

SWCTRL Parts List

Item	Qty	Reference	VALUE	PART DESC
1	5	TAKAMSAWA	NAS5W-K (FUJISTA)	At typical slow repetition rates, with our zero-current switching technique, relay should last 1,000s of hours. In fast repetition rate applications, it might need to be replaced more often. GELLER has obtained a very large quantity of this part for academic and amateur science use. We will supply a quantity (TBD) of this part with each kit. Carefully fold (as with long nose pliers) the long SMT leads down to fit into the gold MillMax contact jacks. This relay includes a rare-earth magnet for fast switching.
2	10	pin sockets	SIP	Gold MILL-MAX pin jack, PN 0501-0-15-15-30-27-04-0, place on a relay to hold in place for rear-side soldering, it is also possible to heat the pins from the rear and to very carefully feed a small diameter solder to the front side pads for more rigid construction, such as for field use where more frequent relay changes are anticipated., R8 posts
3	3	Terminal Block	WEGO 141-3, 141-C-111/03	Allied Electronics 924-0174, WECO Screw Connector; 3; 30 to 14 AWG; 10 A (UL Rating), 15 A (CSA Certified); 300 V. (WECO blocks slide-lock together to get 4, 5, or 6 terminals)
4	3	Terminal Block	WEGO 141-2, 141-C-111/02	Allied Electronics 924-0173, WECO Screw Connector; 2; 30 to 14 AWG; 10 A (UL Rating), 15 A (CSA Certified); 300 V. (WECO blocks slide-lock together to get 4, 5, or 6 terminals)
5	2	R1,2	10 ohms	1% metal film, 1/4W, Mouser 271-10-RC (note that most of the Q1 bias R is provided by an internal 4.7 k ohm R within the USB-6008 module).
6	1	R8	1.1 k ohms	1% metal film, 1/4W, Mouser
7	1	R3	499 ohms	1% metal film, 1/4W, Mouser 271-499-RC.
8	1	R4	4.99 k ohms	1% metal film, 1/4W, Mouser 271-4.99K-RC.
9	2	R21,22	35.7 k ohms	1% metal film, 1/4W, Mouser 271-35.7K-RC (size for power indicating LEDs, try to keep current very low, e.g. under 200 uA).
10	1	Q1	2N3904	any suitable NPN switching transistor, relay draws about a 30 mA coil current.
11	1	Q2	2N3905	also 2N3906, any suitable PNP switching transistor, about 10 mA on current.
12	1	FET	IRFI1310N	NMOS Power FET, VD _{ss} 100 V, EAS is 420 mJ, ultra low on R, this part is very conservative. The part does not heat (no heat sink needed) in normal operation Digkey IRFI1310NPBF-ND.

13	1	D1	General purpose rectifier, 1N4004 or equivalent (e.g. any suitable 1N400n series).
14	2	C21,24	0.1 μ f Kemet ceramic, Mouser 80-C315C104M5U
15	1	C1	1 nf FILM 1000PF 400VDC RADIAL, EPCOS MKT series, Digikey 495-2564-ND .
15	1	C23	150 μ f Nichicon 150 μ f, 50V, low impedance electrolytic, Mouser UHE1H151MPD
16	N	Resonating Film Cs	Use high quality film capacitors, such as the Kemet MMK polyester film series from Mouser (e.g. Mouser 80-MMK5153K50J01L4). Use a variety of values that add up to what you need for your local resonant frequency and the inductance of your center-tapped counter-wound coil pair. Each of our 600 turn coils has an inductance of about 17.6 mH, so the center-tapped counter-wound coil pair has an inductance of ~35 mH. We provide lead spacings of 5mm, 7.5 mm, and 15 mm to give maximum flexibility in providing a range of Cs. You can use a binary combination of values, however, there does not need to be any special relationship between the values, it is only important that they add up to your needed resonance value.
18	2	Header strip	14 pin header strip(s) to select capacitors from the capacitor resonating bank. Use two 1x14 or one 2x14 strip. If using two 1x4 strips, put on a couple of the shorting blocks when soldering to hold the correct spacing.
19	14	shorting blocks	header shorting or jumper blocks. Use as many as needed to select a combination of capacitors that resonates with your center-tapped counter-wound coil pair at your local nominal magnetic field (i.e. the local nominal Larmor frequency).
20	4	4-40 standoffs	general purpose hardware (if you experiment with nylon, note that chassis common is made through one of the conductive metal corner posts).
21	4	4-40 screws	general purpose hardware
22	4	4-40 nuts / lock washers	general purpose hardware
23	2	LED	Any LED visible at about 50 to 100 μ A (to save battery life), some ultra brightness types work well.
24	4	Test Points	Bend from #18 solid copper wire.
25	1	Aluminum Box	Hammond 1590BB, Digikey HM152-ND .
26	1	SWCTRL PCB	Custom PCB, www.gellerlabs.com