

Radio Homebrew and Experimenter's Group

An official function of the
Amateur Radio New South Wales
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The Radio Homebrew and Experimenter's Group workshop meetings are free to Amateur Radio NSW (WIA NSW) members. A \$5 cover charge **may** apply to non-members. Currently we have two "meetings" a month with an extra one on the Trash and Treasure Sundays as follows :

First Tuesday of each month 7 - 9 pm at McDonalds, cnr Church St and Victoria Rd, Parramatta (upstairs dining room)

Buses stop outside and plenty of parking. We usually arrive around 6:30 and have something to eat before the meeting.

Third Tuesday of each month a Radio Net on 2m using the VK2WI Dural Repeater (147.00) duplex at 7:30pm. We get together on-air and discuss our latest projects, antennas and radio gear. All welcome.

Technical/Presentation Meeting after the Trash and Treasure Meets which are usually on the last Sunday of each odd-numbered month. The meetings starts about an hour after the Trash and Treasure and runs from around 1:00pm to 4:30pm, they are at our VK2WI site, 63 Quarry Rd, Dural (first right turn after the round-about at Dural and follow your nose about 2km down the road, look for the tower on your left hand side, plenty of parking on site.

These meetings are informal get-togethers of amateurs interested in building, or repairing their own radio equipment, there is usually a "show and tell" segment, where Amateurs can bring along their latest project (or even an old one) and show others what they have been up to. This is usually held before the demonstration or lecture organized for that particular meeting. We are always interested to see how others get a circuit working or sort out various hardware problems.

If at a meeting you need some test equipment either to fault find, calibrate or demonstrate something, then **please contact Peter O'Connell VK2EMU by email or leave a message for him at the office** and he will endeavor to have the appropriate piece of equipment available.

Check out the "Homebrew" page on www.arnsw.org.au for the latest news on the Homebrew Group. If you would like an extra copy of this newsletter, you will find a PDF version also on this page. Suggest you visit this site regularly to keep up to date with what is happening at ARNSW and for lots more information of interests to Hams.

This Month

- **Editors Comments – The issue is a "Members" Issue with projects by Homebrew Group members.**
 - **Keep track of the Homebrew Group on the Amateur Radio NSW (VK2WI) Web site.**
- **Enclosures for small projects** (Stephen VK2BLQ and Brian VK2TOX)
- **"Metal Bashing" Pt 02 - Aluminum Finishing** (Stephen VK2BLQ)
- **Project – Xtal Calibrator – Pt 02 – 4001/4518 chips and Xtal Osc "Blocks"** (Stephen VK2BLQ)

This Newsletter is online at Amateur Radio NSW <http://arnsw.org.au>

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Editors Comments – As usual this Newsletter is devoted to “Members” ideas and projects.

Devoted mainly to Group member's ideas and projects, most of them have been presented in our Show-n-Tell sessions of recent meetings, details are presented here for others who would like to follow up on the ideas.

The Group projects featured in recent issues are still under way, further development is taking place, however a little hampered by some design issues (got to make it work) and other trivial matters such as family birthdays, Xmas, caring for my grown up (most of the time) daughters and an ailing 83 yr old Mum, also I very occasionally need to sleep.

Keep track of the Homebrew Group on the Amateur Radio NSW (VK2WI) Web site.

To keep track of the Homebrew Group please check the pages of the ARNSW WEB site, look for details in NEWS, Meetings or the Homebrew Page itself on www.arnsw.org.au

A few of the Homebrew Groups members and visitors do not have Internet/Email facilities, if you have contact with one of these guys could you please pass the above information along to them and also check this page for information on future meetings/venues so that you can keep them up to date. Thank you.

Enclosures for small projects

Stephen VK2BLQ and Brian VK2TOX



Well, ever since the demise many years ago of the “Jabel” range of probe housings (plastic and aluminum) we have all had to make do with various lengths of PVC pipe/tube and hobby supply copper/brass tubing. Can't remember when I last saw a “Strepsils” tin.

Of late the ubiquitous “Althoids” tin (available in the UK and US) has meant a nice small metal container for projects, although they are a bit pricey out here. Stephen recently located a small tin containing sweets in one of the “Target” stores for a couple of dollars, that is if you don't mind “BatMan” or “Shrek” on your front panel, although I find a small section of PCB covers it up nicely. However they seem to be some sort of alloy which won't solder and is not very strong. I did “score” a handful of them, my Granddaughter is still wondering where her “Gampa” got all the sweets from.

