

Micro-Pulse

User Manual for I.C.E.S. Model M1



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Getting Started

- The best way to get started with the M1 is just to use it on the default settings. If this is what you want to do, follow the directions on the next page (Quick Start Guide).
- The model M will remember your most recent settings from the last time you used the device. If you do not want to change the settings on the device, just turn on the power and wait for the screen to clear, then press the red button firmly 3 times to get past the adjustment screens.
- When the green LED starts blinking, you can use the device, place it in bandages, whatever. The settings cannot be changed once the device is running unless you re-start the power (OFF – ON).
- When you decide to change the intensity level or try a different ICES protocol, just follow the directions in the rest of this User Manual.

Model M Quick Start Guide



1 Insert coils fully

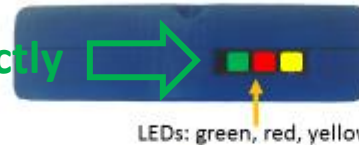
2 Insert freshly charged battery (DLI88)



Features of the Model M

NOTE: The model M case is made using a 3-D modeler. Therefore the surface will have a texture, unlike an injection molded plastic case. The plastic used in the 3-D model is stronger than injection-molded ABS plastic and will last longer and resist slippage.

6 When GREEN LED is flashing, unit is operating correctly



LEDs: green, red, yellow

3 Set switch to "battery" position (down)

4

Screen

Wait 2 seconds for screen to clear
It will sweep all white then black

3

Power switch

Switch Functions:

