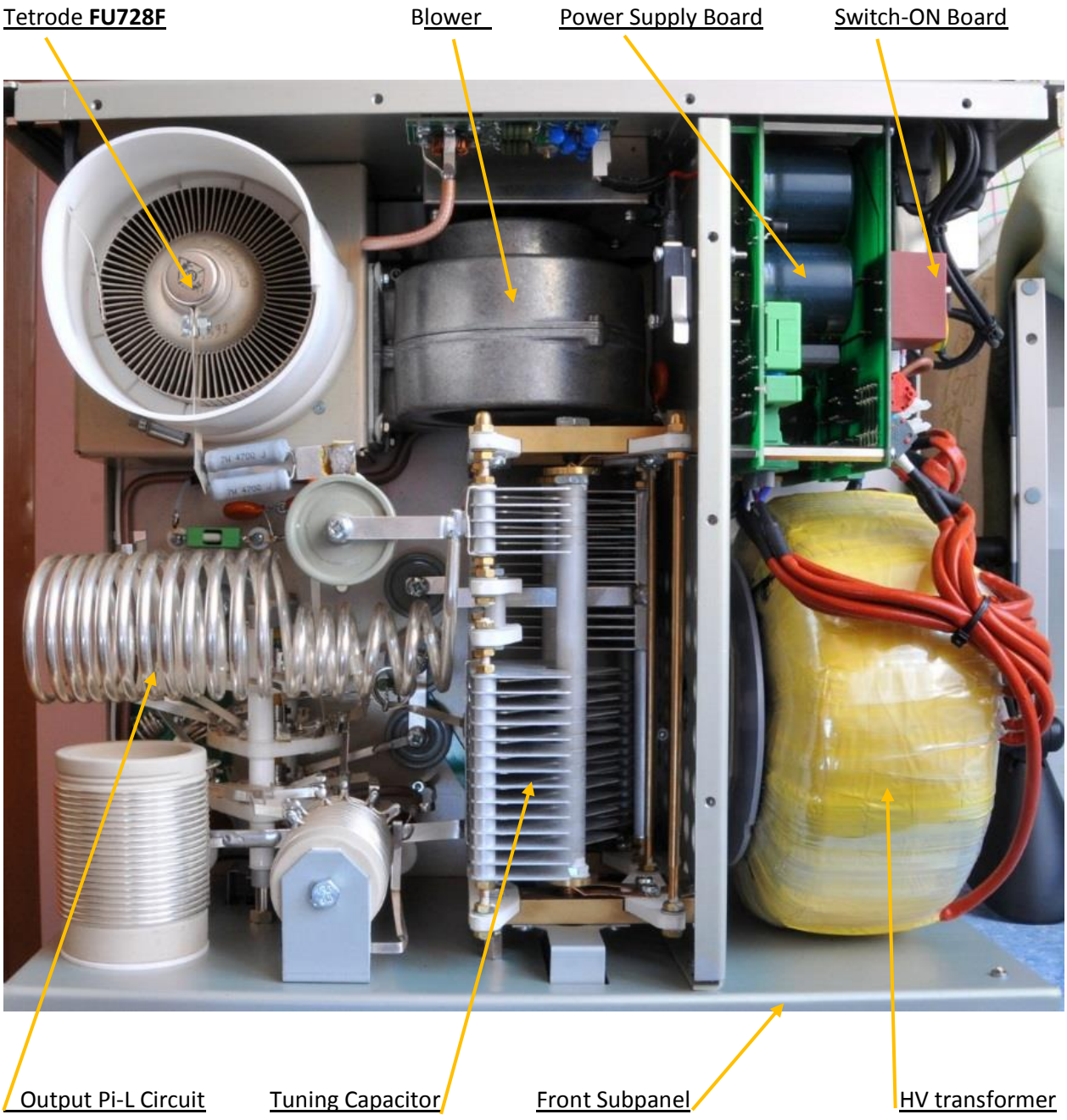
3. GENERAL DESCRIPTION

3.1. HF part

This amplifier is using a **ceramic tetrode FU-728F** in a grounded-cathode circuit (input into control grids). The OM2000A+ 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 grids, using a broadband input circuit with an input impedance of 50 Ohms. This adaptable input circuitry ensures a good input SWR (better than 1.5 : 1) on all amateur bands.

The output of the amplifier is a Pi-L circuit. The ceramic capacitor for TUNE and LOAD are divided. This enables the amplifier to be tuned exactly and makes it possible to easily return to the previously set positions after band changes.

Top view on the opened OM2000A+



3.2. *Power Supply*

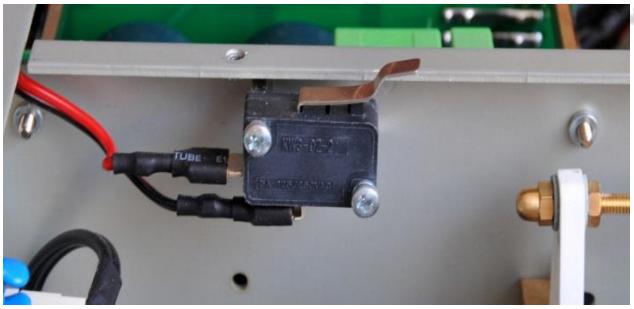
Power amplifier is using one 3 KVA toroidal transformer. A soft start is provided using relays and resistors (placed on the switch-ON board). The high voltage is made by combining 4 x 575V AC (total abt. 3200V DC) @ 1.2A. Each has its own rectifier and filter. In the high voltage circuit, safety resistors are employed to protect the amplifier against overload (placed on the power supply board).

The separated supply for screen grid is regulated by stabilization with MOSFET and delivers abt. 330V DC at 100mA. Control grid voltage is also stabilized (-120V DC). Change of stabilized first grid voltage is controlled by the software (EBS for example).

Primary section of the transformer is adjustable for 220 - 240 VAC (230 – 250VAC for US). Factory setting is 230VAC. If the AC voltage in your network is 220 or 240 Volts, you need to set the correct value before first starting of the PA. See part 7.1. for more information. Other primary voltage is possible on request (for example 200V 50/60 Hz for Japan).

3.3. *Safety Devices*

Control and monitoring circuits ensure control and safety during malfunctions of the PA. These are placed on the Control board, which is located on the chassis subpanel.



One of the important safety element is mechanical switch for AC blocking at opened amplifier.

4. INSTALLATION

Read this chapter carefully prior you will start installation. Before unpacking inspect shipping carton first, if it is not damaged. Keep all of packing parts for possible future shipment. Check unpacked power amplifier. If you find some damaging, contact your dealer immediately to keep full warranty.

During installation go step by step according to the next parts.

4.1. Grounding

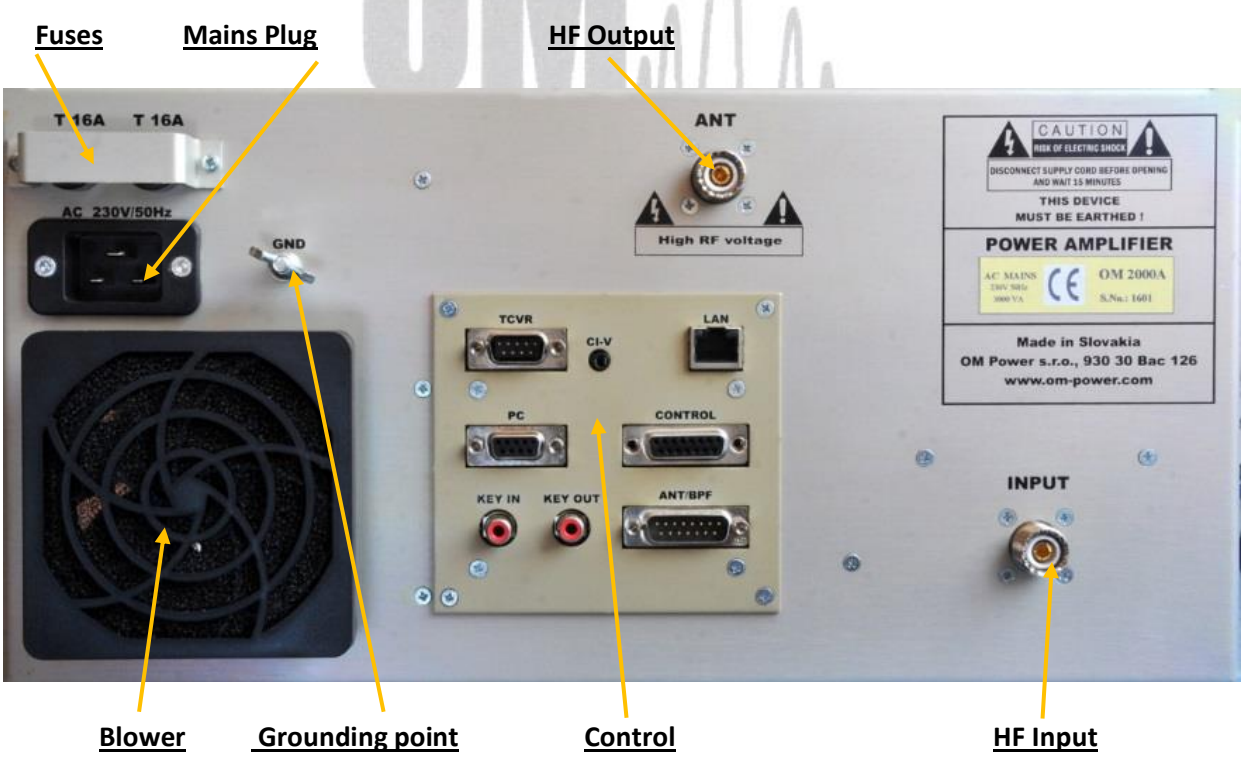
The amplifier has to be grounded properly! Connect the screw on the rear panel of the amplifier to your local grounding system with a copper cable; use a cross-section of 4 mm^2 at least.

Connect your transceiver to the same grounding system of your shack carefully! Use minimum length cables and make certain that the connections are both physically and electrically sound. With poor grounding, you may risk damaging your equipment, having problems with TVI/BCI or your transmitted signal may be distorted.

4.2. Coaxial Cable

The output of the transceiver is to be connected to the input of the amplifier via RG58 or similar cable. For the connection between the power amplifier and the antenna, RG213 or similar coaxial cable suited for high power is recommended. At the INPUT and OUTPUT SO-239 sockets with Teflon insulation are used.

Rier view of the amplifier OM2000A+



4.3. Control Cable

Control cable maintains TX / RX switching of the PA (TX GND). The cable is shielded. On the side of the power amplifier a CINCH-socket is used. On the side of your transceiver you have to use a socket suitable for this transceiver. During transmitting the middle pin is connected to the ground. The relays of the OM2000A+ have to be switched earlier than HF is applied (cold switching). Modern transceivers they have a time delay between PTT switching and power output.

If you are using an older transceiver or transmitters without time delay, we recommend to connect the PA in such a way that the transmit/receive switch (foot switch for example) 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. If there is possible to adjust TX delay in your TCVR, set the delay to 10ms, please.

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

KEY IN RCA Phono **-** Input signal PTT switching voltage / current - 5V /2mA)
KEY OUT RCA Phono - Output signal PTT (maximum switching of 30V / 50mA)

See section 7.6. for Control and ANT/BPF connectors PIN-OUT.

Be sure that your power system is correctly wired and properly rated! To use adequately sized and connected grounding system is also very important!

4.4. Cooling

The amplifier must be installed in such a way that free flow of hot air from the tube is allowed. Do not obstruct air intake and exhaust areas of the PA.

The centrifugal blower provides the necessary cooling of the amplifier, even during long contests. The blower is activated by switching the PA on and it is turned off when cooling is finished (approx. 1-5 min after switching off the PA depending on the temperature of the tube). Blower working mode is programmable (3 modes). See page 19 for more details.

5. OPERATION

Before switching PA on, make sure that amplifier is grounded, antenna or dummy load is connected, and line cord is putted to the outlet. Be sure you selected AC input by 7.1.

Do not turn PA on for at least 2 hours after unpacking it and locating in its operating location. Especially when amplifier is moved from a cold place to a warm one because not visible condensation may develop, and this could result in damage to the high voltage circuits.

We do not recommend to take antenna off during a transmission.

When you decide to have a short operating break, place the amplifier to the standby mode rather than switch it off.

5.1. OM2000A+ Front Panel

Front panel of the OM2000A is almost empty…There is only touch TFT display accessible plus two switches.

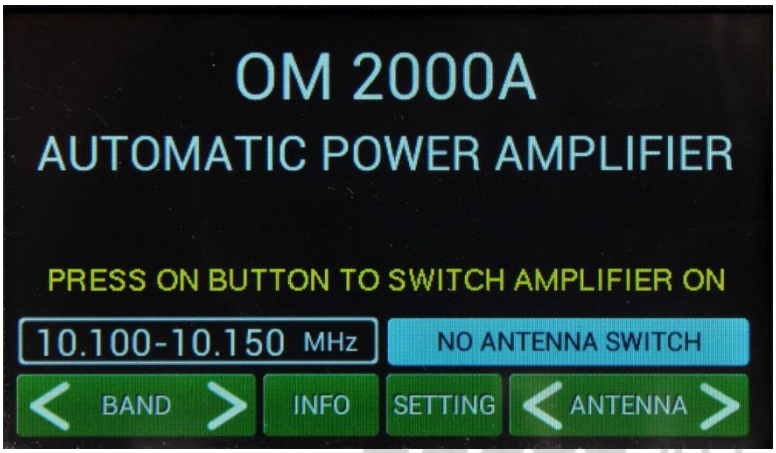
ON - Main Switch. After turning ON small 12V APU for logic, protection circuits and the display will be activated. High voltage and RF circuits are still OFF.

OPR/STBY - Short press for switching betwen STBY and OPERATION mode.

ON/OFF - Long press (1 sec.) for switching the PA ON (tube heating first), 2 seconds for PA OFF. Do NOT use the green button for switching the PA OFF as first! Every time use ON/OFF button as first to give chance for cooling the tube and inside area of the PA.

5.2. OM2000A+ control

Turn ON the Main switch and the **home screen** will lights up. In the bottom line touch buttons are visible



Remember that the home screen is active for some information and settings , while PA is still OFF!

BAND

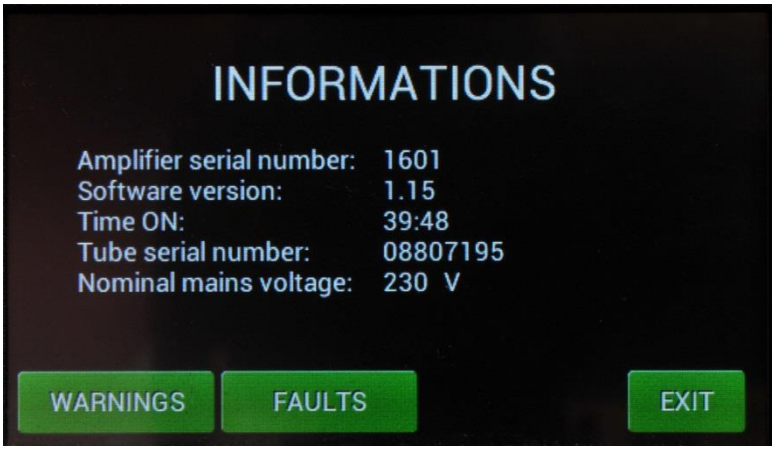
Touch the left side of BAND button to go down, touch the right site to go up with band displayed above the button.

ANTENNA

Transmitting antenna choice. Functional ONLY when the antenna switch is programmed and antennas are defined (see next parts). It allows switching between antennas authorized for the current band. An external antenna switch is controlled by BCD code at the ANT/BPF output.

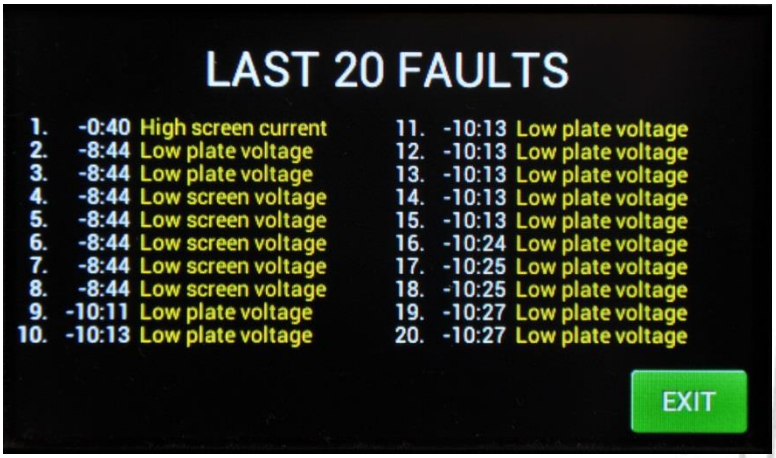
INFO

Information display shows basic information about the PA: serial number, software version, time ON, tube serial number and nominal Main voltage. Some of them manufacturer can requested in case of any failure, etc.



