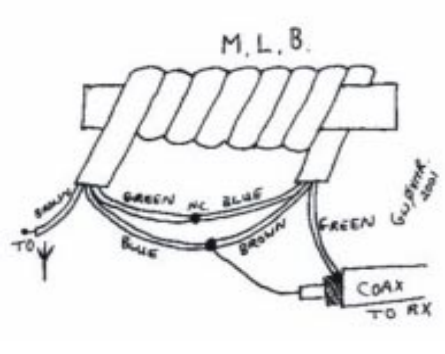
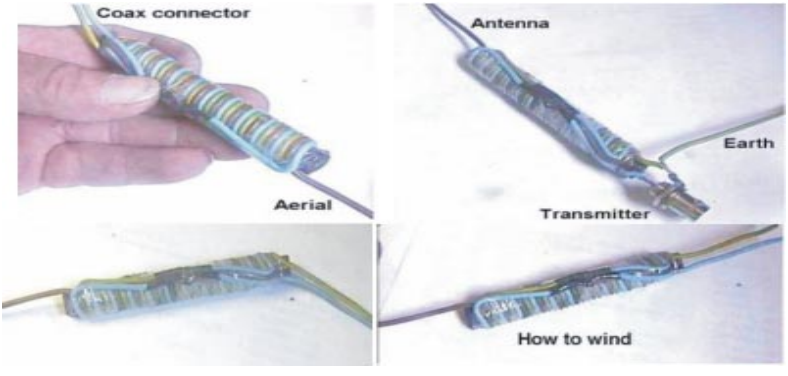
Previous club projects

MAGNETIC LONGWIRE BALUNS



The “VMR version” MLB was made from scrap. 3 core 2 amp lighting flex and an old ferrite rod.
The results are just the same as the posh version!

You need about one yard of 3 core, 2 amp flex and a ferrite rod with a length of about 6 inches or longer.
Using 3 core flex it is easy to wire because it is color coded. Tape one end of the flex to the rod leaving 6 inches for the connections, then wind on as many turns as possible (mine has 10 turns)
and again fix the wire with tape etc at the other end. Now you can just twist the wire connections together or better solder them. Connect it up as shown.
Blue right hand side to Green left-hand side. Brown right to Blue left. Inner of COAX, to Brown/Blue. Braid to single Green. Aerial to single Brown.
Then just bung it into a box. Have Fun



CTCSS Encoder Board

Our Project Officer advises that a limited number of kits for the CTCSS encoder are still available. These can be purchased for $20 or, if you prefer, for an additional $5 they will assembled and set on either 114.8Hz or 123.0Hz, your choice.

Westlakes latest repeater VK2RZL requires a tone of 123.0Hz to activate it. There will be an assembly day organized at the club in the near future. It is also hoped to have fitting instructionavailable on the day.
A test oscillator is available at Westlakes Amateur Radio Club Inc for testing and setting the frequency ie; 123hz
or 114.8hz
This article is prompted by a recent necessity to add tone squelch to the local repeaters (147.025 and 438.575)to combat interference from various sources.

Many of the members of our local club use older, often ex-commercial, equipment on the local 2M and 70cM repeaters, both of which suffer varying degrees of interference due primarily to their proximity to the Sydney CBD. Many of these radios do not have CTCSS (Continuous Tone Coded Squelch System) tones available in them so it was decided to come up with our own encoder board, if possible, at a lower cost than importing ready made ones form overseas. Fig 1 show s a picture of the completed board.

Fig.1

The local repeater initially used 141.3Hz for its tone squelch, however, after some research and looking at what was being used around the country it was decided to change to the more common 123Hz which is where we are today. In fact, the latest (2001) WIA Callbook notes that 123Hz is recommended for use where CTCSS is being used to overcome interference problems whereas 141.3Hz is suggested for repeater linking purposes.

A simple CTCSS encoder was described by Will McGhie's Repeater Link column in July 1996 AR (page 46) and this article should be referred to for a full description of the encoder operation. It is based on a NE567 tone decoder IC which has either a square wave or triangle wave output from its oscillator. The triangle output is used and passed through a three stage RC filter which gives a near sine wave output. This is then buffered and fed to the output.

