

MADE IN SLOVAKIA



OM4001A

SHORTWAVE
POWER AMPLIFIER



WWW.OM-POWER.COM

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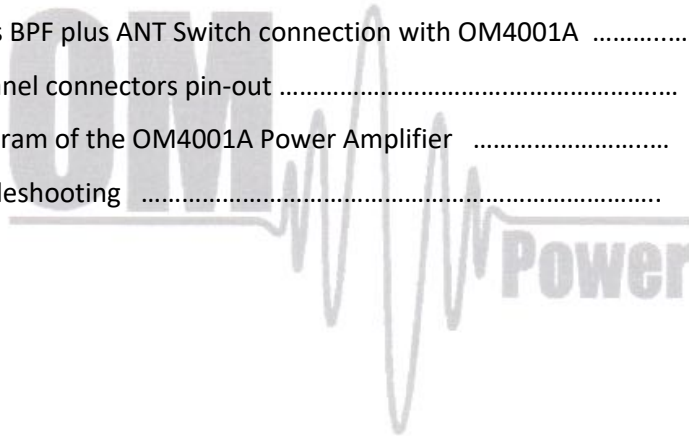
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GENERAL INFORMATION

1.1. Introduction

The OM Power model OM4001A is designed for all short wave amateur bands from 1.8 to 29.7 MHz (including WARC bands) and all modes. It is equipped with a two ceramic tetrodes FU-728F.

1.2. Specification

1.2.1. Parameters

Frequency Coverage	Amateur Bands 1.8 – 29.7 MHz including WARC
Power Output	1500+ W in SSB/CW on HF bands 1500 W in RTTY and DIGI modes
Input Power	Usually 50 to 70W for full Output Power
Input Impedance	50 Ohm, VSWR < 1.5 : 1
Power Gain	14,6 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	-31dB below nominal output
Suppression of harmonics	< -50 dBc
Tubes	2 x FU-728F Ceramic tetrode
Cooler	Centrifugal blower + Axial blower
Power supply	switchable 2 x 230 ,240V, 250 V – 60 Hz one or two phases
Transformers	2 pcs of toroidal transformer 3kVA
Dimensions	485 x 200 x 455mm (width x height x depth)
Weight	46 kg

1.2.2. Protection Circuits

There are several protection circuits used in the amplifier. They are activated when one or more parameters exceed defined values or some unwanted condition 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 too high
- Soft start for fuse 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

1.2.4. The Advantages of OM40001A

- 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 Band and Frequency switching, for use with radios which do not have CAT. We recommend using CAT and BAND DATA information due to the much faster band changing whenever possible.
- 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 via available PC Application. 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 3300 V 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 THE FOLLOWING SAFETY 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 OM4001A amplifier should not be used in a WET or HUMID environment or 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 removing the upper lid of the amplifier make sure that power supply has been disconnected AT LEAST 10 minutes allowing for the electrolytic capacitors to discharge fully. Disconnect power cord from the outlet!

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



CAUTION

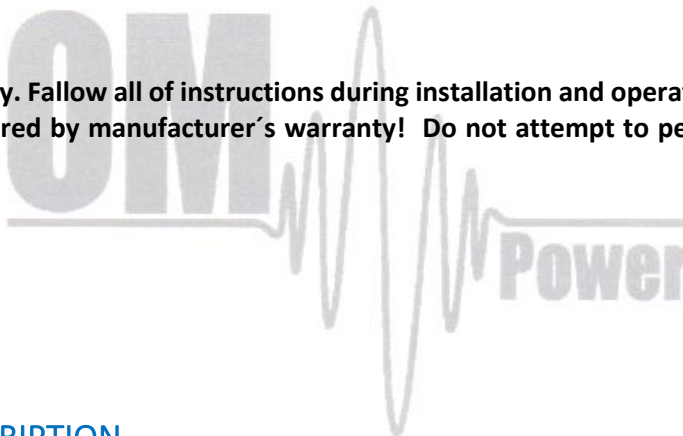
The amplifier must be installed in such a way that free flow of hot air from the tube is allowed. The amplifier must not be installed in a constrained surrounding (i.e. tight shelves etc.). During extended operation the tube ventilation grid can reach high temperature. Do not touch it!

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. Follow 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 Compartment

This amplifier is using a pair of ceramic tetrode FU-728F in a grounded-cathode circuit (input into control grids). The OM4001A amplifier achieves excellent linearity by the voltage stabilization of the control grid bias and the screen voltage. The power input is fed 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.

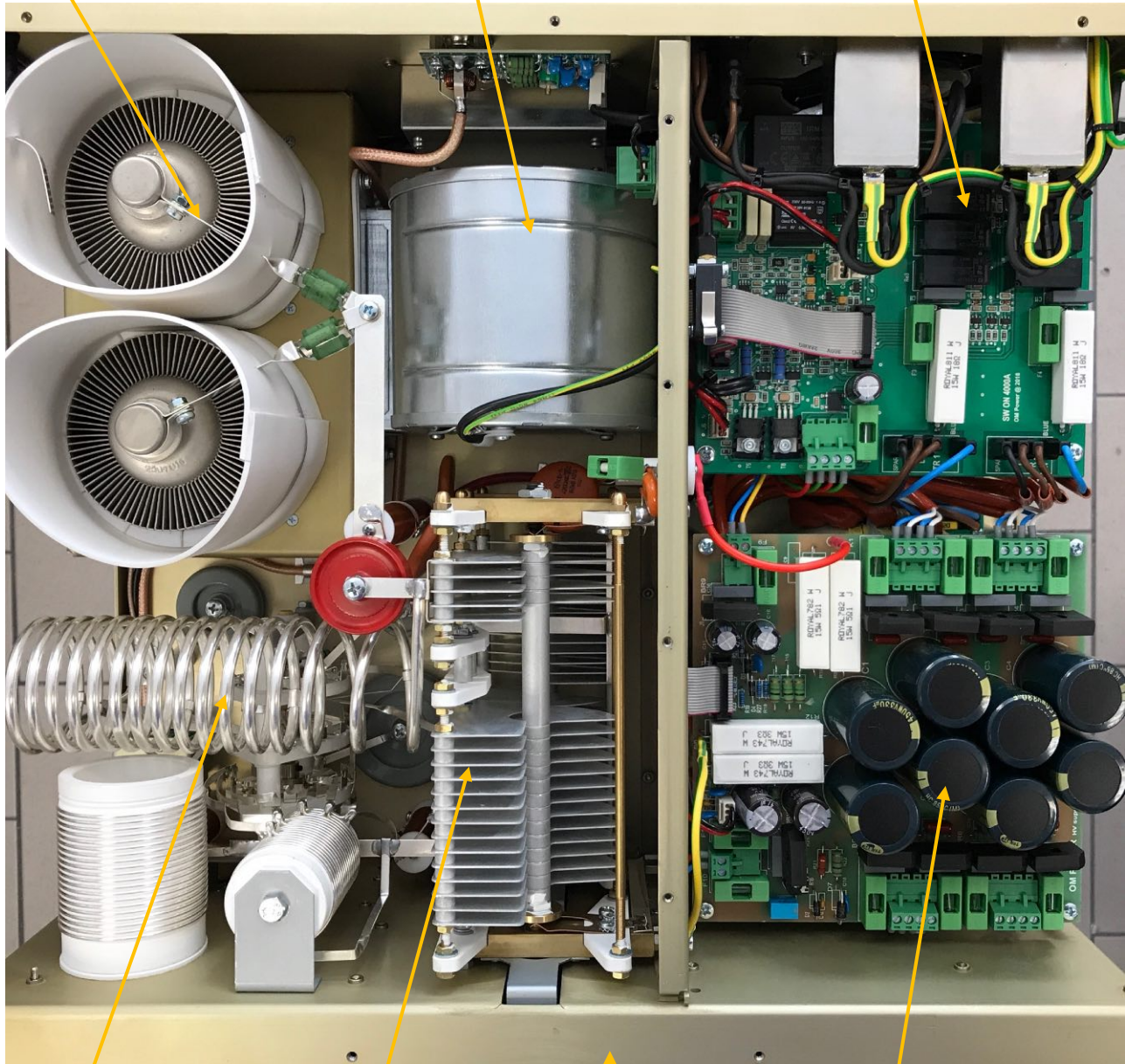
The output of the amplifier is a Pi-L circuit. This enables the amplifier to be tuned exactly and makes it possible to easily return to the previously set positions after band changes.

Top view on the opened OM4001A

Tetrode FU728F

Blower

Switch-ON Board



Output Pi-L Circuit

Tuning Capacitor

Front Subpanel

Power Supply Board

3.2. Power Supply

This Power amplifier uses two 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 8 x 420 V (total 3360V) @ 2.5A . 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).

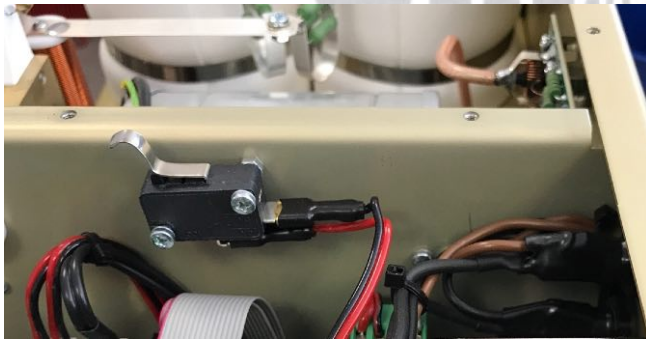
The separate screen grid supply is regulated and stabilized with MOSFET circuits and delivers abt. 340V DC at 200mA. Control grid voltage is also stabilized (-130V DC). Change of stabilized first grid voltage is controlled by the software (EBS for example).



The transformer primary is Tap adjustable for 230 , 240 or 250V AC. The factory setting is 240 VAC . If the AC voltage in your network is 230 or 250 Volts, you need to set the correct transformer tap before first starting 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 elements is a mechanical switch for AC blocking an opened amplifier.

4. INSTALLATION



Read this chapter carefully prior to starting installation. Before unpacking inspect shipping carton for any damage. Keep all of packing parts for possible future shipment. Check unpacked power amplifier. If you find any damage, contact your dealer immediately to keep full warranty.

4.1. Grounding



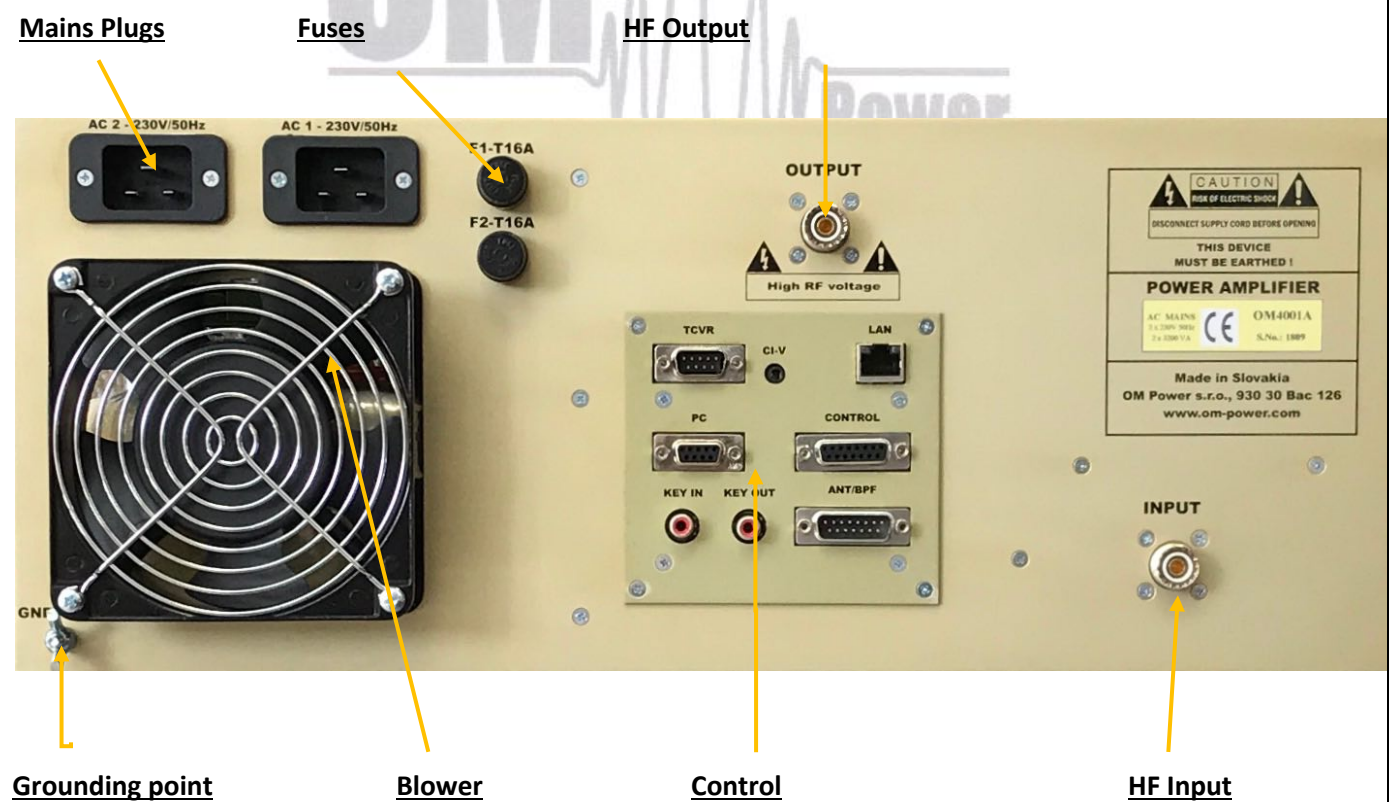
The amplifier has to be grounded properly! Connect the screw on the rear panel of the amplifier to your local grounding system with a copper cable; use a cross-section of 4 mm² at least.

