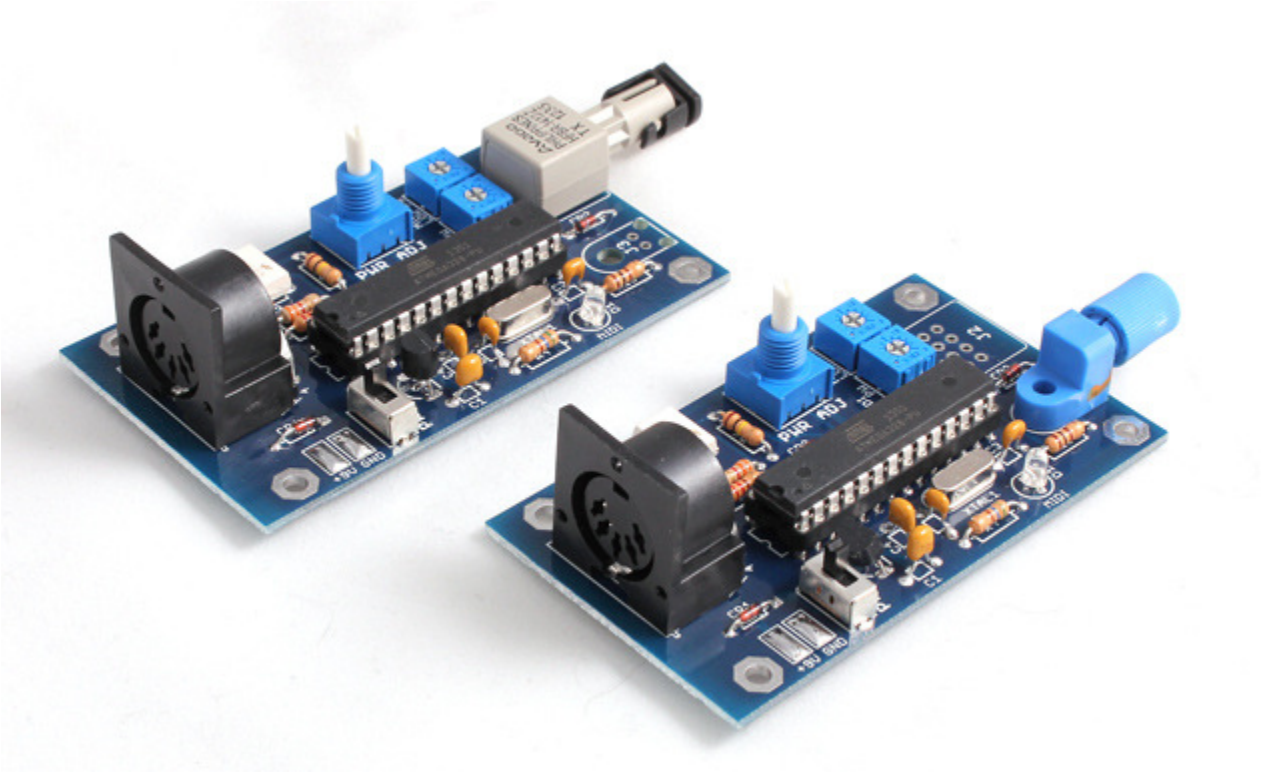
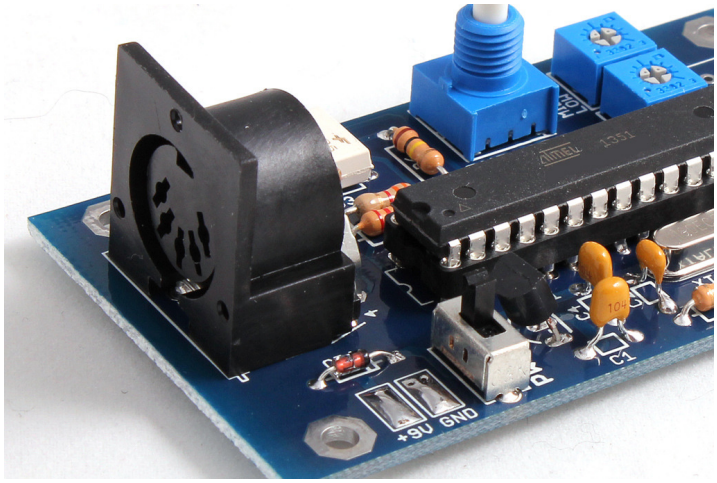
mini MIDI Controller



Instruction Manual

Eastern Voltage Research, LLC



Introduction to the mini MIDI Controller

Thank you for purchasing the mini MIDI Controller. This integrated MIDI controller board is one of our most popular kits and extremely easy to both build and use. What this kit provides is an easy way to convert your existing or your new Solid State Tesla Coil (SSTC) or Double Resonant Solid State Tesla Coil (DRSSTC) into a musical instrument. In otherwords, by connecting a keyboard or other compatible MIDI based instrument or sound source, you can use your Tesla Coil to generate musical tones. For example, if you play a MIDDLE C on your electronic keyboard, your Tesla Coil will be pulsed at the MIDDLE C frequency of 261 Hz and you will hear that audio frequency of 261 Hz. Pretty neat, eh? Our monophonic version will allow one to play single notes with their Tesla Coil while our polyphonic version will allow you to play two simultaneous notes! The ability to play more than one note at a time on your Tesla Coil will definitely up the coolness factor significantly.

