

The ST2 is a CW side-tone generator/ morse code practice oscillator.

Brief technical data:- Tone - 800Hz sine-wave, nominal frequency adjustable.  
 Power required:- 12 to 14 volts DC, current varies with volume control setting, but 50mA is plenty for normal listening levels.  
 Audio output power:- 1 Watt approx into 8ohms  
 Keying:- +ve or -ve keying, or will work from the Rf output of a transmitter either by inline connection or a pickup antenna.  
 TX power for inline connection:-  $\frac{1}{2}$  to 25W on HF bands 80 to 10, 2meters:- 25W max.

Tools required:- Small tipped soldering iron, about 25 to 30 watts, small side cutters, long nosed pliers, small screwdriver for adjusting tone when the unit is finished.

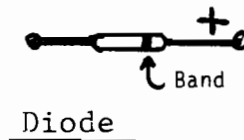
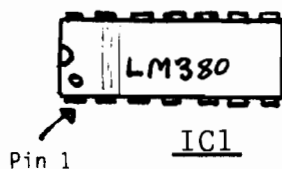
Make sure you have all the correct parts and tools before you start. It is advisable to read all the paperwork through at least once before you plug in the iron.

Start by fitting the resistors. Refer to the parts list and select R1, fit this into the holes marked for it on the circuit board, bending the leads as shown:-



Turn the board upside down and solder R1 to the printed circuit track. To solder properly you should hold the hot iron so that it is in contact with both the track and the component lead so that they both heat up for a second or so, then keeping the iron in place, touch the solder onto the joint so that it runs freely over the lead and the circuit track. Remove the iron as soon as the solder has flowed along the lead and track to make a good joint. Under no circumstances use any extra flux, only use proper multicore electrical solder of thin gauge, plumbers' materials will do you no good at all, the unit will be ruined by them. The soldering iron should remain in contact with the component lead and track for about 3 to 4 seconds - any longer and you risk damaging the component or the board. Next cut the component lead as close to the joint as possible.

When you have fitted all the resistors, including RV1, fit the capacitors, keeping the leads short. Make certain you fit the electrolytic capacitors the the correct way round- see note on parts list. Next fit the semiconductors making sure that these are also in the right way round:-



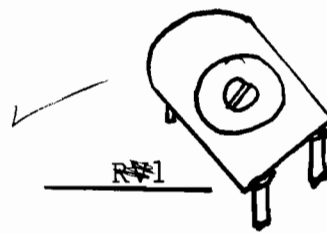
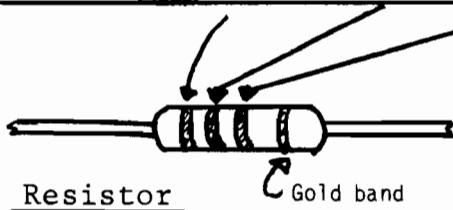
TAKE CARE NOT TO OVER-HEAT THE SEMICONDUCTORS.

Your ST2 module should now be finished, and it is a good idea to visually check that there are no splashes of solder or whiskers of wire shorting out the tracks. Double check that all electrolytic capacitors and all the semiconductors are fitted the right way round. Inspect all the solder joints and make sure they are all bright and shiny, resolder any that look dull or "dry" with a little fresh solder. With good quality modern components, as used in our kits, it is almost unknown to find a faulty part, if the unit fails to work you can be pretty sure that it is due to poor soldering or a part in the wrong place.

Next wire the module into a suitable box, or just hook it up to a power source, morse key and loudspeaker on the bench for testing.

See the Test and Installation sheet for wiring and setting up details.

Part No.	Value	Description	Fitted	Checked
<del>R1</del>	4k7	Yellow Violet Red		
<del>R2</del>	100k	Brown Black Yellow		
<del>R3</del>	4k7	Yellow Violet Red		
<del>R4</del>	8k2	Grey Red Red		
<del>R5</del>	22k	Red Red Orange		
<del>R6</del>	100k	Brown Black Yellow		
<del>R7</del>	1k0	Brown Black Red		
<del>R8</del>	100k	Brown Black Yellow		
<del>R9</del>	100k	" " "		
<del>R10</del>	10k	Brown Black Orange		
<del>R11</del>	1k0	Brown Black Red		
<del>R12</del>	100k	Brown Black Yellow		
<del>R13</del>	33k	Orange Orange Orange		
<del>R14</del>	8k2	Grey Red Red		
<del>R15</del>	33k	Orange Orange Orange		
<del>R16</del>	2R2	Red Red Gold		