A couple of weeks ago, sitting on someone's desk was a container of mints, looks sort of metallic, it was, and a nice little tin for an RF or audio project (the “Eclipse” pic above). Good size but opening is not very big, putting a project inside is a bit like building a ship in a bottle. Also very handy the “Jols” lolly container (above), very handy for probes and signal squirters. Both these containers could be sanded back and painted or just wrap some insulated tape around them. Have just acquired some large diameter “heat shrink” will see how that works out.

Metal Bashing For Beginners – Pt 02 – Aluminum Finishing

Stephen VK2BLQ

Note: The following process uses hot water and corrosive chemicals, make sure when “using” them that your eyes, face and hands are protected (assumes you are fully clothed and wearing enclosed shoes/boots). Make sure you have a small bucket or container (at least 2ltrs) of clean cold water nearby and also are near a cold water tap. So that if any “accidents” occur you can thoroughly wash down any effects parts of your body. Always dispose of chemicals in a responsible way. Good idea to also read up on First Aid procedures regarding acid/caustic “accidents”, even better if another adult is helping you and is also familiar with the First Aid procedures.

Also NEVER !! EVER!! Pour water into acid as it boils very rapidly, generating a lot of heat and splashes all over the place, **you ALWAYS add the acid to the water** in small quantities. Also use plastic spoons etc to measure and stir the solutions.

If you don't feel confident about the following process **THEN DON'T DO IT !!!!!** If you are going to try it out then read the whole article first so that you know here you are headed and what to expect.

So!!

The problem with using aluminum for front panels and cases is that it needs to be “finished” or it will corrodes due to moisture in the air and sweaty hands. You can just leave it in its natural color by sanding it off and spraying the panels with clear lacquer or paint from a spray pak.

A more durable finish can be achieved by “anodizing” the panels, this is a process whereby the panels are “pickled” in acid and then the resultant porous surface is dyed the color of your choice, thus “sealing” the surface and protecting it from corrosion.

Firstly a shopping list of items readily available from your local supermarket or even may already be in your kitchen or laundry.

Pads of "Steel wool" (can be either soapy or plain)
Tub of caustic soda (otherwise known as "Draino" ®)

Thick rubber gloves (from the gardening Dept) also some thinner "throw away" ones to wear during the simpler processes. Suggest you wear the "throw away" gloves during most of the following process to ensure you don't get finger marks on the aluminum, then also put on the heavy ones when you handle the caustic soda.

We will also need a plastic container, something like an ice cream container, to do the work in. I find the bottom half of such things as cordial containers very handy when "playing" with liquids and solutions, good for measuring stuff into.

Also as per the pictures perhaps put down some plastic sheet to protect your kitchen or bathroom, but make sure you can't accidentally pull it and cause the liquids etc to spill.

A hair dryer or heat gun would also be handy to dry the panel, but you could also just place it in the sun to dry.

For practice we will start off with a simple flat front panel. First if it does not already have any holes in it near the edge, drill a couple in an out of the way place. Then whilst wearing the "throw away" gloves, scrub the panel with the steel wool under running water, till it has a nice even and shiny surface, best with the "grain" going the same way. This is best done with "soapy pads". Then dry off the panel in the sun or with a hair drier/heat gun.

Thread a couple of pieces of string or nylon cord through the holes in the panel, this is to allow you to agitate the panel and lift it out of the anodizing process. While you are at it make sure you have a couple of liters of cold clean water handy in case of "accidents".

Fill the ice cream container about half full of hot water, straight from the tap or freshly boiled, place the aluminum panel flat in and well covered by the water. Now put on the Heavy Gloves !! Measure about two tablespoons of the caustic soda into a small plastic container, and then put the lid back on the soda container. Carefully stir the measured quantity of the caustic soda into the hot water. The water will start to boil rapidly and give off strong fumes. Don't breathe the fumes or get the solution on your cloths or flesh.



Let it bubble away for about 10 minutes, and remove it by picking up with the string and wash or immerse in water. The result is a satin finish that may be sprayed with paint or left plain. After washing the acid off the panel you can also soak the panel in a colored solution (water soluble cake or hobby colors) to the desired depth of color, and then rinse the panel again. The color is absorbed into the now porous surface of the panel and seals it. In fact simply

rinsing the fresh panel seals the surface too, leaving it with a durable and natural color. Yellow dyes come out almost gold, blues, blacks and greens produce amazingly professional looking panels

Project – Xtal Calibrator – Pt 02 – 4001/4518 chips and Xtal Osc “Blocks”

Stephen VK2BLQ (Written up by Brian VK2TOX)

As mentioned last time we all, from time to time we all need a reasonably precise source of frequency or pulses, be it for checking the calibration of a receiver dial, calibrating an CRO timebase display or calibrating a signal or pulse generator. Exactly what frequencies are needed obviously depends on what you are doing and how accurate you need to be. For a particular job most of us just "cobble" up a Xtal oscillator or breadboard an oscillator block, but of course next time you have to do the same thing again.

