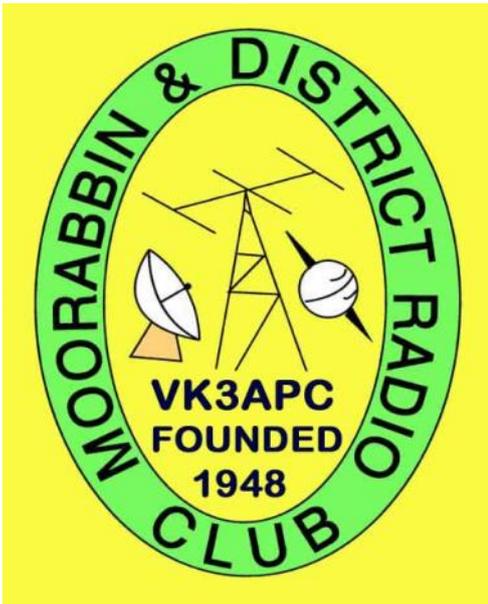


# APC NEWS





Ken VK3KIM operates on SOTA peak VK3/VS/053. This was the first time the recently registered peak had been activated by anyone.

Ken was running an FT817 and a link dipole on a squid pole tied to a utility marker stake.

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# QTC

Another year gone, and this one faster than the last one too. I hope your Christmas was a very enjoyable one .

## **TRADE DISCOUNT;**

If you want a discount card you need to have your photo taken and provided to the editor.

## **CORRECTION:**

In the last issue the Speaker Reports were misnamed by a month. The “August” talk was actually in September and the “September” one was in October. The error was the editors. Sorry.

## **REMINDER**

**Night meetings, Second Friday in the Month.** Please come along and listen to our speakers. Enjoy a cuppa, a biscuit and a chat.

**Day meetings, every Tuesday from 9:45 on.** Chatter and coffee time to 10:30. Reports, requests, show and tell to 11:00. Attendances are around 20 on a regular basis and Convenor Leon provides plenty of joviality.

This is your Club. If you want a particular activity, ask.

# COMING UP

Tuesday 28th January Pixie Construction continues. Initial tests.

Tuesday 4th February Pixie Construction concludes. Final tests and boxing up.

Tuesday 11th February. Three peaks SOTA expedition

Friday 14th February 2020. TBA

Friday 13th March 2020. TBA

Updated 23 Jan 2020

# GUEST SPEAKER: NOVEMBER

## A modern Valve Tester by Ian VK3XI



Ian VK3XI

Many members harbour thoughts about building a piece of valve equipment but wonder if the valve they saved for the project is OK.. A few have boxes of valves and also wonder how many are viable. Of course you need a valve tester.

Ian recently saw an article in the HSRA magazine about a new tester that is available in kit form, so he sent off for it and has built it.

The instrument can perform most of the functions any of the older AVO type analog valve testers did.

Perhaps the hardest part once the hardware is mounted is to wire up the multiple valve sockets to the selector plugs.

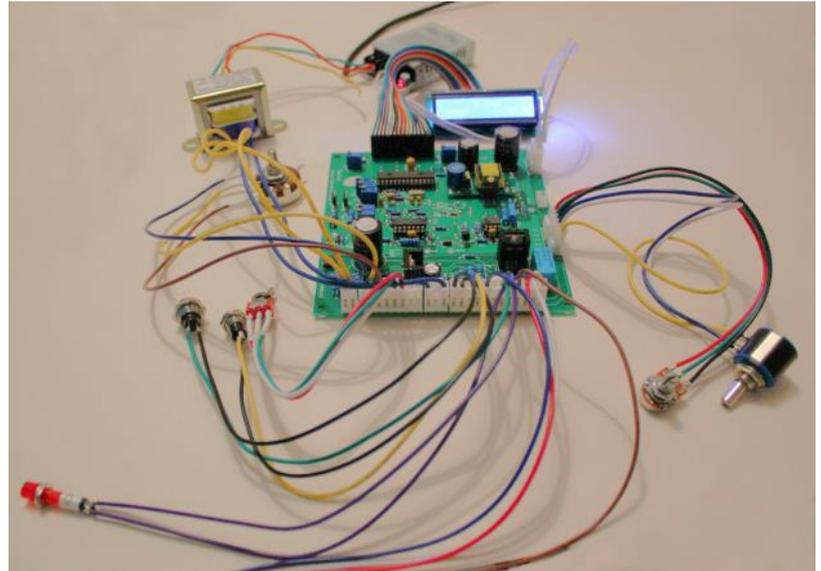
A very useful project. Thanks Ian for sharing.