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, have problems with TVI/BCI or possible distortion of your transmitted signal.

4.2. Coaxial Cable

The output of the transceiver is to be connected to the input of the amplifier via RG58 or similar 50 Ohm cable. For the connection between the power amplifier and the antenna, RG213 or similar coaxial cable suited for high power is recommended. SO-239 sockets with Teflon insulation are used for the HF INPUT and OUTPUT connectors.

Rear view of the amplifier OM4001A



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 OM4001A 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 has 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 15ms, 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 7.9. for Control and ANT/BPF connector PIN-OUT.



Be sure that your power system is correctly wired and properly rated! To use an 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). Additional fan working mode is programmable (3 modes). See page 20-21 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 plugged into the outlet. Be sure you have selected the proper AC input TAP (Sect 7.1)



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



We do not recommend changing antennas during a transmission. (Hot switching)



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

5.1. OM4001A Front Panel

Front panel of the OM4001A is almost empty...Containing only the touch TFT display plus two control switches.



ON - Main Switch. After turning ON, a 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 - switching between STBY and OPERATION mode.

ON/OFF - Long press - (1 sec.) switch the PA ON (tube heating first), (2 seconds) switch the PA OFF. Always use the ON/OFF button as this allows for a predetermined (software controlled) time to cool down the tube and the inside of the PA compartment.

5.2. OM4001A control

Turn ON the green Main Power switch and the **home screen** will light-up. Initial control touch buttons are visible on the bottom line.



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

BAND

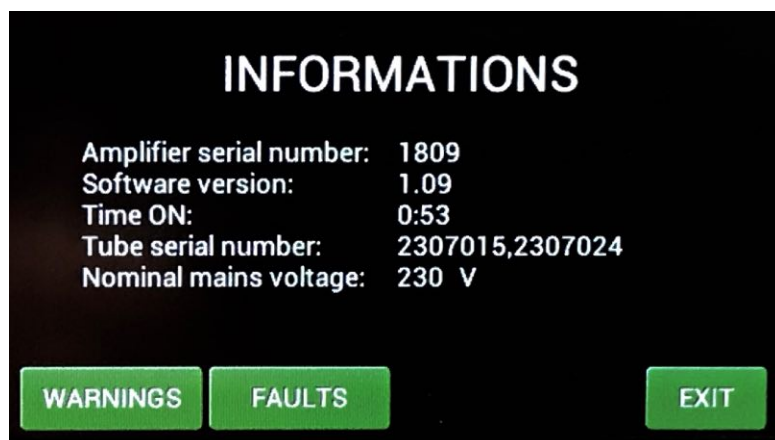
Touch the left side of BAND button to go down, touch the right side to go up. The band information is displayed above the button.

ANTENNA

Transmitting antenna choice. Functional ONLY when the antenna switch is programmed and antennas are defined (see page 17). This antenna feature allows switching between antennas authorized for the current band. An external antenna switch is controlled by BCD code at the ANT/BPF output (see Section 7.9).

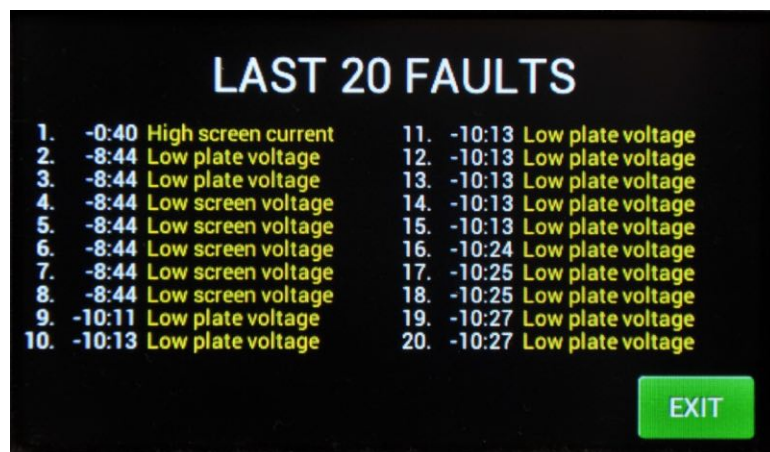
INFO

Information display shows basic information about the PA: serial number, software version, time ON, tube serial number and nominal Main voltage.



The information screen also provides an overview of the last 20 warnings and faults:

Press **FAULTS**.



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



Now press **SETTINGS**. This display shows various menu settings for CAT, NO CAT, ANTENNA, DISPLAY, EBS, CLEAR user settings for one or all bands, BLOWER mode and other INFO.



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

Scroll to **CAT SETTINGS** (up or down) and

press **SET**.



Select your TCVR family
Select appropriate bit rate
then press **SAVE**.

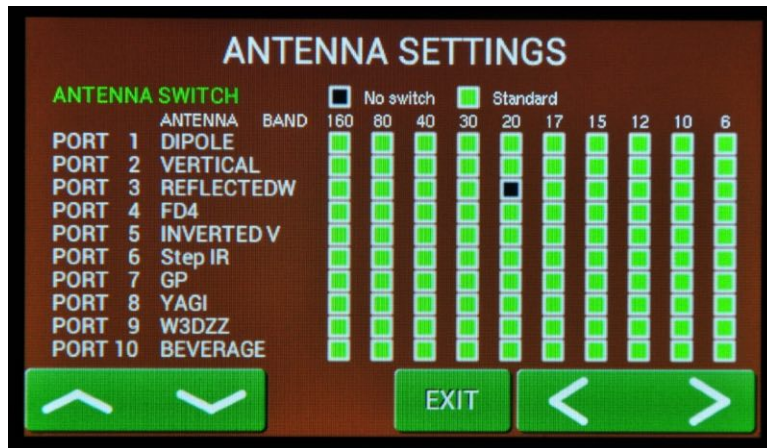
If your TCVR is not equipped with CAT
than select **NO CAT** and press **SAVE**.

We recommend using the CAT connection whenever possible because, in such a case, the OM4001A has permanent information about the transmit frequency and is immediately ready for transmitting.

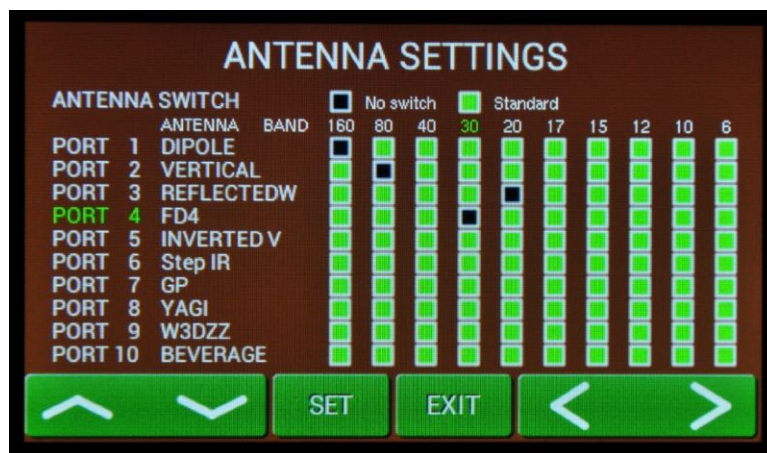
With a setting of NO CAT the OM4001A detects transmit frequency from the input signal. With the input signal frequency changing the PA automatically reacts and tunes itself to optimal output parameters. If NO CAT is used, we recommend using BAND DATA (BCD) information for much faster band changing.

Passive OFF - select this button when amplifier is connected only with TCVR

Passive ON - select this button **when amplifier is connected with more devices (PA, PC with logging software, antenna controller, etc.)**



Press **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). Press **SET**.



Four types of antennas for four different bands were disabled.

Black square means disabled combination.

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



BCD code (4 bits) is used for automatic antenna and BPF switching (see Antenna/BPF connector on the Control panel (rear side of the PA). See section 7.9 for Control and ANT/BPF connectors pin-out.

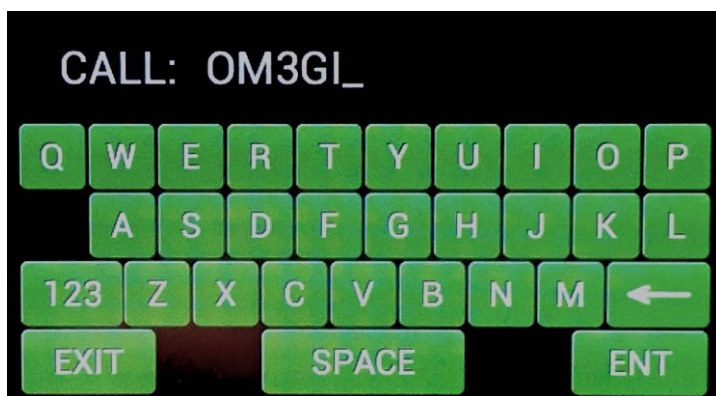


Next **SETTINGS** position is for choosing display parameters. First choose the background color. Scroll on it and choose the color (left/right).

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



Press **SET** for setting your callsign.
Keyboard will be displayed for typing.



Type your callsign and press ENT.

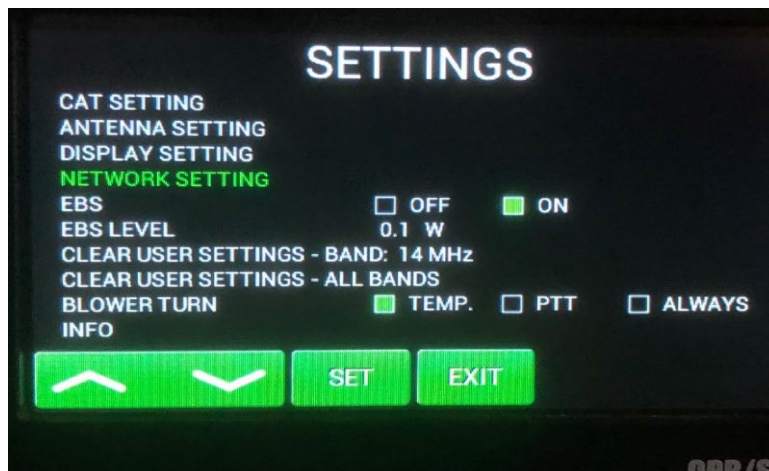


Use next lines and set brightness, sound volume and bar graph style (use up/down and left/right).

Confirm with **SAVE**.

POWER OUT – choose **PEAK** in the display settings if you want to hold peak output (approx. 2s) or **NORMAL** (average)

SCREEN SAVER – adjust time for screen saver (OFF – screen saver functionality is switched-off)



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



Here the user has the option 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 a significant feature of this power amplifier. It automatically allows lower plate current after pressing the PTT, regardless of whether operating CW or SSB mode, when no RF signal is present at the input. At the moment an RF signal is applied, the 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 turning EBS ON. A significant feature of using EBS is PA operating temperature reduction.

NOTE: If you are not using compression in your TCVR, or you are not speaking loud enough, some syllables can be cut off. In such a case you should turn OFF the EBS.



The next two settings allow deletion of the manual user settings of the amplifier tunings for a single band or for all bands.

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

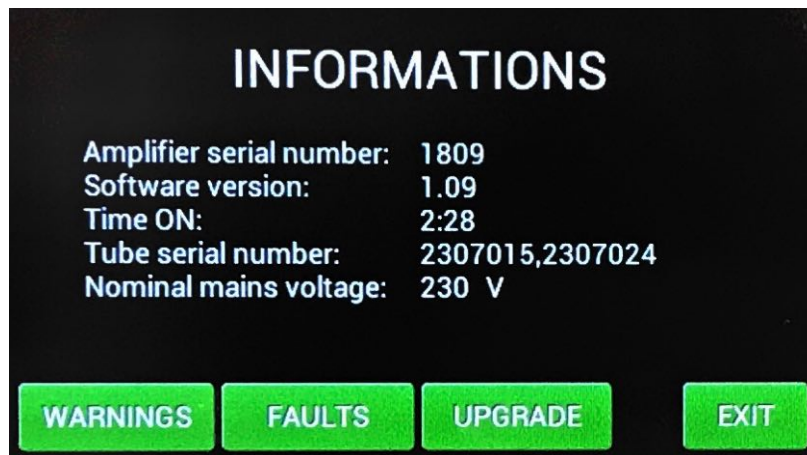


In the next line you can define working mode of the blower. In the first mode speed depends on the PA temperature (**TEMP**), In **PTT** mode the speed increases to maximum, and the **ALLWAYS** mode means maximum speed all the time during PA operation (recommended for DIGI modes).

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



The INFO settings allows viewing all of the previous PA INFORMATION screen plus the addition of one more touch key to enter the UPGRADE mode.



UPGRADE touch button should ONLY be used if the EEPROM or firmware files (or both) will be upgraded. In such a case see page 45.

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! The bypass 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. (These same functions are also available on the OM Power Remote Control PC Application)



The “Tube Heating Timer” is visible on the display. Wait until the required 180 seconds is complete before placing the amplifier in OPERATE Mode.



After heating is completed, the PA will light the **STBY** mode indicator and this **Main display** will appear.

NOTE: If CAT or ANTENNA settings are populated the associated windows will reflect these settings.

Depending on **CAT** settings you would have two possible situations illustrated. If **NO CAT** was saved, the above display will be visible. To manually 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.