The mini MIDI controller is designed to be used for virtually any solid state Tesla Coil. It will work with the smallest SSTCs as well as the largest DRSSTCs which could be using full-bridge switching configurations of high power CM600 IGBT bricks. The mini MIDI controller is fully customizable by the end user and can be configured very easily for practically any Tesla coil application.

This kit is also directly compatible with our microBrute, miniBrute, and Plasmasonic line of DRSSTCs.

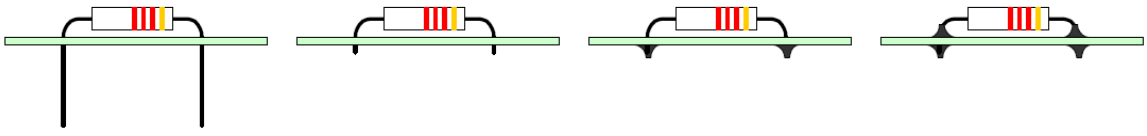
Please read this manual in its entirety before building, testing, or operating your kit!

Kit Building Tips

A good soldering technique is key! Let your soldering iron tip gently heat both the wires and pads simultaneously. Apply solder to the wire and the pad when the pad is hot enough to melt the solder. The finished joint should appear like a small shiny drop of water on paper, somewhat soaked in. If the pads have not heated up sufficiently, melted solder (heated only by the soldering iron itself) will form a cold solder joint and will not conduct properly. These cold joints appear as dull beads of solder, and can be easily fixed by applying additional heat to the pad and wire. All components, unless otherwise noted, should be mounted on the top side of the board. This is the side with the silkscreen printing.

When installing components, the component is placed flat to the board and the leads are bent on the backside of the board to prevent the part from falling out before soldering. The part is then soldered securely to the board, and the remaining lead length is clipped off. It is also extremely important to place the components as close to the board as possible. This is necessary for proper operation over the wide frequency range of the various kits we provide. Also be sure that component lead lengths are always as short as possible. This will avoid adding any stray capacitances or inductances that can be detrimental to circuit operation.

An alternative approach (which is actually the one I use) is to install the component into the board and then apply a piece of masking tape on the topside to the hold the component in place temporarily. The leads on the backside of the board are then trimmed leaving about 0.10" lead protruding through the backside of the board, and then soldered from the backside. You can then remove the masking tape, and finally apply a small amount of solder on the top to complete the joint on both sides. This is shown in the figure below.



mini MIDI Controller Parts List

RESISTORS

❒	1	100 ohm Resistor (brown-black-brown), R16
❒	1	220 ohm Resistor (red-red-brown), R5
❒	1	560 ohm Resistor (green-blue-brown), R4
❒	1	3.3k Resistor (orange-orange-red), R7
❒	1	100k Resistor (brown-black-orange), R6
❒	2	Trimmer Potentiometer, 100k (marking 3362P, 104), R1,R2
❒	1	Shaft Potentiometer, 100k (marking 3310Y, 104), R3

CAPACITORS

❒	2	22pF Capacitor, Ceramic, C2,C3
❒	2	0.1uF Capacitor, Ceramic, C1,C4

DIODES

❒	3	Diode, 1N4148, CR1,CR2,CR3
❒	1	LED, T-1, Blue, D1

SEMICONDUCTORS

❒	1	Microcontroller, mini MIDI, 28-Pin, U2
❒	1	4N25 Optoisolator, U3
❒	1	MCP1702-5002 Voltage Regulator, U1
❒	1	Crystal Oscillator, 16MHz, XTAL1

MISCELLANEOUS

❒	1	MIDI, 5-Pin Connector, J1
❒	1	Fiber Optic Connector, HFBR1412, J2 (See Note 1)
❒	1	Fiber Optic Connector, IF-E96E, J3 (See Note 1)
❒	1	Slide Switch, SW1
❒	1	IC Socket, 28-Pin DIP, U1
❒	1	mini MIDI PCB Board
❒	1	mini MIDI Schematic

Note 1: The type of connector supplied with the kit is dependent on the particular kit you ordered.

REQUIRED, NOT SUPPLIED

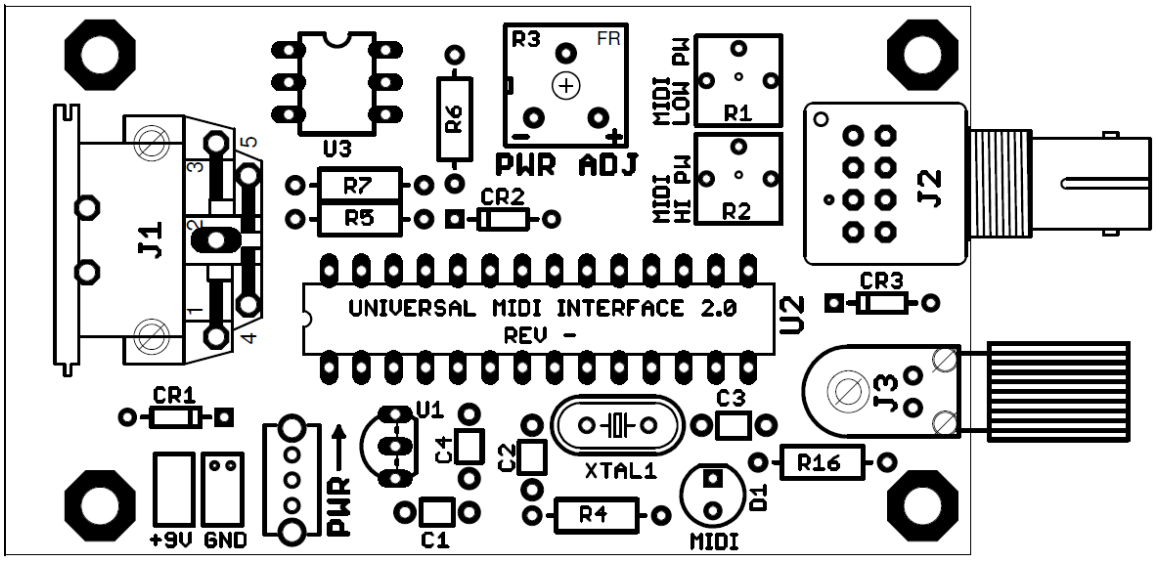
- ❒ 1 Power Supply, 9V, 1A (or similar)
- ❒ 1 MIDI Cable
- ❒ 1 MIDI Source (laptop, keyboard, etc…)