power from USB

power from battery

USB mini-B
Power port

5

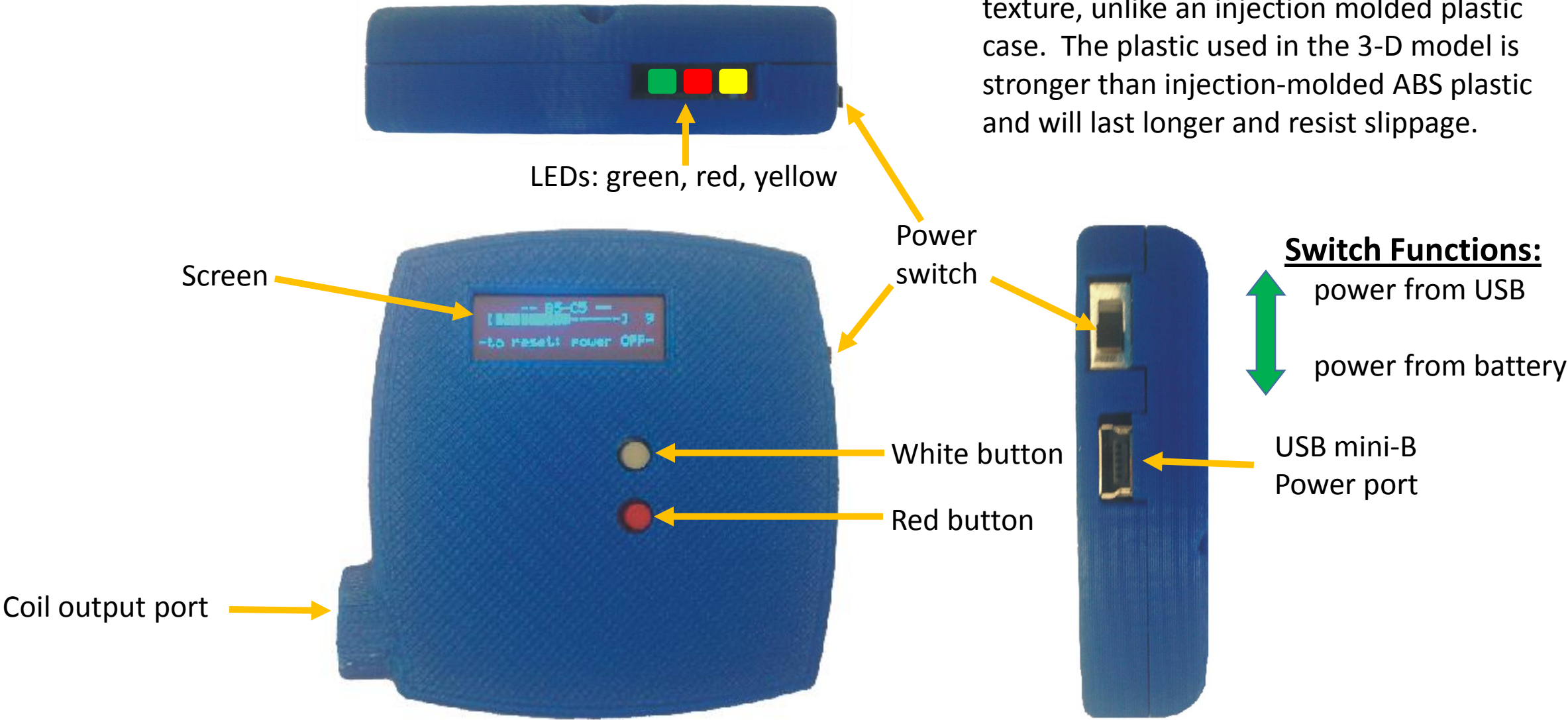
Press RED button 3 times firmly

Coil output port

White button
Red button

Features of the Model M

NOTE: The model M case is made using a 3-D modeler. Therefore the surface will have a texture, unlike an injection molded plastic case. The plastic used in the 3-D model is stronger than injection-molded ABS plastic and will last longer and resist slippage.



Connecting Coils

- Any single pair Micro-Pulse coil can be used
- May use 2x2 coil arrays
- Do NOT use an audio cable splitter to attach multiple coils



How to Place Coils on the Body

For the most recent advice on coil placement, please visit YouTube and search the following terms:

“ICES PEMF tutorial” (optionally refine the search with the term “coil”)

Optionally, you can jump straight to the following links:

