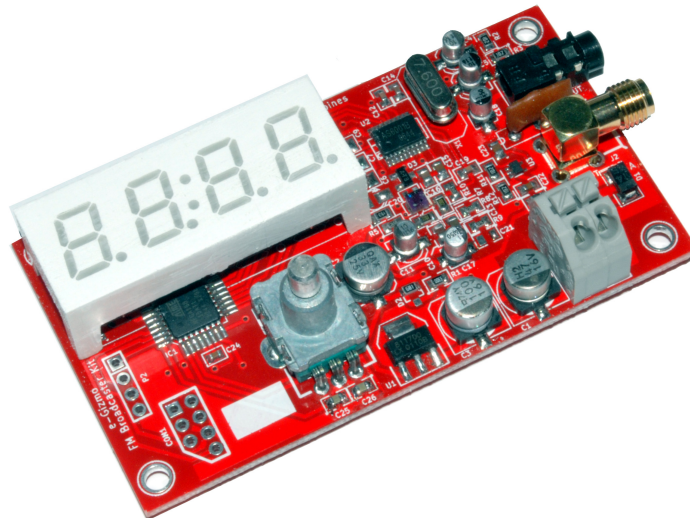




Personal FM Broadcaster (PFMB)

Technical Manual rev 1R0



The Personal FM Broad-caster kit is a low power educational FM transmitter unit that can be used for instructional training and practice broadcast. Use with a laptop running a sound mixing software and you can instantly become a radio DJ. Use with a personal MP3 player and you instantly create a central wireless music source.

Communications engineering students will find this useful as a practice transmitter where they

can perform hands-on RF transmission experiments.

Owing to its built-in digital control and PLL circuitry, this kit has crystal locked stable frequency source and filter output that helps reduce unwanted interference to other appliances.

Main Features

- 87.0-108.0 Mhz PLL Frequency Range, adjustable with 0.1MHz resolution.
- Phase Lock Loop PLL circuitry locks the broadcast frequency to a stable crystal reference, ensuring drift free operation. Compatible with FM receivers with digital frequency control.
- 13dbm (20mW) RF output power
- The PFMB 13dbm RF output power provides clear FM broadcast coverage within a fairly large home or establishment. With the use of external antenna, line of sight (unobstructed)

coverage can reach a 300 meter radius.

- Hi Fidelity Stereo Broadcast
- Broadcast in full stereo.

