



AMMAX8000+ DSP PWM AM transmitter
100/150Wpp AM radio broadcasting transmitter board with DSP processor, also covers 500W/1000W/2000Wpp units in 1H/2H/3H rack and MW/SW models

Manual

IMPORTANT NOTE

- Upon receiving your order inspect the packaging material and unit for apparent damage. Any damage should be reported immediately so we can make a claim with the shipping company. Take photos, if you can, they can be used as a proof.

- Mains cable is typically not included with our mains power supplies and units. Since these cables vary from country to country and we had trouble finding the exact type we decided against including them, especially since finding them is so easy and cheap locally. They can be obtained in any radio/computer/hardware shop at the cost of about 1 US\$. It is the type used in your PC for mains power.

- Study local regulations and ensure you are always operating in compliance.

- Do not open the unit or attempt service yourself. Deadly mains voltage is present inside. There are also high RF voltage points that can cause burns and discomfort if touched.

- Finally, never ever operate any transmitter or amplifier without a properly tuned antenna!

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Introducing AMMAX series of transmitters

Our series of AM broadcasting radio transmitters

This manual covers our AM transmitters either as a board or built into 1H rack enclosure or 2H/3H enclosure together with an amplifier. Please note these units are available for medium wave (MW) and short wave (SW) bands. Additional frequency bands may be available so don't be afraid to ask for a new band.

What makes this AM transmitter series so great?

While for many mentioning AM transmitters brings back childhood memories, these are still used widely in some countries. Besides, AM can be lots of fun to play with. Long wire antennas, different signal propagation (even worldwide), the nostalgia that comes packed with it... well, it is something very different in this modern age.

Our old AM MAX units sold out many years ago and for a long time we wanted to make a new AM transmitter, this time with different, more modern approach, with better new parts and better specs. And we finally did. It is equipped with DSP which makes it possible to control parameters of the audio chain, such as the compression, low pass audio filter cut frequency and pre-emphasis via convenient LCD with menu system. Other features, such as the fully solid-state PWM modulator which ensures crisp audio, 125% positive peak modulation, compact form factor, plenty of audio input options and LCD display unit make AMMAX8000+ really something special in this modern age.

Version in 1H 19" rack enclosure enables fast deployment in easy-to-use form factor with good shielding and ventilation. Unit is rugged and made for 24/7/365 operation. The larger models in 2H and 3H rack can produce up to 2000W of power and are also designed for 24/7/365 operation with regular maintenance.

Technical specifications:

RF section:

- Frequency range: 540-1800KHz (MW), 5000-6000KHz (SW), 6000-7000KHz (SW), 7000-8000KHz (SW), 40m+80m (HAM) and other bands on request
- RF Output Power: about 100W/500W/1000W/2000W peak to peak depending on selected band and frequency
- Output connector: BNC, 50 ohms (100W model), 7/16 female for 500W/1000W/2000W models
- PLL steps: 1KHz, DDS generated signal
- Spurious/harmonic rejection: >25dB on some bands band >50dB (may require additional external filter)
- No-tune wideband amplifier design with custom built filter (for 500W/1000W/2000W)
- Power supply 100W model: 24-48V (2,5A). Use 50V for maximum output power, 2.1mm power socket, center (+), polarity protection (diode + fuse)
- Power supply 500W/1000W/2000W models: Mains 220-240V/50Hz, will work with 110V power with some derating
- LCD display shows: Power, frequency, temperature, supply voltage, audio level
- Ambient temperature: 0° to +45°C
- External dimensions 1H rack: (W x D x H) 19" x depth (130mm) x height 1HE (44mm)
- Weight: 1kg
- External dimensions 1000W (W x D x H) 19" x depth (492mm) x height 2HE (88mm)
- Physical weight 15Kg
- Volumetric weight up to 20Kg
- External dimensions 2000W (W x D x H) 19" x depth (550mm) x height 3HE (132mm)
- Physical weight 25Kg
- Volumetric weight up to 30Kg

Audio section:

- Audio performance: Less than <1% distortion, 20Hz-4500Hz (adjustable bandwidth up to 7500KHz for digital modes)
- Limiter + DSP compressor and filter
- Audio connectors exciter board only: 3-pin jumper
- Audio connectors for units in a rack enclosure: BNC (single-ended input), 2x RCA, 2x balanced XLR and USB audio
- Audio level required: 4dBu (1.23Vrms @ 0db gain), -10dBu (0.316Vrms @ +14dB gain), adjustable in wide range
- Audio input impedance: 10Kohms resistive, balanced
- Pre-emphasis Flat, 50 or 75usec

Thank you for purchasing this AM transmitter

We hope you will enjoy it as much as we do and if you do remember to tell your friends and colleagues about it. Please feel free to leave your comments at our website or post your experience in our forum. And if you encounter a problem, please let us know so that we may improve our products, offer advice and suggestion. From all of us we wish you happy broadcasting!

