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PCI MAX 2006+

PC based FM stereo transmitter card

PCI MAX 2006+ is a high performance PLL controlled FM transmitter for your everyday PC compatible computer. It is a all-in-one solution, perfect for transmitting your music throughout your house, your yard and further, if you couple it with our 15W booster. It can even serve as a local, college or a community radio station, with the features and quality you expect from the professional setup, with amazing audio quality and stereo separation. It is perfectly suited for homebrew DJ's. It is easily tunable anywhere on the dial with a simple click of the mouse.

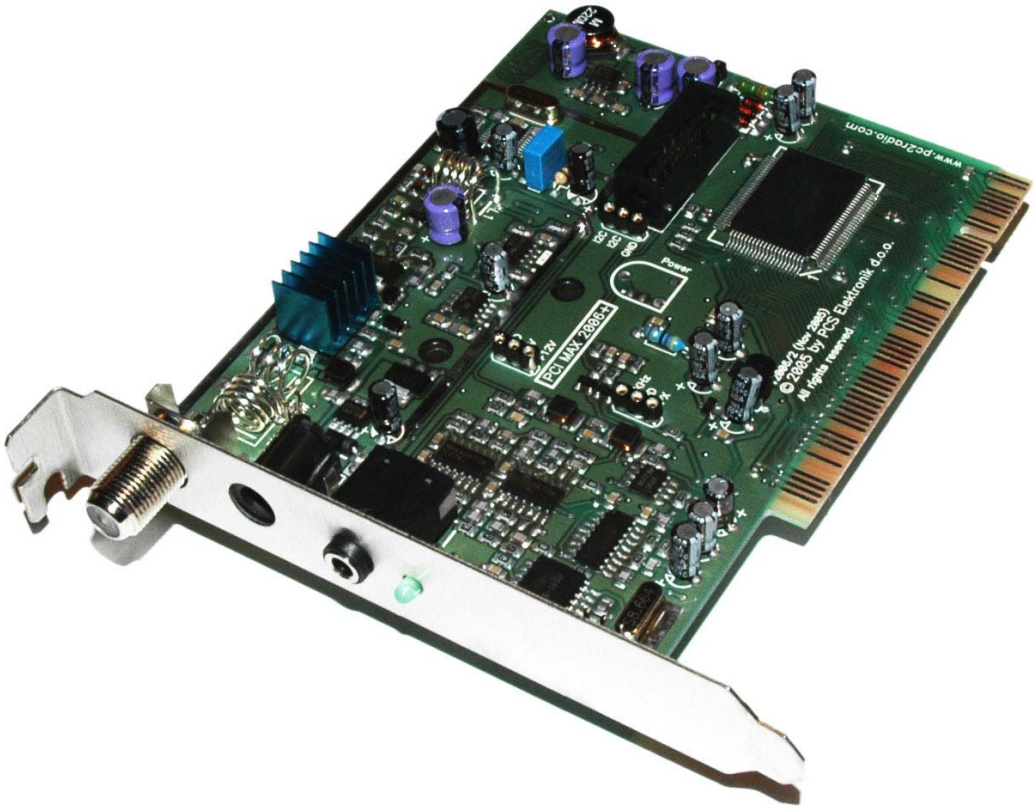


Fig. 1: Plug it in and turn your PC into a real radio station….

Technical specifications:

- RF Output Power: 0 to to 1000mW max (depending on model, varies from sample to sample)
- RF power adjustment: In Windows; Slider, in standalone mode; LCD digital control
- Output connector: F
- Output Impedance: 50 Ohms
- Frequency Range: 87.5-108MHz (can be extended on special request)
- PLL Steps: 50KHz
- Frequency stability: +/- 100Hz
- Spurious rejection: -70dB
- Harmonic rejection: -50dB
- Power Supply: Internal from PC or external 12-15V/1A
- Quartz Locked PLL Frequency Control
- Ultra Stable Output
- Audio performance: Less than 0.01% distortion, 30Hz-15KHz
- Stereo channel separation: >45dB
- Audio processing: Limiter, pre-emphasis, low pass filter
- Built-in balanced audio inputs and MPX filter

Accessories:
- External power supply (enables more output power), 15V/1A: available immediately
- RDS board (plugs into PCI MAX 2006+ board): available end of January 2006
- Audio, Y jack splitter: available immediately
- 15W power booster

- LCD control unit for stand-alone mode: available immediately
- Stand-alone 19-inch rack enclosure (requires above LCD unit): available immediately

- Miniature LCD control unit with LED VU meter for stand-alone mode: available end of January 2006
- Miniature stand-alone enclosure (requires above miniature LCD unit): available end of January 2006