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



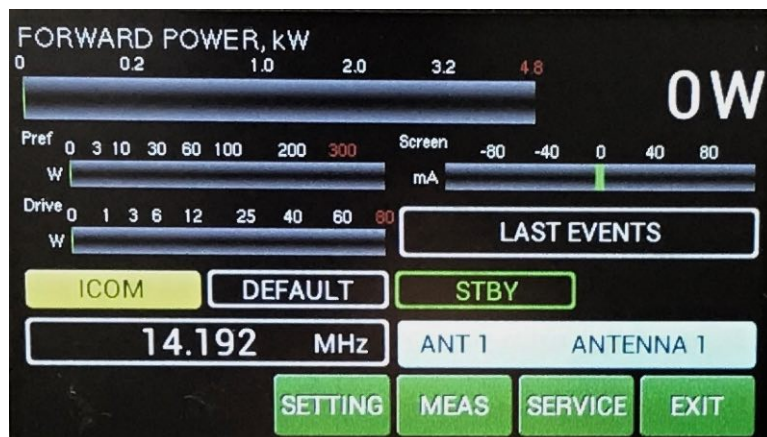
FREQ button has two functions. It allows displaying the working frequency or active band segment.

NOTE: If CAT is used the working frequency will be read directly from the TCVR.

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



The **Menu display** allows the user to go deeper into the **SETTINGS** mode, **MEAS**uring mode or **-SERVICE** mode.

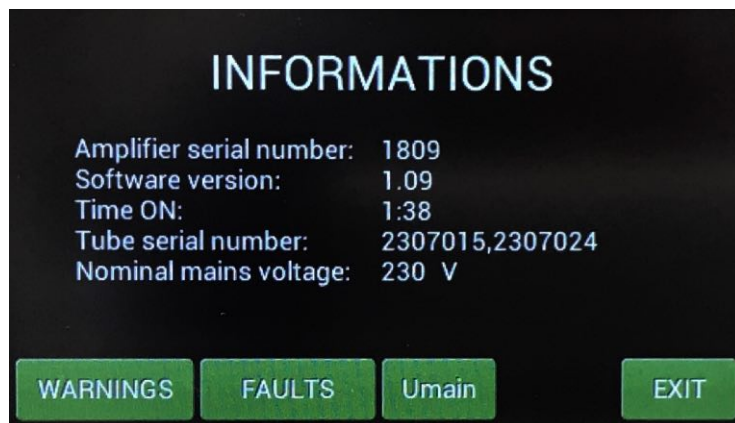


Press **SETTING** button.



We are in the settings mode again, but with a new submenu called **INFO**.

Scroll to **INFO** and press **SHOW**.



A new button is visible – **SET Umain**.
 Press it.

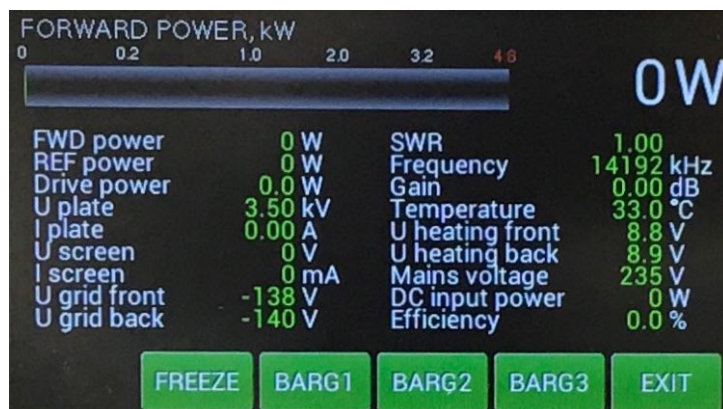


Type in the actual setting of the primary voltage tap and press **ENT**.

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

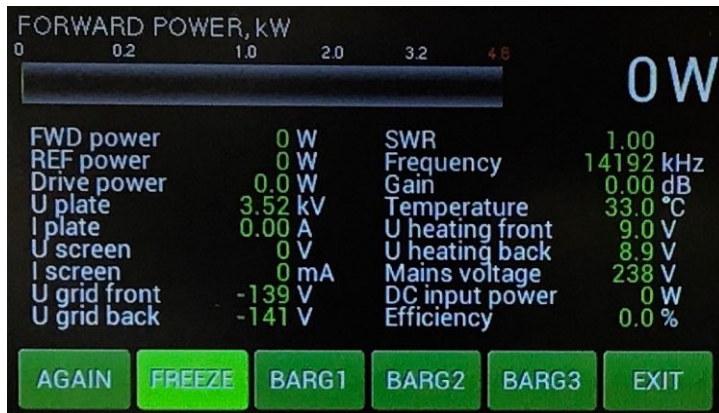


This is the actual physical setting of the primary voltage tap. It is just information for the processor, which protects the permitted limits (up or down) for a given value of the primary voltage (protection circuit).



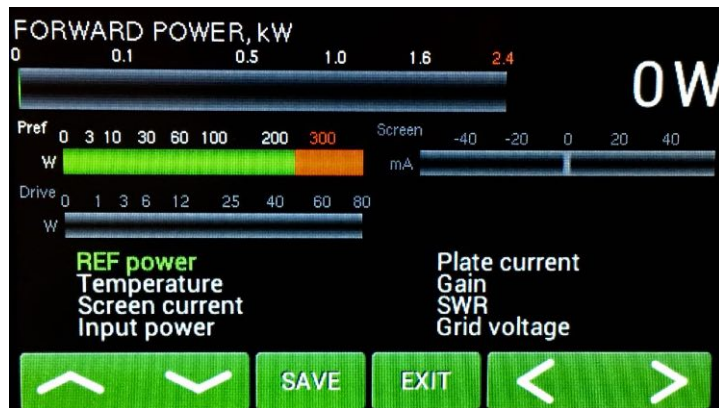
Pressing **MEAS** displays this screen. Instantaneous values of the basic amplifier parameters are displayed.

NOTE: You can **FREEZE** the screen and/or allow constant monitoring.



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

Press **BARG1**.

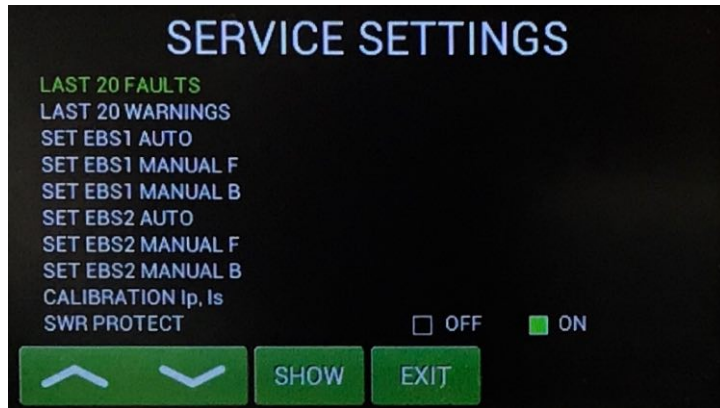


Green graph may show one of the user selectable 8 monitored parameters. Select the wanted parameter from the list at the bottom of the screen and press **SAVE**.

NOTE: Follow these steps to populate **BARG2** and **BARG3** as desired.

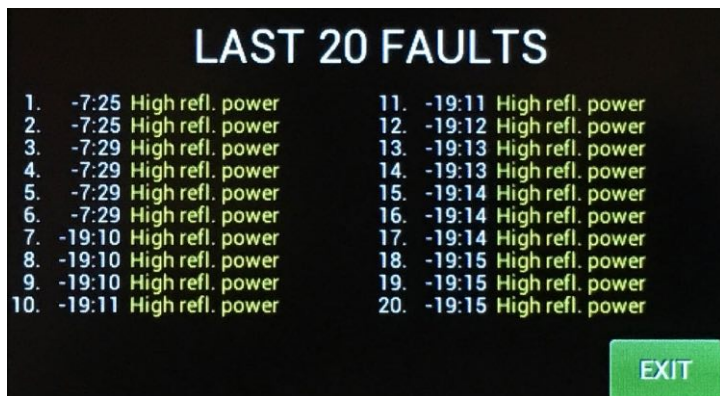


Press **EXIT** to go back to the **Menu display**, then press **SERVICE**.



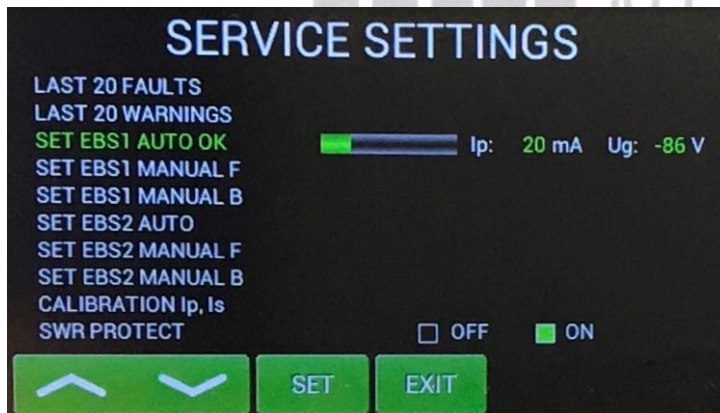
Now we are in the **SERVICE** settings mode.

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



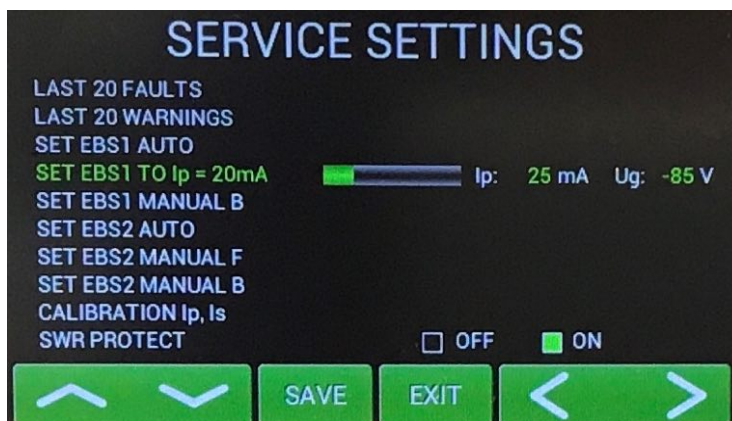
We selected last 20 **FAULTS** to show.

Press **EXIT**



Go to **SET EBS1 AUTO** and press **SET**.

PA will automatically set 20mA on the front and back tube separately. When finished successfully, you will see **SET EBS1 AUTO OK** on the screen



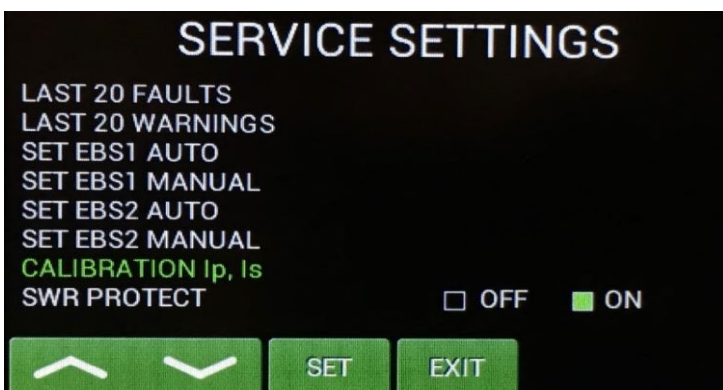
You can try to do this manually, too.

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

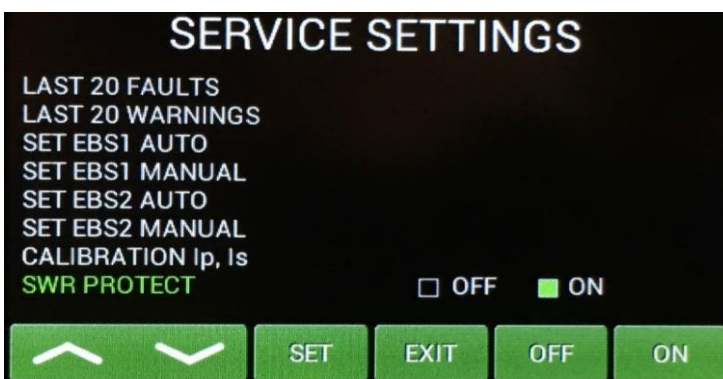
Use up/down buttons to set 20mA or as close as possible value and press **SAVE**.

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

Or another value of EBS2 by MANUAL setting. Do not forget to adjust the same values for both tubes.



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



Scroll to **SWR PROTECT** and press **SET**.

This feature allows user to switch OFF the SWR. This feature allows the 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.

5.4. Operation mode



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



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

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



We are now in OPERATE mode.

Note the light indicator on the touch Screen has changed to **OPERATE**.

Press **MENU**.



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

We are now in TRANSMIT mode (without RF).

Note the new **TRANSMIT** light indicator on the touch screen.

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

M-TUNE means entry into the manual tuning mode. It allows fine tuning of the PA, especially in cases where the antenna impedance is different from real 50 Ohms. For proper adjustment we need to show **Screen** current (at least). By Pressing **M-TUNE**. A new screen is visible and TUNE and LOAD adjustment sliders appear.

M-TUNE Adjustment process: Move **TUNE** left or right until maximum **FWD** power is reached. Then move **LOAD** carefully so that Ig2 **Screen** (I Screen on the display) current will not be higher than 40mA. Repeat this process until the tuning process is optimal at the desired power level.

The result of the tuning process is optimal when the PA is tuned for maximum forward power and Ig2 current stays in the 0 to +40mA range. 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 slightly lower efficiency. If we increase the output power, retuning is necessary only if Ig2 exceeds +60mA.



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

NOTE: Repeat M-TUNE adjustment process for other segments / bands as required.