Your PCS Electronics team

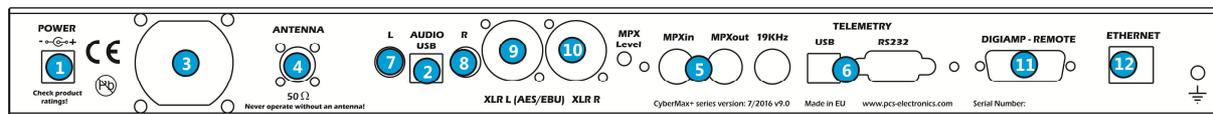
Front and back panel layout – 100W model



Front panel for 100W model

Reference	Function
1	Three push buttons, the UP, DOWN and MENU keys.
2	LCD display that lets you control the unit and monitor various parameters.
3	The green led. Green signals power is ON.
4	Red error led. Turns on while VCO is tuning into selected frequency and in case of SWR or TEMP error.
5	Power switch in the middle of the panel is a standby switch. To really disconnect the unit from mains power, use the main switch at the back.

Description of front panel of CyberMaxAM+ in 1H rack enclosure

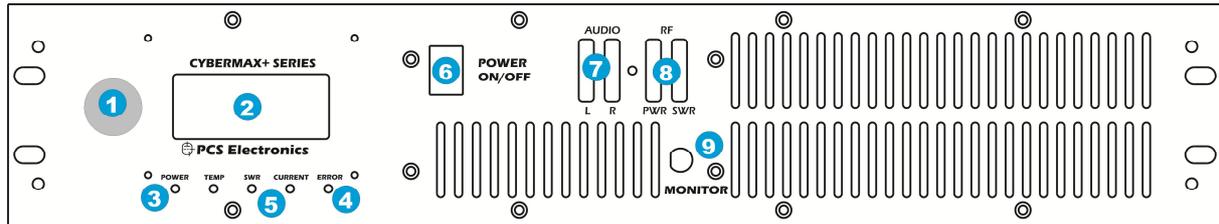


Back panel for model in 1H rack

Reference	Function
1	Power jack, center is positive. 40-50V DC, 2,5A
2	USB audio input (for PC)
3	Ventilation aperture, fan
4	Antenna connector, BNC. Do not operate without antenna.
5	BNC connectors for MPXin, MPXout and 19KHz pilot not needed for AM transmitter (MPXin can be used for audio input)
6	RS232/USB for controlling your transmitter and programming RDS parameters. AMMAX does not have remote control currently. If you ask for this feature, we will add it.
7, 8	Audio inputs, RCA jacks for left and right channel.
9, 10	Balanced audio inputs left and right channel XLR (Canon).
11	AMMAX does not have DIGIAMP currently.
12	Optional Ethernet remote control port. AMMAX does not have remote control currently. If you ask for this feature, we will add it.

Description of back panel of CyberMaxAM+ in 1H rack enclosure

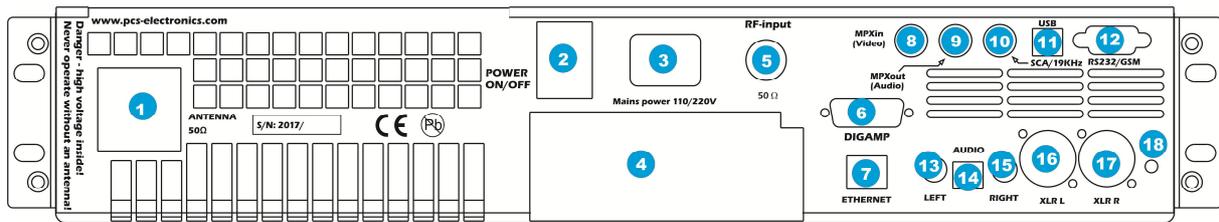
Front and back panel layout – 500W/1000W/2000W



Front panel for 500W/1000W/2000W model

Reference	Function
1	Rotary button.
2	LCD display that lets you control the unit and monitor various parameters.
3	The green led. Green signals power is ON.
4	Red error led. Turns on when any alarm is active.
5	Alarm LEDs for Temperature alarm, SWR (Reflected power) alarm and Over-current alarm.
6	Power switch in the middle of the panel is a standby switch. To really disconnect the unit from mains power, use the main switch at the back.
7	LED Bar-Graph VU meter for audio
8	LED Bar-Graph VU meter for power and reflected power
9	RF sample signal for monitoring of transmitted signal