- RPL0205 antenna: available immediately
- MLB6600 antenna: available immediately
- COMET antenna: available immediately
- For other antennas check our website

Why is PCI MAX 2006+ better than PCI MAX 2005+?
- External power supply connector was moved to the back for easy access (for those with noisy PC power supplies or perfectionists trying to get the most out of their PC based FM transmitter system. Using external power supply allows for full output power and better audio quality
- All boards are prepared for RDS, a daughter board is simply plugged in (this could only be done in our laboratory before). Besides, the mounting of RDS board is now much more elegant and easier.
- Additional RF stage for increased isolation (stability) and more RF power (~350mW & 1W versions available). Low power version is noticeably stronger than the old 2005 cards.
- A LED diode at the PC back-plate for transmitter power indication, it makes it possible to check whether transmitter is ON or OFF (and what the power level is approximately). It is very handy for troubleshooting and looks good, too.
- DC/DC converter is now synchronized with stereo encoder, which eliminates interference problems.
- Power adjustment circuitry has been redesigned entirely and now performs much better.
- PLL loop filter was redesigned for better audio quality and bass response.
- 15KHz low pass filter was added (this was really needed as it sounds much better now).
- Improved PCB layout for improved audio quality (less noise from PC).
- An optional external box as well as miniature LCD display board with VU meter (2x5LEDs)
- 50KHz PLL steps

This is a more/less complete list, some changes may have been implemented, but were not mentioned here.

PCI MAX 2006+ has built-in balanced audio inputs, limiters, precise preemphasis and MPX filter. It can be switched to MONO or STEREO by a simple click of a mouse button. There is a phono audio input at the back of the card, which connects to the sound card via provided jumper cable. If you need to keep the particular output for your speakers, simply use splitter (available from radio shack or our website). Audio can also be fed to the card from other audio sources (cd players, mixers etc).

Q&A section
Q: How does the sound get from the sound card to the PCI MAX 2006+?
A: Well, audio jumper cable is included, it connects between your sound card's output and the PCI MAX 2006+. This cable passes the audio to the transmitter and you hear the music on your radio.

Q: So I can also plug some other audio to this audio input, such as CD player or portable MP3 player?
A: Sure, you can use any audio source.

Q: Can the frequency band be extended to cover Japanese FM band?
A: Sure, 60-150MHz can be covered by small modifications to the board, if there's enough interest out there.

Q: I just want to cover my apartment and my yard. What do I need?
A: I'd just get PCI MAX 2006+ 350mW in this case and use included wire. There's absolutely no need to go overboard and spend for 1W version, special antenna, external power supply, and coaxial cable in all such cases.

BEFORE YOU START…

-**A word of caution!**

Our PCI MAX card is legal to use in many countries, but may not be legal in yours. Please consult local authorities before you start using this product.

WHAT WILL YOU NEED TO START…

-**Antenna** Antenna is a crucial part of any radio communication system, especially if you need good

A PROVIDED PIECE OF WIRE WILL WORK, BUT YOUR RANGE WILL BE LIMITED!

range. A good antenna placed as high as possible can massively increase your range. We recommend that you look at many of the designs for homebrew antenna projects at our website (guides section) or any of the factory produced models. It is usually a good idea to place your antenna away from your transmitter and audio system and connect it via coaxial cable! If you intend to use the high power version of PCI MAX 2006+, purchase a suitable tuned antenna from our website. Using any non-matched antenna (a piece of wire also qualifies as unmatched here) with the high power version of PCI MAX card can result in significant amount of power being reflected back to the output stage and subsequently damaging the output transistor, which is not covered by warranty (since it is usually user error).

-**Coaxial cable** Common RG-58 from Radio Shack is not the best you can do. Use it only for short runs – up to about 10m. BELDEN makes terrific coax in various qualities and with very low loss (measured in dB's…decibels). Don't buy more than you need to make the long run to your antenna and do not make too many "jumpers" between PCI MAX and your antenna as all you'll do is create a higher VSWR and more line losses. Avoid cheap TV coaxial cable.

-**Audio equipment.** This is obviously going to be your PC, but you can easily power PCI MAX from any other audio source, such as CD player, walkman or MP3 player. Remember, PCI MAX cards can also be used without the PC in standalone mode with add-on LCD display unit.

When used in a PC, use WinAmp or any other MP3 player. Plug-ins are available and take care of limiting-compression. You are advised to pull down the equalizers above about 15 KHz as the broadcast standard requires them to be attenuated. They can produce hiss as they can interfere with the pilot carrier signal at 19 KHz.

