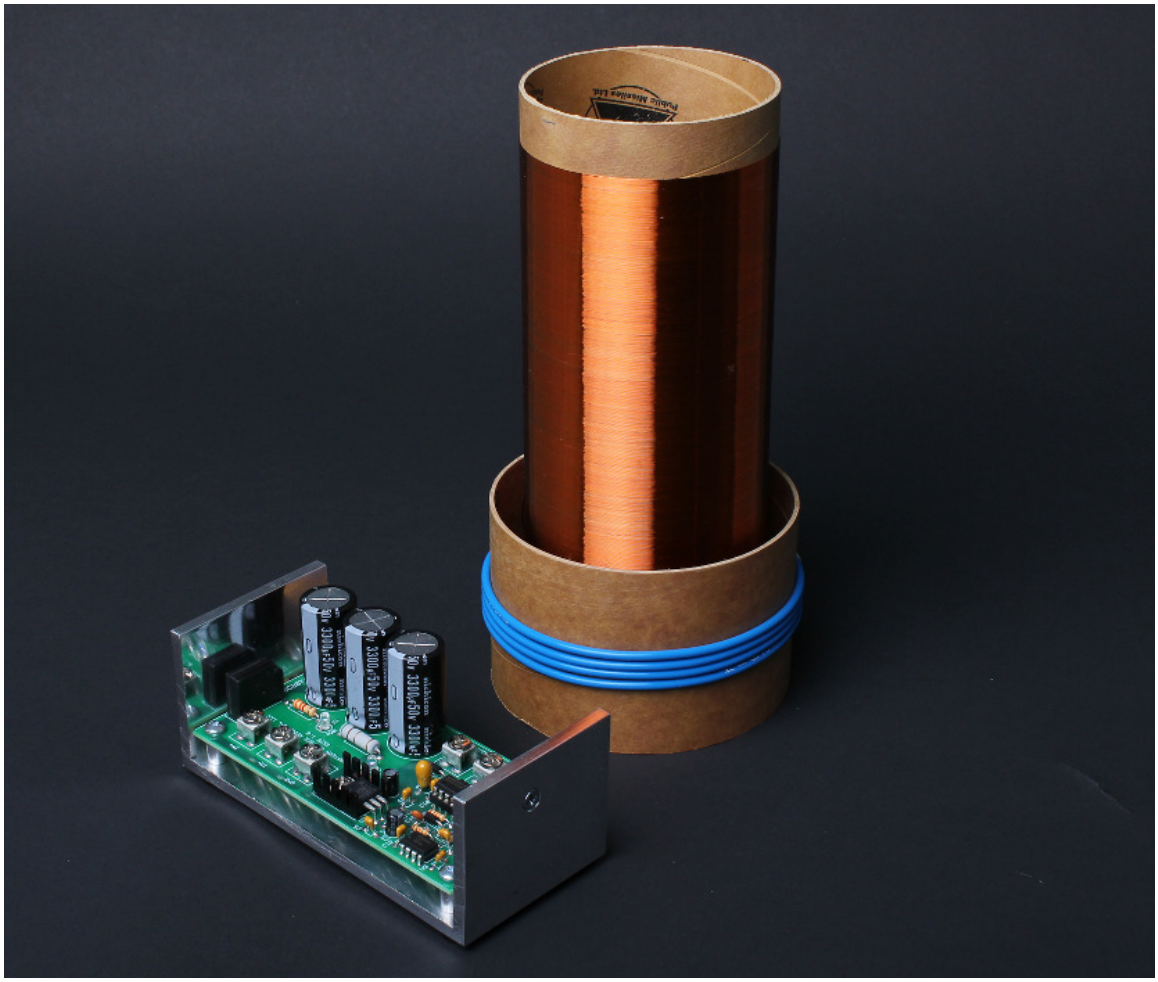
Solid State Tesla Coil 1.0



Instruction Manual

Eastern Voltage Research, LLC

ELECTRICAL WARNING

This circuit utilizes dangerous line voltages up to 120VAC. Failure to handle this circuit in a safe manner may result in injury or death!

POWER SEMICONDUCTOR WARNING

This is a solid state power device. Power Semiconductors may fail at any time and eject flying shards of plastic.
EYE PROTECTION IS REQUIRED AT ALL TIMES!

RF HAZARD WARNING

This device when connected to a resonator will produce strong electric and magnetic fields. Exposure to this field should be limited.
NO BIOMEDICAL DEVICES WITHIN 50 FEET!