Description of front panel of CyberMaxAM+ in 2H rack enclosure



Back panel for 500W/1000W/2000W model

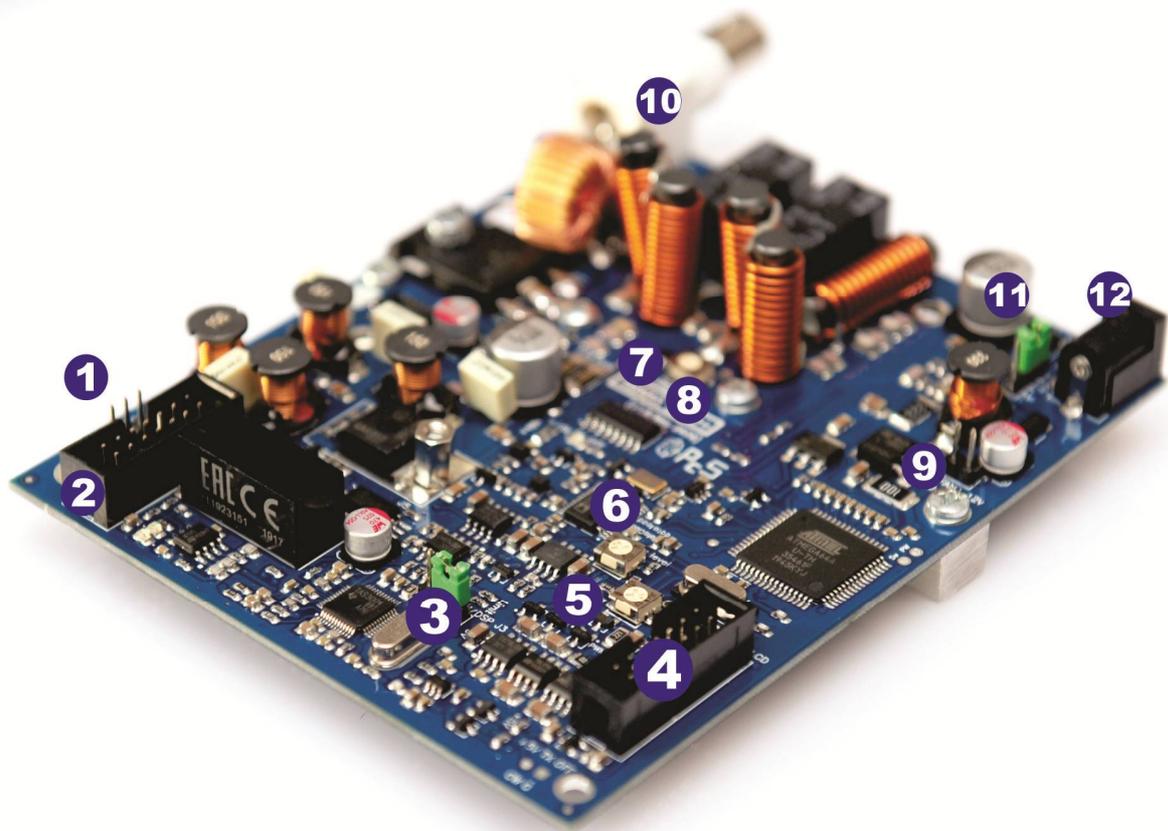
Reference	Function
1	Antenna connector, 7/16 female. Do not operate without antenna.
2	Main power switch for complete shut-down
3	Mains cable socket, insert mains cable type here (same type as used for PC). 2KW units don't have this as mains cable is wired directly.
4	Mains power supply. Pull-out and replace type. Usually secured in place with a small screw.
5	RF input, only used for amplifiers (not used for AM transmitters)
6	DIGAMP interface, (not used for AM transmitters)
7	Optional Ethernet remote control port. AMMAX does not have remote control currently. If you ask for this feature, we will add it.
8,9,10	BNC connectors for MPXin, MPXout and 19KHz pilot not needed for AM transmitter (MPXin can be used for single-ended asymmetric audio input)
11,12	USB/RS232 for remote control of transmitter. AMMAX does not have remote control currently. If you ask for this feature, we will add it.
13, 15	Audio inputs, RCA jacks for left and right channel.
16, 17	Balanced audio inputs left and right channel XLR (Canon).
14	USB audio input (for PC)
18	MPX audio level adjustment (not used in AMMAX transmitters)

Description of back panel of CyberMaxAM+ in 2H rack enclosure

What's inside the box?

AM Exciter board

CyberMaxAM+ units are all based on our AMMAX8000+ series AM exciters.



AMMAXPRO8000 series exciter board

Ref.	Function
A	Connect ON/OFF switch here, but you can also just install a jumper. A LED diode can also be connected as shown on the image, series resistor is on board and is not necessary.
1	Audio input - 3-pin jumper.
2	Audio input - 14-pin header for optional external audio input board with RCA, XRL and USB interface
3	Audio processing selection jumper (DSP or purely analog with minimal processing for use with DRM)
4	LCD control unit, attach your LCD control module here
5	AM PWR modulator adjustment – amplitude level
6	AM PWR modulator adjustment – carrier level
7, 8	Power display adjustment trimmers, internal power meter accuracy adjustment. If the internal power display on the LCD is a bit off you can correct its accuracy with this trimmer.
9	Soldering posts for a 12V fan. Required for stable operation and long life.
10	RF output connection. BNC jack. Use a properly matched antenna. The range and success of your transmissions will depend primarily upon the quality and position of your antenna so invest your energy and money into a proper solution. Poor unreliable connections may damage the final transistor.
11	Power ON/OFF connector, install a jumper if you don't need a switch. There is also a pin for LED diode going to + via resistor.
12	Power supply connector, center is positive. DO NOT use more than 50V.