Also it provides an overview of the last 20 warnings and faults:

Touch **FAULTS.**



Press **EXIT** to go back to the home screen.

Now press **SETTINGS.** Display shows menu which allows to set CAT, NO CAT, ANTENNA, DISPLAY, EBS, CLEAR user settings for one or all bands, BLOWER mode and another INFO.

Screen shows settings possibilities for CAT, ANTENNA, DISPLAY, NETWORK SETTING, EBS, BLOWER and other infos.

Scroll to **CAT SETTINGS** (up or down) and touch **SET.**

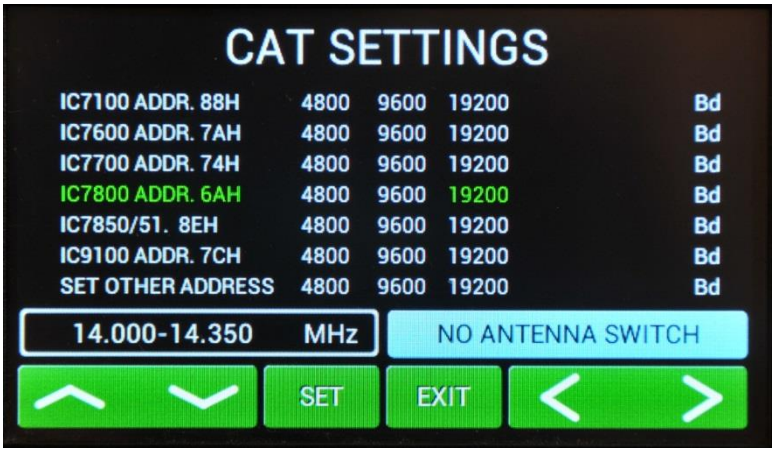
Scroll to your TCVR family (up or down) and select bit rate (left or right), then press **SET.**

Or select **NO CAT** and press **SET**.

We recommend to use CAT connection always when possible, because in such a case OM2000A+ has permanent information about the transmit frequency and is immediately ready for transmitting.

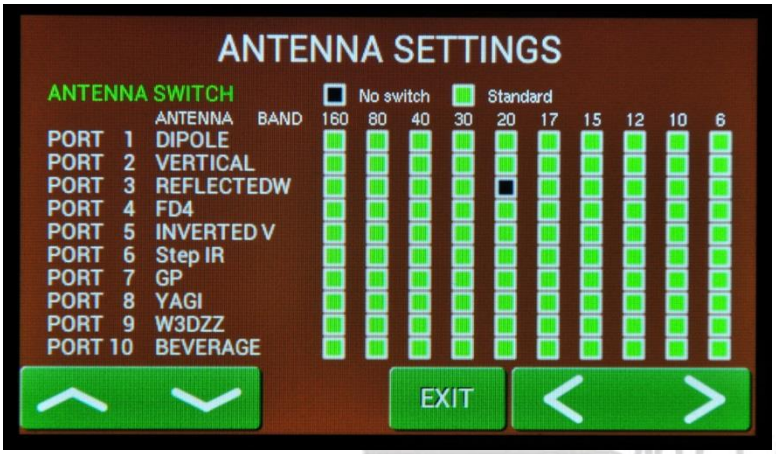
With setting NO CAT the OM2000A+ detects transmit frequency from the input signal. With the input signal frequency changing the PA automatically reacts and tune itself to optimal output parameters. Tuning takes abt. 1sec. inside the band, abt. 2 sec if band is changed. By NO CAT using we recommend to use BAND DATA information due to the much faster band changing.

If you choose **YAESU** or **ICOM NEW,** after **SET** pressing you will go to deeper level which allows you to select specific type of TCVR. See the following picture for **ICOM NEW** selection, for example.

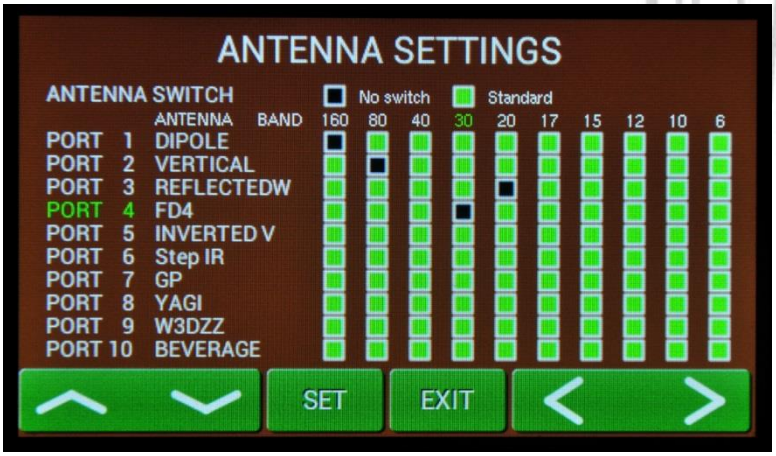


You selected IC7800 addr.6AH and 19200 Bd. Press **SET** to write to the memory, then press **EXIT** to go back to the SETTINGS possibilities.

"**SET OTHER ADDRESS**" means that you must add here a new type of used ICOM TCVR which is not defined in the table (its address plus bitrate in Bd) to have possibility to communicate with it.



Touch **ANTENNA SETTINGS**. First select **ANTENNA SWITCH** (No switch, Standard). Use left or right arrows. If you select some switch, 10 ports for different antennas displays. Generally all of antennas are allowed in every band (green squares). To disable some square select port (up/down), touch **SET** for antenna name and then select band (left/right). Touch **SET**.

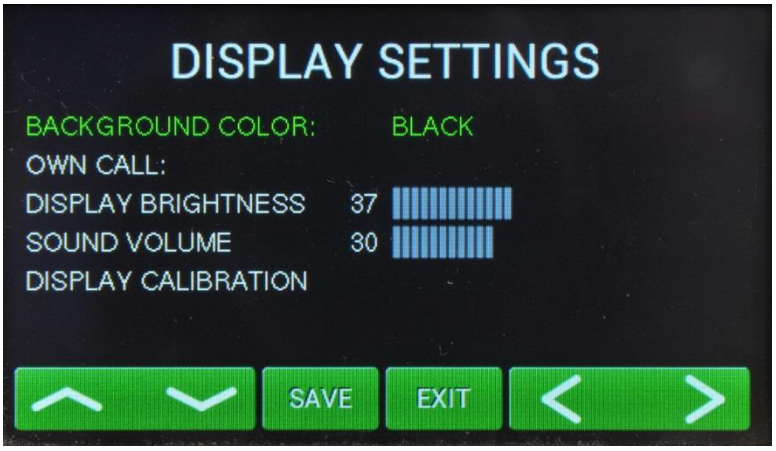


Four types of antenna for four different bands were disabled.

Black square means disabled combination.

Press **EXIT** to go back to **SETTINGS** menu.

BCD code (4 bits) is using for automatic antenna and BPF switching (see Antenna/BPF connector on the Control panel (rear side of the PA). See section 7.8. for Control and ANT/BPF connectors pin-out.



Next **SETTINGS** position is for display parameters. First choose the background color. Scroll on it and choose the color (left/right).

Press **SAVE** twice, then scroll to **OWN CALL.**

Press **SET** for your callsign edit. The keyboard displays.

Type your callsign and press ENT.

Use next lines and set brightness and sound volume (use up/down and left/right). Confirm with **SAVE.**

Press **NETWORK SETTING** and then press **ENTER.**

Here the user have possibility to set IP Address, Network mask, Default gateway, Port number.

User can enable or disable IP parameter setting via LAN connection.

Next lines are for EBS (Electronic Bias Setting) ON/OFF and for EBS level selection.

We recommend **EBS ON**. See next comment for more details.

Electronic Bias Settings (EBS) is one of significant feature of the power amplifier. It allows to set low plate current after pressing the PTT regardless of whether you have CW or SSB mode, until RF signal is no present at the input. At the moment when RF signal comes to the input of PA, bias will automatically change to its working value.

EBS level means level of the Input power, where EBS starts working. Default EBS value is 0.1 W. We recommend using EBS ON. Significant accompaniment of used EBS is temperature reducing.

If you are not using compressor in your TCVR or you are speaking not good enough loud, some syllables can be cutted off. In such a case you have possibility to turn OFF the EBS.

Next two lines allow delete user settings of antenna tunings for selected band or for all bands.

Settings in all segments will return to the factory default values (for 50 Ohms).

In the next line you can define working mode of the blower. In the first case speed depends on the temperature (**TEMP**), during **PTT** speed increased to maximum, **ALLWAYS** means maximum speed all the time during PA operation (recommended for DIGI modes).

Press **SAVE** to write the mode to the memory.

Last settings allows to see INFO. All of previous information screen will be visible plus one more for upgrade.

UPGRADE touch button can be used ONLY in the case if EEPROM or firmware files (or both) will be upgraded. In such a case ask dealer or manufacturer for the exact procedure.

5.3. Preparing for operation

In STBY the amplifier is in bypass-mode and your transceiver is directly connected to the antenna. Maximum allowed power in bypass mode is 200 Watts! Passing RF power is displayed if PA is in standby mode.

To turn PA ON press ON/OFF button on the front panel (black one) and **hold it abt. 1 second**. PA will start tube heating. It will take 180 seconds. Turning PA ON is possible **ONLY** from the home screen! If you have other display active, press EXIT more times to go back to the home screen.

Time to go is visible on the display. Wait until heating finish.

After heating finished PA will stay in **STBY** mode and **Main display** will appear.

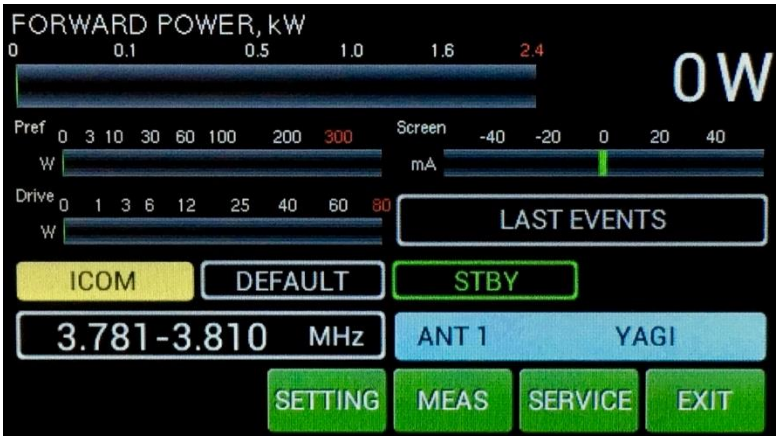
Depending on **CAT** settings you would have two possible situation illustrated. If **NO CAT** was saved, above display will be visible. To set band and segment for transmitting, use **BAND** and **SEGMENT** buttons. In this mode exact frequency will be read from RF input and PA will set up on it automatically.

Another display appears, if CAT was defined but TCVR is not connected with the PA (CAT cable). See the following pictures.

FREQ button has two functions. It allows to display working frequency or active band segment.

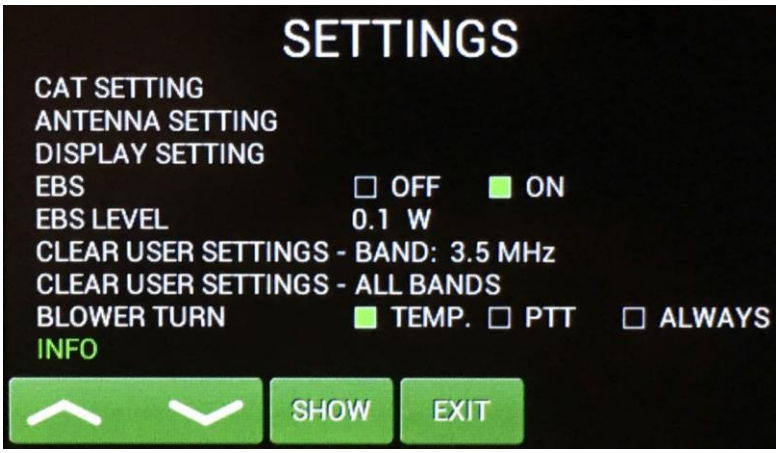
Also in this case frequency will be read directly from the TCVR in operation mode.

Use **ANTENNA** (left/right) to select one of preprogramed antenna for that band.



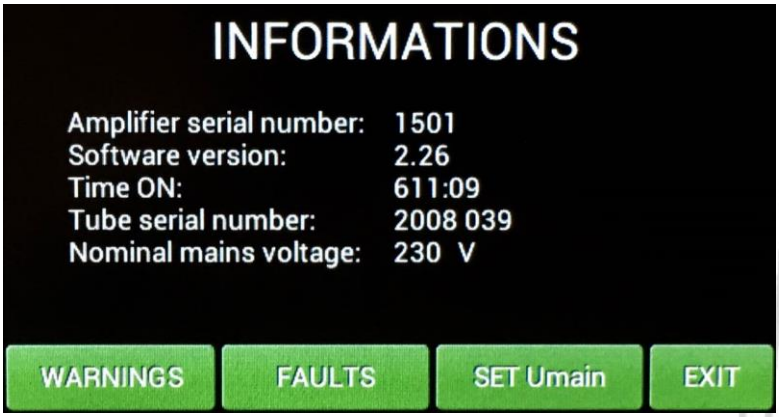
Menu display allows to go deeper to the SETTINGS mode, MEASuring mode or to SERVICE mode.

Press **SETTING** button.



We are in the settings mode again, but with little difference in **INFO** part.

Scroll to **INFO** and press **SET**.

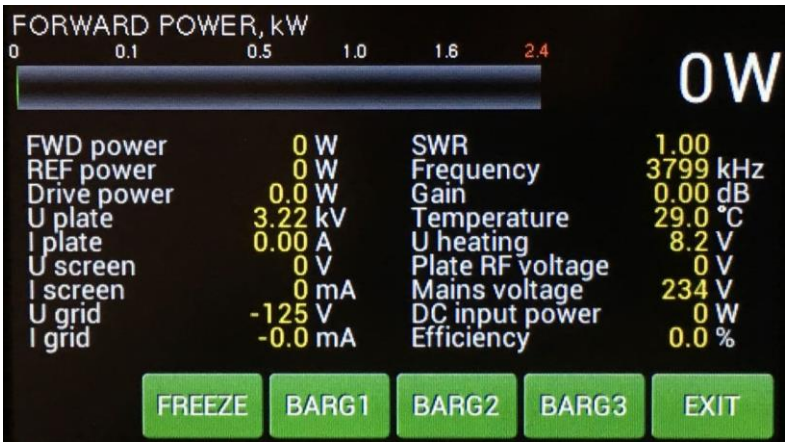


New button is visible – **SET Umain**. Press it.

Type proper value of the primary voltage and press **ENT.**

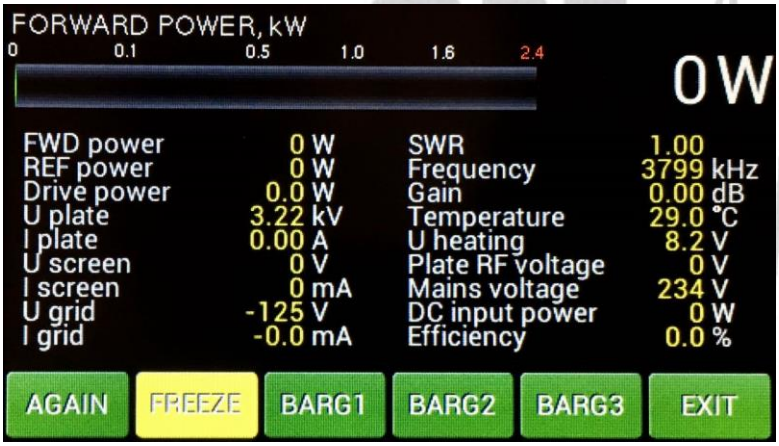
Press **EXIT** twice to go back to the **Menu display**.

This means not programmable setting of the primary voltage. It is just information for the processor, which protects the permitted limits (up or down) for a given value of the primary voltage (protection circuit).



MEAS pressing shows this screen. Instantaneous values of the basic parameters are displayed.

You can **FREEZE** the screen and measure **AGAIN**.



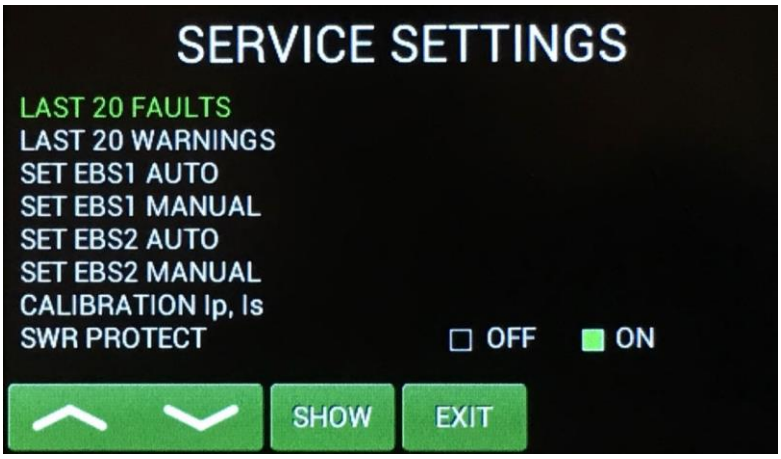
Three different bar graphs can be defined using BARG1, BARG2 or BARG3 button.

