

Bill of Materials

REFDES	Quantity	Value	Tolerance	Function	MFG	MFG P/N	Part Description	Package	Datasheet Link	Vendor	Vendor P/N	Comments
CONNECTORS												
Connectors												
P1, P2	2	---	---	Battery Connection - Screw Terminal	TE Connectivity / AMP	282834-2	Fixed Terminal Blocks 2P SIDE ENTRY 2.54mm	TH - 2.54mm pitch	http://www.te.com/catalog/pn/en/	Mouser	571-282834-2	This part is generic.
P3, P4	2	DNI	---	Alternate Input Connection Block - Screw Terminal	TE Connectivity / AMP	282834-3	Fixed Terminal Blocks 3P SIDE ENTRY 2.54mm	TH - 2.54mm pitch	http://www.te.com/catalog/pn/en/	Mouser	571-2828343	This part is generic.
BP1	1	YELLOW	---	Input Connector - Binding Post	Johnson / Emerson Connectivity Solutions	111-0107-001	Test Plugs & Test Jacks BINDING POST YELLOW	Panel Mount - Solder or Screw	http://emersonconnectiv	Mouser	530-111-0107-1	This part is generic.
BP2	1	WHITE	---	Input Connector - Binding Post	Johnson / Emerson Connectivity Solutions	111-0101-001	Test Plugs & Test Jacks BINDING POST WHITE	Panel Mount - Solder or Screw	http://emersonconnectiv	Mouser	530-111-0101-1	This part is generic.
BP3	1	BLACK	---	Input Connector - Binding Post	Johnson / Emerson Connectivity Solutions	111-0103-001	Test Plugs & Test Jacks BINDING POST BLACK	Panel Mount - Solder or Screw	http://emersonconnectiv	Mouser	530-111-0103-1	This part is generic.
BP4, BP5, BP6	3	RED	---	Input Connector - Binding Post	Johnson / Emerson Connectivity Solutions	111-0102-001	Test Plugs & Test Jacks BINDING POST RED	Panel Mount - Solder or Screw	http://emersonconnectiv	Mouser	530-111-0102-1	This part is generic.
BNC1, BNC2, BNC3, BNC4	4	---	---	Output Connector - BNC	TE Connectivity / AMP	5227161-6	RT/A BNC 50 Ohms, PCB-Mount	Through-Hole with Panel-Mount Face, Right-Angle Launch	http://www.te.com/catalog/pn/en/	Mouser	571-5227161-6	This part is generic.
RESISTORS/JUMPERS												
Resistors/Jumpers												
G1, G3, G4, G5	4	11k	1%	Gain Resistor for U1, U3, U4, U5 (respectively)	Yageo	MFR-25FBF52-11K	RES 11K OHM 1/4W 1% AXIAL	TH	http://www.yageo.com/documents/rec	Digikey	11.0KXBK-ND	This part needs 1% tolerance.
R1	1	2M	1%	Single-Pole HPF - goes between differential amplifier gain stages	Stackpole Electronics Inc.	RNF14FTD2M00	RES 2M OHM 1/4W 1% AXIAL	TH	http://www.seielect.com/Catalog/SEI-RNF_RNMF.pdf	Digikey	RNF14FTD2M00C1	This part is generic (it doesn't really need 1% tolerance).
R2	1	2.1k	1%	Gain Resistor for U2	Yageo	MFR-25FBF52-2K1	RES 2.1K OHM 1/4W 1% AXIAL	TH	http://www.yageo.com/documents/rec	Digikey	2.10KXBK-ND	This part needs 1% tolerance.
R3, R4, R5, R6, R7, R8	6	43k	5%	Offset Adjust leg resistors	Panasonic Electronic Components	ERD-S2TJ433V	RES 43K OHM 1/4W 5% AXIAL	TH	http://industrial.panasonic.com/www-data/pdf/AA0000/	Digikey	P43KBACT-ND	PART IS OBSOLETE! Needs replacement identified.