# GUEST SPEAKER: NOVEMBER

The EBay reference is :

<https://www.ebay.com.au/itm/161942329443>

What you get in the kit.



# Christmas Parties

Those who attended the first Tuesday Christmas Party had a great time with plenty of food and chatter.

The Friday evening one was enjoyed by a smaller group. The usual people we only see once a year did not show up. Perhaps Friday nights are becoming harder for people to get out on. If the prospect of free food and a party doesn't attract people what would?

# SOTA on New Years Day



**Left: Fires in the Howqua valley on NYD 2020 from the summit ridge of Mt Buller.**

The first fire had smoke going straight up on my ascent to the summit of Mt Buller for a SOTA activation on NYD. This indicated no driving wind. After the activation, on the descent a second fire can be seen on the Bluff. There was now a gentle breeze. Two hours later the CFA declared a Watch and Act for Mt Buller. It was cancelled two hours later.

Ron VK3AFW

# SOTA in the OTWAYS

Here we see Ken VK3KIM running out his linked dipole prior to a successful activation of VK3/VS-052 in the northern Otway forest.. No it wasn't winter, December in fact, but the weather is changeable in the mountains.



# Supporting Ribbon Feedline

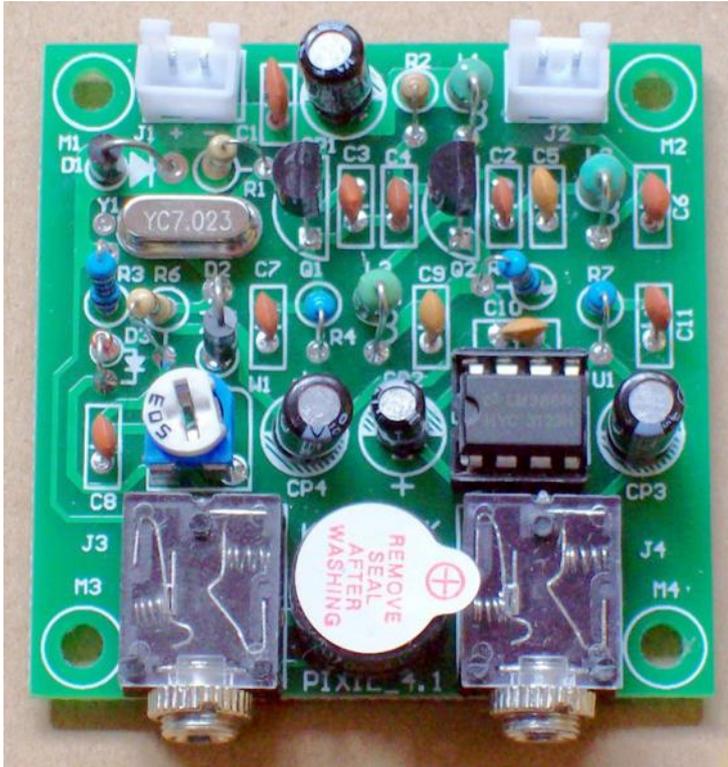
300 ohm ribbon can make an excellent low loss feed line for an HF doublet. Here is one method of supporting the ribbon and making a waterproof connection to the radiator. Extensive use is made of roof and gutter sealant and heat shrink tubing with a glue inner.

Where do you get 300 ohm ribbon these days? Rockby sell some cheap stuff: clearing sales for radio amateurs often throw up an unused reel of good stuff.



**Cable ties and roof and gutter sealant secure a load bearing loop of ribbon. Electric fence insulators can have a groove filed in them for secure mounting.**

# Building the PIXIE



The following pages contain hints for building kits and some detailed suggestions on the construction.

We acknowledge the Contribution made by The Dick Smith Company to kit building.

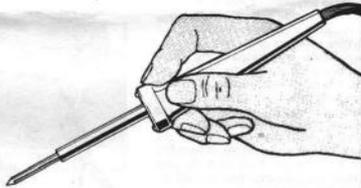
**A completed board on the left.**

# Building the PIXIE cont'd

**DICK SMITH**  
ELECTRONICS

A.B.N. 34 000 908 716

## Guide to Kit Construction



This is a guide for newcomers to kit building. Follow the guidelines given here and your kit will be easier and more enjoyable to assemble and more likely to work first time.