However as everyone's needs are different and the actual components available may vary we will look at a Xtal based calibrator in a "building block" fashion. You pick what you want to do or use what components you have available. The actual choice is a bit of "chicken and egg" situation as you have to balance what you want against what you have or can find or "acquire".

TimeBase

This is the basic source of signals which we then process as required. Basically we can use :

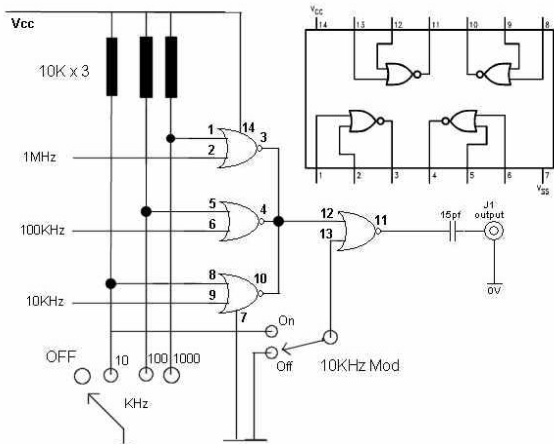
- (a) An external signal source
- (b) An internal Variable signal source
- (c) An internal Xtal oscillator circuit
- (d) A Oscillator Block i.e. from a PC motherboard or surplus equipment
- (e) A combination of the above.

Some years ago in "73" Magazine they ran a very interesting project utilizing a combination of the above, we will revisit this concept in a later issue. For the meantime we will look at a project based on an internal Xtal oscillator.

circuit we use the two “divide by 10” sections of the 4518 to obtain 100KHz and then 10KHz from the 1MHz timebase. The 4518 can be setup to count differently but that is for a future article.

Now we get to the interesting bit. In a conversation with Stephen I suggested it might be nice to select different output frequencies with the spare gates in the 4001 chip. So as you can see we route the 100KHz and 10KHz signals to the input of the two spare gates of the 4001 and then using simple DC switching we can enable the gate of the signal we require.

The small cap leading to the output terminal blocks any DC voltage appearing on the output terminal, stops it going out and external circuits feeding DC back into the chips, but also improves the harmonic content of the output signal.



Mods and additions

As with the 4011/4520 circuit presented in the last issue we can expand our basic circuit with more dividers, even mixing the 4518 and 4520 divider stages to achieve quite a variation in output frequencies. We could also add more 4001 chips to allow a greater selection of output signals. In fact the selector gates could also be used to “gate” one of the selected frequencies by using one of the lower frequency signals to “enable” the gate rather than a DC voltage. Here is a suggested circuit to implement this idea.

Supply voltage

These chips can be powered from a supply of 5 to 15VDC, they will obviously draw more current at the higher voltages (a consideration if you need to battery power the project). However the frequency the chips can operate at depends greatly on the supply voltage. Up to around 6MHz at 10V supply, for 10MHz you will have to go to 15V supply. The operating frequency also depends on the actual

“Brand” or manufacturer of the chips, their quality and the actual CMOS family you are using. In this circuit we are using the “CD” or “MC” types which are generally available from dealers or ratted from equipment.

Next Issue

We will look at the alternate chip types, even using TTL chips. We will also look at using internal and external signals to feed the divider stages as so put together a very useful piece of test/calibration equipment. We will expand our use of oscillator blocks to provide markers for VHF and UHF equipment. Peter VK2EMU got his solid state variable HV PSU (0 to 35VDC) up and running will see if we can get a sneak preview of it in the next issue. Also back to microwave stuff with continuation of the project started some time ago, along with details on a nice bit of kit I picked up at a recent trash and treasure, an ATV transceiver input on 23cm and output on 70cm, am tracing out the circuits and identifying the boards right now. We will see if we can squeeze a few of Alan VK2ZAY’s projects into the small boxes mentioned above.

Meantime

Why not rustle up some components and breadboard the above circuits to try it out and get a feel for it capabilities, if you have any questions don’t hesitate to write or email us, we would be happy to help.

Hope you have/had a good time at Wyong, see you in the next issue

Note: The back page has been left blank so that you have somewhere to note your friends email or contact detail and make a note of any dealers you would like to chase up after the weekend..