Press **BARG1.**

Green graph may show one of the 8 parameters. Scroll to request parameter and press **SAVE**. Screen jumps back.

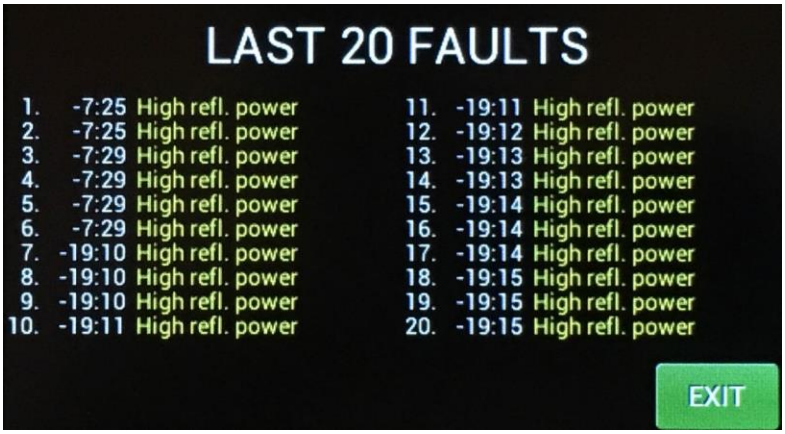
Touch **BARG2** in the next step, then the same way **BARG3**.

Press **EXIT** to go back to the **Menu display,** then press **SERVICE**.



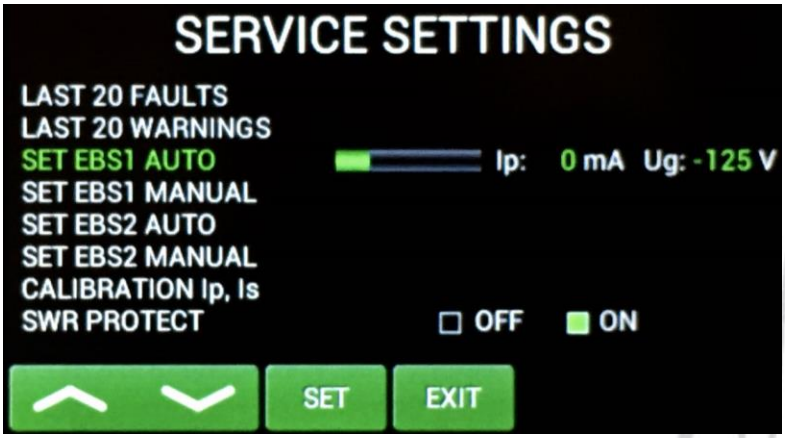
Now we are in the **SERVICE** settings mode.

Scroll to selected line and press **SHOW** or **SET** (depending on the line).



We selected last 20 **WARNINGS** to show.

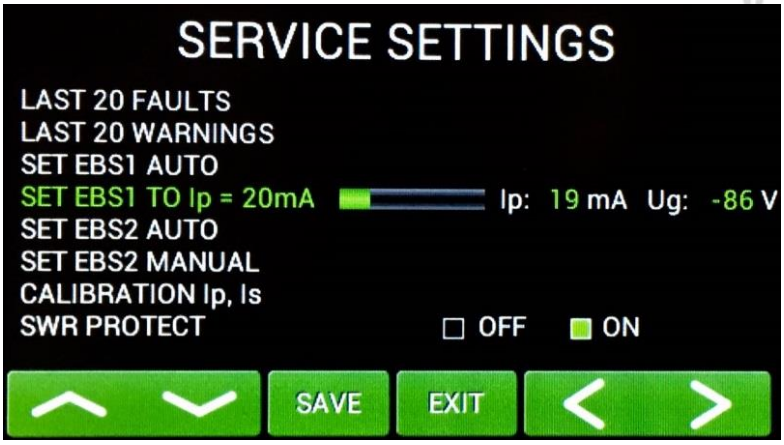
Press **EXIT** and go to the **SET EBS1 AUTO** and press **SET.**



PA will automatically set 20mA of EBS.

You can try to do this manually, too.

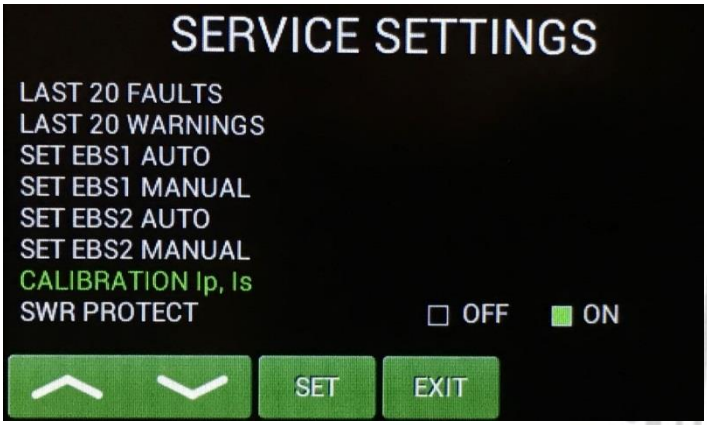
Scroll to **SET EBS1 MANUAL** and press **SET.**



Use left/right button to set 20mA or as close as possible value and press **SAVE**.

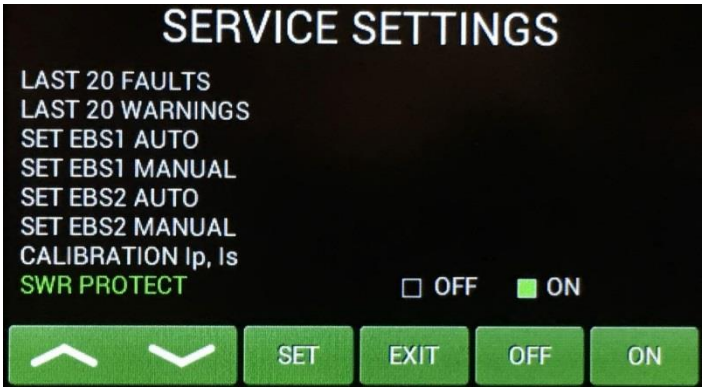
Similar ways **EBS2** can be preprogrammed (300mA by AUTO set).

Or another value of EBS2 by MANUAL Set.



Scroll to **CALIBRATION Ip, Is** and press **SET**. Calibration will be done automatically.

Go to the bottom line.



This feature allows user to switch OFF the SWR protection.

We recommend to set it **ON** (SWR protection circuit will stay active, max. allowed SWR is 3:1). If **OFF** is selected, higher SWR is allowed, but reflected power is measured. If it exceeds 350W, transmit will be blocked.

Press EXIT.

5.4. Operation mode

Before switching to operation mode, check all connections between PA and TCVR.

We are back in the **Main display**, bar graphs were defined, antennas were preprogrammed, CAT was set. We are ready to go to the operation mode.

Press shortly black **STBY/OPER** button on the front panel.

We are in the operation mode.

Press **MENU**.

Now try to press PTT (foot switch for example).

We are in the transmit mode (without RF).

We have new button here. **M-TUNE**.

M-TUNE means entry to the manual tuning mode. It allows fine tuning of the PA, especially in the case when antenna impedance is different from real 50 Ohms. For proper adjustment we need to show **Screen** current (at least). Press **M-TUNE**. New screen is visible. Slides on the left and right side represent both variable capacitors.

Adjustment process: Move **TUNE** left or right until maximum of **FWD** power reached. Then move **LOAD** carefully so that Ig2 **Screen** (I Screen on the display) current will be not higher than 20mA. **Optimum means maximum FWD power and Screen current between 0– 20mA** for the used power output. Repeat more times. When using lower power, Ig2 can go to negative values.

Result of the tuning process is optimal, when PA was tuned to the maximum forward power and Ig2 current stays in the range from 0 to +20mA. At that time maximum efficiency and optimal linearity are achieved. This applies to each power application. It is not necessary to retune the PA, if we decrease the output power. The PA stays in linear mode with little lower efficiency. If we increase the output power, retuning is necessary only if Ig2 exceeds +20mA.

After adjustment press **SAVE** for writing values to the memory and press **EXIT**.

Repeat adjustment process for other segments / bands.

Now one example from real situation. First we will check driving power from the transceiver. Stay in **STBY** mode, press **PTT** and apply **RF** power.

Measured driving power is 53 Watts.

Now switch to **OPER**, press **PTT** and apply **RF** from TCVR. See the following picture.

Output power is 1507W, reflected power reached abt. 4W and screen current is abt. -8 mA.

If your antenna has **different** impedance than real 50 Ohms then is necessary to start the **M-TUNE procedure** to optimize PA adjustment (press **MENU, M-TUNE**) and make the manual adjustment.

This is the result after manual adjustment process. Output power increased to 1585 W. Screen current is now abt. +10 mA.

These parameters were **SAVED**.

Notice: OM2000A+ is factory adjusted to maximum output power of 2000W (1500W for US models) to the real load 50 Ohms. Unique Tuning table with TUNE and LOAD values for every band is supplied with each PA.

When the antenna impedance has greater tolerance, it may be the case that the PA cannot deliver the full power 2000W, or some of protection circuits will be automatically activated. In such a case we recommend to do manual tuning.

The best indication of proper PA tuning is the Screen Current. In the properly tuned PA to be within 0 to + 20mA (at full or used output power).

Tuning procedure:

- Press M-TUNE button. IF CAT is active, TCVR will automatically tune itself to the middle frequency of the segment. If NO CAT, you must tune TCVR manually to the segment center frequency. If NO CAT but BCD, band will be changed but segment will be set after keying. Set CW or RTTY mode in the TCVR. **Set input power to abt. 50%.**
- Press PTT, check the Ig2 (**I Screen on the display**). If it is ok (0-20mA), increase gradually the input power of the PA to reach abt. 70% of its maximum output power.
- With TUNE buttons adjust maximum FORWARD POWER while monitoring the Screen current.

- When Screen current exceeds +20mA, use right LOAD button to decrease current to abt. 0 mA.
- Increase the input power until you reach the used maximum output power. Again watch the Screen current. If exceeds +20mA, decrease it using right LOAD button.
- Repeat TUNE buttons using to reach maximum FORWARD POWER and check Screen current.
- If Screen current is lower than 0 mA (negative value), change it with pressing left LOAD button until 0 mA is set and check again the maximum output power. Do not start with very low input power, set abt. 50% before beginning M-tune process.
- If you reached maximum output power and Screen current is inside 0 / +20mA, press SAVE button.

Notice 1: If tuning process takes more than 1 minute, make a short brake to prevent temperature overloading of the PA.

Notice 2: If you will use PA with the output power lower than maximum, Screen current can take negative values. There is no necessary to readjust the PA, it is working still in the linear mode.

We can see new small yellow window. **USER** means that we used manual tuning feature to optimize the PA adjustment.

If you want to go back to the default factory settings, use CLEAR USER SETTINGS in the MENU settings (page 15) – for one band or all bands.

If the amplifier demonstrate any malfunctions during tuning or it does not behave in accordance witch the description, interrupt the tuning procedure immediately and check the amplifier! Be sure not to do any mistakes in choosing antennas, bands or segments! Be sure that VSWR is not higher than 3:1 and input power is LOW!

After excluding possible human mistakes you will be able to work for long time with this amplifier!

6. MAINTENANCE

6.1. Indication of Fault Conditions

If a fault condition appears during the operation of the amplifier, the safety circuits of OM2000A+ will react. There are several warning or fault messages possible to appear on the display, when some of the protection will be activated. The OM2000A+ power amplifier can report one of the following messages:

Power Out is too high
Refl. power too high
Power In is too high
Low output power (tune)
Plate current too high
Grid current is high
Screen current error
Heating voltage error
HARD FAULT
Plate voltage error
Grid voltage is low
Screen voltage error
SWR is too high
Amplifier is too hot

Most of safety circuits are preset for two levels of exceedances. First level is a warning level. In such a case a warning message appears on the display, but power amplifier will stay in **normal operation**. See the table below for warning and fault conditions.

When a fault condition appears during the tuning or operation of the amplifier, the safety circuits will **block transmitting**. The amplifier stays in **OPER** mode. After approx. 1 sec the control circuits will automatically switch the amplifier back to the transmitting mode. If problem persists, safety circuit will react again.

If the fault will repeat 3 times during 10 seconds, the safety circuits will turn the amplifier to STBY mode. To cancel fault status, press STBY/OPER shortly. Power amplifier will stay in STBY mode.

All the warning and fault messages are stored in the memory. You can display particularly warning messages and particularly error messages. They are stored one by one to the memory. You can see them on the display. If memory is full, every new message will delete oldest one and move rest of them one position back. It means that every time last 20 messages are visible on the display.

This an example from previous attempt, when antenna was disconnected from the PA during transmitting.

Reflected power was higher than 250W, warning message “Reflected power too high” appeared.

If you touch the yellow box, warning details will be visible.

In the case of some hardware failure or if your power amplifier is not working properly, please contact the manufacturer or your dealer.

Never try to change or move any part inside the amplifier except of tube or fuses. Substitution of parts may void intrinsic safety!

Manufacturer’s contacts:

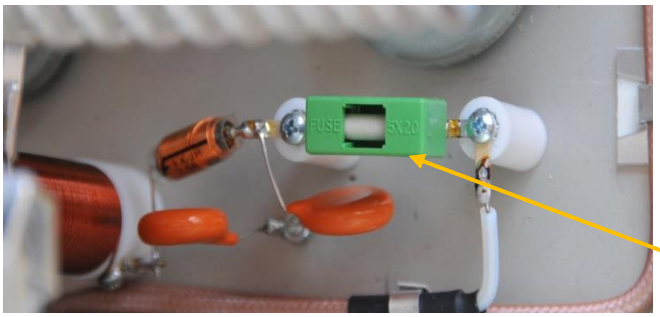
OM POWER, s.r.o.
930 30 Báč 126
SLOVAKIA
Email: om-power@om-power.com

Dealer in the USA:

Array Solutions
2611 North Belt Line Road
Suite # 109
Sunnyvale, TX 75182
Tel: (214)954-7140
Email: sales@arraysolutions.com

6.2. Fuse Replacement

The user is allowed to change mains fuses (6.3 x 32mm), accessible from the rear panel, only. In the case of fuse (fuses) interruption inside the power amplifier, **exchange can be carried out only by professionally qualified person!** Internal fuses are located mainly on the SWITCH-on board (next to the HV transformer).



One special fuse filled with sand is used in the model OM2000A+. In the case of an accidental discharges in the tube this fuse (4 Amps fast, filled with sand) saves HV supply circuits.

Fuse

6.3. Tube Replacement

In the case of vacuum tube damaging, contact the manufacturer or your dealer for ordering new one. You will get instructuions how to change it. **Exchange can be carried out only by professionally qualified person!** After tube replacing **automatic BIAS adjustment** must be done.

6.4. Cleaning

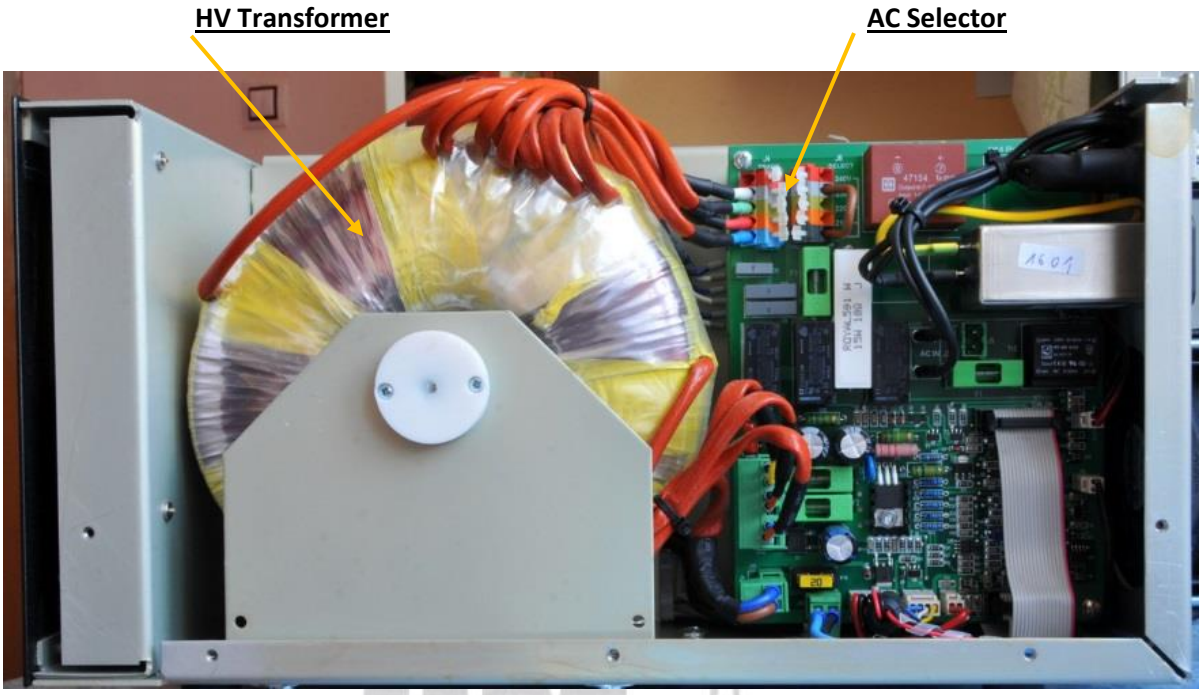
To prevent damage to amplifier surface and plastic components do not use aggressive chemicals for cleaning. Do not open the amplifier for cleaning. Outer surface may be safely accomplished by using piece of soft cotton cloth moistured with clean water or window cleaner.