This booklet covers the basics of tools, parts identification, construction methods and trouble-shooting. Details for specific kits are given in each kits' construction manual.

| CONTENTS                              |      |                               |    |
|---------------------------------------|------|-------------------------------|----|
| Tools .....                           | 2    | Schematic Diagrams .....      | 13 |
| Soldering .....                       | 2    | Construction Techniques ..... | 14 |
| Component Identification .....        | 4    | Using a Multimeter .....      | 15 |
| Simple Digital Circuits .....         | 7    | Mains Voltages .....          | 16 |
| Metal Film Resistors .....            | 8    | Missing Parts .....           | 16 |
| Conversion Charts .....               | 9/10 | Troubleshooting .....         | 16 |
| Component Identification (cont.) .... | 11   |                               |    |

### HANDY HINTS:

#### FOLLOW THE MANUAL

Read each step completely - before starting. Make sure you understand everything that's involved.

#### TAKE YOUR TIME

Allow yourself plenty of time to build the kit. Set aside an area where you can work undisturbed, and can leave the kit between sessions.

#### CHECK YOUR WORK

Refer frequently to the kits' instruction manual, check each step as it is completed.

### TOOLS YOU WILL NEED

Only a minimum of tools are needed for most kits. These are:

- A soldering iron, 10-30 W rating
- Three screwdrivers (one Philipshead)
- A pair of side cutters (small)
- A pair of long nose pliers
- Wire strippers or a knife

Solder is included in the kits. If you buy additional solder make sure that it is 60/40 resin core. Using acid core solders will damage components and invalidate the guarantee. Some kits also involve some metalwork, so access to a drill may be needed. Other tools: spanners, alignment screw-drivers etc. are also needed from time to time. Suitable tools are available from all Dick Smith Electronics stores.

For testing, a multimeter with 20,000 ohms per volt sensitivity is essential.

\*See your nearest Dick Smith store for their latest range of tools and accessories.

### SOLDERING

Poor soldering is the major cause of kits not working. This is simply because most people do not take the time to learn how to solder properly and practise it.

Page 2



### THE IRON

The soldering iron used should be suited to electronics work. A wattage of from 10 to 30 watts is ideal, with a tip size from 1.5 to 4mm across. A chisel shape is usually best. The tip should be kept clean at all times. The best way

# Building the PIXIE cont'd

## COMPONENT IDENTIFICATION

One of the biggest problems for the beginner constructor is identifying the components correctly. The main trap is in the maze of numbers put on components by manufacturers. There may be a drawing of the parts in the kit manual, but identifying numbers may not be easy to find on the components themselves. As an example, what is described as a '741' IC may be marked LM741CN, N741T, 741TC, MC1741CP1,

or SN52741N. Confusing, isn't it? Notice though, that there is a '741' somewhere in all the numbers. The other numbers and letters indicate the manufacturer, and various batch and variety codes of the particular manufacturer. All these may be ignored as any of these ICs would work equally well in a circuit.

We'll now go through the common components in our kits.

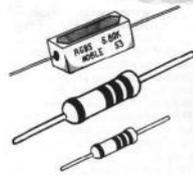
## RESISTORS

So called because they 'resist' the flow of current. They are normally in the form of small cylinders about 10mm long. Some high wattage types are rectangular.

Resistance is measured in ohms, abbreviated to  $\Omega$  or R. Thousands are indicated by 'k', millions by 'M'. Thus a 12k resistor has a resistance of 12,000 ohms.

This value is marked on the resistors using a colour code. The body has

(normally) four stripes. The first three indicate the resistance, the last the tolerance - how much the resistor may vary from its quoted resistance. The last band need not concern us as it is normally gold (5%) in our kits, which is accurate for most uses. To read the colour code, start with the band closest to the end. The first two are the significant figures, and the third is the number of zeros following. The chart below shows the value of the different colours.