OPTIONAL, BUT RECOMMENDED

- ❒ 1 6-Pin DIP Socket (See note 2)

Note 2: The use of DIP sockets is not required, but it is recommended. Using DIP sockets for each and every IC will allow easy removal for troubleshooting and repair. DIP sockets may be purchased from any electronics supplier, including your local Radio Shack or similar electronics store, or can be purchased directly from us at our website under the components ordering pages.

mini MIDI Controller - Component Layout Diagram



mini MIDI Controller – Mounting Provisions

Your mini MIDI Controller can be mounted directly to any flat surface using the four (4) mounting holes located at each corner of the board. Each mounting hole accepts #6 hardware and we recommend using 6-32 stand-offs and 6-32 screws to mount the board.

KIT Building Instructions

Now we will begin building the kit. There are just a few more important things to know before we install the first components.

For each component, the word "install" always means the following:

1. Pick the correct value to start with.
2. Insert the component into the correct printed circuit board (PCB) location.
3. Orient the component correctly – especially when there is a right and a wrong way to solder it in. (i.e. Electrolytic capacitors, diodes, ICs, transistors, etc…)
4. Solder all connections unless directed otherwise. Ensure enough heat is used to allow solder to flow for clean, shiny, and completed connections.

Also, please be sure to take us seriously when we say that good soldering is the key to the proper operation of your circuit!

- Use a 25W soldering pencil with a clean, sharp tip. DO NOT USE a high power soldering gun such as those trigger activated units.
- Use only rosin core solder intended for electronics use
- Ensure your work area is clean, and has plenty of bright lighting
- Build your kit in stages, taking breaks to check your work. Be sure to clean the board periodically with a brush or compressed air to remove any excess wire cuttings, etc…

Okay, so lets begin!

❒ 1. Install R16, 100 ohm resistor (brown-black-brown)

❒ 2. Install R5, 220 ohm resistor (red-red-brown)

❒ 3. Install R4, 560 ohm resistor (green-blue-brown)

❒ 4. Install R7, 3.3k resistor (orange-orange-red)

❒ 5. Install R6, 100k resistor (brown-black-orange)

❒ 6. Install CR1, 1N4148 diode. The cathode band on the diode must match that shown on the silkscreen.

❒ 7. Install CR2, 1N4148 diode. The cathode band on the diode must match that shown on the silkscreen.

❒ 8. Install CR3, 1N4148 diode. The cathode band on the diode must match that shown on the silkscreen.

❒ 9. Install D1, Blue LED. The short lead of the diode is the cathode and will install into the square pad on the PCB board.

❒ 10. Install C2, 22pF capacitor (marking BC22 or 22J)

❒ 11. Install C3, 22pF capacitor (marking BC22 or 22J)

❒ 12. Install C1, 0.1uF capacitor (marking BC104 or 104)

❒ 13. Install C4, 0.1uF capacitor (marking BC104 or 104)

❒ 14. Install 28-Pin DIP Socket in the U2 location. Note that one end of the DIP Socket is marked by a dot, notch, or band; this end MUST be oriented as shown on the PCB layout.

❒ 15. Install U3, 4N25 Optoisolator (marking 4N25). The 4N25 may be soldered directly to the PCB without worry, but you may use an 6-pin DIP socket (not supplied) if you prefer as this would aid in troubleshooting and repair. Note that one end of the IC is marked by a dot, notch, or band; this end MUST be oriented as shown on the PCB layout.

❒ 16. Install U1, MCP1702-5002 Linear Regulator. This device is a 3-lead TO-92 packaged voltage regulator and must be installed with the proper polarity. You will notice that there is a flat edge on one side of the component. This flat edge must align with the flat edge as shown on the silkscreen on the PCB board.

❒ 17. Install XTAL1, crystal oscillator. Note there is no polarity on the crystal so the crystal may be installed in any orientation.

❒ 18. Install SW1, slide switch.

❒ 19. Install R1, 100k trimmer potentiometer (marking 3362P 104)

❒ 20. Install R2, 100k trimmer potentiometer (marking 3362P 104)

❒ 21. Install R3, 100k shaft potentiometer (marking 3310Y 104)

❒ 22. Install J1, 5-Pin DIN MIDI connector

❒ 23. Install knob on the shaft of the R3 potentiometer.

The following instructions will vary depending on which particular connector options you purchased with your individual kit.

❒ 24. Install J2, HFBR1412 fiber optic transmitter (if supplied).

❒ 25. Install J3, IF-E93E fiber optic transmitter (if supplied).

DO NOT install the 28-Pin Microcontroller IC at this time!

Congratulations! You have just completed your Universal MIDI 1.0 Interrupter kit. Please take a few moments to look over the board and ensure that all the components are installed properly with the correct orientation. Since some of the parts may be unfamiliar to you, you may want to be extra sure that they have been inserted correctly. After you are sure that everything seems to be properly installed, move on to the set-up and testing section.