Introduction to the Solid State Tesla Coil 1.0

Thank you for purchasing the SSTC 1.0 Kit. The SSTC 1.0 is an incredibly simple Tesla coil that is an excellent choice for both beginners and seasoned enthusiasts alike. Its an extremely popular choice for middle school and high school science fair projects. The small coil produces output arcs up to 2.0" in length, and easily illuminates fluorescent and neon lights with the electric field it creates. It also features a self-resonant feedback circuit which tunes the coil automatically. No need to spend time tuning and re-tuning your coil. Just turn on the Tesla coil and watch the high voltage spring into action!

Notice to Beginners: If you are first time kit builder, you may find this instruction manual easier to understand than expected. Each component in this kit has an individual check box, while a detailed description of each component is provided as well. If you follow each step in the instruction manual in order, and practice good soldering and kit building skills, the kit is next to fail-safe.

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

Circuit Description

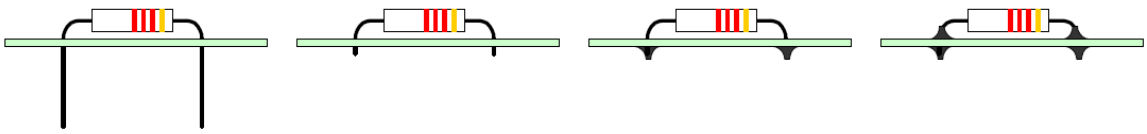
The SSTC 1.0 is a very simple circuit comprised of only a few major subcircuits. The low voltage 24VAC transformer, T1, along with bridge rectifier, BR1, and filter capacitors, C1,C2, and C3, provide the DC voltage required to power the Tesla coil and its control circuitry. The 7812 linear regulator, U1, provides 12VDC which is used to provide power to the control and driver circuits. Because the Tesla coil is self-resonating, it requires something to sample the output high voltage and feed it back into the control circuit providing positive feedback. This is accomplished through the use of a wire antenna which "picks up" the electric field of the Tesla coil. However, because the control drive circuitry requires the high voltage of the Tesla coil to provide the positive feedback necessary to self-oscillate, an external pulse is required to "start" the oscillation process. This is simply accomplished through the use of an external pulse circuit which is comprised of a single 555 Timer. The 555 Timer continuously outputs pulses which will cause the circuit to begin oscillation. Once oscillation begins, the feedback from the antenna will "overpower" the output of the 555 Timer and take over control of the drive circuit. Finally, the primary solid state power stage of this coil is made-up of the gate driver IC, U2, and high power switching transistor (200V N-Channel MOSFET), Q1. Due to the self-resonating feedback network, Q1 will always switch at the exact resonant frequency of the Tesla resonator, and thus never requires manual tuning.

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.



SSTC 1.0 Parts List

RESISTORS

- ❒ 1 33 ohm Resistor, 2W (orange-orange-black), R1
- ❒ 1 3.3k Resistor 1/2W (orange-orange-red), R2
- ❒ 1 820, Resistor (gray-red-brown), R3
- ❒ 1 100k, Resistor (brown-black-yellow), R5
- ❒ 1 5.1, Resistor, 2W (green-brown-gold), R6
- ❒ 1 10k Resistor (brown-black-red), R4
- ❒ 1 20k Resistor (red-black-orange), R8

CAPACITORS

- ❒ 3 2200uF (or 3300uF) Electrolytic Capacitor, C1,C2,C3
- ❒ 2 10uF, 50V Electrolytic Capacitor, C5,C7
- ❒ 1 10uF,35V Tantalum Capacitor, C9
- ❒ 4 0.1uF Ceramic Capacitor, C6,C8,C10,C12
- ❒ 1 0.01uF Ceramic Capacitor, C14
- ❒ 1 330pF Ceramic Capacitor, C13
- ❒ 1 1000pF 3kV Capacitor, C11

DIODES

- ❒ 1 1N4002 Diode (marked 1N4002), CR1
- ❒ 4 1N5819 Diode (marked 1N5819), CR2,CR3,CR4,CR5
- ❒ 2 LED, Blue (or Red), D1, D2
- ❒ 1 Bridge Rectifier, BR1

SEMICONDUCTORS

- ❒ 1 IRFP260 MOSFET, Q1

INTEGRATED CIRCUITS (ICs)

- ❒ 1 12V Regulator (marked LM7812), U1
- ❒ 1 Gate Driver (marked UCC37322), U2
- ❒ 1 555 Timer (marked 555), U3

MISCELLANEOUS

❒	1	8DIP IC Socket
❒	6	Screw Terminals
❒	1	Power Transformer
❒	1	3.1” DIA Coilform, 8” Length
❒	1	3.9” DIA Coilform, 2.5” Length
❒	1	Coilform Centering Ring
❒	1	30AWG Magnet Wire, 500-800 Ft.
❒	1	Heatsink, U-Channel
❒	1	Misc. Hardware
❒	1	AC Power Cord
❒	1	Antenna Wire, 22-26AWG, 14”
❒	1	Black Grounding Wire
❒	4	Adhesive Rubber Feet
❒	1	Adhesive Thermal Insulator