7. APPENDIX

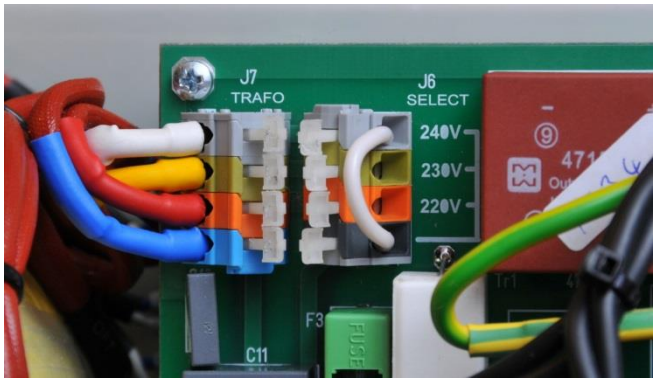
7.1. Primary AC voltage selection

Primary section of the HV transformer is switchable for three values of AC voltage (220, 230, 240V), resp. 230, 240, 250V for US models. Factory settings is 230VAC. Before first starting of the PA we recommend to check the correct value according to the AC voltage in your network. Change the settings, if necessary. The correctness of the selected network voltage indicates Uf voltage, which must be in the range 8.5 – 9.5V. If it is lower, change the digression down and vice versa.

Side view on the opened OM2000A+



Remove the upper lid first. On the right side of the PA, next to the HV transformer there are two PCBs mounted. On the left upper side of the front (Switch-ON) board connector J6 is located.



Use flat screwdriver or finger and press carefully the white stick to release contact and move upper end of the white jumper to the proper position, if necessary.

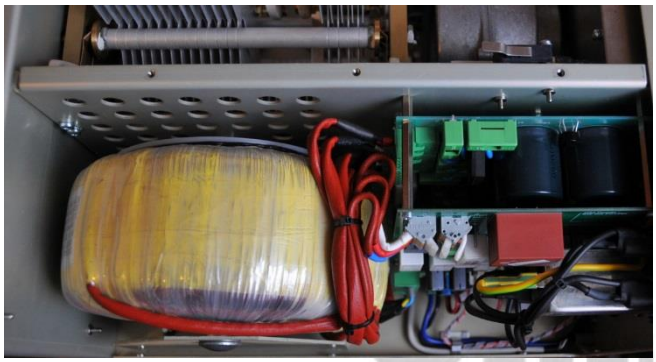
Jumper must be connected between bottom contact and one of remaining contacts. AC voltage is marked next to every contact.

AC selector range can be changed in the production according to the specific conditions in individual countries. Default settings is 220V – 240V / 50 Hz for EU market and 230V – 250V / 60Hz for US market. If you need different settings in the range of 200 – 260V, this should be specified in the order!

7.2. Removing HV Transformer

For simpler and easier transport of the PA, HV transformer can be removed and taken separately. This distributes the weight of the PA (24 kg) about half and half. Follow next steps to do it.

1. Remove upper lid from the PA (use Phillips screwdriver bit PH1 !) .
2. Turn the PA on the left side (transformer is up).
3. Disconnect **3 connectors** from the front board and **1 connector** from the rear board.
4. Release **4 screws** from the bottom side of the PA. Use Philips screwdriver bit P2. During the release of the last 2 screws hold the transformer by hand. Do not worry about its weight, it will move down just 1 cm and remains on the central rung of the PA.
5. Use both hands to take transformer away from the chassis.



Watch the released terminals, when moving the transformer!

Do not damage transformer insulation during removing and transportation.

Weight of the PA was distributed (transformer has 12 kg, rest of the PA has cca 12 kg, too).

When refitting the transformer, watch to the correct location of individual sections and wires.

Manufacturer reserves the right to make future changes in the way of connecting the transformer to the board. Allways mark the position of the terminals before disconnecting the transformer.

7.3. Controlling the OM2000A+ with Flex Radios Series 6xxx

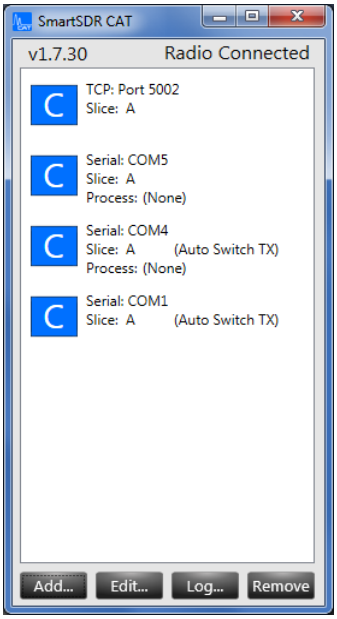
There are two possible methods to connect Flex Radio series 6xxx belong to OM2000A+:

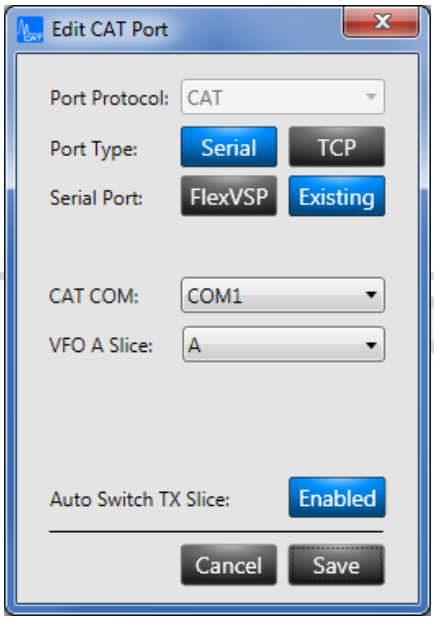
- Using SmartSDR CAT program
- Using USB connector at Flex 6xxx

Flex Radio 6xxx series connection using SmartSDR CAT

Choose the control port in the SmartSDR CAT window that you will use to control the power amplifier. It must be an existing serial port – a hardware COM port in your PC or an USB to serial port adapter. Connect the chosen COM port and the transceiver port (TCVR DB9)to the OM Power amplifier with a null modem serial cable (both ends of the cable with a female DB-9 connector and pins 2 and 3 are crossed).

You must use it for the TX slice that is associated to the connecting port otherwise the amplifier will not to be set on the proper frequency.



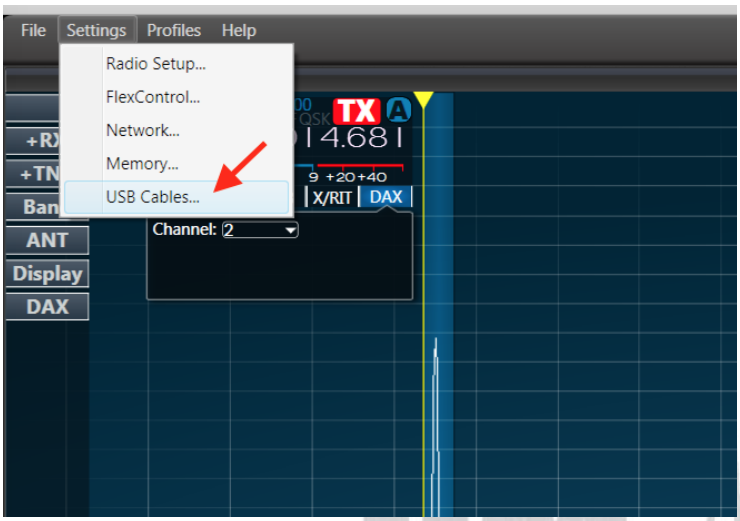


In the **CAT SETTINGS** menu select **FLEXRADIO**, baud rate **9600** and press **SET**.

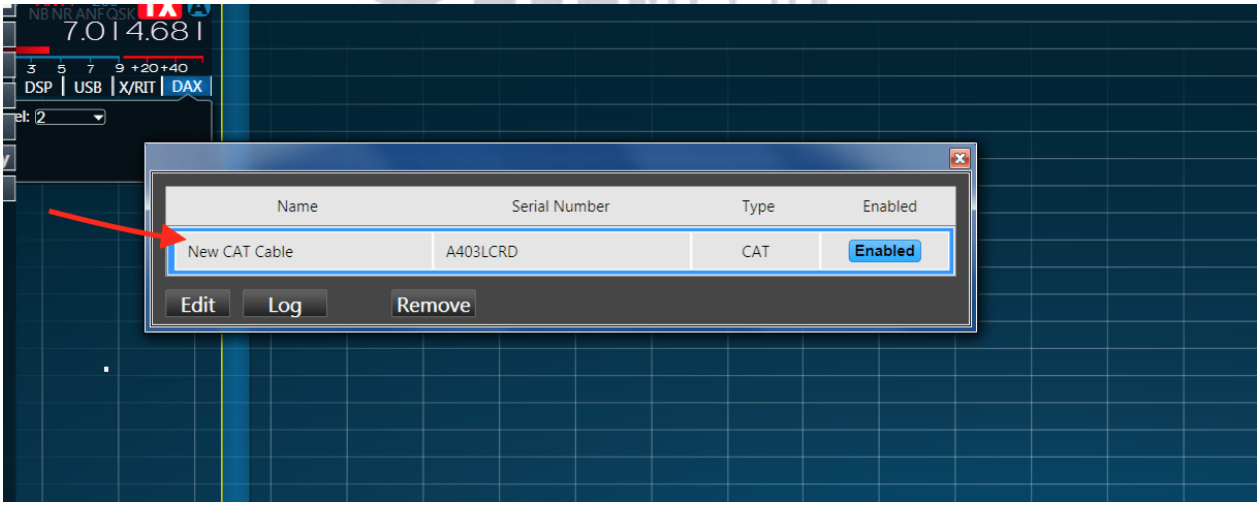
Flex Radio 6xxx series connection using USB output

Connect USB from Flexradio directly to TCVR port on OM2000A+ using USB – serial port adapter and a null modem serial cable (both ends of the cable with a female DB-9 connectors (pins 2 and 3 are crossed).

Activate the smartSDR and choose Settings / USB Cables

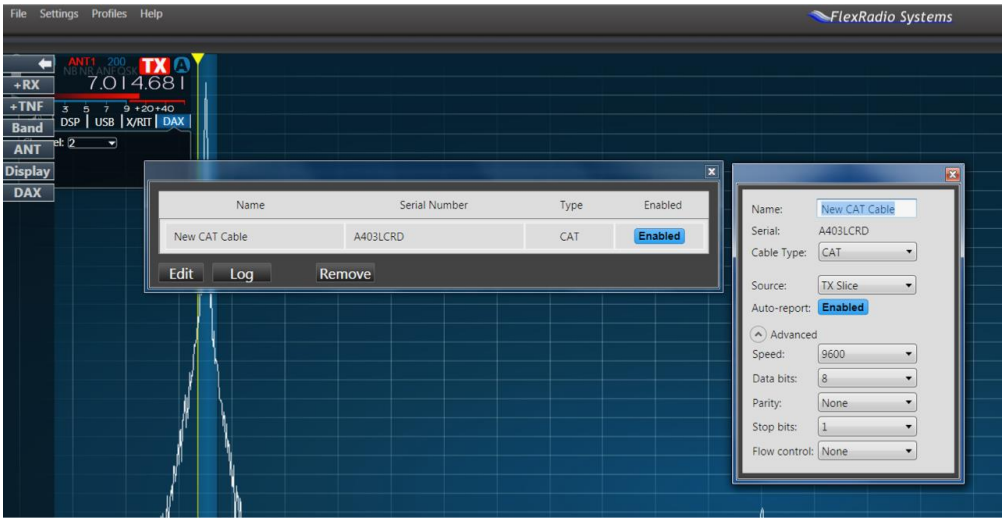


(USB adapter to serial connect to USB port of Flexradio). Line with connected USB adapter will appear.



Make double click on the line (with connected USB adapter after that appears possibility) to open configuration window for COM port .

Set all parameters in the table according the picture below. In both windows ENABLED must be selected.



Close both windows. (USB adapter connect trough null modem cable to TCVR port on OM2000A+).

In the **CAT SETTINGS** menu select **FLEXRADIO**, baud rate **9600** and press **SET**.

7.4. OM2000A+ Remote Control

The OM Power team developed special software which allows control the PA OM2000A+ remotely. Download it from the official OM Power website http://www.om-power.com/downloads. First unzip the downloaded file, then open software.

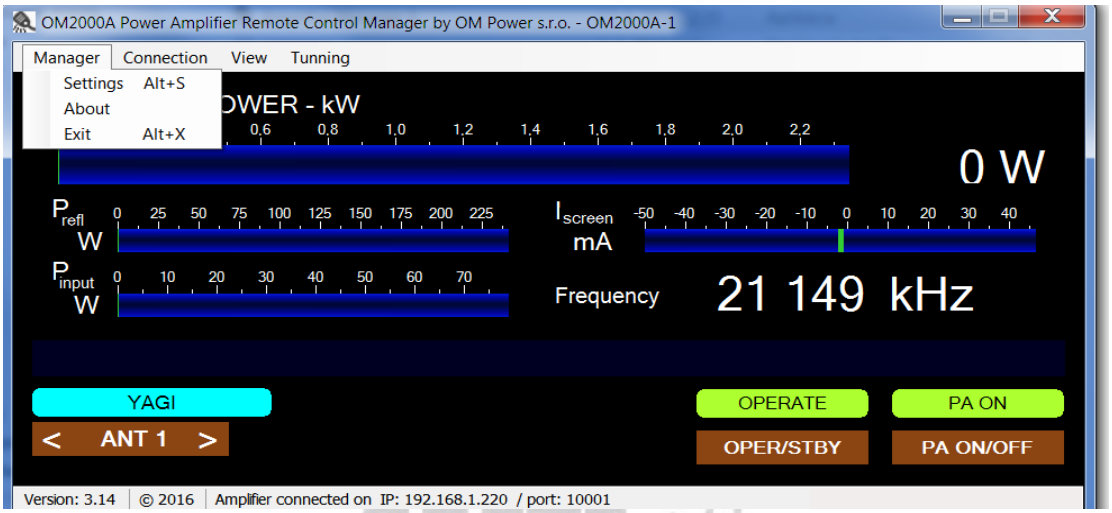
The software allows user:

- Switch PA ON and OFF
- Switch between STBY and OPERATE
- Switch between preprogrammed antennas
- Read and reset last 20 warnings and fault statuses
- Fine tuning of the PA
- To check almost all operation parameters of the PA

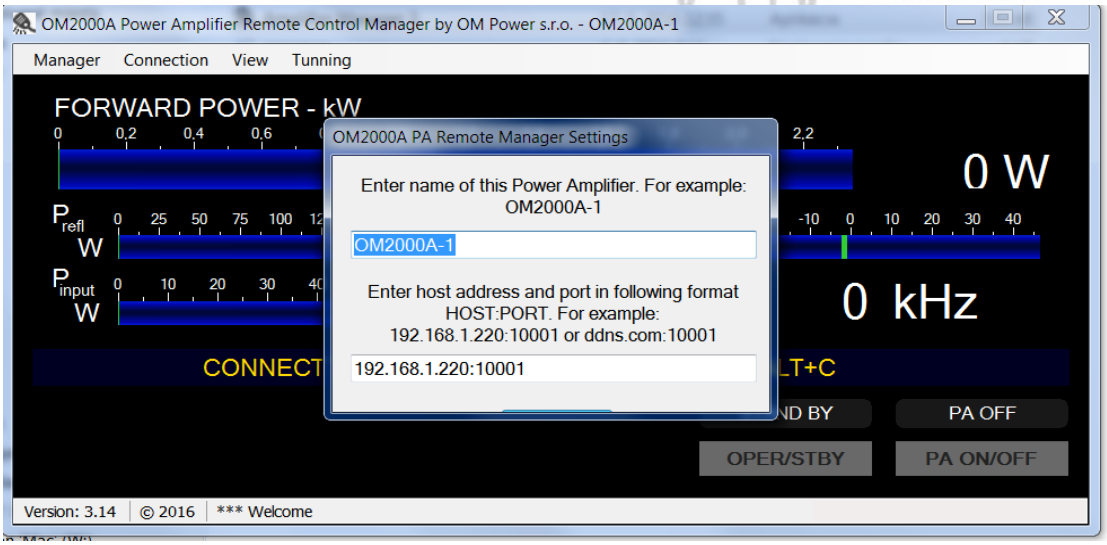
- To select different screens
- Antenna retuning if parameters changed

Have a look on the next pictures and follow instructions to setup remote control properly.