Set-up and Testing

Okay, so lets begin!

RECOMMENDED TEST EQUIPMENT, NOT SUPPLIED

- ❒ 1 Analog or Digital Multimeter
- ❒ 1 Oscilloscope
- ❒ 1 MIDI Keyboard (or similar)

IMPORTANT

Before connecting the mini MIDI Controller to any SSTC or DRSSTC Tesla Coil, be sure that you are completely familiar with the operation of the MIDI Interface as well as verified the operation of the interface card using an oscilloscope or similar device. It is important to ensure that the MIDI Interface pulsewidth ranges are programmed per the SSTC or DRSSTC it is being used for and that the proper settings are programmed before connecting to an SSTC or DRSSTC.

WARNING

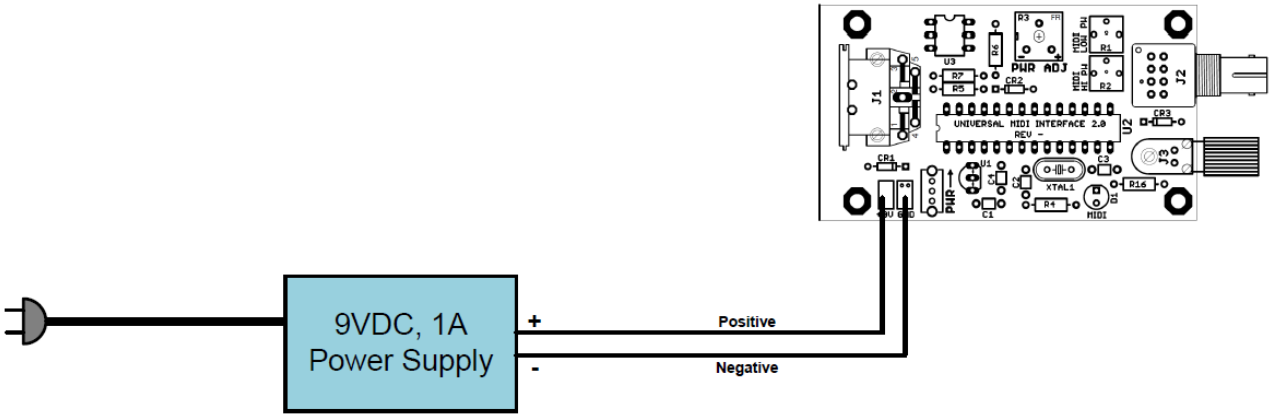
Unplugging the MIDI connector while playing a note will result in this note being played indefinitely through the MIDI Interface Card. This is simply how the MIDI protocol operates, since the note will not stop until a stop-note command is sent by the MIDI device.

❒ 1. Hook-up a 7-12VDC, 1A power supply according to the figure below. We recommend using a 9V, 1A DC power supply which can be ordered from our website under the mini MIDI Controller ordering page. (A 9V battery can also be used, although operating run-times will be limited due to the life of the battery.)

First, use your multimeter to verify which lead from the power supply is the positive lead, and which lead is the negative lead. Reversing the leads to the MIDI Interface board may cause damage to the components.

Connect the positive lead to the solder pad labeled "+9V."

Connect the negative lead to the solder pad labeled "GND."



❒ 2. Apply power to the mini MIDI Controller board.

❒ 3. Verify that the MIDI LED, D1, is illuminated.

❒ 4. Verify that the voltages are correct at the measuring points located below. All voltages should be measured with respect to GND. All of the four (4) screw mounting holes are connected to GND and provide an easy reference point to measure from.

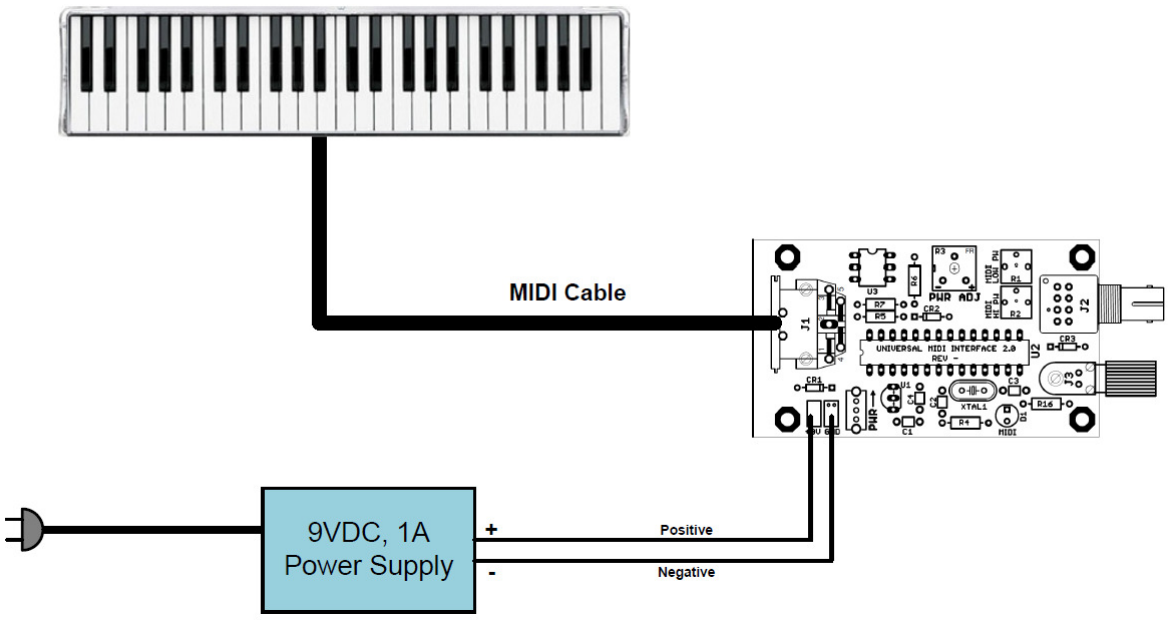
Check	Component	Measuring Point	Voltage
❒	U1, MCP1702-5002	Pin 2 (Input)	7-12V (9V nom)
❒	U1, MCP1702-5002	Pin 3 (Output)	5V ± 0.1V
❒	U1, Microcontroller	Pin 1 (MCLR)	5V ± 0.1V
❒	U1, Microcontroller	Pin 7 (Vcc)	5V ± 0.1V
❒	U1, Microcontroller	Pin 20 (Vcc)	5V ± 0.1V
❒	U1, Microcontroller	Pin 21 (Vcc)	5V ± 0.1V