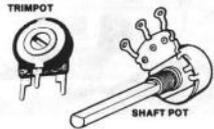


| CLOUR  | TENS | UNITS | MULTIPLIER | TOLERANCE |
|--------|------|-------|------------|-----------|
| BLACK  | 0    | 0     | 1          | 20% (M)   |
| BROWN  | 1    | 1     | 10         | 1% (F)    |
| RED    | 2    | 2     | 100        | 2% (D)    |
| ORANGE | 3    | 3     | 1000       |           |
| YELLOW | 4    | 4     | 10000      |           |
| GREEN  | 5    | 5     | 100000     |           |
| BLUE   | 6    | 6     | 1000000    |           |
| VIOLET | 7    | 7     |            |           |
| GREY   | 8    | 8     |            |           |
| WHITE  | 9    | 9     |            |           |
| GOLD   | -    | -     | 0.1        | 5% (J)    |
| SILVER | -    | -     | 0.01       | 10% (K)   |

## POTENTIOMETERS

Potentiometers are variable resistors. There are two main types in kits: normal potentiometers (often called pots) which are used as front panel controls for volume, bass, treble, speed control, etc.; and 'trimpots' which are smaller devices mounted on the circuit board. These are used for initial adjustment of frequencies, levels, etc. and are not normally

adjusted once set.



Page 4

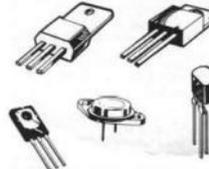
## DIODES

Diodes are used to convert AC current to DC (rectify), or to detect signals. Most are in the form of a black or clear cylinder 3-10mm long. Diodes are also polarised, with a cathode end (k) and an anode end (a). The cathode is marked with a black or silver stripe, or in some small signal diodes, a white end. Always check that they are installed the right way around.

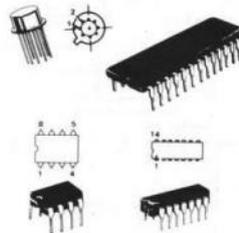


## TRANSISTORS

Transistors are the heart of most solid state equipment. They are used to amplify and switch signals. Transistors generally have three leads called emitter (e), base (b), and collector (c) and come in a wide variety of different cases. Always check that the leads are installed in the correct positions - two transistors may look the same, they may even work the same, but their leads could be differently oriented. The number of a transistor is normally printed on the case. Any other numbers or letters are manufacturers' codes and may be ignored. Typical transistors are illustrated alongside.



\* ALWAYS FOLLOW THE PIN CONNECTIONS ON THE CIRCUIT DIAGRAM CAREFULLY.



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## INTEGRATED CIRCUITS

Integrated circuits are just what their name indicates: a complete circuit in a single package. They perform a wide variety of functions - amplifying, timing, switching, counting - the list is enormous. They are usually packaged in a dual-in-line (DIL) package with from eight to forty pins.

ICs must be installed in the correct direction. One end will be marked with a notch or hole which must be installed as indicated in the circuit layout.

Identifying the right IC can sometimes be difficult due to the maze of numbers printed on them. See the first paragraph of the component identification section for clues to identifying the right IC.

# Building the PIXIE cont'd

## CONSTRUCTION TECHNIQUES

Most kits are assembled on a 'Printed Circuit Board' (PCB). This is a sheet of insulating material on which is etched the circuit layout in copper. Components are mounted on the non-copper side with their leads fed through the board and soldered to the copper tracks. When soldering, take care not to overheat as the tracks can lift off the board. Also avoid using too much solder, or you may 'bridge' across to another track causing a short circuit.

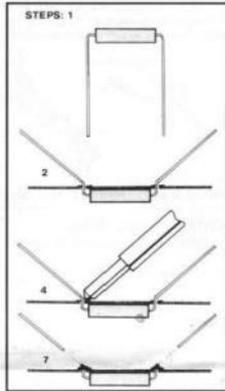
The drawings show how components are mounted on the PC board.

1. Bend components leads to fit the holes.
2. Insert leads in the correct holes and push down hard against the board. If the component is polarised, check that it is installed the right way round.
3. Turn the board over and bend the leads to 45 degrees.
4. Hold the bit of your soldering iron against the component lead and the copper.
5. After pre-heating for about one second apply the solder to the joint and the iron.
6. When the solder has flowed across the pad remove the iron and solder. (For more details, see the section on soldering on page 3.)
7. When cool cut the leads off flush with the solder.

The printed circuit boards are connected to the other components using hookup wire. Usually PC pins will be used to simplify connection. To connect to these first strip 5mm of insulation from the wire, tin the end (tinning is simply coating with solder) and the PC pin. Hold the wire against the pin and re-melt the solder. Hold still until the joint is solid.

When connecting wires to switches, potentiometers and terminals first strip and tin them as above; put a 90 degree bend in the stripped end and hook it through the terminal. Do not

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wrap it around the terminal or it will be difficult to remove if necessary.

