microBrute Modulator

Instruction Manual

Eastern Voltage Research, LLC

AGE DISCLAIMER

THIS KIT IS AN ADVANCED, HIGH POWER SOLID STATE POWER DEVICE. IT IS INTENDED FOR USE FOR INDIVIDUALS OVER 18 YEARS OF AGE WITH THE PROPER KNOWLEDGE AND EXPERIENCE, AS WELL AS FAMILIARITY WITH LINE VOLTAGE POWER CIRCUITS.

BY BUILDING, USING, OR OPERATING THIS KIT, YOU ACKNOWLEDGE THAT YOU ARE OVER 18 YEARS OF AGE, AND THAT YOU HAVE THOROUGHLY READ THROUGH THE SAFETY INFORMATION PRESENTED IN THIS MANUAL.

THIS KIT SHALL NOT BE USED AT ANY TIME BY INDIVIDUALS UNDER 18 YEARS OF AGE.

SAFETY AND EQUIPMENT HAZARDS

PLEASE BE SURE TO READ AND UNDERSTAND ALL SAFETY AND EQUIPMENT RELATED HAZARDS AND WARNINGS BEFORE BUILDING AND OPERATING YOUR KIT.

THE PURPOSE OF THESE WARNINGS IS NOT TO SCARE YOU, BUT TO KEEP YOU WELL INFORMED TO WHAT HAZARDS MAY APPLY FOR YOUR PARTICULAR KIT.

PACEMAKER WARNING

THIS DEVICE WHEN CONNECTED TO A RESONATOR WILL PRODUCT ELECTRICAL AND MAGNETIC FIELDS. EXPOSURE TO THIS FIELD SHOULD BE LIMITED. DO NOT USE THIS KIT IF YOU HAVE AN IMPLANTED PACEMAKER OR OTHER BIOMEDICAL DEVICE!

ELECTRICAL HAZARD

This circuit utilizes dangerous line voltages up to 115VAC. Failure to handle this circuit in a safe manner may result in serious injury or death!

POWER SEMICONDUCTOR HAZARD

This is a solid state power device. Components may fail explosively at any time and eject high velocity projectiles.
EYE PROTECTION IS REQUIRED AT ALL TIMES!

ELECTROMAGNETIC FIELD HAZARD

This device when connected to a resonator will produce strong electric and magnetic fields. Exposure to this field should be limited.
DO NOT USE THIS KIT IF YOU HAVE AN IMPLANTED BIOMEDICAL DEVICE!

FIRE HAZARD

Due to high power dissipations of the the various semiconductors devices attached to the heatsink, the heatsink may become extremely hot, especially during periods of continuous operation. Please ensure the heatsink is not installed on or near any flammable material and that a cooling fan is ALWAYS used during operation.

SAFETY GUIDELINES FOR LINE POWERED EQUIPMENT

The electronic kit you purchased utilizes line voltages (115VAC) and also contains circuitry that produces output voltages in excess of 400VDC. Normally, consumer electronics equipment are safely enclosed to prevent accidental contact. However, the kit you have purchased does not come with an enclosure, and must be handled and operated with this in mind. Voltages exceeding 35V pose a safety hazard and depending on overall conditions and your general state of health, voltage and current levels have the ability to serious harm or even kill.

The following guidelines are to protect you from potentially lethal electrical shock hazards as well as the equipment from accidental damage.

It is also important to note that the danger isn't limited to only your body providing a conductive path, namely your heart. Any involuntary muscle contractions caused by an electrical shock, while perhaps harmless in themselves, may cause the person to be injured by falling, hitting a body part on something sharp, etc….

The purpose of these set of guidelines is not to frighten you, but rather make you aware of the appropriate precautions needed to safely build and operate this electronics kit.