<https://www.youtube.com/watch?v=FGMyCZVQM5E>

<https://www.youtube.com/watch?v=Ew1H4nglT0A&t=8s>

<https://www.youtube.com/watch?v=WtdlF0OmJ0&t=275s>

https://www.youtube.com/watch?v=Fy_p2ZtW03M&t=46s

INSERTING A NEW BATTERY

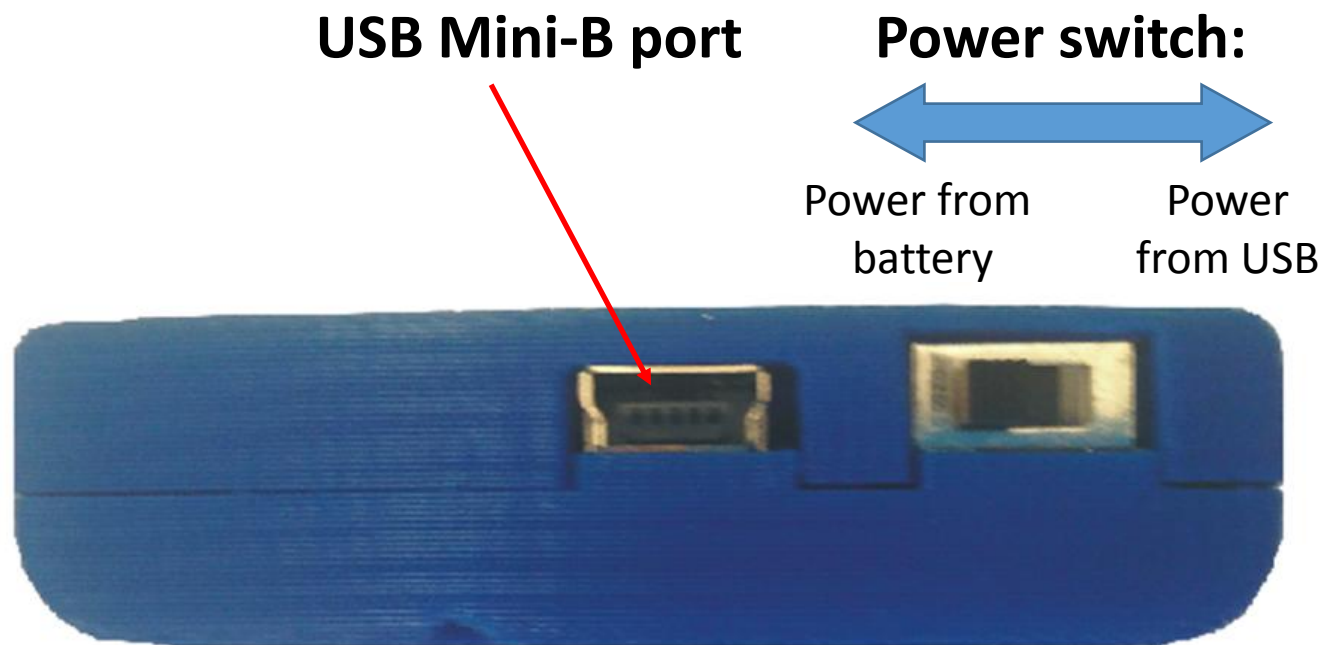


- Insert a fully-charged battery as shown, making sure to line up the gold spring pins on the device with the gold contact pads on the battery. The battery will snap into place. Push leftward and pull up on the back of the battery (green arrow) to snap it out again when it needs to be recharged.

Battery Life

- The battery life depends mainly upon two factors:
 - The intensity setting. The higher the intensity, the shorter the battery life.
 - The age of the battery: Brand new batteries can be recharged hundreds of times, but each time they lose a small amount of capacity. As soon as your batteries start to bulge out a bit from the sides or do not last as long as they once did, it's time to start thinking about ordering a new set of batteries.
 - You can expect the following battery life (roughly):
 - Very high intensity settings (11 – 15): the battery will last only 1 to 3 hours
 - Medium intensity settings (8 – 10): the battery may last 4 to 6 hours
 - Low intensity settings (below 8): the battery may last 6 to 8 hours
- Recharge the batteries as soon as they are drained to get the best battery performance.

POWER



NOTES:

- To turn the device OFF, either the USB or the battery must be removed. Otherwise the device will power from one or the other depending upon the switch position. When either power source is disconnected, the corresponding switch position = OFF
- It is OK to run the battery until it is completely drained, but it should then be recharged immediately or as soon as possible.
- You may remove the battery or the USB power at any time without damaging the device.
- If the device loses power, when power is restored it will begin with the last setting for intensity and protocol that was set by the user.

LED Indicators



Coil Tester (above). For instructions, see: https://www.youtube.com/watch?v=Fy_p2ZtW03M

GREEN – flashes every time a pulse is sent to the coils

RED – brief flash at the end of each mode, but if RED flashes many times or stays ON, that means *device fault*. Try this: make sure coils are plugged in correctly and fully, test coils with hexagonal tester, turn power OFF and allow to cool.

YELLOW – flashes only during REST periods (available in selected protocols). No pulses are sent to the coils when flashing.

Power-up Sequence

On Power-up, the model M will do the following:

- 1- Flash all three LEDs for ½ second
- 2- Clear the screen
- 3- Display the model and firmware revision
- 4- Allow the user to change the power level
- 5- Allow the user to change the protocol
- 6- Clear the screen
- 7- Display current power level and protocol
- 8- Begin operation: green LED flashes with each pulse

NOTE: settings can not be changed while operating, only at power-up.
You must shut the power OFF, then back ON to make changes to settings.
This is to prevent settings from being accidentally changed during operation.