Other Features

- 7 segment LED Frequency Display
- Encoder type frequency control

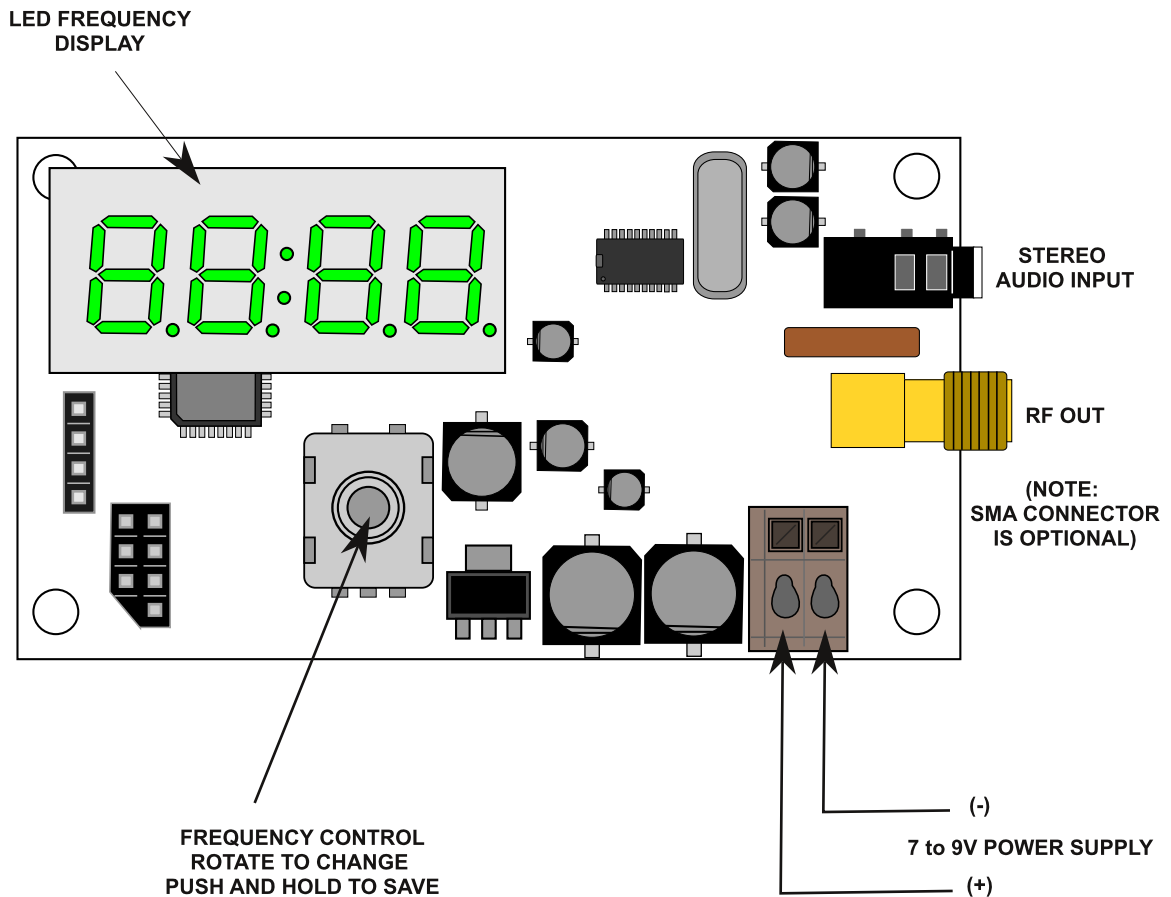


Figure 1. Layout of the Personal FM Broadcaster kit PFMB identifying relevant controls and indicators. A good 7 to 9V DC power source, rated at least 250mA, is required for its operation.



Strong transients and overloading the PFMB input may cause the PLL circuitry to disable the FM modulation process. Under this condition, music broadcasting is stopped. This is a safety feature to prevent your PFMB from causing your FM receiver blasting loud noise as a result. Power cycle your PFMB (turn OFF and then ON again) to recover from this condition and resume normal operation again.

USER GUIDE

- To change frequency, rotate the frequency control (clockwise to increase frequency, counterclockwise to decrease frequency) until the desired frequency is displayed.

Note:

The 4-digit LED 7 segment display used in this kit does not have a decimal point display. The right-most digit is the 0.1MHz display. (e.g. '907' is read as 90.7 MHz, '1035' is read as 103.5 MHz)

Important:

For best results, tune the PFMB to a vacant FM Channel frequency. Not only will this ensure a clear and wide coverage, it will also prevent you BFMB from interfering with FM commercial broadcast. See Table 1 for more details.

- If you want to store the current frequency, press down the frequency control until the LED displays "----". The PFMB will power up and defaults to the last saved frequency setting.

APPLICATION GUIDELINES

The PFMB can be driven by various personal audio devices, such as iPod, MP3 players, tablets and smart phones, PCs and notebooks. Simply connect the earphone output of your player with the input jack of the PFMB using applicable cables. The PFMB jack mates with a garden variety mini stereo phone plug. Most personal player's earphone jack (including notebooks and PCs) would also mate with a mini stereo phone plug. But occasionally, you might find 'non-conforming' devices; hence, it is always a good idea to check.

1. Prepare a suitable FM receiver, preferably with digital tuning control, by setting its frequency equal to the broadcast frequency of your PFMB, and then setting its volume to a level low enough for a soft and comfortable listening.
2. With the your personal player now connected to you PFMB, play a music and adjust the personal player's volume to about mid settings.
3. Switch ON the PFMB, and wait until you hear its broadcast on your FM receiver prepared in step 1.
4. If the sound is noticeable distorted, reduce the player's volume until the music becomes clear and distortion free. If the music played clear and distortion free initially, slowly increase the player's volume until sound distortion occurs, and then slowly reduce the volume back until there is no distortion once again. This is the optimum