R9, R10	2	300	5%	Indicator LED limit resistors	Stackpole Electronics Inc.	CF14JT300R	RES 300 OHM 1/4W 5% CARBON FILM	TH	http://www.seielect.com/catalog/SEI-CF_CFM.pdf	Digikey	CF14JT300RCT-ND	This part is generic (size it to match how bright you want the indicator LEDs to be - but remember that brightness costs you battery life).
R11	0	DNI	---	this is a bug/error (with C2)	---	---	---	---	---	---	---	---
R12, R13, R14	0	DNI	---	Jumpers (0 Ohm) - Connects P3 pins to BP1, BP2 and BP3 (respectively)	---	---	---	---	---	---	---	This part is generic.
CAPACITORS												
Capacitors												
C1, C20, C22	3	1uF	10%	C1 = Single-Pole HPF - goes between differential amplifier gain stages. C20, C22 = Decoupling Capacitors	TDK Corporation	FK28X5R1A105K	CAP CER 1UF 10V 10% RADIAL	TH, RADIAL	http://product.tdk.com/capacitor/leadr	Digikey	445-2851-ND	This part is generic.
C2	0	DNI	---	this is a bug/error (with R11)	---	---	---	---	---	---	---	---
C3, C5, C7, C9, C11, C14, C15, C18, C19	9	0.47uF	10%	Decoupling Capacitor (two per IC)	Vishay BC Components	K474K20X7RF5UH	CAP CER 0.47UF 50V 10% RADIAL	TH, RADIAL	http://www.vishay.com/docs/45171/ksi	Digikey	BC2689CT-ND	This part is generic.
C4, C6, C8, C10, C12, C13, C16, C17, C21	9	0.1uF	10%	Decoupling Capacitor (two per IC)	Vishay BC Components	K104K15X7RF5TL2	CAP CER 0.1UF 50V 10% RADIAL	TH, RADIAL	http://www.vishay.com/docs/45171/ksi	Digikey	BC1084CT-ND	This part is generic.
POTENTIOMETERS												
Potentiometers												
POT1, POT2, POT3	3	10k	20%	Offset Adjust Knob for Single-Ended Amplifiers	Panasonic Electronic Components	EVU-F2AF30B14	POT 10K OHM 9MM VERT NO BUSHING	TH	http://www.panasonic.com/industrial/comp	Digikey	P3C3103-ND	This part was selected for its value (10k), its linearity, its shaft type, and its shaft length.
SWITCHES												
Switches												
S2	1	SPDT, 0.4VA, 28V	---	Power Toggle Switch	NKK Switches	M2012SS1G03	SWITCH TOGGLE SPDT 0.4VA 28V	TH, Panel-Mount	http://www.nkswitches.com/pdf/MtogglesB	Digikey	360-1800-ND	This part is fairly generic. It was picked because it's got a nice clicking action and it's panel-mount SPDT.
ACTIVE COMPONENTS												
Active Components												
Q1, Q2	2	---	---	Power Supply N-Fet - Connects Batteries to respective power supply rails when S2 is toggled.	Alpha & Omega Semiconductor Inc	AOD4102	MOSFET N-CH 30V 19A TO-252	SMT, TO-252	http://www.aosmd.com/res/data_sheet	Digikey	785-1104-1-ND	PART IS OBSOLETE! Needs replacement identified.
U1, U3, U4, U5	4	G = 10	---	Instrumentation Amplifier - Gain = 10	Analog Devices	AD623ANZ	IC AMP INST R-R LP 8DIP	8-DIP	http://www.analog.com/static/imported	Digikey	AD623ANZ-ND	This part was specifically picked for its performance.
U2	1	G = 100	---	Instrumentation Amplifier - Gain = 100	Analog Devices	AD627ANZ	IC AMP INST R-R 25MA 8DIP	8-DIP	http://www.analog.com/static/imported	Digikey	AD627ANZ-ND	This part was specifically picked for its performance.