## COMPONENT DRESS

Dress is the name given to the neat layout of parts. Whilst it is not essential, neat consistent layout and construction makes any fault-finding much simpler, as well as producing a more professional and reliable finished product.

Bend leads to fit their PCB holes accurately, using long-nose pliers. This means easier installation and less strain on the point where the lead enters the component. All components except transistors should sit right on the board. Line up all resistors so that their colour codes can be easily read. Position capacitors so that their values can be read (except polarised types, which must go in the direction indicated).

## USING A MULTIMETER

A multimeter is indispensable for testing and troubleshooting circuits. These notes will help you to use it effectively.

A typical multimeter measures volts (AC & DC), resistance and DC current.

To measure voltages, set the multimeter's range switch to the next voltage range higher than the voltage you want to measure. For example, to measure six volts, set the switch to ten volts. If you do not know what the voltage should be, set the switch to the highest voltage range (AC or DC) and measure the voltage. If it barely moves the needle, move the switch to the next range down. Do this until the needle falls around the middle of the scale.

Always make sure that you have set the meter to AC or DC as needed. Transformers and mains wiring are AC, transistor circuits are DC. When measuring DC, the red lead must be connected to the positive side, and the black to the negative. If the needle swings to the left, you have them the wrong way around.

## RESISTANCE MEASUREMENTS

When measuring resistance always make sure that no power is applied to the circuit or you will damage your meter or get a false reading.

The most important thing to remember when measuring resistance is to make sure the meter is properly 'zeroed'. To zero the meter, set it on the appropriate range ('ohms X1') and hold the two probe tips together. Now adjust the knob labelled 'ohms adjust' until the meter needle is sitting over the zero mark on the right hand side of the meter scale. Notice that the ohms scale reads from right to left.

## CURRENT MEASUREMENTS

To measure current, the point you wish to measure will have to be separated, as the meter will only measure current in series with the circuit. Adjust the range switch as for



A TYPICAL MULTIMETER



A MULTIMETER CORRECTLY ZEROED FOR MEASURING RESISTANCE

voltage measurements - start with the highest range and work down.

## GENERAL RULES

Check the position of the range switch before every measurement. Multimeters will not take much abuse (such as connecting to the mains on the ohms range!).

Make sure that you're reading the right scale of the meter. These will be identified similarly to the range switch.

Keep the meter flat when measuring, and read the scale from directly above - if your meter has a mirrored scale, line the needle up with its' reflection. This will minimise errors.

Re-zero the needle every time you measure resistance.

Switch the meter off, or to the highest current range when not in use.

Read your meters' instruction manual thoroughly.

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# Building the PIXIE cont'd

## A GUIDE TO BUILDING YOUR PIXIE

Congratulations. You are about to embark on one of the most enjoyable AR projects around. This rig is also fun to use either at home or in the field. Apart from the obvious QRP minimal transceiver it can be used as a beacon and a fox in hidden transmitter hunts. It can be used as a driver for a larger rig. Your imagination is the limit to what you can do with it.

### ***IF YOU READ NOTHING ELSE READ THIS,***

*Open the packet and check the contents against the Component Listing in the packet. Report any discrepancies.*

*When building use the board layout to locate where to put the parts. You may find it useful to mark off each part as you finish soldering it in.*

### **FIRST THINGS FIRST.**

#### **Make sure you have the basic tools.**

A 40 w temperature controlled soldering iron with stand and moistened tip wiping pad. A small chisel shaped bit is suggested as suitable.

A pair of small sharp side cutters.

A pair of needle nosed pliers

A pencil or ink eraser.

Magnifying glass.

Component/board holder/third hand.

A working multimeter (check the battery).

Four sheets of newspaper to catch small solder droplets.

Solder will be provided.

# Building the PIXIE cont'd

## **Check the packet contents.**

It is unlikely that anything is missing or an incorrect value has been included but best to be sure so that later you know it's your fault if you have bits left over or not enough bits. Report any discrepancies.

It helps to have a tea towel or similar cloth to empty the packet contents on. A component on the floor is likely lost or damaged by big feet.

Sort and check the components against the Component Listing. Use an empty egg carton or other segmented receptacle to help separate resistors, capacitors etc.

## **Preparing the components**

The component leads are tinned but tinning can oxidise so to ensure clean rapid soldering use the eraser to firmly wipe along the leads of each component to ensure they gleam.