Below is an example of an M-TUNE situation. First we will check driving power from the transceiver. Stay in **STBY** mode, press **PTT** and apply **RF** power.



Measured driving power is 30 Watts.

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



Output power is 4113W, reflected power about 1W and screen current is about +50 mA.

NOTE: If your antenna impedance is different than real 50 Ohms then can be necessary to start the **M-TUNE procedure** to optimize the PA tuning.



Press **MENU, M-TUNE**) and make the manual adjustment.

This is the result after manual adjustment process. Screen current is now abt. +30 mA.

These parameters were **SAVED**.

NOTE: The OM4001A is factory adjusted to a maximum output power of 1500W into a 50 Ohm load. A unique Tuning table, with TUNE and LOAD values for every band, is supplied with each PA.

When the antenna impedance has greater variance from 50 Ohms, it may be the case that the PA cannot deliver the full power 1500W, or some of the protection circuits may be automatically activated. In such cases we recommend doing a manual tuning. (M-TUNE)

The best indication of proper PA tuning is the Screen Current. In the properly tuned PA this should be within 0 to + 40mA (at full output power).

M-TUNE Tuning procedure:

- Press M-TUNE button. If CAT is active, the TCVR will automatically tune itself to the middle frequency of the segment. If NO CAT, you must tune the TCVR manually to the segment center frequency. If NO CAT but using BCD, the band will be changed but the segment will only be set after keying. (Set CW or RTTY mode in the TCVR.)

NOTE: Set input power to about 25 watts to begin.

- Press PTT, check the Ig2 (**I Screen on the display**). If it is ok (bellow +40mA), gradually increase the input power until the PA reaches about 70% of its maximum output power. (when is use low output power the screen current is usually in the negative value)
- Using the TUNE buttons, adjust for maximum FORWARD POWER while monitoring the Screen current.
- When the Screen current exceeds +60mA , adjust the LOAD button clockwise to decrease Screen current to about 0 mA.
- Increase the PA input power until you reach the desired maximum output power. Keep watching the Screen current. If the Screen current exceeds +60mA decrease it by using the LOAD button.
- Repeat using the TUNE buttons to reach desired maximum FORWARD POWER and check Screen current.

- If the Screen current is lower than 0 mA (negative value), change it by pressing the LOAD button until 0 mA is set and check again for maximum output power. Do not start with very low input power, set abt. 50% before beginning M-tune process.
- If you reached the desired maximum output power, and the PA Screen current is inside 0 / +40mA , then press the **SAVE** button.

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

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



We can now see a new small yellow **USER** window in the touch screen display. **USER** means that we used the M-TUNE 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 19) for one band or all bands.

If the amplifier demonstrates any malfunctions during tuning or it does not behave in accordance with the M-TUNE procedure, interrupt the tuning procedure immediately and check the amplifier! Be sure there are not any mistakes in choosing antennas, bands or segments! Insure that VSWR is not higher than 3:1 and input power is LOW!

6. MAINTENANCE

6.1. Indication of Fault Conditions

If a fault condition appears during the operation of the amplifier, the safety circuits of OM4001A will react immediately. There are several types of warning or fault messages that may appear on the display when any of the protection circuits are activated. The OM4001A power amplifier provides the following protection:

- 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 the safety circuits are preset for two levels of activation. The first level is a warning level. In such a case a warning message appears on the display but the power amplifier will stay in **normal operation**. See the table above for warning and fault conditions.



When a fault condition occurs 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 the problem persists, the safety circuit will react again and the appropriate fault message will appear on the PA status screen.



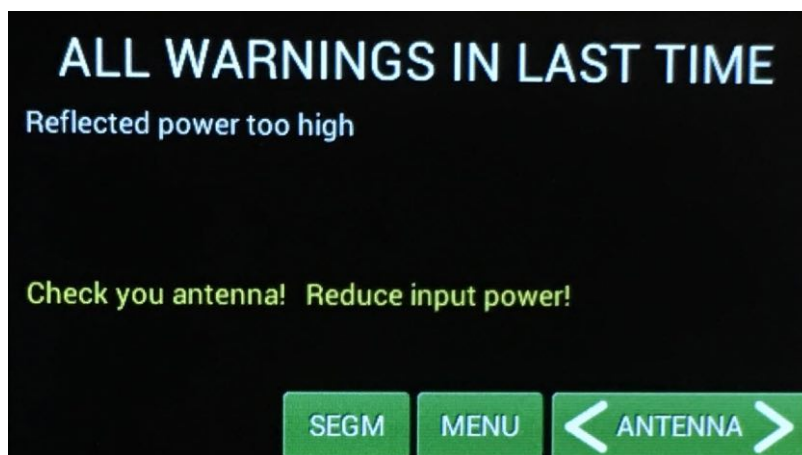
If the fault repeats 3 times during a 10 seconds interval, the safety circuits will turn the amplifier to **STBY** mode. Cancelling a fault condition takes a short press of the **STBY/OPER** button. The PA will stay in **STBY** mode.

NOTE: All the warning and fault messages are stored in the onboard memory. You can display particular warning messages and particular error messages. They are stored up to 20 at a time to the memory. You can view them on the menu display. If the error memory is full, every new message will delete the oldest one in the stack. It means that only the last 20 messages are visible on the display.



This is an example from a previous attempt at transmitting when the antenna was disconnected from the PA .

Reflected power was higher than 350W and a warning message "Reflected power too high" appeared.



If you touch the yellow “last events” box on the PA touch screen it will display the warning details.

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



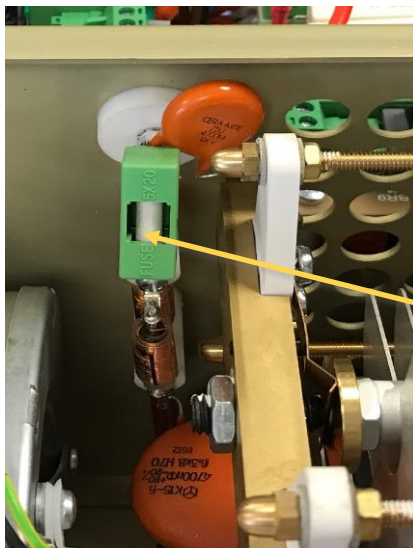
Never try to change or move any part inside the amplifier except the tube or fuses. Substitution of parts may void intrinsic safety!

Manufacturer's contacts:

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

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 persons!** 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 OM40001A. In the case of an accidental discharges or short within the tube this fuse (4 Amps fast, filled with sand) saves the HV supply circuits.

Fuse F 4A

6.3. Tube Replacement

In the case of a damaged vacuum tube , contact the manufacturer or your dealer for ordering a new one. We will provide instructions for replacing the tube. **Replacement should be done by a professionally qualified person!** After tube replacement the **automatic BIAS adjustment** procedure must be done.

6.4. Cleaning

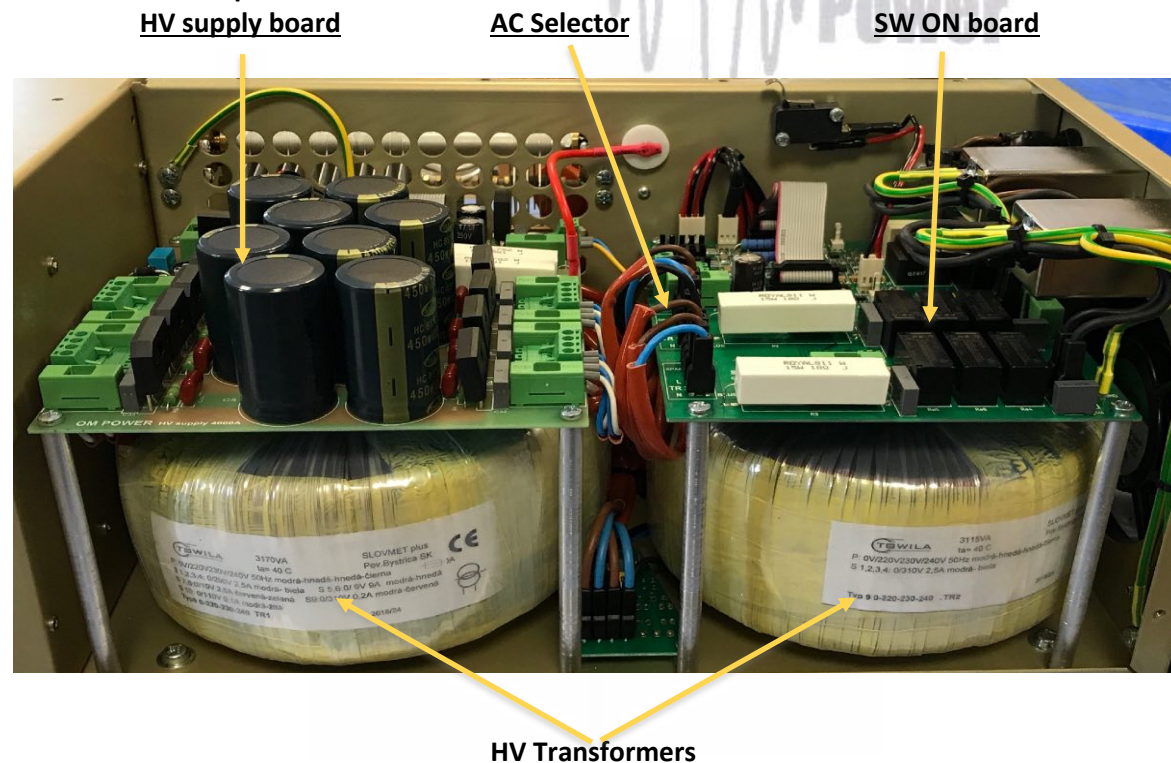
To prevent damage to the amplifier surface and plastic components, do not use aggressive chemicals for cleaning. Do not open the amplifier for cleaning. Outer surface cleaning may be safely accomplished by using a piece of soft cotton cloth moistured with clean water or window cleaner.

7. APPENDIX

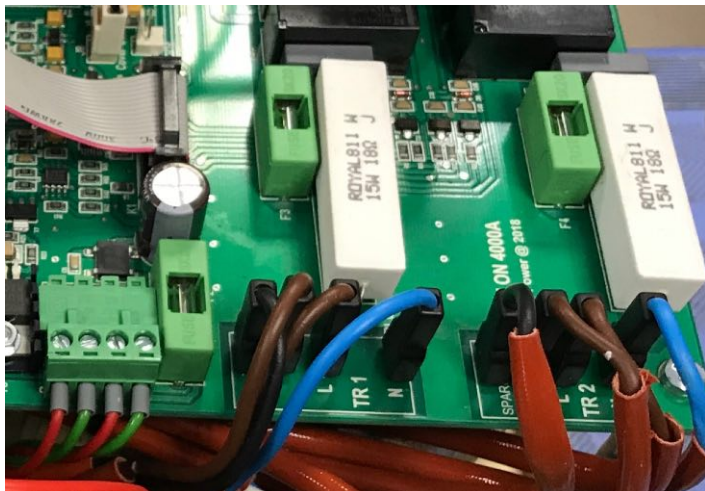
7.1. Primary AC voltage selection

Primary section of the HV transformer is switchable for three values of AC voltage (230, 240, 250V) Factory settings is 240VAC. Before first starting the PA we recommend checking that the correct value is selected according to the AC voltage in your network.

Side view on the opened OM4001A



Remove the upper lid first. On the right side of the PA, there are two PCBs mounted. On the right upper side is Switch ON board where AC selector is located.



There are AC selector for each transformer. The blue wire – one side of primary winding is connected to N pole. Wire marked with proper voltage connect to L pole.

AC voltage is marked at every black terminals.



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



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

7.2. Controlling the OM4001A with Flex Radios Series 6xxx

There are two possible methods to connect the Flex Radio series 6xxx to the OM4001A:

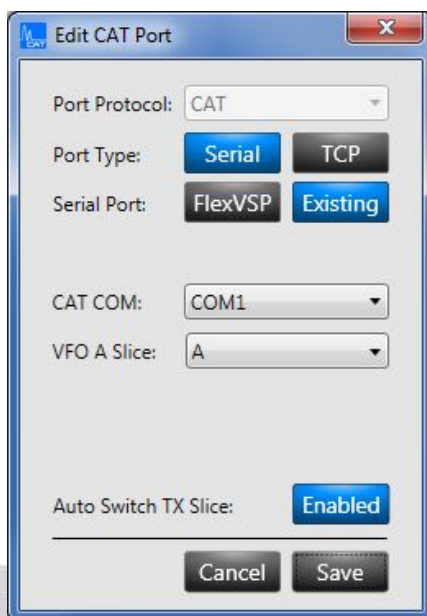
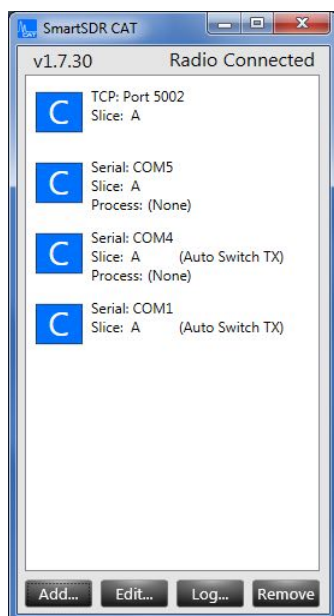
- Using the SmartSDR CAT program
- Using the USB connector at Flex 6xxx

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 have a female DB-9 connector and pins 2 and 3 are crossed).



You must assign this serial port to the TX slice that is associated with the Flex 6XXX. otherwise the amplifier will not set on the proper frequency.



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

NOTE: If you have already configured other programs to communicate with the Flex 6XXX using a different baud rate then set the same baud rate for the Amplifier CAT setting.