- Perhaps, the number one rule – Don't work alone! If something does happen, it is extremely important to have someone nearby to render assistance or to call for help.
- When working on energized equipment (namely those that are line powered), always keep one hand in your pocket. This ensures there is not a complete electrical path through your heart providing you accidentally make contact with live voltage.
- Wear footfear with non-conductive (rubber) soles. Do NOT work on line powered or high voltage equipment in barefeet.
- Always wear eye protection. Power semiconductor devices, and capacitors do have the potential to explode unexpectedly and project sharp fragments across the room.
- Always work in a clean, open area. Avoid working in cluttered spaces, especially if there are grounded objects nearby that could complete a circuit path in the event you make accidental contact with live voltage.
- Avoid wearing any kind of jewelry or other articles that could accidentally contact circuitry.
- Never operate your PC boards on top of conductive tables, or other conductive objects. PC boards should ALWAYS be supported by the provided stand-offs or placed on top of a non-conductive tabletop or other material.
- ALWAYS allow proper time for any large electrolytic or other high voltage capacitors to discharge after removing power prior to working or touching any

circuit. ALWAYS use a multimeter to measure the voltage across large capacitors after power is disconnect to ensure the voltage has properly bled off.

- Use an isolation transformer if there is any chance of contacting line powered circuitry. A Variac is NOT an isolation transformer!
- Finally, if your kit involves a Tesla Coil – NEVER touch or attempt to draw an arc with an object from the output of a Tesla Coil. The output of a Tesla Coil poses not only an electrical hazard, but also a burn hazard. The output from even the smallest solid state Tesla Coil can cause serious burns. Always operate the Tesla Coil at a safe distance.

SAFETY GUIDELINES - SEMICONDUCTOR POWER DEVICES

- Always wear eye protection. Power semiconductor devices, and capacitors do have the potential to explode unexpectedly and project sharp fragments across the room.
- Power semiconductors may be extremely hot. NEVER touch any semiconductors during operation or after use. Always allow proper time for components to cool down prior to handling them.

SAFETY GUIDELINES – HIGH TEMPERATURE COMPONENTS

- Power semiconductors may be extremely hot. NEVER touch any semiconductors during operation or after use. Always allow proper time for components to cool down prior to handling them.
- The extruded aluminum heatsink will be extremely hot during and after use until it cools down to ambient temperature. NEVER place the heatsink on any material that is flammable such as wood, plastic, or paper. It is preferable to place the extruded aluminum heatsink onto a metal plate.
- NEVER operate the device without the use of a cooling fan. If you are using an extruded aluminum heatsink, be sure to blow fan parallel to the cooling fins of the heatsink to maximize the cooling effects of the fan. Always allow the cooling fan to continue running, even after power is removed, until the heatsink and board components are properly “cooled” down.

SAFETY GUIDELINES – ELECTROMAGNETIC FIELD OUTPUT

DO NOT USE THIS KIT if you have an implanted biomedical device such as a pacemaker!

- Electromagnetic fields are produced when the Tesla coil is operating. Ensure that you and others are always at least five feet away from the devices during operation (small kits), and farther away with some of the larger kits such as the miniBrute Tesla Coil kit.
- Avoid contact with metallic objects. This is mostly important for the smaller CW based Tesla coils such as the SSTC 1.0 or Class-E Audio Modulated Tesla Coil. What happens is that the electromagnetic fields cause charge to build up on your person and any contact with something metallic will initiate a potential RF burn to occur. The burns are on the magnitude of an electrostatic shock – they are rarely harmful, but they can surprise you and give you a small instant of localized pain – again similar in receiving a electrostatic shock. Maintaining at least five feet away from the Tesla coil will prevent his from occuring.
- DO NOT use this kit if you have an implanted biomedical device.

Introduction to the microBrute Modulator

Thank you for purchasing the microBrute Modulator / Interrupter Kit. The microBrute Modulator is a handheld controller (interrupter) that was specifically designed for use with the microBrute DRSSTC system. It features two potentiometers which the user can adjust in real time to control both the pulsewidth as well as the pulse repetition frequency (PRF) of the modulation (pulsing).
The microBrute Modulator can also be modified by the user to utilize different ranges of pulsewidths and PRFs to suit most any SSTC or DRSSTC system.