One of the more important features of the encoder is its stability, which is due to the components used most importantly being the 1µ5 MKT capacitor on pin 5 of the IC.

The encoder has two controls. One is a multi-turn pot, which is used to set the frequency of the oscillator. It has a frequency range of about 70Hz to about 250Hz . The other pot is used to vary the output level so that the correct modulation level may be set. Depending on the frequency setting they can get up well over 1.5V RMS and usually sit at about .5V RMS at the 123Hz mark.

Generally, on FM transmitters, a deviation of between 300Hz and 600Hz is all that is needed to give reliable operation of the tone squelch at the receive end. This is a fairly low level compared to the normal voice deviation of somewhere around 3.5kHz.

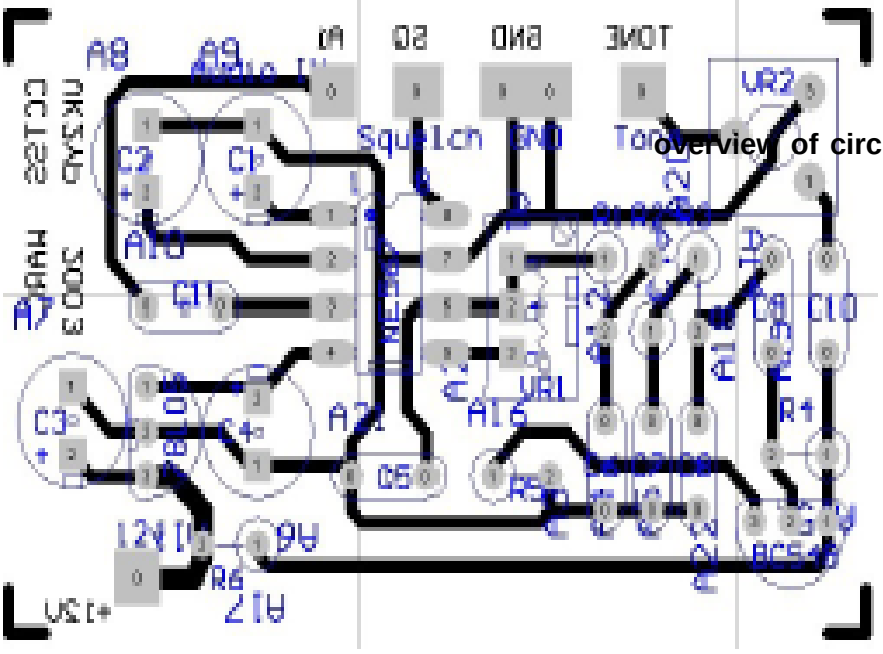
The encoder will work on any input from about 8V up as it includes a 5V regulator on board.

I have also added an extra capacitor to the input of the NE567 (pin 3) and bought it to an input pin and also bought out the Squelch output from pin 8 of the IC. This was to make it easier for future experimentation with decoding received tones to enable the radio to be tone squelched as well, although, as yet, I haven't had time to do so.

I set about to design a PCB for the project resulting in a fairly compact yet easy to assemble board measuring 45mm x 28mm with a component height of 12mm (see attached pictures of the board). This was then manufactured by a local manufacturer and made up into kits for sale to members.

We have now fitted these encoders to several radios with excellent results. The transceivers to which I have fitted them so far include Phillips FM900 and FM828, AWA RT80 and RT85, Yaesu FT290 and FT790. I believe that some others have fitted them to other radios as well. Many transceivers include a tone input to feed in such a tone and on those that don't, it is usually a fairly simple matter to find an appropriate place into which to feed it. It is preferable to feed the tone in at a point close to the actual modulator so that it does not go through any preemphasis network which may be in the radio.