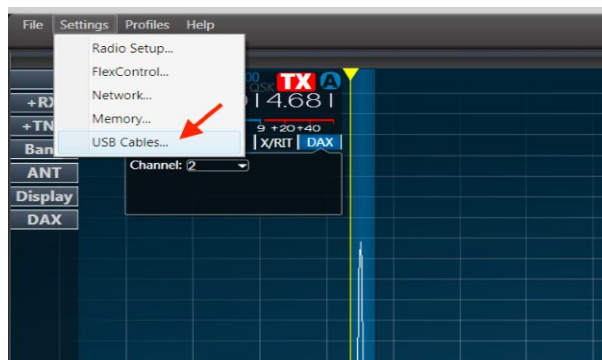
Flex Radio 6xxx series connection using USB output

Connect from the Flex USB port directly to the TCVR port on the OM4001A using an USB – FTDI serial port adapter and a null modem serial cable (both ends of the cable have a female DB-9 connectors (pins 2 and 3 are crossed)).

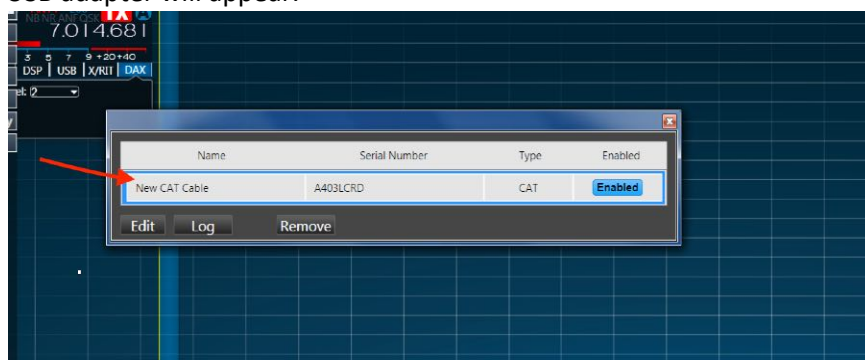
NOTE: A USB adapter equipped with a genuine FTDI chip set is a must. Knock off FTDI chip sets do not work properly.

Now connect the DB9 end of the null modem cable/FTDI adapter to the **TCVR** port on the OM4001A.

Activate Smart SDR and from the Flex SDR main screen choose **Settings** then **USB Cables**



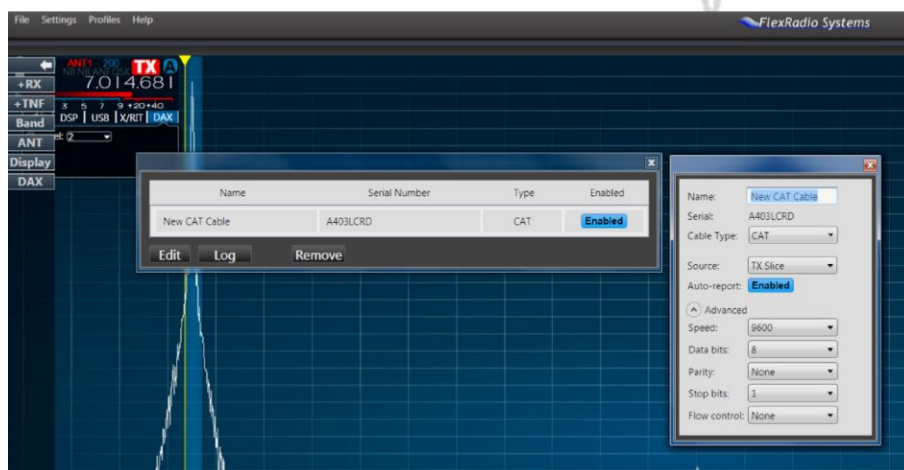
Now connect the USB-FTDI adapter to a USB port on the Flex radio. A new line showing the connected USB adapter will appear.



Double click on the new usb adapter line to open the configuration window for this COM port .

Set all parameters in the configuration window according to the picture below.

Check that **ENABLED** is selected in both associated USB windows.



Close both windows. The OM4001A will now follow the Band and Frequency changes on the Flex 6XXX.

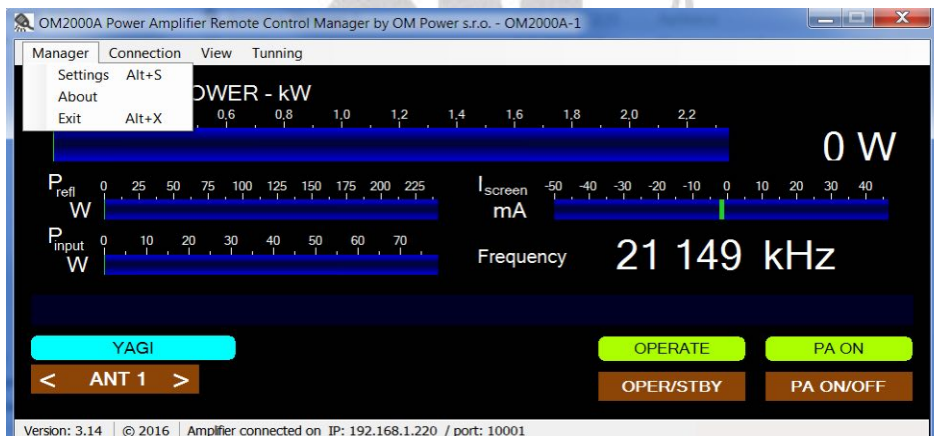
7.3. OM4001A Remote Control

The OM Power team has developed special software which allows controlling the PA OM4001A remotely. Download it from the official OM Power website <http://www.om-power.com/downloads>. The software allows the following controls:

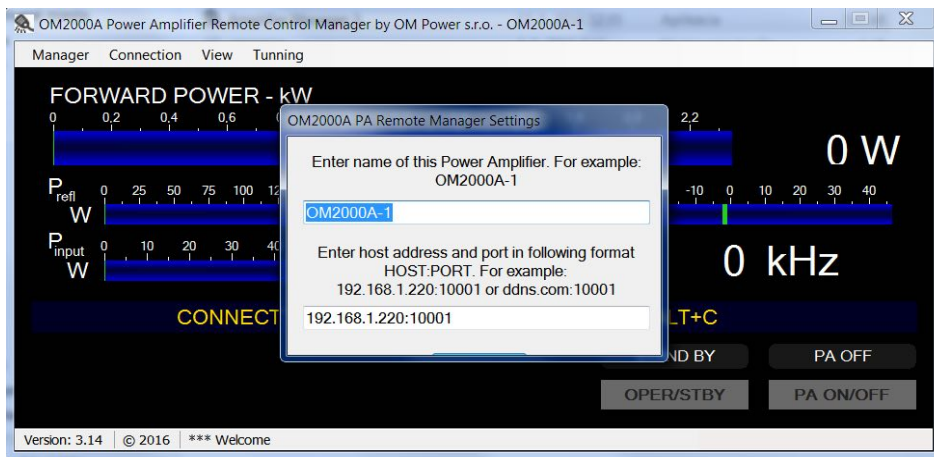
- Switch the PA ON and OFF
- Switch between STBY and OPERATE
- Switch between preprogrammed antennas
- Read and reset the last 20 warnings and fault messages
- Manual fine tuning of the PA Tune and Load
- To check most operating parameters of the PA
- Selection of different screens for the PC display
- Antenna retuning if parameters changed

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

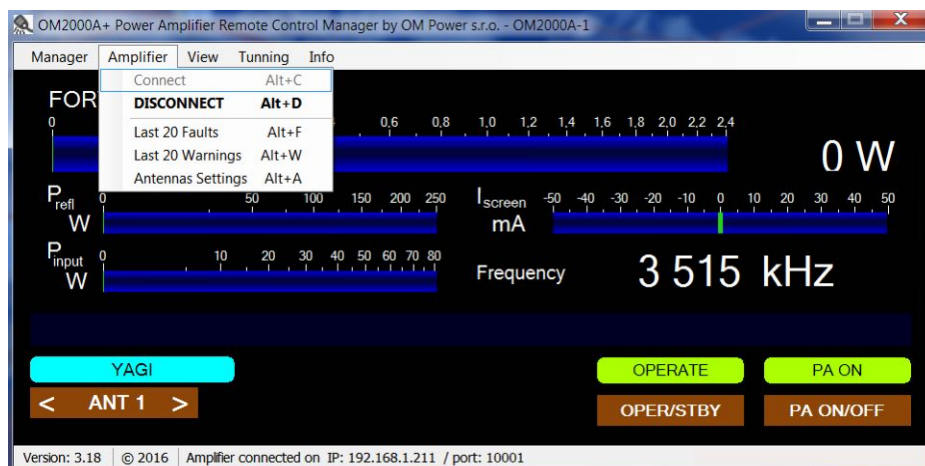
Connection setting:



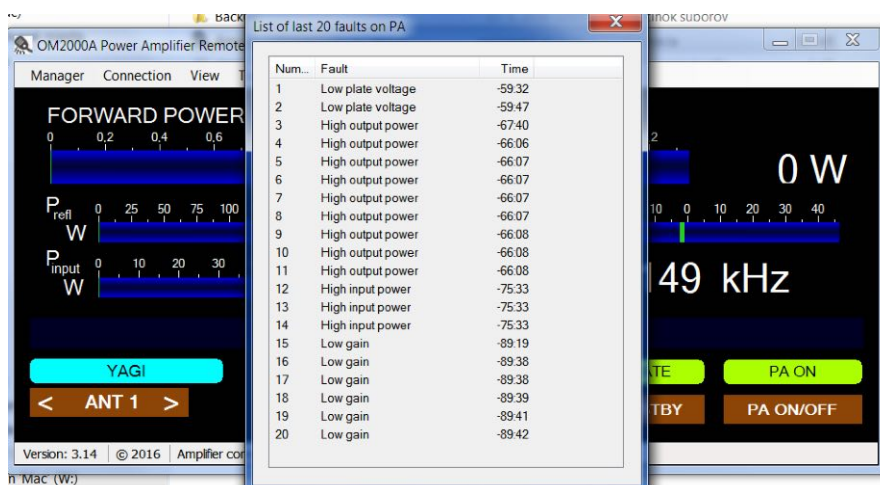
Set up TCP/IP address and port:



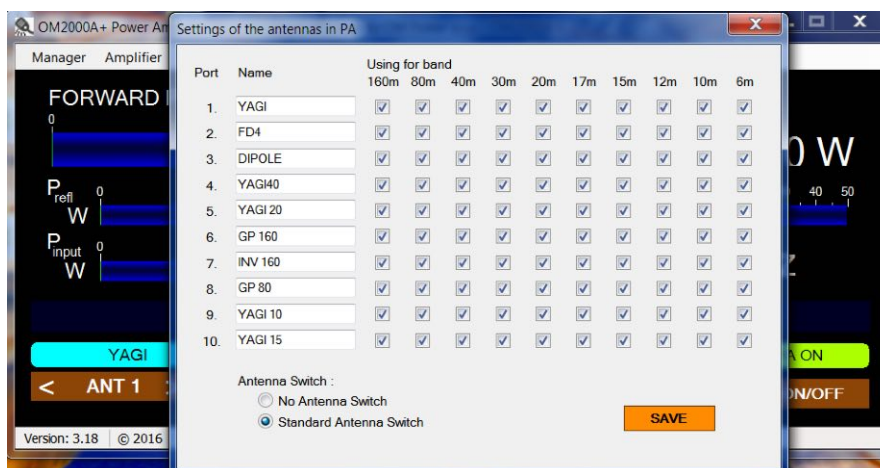
Connect / disconnect to OM4001A:



View last 20 PA faults:

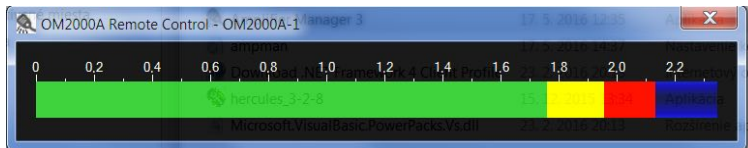


Antennas Settings:



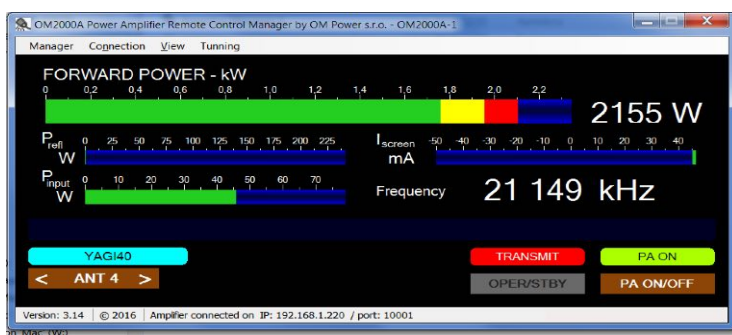
Screen selections:

Minimal view:

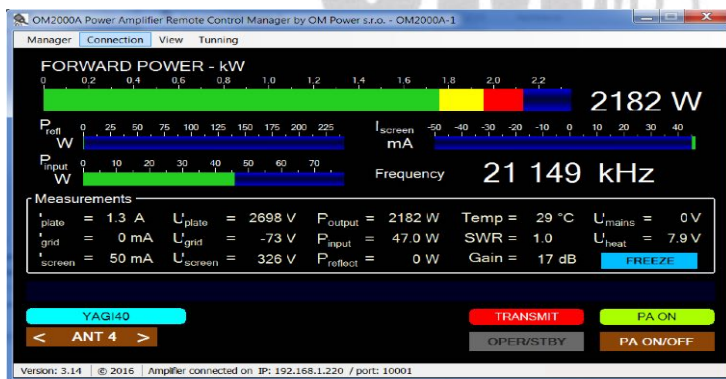


NOTE: To return to the normal view from the minimal view just right click with your mouse

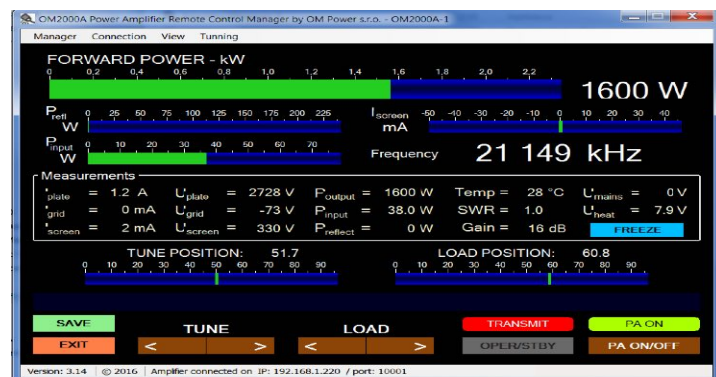
Normal view:



Advanced view:



Fine tune screen: It is possible to retune the PA TUNE and LOAD remotely (See page 31).