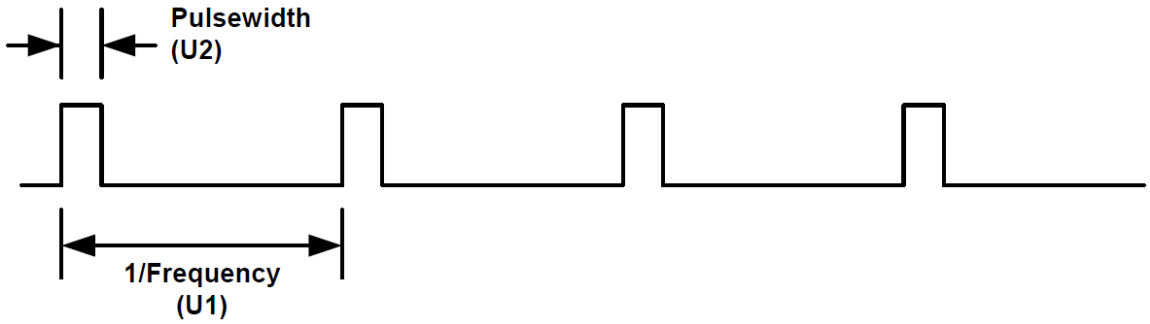
Notice to Beginners: If you are first time kit builder, you may find this instruction manual easier to understand than expected. Each component in this kit has an individual check box, while a detailed description of each component is provided as well. If you follow each step in the instruction manual 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 microBrute Modulator utilize two 555 Timer ICs to perform the pulse timing logic. 555 Timer, U1, runs in astable (continuous) mode, providing the PRF, of the modulation, while 555 Timer, U2, is configured as a monostable (single pulse) one-shot. U1 produces a continuous series of pulses, whose frequency is determined by the RC network comprised of C2, R2, and R3, and is adjustable by the user by varying potentiometer R3. The frequency of these pulses equate to the pulse repetition frequency (PRF) of the interrupter. Each of these pulses then triggers U2 to produce a one-shot pulse of some varying pulsewidth, which is determined by the RC network comprised of C7, R6, and R5. The pulsewidth of this one-shot can be varied by the user by adjusting potentiometer, R5. The figure on the next page shows the output timing of the modulator.

When operating the microBrute DRSSTC, power output is controlled by varying the pulsewidth, or R5. When pulsewidth is equal to “0”, the DRSSTC is in an OFF state. When pulsewidth is increased, the DRSSTC output power is gradually increased.

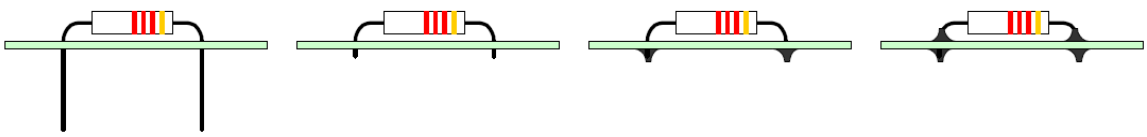


Kit Building Tips

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. 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 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 soldering from the backside. You can then remove the masking tape, apply a small amount of solder on the top to complete the joint.



microBrute Modulator Parts List

RESISTORS

- ❒ 1 1.5k Resistor (brown-green-red), R1
- ❒ 1 51k Resistor (green-brown-orange), R2
- ❒ 1 1k Resistor (brown-black-red), R4
- ❒ 1 100k Resistor (brown-black-yellow), R7
- ❒ 1 100k Panel Mount Potentiometer, R3
- ❒ 1 10k Panel Mount Potentiometer, R5
- ❒ 1 750 ohm Resistor (violet-green-black), R8

CAPACITORS

- ❒ 3 0.1uF Capacitor, C1,C2,C5
- ❒ 1 0.015uF Capacitor, C7
- ❒ 3 0.01uF Capacitor, C3,C4,C6

DIODES

- ❒ 1 Diode, 1N4002, CR1
- ❒ 1 LED (red or green), Panel Mount, D1

INTEGRATED CIRCUITS (ICs)

