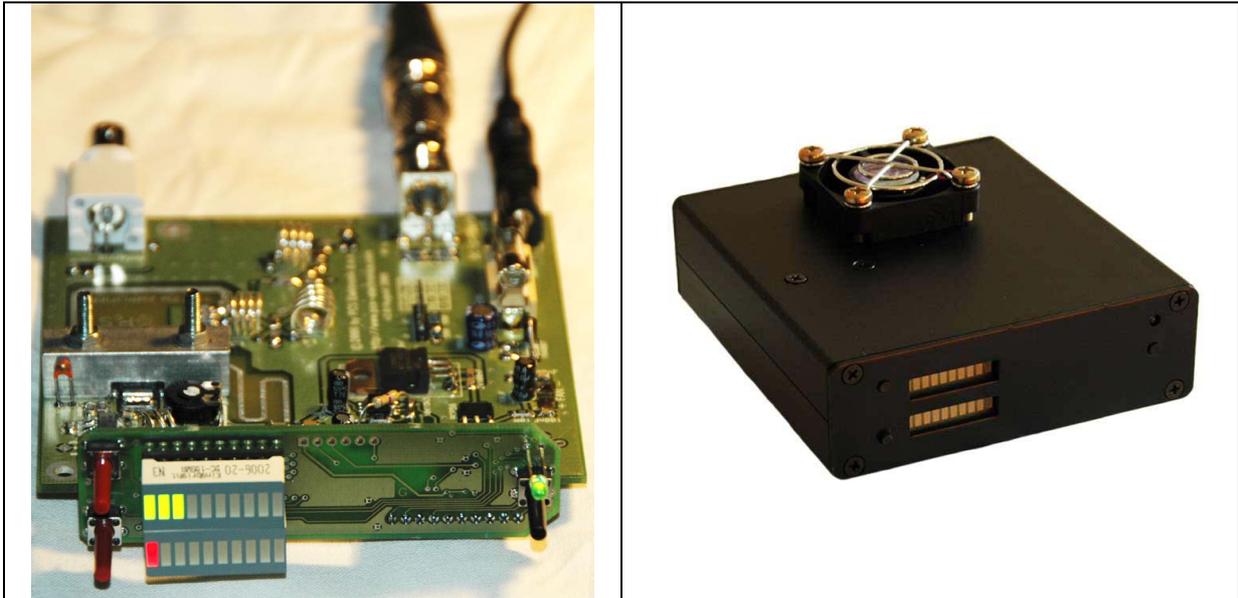


15W FM BOOSTER+

Innovative digital high performance FM amplifier with SWR meter and triple protection

This 15W FM amplifier will boost even the weakest FM signal and assure ample power and solid range. Built-in SWR meter with bargraph LED display, SWR protection, TEMP protection and over-voltage protection (TRIPLE PROTECTION!) only add to the already convincing features of this unit. Let's not forget the FAN, which now only engages when necessary and is overall much quieter than the previous model. The case has been redesigned as well; with its 20-segment RED/GREEN bargraph display, completely digital control and chromed vent exhaust mesh it really looks good next to your audio setup or elsewhere.



Technical specifications:

- RF Output Power: 0 to 15 Watts (10-15W typ, 20W max., digitally adjustable with 2 keys)
- Output connector: BNC
- Output Impedance: 50 Ohms
- Input connector: F
- Input Impedance: 50 Ohms
- Input power: 50mW-1000mW
- Frequency Range: 85-115MHz (other bands on request)
- RF output ruggedness: SWR protection, TEMP protection, over-voltage detection & shut-off
- Spurious/Harmonic rejection: Harmonics: -60dB, Spurious: -90dB
- Power Supply: 13.8-15V/3A or car battery
- Ultra Stable, Ultra Clean Output
- SWR meter: 10-segment BARGRAPH LED display
- SWR protection: foldback
- TEMP protection: foldback
- Polarity protection: Diode with a fuse
- Over-voltage protection: powers off the transmitter and blink the LEDS if more than 15V is used
- No Expensive Test Equipment Required to setup, no SWR meter required to setup
- Fuse type: F3A/250

Why is this AMPLIFIER so great?