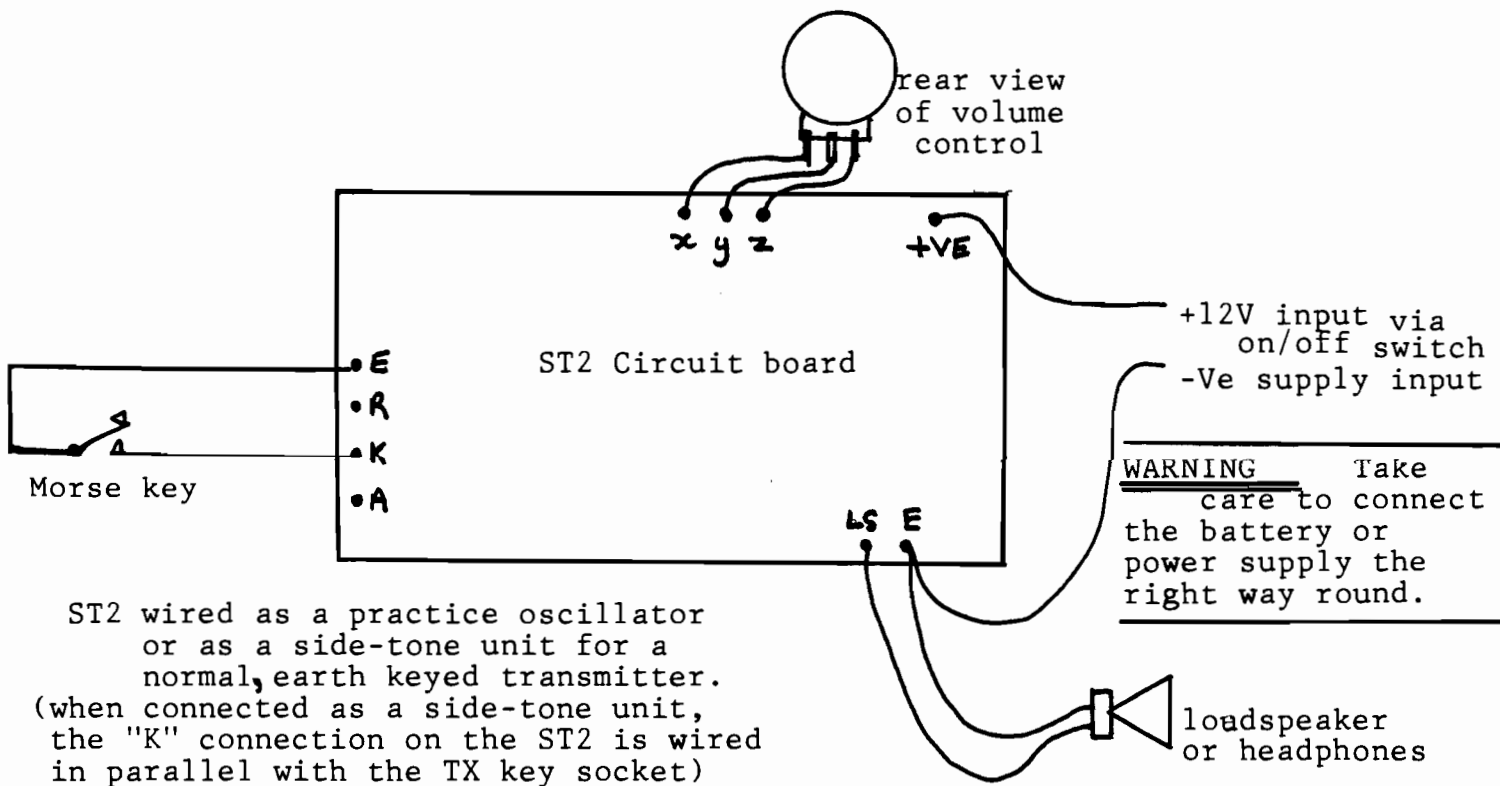
Capacitors

<del>C1</del>	1n0	marked 102 or .001	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>NOTE The lead of C3, C13 &amp; C14 marked with a -ve sign goes to the hole marked with the same sign on the circuit board.</p> </div>	
<del>C2</del>	1n0	" 102 or .001		
<del>C3</del> *	22µF	" 22µF 25v SEE NOTE		
<del>C4</del>	10nF	" 103K		
<del>C5</del>	10nF	" 103K		
<del>C6</del>	22nF	marked 223K		
<del>C7</del>	10nF	" 103K		
<del>C8</del>	10nF	" 103K		
<del>C9</del>	.1µF	" 104K		
<del>C10</del>	.1µF	" 104K		
<del>C11</del>	1n0	marked 102 or .001		
<del>C12</del>	.1µF	" 104K		
<del>C13</del> *	22µF	" 22µF 25v SEE NOTE		
<del>C14</del> *	100µF	" 100µF 25v SEE NOTE		