Description of various elements of the AMMAX+ AM exciter board

Before you start

It is recommended that you read this section before you power your unit up for the first time. Let us clear up some basics you should know about. You will also find some useful tips in our guides and forum at <http://www.pcs-electronics.com>. Here is what you need to get your AM transmitter on the air:

Antenna

We are now selling a wire antenna type that can be used to transmit at MW frequencies. It is a relatively simple wire antenna, and it is very long so keep this in mind. If placed high and in a great location the range can sometimes even reach tens of kilometers. Place it as high as possible. You can even bury the grounded radial exactly under the wire antenna to enhance performance further. Commercial stations usually have long grounded wires buried under the towers going in all directions.

Suitable DIY antennas for the AM transmitters:

We are giving you a link to several 160m HAM radio antennas. These are operating just slightly above broadcast band at 1800KHz. To make these work for MW broadcast band they will need to be slightly longer. The further you go towards 540KHz the longer antenna will need to be. The same goes for capacitors and coils in any tuning/matching networks that are needed to bring impedance of antenna closer to 50 ohms. You can also look for 160m ham antenna designs [here](#). Note antenna performance is critical for AM transmitter range and it does make a HUGE difference. A good antenna will ensure surprisingly big range with 100W, more than 20km-30km is possible. [Link 1](#), [link 2](#), [link 3](#), [link 4](#)

Once you've chosen and installed your antenna there is another thing to consider. You can read more about it in the next section (So what is this SWR everyone talks about). Before powering up your transmitter on the air you should tune your antenna to get minimal SWR. This is typically done by adjusting the position of the antenna and any adjustable pieces or length of wire. Aim for 2:1 or less. Use low power into the antenna when tuning it up and adjusting. If you were using full power and a bit of the antenna came off in your hand the VSWR could be so bad as to blow the final transistor. For the same reason check the DC continuity of the antenna with an ohmmeter before plugging it in, to be sure it's what it's meant to be, either a short circuit or an open one, depending on the antenna type. Note you won't be reading 50 ohms with regular ohmmeter. For instructions regarding construction of antennas please see our website: <http://www.pcs-electronics.com> (guides section - antennas).

Antenna is a crucial part of the system so take special care. It is usually a good idea to place antenna away from your transmitter, power supply and audio system. Also, any transmitter should be in a metal case which shields circuitry from the radiation of the antenna. If you cannot meet these requirements, you could experience feedback and other RF problems. We cannot guarantee proper operation of any transmitter/amplifier unless suitable antenna system is used and transmitters are in ventilated metal enclosure! This applies to any transmitter. Interestingly, strong RF field can make CD players and other digital devices go crazy. Try placing antenna next to yours and see what happens. Most of the modern audio gear is not RF shielded – reducing costs is unfortunately the mantra today. Therefore, keeping antenna away from audio gear is a good idea, too.

If you are going to place your antenna outside, on your roof, please take care of the grounding. This should be done to prevent lightning hazard and should be done by a company specializing in lightning protection. You can read more about lightning protection in the book recommended below or many of the websites (Google up "lightning protection ham radio" for example).

I hope this basic introduction will not scare you too much, it should be sufficient for the time being although we encourage you to explore this exciting subject further with the help of a book such as the ARRL Antenna Book:

<http://www.amazon.com/exec/obidos/ASIN/0872598047/mightyspiraterad>

So, what is this swr (vswr) everyone talks about?

SWR is a measure of how well two devices are impedance matched to each other. Typical radio/TV transmission equipment is designed for 50-ohm load impedance, so we usually use 50-ohm cables and build or buy antennas that are specified for 50 ohm. While most cables have flat impedance over frequency (they measure 50 ohms at all frequencies you are likely to use) the same is not true of the antennas.

A 1.0:1 VSWR is a perfect match. That means the load impedance is exactly 50 ohms. A 2.0:1 VSWR is obtained when the load impedance is either 25 ohms or 100 ohms.

Because most transmitters will deliver full power with a load VSWR of up to 2.0:1, this value is usually considered the limit for acceptable operation. Many prefer to keep their VSWR below that however, but for all practical purposes, it is unnecessary to spend time or money trying to get much below a VSWR of 1.5:1. The benefits will be hard to measure and even harder to notice.