7.4. Remote Control using own public IP address:

7.4.1 Changing OM4001A connection settings



Authentication Required

Enter user name and password for http://192.168.1.104

User Name:

Password:

OK Cancel

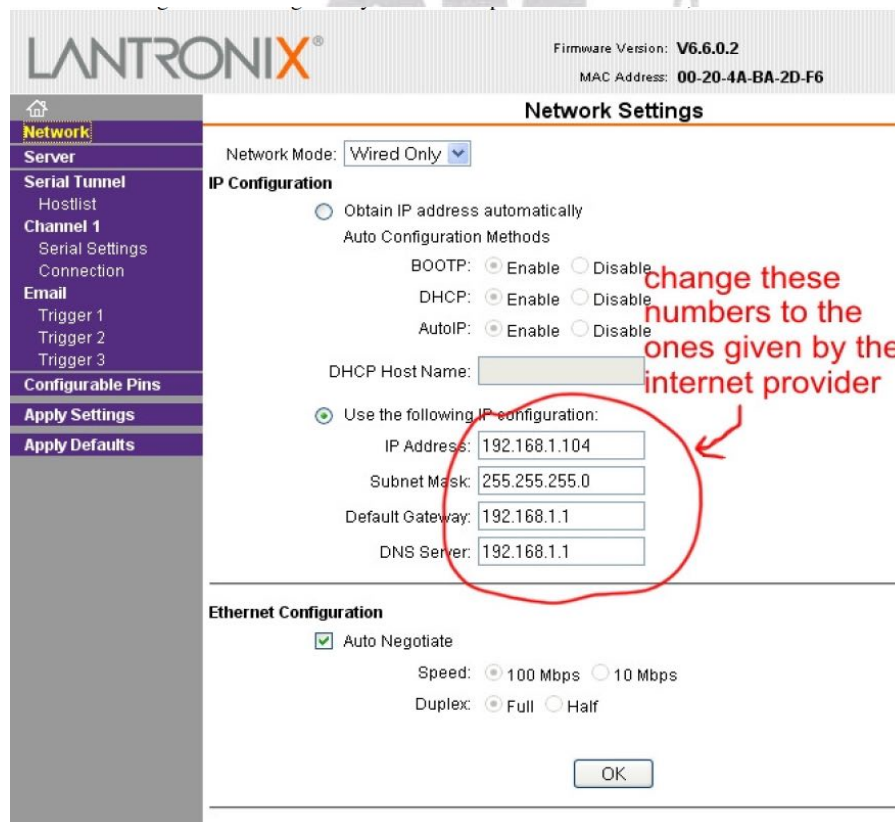
Connect the LAN connector on the OM4001A to your local Internet with ethernet cable.

Open up a WEB browser and enter the OM4001A current IP address (default is

192.168.1.222).

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

Open the 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.



LANTRONIX® Firmware Version: V6.6.0.2
MAC Address: 00-20-4A-BA-2D-F6

Network Settings

Network Mode: Wired Only

IP Configuration

☐ Obtain IP address automatically

Auto Configuration Methods

BOOTP: ☒ Enable ☐ Disable

DHCP: ☒ Enable ☐ Disable

AutoIP: ☒ Enable ☐ Disable

DHCP Host Name:

☒ Use the following IP configuration:

IP Address: 192.168.1.104

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 192.168.1.1

Ethernet Configuration

☒ Auto Negotiate

Speed: ☒ 100 Mbps ☐ 10 Mbps

Duplex: ☒ Full ☐ Half

OK

change these numbers to the ones given by the internet provider

If necessary it is also possible to change the OM4001A local Port number. Make any changes as required in the Connection menu. When finished, click OK.

LANTRONIX® Firmware Version: **V6.6.0.2**
MAC Address: **00-20-4A-BA-2D-F6**

Connection Settings

Channel 1

Connect Protocol
Protocol: **TCP**

Connect Mode

Passive Connection:
Accept Incoming: **Yes**
Password Required: ☐ Yes ☒ No
Password:
Modem Escape Sequence Pass Through: ☒ Yes ☐ No

Active Connection:
Active Connect: **None**
Start Character: 0x **0D** (in Hex)
Modem Mode: **None**
Show IP Address After RING: ☒ Yes ☐ No

Endpoint Configuration: *change this if you need*
Local Port: **10001**
Remote Port: **0**
Remote Host: **0.0.0.0**
☐ Auto increment for active connect

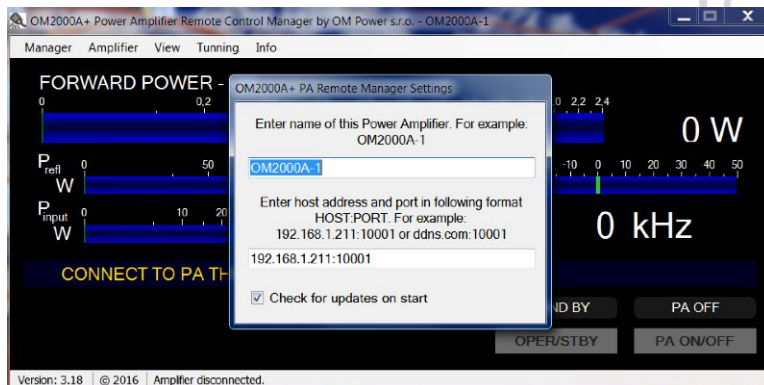
Common Options:
Telnet Com Port Ctrl: **Disable**
Connect Response: **None**
Terminal Name:
Use Hostlist: ☐ Yes ☒ No
LED: **Blink**

Disconnect Mode
On Mdm_Ctrl_In Drop: ☐ Yes ☒ No
Hard Disconnect: ☒ Yes ☐ No
Check EOT(Ctrl-D): ☐ Yes ☒ No
Inactivity Timeout: **0** : **0** (mins : secs)

OK

When completely finished, click Apply Settings in the main Menu.

7.4.2 Setting up in the Remote software



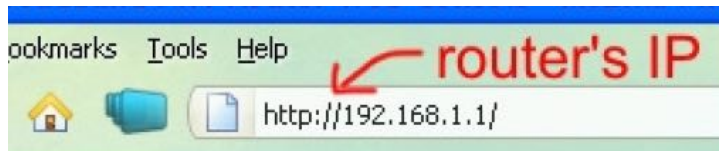
In the Remote Control software open the Manager Settings and enter the IP Address and Port number that you set in point 7.5.1.

Press enter, when done. Now you are ready to work with the OM4001A over the internet.

7.4.3 Remote Control without own IP Address, behind a router

If you need to change the OM4001A connection settings for some reason, use point 7.5.1 above.

Change router's settings

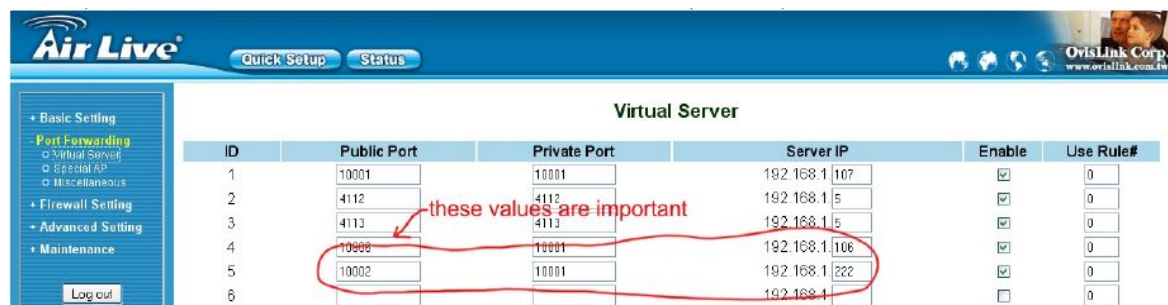


Open up a WEB browser and enter the routers's internal IP Address (usually 192.168.1.1)



An authentication window WILL APPEAR. You need to enter the routers login and password. Usually 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 OM4001A IP Address, 192.168.1.222 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 don't have separate Public Port settings. Enter an available port number (usually the default 10001 is free and usable). Check the Enable box too. When done, click OK (or Save).



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

Item	
LAN IP Address	192.168.1.1
WAN Type	Static IP Address Change...
WAN IP Address	10.72.43.164
WAN Subnet Mask	255.255.255.0
WAN Gateway	10.72.43.163
Primary DNS	10.72.43.163
Secondary DNS	172.16.1.1



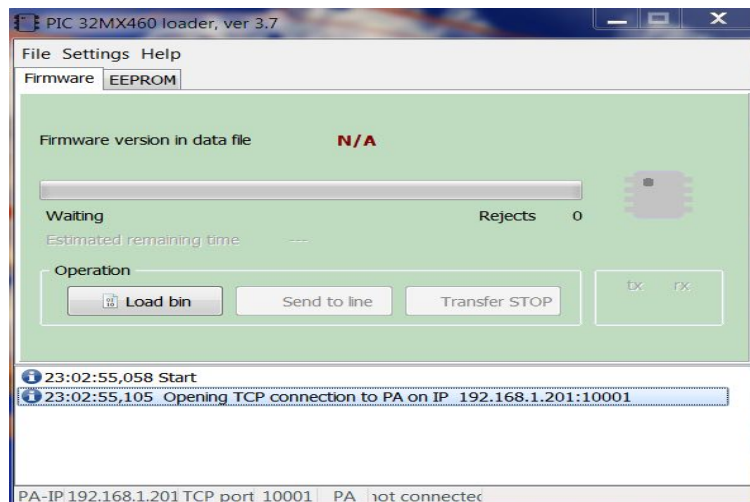
In the Remote Control software, open the Manager Settings. Enter the IP Address and Port number you set up previously in your router. IP Address is the WAN IP Address from the basic setup page and the Port number is the Port (or Public Port if separate) from the port forwarding page.

Now you are ready to work with OM4001A over the internet.

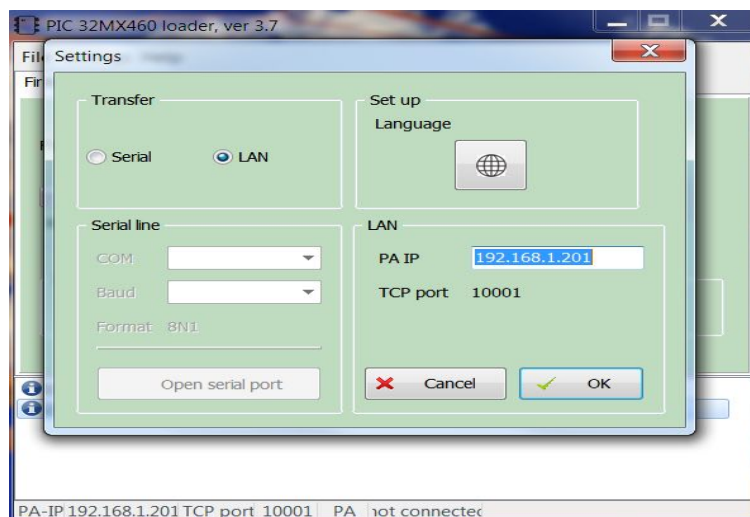
7.5. OM4001A firmware upgrade

Download the firmware upgrade software and latest firmware file for the OM4001A from the official OM Power website <http://www.om-power.com/downloads>. Store it to OM4001A folder created on your PC.

NOTE: Use a serial null modem cable and connect the TCVR port on the OM4001A rear panel with a COM port on the PC or use a LAN connection.



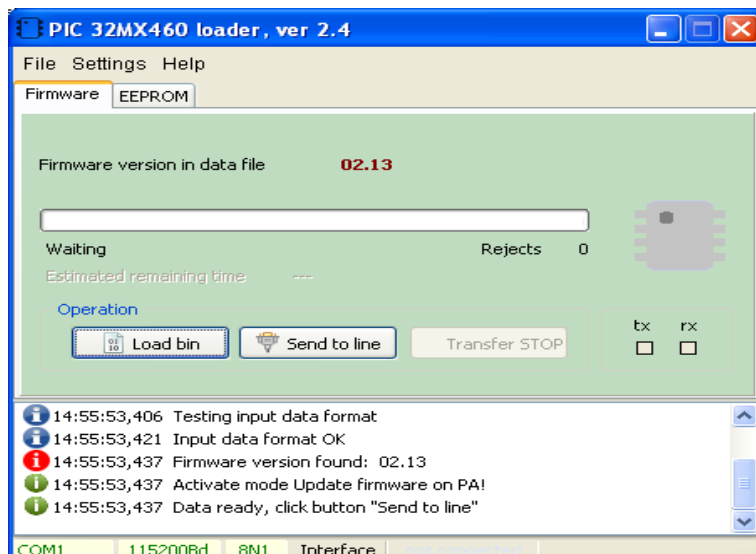
Open folder OM4001A on your PC, find the MX460L.exe file and run it.