LEDS/DIODES												
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VEE_LED, VCC_LED	2	RED	---	Power Supply Indicator LEDs	Everlight Electronics Co. Ltd.	MV8112	LED SS ALGAAS SUP RED CLEAR 5MM	TH, RADIAL	http://media.digikey.com/PDF/Data%20Sheets/Everlight	Digikey	1080-1134-ND	This part is generic (pick any same-sized LED you like, as long as Vf < 2.5V).
OTHER ELECTRICAL/MECHANICAL ASSEMBLY PARTS (NOT IN CIRCUIT, SO NOT NOTED ON SCHEMATIC)												
Other Parts												
Enclosure	1	---	---	Holds it all together	LBM Heager	KAB3432-BLK	Die Cast Enclosure Semi-Gloss BLACK	4-11/16"L x 3-11/16"W x 2-7/32" H	http://www.minute-man.com/acatalog/LMB	Minute Man Electronics	LMB Heeger KAB-3432BLK	This part requires hand-modifications to the lid and body in order to accommodate the: switch, potentiometer shafts, binding posts, and BNC connectors.

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Potentiometer Knobs	3	---	---	Knobs fit over potentiometer slotted-D shaft. Act as indicator, make it easier to adjust the potentiometer, and also help hold the board to the enclosure lid.	Eagle Plastic Devices	450-4760	Knobs & Dials SOFT TOUCH D SHAFT	---	http://www.mouser.com/ds/2/209/EPD-	Mouser	450-4760	This part is generic.
Battery Holders	2	2xAA	---	The batteries! One battery pack provides the +3V supply (via P1), the other provides the -3V supply (via P2).	Eagle Plastic Devices	12BH325/C-GR	Battery Holders, Snaps & Contacts 2XAA 6" LDS COVER	---	http://www.mouser.com/ds/2/209/EPD-	Mouser	12BH325/C-GR	This part is pretty generic - the important feature here is that it have a lid (or way to lock in the batteries well) and pigtail leads instead of pins.
IC DIP Sockets	5	---	---	Allows Removal/Repair of Instrumentation Amplifiers (because they're expensive!)	TE Connectivity / AMP	1-390261-2	CONN IC SOCKET VERT 8POS TIN	8-DIP	http://www.te.com/commerce/Doc	Digikey	A100204-ND	This part is generic.
BNC Sealing Rings	4	---	---	Used with a nut to improve splash-protection	TE Connectivity / AMP	330620	RF Connectors INSULATION BUSHING	---	http://www.te.com/catalog/pn/en/	Mouser	571-330620	This part can't easily be fudged.
BNC Panel-Mount Nut (i.e. a "Jam Nut")	4	1/2-28 UNEF-28 (extra fine threaded nut - 0.109 inches thick)	---	Holds the BNC connector into the enclosure body, and seals against the sealing ring.	TE Connectivity / AMP	1-329631-2	JAM NUT 0.623" BRASS 1/2-28	1/2-28 threaded	http://www.te.com/commerce/Doc	Digikey	A1128-ND	These guys are also often called "Panel Mount Nuts." It would be great if they shipped with the BNC connectors, but that's not super-common. So, you have to buy them separately.
PCB	1	Version 1.0	---	---	Advanced Circuits	---	Custom PCB	---	---	Advanced Circuits	---	This part is custom. Use the provided gerbers and fab up a PCB!
Miscellaneous Assembly Materials	MISCELLANEOUS ASSEMBLY MATERIALS											
Double-Sided Foam Tape	2	1 inch strips	---	Use to affix the battery holders to the bottom of the enclosure and keep things from rattling around.	---	---	---	---	---	---	---	This part is epically generic. Pick your favorite double-sided foam tape from your local office supply or hardware store.
Epoxy	1	---	---	Use to make fake light-pipes for the enclosure (because drilling press-fit holes for real light pipes can be a pain)	---	---	---	---	---	McMaster-Carr	7556A33	Any clear, 1-5 minute, aluminum-bonding 2-part epoxy will work for this. Pick it up at your local hardware store because they tend to have a good selection of 3-5 minute translucent 2-part epoxies in easy-to-use dispensing syringes. I've also provided a McMaster-Carr P/N for a 1-minute epoxy that should work.
END OF BILL OF MATERIALS												