On the other hand, coaxial cable losses increase rapidly, for a given frequency of operation, when the antenna VSWR exceeds 2.0:1. This can even, in some extreme cases, result in the coaxial cable burning, even when running 100 W. Using a higher grade of cable will definitely improve things, but even high-quality coaxial cable becomes very lossy when VSWR exceeds 3.0:1 at higher HF frequencies (or VHF and higher).

Coaxial cable

Coaxial cable is an electrical cable consisting of a round, insulated conducting wire surrounded by a round, conducting sheath, usually surrounded by a final insulating layer. The cable is designed to carry a high-frequency or broadband signal, usually at radio frequencies. Coaxial Cabling is a two-conductor closed transmission medium that is often used for the transmission of RF energy. It yields excellent performance at high frequencies and superior EMI control/shielding when compared to other types of copper cabling. Coaxial cabling is commonly found in broadcast and networking systems. Most coaxial cables have a characteristic impedance of either 50 or 75 ohms. The RF industry uses standard type-names for coaxial cables. The U.S military uses the RG-# or RG-#/U format (probably for "radio grade, universal", but other interpretations exist).

The common RG-58 from Radio Shack is perfectly ok at MW frequencies. BELDEN makes terrific coaxial cable in various qualities and with very low loss (measured in dB's...decibels). 3 dB loss = 1/4 of your signal strength - either lost or gained. Watch out for the correct impedance; RG58, RG213, H-500 and H-155 have 50 Ohms, RG-59 and RG-6 have 75 Ohms. Most antennas and transmitters including ours are 50 ohms. Check our website for good coax. Don't buy more than you need to make the long run to your antenna and don't make up a few "jumpers" to go between your exciter, VSWR meter and your antenna as all you'll do is create higher SWR and more line losses. H-155 from Belden is also perfectly ok at MW or SW frequencies!

Mains power supply and mains power cable

Do not underestimate the importance of mains power supply, despite abundance of all kinds of cheap units available today they unfortunately do not always meet requirements. What you need is a well stabilized DC 48-50V mains power supply that can supply at least 2,5 amps of continuous current without overheating, introducing buzzing, dropping the voltage down or acting up in other way. Whenever in doubt please buy our mains power supply. One final note, if you use less than 48V this effectively lowers your output power. The lower the supply voltage the lower the power.

If you ordered and received our mains power supply (which is recommended) you'll notice the mains cable is not included but can be obtained in any radio/computer/hardware shop at the cost of about 1 US\$. It is the type used in your PC for mains power. Since these cables vary from country to country and we had trouble getting the exact type locally we decided against including them, especially since finding them is so easy locally.

Audio source with mixer, microphone etc

You need audio source to drive your transmitter. This will typically be either a computer (just plug the cable into your sound card outputs, a mixer and a variety of audio sources, such as a microphone, CD player, DAT player, tape deck, gramophone, MP3 player etc.

Wiring everything together

Wiring things up and first power-up

Wiring the CyberMaxAM+ is easy, just make sure you read the previous chapter first and setup antenna and coaxial cable correctly. Then proceed with the following:

- Erect antenna tower and install antenna securely. Make sure your antenna is well away from any metal objects. Ensure your antenna tower is grounded securely.
- Connect one end of your 50ohm coaxial cable to the antenna. If you have SWR analyzer you can now verify SWR of your antenna. If your antenna is already tuned connect the other end of coaxial cable to the antenna connector (BNC) at the back of the transmitter. If you have SWR/POWER meter, you can wire that one inline between antenna and transmitter as well. Make sure the SWR meter supports the frequency band required. Ensure all connectors are firmly secured and antenna is mounted securely.
- While making sure power switch is off connect mains power cable into the mains power supply and connect mains power supply into the back of the transmitter.
- Inspect all cables quickly again and make sure everything is secure.
- Turn on a radio receiver and set it to your intended transmitter frequency.
- Flip the POWER switch and wait for the unit to turn on. Now set desired frequency with the UP/DOWN keys. There is a known software bug that may make unit reboot during tuning, wait for reboot and continue tuning. Rebooting will not happen during normal operation. Wait a few seconds for the red LED diode to turn off and transmitter will turn on. Your radio should now mute since you did not connect any audio sources yet.
- Observe output power. Should be about 10-20% of maximum rated power with no audio.
- You can now connect audio sources of choice and verify audio performance.

Using the CyberMaxAM+ series transmitter

Basically, there are three push-buttons available for the menu system; **UP**, **DOWN** and **MENU**. By pushing **UP** or **DOWN** you get a shift of frequency in corresponding direction. Hold any of these keys for a few seconds and the jumps will increase to 25 KHz. The new frequency is saved automatically. The third button (**MENU**) gives you an option to select and setup many of the options and DSP functions of this unit.

