

Code Practice Oscillator (CPO)

Overview

Many thanks for your purchase of this code practice oscillator or CPO, this guide is intended to allow you to quickly get operational.

The CPO comprises an approx. 2 x 3 inch pcb that contains the oscillator and a small amplifier. The oscillator is based on the Twin T circuit configuration and produces a tone that is much closer to the side-tone produced by a transceiver. The oscillator output feeds an amplifier built around the LM386. This amplifier allows the oscillator to be used with a loudspeaker if required or headphones.

Operation & Use

Please refer to the photo on the next page to help identify the components on board.

The CPO requires 9 volts DC to operate, but can tolerate up to 13.8 volts DC, this voltage can be supplied by a battery or bench power supply. The power jack is a 5.1 mm barrel jack with center positive connection. After plugging in suitable power attach the Morse code key to be used, by means of the screw terminal block marked "Key Jack", this is a non-polarized connection. Plug a loudspeaker into the 3.5 mm jack plug socket. The loudspeaker may be 4 – 8 ohms, 8 ohms gives optimal results.

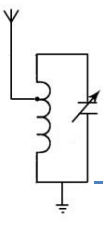
Before switching on the unit, adjust the AF gain potentiometer to the mid-way point, the potentiometer has a detent at the mid-point, to help identify it.

When all connections have been made, move the on/off switch to the On position. Closing the code key at this time will produce the oscillator tone.

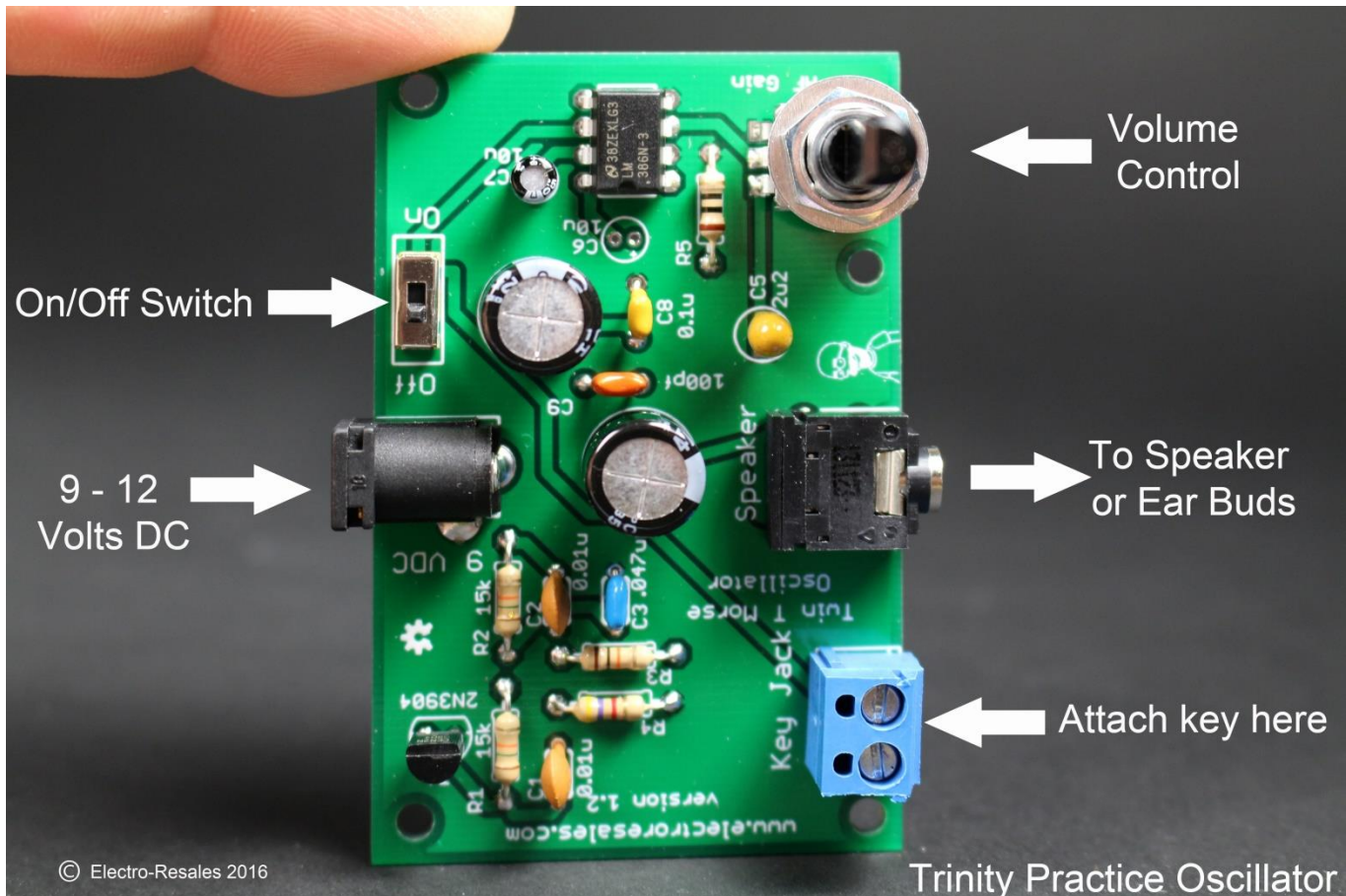
If it is preferred to practice quietly, ear phones or ear buds may be employed. Before inserting headphones make sure the AF gain control is full anti-clockwise when the AF Gain control is on the right side with the PCB facing you.