## **Preparing the tools.**

Heat the iron to about 340 C. Clean it on the moist pad or steel wool clump. Melt some solder and check that the bit is tinned and the solder flows to the tip of the bit when solder is melted on side of the bit.

# Building the PIXIE cont'd

## **Preparing the components.**

For the resistors, inductors and diodes you need to carefully bend one wire so it returns parallel with the body. Use the needle pointed pliers to hold the component wire just beyond the body and with index finger and thumb bend the wire.

## **Order of assembly.**

A guide to component placement follows. It is important to have a methodical approach and not just grab a component and stick it in where you think it should go.

## **Soldering.**

If you haven't soldered before, lookup a "how to solder" clip on the WWW. Practice soldering two copper wires crossing each other at right angles.

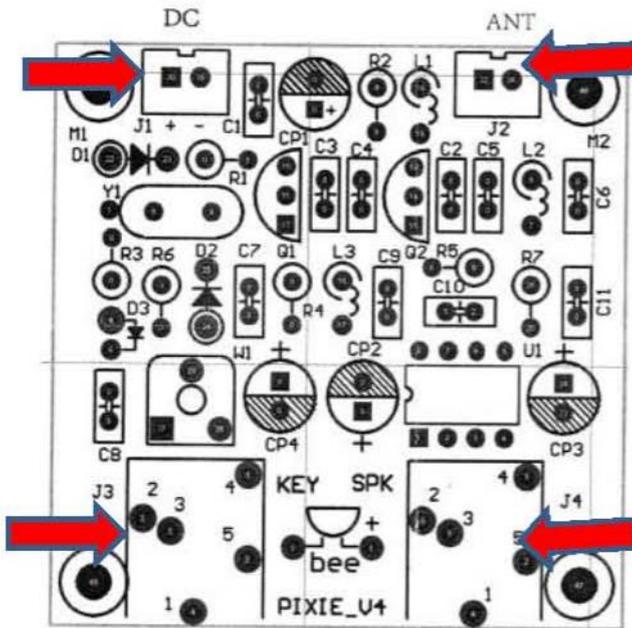
Place the tinned tip and the component lead and the pcb track in contact with each other and quickly apply the solder. It should wick from the component to the pcb. Remove the iron and replace in its stand. It should be done in a second or two. Longer may damage the board track. Inspect the joint. If clean and shiny proceed.

## **Lead trimming**

When a component such as a capacitor has been soldered in there will be excess wire protruding. Hold the excess between finger and thumb of the left hand and use the side cutters to clip the wire about half a mm beyond the solder.. If you do not hold the wire it will fly off and may injure someone nearby.

# Building the PIXIE cont'd

## PIXIE PCB POPULATING SEQUENCE



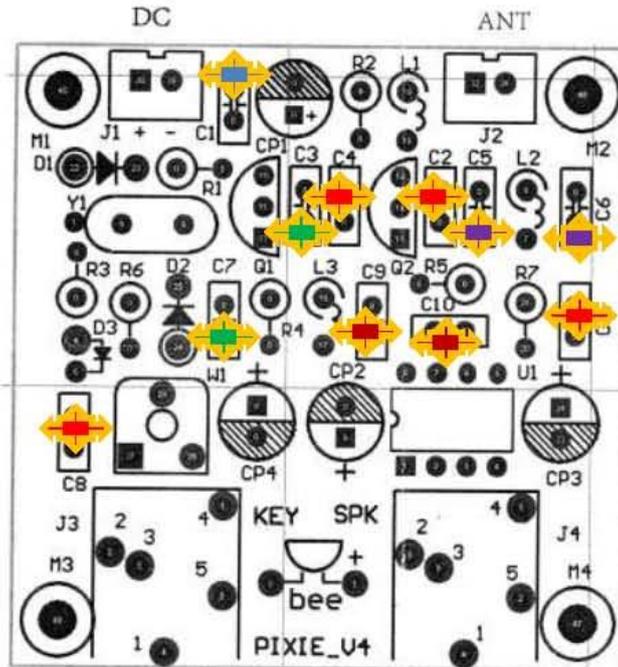
Mount some of the larger components first to help with orientation and to protect the smaller components when the board is inverted.



Mount the key and headphone sockets and the DC power plug J1 and the Antenna connector plug J2. Note the polarity notch position.