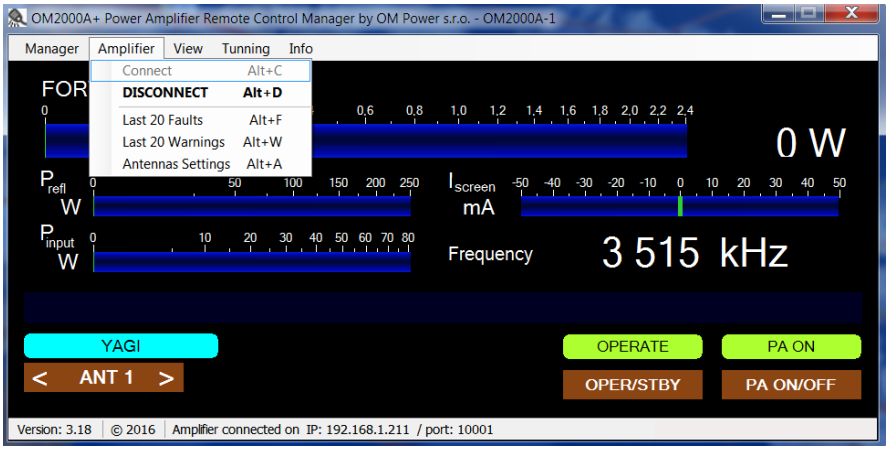
Connection setting.



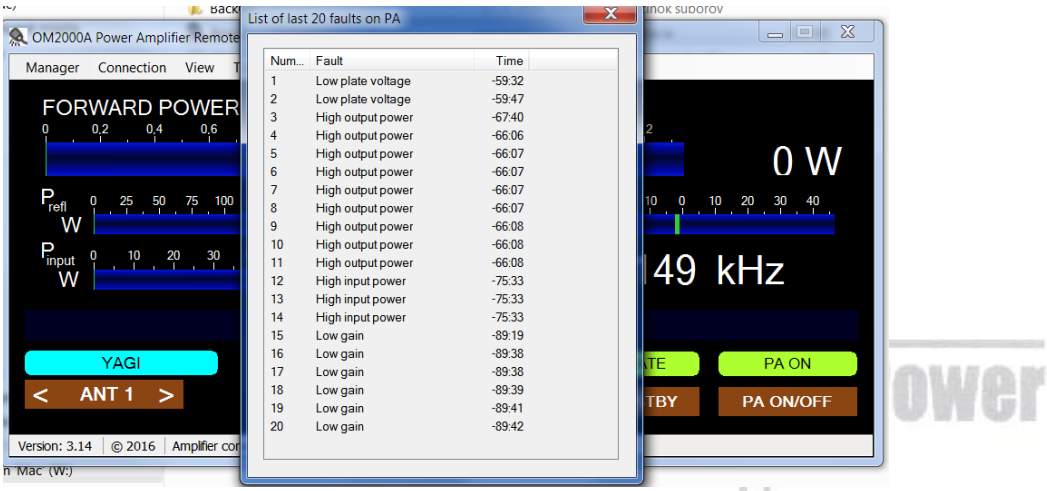
Set up TCP/IP address and port



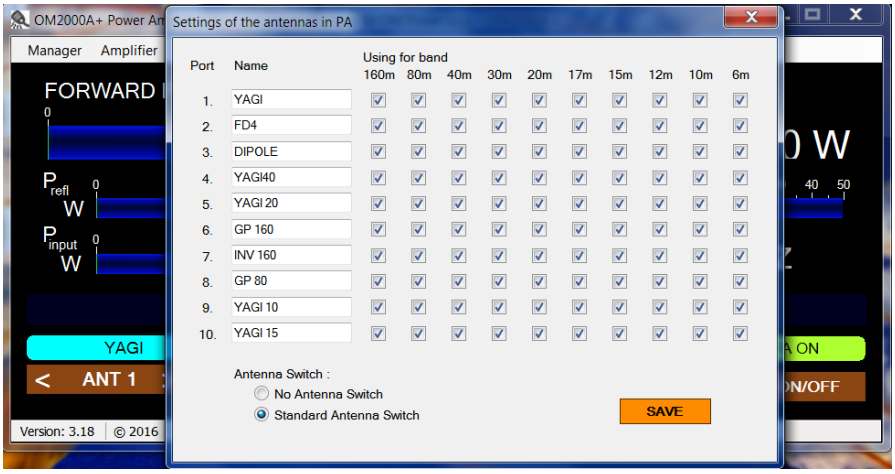
Connect / disconnect to OM2000A+



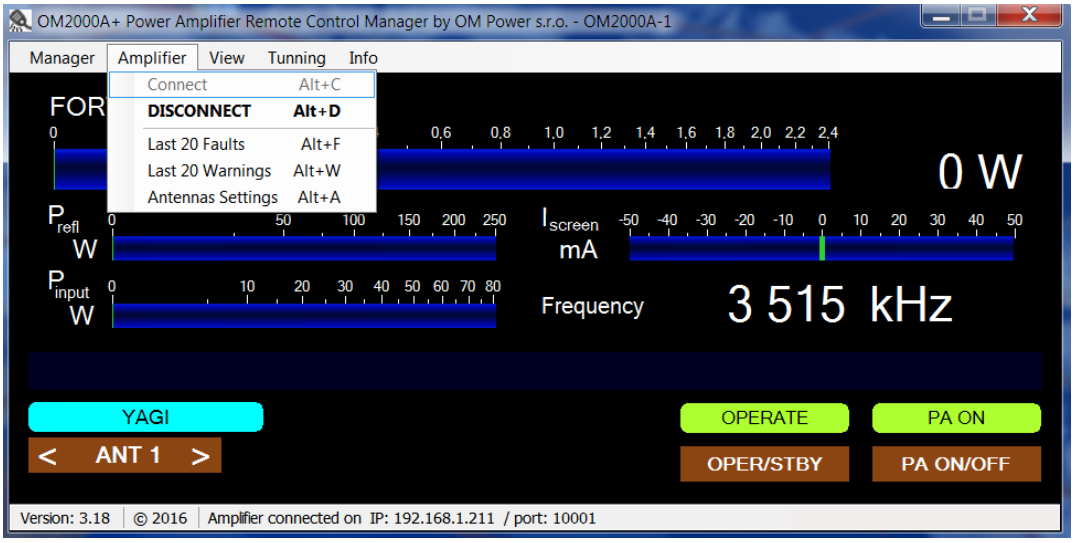
View last 20 PA faults



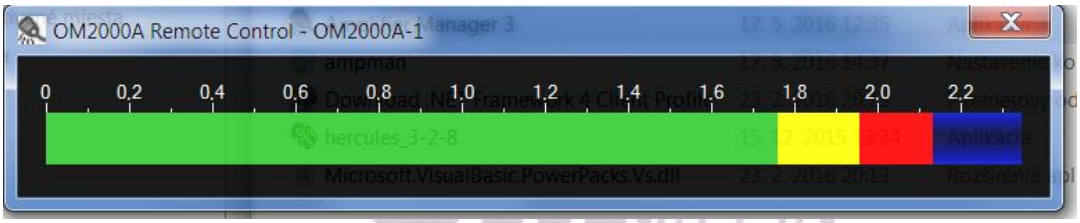
Anennas Settings



There are three possible screen selectable

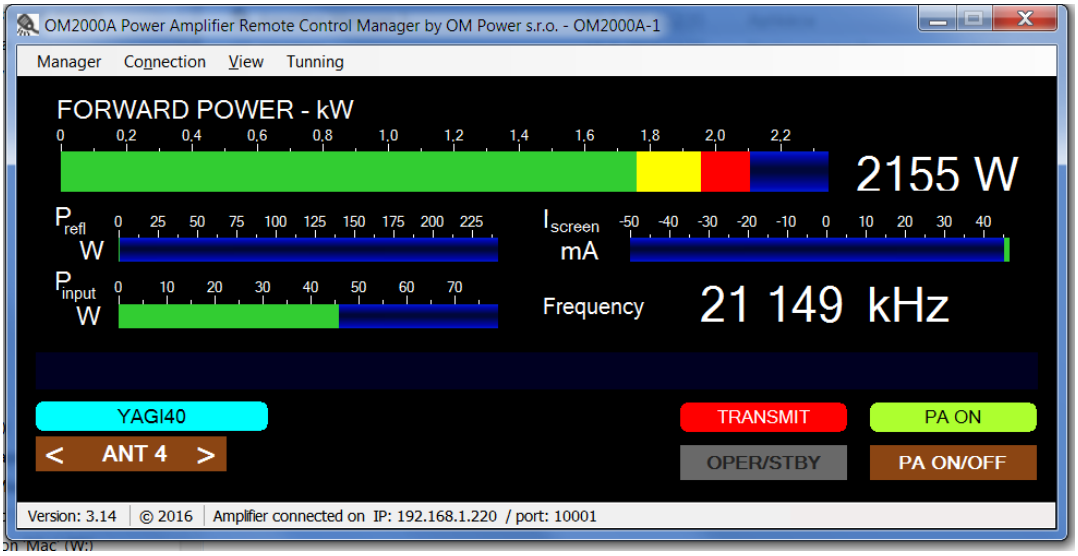


Minimal view

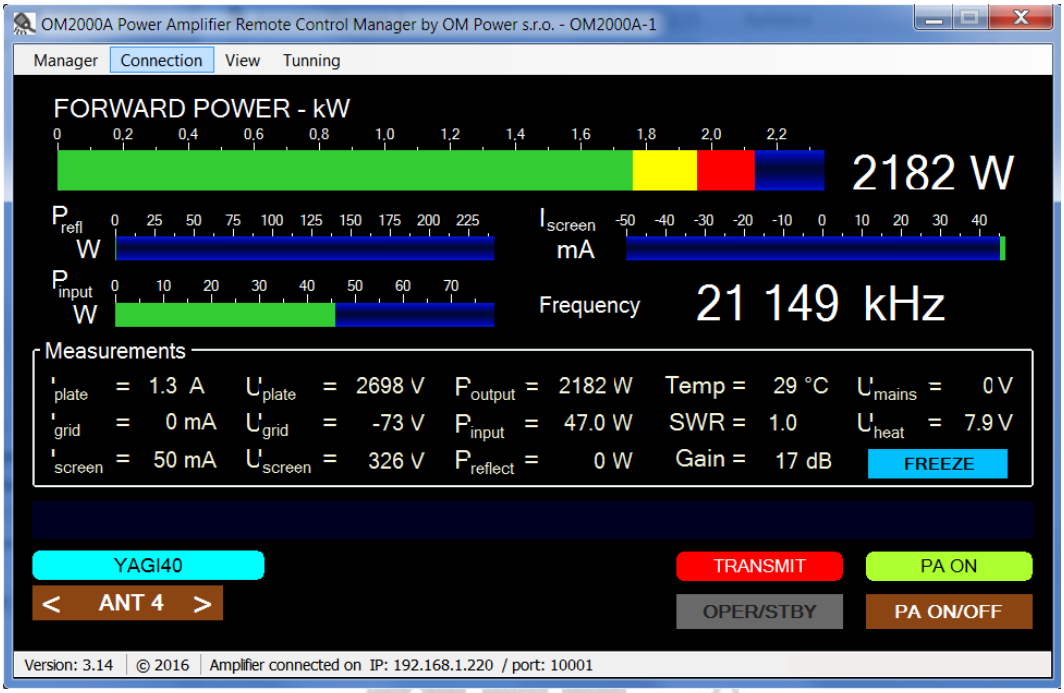


To go back from Minimal view click with right mouse button and close it. Normal view will appear back.

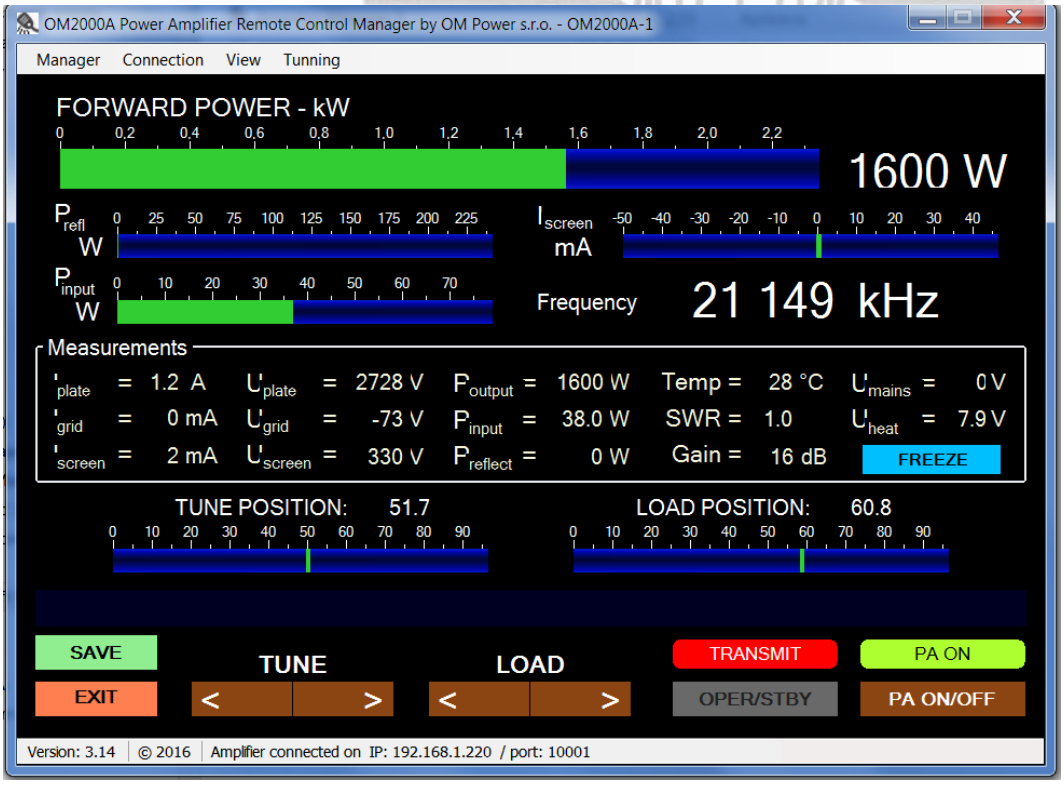
Normal view



Advanced view



Fine tune screen. It is possible to retune the PA remotely (if antenna parameters changed, for example), too. Proceed the same way than with local control (page 28).

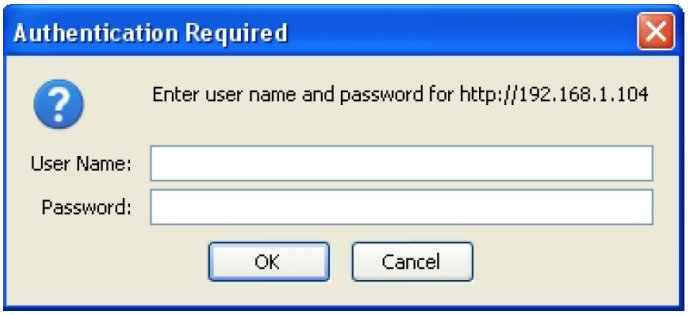


7.5. Remote Control using own public IP address

7.5.1 Changing OM2000A+ connection settings

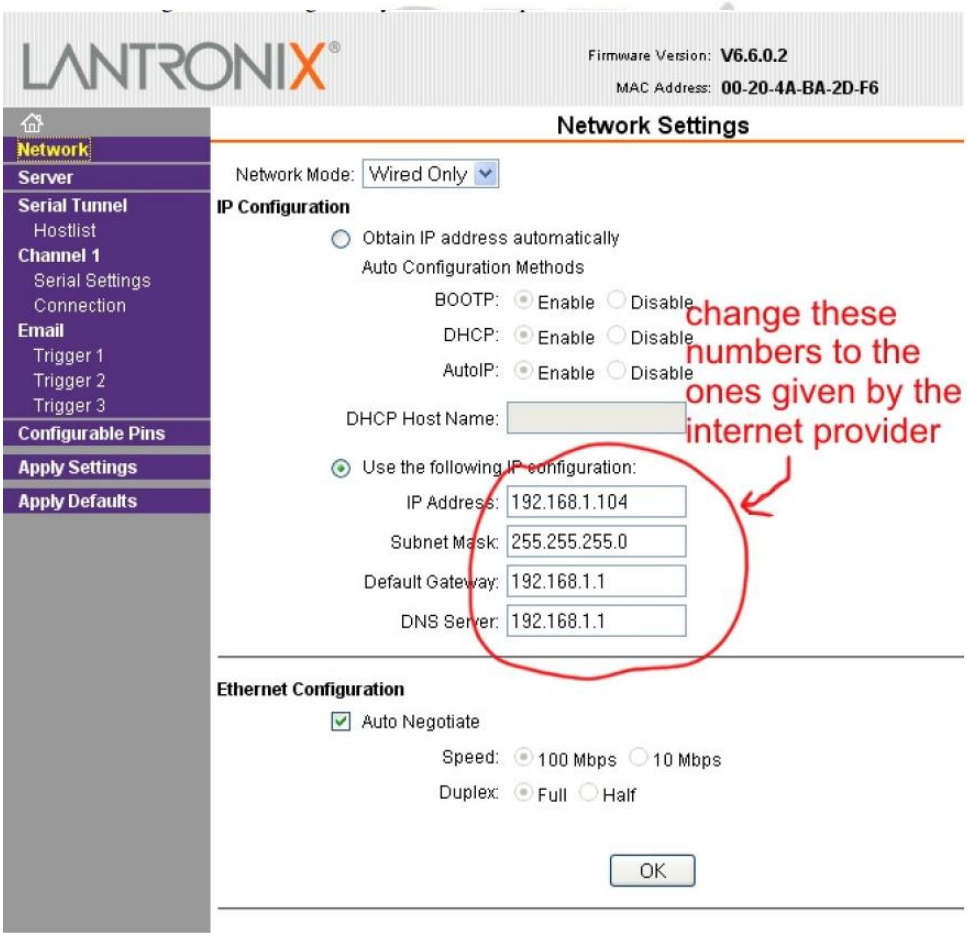
Connect LAN connector on OM2000A+ to PC with ethernet cable.