- true wideband no-tune operation
- built-in SWR meter

- high power (12-5W typ, 20W max)
- SWR, TEMP, OVERVOLTAGE and POLARITY protection
- digital output power adjustment (with up/down keys)

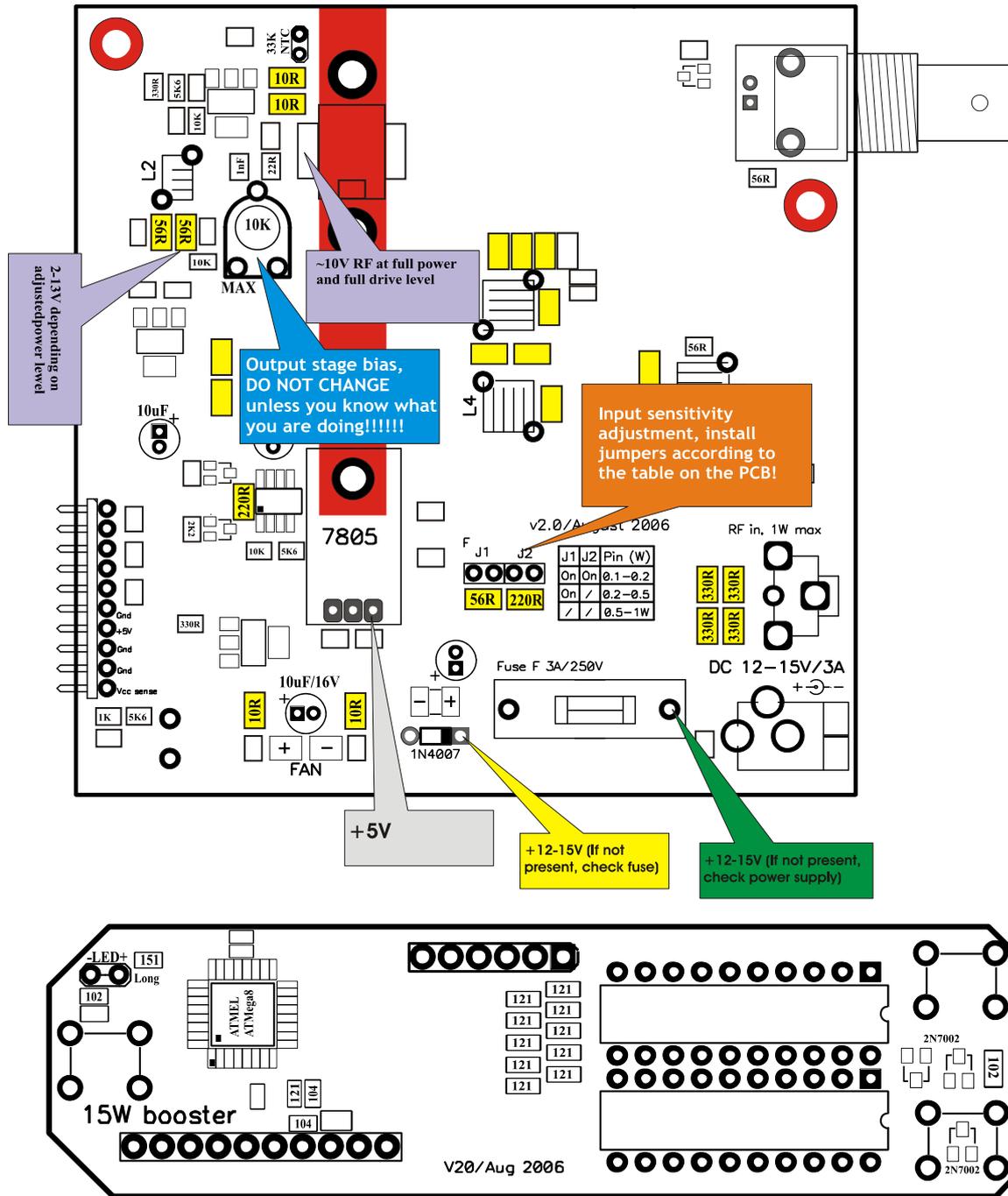


Figure 2: FM AMPLIFIER RF board (TOP) and control board (BOTTOM)

THANK YOU FOR PURCHASING OUR 15W FM BOOSTER+!