Mount one at a time, holding it in place and soldering carefully. Mark it off the list and go to the next part.

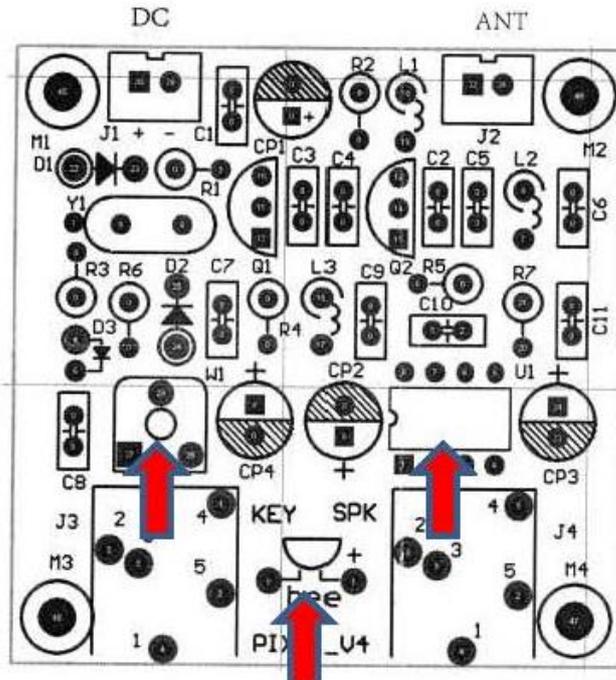
# Building the PIXIE cont'd



Now fit the capacitors as follows, soldering one at a time and marking it off the list as you go.

-  C1 0.01 uF
-  C2, C4, C8, C11, 0.01 uF
-  C3, C7: 100 pF
-  C5, C6: 470 pF
-  C9, C10: 0.047 uF

# Building the PIXIE cont'd



Now we can fit

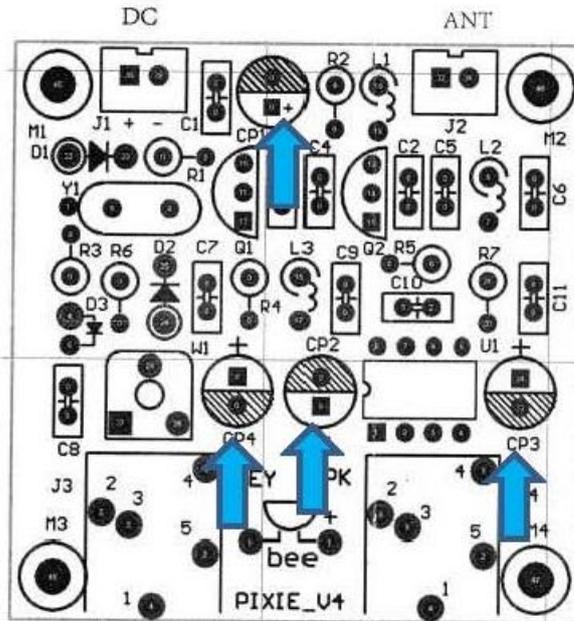
the buzzer,

the potentiometer

and the IC socket. Keep the notch as per the diagram.

Mark them off as you go.

# Building the PIXIE cont'd



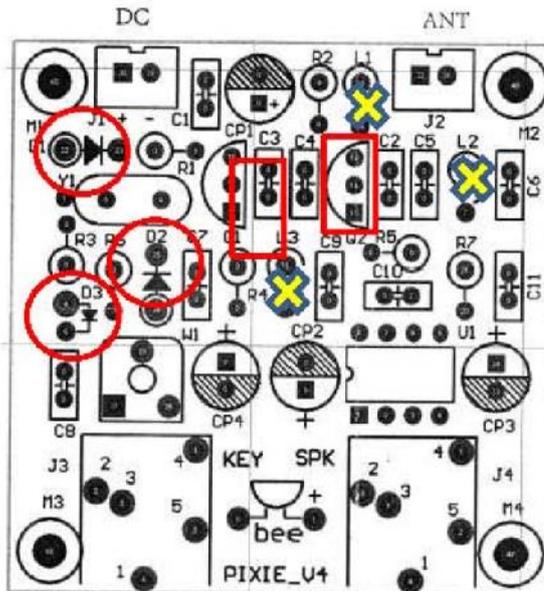
Next the electrolytic capacitors. NOTE THE POLARITY

CP1 100 uF,  
CP2, CP3, CP4 10 uF

Now if not already done bend one lead on the resistors so that the resistor when mounted stands vertically with 2 mm lead above the board at the bottom. See demo.