Note: All voltages should be measured with respect to the GND

❒ 5. Disconnect power to the mini MIDI Controller Interrupter board

❒ 6. Install U2, 28-Pin Microcontroller. Note that one end of the IC is marked by a dot, notch, or band; this end MUST be oriented as shown on the PCB layout.

❒ 7. At this point, you are ready to begin testing and setting the potentiometer settings for your mini MIDI Controller board. Connect your MIDI keyboard (or similar) to the mini MIDI Controller as shown in the figure below.



❒ 8. With everything connected properly, apply power the mini MIDI Controller.

❒ 9. Turn the MIDI keyboard ON.

❒ 10. Ensure that the MIDI output channel of the keyboard or other MIDI instrument is set to MIDI channel 1.

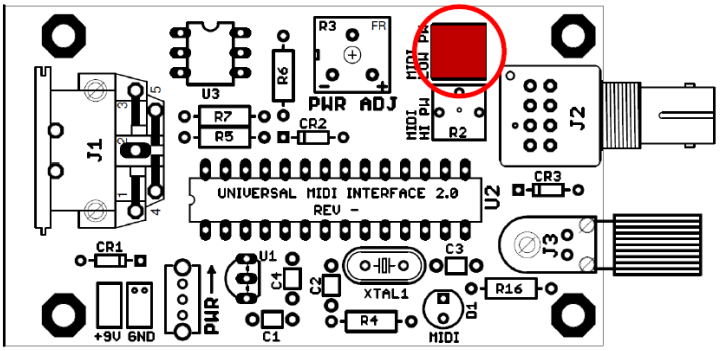
❒ 11. Using an oscilloscope, monitor the voltage at the input side of R16 (side connected to the microcontroller, U2). This will be the output of the mini MIDI Controller board. The GND clip of the oscilloscope probe can be connected directly to one of the four (4) mounting holes on the board.

❒ 12. Try playing a few notes on the keyboard. If everything is connected and operating properly, you should begin to see the output of the notes on the oscilloscope.

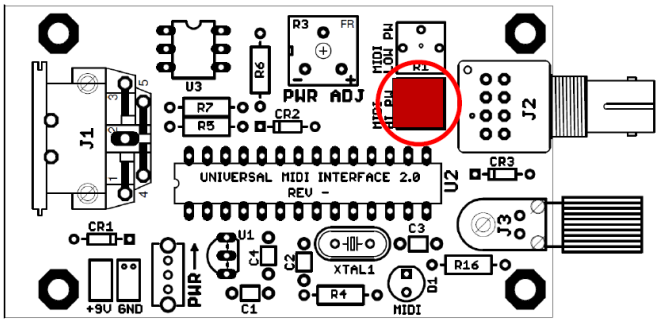
❒ 13. Verify that the MIDI LED turns OFF when notes are played on the keyboard. Note that the MIDI LED changes state every time a valid MIDI command is received from the sending instrument. When a single note is played, the MIDI LED will turn OFF, however, if you play a second note, while the first note is still being held, the MIDI LED will turn back ON.

❒ 14. In the next few steps, we will adjust the potentiometers for the operation of the MIDI interface board. You will use the same oscilloscope measurement as you did in step 11 above. (Note: If an oscilloscope is not available, you can adjust the potentiometers using the figures below to get approximate pulsewidth settings.)

❒ 15. In this step, you will set the MIDI low note maximum pulsewidth. This will set the maximum pulsewidth the interrupter will output when the lowest frequency note is played via MIDI. The potentiometer, R1, shown below, is used to set the MIDI low note maximum pulsewidth. The range of adjustment for this potentiometer is 0-1ms.



❒ 21. In this step, you will set the MIDI high note maximum pulsewidth. This will set the maximum pulsewidth the interrupter will output when the highest frequency note is played via MIDI. The potentiometer, R2, shown below, is used to set the MIDI high note maximum pulsewidth. The range of adjustment for this potentiometer is 0-1ms.



At this point, your mini MIDI Controller is properly set-up and configured. You are now ready to connect the mini MIDI Controller to your Tesla coil!

Operation with a Tesla Coil

Okay, so lets create some arcs and music!

IMPORTANT NOTICE

Before connecting the mini MIDI Controller to any SSTC or DRSSTC Tesla Coil, be sure that you are completely familiar with the operation of the mini MIDI Controller as well as verified the operation of the mini MIDI Controller using an oscilloscope or similar device. It is important to ensure that the mini MIDI Controller pulsewidth ranges are programmed per the SSTC or DRSSTC it is being used for and that the proper settings are programmed before connecting to an SSTC or DRSSTC.