Select type of connection:

Select SERIAL and choose the COM port you want to use. Baud rate should be 115200 or choose LAN and write up PA IP address.

Push OK button.



Select the Firmware tab and click on the LOAD BIN button.

Choose OM4001A Vxxx.bin file in the OM4001A folder.

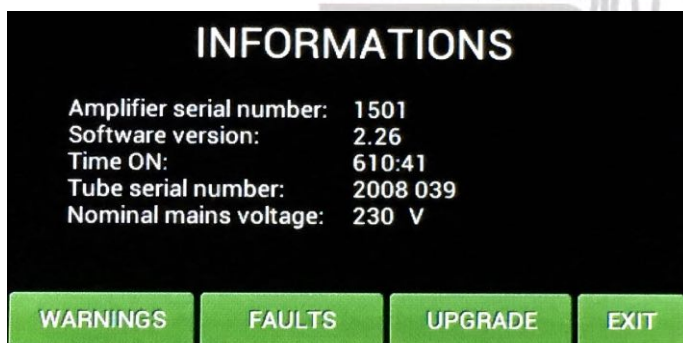


Switch ON the power amplifier using the front panel green ON switch.

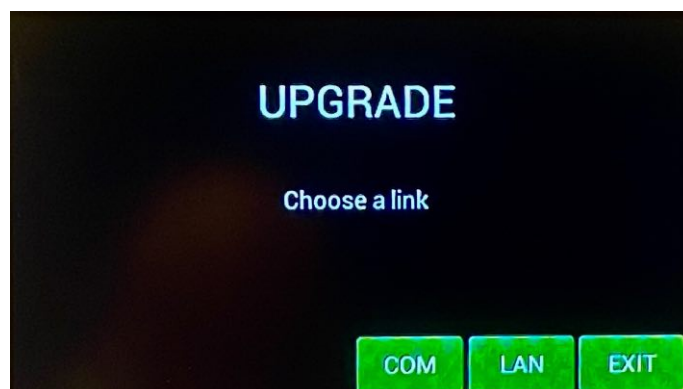
Press SETTINGS to enter the SETTINGS Menu.



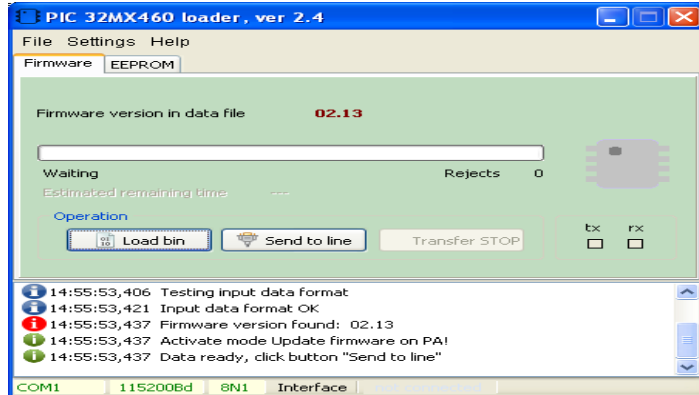
Choose INFO and press SHOW.



Press UPGRADE to start the Amplifier upgrade process..



When you see this screen on the PA, **select the type of your connection** and go to the PC and the PIC Loader software.



Press the SEND TO LINE button.



Press LOAD on the OM4001A to start loading.



You can see the loading progress on the bar graph



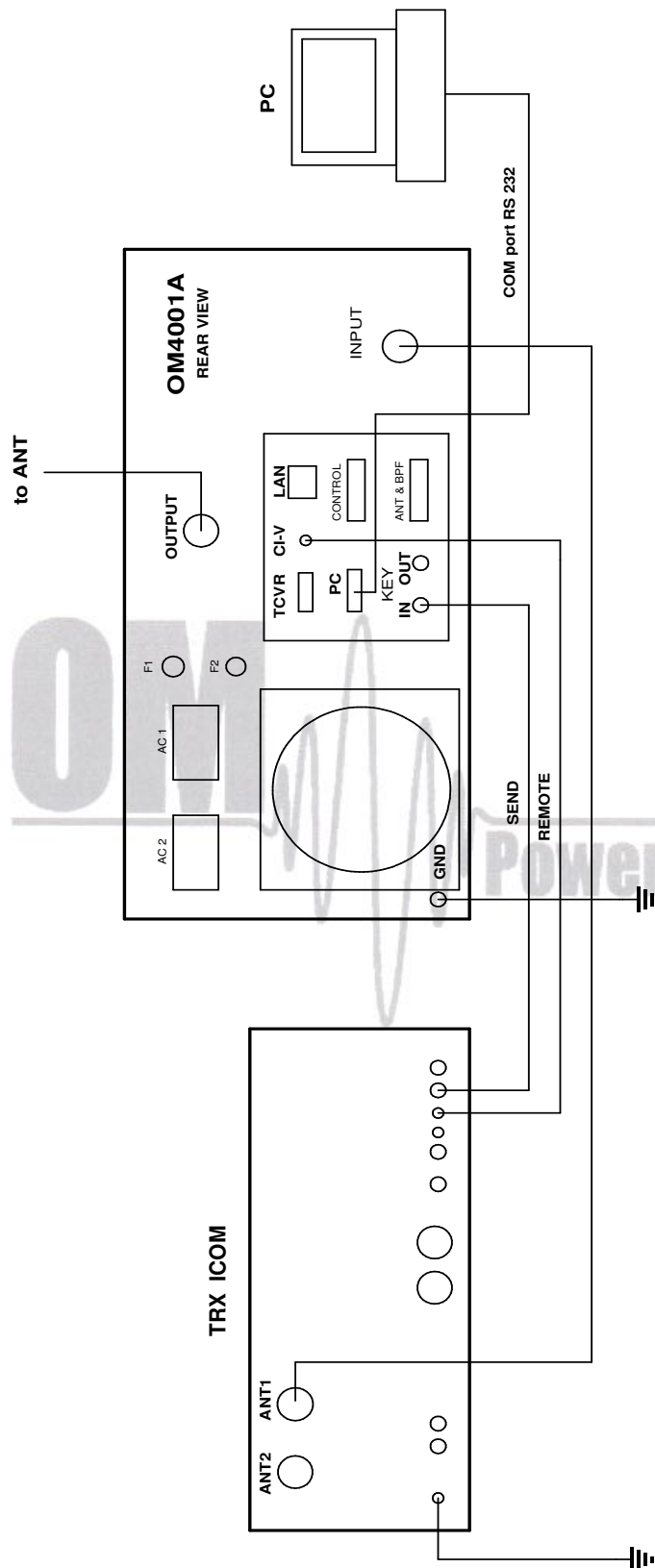
You will see this screen after the firmware was successfully loaded

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

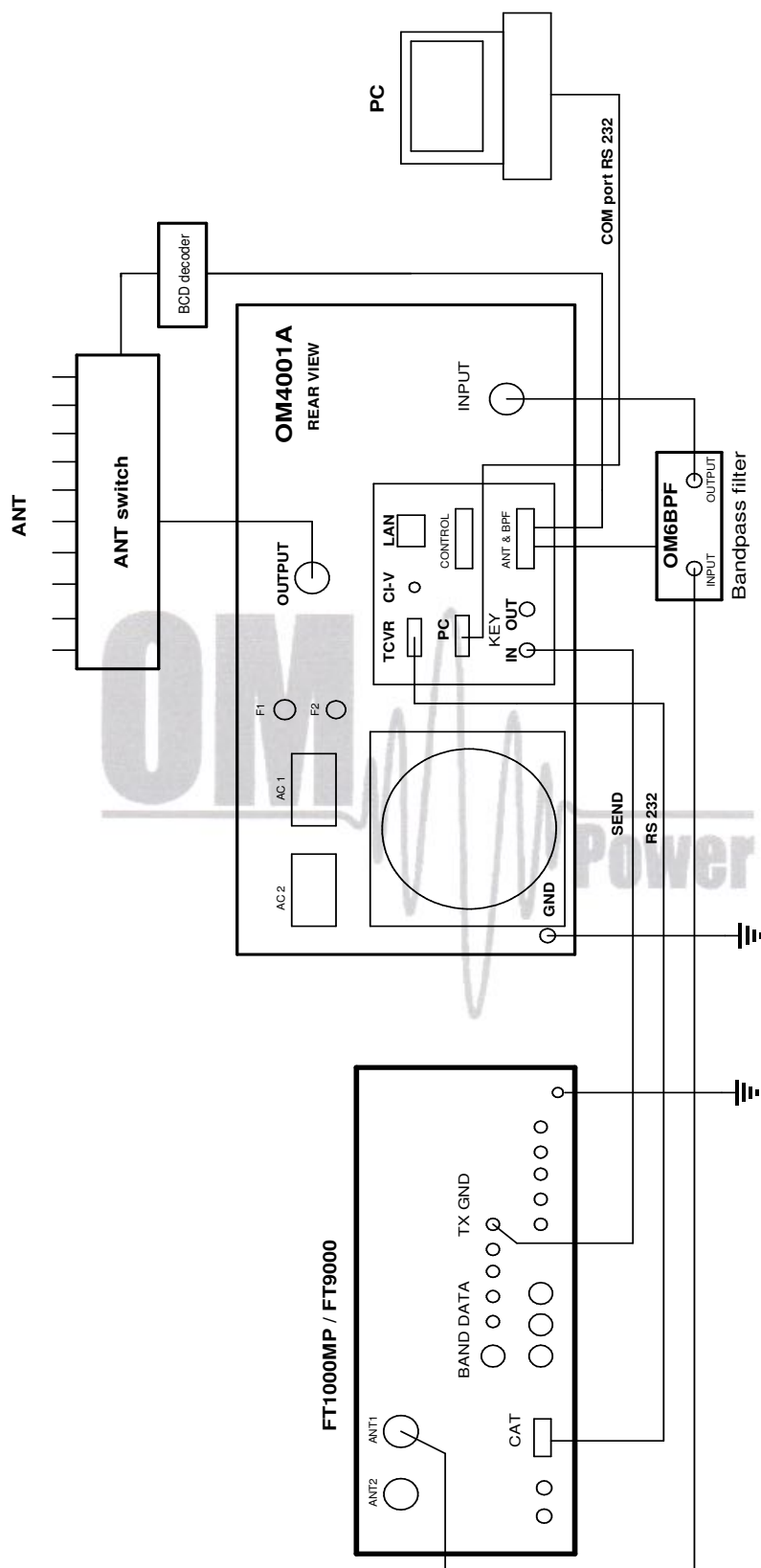
NOTE: Do not take any action until this screen disappears!

At the end you will return to the main screen of OM4001A. Switch PA OFF, disconnect the TCVR serial cable and you are ready to use the OM4001A with the new firmware.

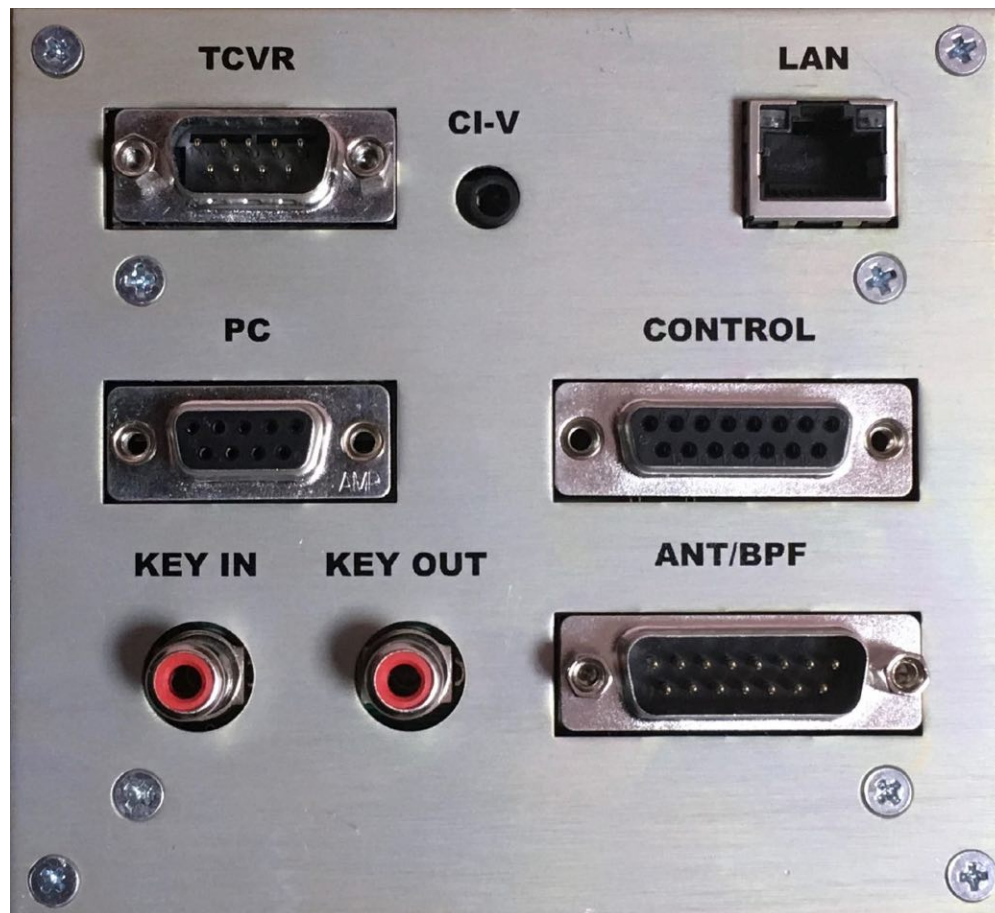
7.6. **ICOM connection with OM4001A**



7.7. Yaesu plus BPF plus ANT Switch connection with OM4001A



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

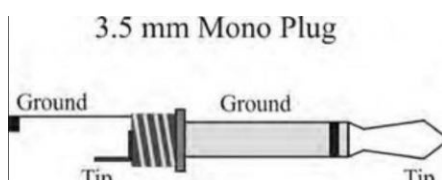


TCVR connector DB 9 male



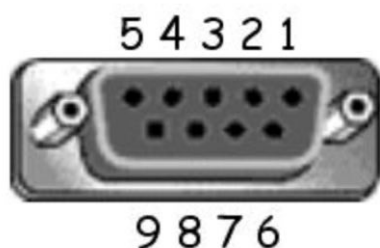
RS232 connection with TCVR. For CAT communication connect pin 2 RX-D, pin 3 TX-D and pin 5 GROUND

CI-V connector



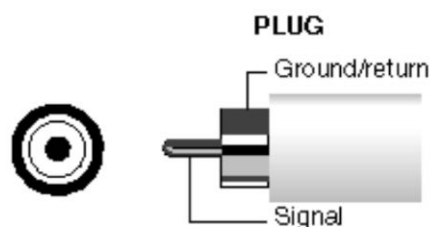
Use CI-V connection for communication with ICOM type transceiver. Signal CI-V is connected to the Tip.