Open up a WEB browser and enter the OM2000A+ current IP address (default is 192.168.1.211).

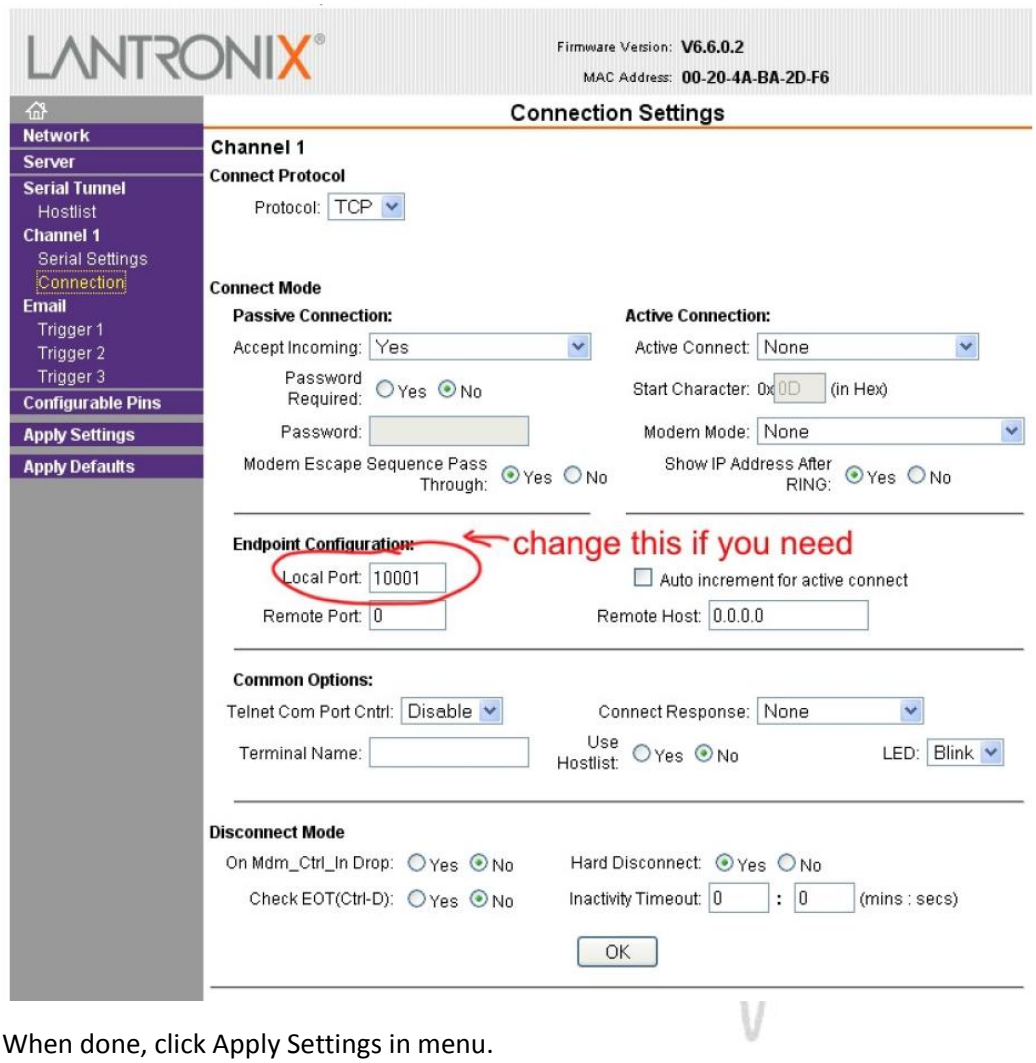


An authentication window will show up. Leave the fields empty and click OK.

Open Network menu and change the IP address, Subnet mask, Default Gateway and DNS Server settings to the ones given by the internet provider. When done, click OK.

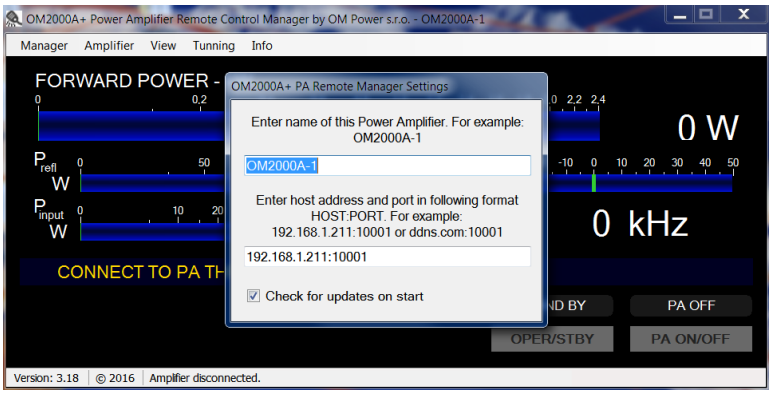


You can change the OM2000A+ Port number too, if you need / want in the Connection menu. When done, click OK.



When done, click Apply Settings in menu.

7.5.2 Setting up in the Remote software



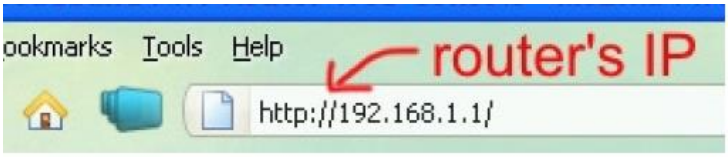
In the Remote Control software open Settings and enter the IP Address and Port number that you set in point 7.5.1.

Click enter, when done. Now you are ready to work with OM2000A+ over the internet.

7.5.3 Remote Control without own IP Address, behind a router

If you need to change the OM2000A+ connection setings for some reason, use point 7.5.1 writen above.

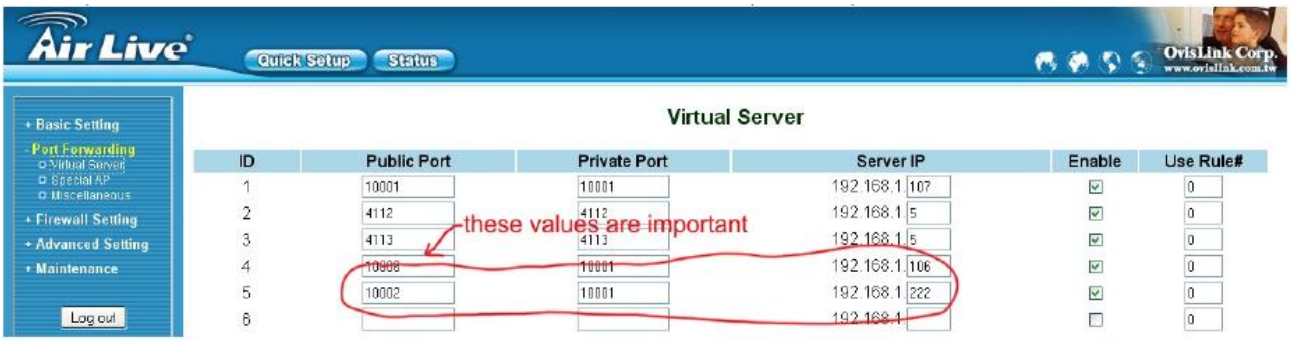
Change router´s settings



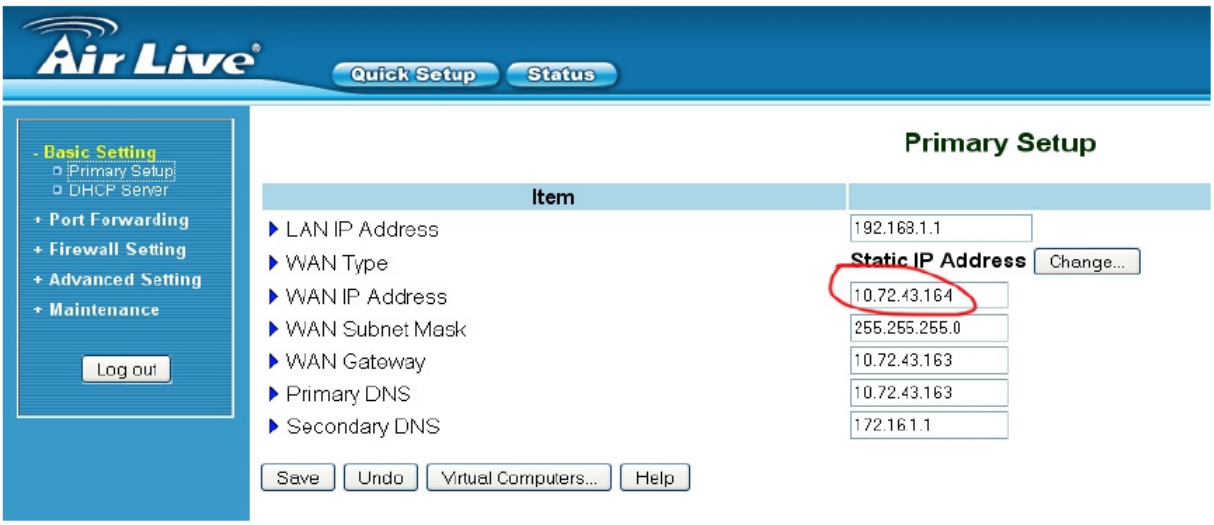
Open up a WEB browser and enter the routers´s internal IP Address (usually 192.168.1.1)

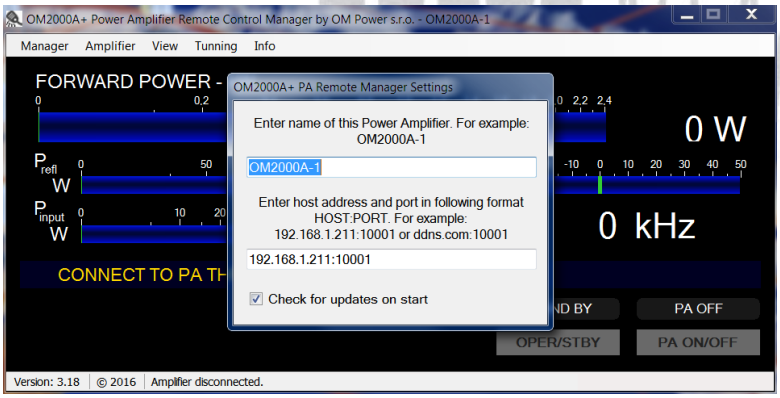
An authentication window WILL APPEAR. You need to enter the routers login and password. Usualy a router´s default login is "admin" or "administrator" and default password "admin" or an empty field.

Open Firewall Settings (depends on router software, can be called Forwarding, Port Forwarding, or something similar). As Server IP enter the OM2000A+ IP Address, 192.168.1.211 if you haven't changed it, or the one you changed to in point 7.5.1. Private port should be 10001 in default, or the one you changed to in point 7.5.1. Some routers THEY don't have a separate Public Port settings. If you got, enter a free port number (usually the default 10001 is free and usable). Check the Enable box too. When done, click OK (or Save).



Open Basic Setup (or WAN Settings or similar, depending on router) and note the WAN IP Address value.





In Remote Control software, open Settings. Enter the IP Address and Port number you set up in previous point in your router. IP Address is the WAN IP Address in basic setup page and Port number is the Port (or Public Port if separate) in forwarding page. When done, click enter.

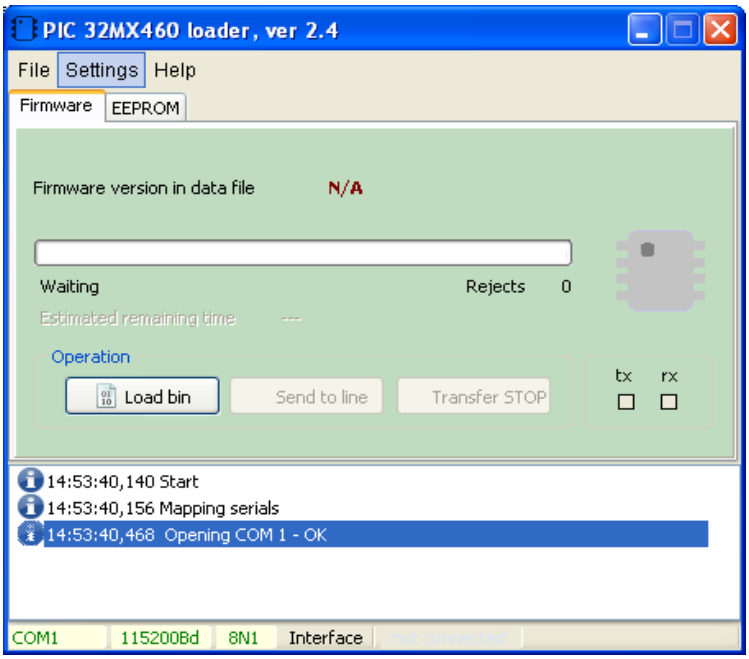
Now you are ready to work with OM2000A+ over the internet.

7.6. OM2000A+ firmware upgrade

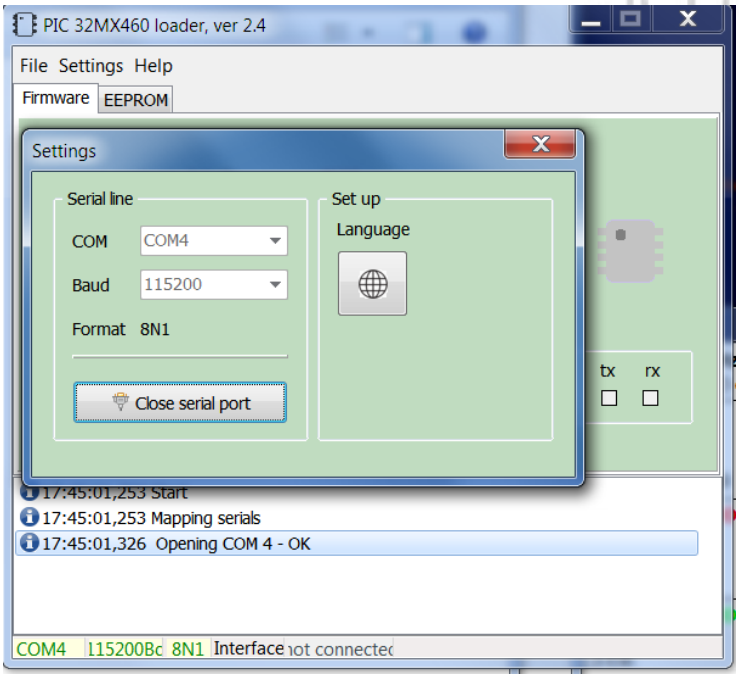
Download firmware upgade software and latest firmware file for OM2000A+ from the official OM Power website http://www.om-power.com/downloads. Store it to OM2000A folder in your PC.