WARNING

Unplugging the MIDI connector while playing a note will result in this note being played indefinitely through the MIDI Interface Card. This is simply how the MIDI protocol operates, since the note will not stop until a stop-note command is sent by the MIDI device.

Controller Output Specifications

Please use the following table to determine the proper interface between the mini MIDI Controller and your DRSSTC or SSTC system.

Output Connector	Specification
J2, Fiber Optic	HFBR1412T Transmitter (ST connector) Compatible with HFBR 2412T Receiver (ST connector) Light OFF = OFF Light ON = ON
J3, Fiber Optic	IF-E96E Transmitter (Bare fiber connector) Compatible with IF-E96E Receiver (Bare fiber connector) Light OFF = OFF Light ON = ON

MIDI Channel

The mini MIDI Controller operates with MIDI channel 1 only. Ensure that any MIDI equipment you connect to the mini MIDI Controller is set to MIDI channel 1.

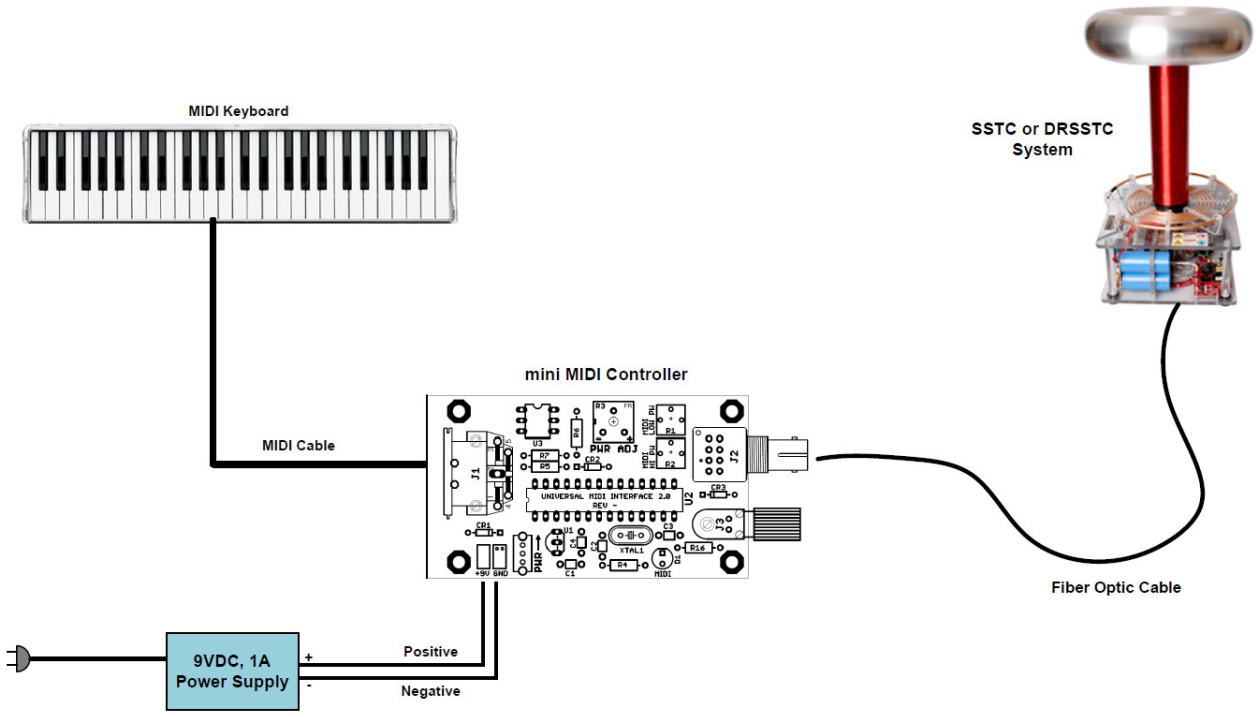
MIDI Board LED Status

The follow table lists the MIDI interface board status LED and its function.