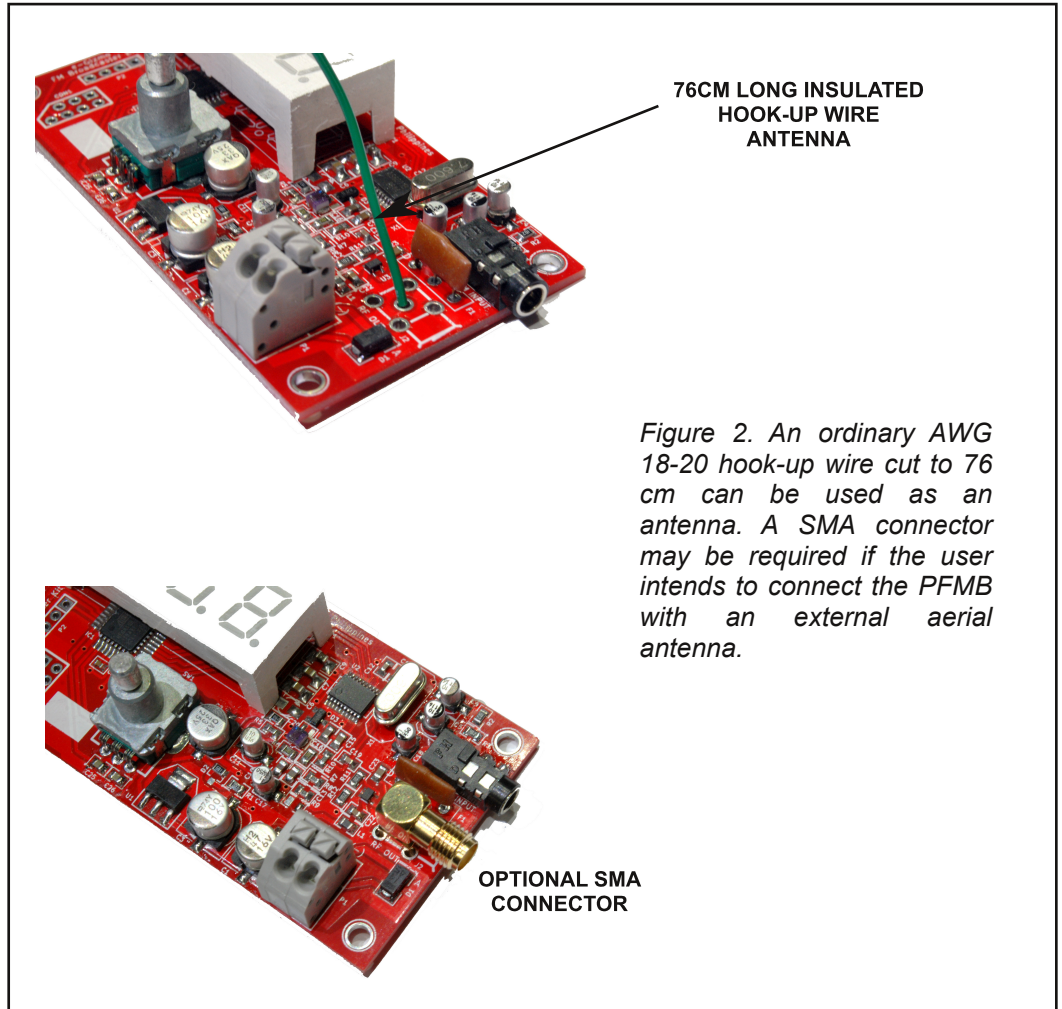


Figure 2. An ordinary AWG 18-20 hook-up wire cut to 76 cm can be used as an antenna. A SMA connector may be required if the user intends to connect the PFMB with an external aerial antenna.

volume setting for the PFMB.

Note:

The PFMB earphone jack is a surface mount type, and is, with apology, not as sturdy as we like it to be. Be gentle when plugging cables into the jack. A little finger support with the phone jack while plugging will go a long way in protecting your PFMB from damage.

Table 1. List of FM Stations in Metro Manila

88.3	Jam 88.3
89.1	Wave 89.1
89.9	Magic 89.9
90.7	90.7 Love Radio
91.5	91.5 Big Radio
92.3	Radyo5 92.3 News
93.1	Monster Radio RX 93.1
93.9	93.9 i
94.7	Mellow 947
95.5	Pinas 95.5
96.3	96.3 Easy Rock
97.1	Barangay LS 97.1
97.9	97dot9 Home Radio
98.7	98.7 The Master's Touch
99.5	99.5 Play
100.3	RJ 100
101.1	101.1 Yes
101.9	MOR 101.9 For Life!
102.7	102.7 Star
103.5	103.5 K-Lite
104.3	104.3 Business Radio
105.1	105.1 Crossover
105.9	Radio High 105.9
106.7	106.7 Energy
107.5	107.5 Win Radio

Source: Wikipedia

Each broadcast channel are allocated a 400kHz (0.4MHz) bandwidth. The Metro Manila FM band, crowded as it may be, are separated each by 0.8MHz, or by 2 channels. There is a unoccupied channels in between each stations! Select a frequency that is unoccupied, displaced by at least 0.4MHz from a nearest occupied channel. If you live in places where the FM band is not as crowded, good for you. Pick a channel that is farthest away (in frequency) from an occupied channel.