I have included, on most of the radios I have converted, a switch to turn the encoder on or off so that the tone
does not have to be transmitted on all channels although that is usually not a major problem.
As far as setting up goes, I test each unit as it is made and then tune it to the desired frequency using a
frequency counter, before installing it. If you don't have a counter, however, you can tune it once it is in the radio
by starting off transmitting on the repeater input and gradually tuning the multi-turn pot until the repeater starts
transmitting and then keeping going until it drops out. Then wind it back to the midpoint between the two
positions. It may be necessary to employ a friend to listen to the repeater for you and tell you when the repeater
opens and closes either on another band or over the phone.



overview of circuit

Text with permission from Eric van de Weyer VK2KUR

Drawn by VK2YP for Westlakes Amateur Radio Club Inc.

Following are brief instructions to install in several different radio's

Phillips FM900

On the synthesizer/control board

1. check that R357 (470k) is installed. It is located between the deviation and modulation Balance trimmers. If not, install a 470k 1/4 w resistor.
2. locate the option connector U405 (one of 3 rows of holes on the board) and connect the encoder as follows.

Pin 18 +10v
Pin 21 Ground
Pin 23 Tone out

AWA RT80 Receive board

1. Locate S201 the tone squelch connector
2. Connect the encoder as follows.

Pin 6 +9V
Pin 7 Tone output

AWA RT85 Receive Board

1. locate J358 the tone squelch connector
2. Connect the encoder as follows

Pin 1 Ground
Pin 8 +8V
Pin 6 Tone output

Yaesu FT290/690/790

On these radios there is a tone board connector in the area next to the battery compartement with the following connections

Black—Ground
Red +9V
Green- Tone out

These radios have a tone On/Off switch on the small board also adjacent to the battery

The foregoing should give many people a quick start to installing the CTCSS board whilst others will need to look into their radios to determine where to connect it. It seems that many radios both commercial and Amateur already have a means of connecting a CTCSS encoder or encoder/decoder in them so it is just a matter of identifying it.

Text with permission from Eric van de Weyer VK2KUR

WESTLAKES ARC BATTERY DE-SULPHATOR

VK2ATZ Lead-Acid Battery De-sulphator

SCHEMATIC DIAGRAM and OPERATION –

There are still a few kits available

This circuit shown at below is essentially a switching DC-to-DC converter that steps a DC voltage up to a higher level. It takes power from the battery and pulses it back into the battery. The pulse rate is set by the 555 timer chip,U1 which switches the MOSFET at a 1 kHz rate. When Q1 is in the non-conducting state, current is drawn from the battery through L2 so it charges capacitor C4 slowly. Q1 is then switched on for 50 microseconds, causing C4 to discharge through L1. When Q1 is switched off again, the stored inductive energy in L1 pulses back into the battery through diode D1. This pulse of current can be as high as 6 amps. The use of an inductor to supply this high voltage pulse is what makes it possible to restore a badly sulfated battery with a high internal resistance. The peak voltage applied across the battery can be as high as 50 volts. This voltage will decrease as the battery's internal resistance declines or it's function is restored to normal.

NOTES

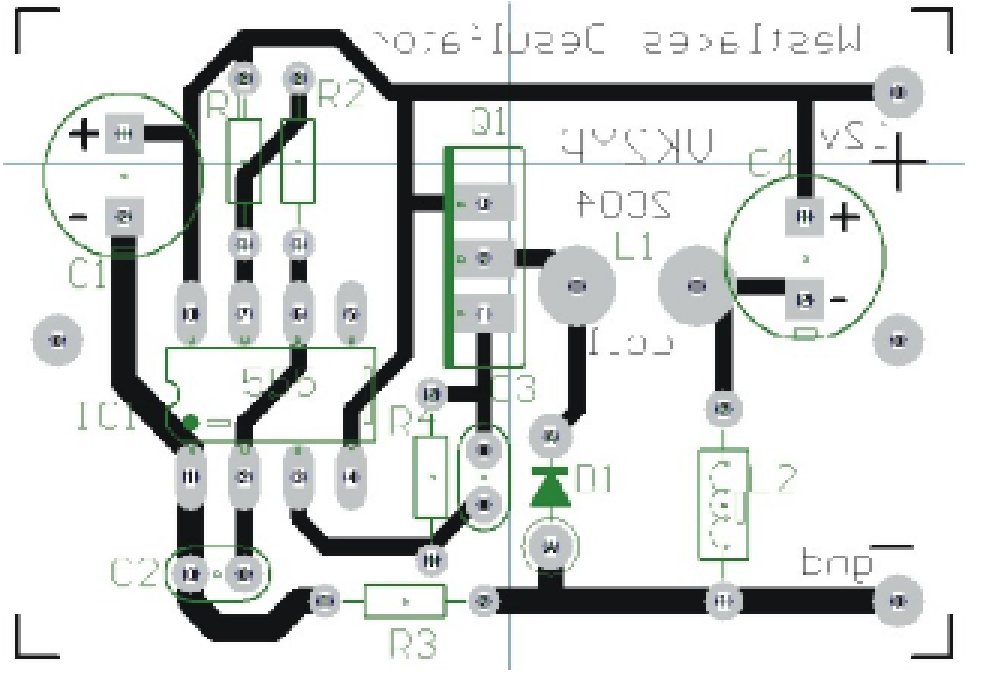
There is no reverse polarity protection for this circuit so label the leads well. Connect them backwards and you will blow components. Connect positive of the pulse charger to positive of the battery!