After inserting the head set slowly advance the gain control while keying the oscillator, until a satisfactory listening volume is achieved

You are now ready to practice or improve your Morse code sending proficiency. Good luck!



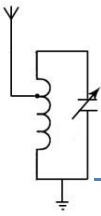
CPO layout and external connection diagram



Troubleshooting

The CPO has been designed and built to give trouble free operation; however, problems can occur, these pointers may help resolve any issues;

1. No audio – Check AF Gain control is rotated to its mid-point detent
2. No audio – check that a fresh battery is being used, try another battery
3. No audio – check the key is making a good contact, try shorting the screw terminals with a piece of wire
4. Clicks when key is pressed, no audio – replace battery, use DC power supply



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Kit Builders guide

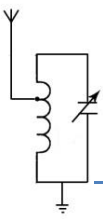
If you have purchased the CPO kit, these instructions are intended to guide you in getting the CPO constructed.

Parts List

The complete parts list, please note C6 is supplied, but not installed, C4 does not exist. Note some components are polarized; there orientation on the board is important.

Part Name	Part Number	Part Value	Part Identification
Resistor	R1 & R2	15 K	Brown Green Orange
	R3	10 K	Brown Black Orange
	R4	4.7 K	Yellow Purple Red
	R5	10 Ohm	Brown Black Black
Capacitor	C1 & C2	0.01uF	Marked 103
	C3	0.047uF	Marked 473
	C5	2.2uF	Polarized Tantalum
	C6 & C7	10uF	Polarized Electrolytic
	C8	0.1uF	Marked 104
	C9	100pF	Marked 101
	C10 & C11	470uF	Polarized electrolytic
Potentiometer	AF Gain	10 K	PCB Mount – marked 103
Semiconductors	T1	2N3904	Black plastic transistor, marked 2N3904
	IC	LM386	8 Pin DIP package, marked LM386-3
Hardware	Key Jack		Blue 2 pin screw terminal block
	Speaker Jack		3.5 mm black PCB mount jack socket
	On/off switch		SPST slide switch
	Power jack		5.1 mm PCB mount barrel jack
	PCB		Double sided PCB

