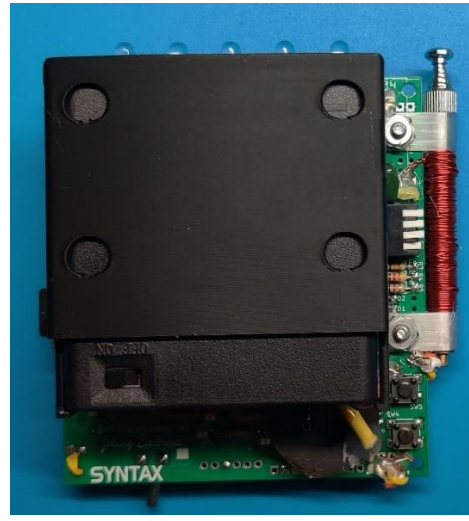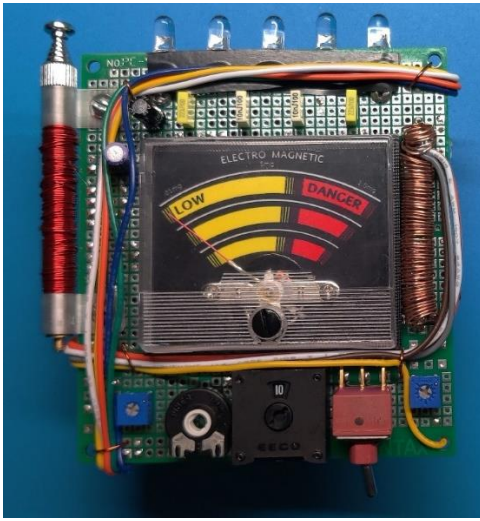# EMF Meter User Guide

This EMF Meter was made to be a replica of the one used in the Supernatural TV series. I based my initial version on Sam's EMF Meter from S4 E13 (and seen in a few other seasons).

This is a functional EMF meter that can detect both Electric and Magnetic fields. The meter was designed to replicate a variety of the meter configurations used in the TV series. Great prop or cosplay item.

Meter Details

- Dimensions: 86 x 95 mm
- Powered by 6v AA power pack, 4 AA batteries
- Configured for 4 or 5 top capacitors. (If you ordered a 4-cap version the 5th will be included separately)
- 5 LED BAR display mode
- Functional EECO rotary switch
- ATTiny85 to control the meter deflection and DF sound board
    - Re-programming using an ICSP port.
- SD card with sound files
- Detects E-Field and H-Field signals (Electric and Magnetic Fields) with 3 gain settings for each (-10, 0, +10). No guaranteed accuracy of the meter.

Meter Operation

If you purchased an assembled unit then all adjustments have already been made and an programmed SD card has been installed. Otherwise review the EMF Meter Adjustments and Power Up section in the build guide.

- Install the batteries in the battery pack if you have not already done so.
    - To remove the battery pack just pull it straight out from the holder.
    - To insert slide the pack in so the power switch is facing out and the clasps are at the edges of the pack. Slide in until in locks into place.

- Check that the SD card is inserted properly.
- If the battery pack power switch is not on, move it to the ON position.
- Flip the front power switch to the ON position.
- You should see the meter deflect briefly and the EMF detected sound played.
- Use the Test button to force an EMF event otherwise you can move around and see if any Electric or Magnetic fields can be detected.
- There is a VOLUME UP and DOWN to control the meter sound.
- Review the remaining sections for gain adjustments of the meter.
- This meter was designed as a novelty item and no calibration of field strengths was performed.