Think about specialized scheduling software, such as SAM3 or Jazler, also used by real radio stations. Get a good sound board! Integrated sound boards are often noisy. Check the forum at our website for tips:

http://www.pcs-electronics.com

-**External power supply.** A 12-15V /1A DC stabilized type is required. The plug needs to be positive in the middle. You only need external power supply in case of the following:

1. Your PC is too noisy and you want to eliminate the PC-borne noise.
2. You want to increase output power. PCI MAX throttles down a bit when used without external power supply. This helps reduce noise and prevents any damage to the computer or the output stage. When increasing output power this way also consider using a proper antenna, such as MLB6600 or Comet. Please check our website for suitable types.

SETTING UP THE PCI MAX CARD

Setup basically consists of two major steps:

STEP 1 – SOFTWARE INSTALLATION

Insert the PCI MAX installation CD in the computer's CD-ROM drive. NOTE: Some computers will start the CD automatically and others will not. If the CD does not begin after a couple of seconds, you need to manually run the setup file, usually found in the appropriate directory on the supplied CD. If you lost the CD, download the driver from our website.

The setup program will make a backup of every file installed so that you can simply uninstall the program later, if you experience any problem with your computer.

Fig. 2: You've just started the Setup program…

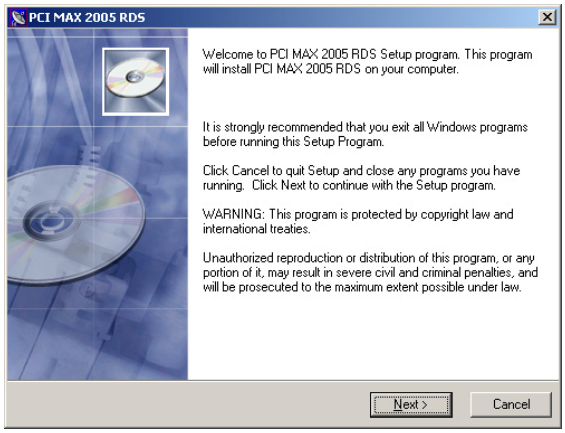


Fig. 3: Just follow the installation process…

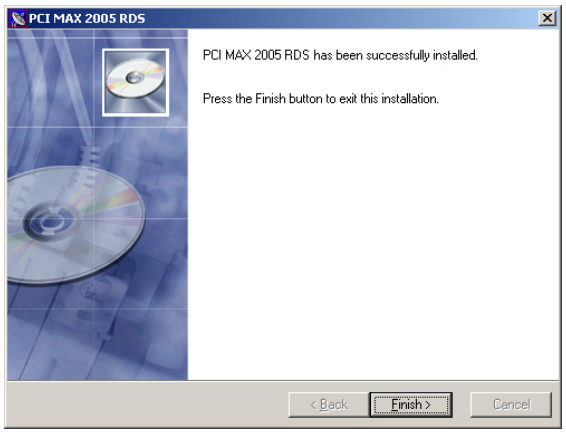


Fig. 4: You're just about finished…

Shut down the PC after you've successfully installed the Setup program.

STEP 2 – PCI CARD INSTALLATION

You will need one free PCI slot to install your PCI MAX. Remember to turn off your computer and remove the power cable from the wall or power strip. Open your PC, find an empty PCI slot and insert your PCI MAX card into that slot as you would any other PCI card. You may need to move your card to another slot, if Windows doesn't find it as you boot up. This often happens with other cards as well (network cards, sound cards) so don't be alarmed. If you can, place your card as far away from other cards as possible. Also, move any cables as far as possible away from the PCI MAX. Finally secure your PCI MAX card with a screw. Make sure that none of the cards are in contact with each other. It is now time to install the provided antenna (or another better antenna, if you're using a high-power card); plug it into the F-connector (denoted with A on the picture below).

Fig. 5: A; Antenna connection, B; external power supply, C; Audio input, D; output power indicator

Use the provided jumper audio cable to connect the audio input (C) to the sound card. If you wish to keep your audio output, use Y splitter/adapter and wire one of the outputs to your speakers, for example. Now that you've installed your card Windows should report finding new hardware after loading Windows. When it does, point the location of the driver to the CD-ROM (make sure you inserted installation CD first) or to the directory where you installed the program. Example below is for Windows XP. Other operating systems will display similarly looking panels. Complete the installation as the operating system instructs you. You may need to reboot your PC again, depending on the operating system that you're using.

Fig.6: This is an example for Windows XP.

There will be a new icon on your desktop… go ahead, click it!

Fig. 7: PCI MAX card icon, click it to bring up the control program for the PCI MAX card.