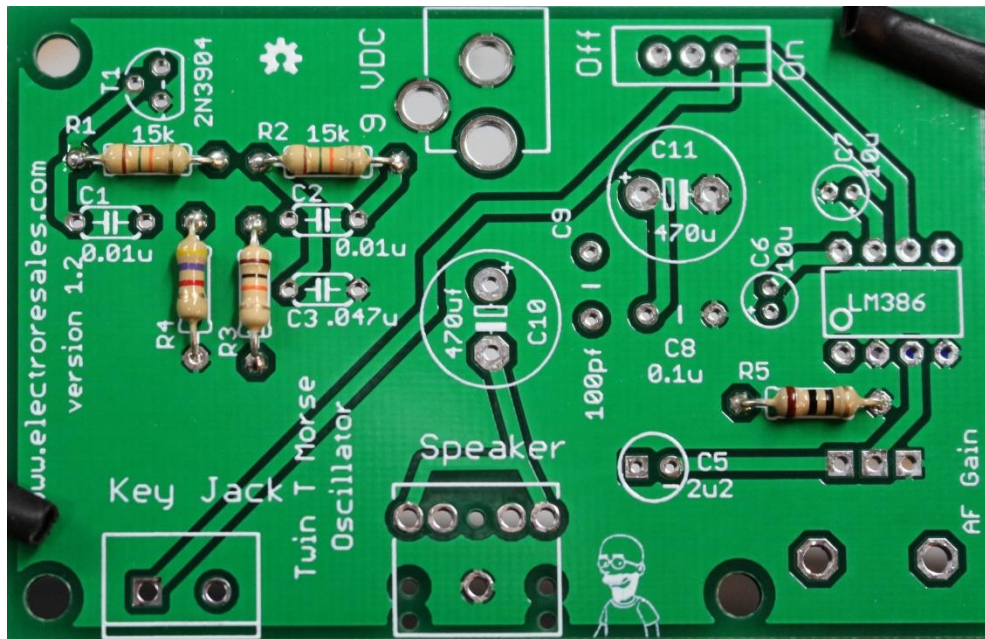
Before starting construction make sure you have a clean work space, with room to layout parts and work easily on the PCB. When unpacking the components a set of small plastic trays or bins is advised to ensure no parts can be lost or roll away.



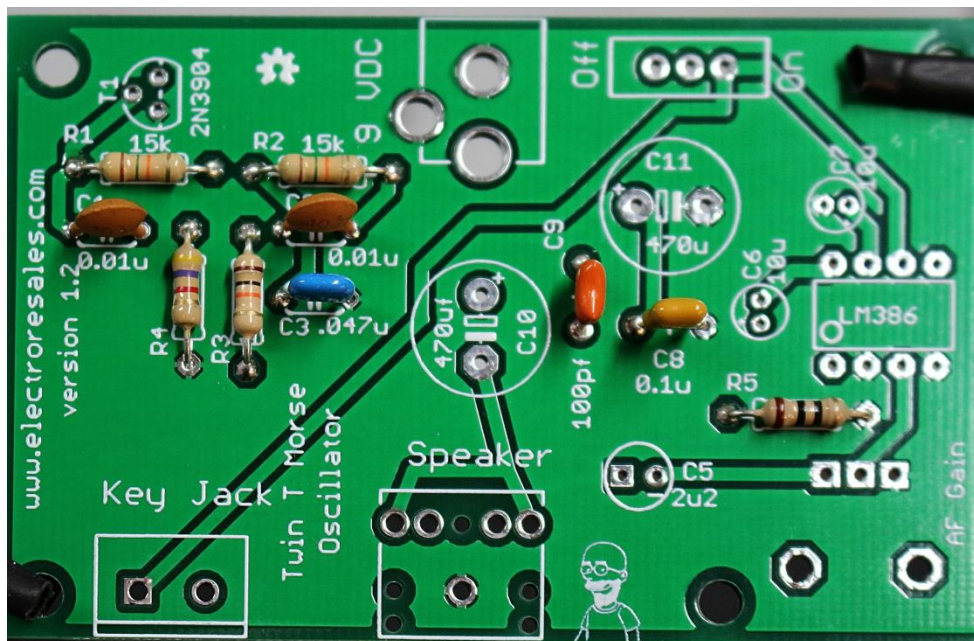
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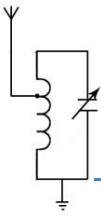
Carefully unpack the components, noting the above advice, make sure all parts are included and nothing is missing. Each component has an identifying mark or color code, use a magnifier if needed to identify the components. If parts are missing contact us – resalese@gmail.com