- ❒ 2 555 Timer, U1,U2

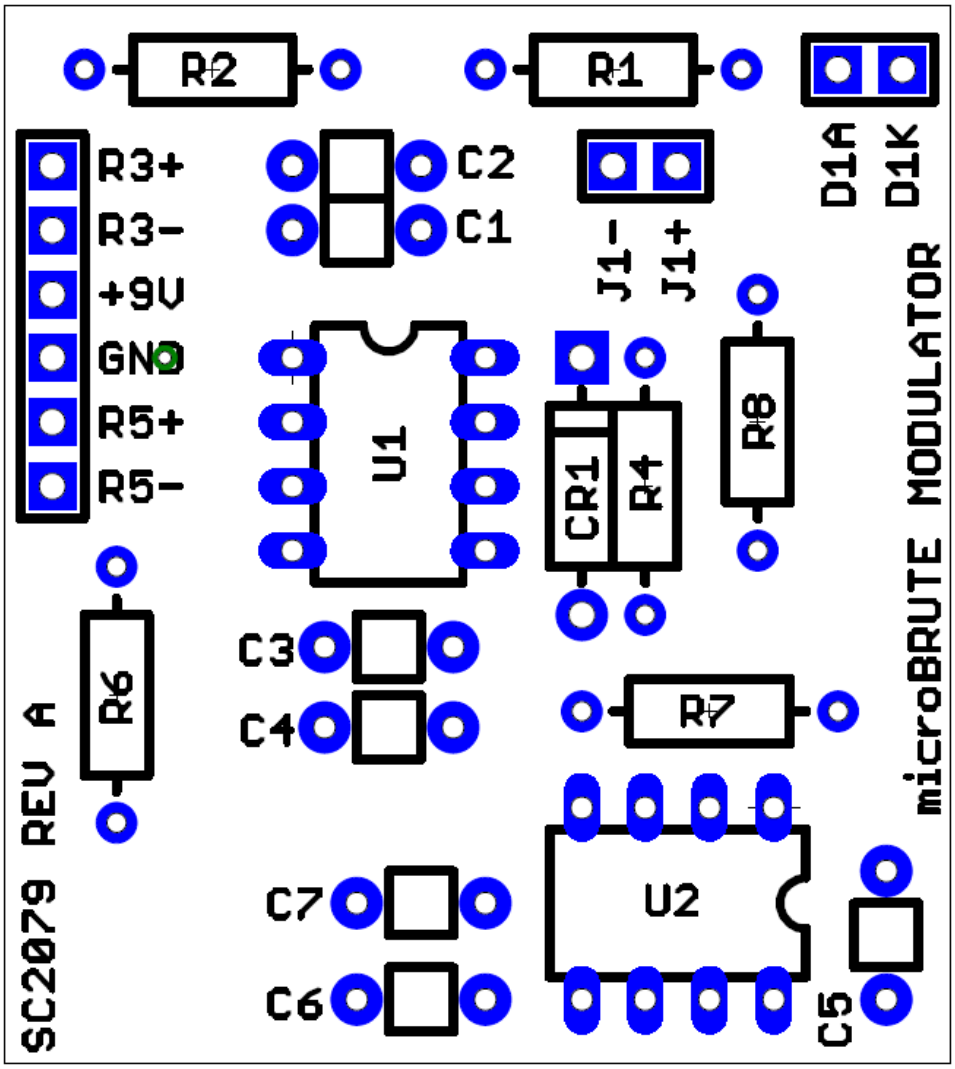
MISCELLANEOUS

- ❒ 1 Connector, RCA, Female, J1
- ❒ 1 Plastic Enclosure
- ❒ 1 9V Battery Connector, BAT1
- ❒ 1 Panel Switch, ON-OFF, SW1
- ❒ 2 Knob, 1/8” Shaft
- ❒ 1 Front Panel Plate
- ❒ 1 Misc. Hardware
- ❒ 1 Misc. Hook-up Wire

REQUIRED, NOT SUPPLIED

- ❒ 1 9V Battery

microBrute Modulator 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…

Please note that these Revision A instructions apply only to REV A of the microBrute Modulator Board. Please ensure the board you are working on matches that shown on the previous page and is marked SC2079 REV A. If it is not, please use the earlier revision instruction manual.

Okay, so lets begin!