We hope you will enjoy it as much as we do and remember to tell your friends about it. Please feel free to leave your comments at our website or post your experience in our forum.

From all of us we wish you happy broadcasting!

PCS Electronics team

www.pcs-electronics.com

BEFORE YOU START...

Let us clear up some basic things you need to know before we move on. You will find some very useful tips, a forum and tips on antennas and hooking things together at <http://www.pcs-electronics.com> so it's generally a good place to check before putting your unit on the air.

Here is what you need to get 15W FM BOOSTER+ on the air:

Antenna

Preferred type of antenna is affected by several factors, but mostly by your transmitting site. In the middle of the area you want to cover you'll need an omni-directional antenna which transmits equally in all directions, while outside your coverage area you can beam the signal in with a directional antenna. Before going on air get a low VSWR by adjusting the position of the antenna and any adjustable pieces. Aim for 2:1 or less. Use low power into the antenna when tuning it up and making adjustments. 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. For instructions regarding construction of antennas please see our website:

<http://www.pcs-electronics.com> (guides section - antennas).

You should have realized by now that antenna was, is and will always be a crucial part of the system. Special care has to be taken! It is usually a good idea to place antenna away from your transmitter, power supply and audio

A PIECE OF WIRE OR TV ANTENNA IS NOT SUITABLE ANTENNA FOR MAX PRO I OR ANY OTHER RADIO EXCITER!

system. 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! This applies to any transmitter. Interestingly, strong RF field can make CD players and other digital devices go bezerk. 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. This is why keeping antenna away from audio gear is a good idea.

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 NOT the best you can do and will lower your effective power out! Use it only for short runs. BELDEN makes terrific coax 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...RG-8 and RG-58 have 50 Ohms. RG-59 and RG-6 (Low Loss Version of RG-59) have 75 Ohms. Most antennas and transmitters including ours are 50 ohm. 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 or H500 are good choices! RG-142 with Teflon is recommended for wiring inside cabinets, for baluns, Wilkinson couplers and everywhere where resistance to heat is required as insulation won't melt during soldering or operation.

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

VSWR is a measure of how well two devices are impedance matched to each other. Typical radio 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 ohm 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).

BNC connector

A connector comes between coaxial cable and antenna/RF output connector. It's a standard VHF RF connector for low power applications, similar to the one used for Ethernet networks. You might get it along with your antenna. Try to find a good quality BNC connector as PC type usually uses cheap plastic instead of Teflon. The good ones are usually easily recognized by much higher prices. BNC to SO239 converters are available and will make it possible to connect PL259 (CB type or UHF) connector directly.

Power supply

You will need a good regulated 12-15 volt, 3A regulated power supply. You can always use a lead acid car battery and re-charge it when you are off the air. HAM or CB power supply units do the job nicely in most cases. Poor power supply can add hum to your signal! FM BOOSTER+ gives more output power when you increase the supply voltage. We have tested it up to 15V and had no problems, but we do not recommend using more than 15V. In fact amplifier WILL NOT work if you use more than 15V. Built-in protection will shut the transmitter off and blink the LED diodes at a frequency of around 2Hz. This is to protect your output transistor, too much voltage can fry your output transistor, especially if your antenna is not well matched. You can build your own power supply or get one from our website. Try our web site for schematics, if you want to make one by yourself.

FM exciter/transmitter

You need something to drive your amplifier. Any FM transmitter, built for FM broadcasting band with an output power of 50-100mW min and 1000mW max will do. Any pci max card will work nicely with this booster.

Finally, if you know nothing or little about electronics, we selected a few books we found extremely well written and useful. The links to them are on our homepage. We suggest you start with the ARRL HANDBOOK, the holy bible of amateur radio and electronics in general. It is an extremely valuable resource for anyone involved with RF electronics.

TROUBLESHOOTING

We hope you'll never get to this step. We all know bad things happen. But do not despair! First, FM BOOSTER+ is reverse polarity protected so it should blow a fuse if you reverse polarity. Fuse is the first thing to check. SWR and TEMP protection should help, too. Next help your mains power supply and FM exciter, make sure they are working properly. Also make sure your coaxial cable leading to the transmitter is not shorted or open. If you have problems that you cannot solve yourself, please see our website for contact information and support resources in our forum.