A program will come up, enabling you to change frequency, mode of operation (stereo or mono) and turn the transmitter on or off. You will also be able to change RDS parameters, if your card supports RDS.

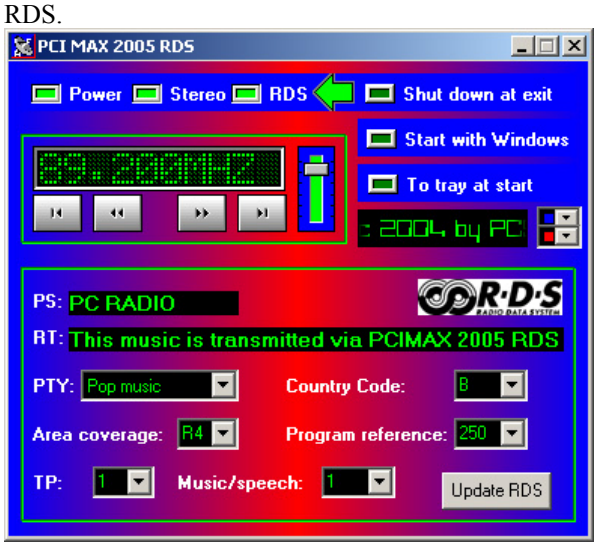


Fig. 8: The PCI MAX control program.

I'd like to point out here that SAM3 also supports PCI MAX through its interface. SAM3 is a all-in-one broadcasting program for PC, supporting DSP plug-ins, scheduling, it publishes your play lists on the internet automatically and does a lot more. We recommend this program to everyone! Check our software section!

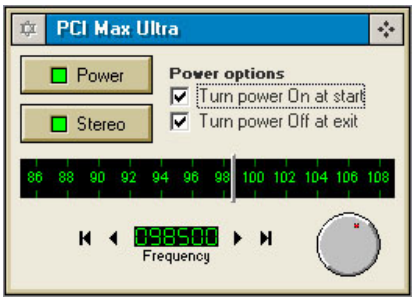


Fig. 9: The PCI MAX control program in SAM2.

USE AND FINAL NOTES

Select the desired working frequency with the mouse. That slider next to the frequency display is the output power adjustment trimmer. Set it to minimal sufficient value in order to avoid interference to other users or neighbors. Open your MP3 player or other audio player. Turn on any fm radio and set the receiver to the transmitter's frequency until you can hear the computer's audio through the fm radio. You will need to adjust audio level so that the sound on the radio sounds naturally and without distortion. Too much volume may sound good on your radio, but will sound horrible a few hundred meters from the transmitter! You shouldn't sound louder as other FM stations. Now any audio you play through your computer will play through the transmitter to any fm radio tuned to the frequency you have the transmitter set to. You may want to try a few different stations because of better reception in different areas some spots on the dial may work better than others.

WARNING: PLEASE BE SURE THAT YOU ARE TUNING IN TO AN AREA ON YOUR LOCAL FM BAND THAT HAS NO STATION BROADCASTING ON IT, YOU DO NOT WANT TO INTERRUPT ANYONE ELSE'S LISTENTING TO LOCAL RADIO STATIONS, IT'S RUDE AND ALSO ILEGAL!

FOR ADVANCED USERS

PCI MAX contains a high quality digital stereo encoder and PLL stabilized FM transmitter. There's a lot more you can do with PCI MAX than meets the eye. For example, you could use it without the PC. Have you noticed the 14-pin connector on the PCI MAX board? This is a control unit that you can attach to it to make it work without the PC:

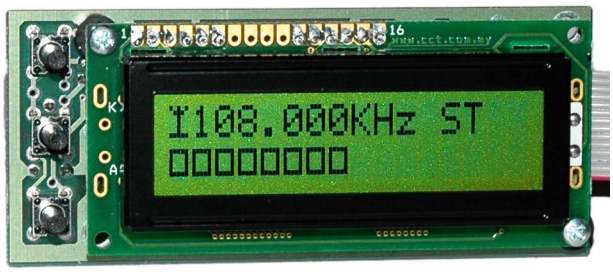


Fig.10: The LCD display unit for the PCI MAX card – standalone mode without the PC.

What we see on the display here is frequency, stereo mode and output power. See those squares at the bottom? The more squares, the more power you have at the moment. What next? Well, for example, you could buy a 19" professional rack mount enclosure (check our website) and turn your PCI MAX card into a stand-alone no-tune stereo FM transmitter. If you need more power, why not put our 15W booster into this very same enclosure? LCD control unit with 3 keys and LCD display lets you set the power, frequency and stereo/mono mode.