❒ 1. Install R1, 1.5k resistor (brown-green-red)

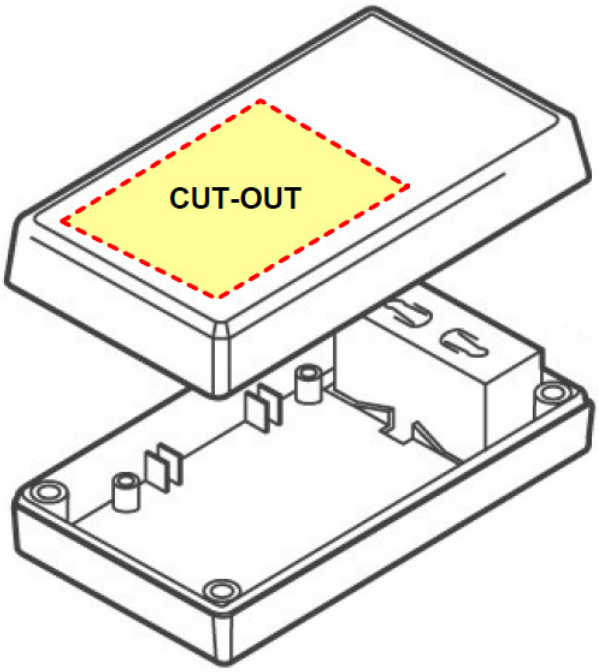
❒ 2. Install R2, 51k resistor (green-brown-orange)

- ❒ 3. Install R4, 1k resistor (brown-black-red)
- ❒ 4. Install R8, 750 ohm resistor (violet-green-black)
- ❒ 5. Install a jumper (short) in the R6 location. You can use the excess lead that you cut off from another resistor to do this.
- ❒ 6. Install R7, 100k resistor (brown-black-yellow)
- ❒ 7. Install CR1, 1N4002 diode. The cathode band on the diode must match that shown on the silkscreen.
- ❒ 8. Install C1, 0.1uF capacitor (marking BC104)
- ❒ 9. Install C2, 0.1uF capacitor (marking BC104)
- ❒ 10. Install C5, 0.1uF capacitor (marking BC104)
- ❒ 11. Install C3, 0.01uF capacitor (marking BC103 or M39014-1455)
- ❒ 12. Install C4, 0.01uF capacitor (marking BC103)
- ❒ 13. Install C6, 0.01uF capacitor (marking BC103)
- ❒ 14. Install C7, 0.015uF capacitor (marking BC153)
- ❒ 15. Install U1, 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.
- ❒ 16. Install U2, 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.

❒ 17. Solder approx. 3-4" of wire lead to each of the following locations on the PCB board:

a. J1+
b. J1-
c. +9V
d. R3+
e. R3-
f. R5+
g. R5-

❒ 18. Using a utility knife or scroll saw, cut out a rectangular hole as shown in the figure below. EXTREMELY IMPORTANT - First line up the both the top and bottom piece of the enclosure and fit together. You want to ensure to cut the right end of the top piece of the enclosure as there are two stand-offs which will interfere with the battery compartment if you cut the wrong end of the top piece of the enclosure.



❒ 19. Using a 1/4" Drillbit, drill a hole approximately 2/3rd across the top of the end of the top piece of the enclosure, as shown in the figure below, for the RCA connector, J1. Be sure not to drill in a location that will interfere with the internal stand-off.

❒ 20. First, use rubbing alcohol to clean the top surface of the enclosure where the control plate will be installed. Next, carefully peel away the adhesive backing on the control plate, position it, and then press firmly to stick it in place. Apply lots of pressure over all areas of the control plate to ensure good contact with the enclosure surface.

❒ 21. First, using a multimeter, determine which switch position of the switch is the ON position. This ON position will be the top of the switch. Press fit SW1, ON-OFF rocker switch into the front control plate cut-out. The ON position will be pointing up.

❒ 22. Press fit D1, panel mount LED into the front control panel hole. This hole is directly to the right of the rocker switch. If the LED is loose, you may use epoxy (not supplied) or a similar adhesive to secure it in place.

❒ 23. Install R3, 100k potentiometer, into the RIGHTMOST front control plate potentiometer location. Secure in place using the included lock washer and nut. Be sure not to overtighten the nut as you may damage the potentiometer.