SEMICONDUCTORS

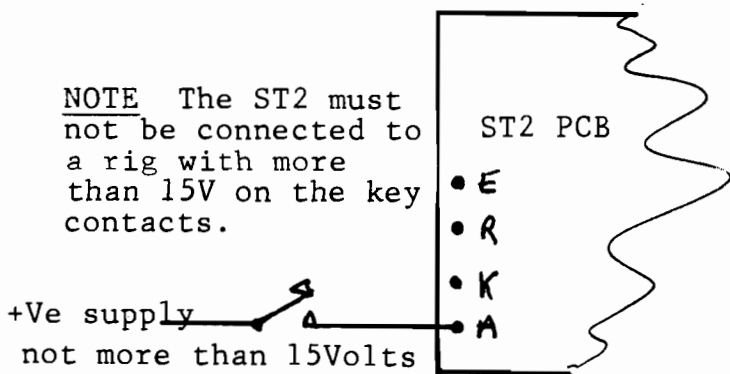
Be certain to fit these devices the right way round.

- ~~TR1~~ & ~~TR2~~ are both BC183, or sometimes we supply BC237 devices.
  - ~~D1~~ is a BZY88 and has it's type number marked on it.
  - ~~D2~~ & ~~D3~~ are OA91 diodes and have clear glass envelopes with a red band.
  - ~~D4~~ & ~~D5~~ are 1N4148 and are blue with a black band to mark the "+" end.
    - Sometimes we supply 1N4148s with several coloured bands, in this case the large band marks the "+" end.
- With all diodes it is essential to make sure the end with the band on it goes to the hole marked with a "+" sign on the circuit board.

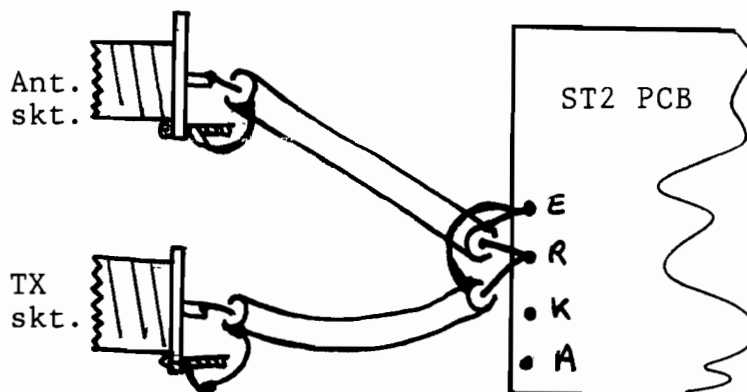


ST2 wired as a practice oscillator or as a side-tone unit for a normal, earth keyed transmitter. (when connected as a side-tone unit, the "K" connection on the ST2 is wired in parallel with the TX key socket)

NOTE The ST2 must not be connected to a rig with more than 15V on the key contacts.



ST2 wired for +Ve keying (a pick-up antenna consisting of a wire placed near the transmitting antenna can also be wired to the "A" input of the ST2).