Stage 1 – Insert all resistors (R1,R2,R3,R4 & R5) - compare to this picture



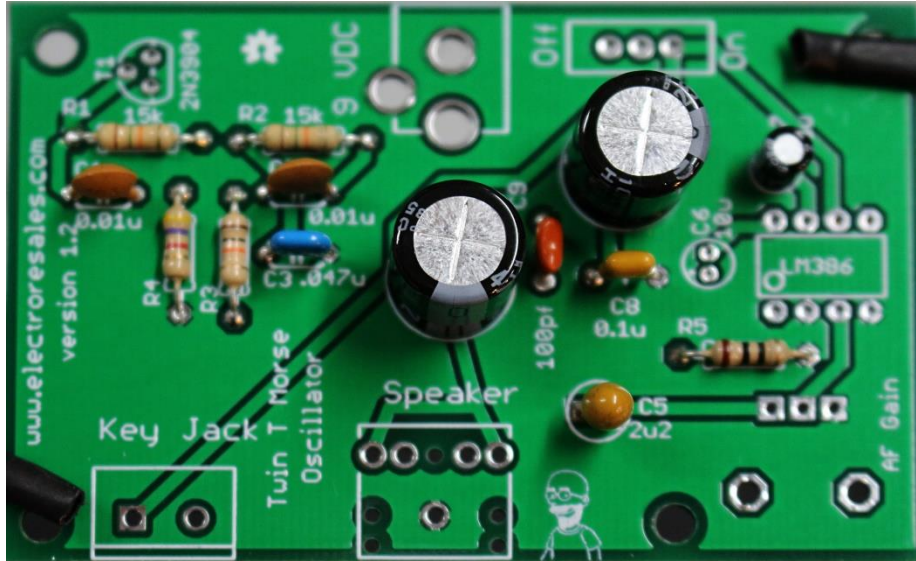
Stage 2 – Insert non polarized capacitors (C1,C2,C3,C8 & C9) – compare to this picture, orientation is not important



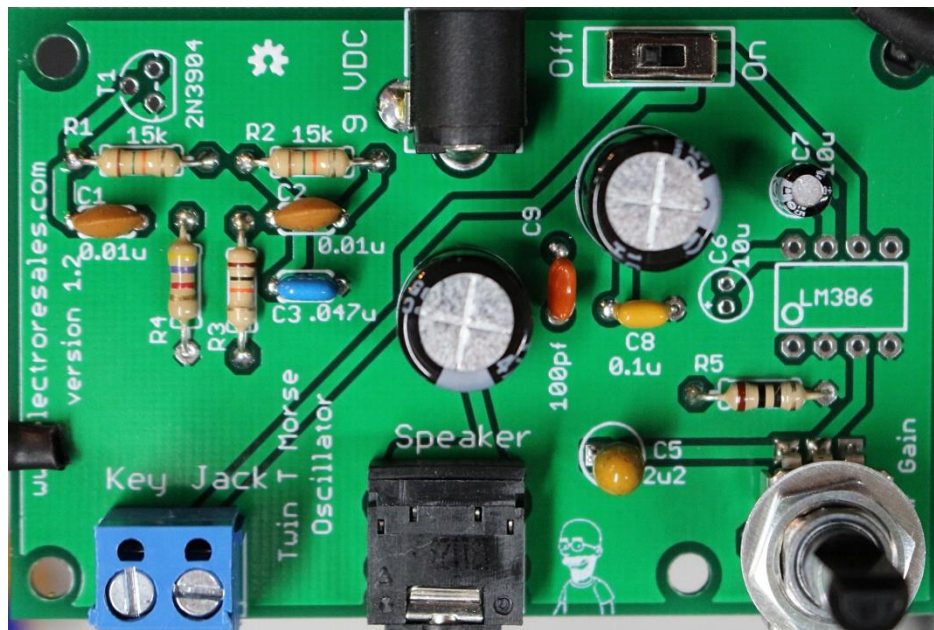


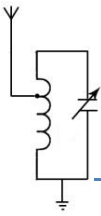
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Stage 3 – Insert Polarized capacitors (C5, C7, C10 & C11). Make sure to get polarity right per the board markings. Note that C6 is not installed; it may be added later if more audio gain is needed.



Stage 4 – Insert hardware & AF Gain potentiometer. Note the potentiometer may be a little stiff to insert, make sure to align the pins and mount lugs with appropriate mount hole, then push gently into the PCB.