ICES model M series
Rev: M-20170706
(C) 2017 Micro-Pulse
< SET >

POWER LEVEL = 9
[██████████ - - - - -] 9
- - B5 - C5 - -
< CHANGE > < SET >

SELECT PROTOCOL
- - B5 - C5 - -
< CHANGE > < SET >

- - B5 - C5 - -
[██████████ - - - - -] 9
- to reset: power OFF -

This is the start-up screen. This screen shows the model number, firmware revision, and the copyright. The screen will display for 5 seconds then advance to the next screen automatically unless you press the < SET > button (white button = SET), which advances to the next screen immediately.

ICES model M series
Rev: M-20170706
(C) 2017 Micro-Pulse
< SET >

The next screen is the Power Adjustment screen. This screen shows the power/intensity level as a power bar and number from 1 to 15. Below that it shows the currently selected protocol name (in this case "B5 – C5"). You adjust the power by pressing the white button <CHANGE>. With each press of the white button, the power will reduce by 1 until it reaches power = 1, then it will jump back and start from 15 again. As before, press the < SET > button (red button = SET), which advances to the next screen immediately, or just wait 5 seconds.

POWER LEVEL = 9
[■■■■■■■■ - - - - -] 9
- - B5 – C5 - -
< CHANGE > < SET >

The next screen is the Protocol Selection screen. This screen shows the currently selected protocol name (in this case "B5 – C5"). You can select a different protocol by pressing the white button <CHANGE>. With each press of the white button, the power will move down the list of protocols until it reaches the end, then it will jump back and start from the beginning again. As before, press the < SET > button (red button = SET) to run immediately, or just wait 5 seconds.

SELECT PROTOCOL
- - B5 – C5 - -
< CHANGE > < SET >

This is the running screen. The green LED will flash every time a pulse is sent to the coils. To reset the device or change the settings, turn the power OFF, then ON.

- - B5 – C5 - -
[■■■■■■■■ - - - - -] 9
- to reset: power OFF -

SYSTEM DIAGNOSTIC SCREENS

While running, you can press the WHITE button to see the internal system diagnostics. This tells you the internal voltages (x 10), the internal temperature, and an estimate of the coil status (OK, NO COIL, or SHORT). If you see NO COIL or SHORT, you might want to check the coils: properly inserted, etc. But this is just an estimate and everything can still be OK even if it says SHORT or NO COIL, so do not panic and call for service. If you have concerns, use the coil tester to test the coils: https://www.youtube.com/watch?v=Fy_p2ZtW03M

SYSTEM STATUS SCREEN
226V – 220V 81 °F
Analysis: OK

ICES model M series
rev: M-20170706
(C) 2017 Micro-Pulse
Power ON # = 16

While running you can also press the RED button. This will alternate between the two screens on the left. The top screen displays the model number, the firmware revision, a copyright statement, and the number of times the device has been powered ON.

-- B5 – C5 --
[■■■■■■■■■■- - - - -] 9
- to reset: power OFF-

The bottom screen is the normal running screen for the model M1. It displays the currently running protocol name and the intensity setting. Note that this screen also reminds you that when running, you must power OFF to reset the device and change the settings. This feature prevents settings from accidentally changing while the device is running.

General Guidelines: setting up your model M

- Unless you are an experienced user, you should start with the default settings: intensity = 9, protocol = B5-C5
- If you want to change any settings, it is best to decide what you want BEFORE turning the device ON. The menu screens auto-start pretty quickly (after a 5 second delay) which is very convenient if you know what you want but very frustrating if you are trying to just surf through the menu options blindly. Decide what settings you want BEFORE starting up the device, then scroll to your settings quickly. You'll be up and running in about 15 seconds.

General Guidelines: selecting an intensity level

- This is not medical advice
- We suggest you start with a power/intensity setting of 8 or 9.
- Higher power DOES NOT result in faster or better results.
- Most people respond best to a medium intensity setting.