Meter Settings

	Left Back Side of Meter Battery Pack Power – Main power switch SD Card – Contains sound files for meter operation. If you do not hear any sound check that the SD card is inserted properly. Press in to release and insert. You should hear a click when inserting. Test Button – This button can be pressed to simulate an EMF event.
	Right Back Side of Meter Piano DIP Switch (SW2) – Used to control the H-Field gain as well as enable and disable of H-Field detection. Volume Control Up/Down – Used to control the volume level of the meter sound
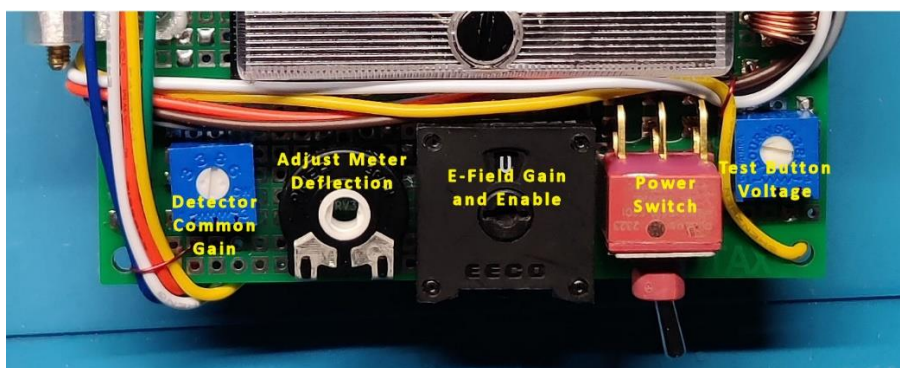
Meter Adjustments

RV1	Test button voltage – CCW increases level
RV2	Detector Common Gain – CW increases gain. Reduce if H/E-Field to sensitive
RV3	Meter Deflection – CW increases deflection

EECO Switch (SW1) – E-Field Gain and Enable/Disable

The EECO switch installed in this meter is a 271131M and the table below will show the various E-Field gain settings based on the switch position.

Dial	Function
0-7	Disabled
8-11	Gain +10
12	Gain 0
13	Gain -10
14	Gain 0
15	Gain -10

Piano DIP Switch (SW2) – H-Field Gain and Enable/Disable

The lever DIP switch is used to control the gain and operation of the H field circuit. The table below shows the setting for each switch position. For proper operation switch 1-3 must always have one selection enabled.

|	
1	**Gain x10** – Provides a gain setting of 10
2	**Gain x1** – Provides a gain setting of 1
3	**Gain x0.1** – Provides a gain setting of 0.1
4	**Enable** – Connects or disconnects coil L1, and L3, if used. Enables checking for E-fields only. *To disable all switches should be up (Off position)*

SD Card (Sound Files, MP3)

The sound files are stored in a folder named /mp3 on the SD card. Six files are available but only five are used in the program for the EMF meter. This table lists the files, functionality, and associated code define. The sound files are available in Github. The link is in the references section at the end of this document.

File Name	Define Name	Function
0001_emf start.mp3	EMF_TONE_START	Initial startup when a signal is detected or test button pressed, 0.238s
0002_emf low short.mp3	EMF_TONE_LOW	Used for mid-point signals that are neither high or low, 0.238s
0003_emf steady short.mp3	EMF_TONE_STEADY	Short high tone - Not used
0004_emf steady long.mp3	EMF_TONE_STEADYL	Long high tone when signal reaches maximum, 1.435s

0005_emf steady end.mp3	EMF_TONE_END	Signal going back down to off, 0.282s
0006_emf power up.mp3	EMF_POWER_UP	Used for initial setup/power on (5 LED)
0007_emf power up.mp3	EMF_CHARGE_UP	Used for initial setup/power on (10 LED)

ICSP Header
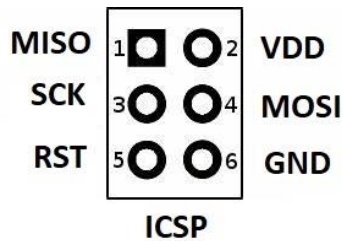
The ICSP connector follows this layout which is the same used for Arduino boards. There are a number of YouTube videos showing various methods for programming including using UNO or Nano boards as an AVR In System Programmer using the ArduinoISP sketch.

I also offer a soft touch programming cable to eliminate the ICSP header and connect directly to the board.

References

- **Github: Development board documentation, schematics, and related files.**
  - **https://github.com/JohnnyElectronic/EMF_Meters/**
- **YouTube: Board assembly and project videos that are related to this project.**
  - **https://www.youtube.com/@Johnny_Electronic**

Disclaimer

This information is provided "as-is" with no representation or warranty of any kind whether express or implied. However, I've tried to make this document (as well as the supporting videos) as useful and accurate as possible. If you find something that is incorrect or confusing, please let me know as I would like to make the correction so others will not have the same issue.

This meter is for entertainment purposes only and there is no representation as to the accuracy of the meter readings.

Feel free to email me any time for issues you may have with this build.
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