Lcd control module menu system: Power and DSP functions

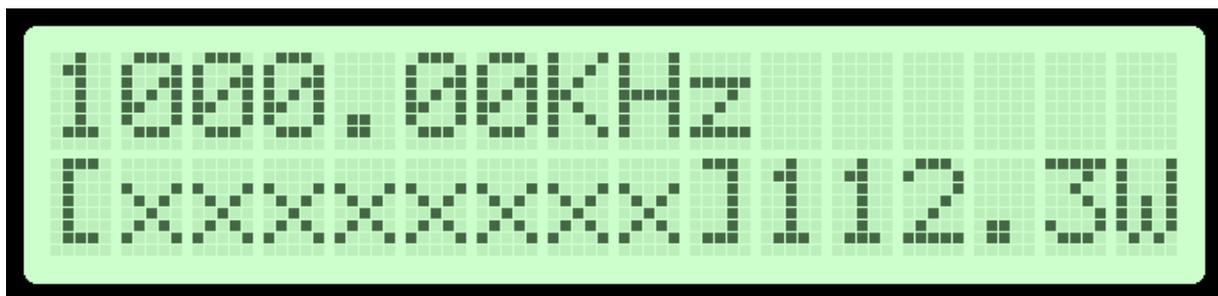
The UP and DOWN keys are used to change parameter values. In normal mode the LCD simply shows the frequency and power or whatever view you select. Menu key can be used to enter the menu mode, repeatedly pressing this key brings up the following menus: <RF POWER>, <VIEW SELECT>, <TREBLE>, <BASS>, <COMPRESSION>, <THRESHOLD>, <ATTACK>, <DECAY>, <INTEGRATION>, <LCD CONTRAST>, <AUDIO VOL>, <PLL STEP>, <FIRMWARE VER>, <TEMP ALARM>. Pressing the UP or DOWN key selects the desired parameter and allows you to modify its value. Another press on the MENU key and you're back to the normal mode. Note that all these settings except power and frequency are already set as they should be so changing them should not be necessary and is not recommended.

<RF POWER>

RF output power can currently only be adjusted by changing supply voltage. The LCD display will not let you change output power.

Changing frequency

Simply press the UP/DOWN button to change frequency. Depending on PLL STEP setting your frequency will go down or up in selected steps. If you keep pressing a key for a while the PLL STEP switches to fast tuning mode and jumps in larger steps.



Setting frequency, default view

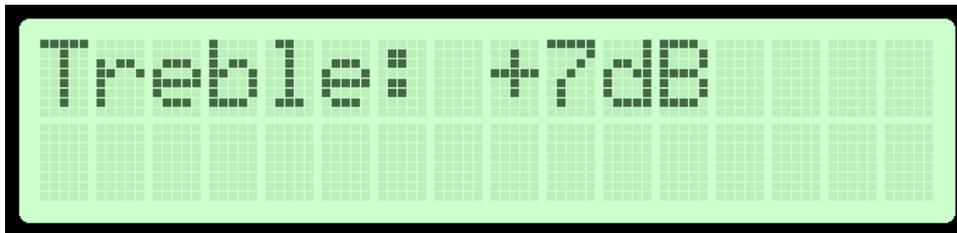
<VIEW SELECT>

AMMAX+ can display several various parameters. Since the LCD real-estate is limited to 2x16 characters we prepared several pre-programmed views that only show a selected number of parameters. At the time of writing these views were available:

- [Freq+Mode+Pwr] – This view shows frequency, mono/stereo mode and output power
- [Fr+Mode+Te+Ue] – This view shows frequency, mono/stereo mode, exciter temperature and exciter supply voltage
- [Po+Pr+Uamp+Ta] – This view shows output power, reflected power, amplifier supply voltage and amplifier temperature (if used)
- [Audio Level] – This view shows audio level bar graph. For this to work you the W solder bridge on the LCD module needs to be closed-soldered.
- [Uptime D:H:M] – This view shows how long the transmitter has been operating without mains power going out. It is sometimes useful in diagnosing mains power failures.
- [Auto Scroll]D – This is the default view, it shows each of the above listed views for a short while and than moves on to the next in an endless loop. This way you can see all the relevant parameters without having to go through the menu system to change the view type, you just have to wait a few seconds for the view to change.

<TREBLE> and <BASS>

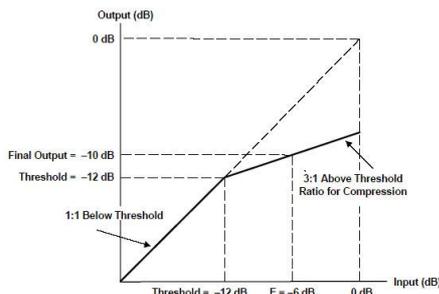
This option allows you to set the amount of TREBLE and BASS in your audio. Recommended values are marked with (D).