General Guidelines: Selecting a Protocol

The Micro-Pulse Model M1 allows self experimentation by responsible adults. It is not a marketing gimmick. We do not provide pre-programmed protocols to:

- Enhance sleep

- Amplify your brain power

- Connect you with the Earth Mother Goddess

- Magically cure a specific disease

- Magically heal a serious injury

While many commercially available PEMF systems make such claims, we believe most of these claims have limited or no scientific basis. On the other hand, some PEMF devices have been reported to have remarkably beneficial effects. Many of these effects have been reported in peer-reviewed scientific papers, some have been verified by independent certified testing laboratories, and the FDA has approved several PEMF systems as safe and effective, to be used by prescription. Micro-Pulse ICES products are NOT FDA approved for any use. The model M1 will allow you to experiment and explore these effects for yourself. The only miracles you should expect are the miracles of careful science.

List of Available Protocols on the model M1

Standard ICES Protocols:

- B5 – C5
- A9 original
- P2 (SomaPulse, AllewaWave, ...)
- Omni 8 (same as Omni 1, but not adjustable)

all of the above also have an optional 5 minute rest period at the end of each cycle

Schumann Resonances:

- Schumann 1 (7.83 pps)
- Schumann 2 (7.83, 14.3 pps)
- Schumann 3 (7.83, 14.3, 20.8 pps)
- Schumann 4 (7.83, 14.3, 20.8, 27.3 pps)
- Schumann 5 (7.83, 14.3, 20.8, 27.3, 33.8 pps)

Sub-threshold continuous TMS modes:

- scTMS 10pps 30 minutes
- scTMS 10pps 60 minutes

Constant Frequency (continuous):

- 1 pps
- 2 pps
- 3 pps
- 4 pps
- 5 pps
- 10 pps

CNS/cortex wave patterns:

- alpha wave entrainment
- beta1 wave (low range)
- beta2 wave (mid range)
- beta3 wave (high range)
- delta wave
- theta wave
- mu wave
- SMA wave
- gamma wave

Protocol Menu on the model M1


To the right is the built-in protocol list for the model M1, listed in order from top to bottom.

The default protocol when you first use your model M1 is “B5-C5”, but you can scroll down the list by pressing the white button while on the SELECT PROTOCOL screen.

When you have scrolled to the bottom of the list, the device cycles back to the top of the list to begin again (green arrow).

When you see the protocol you want on the screen, press the RED button <SET>

The device will remember your most recent setting the next time you turn the power ON.



- B5 – C5 --
- A9 --
- P2 -- (SomaPulse, AllevaWave, ...)
- Omni 8 --
- Schumann 1 -- (7.83 pps)
- Schumann 2 -- (7.83, 14.3 pps)
- Schumann 3 -- (7.83, 14.3, 20.8 pps)
- Schumann 4 -- (7.83, 14.3, 20.8, 27.3 pps)
- Schumann 5 -- (7.83, 14.3, 20.8, 27.3, 33.8 pps)
- 1 pps -- continuous
- 2 pps -- continuous
- 3 pps -- continuous
- 4 pps -- continuous
- 5 pps -- continuous
- 10 pps -- continuous
- scTMS 10pps 30 minutes --
- scTMS 10pps 60 minutes --
- alpha wave --
- beta1 wave -- (low range)
- beta2 wave -- (mid range)
- beta3 wave -- (high range)
- delta wave --
- theta wave --
- mu wave --
- SMA wave --
- gamma wave --
- B5 – C5 -- REST 5 -- minutes at end of each cycle
- A9 -- REST 5 -- minutes at end of each cycle
- P2 -- REST 5 -- minutes at end of each cycle
- Omni 8 -- REST 5 -- minutes at end of each cycle

A few comments on the history of ICES protocols...