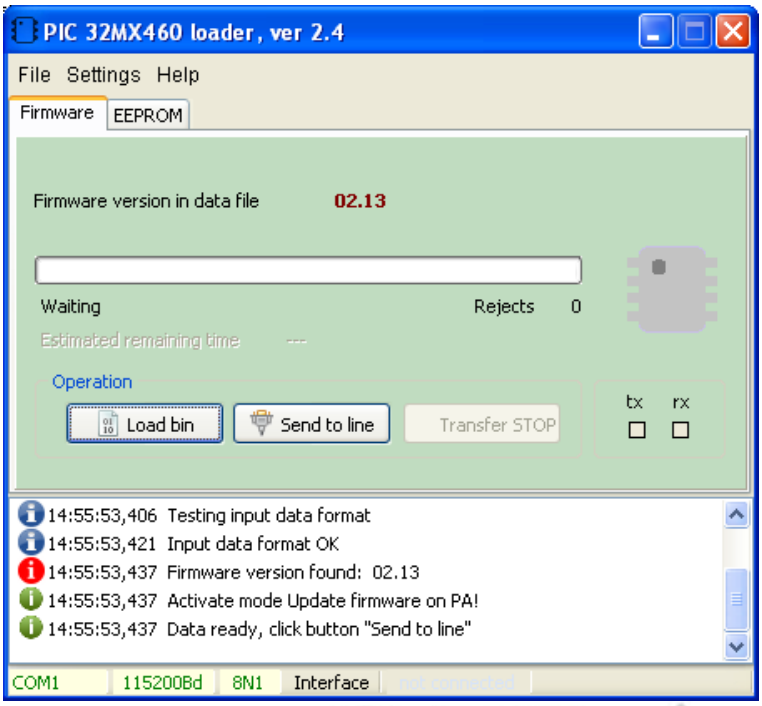
Use serial null modem cable and connect TCVR port on OM2000A+ rear panel with COM port on the PC.

Open folder OM2000A , find MX460L.exe file and run it.



Select SETTINGS and choose COM port you want to use. Baud rate should be 115200. Close the window.



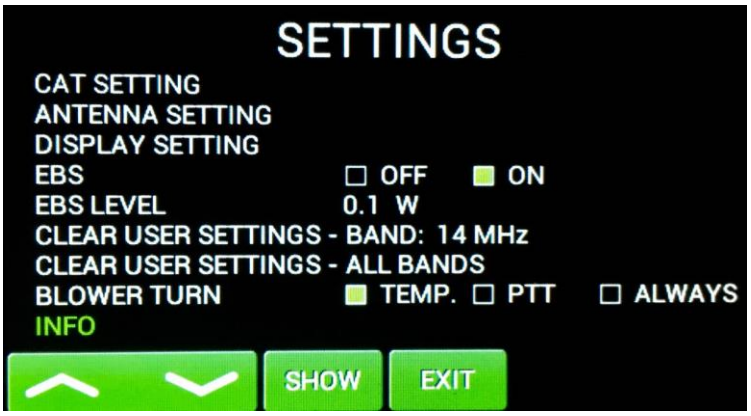


Select the Firmware tab and click on LOAD BIN

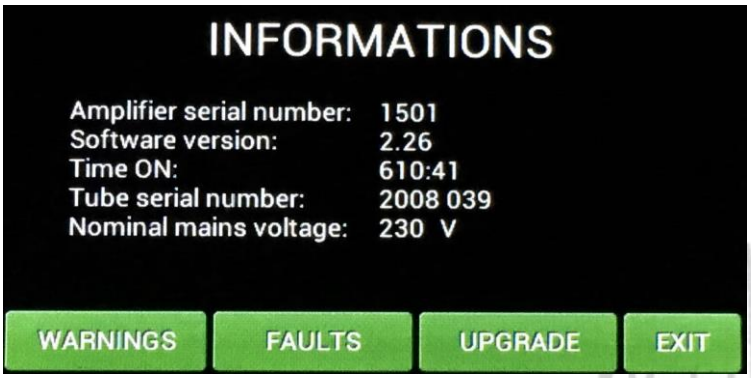
Choose OM2000A+ Vxxx.bin file in the OM2000A folder.

Switch ON power amplifier using mains switch.

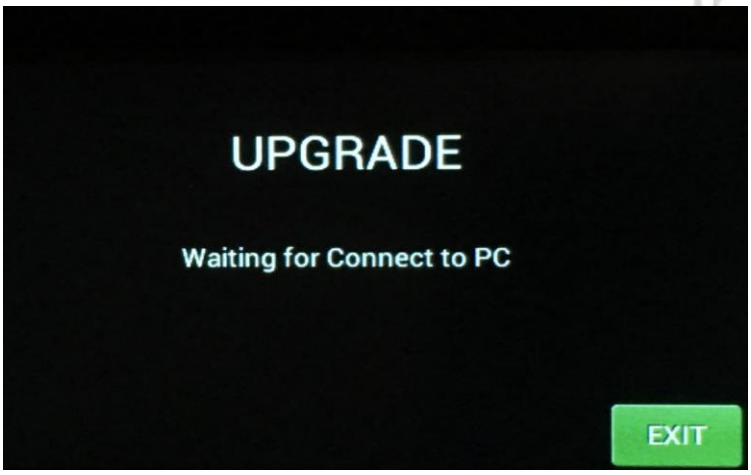
Press SETTINGS.



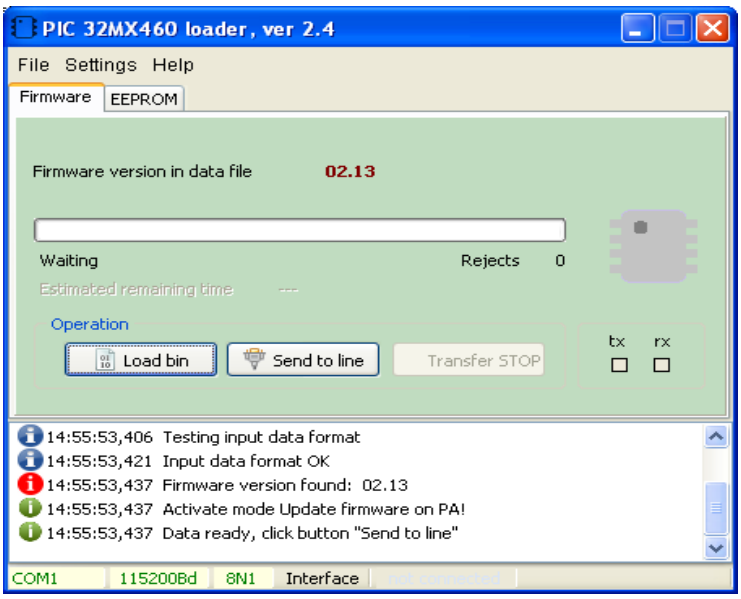
Choose INFO and press SHOW.



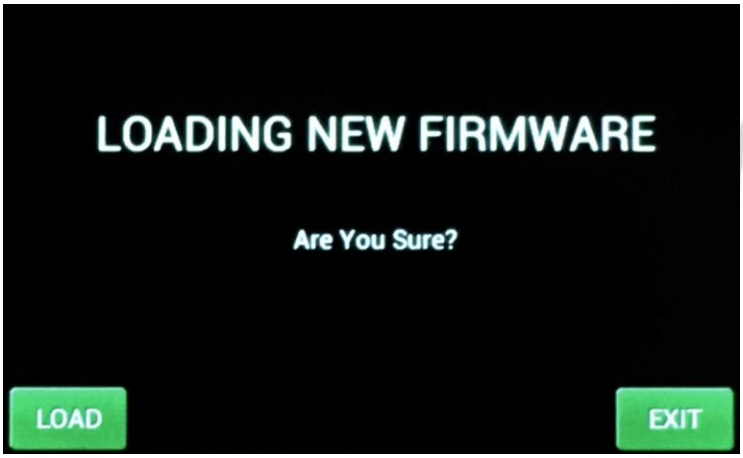
Press UPGRADE.



When you see this screen, go to PC software and press button SEND TO LINE.



Press SEND TO LINE.



Press LOAD on OM2000A+ to start loading.

You can see loading progress on the bar graph

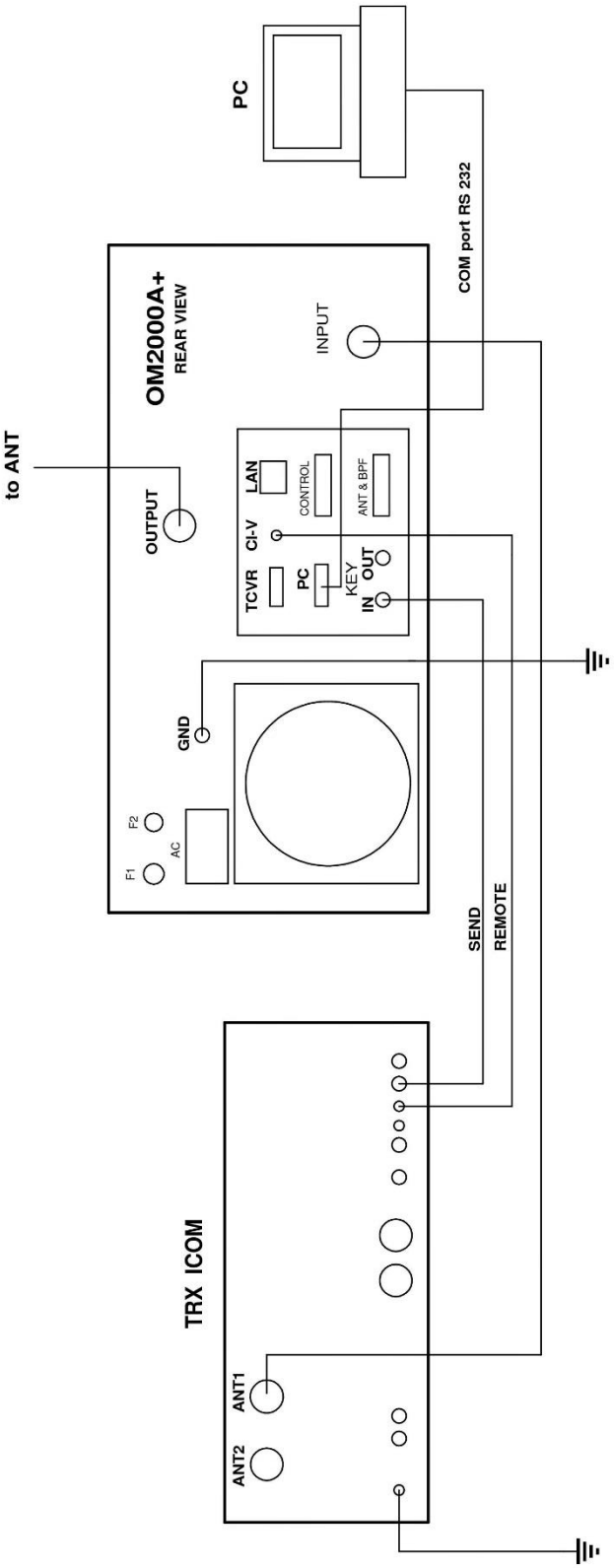
You will see this screen after firmware was successfully loaded.

It is very important: Do not do any action. Wait until this screen disappears!

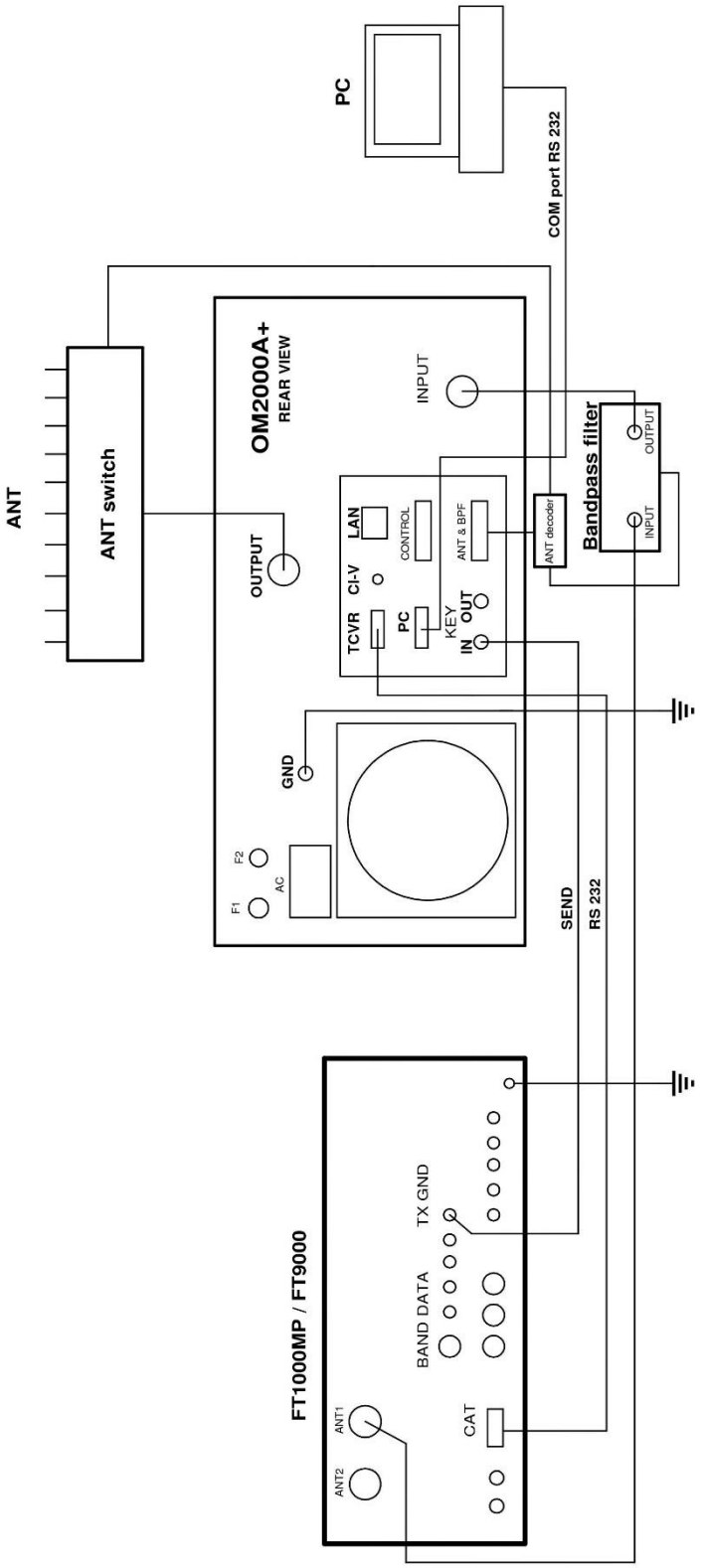
Usually, it takes about 30 seconds but sometimes it might take a little bit longer.

At the end you will see main screen of OM2000A+. Switch PA OFF, disconnect serial cable and you are ready to use OM2000A+ with the new firmware.

7.7. ICOM connection with OM2000A+

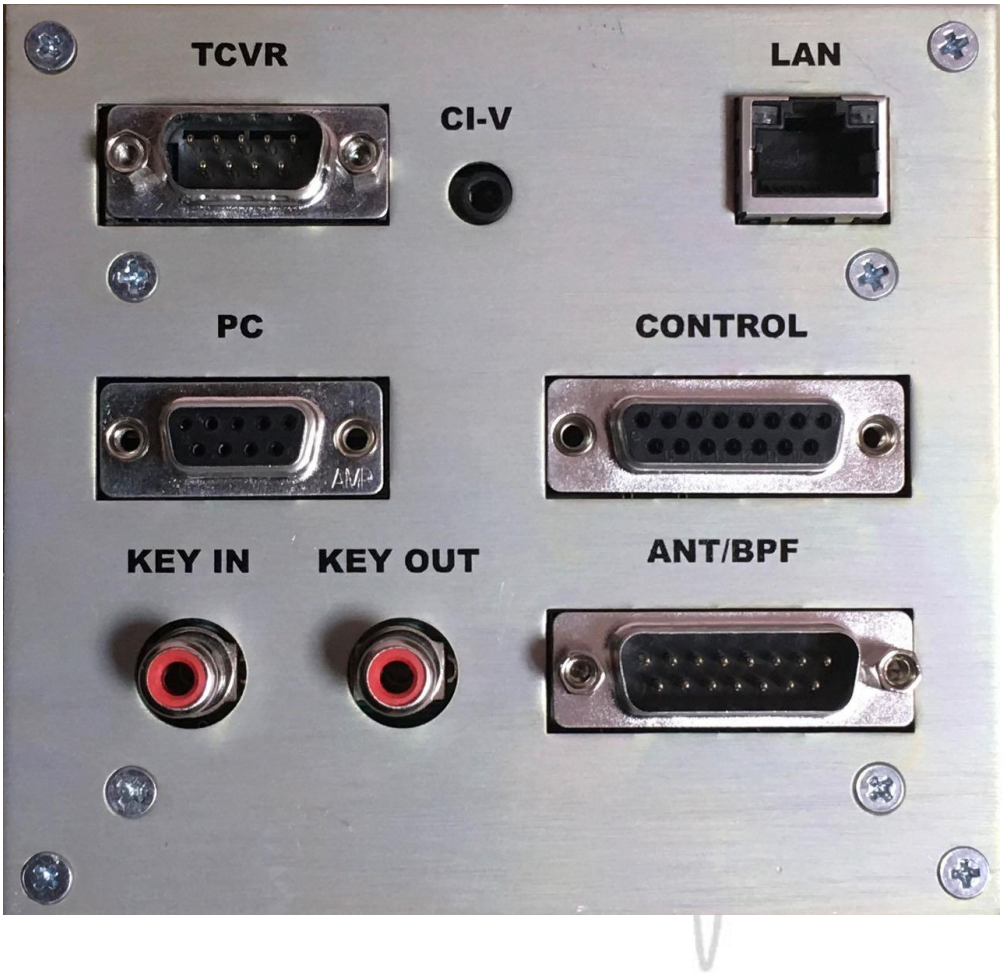


7.8. Yaesu plus BPF plus ANT Switch connection with OM2000A+



7.9. Control panel (rear side) connectors pin-out

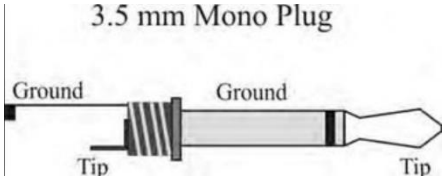
ANT / BPF Connector - DB15 female



TCVR connector DB 9 male

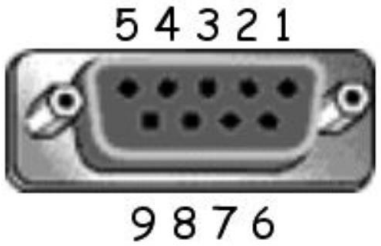
RS232 connection with TCVR. For CAT communication you need connect pin 2 RX-D, pin 3 TX-D and pin 5 GROUND

CI-V connector



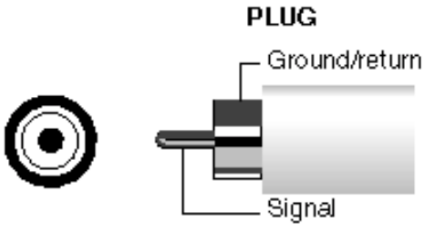
Use CI-V connection for communication with ICOM type transceiver. Signal CI-V is connected to the Tip.