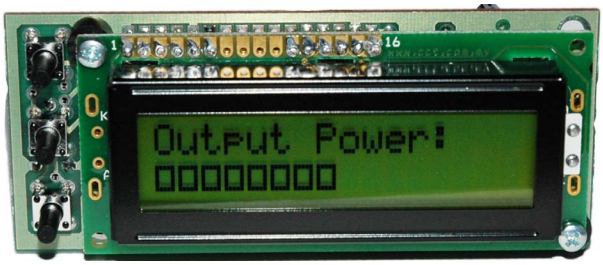


Fig.11: Setting the RF output power with the LCD control unit.

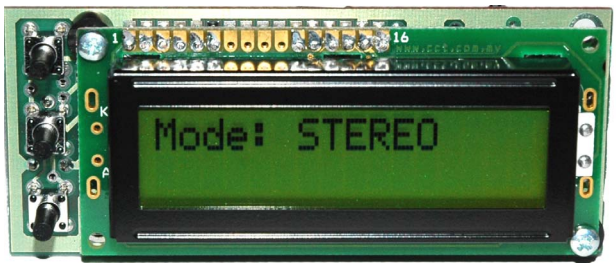


Fig.12: Setting the stereo/mono mode with the LCD control unit.

IMPORTANT NOTICE!

Please remember to turn off the transmitter 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.

WARRANTY

Any PCI MAX unit that fails due to defects in workmanship and/or materials will be repaired or replaced, at the discretion of the manufacturer, to the original purchaser who provides dated proof of purchase. Damages caused by abuse, misuse, negligence (i.e. Water damage, improper installation, lightning strike) are considered to be avoidable. Output RF transistor is not covered by warranty. The stronger version of the PCI MAX card requires a properly tuned FM band antenna, using other type or just a piece of wire may damage output RF transistor. Also, your output power is higher when you use external power supply so the same warning concerning antenna applies here as well.

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 maximum extent permitted by applicable 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.´ 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.

Thank you for purchasing the PCI MAX card!

We hope you will enjoy it as much as we do and remember to tell your friends about it. We would also like to invite you to visit our website; it offers an abundance of information related to broadcasting and radio, as well as feedback form, a forum and support section.

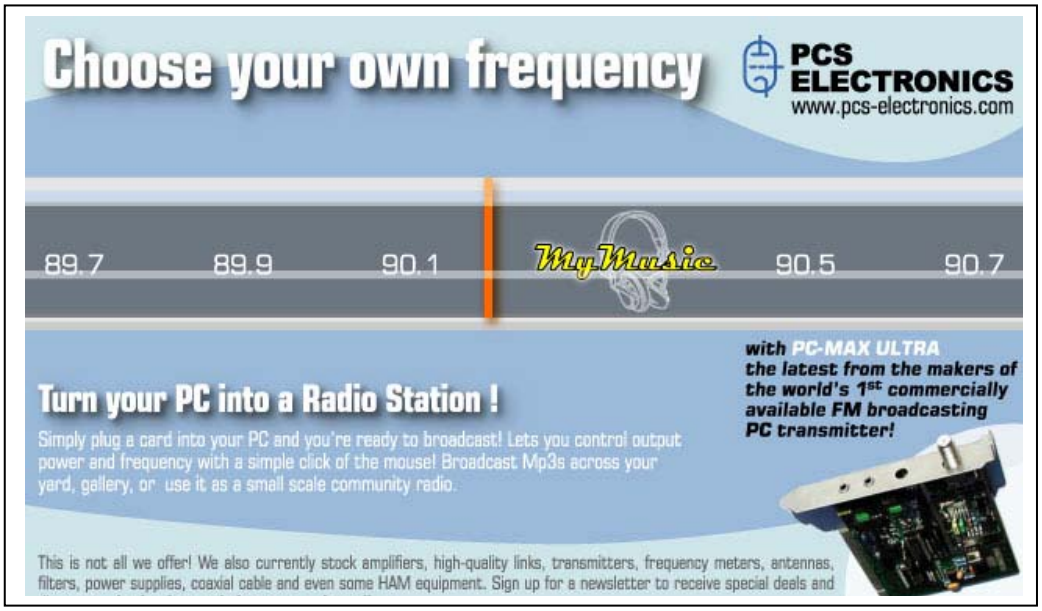
From all of us we wish you happy broadcasting!

Your PCS Electronics team
www.pcs-electronics.com

ALSO AVAILABLE FROM PCS ELECTRONICS

We also carry a big range of:

- FM transmitters in assembled and KIT form
- AM transmitters with extremely clear modulation (PWM design)
- 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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