- This is not clinical advice, it is intended only for informational purposes.
- The original [NASA research](#) was done using the following protocols:
 - (1996 – 2001) 5 pps and 10 pps continuous (along with other waveforms determined to have no biological effect, and therefore not included in the ICES technology beyond gen 1.0)
 - (2001 – 2007) Further experiments using these continuous pulse protocols were used in ICES gen 2.0 and 3.0, with funding from NASA and DARPA, followed by private funding. The 10 pps protocol was used in the TAMU rabbit ulna surgical defect study in 2007.
- The standard ICES protocols were developed in this order:
 - P2 (2008 – 2014, designated ICES gen 4.0), the first ICES protocol, used in our oldest commercial models, including the MagnaFix, AllevaWave, SomaPulse (registered trademark of Dr. Pawluk), WeHelpPlus, and others. This protocol was used in the continuing animal studies and the Egypt Craniofacial Reconstruction study.
 - A9 (2014 – 2015, designated ICES gen 5.0), the original protocol for the model A9, with adjustments and improvements based upon scientific observations, clinical feedback, and user feedback from sales of the model P2 and earlier models.
 - Omni-8 (2016, also ICES gen 5.0), developed with extensive beta testing. This was the only beta-tested new protocol judged to be “slightly better” than the A9 protocol by our beta testers.
 - B5 – C5 (2017, designated ICES gen 6.0), developed on the basis of user feedback and beta testing for the models B5, C5, and M, this protocol is still being evaluated.
- Most of our user feedback favors the Omni-8 protocol, but the differences are individual and tend to be small, and the B5-C5 protocol has not been fully evaluated yet (it is currently under study).

History of ICES protocols, continued...

- This is not clinical advice, it is intended only for informational purposes.
- The Schumann protocols were developed in 2016 for the models B5, C5, and M1, at the request of numerous bio-hackers. Though many people find these protocols useful, [I remain skeptical](#).
- We have no scientific data supporting the use of these protocols.
- But I could be wrong, and these are fun to play with and are in about the right range of frequencies to have biological effects.

History of ICES protocols, continued...

- This is not clinical advice, it is intended only for informational purposes.
- The continuous pulse protocols (1, 2, 3, 4, 5, and 10 pps) have been used from the very beginning of ICES research, and continue to be used in controlled scientific studies, such as the 2017 Cortical Metrics – TBI study:
 - https://downloads.corticalmetrics.com/pub/corticalmetrics_magazine_issue_1.pdf
 - <https://www.dropbox.com/s/7sl5r95qffuhr0k/Pilot%20study%20final.pdf?dl=0>
- For the most recent protocol, see:
<https://www.dropbox.com/s/qj9uuvr4tnoonps/ICES%20TBI%20PROTOCOL.pdf?dl=0>
- Many people simply want to experiment with steady, continuous pulse trains, so this is a good set of common frequencies to start with.

History of ICES protocols, continued...

- This is not clinical advice, it is intended only for informational purposes.
- The scTMS protocols are included at the request of many people.
- These protocols have never been evaluated using ICES technology, but some users report that they find them useful.
- More details and links to the science of TMS are available [later in this document](#).
- The “brainwave” protocols (alpha, beta, delta) have also never been evaluated scientifically using ICES technology, but they are included at the request of a very large number of ICES users and self-hackers. More details are available [later in this document](#).
- Each of the four standard ICES protocols (B5-C5, P2, A9, Omni-8) also can be selected with an optional 5 minute rest period at the end of each cycle. These are at the bottom of the menu.

General Guidelines: selecting a protocol

- This is not medical advice.
- All Micro-Pulse ICES protocols are experimental.
- No protocols are guaranteed to have specific effects.
- The following guidelines are based upon comments from clinicians and users of Micro-Pulse devices, self-hackers, and others.
- There is no scientific evidence to demonstrate conclusively that any given protocol is better than any other protocol for any specific application.

Standard ICES Protocols

- STANDARD ICES Protocols (B5-C5, P2, A9, Omni-8) are generally used by people for a very wide range of applications, from chronic pain to orthopedic injury to peripheral nerve dysfunction. The model M includes all of the newest protocols currently under scientific investigation as well as the older legacy protocols that have been used in older systems.
- These protocols all include a sequence of modes, starting with 5 pps (bipolar pulses) for several minutes, followed by short bursts of 100 pps in both positive and negative polarity, or a mix of the two (5 pps and 100 pps). These patterns were developed to emulate the neural impulses in developing musculoskeletal system *in utero* and are hypothesized to signal tissue growth and development.
- Bob's opinion: it is difficult to tell the difference in biological effectiveness between these in controlled scientific experiments. They all have similar effects. Most people report that the newer protocols (Omni-8 and B5-C5) *may* be 10% to 15% better than the older protocols (P2 and A9). But most people have a preference, so you can experiment with them to see what works best for you. Each one also has an optional 5 minute rest period at the end of each cycle.
- If you are completely lost and cannot decide, consider starting with the B5-C5, the OMNI-8 or either of these with 5 minute REST option.