Fit the 7 resistors. Cross reference the numbers on the board layout with the parts list. Fit in numerical order, R1, R2, R3, etc. Mark them off as you go.

# Building the PIXIE cont'd



Fit the three inductors the same way as the resistors 

Now fit D1 and D2. Form the leads as you did the resistors

Next fit D3. Form the leads as you did the resistors.

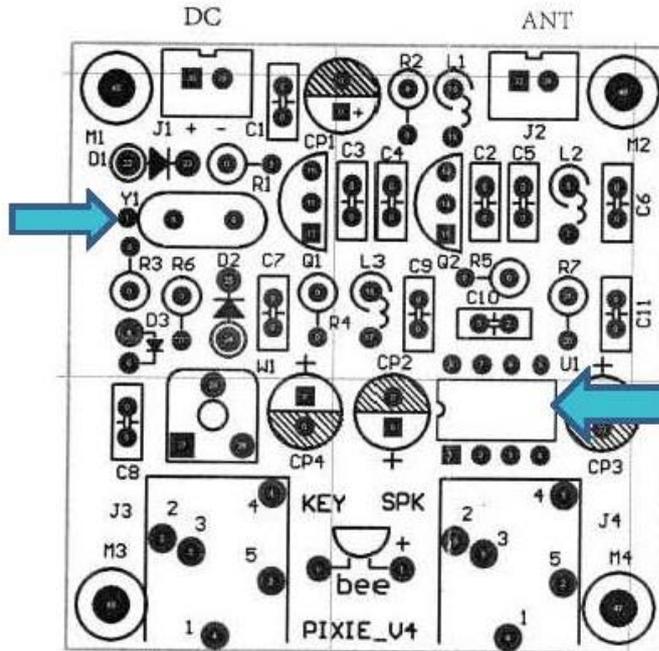


Fit the two transistors. Leave 3 mm of lead beneath the body.



Make sure you have oriented them correctly. If you want a little more power or are concerned about the rating of the transistor supplied talk to Ron VK3AFW about a substitution for Q2.

# Building the PIXIE cont'd



Fit the crystal. If you are not going to use the VFO then the crystal may be mounted flush with the board, otherwise leave the leads at maximum length as the crystal will be removed later.

Now bend the IC leads carefully (see demo) so they are parallel and insert in the socket with the notch aligned with that in the socket..

# Building the PIXIE cont'd

## TESTING.

If you don't have a suitable absorbing power meter, make up a dummy load of two 100 ohm 0.5 W resistors in parallel. Connect a 9 to 13.8 Volt dc supply, plug in a straight key and a mono headphone set.

Switch on the power. Press the key briefly. The buzzer should sound. Tune a receiver to 7.032 kHz CW and while sending short dits adjust the tuning for a good beat note. It should sound clean and be chirp free. The power can be measured by adding a 1N914 type diode and a 0.01 uF filter capacitor plus a voltmeter to the dummy load if you do not have access to a power meter.

## **DO NOT HOLD THE KEY DOWN FOR MORE THAN 2 SECONDS WITHOUT A 4 SECOND KEY UP.**

square the measured voltage and divide by 100 to get the power in watts. For example if the voltmeter reads 7.1 V then the power is  $7.1 \times 7.1 / 100 = 0.50$  watts. You should see between 5 and 10 volts.

To test the receiver another pixie can be operated into a dummy load that is at least 5 m away but within 20 m. A loud tone should be heard. Adjust the potentiometer for the tone that suits you.

Further testing can be done on air with a proper antenna connected but this completes the basic testing and you now have a fully functioning QRP CW transceiver.

CONGRATULATIONS.

# TRADE DISCOUNTS

## FOR CLUB MEMBERS at ALTRONICS and JAYCAR.

Moorabbin and District Radio Club Inc. members can now buy over the counter at **Trade prices** from both **Altronics and Jaycar**. When making a purchase ask for **Trade Discount** and for **Altronics** quote the Club's Trade account number **32323** and your **call sign** or for **Jaycar** quote Customer Number **45400209**. **This is NOT a charge account so you use your money.**  
**Note: Minimum purchase of \$20 may apply.**

Check out these companies at their websites.



<http://www.altronics.com.au>



**Get your Club photo ID  
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