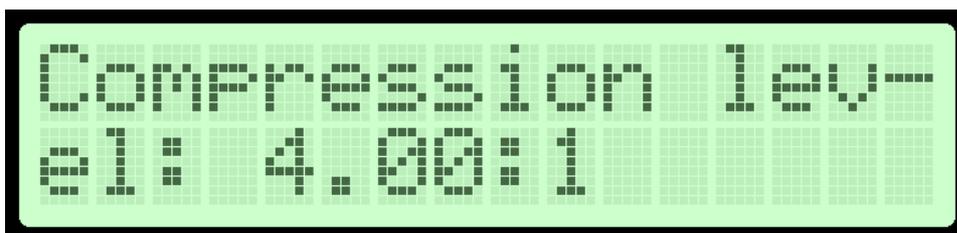
Setting treble

Compressor Settings

Several MENU settings control the operation of the compressor. Let's assume that the audio signal enters the transmitter at some low level. Compressor does nothing to the signal until at one point as the input signal increases the signal reaches the compression threshold. Digital signal processor starts compressing the signal beyond that point. The higher the compression ratio the higher the compression. For example, compression ratio of 1:∞ would in effect be a limiter.



Explanation of the compressor settings



Setting the compression level

Compression thr-
eshold: -12.0dB

Setting the compression threshold

Attack: 3.5ms

Setting the attack time, this is the time between the input signal and the actual response of the compressor

Decay: 106ms

Setting the decay time, this is the time the compressor needs to respond after the input signal falls back to normal level (below threshold).

Integration int-
erval: 212ms

Setting the integration interval, this is the time the DSP evaluates the signal to establish whether it should respond or not

Integration interval determines the energy needed to trip the compressor. In simple words; it determines how long the audio needs to be loud for the compressor to respond by reducing the gain. This is not to be confused with attack time. Attack time of 50ms means the compressor will respond in 50ms after the signal spike is detected, regardless of duration of that spike, even if it is just a very short event. With longer integration interval, on the other hand, compressor only responds if a long spike or a substantial number of spikes are detected (meaning more signal energy).

<LCD CONTRAST>

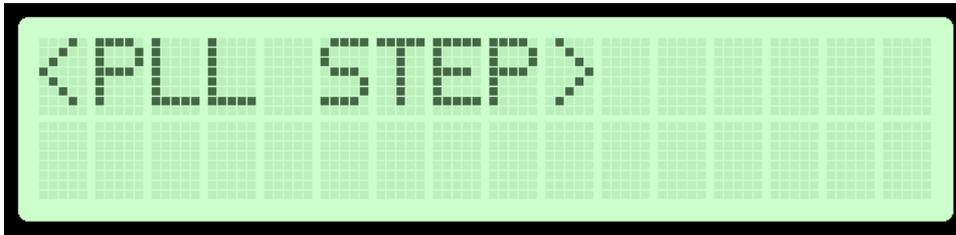
Select for the best visibility. Contrast is slightly affected by ambient temperature and you can adapt it to your needs here.

LCD CONTRAST

Changing contrast

<PLL STEP>

Frequency can normally be adjusted in smallest steps of 50 KHz or larger steps of 100 KHz. We recommend you to select 100 KHz as this lets you change frequency fast and there is rarely need for fine tuning. However, you can enter this menu and select a PLL step of 5 KHz for example and take advantage of these small steps.



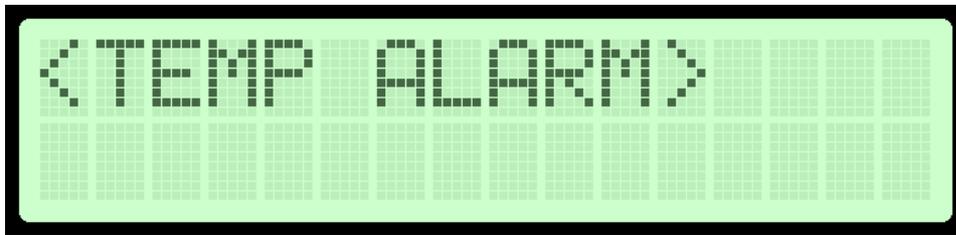
Changing PLL step size

<FIRMWARE VER>

This option allows you to display current LCD module firmware version.

<TEMP ALARM>

You can set the sensitivity of temperature alarm here. We recommend you set these to 70-80 degrees Celsius. A properly installed unit with a tiny fan will typically run at 55 degrees C at maximum output power. This alarm applies to externally sensed temperature if you are using external filter or directional coupler connected via DIGIAMP.



Temperature alarm.

Troubleshooting

We hope you'll never get to this step. We all know bad things happen but do not despair! Make sure your coaxial cable leading to the transmitter or antenna is not shorted or open. Next check the troubleshooting table on the next page. If you have problems, you cannot solve yourself, please see our website for contact information and support resources in our forum.

Troubleshooting our AM transmitters



Do you think you can handle it ??