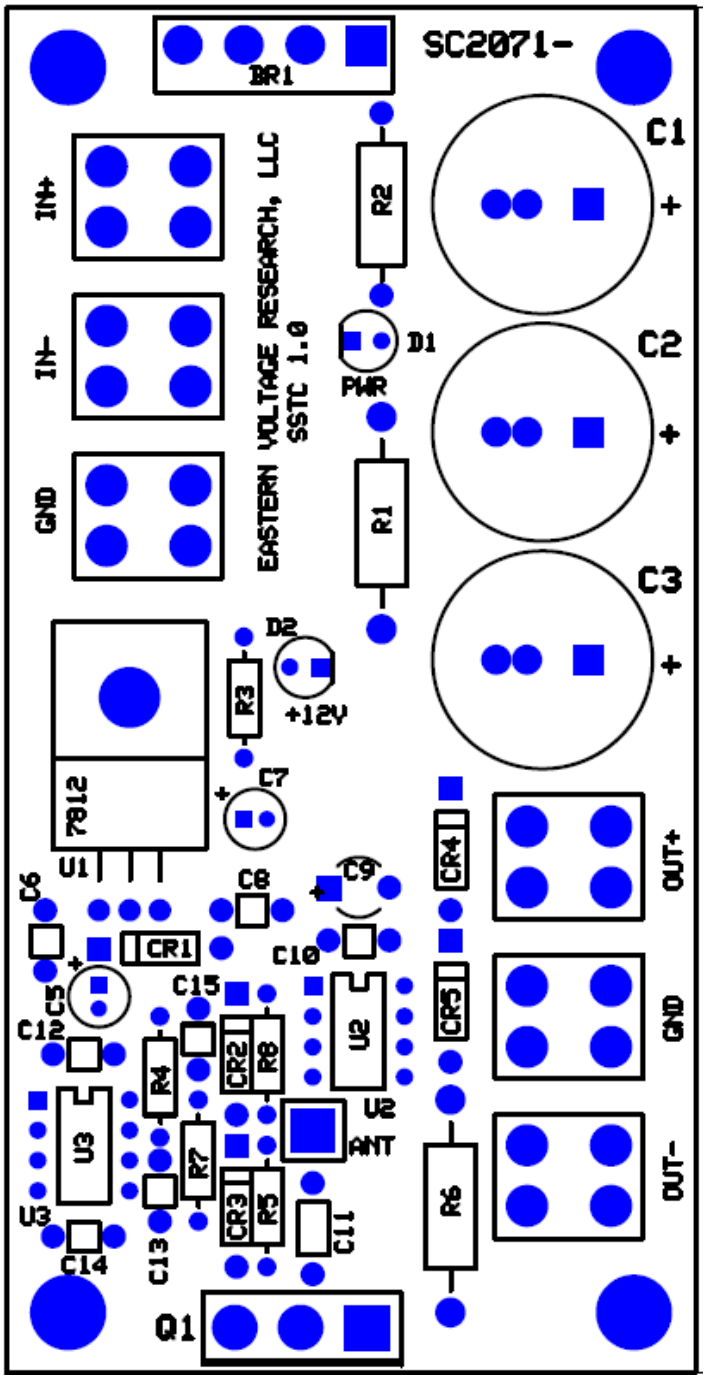
REQUIRED, NOT SUPPLIED

❒	A/R	Electrical Tape or Wire Nuts
❒	A/R	Two-Part Epoxy or similar adhesive

RECOMMENDED, NOT SUPPLIED

❒	1	Enclosure for SSTC 1.0 Board

SSTC 1.0 Component Layout Diagram



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 R1, 33 ohm, 2W resistor (orange-orange-black)

❒ 2. Install R2, 3.3k, 1/2W resistor (orange-orange-red)

❒ 3. Install R3, 820 ohm resistor (gray-red-brown)

❒ 3. Install R4, 10k resistor (brown-black-orange)

❒ 4. Install R5, 100k resistor (brown-black-yellow)

❒ 5. Install R6, 5.1 ohm, 2W resistor (green-brown-gold)

❒ 6. Install a jumper wire in the R7 location

❒ 7. Install R8, 20k resistor (red-black-orange)