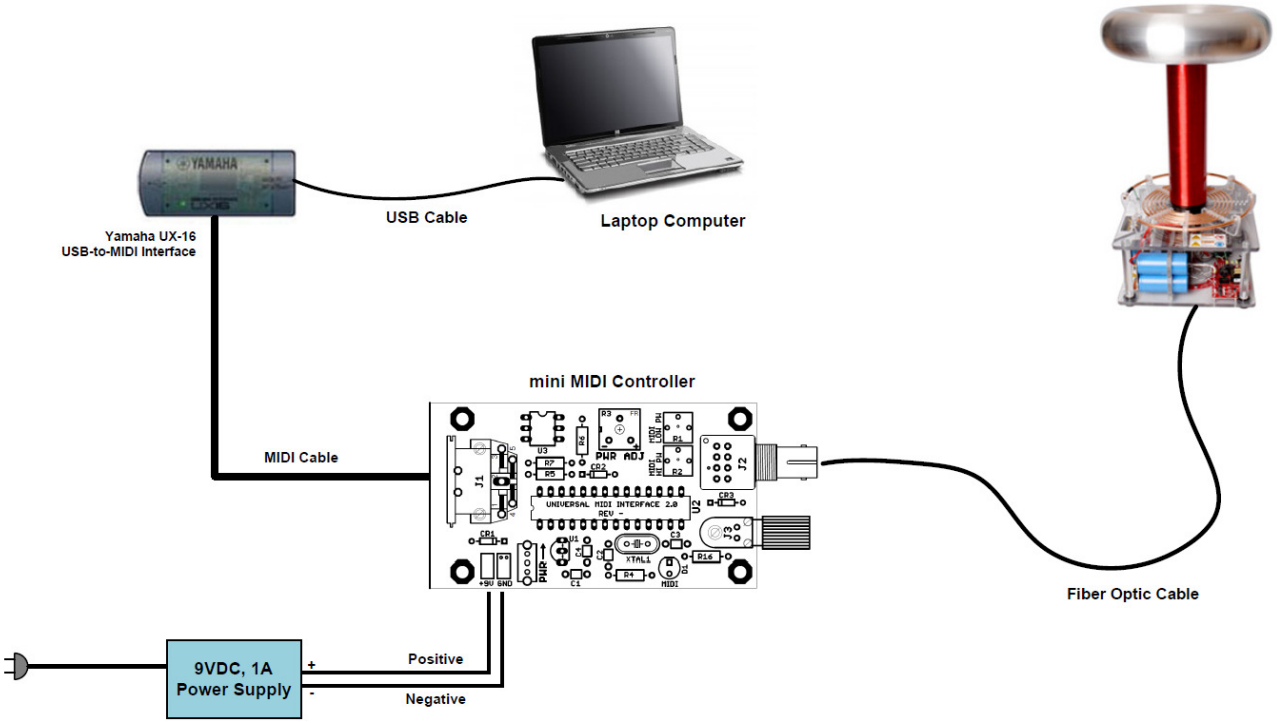
Status LED	Function
MIDI, D1	This LED is a multi-use status LED. During normal operation, it is illuminated to indicate that power is applied and the microcontroller is active. However, this LED will briefly turn OFF whenever a valid MIDI command is received by the MIDI interface board. Sample valid commands would be MIDI note ON, and MIDI note OFF. Note that this LED will toggle ON/OFF (change state) on each valid MIDI command received. So for example, if you press a key, the MIDI LED will turn OFF. If you continue holding that key and press a second key, the MIDI LED will illuminate. The MIDI LED action is inverse of our other standard MIDI products and is only done so that the LED can also be an indicator of power "good" on the board.

Connecting the mini MIDI Controller to a DRSSTC / SSTC

The follow figures show sample hook-up diagrams for the mini MIDI Controller board:



Standard Hook-up using MIDI Keyboard



Standard Hook-up using Laptop Computer for MIDI

Operation

The mini MIDI Controller is capable of only MIDI playback. If you desire a controller that has standard interrupter mode functionality, please check our our Universal MIDI 2.0 Interrupter.

MIDI Mode Operation

This mode of operation will take an incoming MIDI data stream and convert it to an output pulse of the appropriate musical frequency of the note being read in the MIDI data stream and output it to an SSTC or DRSSTC Tesla Coil and thus produce an output arc that has the frequency of that particular musical note. The controller MIDI interface supports polyphonic reproduction therefore can produce up to 3 notes at a single time.

MIDI Power Adjust Potentiometer

The Power Adjust Potentiometer is a shaft mounted potentiometer located on the mini MIDI Controller labeled "PWR ADJ." This controls the output power of the coil by controlling the pulsewidth. When the knob is turned completely counterclockwise, the power level is zero, or output pulsewidth is zero. When the knob is turned completely clockwise, the power level is at maximum. Maximum power level will output a pulsewidth that is equal to the Max PW set using the MIDI LOW NOTE PW and MIDI HIGH NOTE PW adjust trimmer potentiometers.

Prerequisites for MIDI Mode Operation

The following equipment and software is required prior to using your mini MIDI Controller:

- MIDI Source – Laptop Computer (if using MIDI files for playback)
- MIDI Source – Keyboard with 5 pin standard DIN MIDI connector
- MIDI Cable
- MIDI Software (we recommend Anvil Studio Pro – available as free download)
- MIDI Files (we offer several free MIDI files available as a download on our website to get you started.)
- Yamaha UX-16 USB-to-MIDI interface (required if you are using a laptop to playback MIDI files)
- MIDI Solutions Quadra Thru Splitter (required if you plan to use dual channel outputs to drive two (2) or more Plasmasonic DRSSTC simultaneously)

Please note that the only device that we recommend as a USB-to-MIDI interface and a MIDI splitter are the Yamaha UX-16 and MIDI Solutions Quadra Thru Splitter respectively. We have not evaluated any other hardware at this time and only the devices aforementioned are recognized by us as SSTC or DRSSTC compatible devices. The use of any other devices must be done at your own risk.

MIDI Mode Operation – Additional Information

The following paragraphs provide important additional information regarding the playback of MIDI based instruments using the Universal MIDI 1.0 Interrupter.

Recommended MIDI Playback / Editing Software

For playing MIDI files through a PC or MAC computer, we recommend using the Anvil Studio Pro MIDI software. This software is available as a free download from the internet. If you plan on editing MIDI files, we recommend purchasing the Anvil Studio Pro Combo Pack 1 which to date retails for $59.99 USD.

Recommended USB-to-MIDI Interface

When using a computer to playback MIDI files, we recommend using the Yamaha UX-16 USB-to-MIDI interface. Although other USB-to-MIDI interfaces may work satisfactorily, we have not evaluated any other interfaces, so we can only recommend this one specifically at this time.

Recommended MIDI Splitter

If using multiple SSTC or DRSSTC Tesla Coils in a demonstration set-up, you will need a proper MIDI splitter to split the single stream from the computer to multiple handheld controller units. For this purpose, we recommend the MIDI Solutions Quadra Thru 4-Way Splitter. This is a passive device that will split the incoming MIDI stream into four (4) identical output streams.