There is an issue with electrical equipment connected across the battery; lights, radio, etc. Depending on the impedance of this equipment, it may absorb some of the pulse energy, thereby minimizing the effect on the battery. To solve this problem, slip a ferrite toroid core over each positive battery lead (right at the battery) going to the other equipment. Exclude the pulse charger lead. The ferrite core will increase the high frequency resistance without affecting the DC performance of the circuitry. Hence all the pulse energy will enter the battery and not be consumed by the electrical loads connected to it.

Keep the lead length from the pulse charger to the battery as short as possible to minimize RF radiation and power loss in the wires.

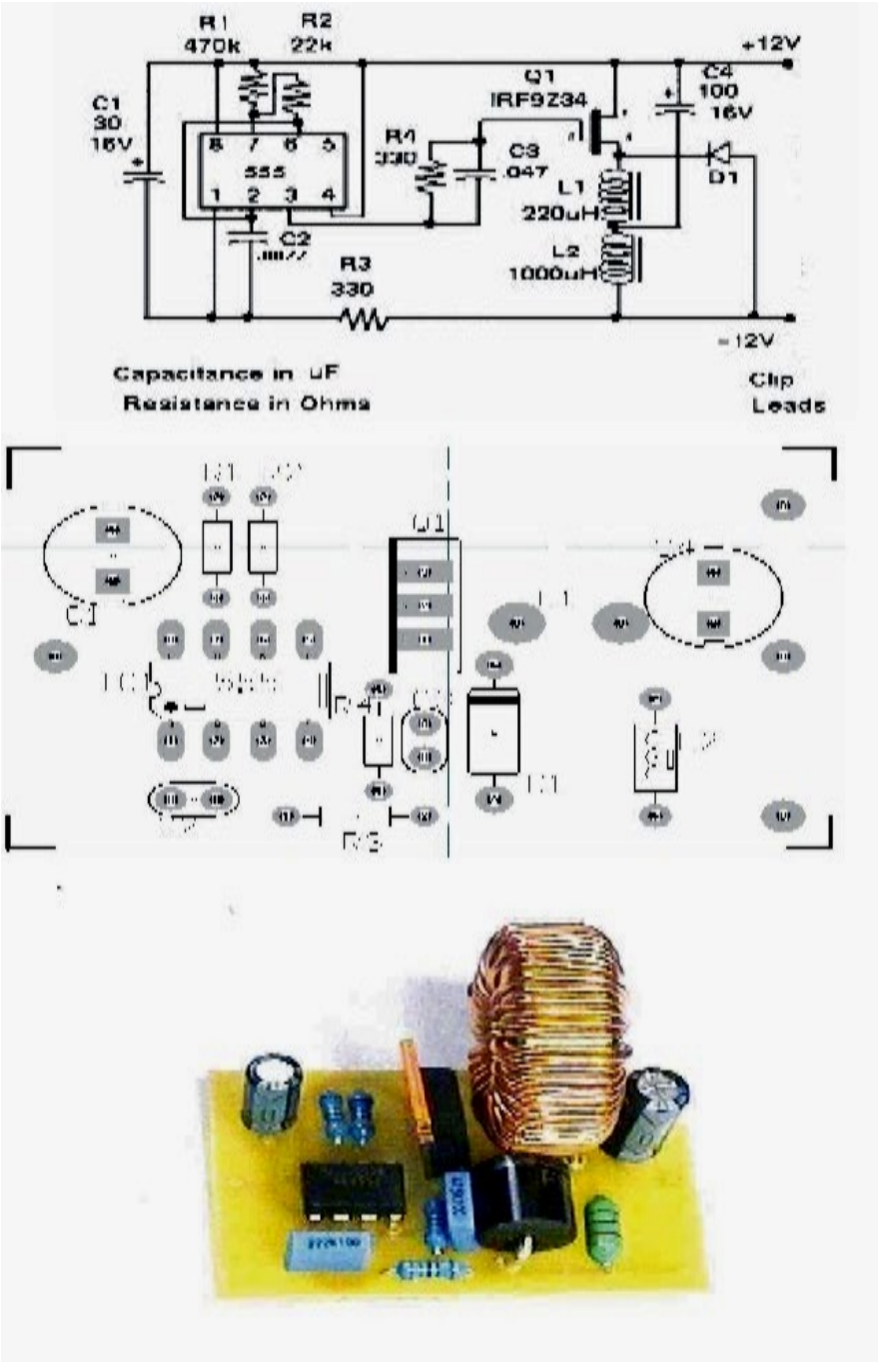
A faint audio tone might be heard when the circuit is in operation.