- ❒ 8. Install CR1, 1N4002 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 9. Install CR2, 1N5819 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 10. Install CR3, 1N5819 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 11. Install CR4, 1N5819 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 12. Install CR5, 1N5819 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 13. Install C6, 0.1uF capacitor (marking BC104)
- ❒ 14. Install C8, 0.1uF capacitor (marking BC104)
- ❒ 15. Install C10, 0.1uF capacitor (marking BC104)
- ❒ 16. Install C12, 0.1uF capacitor (marking BC104)
- ❒ 17. Install C13, 330pF capacitor (marking BC331 or M39014/01-1308V)
- ❒ 18. Install C14, 0.01uF capacitor (marking BC103)
- ❒ 19. Install a jumper wire in the C15 location
- ❒ 20. Install C1, 2200uF (3300uF), electrolytic capacitor. C1 has "polarity." Polarity means the capacitor must be inserted a certain way. You may notice that one side of the capacitor, there is a black stripe with minus signs. This is the negative end. Looking at the PCB silkscreen, you will notice the positive side marked. Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout.
- ❒ 21. Install C2, 2200uF (3300uF), electrolytic capacitor. Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout.
- ❒ 22. Install C3, 2200uF (3300uF), electrolytic capacitor. Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout.

❒ 23. Install C5, 10uF, 50V electrolytic capacitor. Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout.

❒ 24. Install C7, 10uF, 50V electrolytic capacitor. Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout.

❒ 25. Install C9, 10uF, 35V tantalum capacitor (marked 10635). Install this capacitor into the board ensuring the positive side of the capacitor installs in the hole that is marked positive on the PCB layout. The square pad is the positive side.

❒ 26. Install C11, 1000pF, 2kV capacitor (marking Z5U .001M 3kV)

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

❒ 28. Install D2, LED. The short lead of the diode is the cathode and will install into the square pad on the PCB board.

❒ 29. Install an 8-pin DIP socket into the U2 location. Note that one end of the DIP socket is marked by a notch; this end MUST be oriented as shown on the PCB layout. DO NOT INSTALL U2 at this time!

❒ 30. Install U3, 555 Timer. The 555 Timer IC may be soldered directly to the PCB without worry, but you may use an 8-pin DIP socket (your own) if you prefer. Use the same care in soldering such a socket and inserting the IC as you would in direct soldering of the chip. 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.

❒ 31. Install U1, LM7812 Linear Regulator. This component must be installed with the included heatsink and hardware. The easiest way to solder this to the board is to first attach the component and heatsink / hardware to the board, ensuring the leads on U1 are properly bent (formed) to align with the solder holes and heatsink mounting hole. Once the heatsink assembly is attached, the three (3) leads of the LM7812 can be soldered to the PCB. Be sure not to bend the leads more than once as they will break!

❒ 32. Install BR1, bridge rectifier. The notched end of BR1 is the positive pin and must be installed in the square pad in the PCB board.

❒ 33. Install the six (6) screw terminals.

❒ 34. Using the included 22-26 AWG wire, cut the wire to 14 inches in length and solder to the ANT terminal on the PCB board. This is the wire feedback antenna. The antenna must be installed on the top side of the board.

❒ 35. The U-channel heatsink that is included with your kit is unfinished and although efforts have been made to properly deburr all edges, some edges may still be sharp. So at this time, you may wish to smooth any remaining sharp edges with a handheld file and also polish the heatsink. You can polish the heatsink using very fine Scotch-Brite pads (usually found at your local hardware store) or with a motorized grinder using an attached metal polishing pad and compound.

