

# EMF Meter User Guide (r2)



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 be able to replicate a variety of the meter configurations used in the TV series. It's a great prop or cosplay item.

## Meter Details (Pre-Assembled Boards)

Due to the availability of certain parts, the pre-assembled meters may vary. The listing for any pre-assembled meter will show the specific items used for that build.

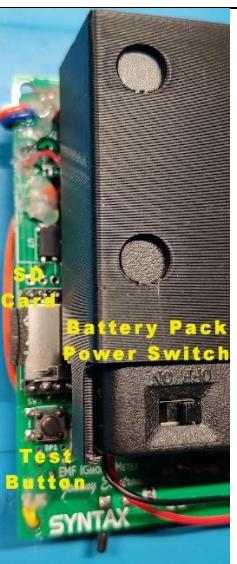
- Dimensions: 86 x 95 mm
- Powered by a 6v AA power pack, 4 AA batteries
- Configured for 4 or 5 top capacitors. (If you ordered a 4-cap version the 5<sup>th</sup> will be included separately)
  - An effort will be made to have the correct capacitor value of 22n for yellow and 10n for white.
- 5 LED BAR display mode
- ATTiny85 to control the MP3 sound effects
  - Re-programming possible using an ICSP port.
- SD card with sound files (sound files can be changed if needed)
- 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.
  - Functional EECO rotary switch for E-Field gain (will vary based on availability)
  - Rotary 4-position switch for H-Field gain
- 3326/3362 Series blue potentiometers (Smaller version)
- PT15 black potentiometer
- Antenna will vary based on availability. If the ATT 5100 6mm is available it will be used.

## Meter Operation

If you purchased an assembled unit then all adjustments have already been made and a 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 (AA) or use your finger to push the battery out of the holder (9v).
  - To insert slide the battery pack in so the power switch is facing out and the clasps are at the edges of the pack. Slide in until it locks into place (AA). For 9v just slide the cell back in to the holder.
- Check that the SD card is inserted properly.
- For AA batteries check that the power switch is in the ON position.
- Flip the front power switch to the ON position, left.
- 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 switch to control the meter sound. It is easiest to adjust the sound volume while pressing the test switch. The sound volume level will be saved every 5 seconds.
- Hold the meter on the right side so you do not block E-field reception. For greater E-field detection extend the telescopic antenna.
- 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

	<p><b>Left Back Side of Meter</b></p> <p>Battery Pack Power – Main power switch</p> <p>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.</p> <p>Test Button – This button can be pressed to simulate an EMF event.</p>
---	--



### Right Back Side of Meter

**Piano DIP/Rotary Switch (SW2)** – Used to control the H-Field gain as well as enable and disable of H-Field detection.

**Piano Switch:** 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.

**Rotary Switch:** Turn the selection dial to the desired setting.

Piano	Rotary	Gain Setting
1	4	<b>Gain x10:</b> Provides a gain setting of 10
2	3	<b>Gain x1:</b> Provides a gain setting of 1
3	2	<b>Gain x0.1:</b> Provides a gain setting of 0.1
4	1	<b>Disable:</b> Disables the checking for H-fields.

For normal operation with the piano switch there must always be one selection enabled.

### 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 decreases gain. Reduce gain if the H/E-Field is too sensitive or increase for more sensitivity.
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

## 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.

If you wish to change the files, they must be in the mp3 folder and start with the same 4-digit number.

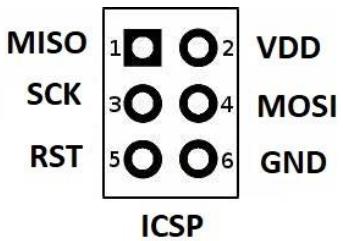
Ie: 0001\_emf start.mp3 could change to 0001 my custom sound.mp3

Keeping the file duration to the same length is suggested but not required.

File Name	Function/Duration
0001_emf start.mp3	Initial startup when a signal is detected or test button pressed, 0.238s
0002_emf low short2.mp3	Used for mid-point signals that are neither high or low, 0.400s
0003_emf steady short.mp3	Short high tone - Not used
0004_emf steady long.mp3	Long high tone when signal reaches maximum, 1.435s
0005_emf steady end.mp3	Signal going back down to off, 0.282s
0006_emf power up.mp3	Used for initial setup/power on (5 LED)
0007_emf power up.mp3	Used for initial setup/power on (10 LED)

## Reprogramming the ATTiny85

### ICSP Header



An In Circuit Serial Programming (ICSP) port is provided for reprogramming the ATTiny part. 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/](https://github.com/JohnnyElectronic/EMF_Meters/)
- **YouTube: Board assembly and project videos that are related to this project.**
  - [https://www.youtube.com/@Johnny\\_Electronic](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.

[johnnyelectronic1@gmail.com](mailto:johnnyelectronic1@gmail.com)