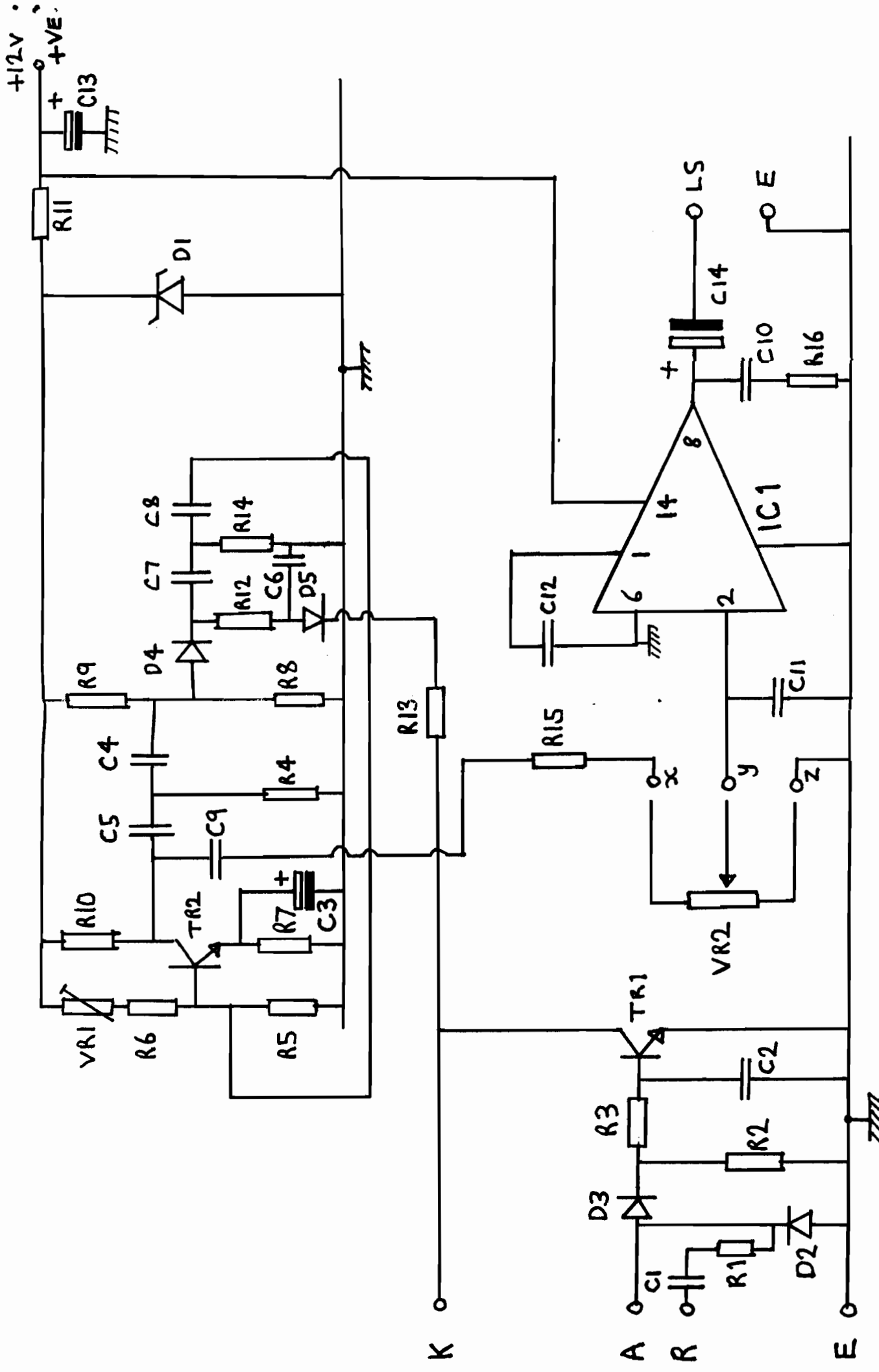


ST2 wired for RF sensing for connection in-line between TX and antenna. For use with transmitters up to 25 Watts only.

Wire up the ST2 to suit your own particular needs. You can simply connect up a power supply, loudspeaker and a Morse key, or you can wire up all the inputs to sockets to cope with the full range of requirements. Most rigs key an earth connection, so the use of the drawing at the top of the page is the most common arrangement. We would recommend that you install the ST2 in a box with sockets for the key and loudspeaker/headphones. The ST2 is a very versatile unit and should be capable of giving good side-tone on virtually any transmitter.

TESTING

Testing is a simple job with the ST2, wire up the unit as shown above and depress the key (or wire a link from K to E on a temp. basis), with the volume control turned up a little, you should hear a tone in the headphones or loudspeaker, if not rotate the preset resistor RV1 until you do. RV1 should now be adjusted for the best sounding note (it also alters the frequency as well as the distortion level of the oscillator). Set RV1 at the point that suits your personal taste. If you feel that the keyed note is too "hard" or too "soft" for your taste, you can change the value of C6. Making C6 larger in value will soften the note, decreasing its value will make it "harder" or more clicky.



ST2 CIRCUIT DIAGRAM