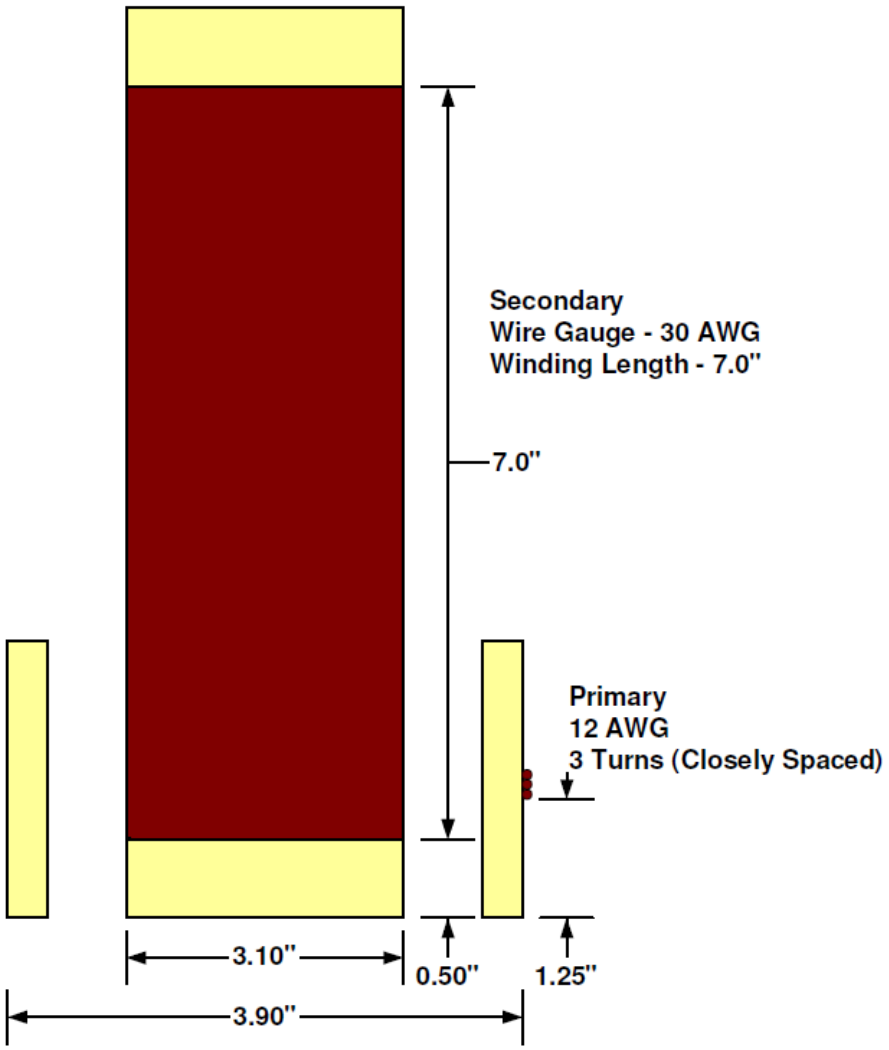
❒ 36. Attach the four (4) threaded stand-offs using included flathead 6-32 hardware to the base of the heatsink. The PC board will sit on top of these stand-offs. Install the four (4) self-adhesive rubber feet to the bottom of the heatsink.

❒ 37. Using the included 6-32 panhead hardware, attach the PC board to the four (4) threaded stand-offs. The board should be oriented so that the component mounting hole in the heatsink align with the component location Q1 on the PC board.

❒ 38. Attach the self-adhesive thermal insulator to the heatsink in the position where Q1 will be mounted. Ensure that the thermal insulator is positioned so that the entire component fits on it. (No overlapping)

❒ 39. Install Q1, IRFP260 MOSFET. With the PCB board mounted to the heatsink, first insert Q1 into the board. Do NOT solder Q1 at this time. The metalized back of Q1 will be the side that attaches to the heatsink. Using the included hardware, attach Q1 to the heatsink (ensure the thermal insulator is also in place). Once Q1 is attached to the heatsink, solder it to the board. This ensures that the fit and alignment of Q1 will match the heatsink mounting hole.

❒ 40. Now the fun part – winding the secondary coil. Using the figure below, wind the secondary coil using the included 30AWG spool of wire. First place the spool of wire on a stationary rod so that it can spin freely. Next, wind a few extra turns at the base of the secondary and use masking or electrical tape to hold in place. Begin winding the secondary at the locations shown in the figure below. Continue winding the secondary, ensuring each wind is neat and tightly together with adjacent windings, for the entire length as indicated in the figure below. Adding masking tape every inch or so will ensure the windings don't unwind and also allows you to take rests if needed. Once you are completed, tape off the end of the winding, and finally add a few extra turns. For finishing the coil, you have the option of leaving it as is, wrapping it with masking or electrical tape, or for a more professional look, simply coating it with polyurethane furniture finish which can be purchased at any hardware or home improvement store.