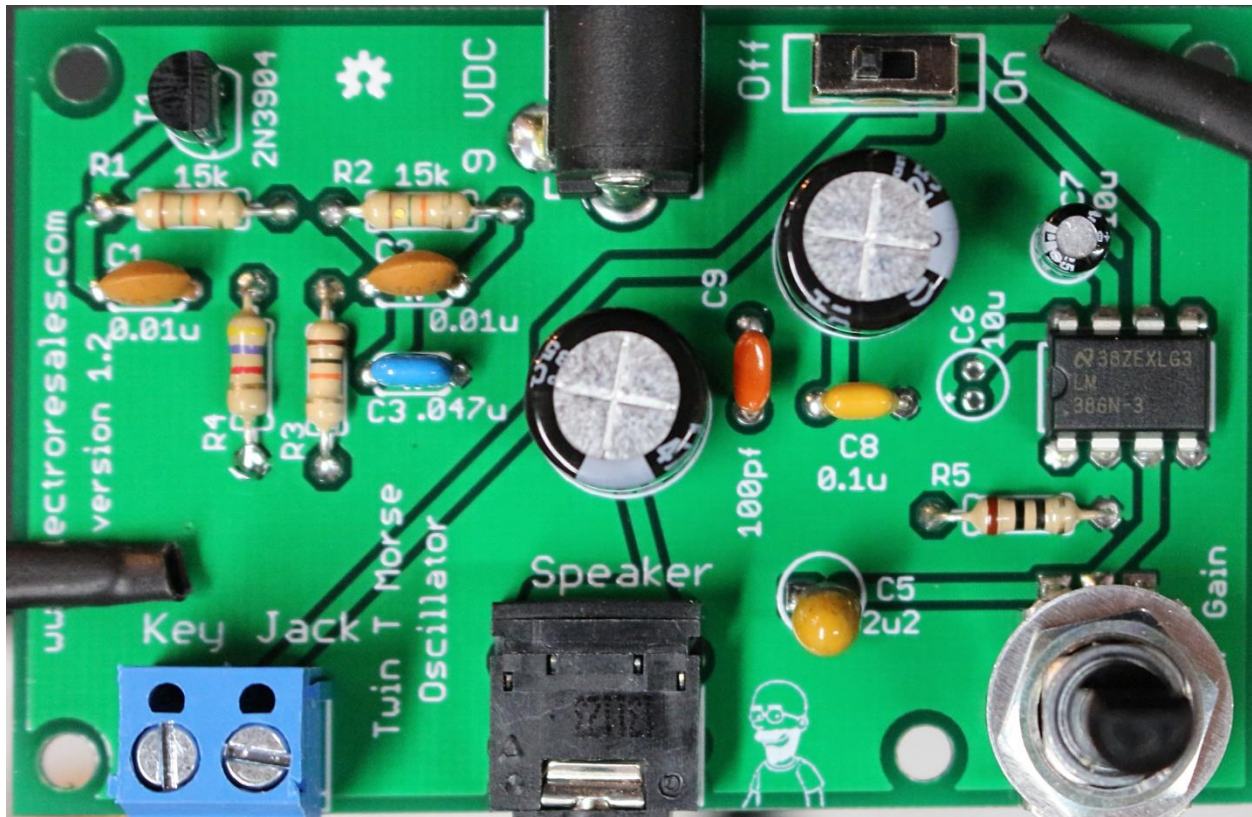




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Stage 5 – Insert Semiconductors - align T1 with outline on the PCB and insert , insert the IC LM386, make sure to align the dot on the IC with the dot on the PCB that indicates Pin 1.

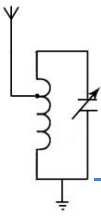
To hold the IC in place during soldering use a piece of tape or a piece of removable putty such as Elmer's removable adhesive putty



This stage completes the PCB construction, however, before applying power and testing the unit, spend a few minutes checking the position of each part, especially the polarization of the electrolytic capacitors and semiconductors.

Make sure that all solder joints are well made, reflow any that you are doubtful about. Check for shorts and solder splashes, remove all shorts and extra solder.

To test the unit, follow the instructions at the start of this document under Operation & Use.



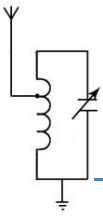
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Troubleshooting

Careful construction and soldering will produce a working unit, issues can occur, and in the event of the CPO not working try these suggestions:

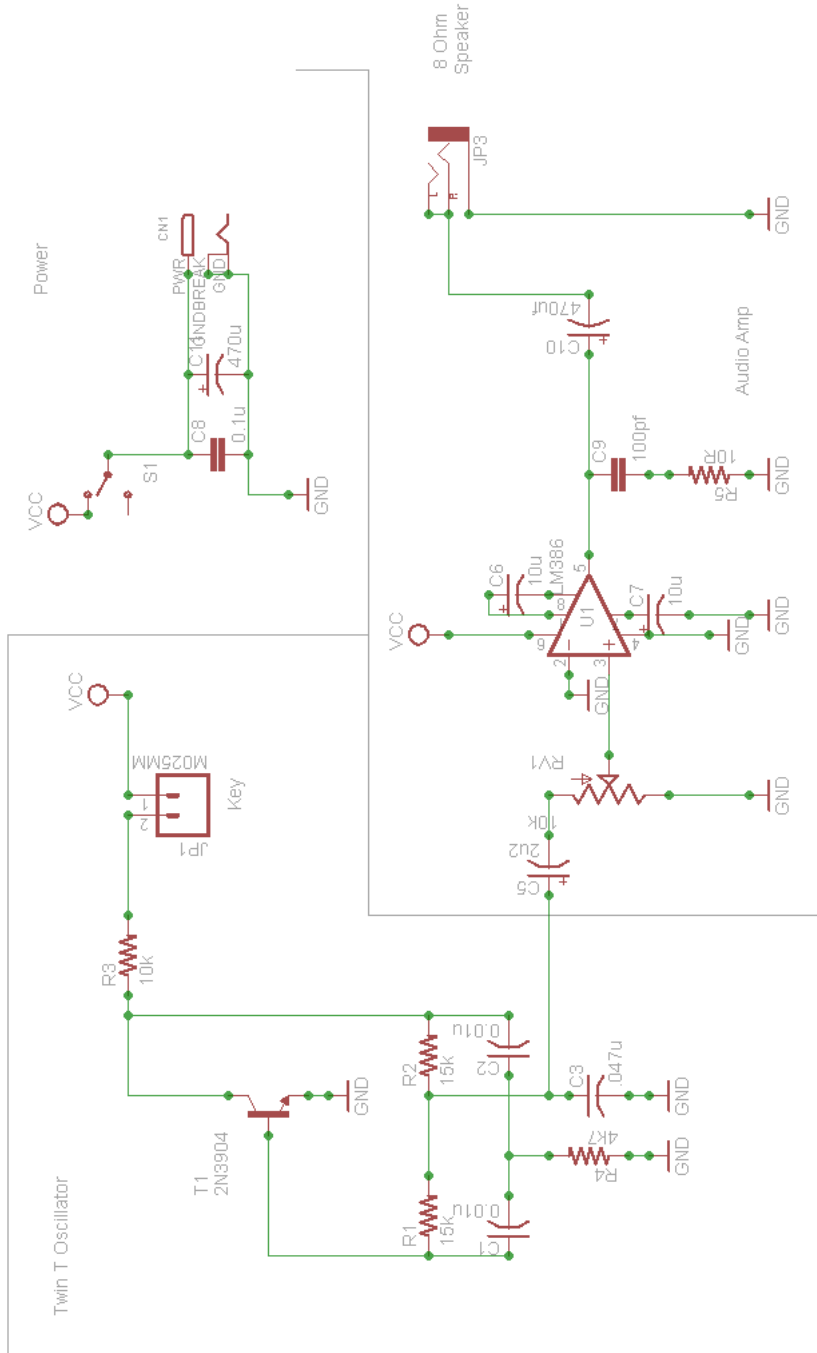
1. Check all component positions for correct value
2. Check polarization of the electrolytic and tantalum capacitor
3. Make sure no solder shorts are present. Examine carefully using an eye glass/loupe
4. Have a friend check over the board for you
5. Try a new battery, make sure connection is center positive

The CPO schematic is included in the attached appendix for your use as needed.

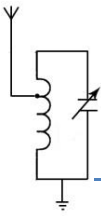


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Appendix - Schematic



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The small Print

DISCLAIMER

Any person who constructs or works on electronic equipment may be exposed to hazards, including physical injury, the risk of electric shock or electrocution.. These hazards can result in health problems, injury, or death. Only qualified persons who understand and are willing to bear these risks themselves should attempt the construction of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

There is a risk of electric shock, electrocution, burns, or fires that is inherent in the construction and use of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE including, but not limited to, property damage, personal injury, death or legal expenses. Buyer's recovery from Seller for any claim shall not exceed the purchase price paid by Buyer for the goods, irrespective of the nature of the claim, whether in warrant, contract or otherwise. By purchasing this item, BUYER AGREES TO INDEMNIFY, DEFEND AND HOLD SELLER HARMLESS FROM ANY CLAIMS BROUGHT BY ANY PARTY REGARDING ITEMS SUPPLIED BY SELLER AND INCORPORATED INTO THE BUYER'S PRODUCT.