PC connector DB 9 female



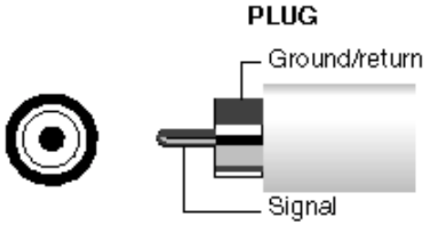
RS232 connection to the computer. For CAT communication you need connect pin 2 TX-D, pin 3 RX-D and pin 5 GROUND

KEY IN – RCA connector



Input signal PTT switching voltage / current 5V /2mA)

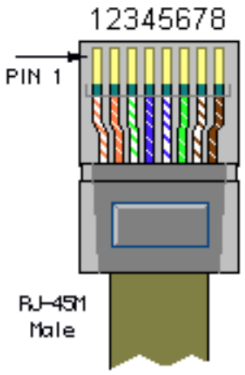
KEY OUT – RCA connector



Output signal PTT (maximum switching of 30V / 50mA)

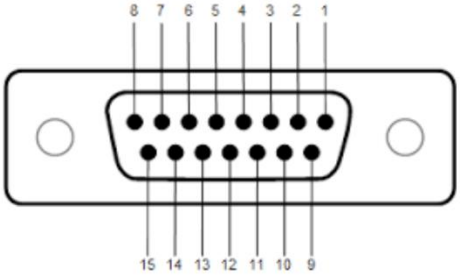
LAN connector

Straight Through Cable	
RJ-45 PIN	RJ-45 PIN
1 Tx+	1 Rc+
2 Tx-	2 Rc-
3 Rc+	3 Tx+
6 Rc-	6 Tx-



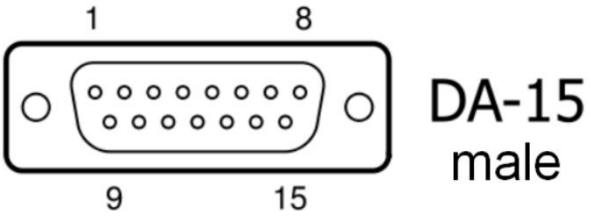
Use for connection to the LAN or WAN network.

CONTROL connector D-sub 15 female



Pin 1 - GROUND
Pin 2 - KEY OUT - ouput signal PTT (maximum switching of 30V / 50mA
Pin 3 - KEY IN - input signal PTT – switching voltage / current 5V / 2mA
Pin 4 - CI-V - CI-V input for Icom CAT. The same as CI-V jack connector
Pin 5 - BAND data A input - input BCD Yaesu compatibile code from TCVR - bit 0
Pin 6 - BAND data B input - input BCD Yaesu compatibile code from TCVR - bit 1
Pin 7 - BAND data C input - input BCD Yaesu compatibile code from TCVR - bit 2
Pin 8 - BAND data D input - input BCD Yaesu compatibile code from TCVR - bit 3
Pin 9 - GROUND
Pin 10 - CI-V SW - connect to Ground if you use CI-V input on pin 4. Not used for CI-V with Jack 3,5mm
Pin 11 - IC band data - Icom Band data input. Band data information from ICOM TCVR
Pin 12 - INHIBIT - Inhibit output for TCVR. +12V/2mA inhibit transmit, 0 V if transmit is allowed
Pin 13 - No connect
Pin 14 - No connect
Pin 15 - No connect

ANT / BPF Connector - D-sub 15 male



Pin 1 - ANT data D - output BCD code - bit 3 for antenna switching

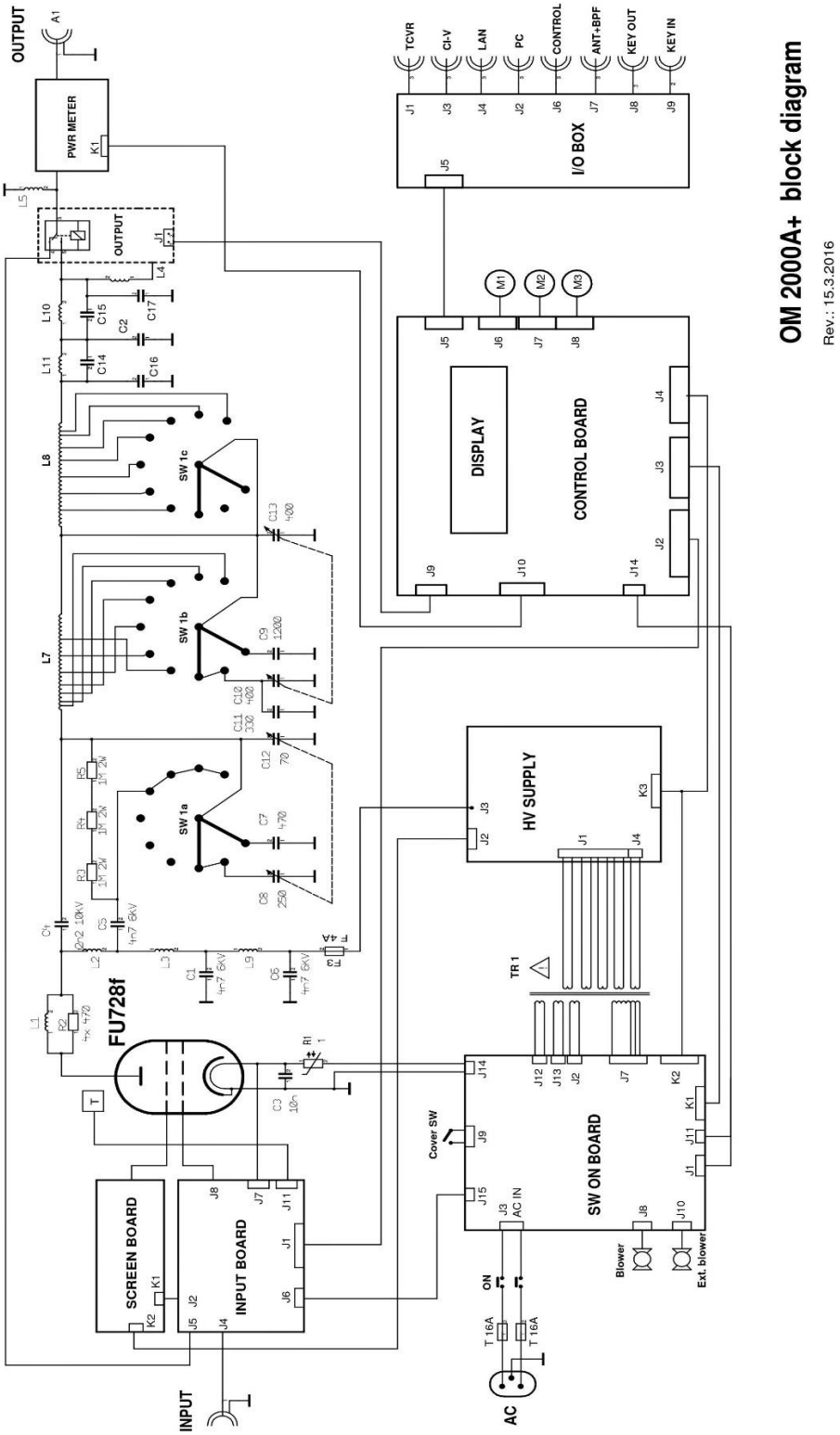
Pin 2 - ANT data C - output BCD code - bit 2 for antenna switching
Pin 3 - ANT data B -- output BCD code - bit 1 for antenna switching
Pin 4 - ANT data A - output BCD code - bit 0 for antenna switching
Pin 5 - Not connected
Pin 6 - GND
Pin 7 - GND
Pin 8 - +12V /100mA - output supply 12V maximum 100mA for antenna BCD decoder
Pin 9 - BAND data A - output BCD Yaesu BAND data compatibile code.Use for automatic bandpass filter OM6BPF

Pin 10 - BAND data B - output BCD Yaesu BAND data compatibile code.Use for automatic bandpass filter OM6BPF
Pin 11 - BAND data C - output BCD Yaesu BAND data compatibile code.Use for automatic bandpass filter OM6BP
Pin 12 - BAND data D - output BCD Yaesu BAND data compatibile code.Use for automatic bandpass filter OM6BPF
Pin 13 - Not connected
Pin 14 - GND
Pin 15 - 12V /100mA – the same as pin 8

OM2000A+ can address up to 10 antenna port, see antenna BCD code table below

D	C	B	A	Logic value	Antenna port
0	0	0	0	0	UNDEFINED
0	0	0	1	1	ANT 1
0	0	1	0	2	ANT 2
0	0	1	1	3	ANT 3
0	1	0	0	4	ANT 4
0	1	0	1	5	ANT 5
0	1	1	0	6	ANT 6
0	1	1	1	7	ANT 7
1	0	0	0	8	ANT 8
1	0	0	1	9	ANT 9
1	0	1	0	A	ANT 10
1	0	1	1	B	UNDEFINED
1	1	0	0	C	UNDEFINED
1	1	0	1	D	UNDEFINED
1	1	1	0	E	UNDEFINED
1	1	1	1	F	UNDEFINED

7.10. Block Diagram of the OM2000A+ Power Amplifier



7.11 Troubleshooting

The OM2000A+ power amplifier contains several protection circuits, which checked operation. In the case when some of parameters exceeds normal level, WARNING appears in the LAST EVENS window with yelllow back colour. If some of parameters exceeds critical level, FAULT is activated and the PA automatically switch to STBY mode. In the LAST EVENTS window with red back colour fault information will appear.

All of these events are written to the FAULT and WARNING memories. Last event is visible after LAST EVENTS button pressing together with information about possible causes.

There are several warning or fault messages possible to appear on the display:

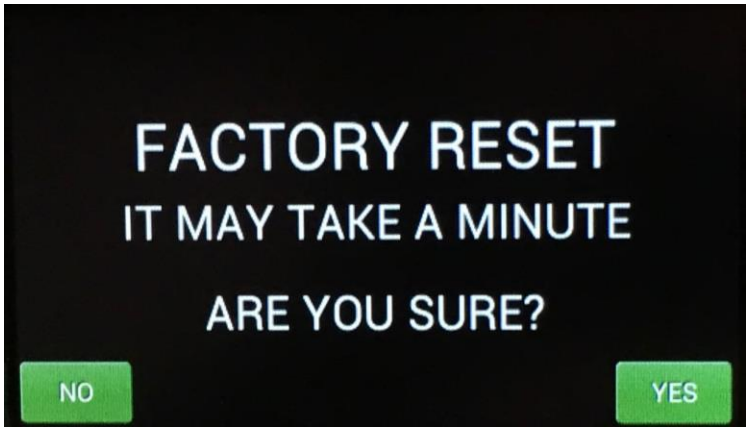
Warning / Fault	Action	Description
Power Out is too high	Reduce input power	Output power exceeds maximum level, reduce the input power.
Refl. power too high	Check your antenna Reduce output power	Reflected power exceeds maximum allowed level. Check if proper antenna is connected. In the case of higher SWR reduce the input power and thus the output and reflected power will be lower.
SWR is too high	Check your antenna Check antenna switch	Antenna SWR is too high (SWR 3 for WARNING and SWR 5 for FAULT). Check if proper antenna is connected. Check antenna switch configuration, resp. If you want to use antenna with higher SWR, this protection can be switch off (page 25). But reflected power will stay checked (max.350W).
Power In is too high	Reduce input power Check amplifier tunning	At the PA input is too high input power – decrease it! If maximum output power is not achievable, check plate voltage and PA tuning.
Low output power (tune)	Tune mistake. Tune your amplifier	The PA has lower gain, may not be properly tuned. Check plate voltage and Screen current. If they are ok, make optimal tuning of the PA.
Plate current too high	Reduce input power Check amplifier tunning Check EBS setting	Plate current too high may be for the following reasons: • Too high input power – reduce it • Improper tuning of the PA – bad antenna impedance matching. Tune the PA properly. • Improper BIAS setting. Check EBS1 and EBS2.
Grid current is high	Reduce input power Check amplifier tunning	Grid current too high is due to overdriving the PA. Reduce the input power. If maximum output power is no reachable due to high plate current, check the PA tuning.
Screen current error	Reduce input power Check amplifier tunning Check plate voltage fuse	High screen current is usually of the following reasons: • Overdriving the PA – reduce the input power • Improper PA tuning. At maximum output power the screen current must be inside the range of 0 mA to +30 mA. • Plate voltage is missing. Press PTT without driving If screen current is higher than +5mA, check plate fuse (page 32).

Plate voltage error	Check plate power supply	High voltage supply fault. Check fuses on HV board.
Grid voltage is low	Check grid power supply	Low voltage on the grid. Check fuse F4 on SW ON board.
Screen voltage error	Check screen power supply	Check fuse F5 on HV supply board and fuse F1 on the screen board.
Amplifier is too hot	Check cooling system Set up aditional blower	Check the airflow (ventilation grid on the rear panel). Cooling exhaust must be free – no obstacle within 15cm. During long contest set additional blower ALLWAYS ON (page 18).
HARD FAULT	Check HV circuits and Tube	Protection circuit saved HV against overload. I the case of too high current from the HV supply the HARD FAULT protection is activated and switched the PA automatically OFF. Check HV circuits, blocking capacitors and the tube.
Heating voltage error	Set up properly transformer voltage selector	Usually is due to improper setting of the primary voltage on the transformer (page 33). In normal condition Uf should be 9V +/- 0,5V.
Cooling error	Check blower rotation	Main blower lost the speed. Check its functionality.
Mains error	Check mains voltage and set up nominal mains voltage Set up properly transformer voltage selector	This error may be caused by the improper setting of the nominal value of Um. Check your AC mains voltage and set it as nominal Um (page 21). Check primary voltage setting on the transformer. This fault may occurs also in the case of very “soft” mains, when during transmitting AC voltage dropped down to very low level.

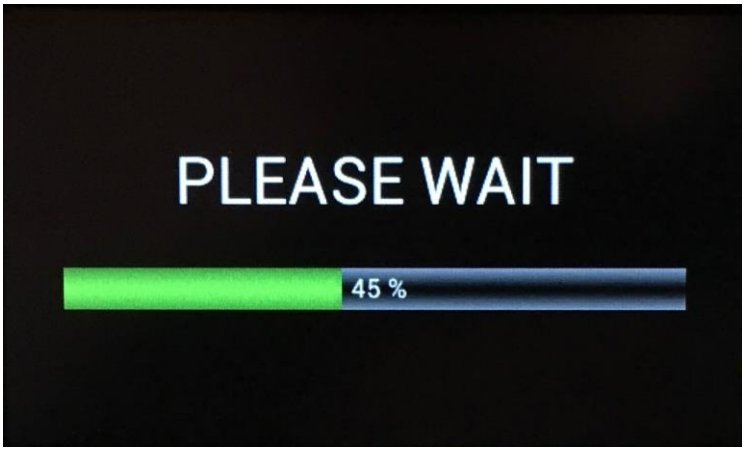
Factory reset

I the case of very abnormal behavior of OM2000A+ is possible to make factory reset. After that all the parameters will be changed to the factory default values.

Press ON/OFF button, hold it and press Main switch. ON/OFF button hold pressed several seconds, until next display will appear.



If you are sure to make factory reset, press YES.



After finish the PA is ready for operation.

Important notice: Perform Factory reset unless it is really necessary, because subsequently you must recover all of personalized settings, mainly CAT communication with TCVR, antenna switch settings etc.