Schumann Resonance Protocols

- Many people want to experiment with Schumann Resonances. While I do agree that these frequencies are within a biologically beneficial range for tissues, I do not think it is because they are exactly in resonance with the [earth-ionosphere resonant cavity](#).
- The model M1 will let you use the following Schuman Resonances:
First five harmonics: 7.83, 14.3, 20.8, 27.3, 33.8 pps. Each Schumann setting adds one additional resonance to the programmed sequence. Schumann 1 has only 7.83 pps, Schumann 2 has 7.83 followed by 14.3 pps, and so on.
- You can [see the technical rationale for my skepticism at the end of this document](#).
- However, I could be wrong. I have been wrong in the past. So I will leave it to you to experiment with Schumann Resonances and decide for yourself how well they work for you.

Constant Frequency Protocols

- The model M1 can generate a several constant output pulse frequencies. For most applications I recommend the use of one of the four standard protocols (B5-C5, P2, A9, Omni-8) to avoid tissue accommodation which can reduce the tissue response over time if a stimulus signal is monotonic and unchanging.
- The list has the most commonly used single frequencies, including:
 - 1 pps
 - 2 pps
 - 3 pps
 - 4 pps
 - 5 pps
 - 10 pps
- Some people have good scientific reason to believe that one or more of these specific pulse frequencies may be of benefit for specific applications. As a scientist I remain skeptical, and I am not a clinician, so I can not give specific advice on which frequencies to use for which condition.
- Using the model M1 you may experiment for yourself.

Sub-Threshold Continuous TMS Protocols

- TMS stands for [Transcranial Magnetic Stimulation](#). TMS was approved by the FDA for the treatment of depression in 2008, but this was only for approved TMS devices using a specific high-intensity protocol: rTMS. No Micro-Pulse device is approved for this purpose.
- If you have, or believe you have, depression, you must seek professional clinical advice. This is no substitute for professional clinical advice.
- TMS is currently under investigation for a wide range of clinical applications other than depression.
- Many people wish to self-experiment, and while the ICES model M1 cannot generate the extremely high levels of power of a clinical TMS device, the inherent efficiency and lower power of ICES technology *may* be useful for this application. You are now in the realm of total self-experimentation, so you must be very cautious.
- The model M1 is pre-programmed to only deliver scTMS, which means “sub-threshold, continuous TMS”, whereas the FDA approved protocol is for very high intensity, short bursts called rTMS (repetitive TMS). High intensity rTMS is known to cause seizures in a small percentage of people subjected to rTMS, likely because the intensity used is sufficient to cause neural depolarization in the motor areas of the brain (see papers below).
- The model M only delivers scTMS, which should be well below the threshold that could cause motor activation and lead to seizures. BUT THE SAFETY OF THIS APPROACH HAS NOT BEEN TESTED AND VERIFIED.
- The model M1 delivers scTMS at the recommended 10 pps (Hz), with a timer that limits the stimulation to 30 minutes or 60 minutes.
- This link will lead you to a recent Clinical Consensus Review Paper for the use of TMS for the treatment of depression:
 - [http://www.brainstimjrnl.com/article/S1935-861X\(16\)30038-9/fulltext](http://www.brainstimjrnl.com/article/S1935-861X(16)30038-9/fulltext)
 - or you can download a PDF of the same paper here: [http://www.brainstimjrnl.com/article/S1935-861X\(16\)30038-9/pdf](http://www.brainstimjrnl.com/article/S1935-861X(16)30038-9/pdf)
- This link takes you to a clinical paper on the use of TMS in depression:
 - <http://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2010.10060864>
 - This paper clearly shows how coils may be placed on the head (on page 3 of 9)
- There are many more scientific papers available by searching Google Scholar using the search terms “TMS depression”