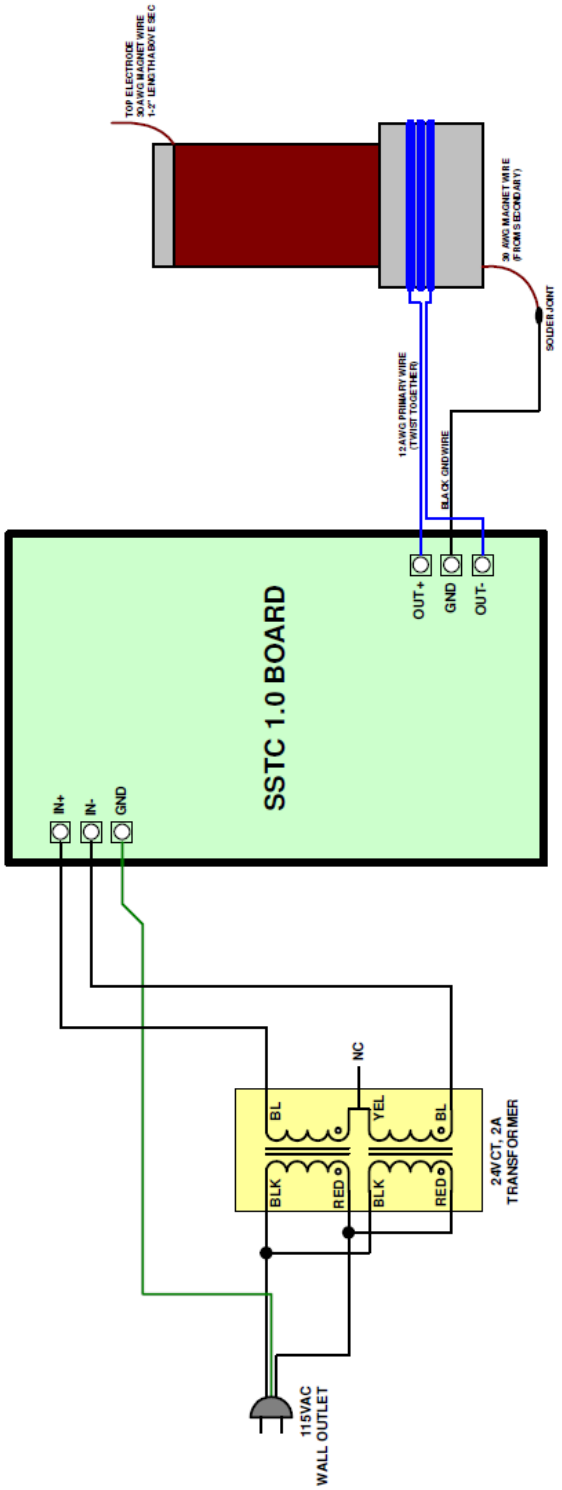


❒ 41. Using the included 12 AWG wire, wind the primary coil as shown in the figure above. The primary coil can then be secured in place using masking or electrical tape (not supplied), or two-part epoxy (not supplied).

❒ 42. Assemble the primary and secondary coils using the included centering ring. Use wood glue or epoxy (not supplied) to permanently affix in place.

❒ 43. Solder the included black ground wire to the bottom of the secondary coil as shown in the hook-up diagram below. You will need to use sandpaper (not supplied) to remove the enamel from the magnet wire prior to soldering it.

❒ 44. Form the top wire of the secondary into a discharge electrode as shown in the figure below.



❒ 45. Install T1, power transformer as shown in the diagram above. It is very important to attach the ground wire of the AC cord to the GND terminal on the PCB board. Use electrical tape or wirenuts (not supplied) to secure and insulate the connections between the power transformer and AC cord.

DO NOT connect the primary coil to the PCB board at this time.

Congratulations! You have just completed your SSTC 1.0 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

Please be sure to wear safety glasses when testing and operating the SSTC 1.0.

❒ 1. After putting on your safety glasses, plug in the 120VAC power cord. Note that both U2 (UCC373232) and the primary coil should NOT be installed at this time. Using a multimeter, verify that the following voltages are correct. If they are not, then there is a problem with your circuit that needs to be diagnosed and corrected.

Check	Component	Measuring Point	Voltage
❒	BR1	Pin 1 (Positive)	22V ± 2V
❒	U1	Pin 1 (Input)	14V to 18V
❒	U1	Pin 3 (Output)	12V ± 0.5V
❒	U2	Pin 1 (Vcc)	12V ± 0.5V
❒	U2	Pin 8 (Vcc)	12V ± 0.5V
❒	U2	Pin 3 (Enable)	12V ± 0.5V
❒	U3	Pin 8 (Vcc)	12V ± 0.5V
❒	U3	Pin 4 (Reset)	12V ± 0.5V

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

❒ 2. Verify that both LEDs, D1 and D2, are illuminated. If they are not, and the voltages above are correct, they may be installed backwards.

❒ 3. Unplug the 120VAC power cord. Due to the capacitor storage on the board, it may take about 10 seconds for the power to bleed off. Wait until the LEDs completely turn off before proceeding to the next step.

❒ 4. Install U2, UCC37322 Gate Driver. 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.

❒ 5. Install the wires of the primary coil to the screw terminals labeled OUT+ and OUT- on the board. Be sure that the primary wires are twisted tightly together from the Tesla primary coil to the PC board screw terminals.

❒ 6. Verify that the ground connection from the bottom of the secondary coil is properly connected to the GND screw terminal on the PC board as shown in the hook-up diagram above. Also ensure there is about 1-2" length of secondary wire protruding above the secondary coil. This will act as the discharge electrode.