PC connector DB 9 female



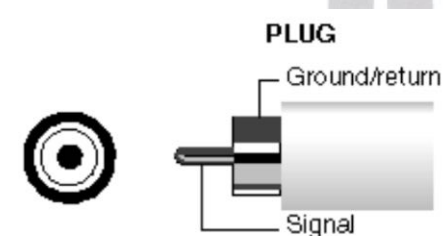
RS232 connection to the computer. For CAT communication connect pin 2 TX-D, pin 3 RX-D and pin 5 GROUND

KEY IN – RCA connector



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

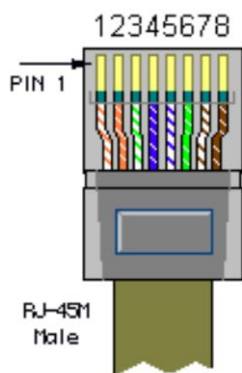
KEY OUT – RCA connector



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

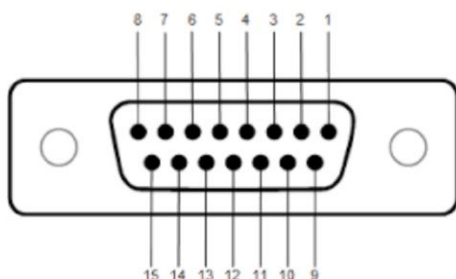
LAN connector

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-



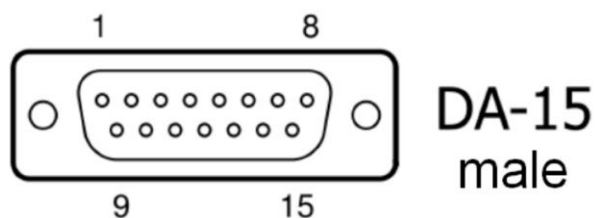
Use for connection to the LAN or WAN network.

CONTROL connector D-sub 15 female



- Pin 1 - GROUND
- Pin 2 - KEY OUT - output 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 compatible code from TCVR - bit 0
- Pin 6 - BAND data B input - input BCD Yaesu compatible code from TCVR - bit 1
- Pin 7 - BAND data C input - input BCD Yaesu compatible code from TCVR - bit 2
- Pin 8 - BAND data D input - input BCD Yaesu compatible 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 compatible code. Use for automatic bandpass filter OM6BPF

Pin 10 - BAND data B - output BCD Yaesu BAND data compatible code. Use for automatic bandpass filter OM6BPF

Pin 11 - BAND data C - output BCD Yaesu BAND data compatible code. Use for automatic bandpass filter OM6BP

Pin 12 - BAND data D - output BCD Yaesu BAND data compatible code. Use for automatic bandpass filter OM6BPF

Pin 13 - Not connected

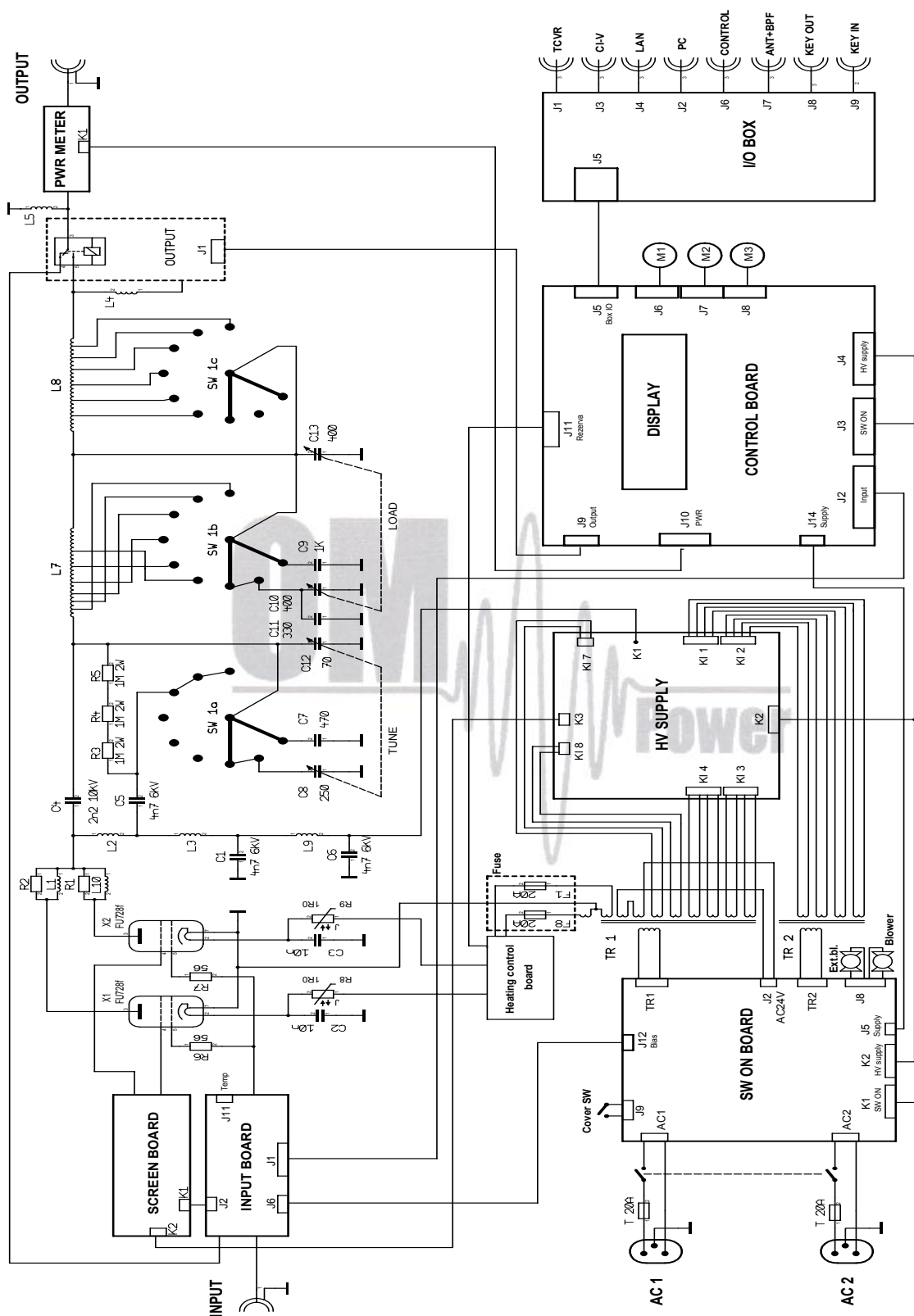
Pin 14 - GND

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

7.9. Block Diagram of the OM40001 Power Amplifier



OM 4001A Block diagram

7.10 Troubleshooting

The OM4001A power amplifier contains several protection circuits, which constantly monitor operation of the Amplifier. When the firmware defined parameters exceed defined operating levels, a WARNING appears in the LAST EVENTS window of the PA front panel. If some parameters exceed a defined critical level, a FAULT is activated and the PA will automatically switch to STBY mode. The LAST EVENTS window will then display the fault information ~~will appear~~.

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

There are several warning or fault messages that may appear on the display:

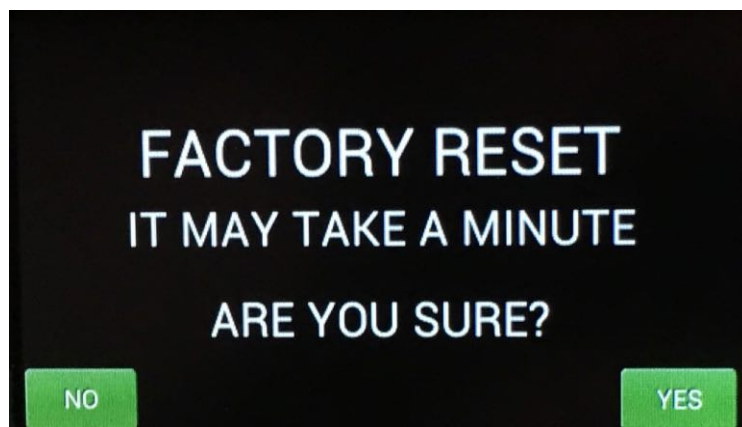
Warning / Fault	Action	Description
Power Out is too high	Reduce input power	Output power exceeds maximum level, reduce the input power.
Refl. power too high	Check your antenna Reduce output power	Reflected power exceeds maximum allowed level. Check if proper antenna is connected. In the case of higher 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. If you want to use an antenna with higher SWR, this SWR protection can be switched off (page 25). But reflected power will stay checked (max.350W).
Power In is too high	Reduce input power Check amplifier tuning	PA input is too high - decrease it! If maximum output power is not achievable, check plate voltage and PA tuning.
Low output power (tune)	Tune mistake. Retune your amplifier	The PA has lower gain and may not be properly tuned. Check the plate voltage and Screen current. If they are ok, manually adjust for optimal tuning of the PA. (M-TUNE)
Plate current too high	Reduce input power Check amplifier tuning Check EBS setting	Plate current too high. Check the following: • 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 tuning	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 tuning Check plate voltage fuse	High screen current is usually due to 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 +80 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 the fuses on HV board.
Grid voltage is low	Check grid power supply	Low voltage on the grid. Check fuse F9 on HV supply board.
Screen voltage error	Check screen power supply	Check fuse F10 on HV supply board and fuse F1 on the Screen board.
Amplifier is too hot	Check cooling system Set up additional blower	Check the airflow (ventilation grid on the rear panel). Cooling exhaust must be free from any obstructions. During extended use set the blower speed to ALWAYS ON (page 20).
HARD FAULT	Check HV circuits and Tube	Protection circuit saved HV against overload. If high current from the HV supply caused the HARD FAULT, then protection is activated and the PA is automatically switched OFF. Check HV circuits, blocking capacitors and the tube itself.
Heating voltage error	Set up proper transformer voltage selector	This error is usually due to improper setting of the primary voltage on the transformer (page 33). In normal condition U_h readings should be $9V \pm 0,3V$.
Cooling error	Check blower rotation	Main blower problem. Check its functionality.
Mains error	Check mains voltage and set up nominal mains voltage selector Set up proper transformer voltage selector	This error may be caused by the improper setting of the nominal value of U_m . Check your AC mains voltage and set it as nominal U_m (page 22,23). Check the primary voltage setting on the transformer. This fault may also be caused by "soft" mains, when during transmitting the AC voltage drops to a very low level.

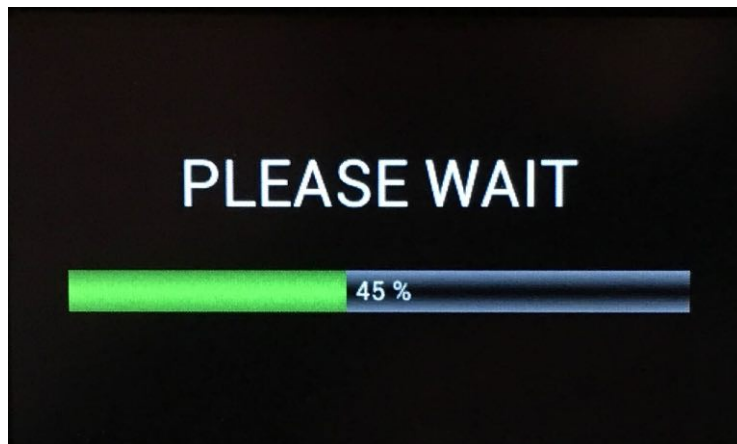
Factory reset:

In the case of very abnormal behavior of the OM4001A it is possible to do a factory reset. This will reset all the amplifier parameters back to the factory default values.

Press and hold the ON/OFF button and press the green Main power switch for several seconds until the following display appears.



If you are sure you want a full factory reset, press YES.



After the FACTORY RESET completes the PA is ready for operation.

Important notice: Perform a Factory Reset only if absolutely necessary to clear abnormal behavior, because personalized settings, mainly CAT communication with TCVR, antenna switch settings and any USER settings must be re-input.