Pulse energy happens at less than 100% efficiency. The circuit draws about 40 MA from the battery so some additional charging must be applied to offset this. A solar panel would be perfect.



Parts List

Q1 IRF9540 P channel MOSFET
IC1 LM555CN Timer IC
D1 FR607 Fast recovery diode, >6 A, 100 V
C1 30 uF, 16 V Electrolytic
C2 0.0022 uF Disk ceramic
C3 0.047 uF Disk ceramic
C4 100 uF, 16 V Electrolytic, low impedance type
R1 470 k. 1/4 W
R2 22 k. 1/4 W
R3 330 . 1/4 W
R4 330 . 1/4 W
L1 220 uH (nominal) Ferrite inductor, 6+ A peak
L2 1000 uH Ferrite choke, 100 mA
Case Aluminum project box
Clip leads Alligator type, insulated (RS)
Board material 0.1" spaced copper pads



Enjoy, Col VK2YP
Westlakes ARC Project Officer

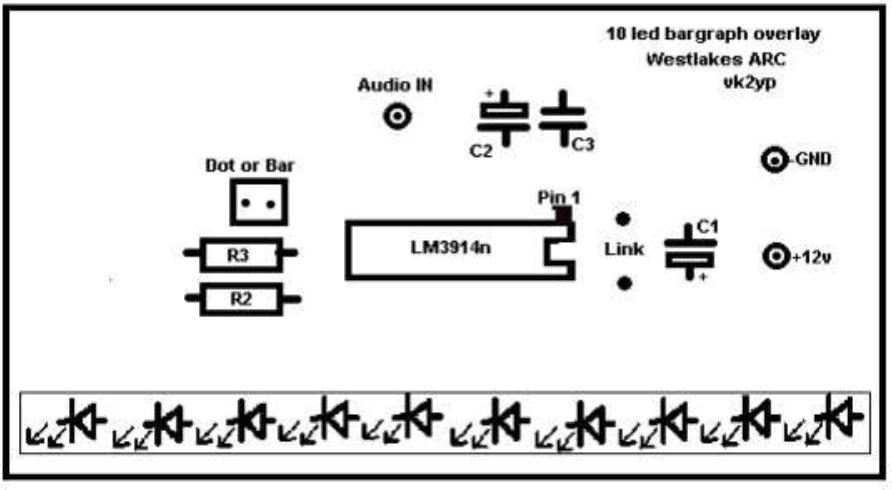
10 LED BARGRAPH

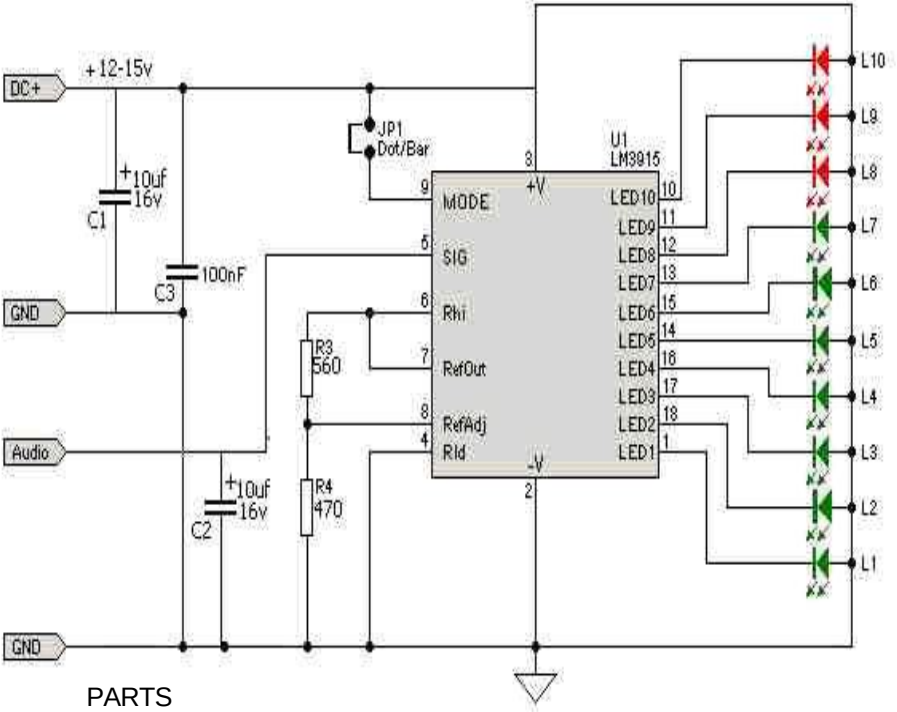
With the Westlakes ARC Bar graph kit, it can be inserted into any speaker system, You then have