❒ 7. Orient the antenna so that is near the Tesla coil, but not touching it.

❒ 8. Plug in the 120VAC power cord.

❒ 9. If everything was installed properly, your Tesla coil should now be self-oscillating and producing an output arc. If it is not, turn off power and then reverse the primary wire connections at the OUT+ and OUT- screw terminals. Once output arc is being produced, move the antenna around until you get maximum arc output.

Congratulations! Your SSTC 1.0 Tesla Coil is now completed and operational. Try gathering some old fluorescent bulbs and placing them close to the Tesla coil. The electric fields generated by the Tesla coil will illuminate the fluorescent bulbs without the use of wires!

The Output Arc of the Tesla Coil is extremely hot. Never attempt to touch the arc or draw arcs using any type of object.

Troubleshooting

PROBLEM: No output arc. (Blue LEDs illuminated)
SOLUTION: This is typically due to the polarity of the primary being incorrect. Simply reverse the primary connections at OUT+ and OUT- on the PC board.

PROBLEM: No output arc. (Blue LEDs are not working)
SOLUTION: In this case, either U2 or Q1 has probably failed. Your unit will require diagnose and repair.

PROBLEM: Output arc is very small
SOLUTION: The antenna needs to be oriented and placed properly to get maximum arc. Try moving the antenna around in relation to the Tesla coil until maximum arc is observed.

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.

Terms and Conditions of Sale

Privacy

We do not provide any information to anyone for any reason.

Shipping

We will make every attempt to ship all orders received within 48 hours of order receipt with the exception of custom ordered components and / or kits. This excludes weekends and holidays. Regular ground service is handled via USPS or UPS. Backorders - all partial shipment backorders will be shipped via regular ground service at our expense.

International Orders

All foreign orders are shipped via USPS International Priority service unless otherwise noted. You are wholly responsible for any custom duties, brokerage fees, import restrictions, etc... that are imposed after the sale.

Order Cancellations

Before you submit your order, please make sure you really want it. Once we have begun processing an order, a 25% restocking fee will be applied, prior to any refund. If you do not agree with this policy, please do not order.

Legal Status of Products

It is the responsibility of the Buyer (not Eastern Voltage Research, LLC) to ascertain and obey all applicable local, state, and federal laws in regard to the possession and the use of any item or kit that is offered for sale. Consult your attorney regarding local, state, and federal laws prior to ordering. By placing an order, the buyer represents that he / she is of legal age and that the products will be used only in a lawful manner.

Electronics Kit Limit of Liability

Our range of electronics kits are intended for educational and demonstration purposes only. They are not intended for use in commercial applications. If they are used in such applications, the purchaser assumes all responsibility for ensuring compliance with local laws. When a product is supplied in kit form and assembly or construction has commenced or the inner component packages have been opened, we are unable to offer any form of refund, replacement, exchange, or free repair. This is because we cannot guarantee the labor you provide and components can be damaged during assembly. Component packages should be checked against the components list supplied and any shortages or damaged components must be advised to us within 7 days of delivery date to ensure free component replacement.

It is recommended that if a kit builder does not have enough knowledge to diagnose faults, that the project should not be started unless assistance can be obtained. (Unfortunately, an improperly installed component or bad solder joint or wiring mistake can take many hours to diagnose and at normal service rates, the service charge could well be more than the total cost of the electronics kit.)

Mains Powered Projects

To ensure your safety, please observe these safety measures. In no way are these complete. As safety requirements vary, please check with your local authorities, in order to comply with local requirements. If in doubt, seek the help of a qualified person.

Due to their nature and function, some electronics kits require MAINS power (115VAC) to be connected directly to the Printed Circuit Board (PCB). Extreme care should be taken when assembling and testing these kits. MAINS power must be treated very carefully. It is strongly recommended that you have previous experience of working with MAINS power equipment and / or circuits prior to attempting assembly of these kits. MAINS power can cause serious injury or death and must therefore be treated with extreme CAUTION. Construction, testing, and use of these kits should only be attempted by competent persons, and / or under the supervision of someone fully experienced in this field.

To ensure electrical safety, and also protection from fire or personal injury, make sure your MAINS operated equipment complies with the safety recommendations below:

- Use a suitable non-conductive enclosure (wood, plastic, etc...) If you use a metal enclosure, be sure that the enclosure is properly grounded to earth ground.
- Use a power switch for any device that consumes more than 10W of power. A double throw switch should be utilized for MAINS operated, transformer-less connections.
- A fuse should be utilized in series with the MAINS switch.
- Use a suitable MAINS input connector, and / or a UL three-conductor power cord which is clamped to your enclosure.
- Use properly insulated and sized wire when making any MAINS power connections inside an enclosure.