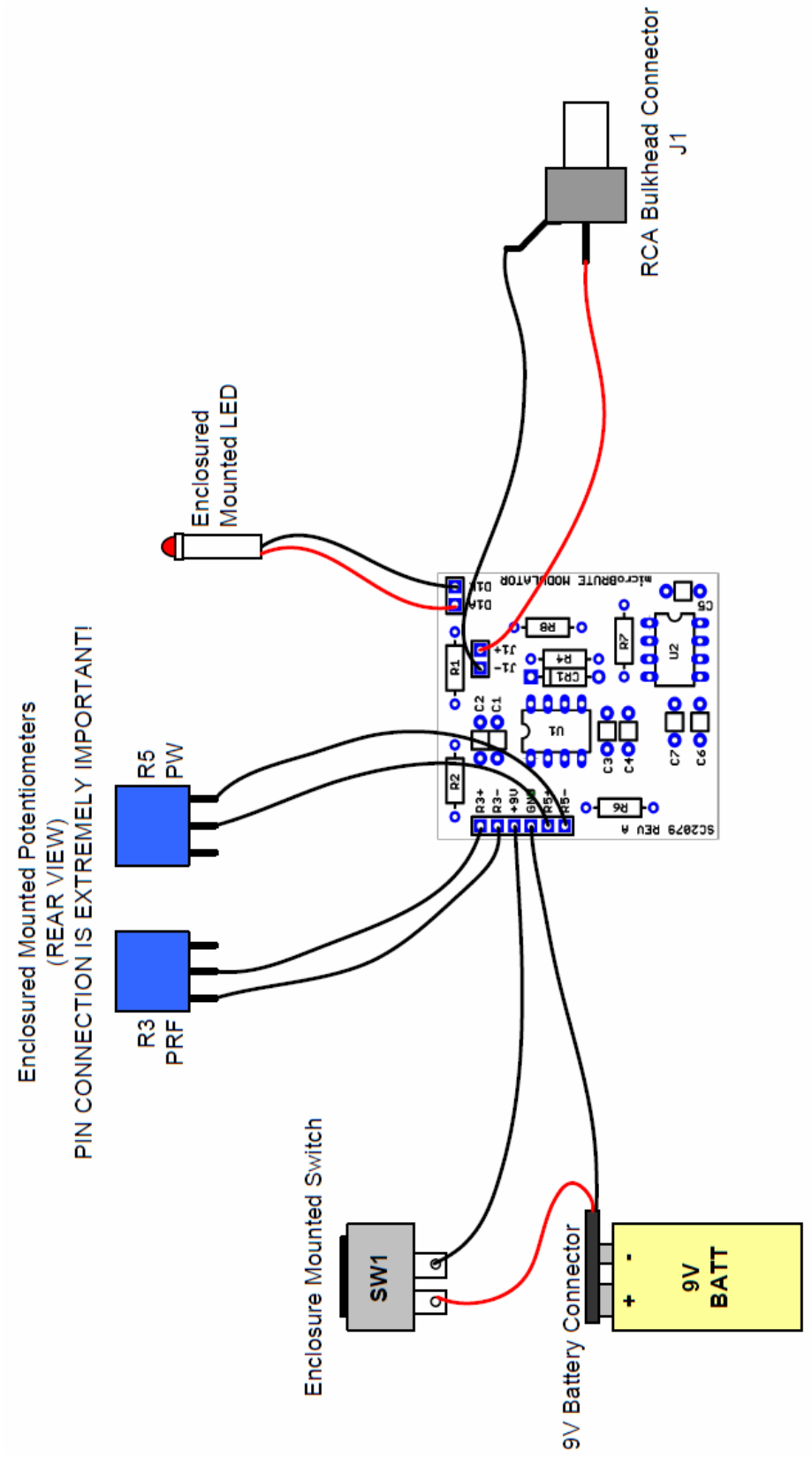
❒ 24. Install R5, 10k potentiometer, into the LEFTMOST front control plate potentiometer location. Secure in place using the included lock washer and nut. Be sure not to overtighten the nut as you may damage the potentiometer.

❒ 25. Connect BAT1 and SW1 to the PC board as shown in the figure below. Be sure to ensure proper polarity during connection, or you may damage the active components such as U1 and U2.