a poor mans deviation meter!

Our repeater super tech VK2ZTV Peter, sent a 2k tone at 3k deviation tone to the repeater VK2RTZ,
and I set my volume at a marked spot, then looked at the bar graph, it was showing 3 leds. Now I
have a reference on audio loudness on my FM900, I can tell if The output is too loud or too soft.

Like I said it's a poor mans system, but it works. This can be done on any extension speaker or
radio.

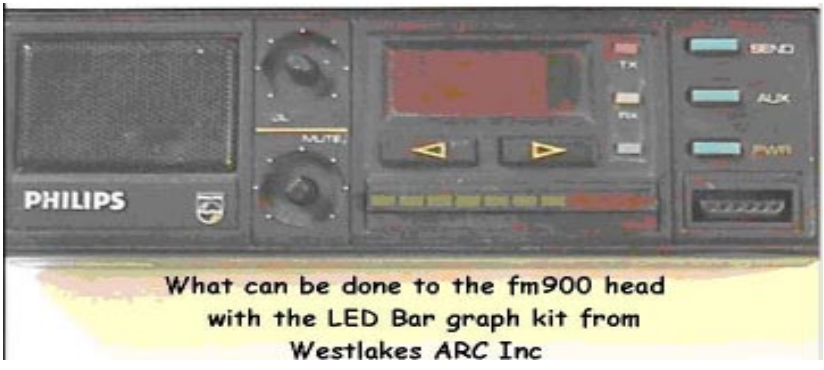
Now if you want to get all spoofy, Buy 2 of the Westlakes ARC Bar graph's, and have a stereo
system, or on your Home entertainment surround, one for each speaker.





PARTS

R2 470 ohm ¼ Watt
C1 10uf 16v tant
R3 560 ohm ¼ Watt
C2 10uf 16v tant
10 Led bar graph
C3 100nf cer (104)
IC Holder
IC LM3914n



Ok, Time to Play! have fun.

Col VK2YP Project Officer.