We accept no responsibility for injury, loss, or damage of any kind as a result of the purchase, assembly, or use of any of our products.

Limitation of Liability

The Customer will be responsible for ensuring the fitness for purpose of the Goods for the Customer's application. Eastern Voltage Research, LLC accepts no liability whatsoever or howsoever arising in respect to loss, damage, or expense arising from errors in information, or advice provided whether or not due to Eastern Voltage Research, LLC's negligence or that of its employees, agents, or sub-contractors save for any loss or damage arising from personal injury. Eastern Voltage Research, LLC shall not be liable to the Customer by reason of any representation (unless fraudulent), or any implied warranty, condition or other term, or any duty at

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Parts Substitutions

Eastern Voltage Research, LLC reserves the right to substitute components in all electronics kits offered provided that the functional performance of a kit is not diminished in any way.

Miscellaneous

Prices are subject to change. Product styles and parts lists may vary. New Jersey orders must add 7% sales tax. If tax exempt, please include a resale certificate. We assume no liability associated with product usage. The buyer is liable and responsible for any loss, damage, or expense of any kind, arising out of the use or misuse of the products. By placing an order, the buyer signifies agreement to these Terms and Conditions of Sale.

Warranty Information

Defective Components

Its always easy to blame a component for a problem with your kit. Before you conclude that a component may be defective, please thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and its sad to say that our human construction skills have not! However, on rare occasions, components which are defective may be shipped and included in your kit. All of our kit parts carry the Eastern Voltage Research, LLC Warranty that they are free from defects for a full ninety (90) days from the date purchase with the exception of power semiconductors (see below). Defective parts will be replaced promptly at our expense. If you suspect a component to be defective, please mail it to us for testing and replacement. Please send only the defective component(s), not the entire kit. The component(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly and / or usage. If you did damage or "blow-up" a component through testing, don't be afraid to tell us. We're all human and in most cases, replacement parts are very reasonably priced.

Power Semiconductors

Due to the nature of the kits, we cannot offer any warranty or replacement for defective or damaged power semiconductor components. This includes both MOSFETs and IGBTs. That said, all power semiconductors are thoroughly tested prior to shipment to ensure that you have a power semiconductor that is non-defective and in NEW, unused condition.

Missing Parts

Before assuming that a component value is incorrect, or missing, check the parts listing carefully to see if it is a critical value such as a specific semiconductor or IC, or whether a RANGE of values is suitable (such as "10uF to 47uF"). Sometimes, a different value component may be substituted in a non-critical application. Eastern Voltage Research, LLC electronics kits are assembled and packed with pride in the USA. If you believe we packed an incorrect part or omitted a component clearly indicated in your instruction manual as supplied, please contact us with information on the component so we can send a replacement as soon as possible.

Factory Repair of Assembled Kits

In the event you are having difficulty with your kit and need assistance, we do offer a factory repair service. However, to qualify for an Eastern Voltage Research, LLC factory repair, electronics kit MUST:

- NOT be assembled with acid core solder or flux
- NOT be modified in any manner
- BE returned in full-assembled form. Kits partially assembled will not be accepted and you will lose your repair deposit.
- BE accompanied by the proper repair fee. No repair will be initiated until we have receive the MINIMUM repair fee (1/2 hour labor) of $20.00.
- INCLUDE a written description of the particular problem and legible return address inside the SAME shipping carton. Please do not include your own hardware such as non-Eastern Voltage Research power supplies, transformers, batteries, cables, etc... Eastern Voltage Research, LLC, reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Eastern Voltage Research, LLC, reserves the right to solve their needs on a case-by-case basis.

The cost of repair for any kit is $40.00 per hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair, and repacking and paperwork can take nearly an hour of paid employee time even on a simple kit. Of course, if we find a component that was defective in manufacturer, there will be no charge to the repair of your kit. (But please realize that our technicians know the difference between a defective component and parts burned out or damaged through improper use or assembly.)

Electronics Kit Return Policy

If you feel, for any reason, that you will have difficulty building any kit-based product purchased from us (and you cannot get assistance from a friend), you can return it for a refund (minus shipping costs) provided a Return Authorization (RA) number is obtained first from us by email. The items must be returned to use (insured against damage in transit) at the customer's expense and received by us in original condition (with all product packaging, documentation, and a copy of the original sales invoice) within 14 days of original invoice date. The RA number must be clearly stated on the shipping carton. Kits may not be returned for any form of refund or credit once the inner component packages have been opened or construction has been started.

Components Return Policy

Individually purchased components may not be returned for any reason. If you do not agree with this policy, please do not order.