❒ 26. Connect D1 to the PC board as shown in the figure below. The black lead of the panel mount LED should be connected to the pad of D1 designated with a "K" as this is the cathode.

❒ 27. Connect R3, 100k potentiometer, to the PC board as shown in the figure below. Be sure to connect the wires to the potentiometer pins EXACTLY as shown in the figure below to ensure that the PRF adjusts in the correct direction when turning the potentiometer. **This is VERY important otherwise you risk damage to the microBrute DRSSTC as your controller will work in reverse.**

❒ 28. Connect R5, 10k potentiometer, to the PC board as shown in the figure below. Be sure to connect the wires to the potentiometer pins EXACTLY as shown in the figure below to ensure that the PW adjusts in the correct direction when turning the potentiometer. **This is VERY important otherwise you risk damage to the microBrute DRSSTC as your controller will work in reverse.**



Congratulations! You have just completed your microBrute Modulator 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 (not required, but can be useful if you wish to verify timing)

❒ 1. Connect the 9V battery to the battery connector and turn the power switch ON. Using a multimeter, verify the voltages below:

Check	Component	Measuring Point	Voltage
❒	U1	Pin 8 (Vcc)	9V ± 0.5V
❒	U1	Pin 4 (Reset)	9V ± 0.5V
❒	U2	Pin 8 (Vcc)	9V ± 0.5V

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

❒ 2. Verify that LED, D1, is illuminated. If it is not, and the voltages above are correct, the LED may be installed backwards.

❒ 3. If you have an oscilloscope, connect channel 1 scope probe to the output of the microBrute Modulator at J1. Verify that the pulsewidth adjustment of the modulator is approximately from 0 to 180us. Pulsewidth should NOT exceed 200us.

❒ 4. If you have an oscilloscope, connect channel 1 scope probe to the output of the microBrute Modulator at J1. Verify that the pulse repetition frequency (PRF) adjustment of the modulator is approximately 50Hz to 150Hz.

Congratulations! Your microBrute Modulator is now completed and operational.

Troubleshooting

PROBLEM: No output.
SOLUTION: Check to see that 9V battery connect is installed properly.

PROBLEM: LED is not illuminating.
SOLUTION: LED may be installed backwards.

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

Before opening or assembling 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

Military Dash Number Identification (M39014/01-xxxx) – Ceramic Capacitors

Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
CKR05 (BX)						
1201	1241	1281	1321	10	10	200
1202	1242	1282	1322	10	20	200
1203	1243	1283	1323	12	10	200
1204	1244	1284	1324	15	10	200
1205	1245	1285	1325	15	20	200
1206	1246	1286	1326	18	10	200
1207	1247	1287	1327	22	10	200
1208	1248	1288	1328	22	20	200
1209	1249	1289	1329	27	10	200
1210	1250	1290	1330	33	10	200
1211	1251	1291	1331	33	20	200
1212	1252	1292	1332	39	10	200
1213	1253	1293	1333	47	10	200
1214	1254	1294	1334	47	20	200
1215	1255	1295	1335	56	10	200
1216	1256	1296	1336	68	10	200
1217	1257	1297	1337	68	20	200
1218	1258	1298	1338	82	10	200
1219	1259	1299	1339	100	10	200
1220	1260	1300	1340	100	20	200
1221	1261	1301	1341	120	10	200
1222	1262	1302	1342	150	10	200
1223	1263	1303	1343	150	20	200
1224	1264	1304	1344	180	10	200
1225	1265	1305	1345	220	10	200
1226	1266	1306	1346	220	20	200
1227	1267	1307	1347	270	10	200
1228	1268	1308	1348	330	10	200
1229	1269	1309	1349	330	20	200
1230	1270	1310	1350	390	10	200
1231	1271	1311	1351	470	10	200
1232	1272	1312	1352	470	20	200
1233	1273	1313	1353	560	10	200
1234	1274	1314	1354	680	10	200
1235	1275	1315	1355	680	20	200
1236	1276	1316	1356	820	10	200
1237	1277	1317	1357	1,000	10	200
1238	1278	1318	1358	1,000	20	200
1239	1279	1319	1359	1,200	10	100
1240	1280	1320	1360	1,500	10	100
1441	1481	1521	1561	1,500	20	100
1442	1482	1522	1562	1,800	10	100
1443	1483	1523	1563	2,200	10	100
1444	1484	1524	1564	2,200	20	100
1445	1485	1525	1565	2,700	10	100
1446	1486	1526	1566	3,300	10	100
1447	1487	1527	1567	3,300	20	100
1448	1488	1528	1568	3,900	10	100
1449	1489	1529	1569	4,700	10	100
1450	1490	1530	1570	4,700	20	100
1451	1491	1531	1571	5,600	10	100
1452	1492	1532	1572	6,800	10	100
1453	1493	1533	1573	6,800	20	100
1454	1494	1534	1574	8,200	10	100
1455	1495	1535	1575	10,000	10	100
1456	1496	1536	1576	10,000	20	100
1457	1497	1537	1577	12,000	10	50
1458	1498	1538	1578	15,000	10	50
1459	1499	1539	1579	15,000	20	50
1460	1500	1540	1580	18,000	10	50
1461	1501	1541	1581	22,000	10	50
1462	1502	1542	1582	22,000	20	50
1463	1503	1543	1583	27,000	10	50
1464	1504	1544	1584	33,000	10	50
1465	1505	1545	1585	33,000	20	50
1466	1506	1546	1586	39,000	10	50
1467	1507	1547	1587	47,000	10	50
1468	1508	1548	1588	47,000	20	50
1469	1509	1549	1589	56,000	10	50
1470	1510	1550	1590	68,000	10	50
1471	1511	1551	1591	68,000	20	50
1472	1512	1552	1592	82,000	10	50
1473	1513	1553	1593	100,000	10	50
1474	1514	1554	1594	100,000	20	50