CNS/cortex “Brain Wave” Protocols

- These Wave protocols all gently ramp between two frequencies over a specified ramp time.
- The gentle frequency sweep is intended to be similar to natural brain wave patterns.
- The use of these wave patterns is totally experimental, we do not know the effects, it is not proven safe, and is intended for adult self-hackers only.
- You can find links to each brain wave pattern on Wikipedia.org:
[Neural oscillation](#) [brainwave entrainment](#)
- The model M1 delivers each wave in the central portion of each generally accepted frequency range as a gently shifting frequency over time, ramping from a higher frequency to a lower frequency, then back again, similar to the natural wave patterns of a living brain.
- The wave patterns are summarized on the following page:

CNS/cortex “Brain Wave” Protocols

Pattern Name	Low	High	Ramp time (low-to-high or high to low)	cycle time (minutes)
<u>Alpha</u>	10 Hz	13 Hz	5 minutes	10 minutes
<u>Beta1 (low)</u>	12.5 Hz	16 Hz	2 minutes	4 minutes
<u>Beta2 (med)</u>	16.5 Hz	20 Hz	2 minutes	4 minutes
<u>Beta3 (high)</u>	20 Hz	28 Hz	2 minutes	4 minutes
<u>Delta</u>	1.5 Hz	3 Hz	10 minutes	20 minutes
<u>Theta</u>	5 Hz	6 Hz	10 minutes	20 minutes
<u>Mu</u>	8.5 Hz	11 Hz	5 minutes	10 minutes
<u>SMA</u>	13 Hz	15 Hz	5 minutes	10 minutes
<u>Gamma</u>	32 Hz	47 Hz	5 minutes	10 minutes

Note that the ramp time is for each direction (up or down). Total cycle time is 2 x ramp time.

Also note that the effects and safety of these patterns has not been established. For example, while Gamma waves may affect memory, recall, and awareness by altering [stochastic resonance](#), it may also just be irritating. Please exercise caution when self-experimenting with these protocols.

Bob's thoughts on Schumann Resonance

- For technical reasons, I remain skeptical that any PEMF products can resonate with the Schuman frequencies of the earth-ionosphere system.
- That is not to say that these frequencies do not work well for PEMF, in fact they seem to work just fine, but in my opinion not for the reasons many people think.



My skepticism is based upon one opinion and two facts:

- **OPINION:** The references on the Internet to Schumann Resonances in PEMF therapy were first put forward by marketers to lend credibility to their products. It sounds cool and “earthy”. But these claims are based upon fictitious “NASA” experiments that never happened. If you disagree, do not send angry emails claiming “NASA has published 2000 studies....” Just send me one study from NASA showing that Schumann Resonance has a biological effect. Just a *single* one. Send the entire reference, not just a title or a link to a blank page. This is very easy to debunk. If I am mistaken, I will thank you.

- **FACTS:**

(1) the phase of the earth-ionosphere Schumann wave is not detected by any PEMF system, because detection of Schumann resonances requires large and highly specialized equipment, so even at a precise Schumann frequency, commercial PEMF systems are just as likely to be in anti-resonance as in resonance. They could cancel, not resonate.

(2) Schumann frequencies vary slightly with changes in the earth-ionosphere cavity geometry, so even a precise non-phase-locked open-loop pulse generator will result in beat frequencies, where: $f_{\text{beat}} = (f_{\text{system}} - f_{\text{earth}}) / 2$ thus generating an amplitude modulation of much lower frequency.

[https://en.wikipedia.org/wiki/Beat_\(acoustics\)](https://en.wikipedia.org/wiki/Beat_(acoustics))

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Bob Dennis