So, do you think you can handle it? We think you sure can!

PROBLEM DESCRIPTION	POSSIBLE SOLUTIONS
Everything appears normal, but there is no RF power	<ol style="list-style-type: none"> 1. Wait a few more seconds, AMMAX+ series exciters need a few seconds to get their power to full 2. Maybe one of the alarms was triggered and power was reduced, try to power off and power back on, whenever an alarm is triggered, power may be reduced until the unit cools off.
RF output power is too low	<ol style="list-style-type: none"> 1. Maybe one of the alarms was triggered and power was reduced, try to power off and power back on, whenever an alarm is triggered, power may be reduced until you power off and back on. Perhaps you adjusted TEMP ALARM too low, set it slightly higher. 2. Transmitter may not give full power when you use a supply voltage of less than 48V. On some parts of the band power will be lower. 3. Power meter may not measure correctly when antenna connected is not perfectly matched to 50 ohms. Check with antenna analyzer.
My power meter shows very low power output	<ul style="list-style-type: none"> - Most HAM SWR/Power meters will not work well for MW band. Even types that perform reasonably well at 160m will fail miserably at 540KHz for example. Sensitivity of directional couplers is very much frequency dependent and usually this means the needle is not even moving with power output at 100W peak. - With AM modulation peaks and using positive modulation more than 100% (this is done to make it sound louder and increase power efficiency) the carrier power needs to be less than ¼ of the peak power. So, with no audio your power might be just 15W with this rising to 100W in peaks of modulation. - The only way to accurately measure peak power (or any power at MW) is to use dedicated power meter or oscilloscope (you can calculate power from voltage and known load which is 50 ohms). Dedicated power meter needs to have peak power measuring capability and must cover the MW band.
LCD display keeps showing TEMP error warning	Unit is over-heating, or your antenna is faulty. Let the unit cool off and ensure proper cooling. Perhaps you set TEMP ALARM low, set it slightly higher.
Audio without any treble	Set treble higher in LCD menu system.
Unit blows fuses and draws excessive current	You have probably burned the output transistor. Overheating of antenna problems are the most probable cause. Or lightning.
Power supply is blinking	Probably the same thing as above. Blinking power supply means its protection is shutting it off and back on, probably due to excessive current draw caused by burned final.
Audio distortion on high peaks, for example on "s" sound.	Your audio input level is slightly too high, reduce input audio level slightly at your audio source. Use compressor to remove over-modulation peaks.
There is HUM in audio	<ul style="list-style-type: none"> - Move antenna as far away from the transmitter and audio gear as possible - Use balanced audio inputs (XLR audio connectors) rather than RCA - Make sure SWR is low - Did you miss the part about metal enclosure? Put your unit in enclosure!! - Keep audio cables short and away from antenna and RF coaxial cable - Form a coil from coaxial cable going to the antenna, make a few turns. This stops RF currents that might be flowing on the outer braid of the coaxial cable. This usually happens when you connect unbalanced cable to balanced antenna without proper BALUN (balanced-unbalanced converter) resulting in coaxial cable becoming part of the antenna and radiating RF energy as well...causing hum.

Troubleshooting AMMAX series AM exciter

Appendix A – Warranty and legal info

Important notice!

Please remember to turn off the transmitter/amplifier when not in use! This goes especially for high powered transmitters. Remember that anything you broadcast through the transmitter can be heard by anyone tuning in to that frequency. Although it is unlikely certain weather conditions may allow the signal to go further than your immediate listening area so please don't broadcast anything you don't mind anyone else hearing.

Warranty and servicing!

Within 2 years of receiving your order, if any product proves to be defective; please contact us via e-mail or our feedback form. Please **DO NOT** ship the product back to us without contacting us first and receiving return instructions. After we receive the defective merchandise, we will test it if need be, and we will ship back to you a non-defective replacement product. Please note that this doesn't cover final RF transistor as it can be damaged by using defective or poorly matched antenna. An exception is as well any mishandling or abuse by the customer. If the product is defective, you will receive a replacement. If you choose to return the defective item, rather than replace it, we will charge a 20% restocking fee and your original shipping and handling charges will not be refunded. The return of the product is at your expense. We believe that this is a fair policy because lower overhead results in lower prices for all of our customers.

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- A large assortment of hard to obtain RF components (RF transistors; BLF188XR, MRF300, 2SC, coils, silver plated wire, coaxial cable, capacitors, quartz crystals and many others)
- PC based FM transmitters (PCIMAX3000+ pc based FM transmitter turns your PC into a radio station)
- Many beginners guides to get you started
- A large selection of free schematics is as well available at our website.

If you can't get much range with your homebrew antenna, have a look at these: <http://www.pcs-electronics.com>

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Revisions and errata

V2 (Dec 2022): Second update

Please report any errors you see in this manual; you will be helping us and many other users out there. Thank you!

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