Military Dash Number Identification (M39014/02-xxxx) – Ceramic Capacitors

Failure Rate Level (%/1,000 Hours)				Capacitance (pF)	Capacitance Tolerance ±Percent	WVDC
1.0 (M)	0.1 (P)	0.01 (R)	0.001 (S)			
CKR06 (BX)						
1201	1241	1281	1321	1200	10	200
1202	1242	1282	1322	1500	10	200
1203	1243	1283	1323	1500	20	200
1204	1244	1284	1324	1800	10	200
1206	1246	1286	1326	2200	10	200
1207	1247	1287	1327	2200	20	200
1208	1248	1288	1328	2700	10	200
1209	1249	1289	1329	3300	10	200
1210	1250	1290	1330	3300	20	200
1211	1251	1291	1331	3900	10	200
1212	1252	1292	1332	4700	10	200
1213	1253	1293	1333	4700	20	200
1214	1254	1294	1334	5600	10	200
1215	1255	1295	1335	6800	10	200
1216	1256	1296	1336	6800	20	200
1217	1257	1297	1337	8200	10	200
1218	1258	1298	1338	10,000	10	200
1219	1259	1299	1339	10,000	20	200
1231	1271	1311	1351	12,000	10	100
1220	1260	1300	1340	15,000	10	100
1221	1261	1301	1341	18,000	10	100
1222	1262	1302	1342	22,000	10	100
1232	1272	1312	1352	27,000	10	100
1223	1263	1303	1343	33,000	10	100
1224	1264	1304	1344	39,000	10	100
1225	1265	1305	1345	47,000	10	100
1226	1266	1306	1346	56,000	10	100
1227	1267	1307	1347	68,000	10	100
1229	1269	1309	1349	82,000	10	100
1230	1270	1310	1350	100,000	10	100
1233	1273	1313	1353	120,000	10	50
1234	1274	1314	1354	150,000	10	50
1235	1275	1315	1355	180,000	10	50
1236	1276	1316	1356	220,000	10	50
1237	1277	1317	1357	270,000	10	50
1238	1278	1318	1358	330,000	10	50
1239	1279	1319	1359	390,000	10	50
1240	1280	1320	1360	470,000	10	50
1404	1408	1412	1416	560,000	10	50
1405	1409	1413	1417	680,000	10	50
1406	1410	1414	1418	820,000	10	50
1407	1411	1415	1419	1,000,000	10	50