Following is a list of unoccupied FM channels in Metro Manila. You should tune your PFMB to any one of this channels. Frequency in MHz.

89.5	90.3	91.1	91.9	92.7
93.5	94.3	95.1	95.9	96.7
97.5	98.3	99.1	99.9	100.7
101.5	102.3	103.1	103.9	104.7
105.5	106.3	107.1	107.9	

Important:

Changing the PFMB frequency settings may require the readjustment of your player's volume as described in the steps above.

BE A DISC JOCKEY

Using a PC (or notebook) running a Mixing (DJ'ing) software opens your broadcasting experience with even more exciting possibilities. There is no shortage of sound mixing/FX software available in the internet at large that can be downloaded for free. For example, in one quick Google search, I found at least two promising free DJ'ing software, Softonic "Virtual DJ" home edition and. "Mixxx". Which one of the two is better, I have no idea. I tried neither of them for a very simple reason- it's not my thing. But hey, as I mentioned, they are free. So why not download them both, in fact download all the free mixing/DJ'ing software you can find, and try each one for yourself to find your perfect fit.



Figure 3. VirtualDJ is just one of the free mixing software you can download from the internet. Surf the internet for more to find the best one for you.

REMINDER

This kit is intended for educational use only and cannot be used for any activities that may be construed as illegal. Remember, your friends and neighbours can pick up your broadcast. So be responsible. Do not broadcast obscene program materials, no foul language; in fact, do not broadcast anything that may offend anyone.

Local laws requires you to stop using the kit if it causes harmful interference to any commercial FM broadcast or any other radio services. ■

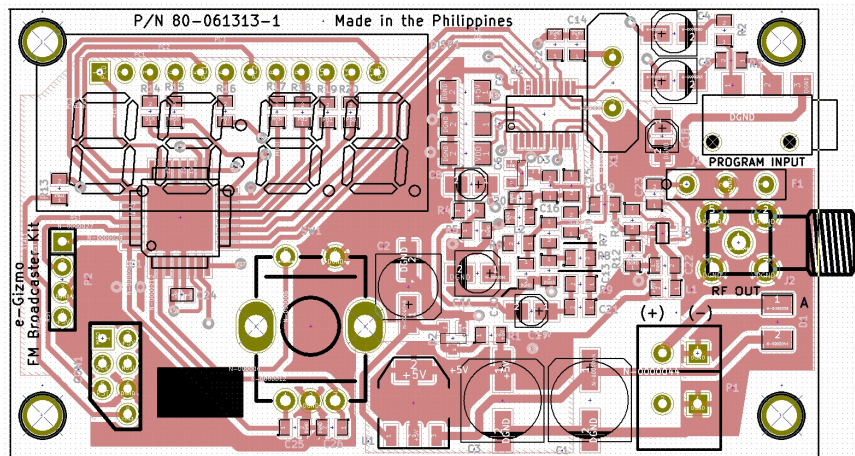


Figure 4. PCB top layer connection guide

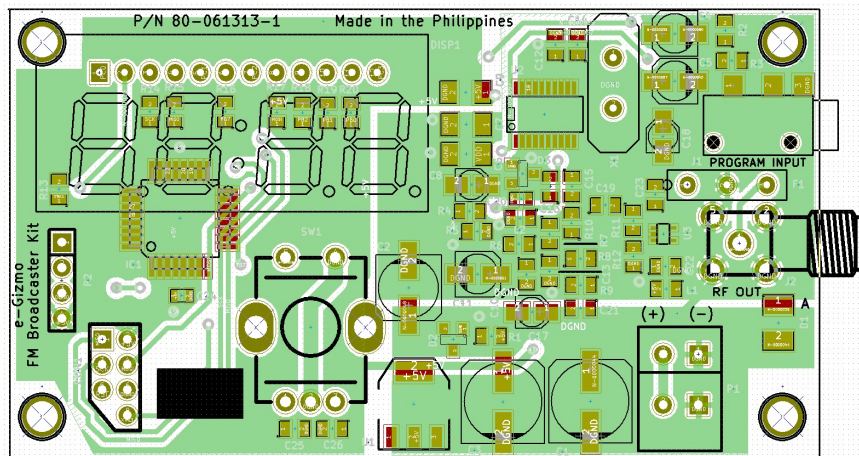


Figure 5. PCB bottom layer connection guide