THINGS TO REMEMBER

Please remember to turn off the amplifier/transmitter when not in use! 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.

NEWSLETTER

You may want to sign up for our newsletter so you can receive the latest news and special deals. Also check our forum and discuss tips and tricks with other users, you never know you just may learn something. You can sign up at www.pcs-electronics.com

USING THE 15W FM BOOSTER+ (KEYS AND DISPLAYS)

Basically there are three push-buttons available on the front panel. They are **UP**, **DOWN** (on the left) and **POWER** (on the right). You can set output power by pushing **UP** or **DOWN** key. Adjusted power level is displayed with a row of 10 green squares in the top bargraph display.

The bottom bargraph (10 red squares) shows the SWR ratio. As long as a maximum of 3 of these are illuminated, you're fine. If more than 3 RED squares illuminate, please power off and use SWR meter to check your antenna.

POWER button makes it possible to turn the unit on or off, as the name suggests. LED diode above this button shows the current power status (ON – LED illuminated, OFF – LED not illuminated).

USING THE 15W FM BOOSTER+ (WIRING)

Wiring 15W FM BOOSTER+ is easy:

- Connect antenna to the BNC connector
- Connect exciter/transmitter to the F connector and make sure it is not driving more than 1W
- Connect power supply to the power jack (center is positive)

USING THE 15W FM BOOSTER+ (POWER-UP PROCEDURE)

The proper procedure for using the 15W FM BOOSTER+ is as follows:

- Wire everything as described above. If you have SWR/POWER meter, wire that one as well.
- Power-up the amplifier and set power to about 50% with the up/down keys. Unit first runs a short light show upon power up.
- Power-up the exciter
- Make sure that no more than 1-2 RED squares are illuminated. If you have SWR/power meter check whether everything is working as expected
- Now try to increase power to 100% making sure no more than 3 red squares are illuminated. If more than 3 are illuminated, power off and tune your antenna
- If LED diodes start blinking at about 2Hz, power off immediately and disconnect mains power supply. Over-voltage protection had detected voltage of more than 15V, which could damage the unit. Use a better mains power supply.

APPENDIX A: IMPROVEMENT TIPS

Think about purchasing SWR meter to tune and align your antenna. A good antenna system is extremely important and can make up for a lot of power. For a suitable SWR meter check:

<http://www.pcs-electronics.com>

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

Still not enough range? Well, how about a 300W amplifier? <http://www.pcs-electronics.com>



Do you think you can handle it ??

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

IMPORTANT NOTICE!

Please remember to turn off the transmitter/amplifier when not in use! This goes especially for the 15W booster. Make sure you turn it off until you start the program on the desktop and turn it off after you stop using the program! 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.

LEGAL INFO

It may be illegal to operate this device in your county. Please consult local authorities before using our products!

PCS Elektronik d.o.o. is not responsible for any damage to your PC arising from use of this product and will not be held responsible for any violation of local laws pertaining to the use of this product. It is entirely your responsibility that you make sure you operate in accordance with local laws and/or regulations.

LIMITATION OF LIABILITY

To the law, in no event shall PCS Elektronik d.o.o. or its suppliers be liable for any special, incidental, indirect, or consequential damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use the PRODUCT, even if PCS Elektronik d.o.o. has been advised of the possibility of such damages. In any case, PCS Elektronik d.o.o.'s entire liability under any provision of this agreement shall be limited to the greater of the amount actually paid by you for the PRODUCT or U.S. \$5.00; because some states and jurisdictions do not allow the exclusion or limitation of liability, the above limitation may not apply to you.

ALSO AVAILABLE FROM PCS ELECTRONICS

We also carry a big range of:

- FM transmitters in assembled and KIT form
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- Various accessories for professional and hobby FM radio stations
- A large assortment of hard to obtain RF components (RF transistors; MRF, 2SC, coils, silver plated wire, coaxial cable, capacitors, quartz crystals and many others)
- PC based FM transmitters (PCI MAX pc based FM transmitter turns your PC into a radio station)
- A large number of beginners guides to get you started
- A large selection of free schematics is as well available at our website.

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