Recommended MIDI Keyboard

As there are literally thousands of different keyboards, synthesizers, and dedicated MIDI keyboards available on the market, we cannot recommend a single brand / model which is fully compatible with your SSTC or DRSSTC system. That said, we have found that many of the inexpensive MIDI keyboards found the market can pose problems in that they tend to lock-up or interrupt their respective output MIDI streams which in turn causes the handheld controller MIDI interface to lock-up. Our suggestion here is to simply try a few MIDI keyboards until you find satisfactory results, or simply use a laptop computer.

Using an IPAD as MIDI Playback Device

To date, we have learned that there are several IPAD to MIDI interfaces available on the market. Although these devices look promising, we have not yet tested the compatibility of those interfaces with the Universal MIDI 1.0 Interrupter and cannot provide a recommendation.

Compatible MIDI Files

We have several examples of DRSSTC compatible MIDI files available as free downloads on our Plasmasonic DRSSTC ordering page on our website.

Creating MIDI Files

We will not cover the specifics of how to create and edit MIDI files for your SSTC or DRSSTC system here, but will cover some basics which should be followed when creating and editing your own MIDI files.

- Download MIDI Files from the internet – There are literally millions of them for almost any piece of music you can think of !
- Download Anvil Studio Pro and purchase the Combo Package 1 for $59.99. This will provide you a very inexpensive way of editing your own MIDI files. The free version of Anvil Studio Pro is also an alternative, but it is difficult as you can only view one channel at a time using the free version of the software package. (Please note that Eastern Voltage Research is in no way affiliated with Anvil Studio Pro and our recommendation is for convenience only.)
- If you are using a single Tesla Coil for playback, you will only want to use a single track of audio. For dual Tesla Coils, you will want to have two playback tracks – one for each MIDI channel.
- Use multiple notes sparingly. Although the handheld controller can decode and playback up to three (3) notes simultaneously, multiple notes does increase the power output and duty cycle of the system considerable and may blow the input fuse.
- Transpose the musical piece to the lowest frequency possible. Not only is lower frequencies more pleasing to the ear, it also reduces power consumption of the system and places less stress on all the components. High notes operate at relatively high duty cycles and place greater stress on the various components.
- If using dual channels, try keeping the high frequency or melody notes on one channel, and the bass tones on the other channel.
- When testing MIDI files, the best way is to test them first on the laptop computer. When ready to test them using a Plasmasonic, simply keep the Pulsewidth ADJ to a minimum (almost to the point where you can't even see an output arc, but still hear audio), just to hear the tones and hear that they are playing back properly.

Playback of MIDI Files – Special Considerations

When playing back MIDI files using your SSTC or DRSSTC system, please take into account the following considerations:

- When playing back MIDI files or using a MIDI keyboard, please keep the Pulsewidth ADJ setting to a minimum level to get the desired performance you are looking for. This is especially important with a MIDI piece that has many high frequency notes or multiple notes as high notes and multiple notes can greatly increase the power consumption of the system.
- If you find that your Tesla Coil suddenly stops working during the playback of a MIDI song, it is most likely due to a blown input fuse. Recognize that the playback of high notes and especially multiple notes will greatly increase power consumption of the Tesla Coil and may cause this fuse to blow. If the Tesla Coil does stop working, please follow the shutdown instructions as outlined in the previous instruction steps and inspect the fuse.
- The instantaneous playback of a single MIDI note, especially high frequency tones, can present a very high step load to the Tesla Coil and may cause a very high electrical gradient that may cause output arcs to occur between the secondary coil and primary coil / strike rail, or cause the output arcs to strike near the base of a Tesla Coil assembly. If this occurs, simply lower the Pulsewidth ADJ knob until this effect disappears or use a strike target. A strike target is simply a grounded object that the arcs can strike to as opposed to randomly flying through the air.

MIDI Playback Latch-up Issues

An issue that sometimes arises is one where during the playback of a MIDI instrument, a note will simply latch up and continue to play on your SSTC or DRSSTC system. To understand this issue, it is first important to understand the nature of how the MIDI output works. For each note played, there are two commands. One command is a NOTE ON command, while to release the note, a second NOTE OFF command is sent by the output MIDI device. We have found that with some MIDI keyboards, this stream can sometimes get disrupted when playing either very fast or by playing multiple notes. If this occurs, you can sometimes release the latched note by playing the same note again on the keyboard, or simply resetting the handheld controller. In either case, if you find this to be an issue that repeats itself frequency, we strongly recommend finding a higher quality MIDI playback instrument. Also, note that when using a computer to playback MIDI files, this problem practically never exists.

Troubleshooting

PROBLEM: There is no output on the MIDI interface board and the MIDI interface LED does not illuminate.
SOLUTION: Verify that the instrument and MIDI interface board are both set to MIDI Channel 1.

Conclusion

We sincerely hope that you have enjoyed the construction of this Eastern Voltage Research Kit. As always, we have tried to write this instruction manual in the easiest, most "user friendly" format that is possible. As our customers, we value your opinions, comments, and additions that you would like to see in future publications. Please submit comments or ideas to:

Eastern Voltage Research, LLC

Technical Support
support@easternvoltageresearch.com

Thanks again from the people here at Eastern Voltage Research.

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Before opening or assemblying your kit, please read and review the latest Terms and Conditions of Sale on our website at the following link:

http://www.easternvoltageresearch.com/terms.html