



- Q R M -

The Bi-Monthly Magazine
of the
Redcliffe and Districts Radio Club Inc.

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October 2006

Amateur Radio Stations VK4RC & VK4IZ



Secretary Peter and Club President David seen leading from the front (or is it the back!) and painting the Clubhouse at the last working bee held on 2nd September

From the Editor

Greetings to all Club members, radio enthusiasts, family supporters and friends.

Welcome to QRM for October 2006. I have just returned from a very pleasant visit to South Australia and Canberra. Much of the time was spent sitting with our old folks (my 92 year old mother and my XYL's parents), but that's OK. We are all going to get old one day, and it gave me an opportunity to think about that. But we were able to see and do other things too. I met up with an old mate of mine from my school days and early youth (Les, VK5KLV), who I haven't seen for many, many years. Les now lives in Pt Augusta. I was his best man, and we both are still married to our same XYLs – we feel like an endangered species! Amazingly, we still seem to agree on most things, and haven't lost our "schoolboy passion" for radio. In Canberra, we were able to see the "Floriade Exhibition", an exhibition about Percy Grainger at the National Library and a special exhibition of the 90th anniversary of the Battle of the Somme (1916) in the Australian War Museum. On the way home we took an extra day and finally visited the Jenolan Caves, having driven passed them umpteen times in the past. Life's too short – if you want to do something, then do it! You can try that argument when seeking "permission" to buy that expensive new radio or whatever – good luck!

I'm delighted to report that while I've been away the advanced radio theory course has got underway, thanks to Laurie (VK4BLE) and Glenn (VK4FZ). If you want to join this course there is probably still time if you are prepared to do a bit of catching up. Also recently, our club members have supported the Scout Movement in the JOTA weekend – reports I've heard suggested that band conditions were not helpful, but otherwise things went fairly well. Preparations are also in an advanced stage for the Redsun Rally to be held on Sunday 19th November starting at 10am at our club rooms. For those who do not know, the Redsun Rally is a friendly competition between our Club and the Sunshine Coast Amateur Radio Club (SCARC) which is usually held annually. It consists of a fun car rally, BBQ lunch and a fox hunt. On this occasion, the "grand opening" of the club renovations by various dignitaries is also planned. This is one of the great annual events of our Club, so please be there if you possibly can and join in the fun.

In this edition we feature an interesting technical article supplied by Laurie (VK4BLE), describing the construction of a variable frequency synthesizer. This project could be a useful basis for a receiver or transmitter project or form part of a test instrument. By the way, I need more articles like this, so if you have something which would be of interest to other members and readers, please send it to me. In the meantime, many thanks to all who have contributed to QRM so far this year.

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----- IMPORTANT NOTICES -----

Redsun Rally

This year's Redsun Rally will also be the "grand opening" of the Club room renovations. The Redsun Rally is a great fun day out, shared between Sunshine Coast club members and ourselves. All visitors are welcome. The event starts with a car rally, followed by a BBQ and lastly the Fox Hunting event. Our Club has been very successful over the years with this event so come along and join in the fun. This event will take place on 19th November, starting at 10am at our clubrooms. For the grand opening of the of the club renovations, we will be inviting our local politicians and supporters.

AMATEUR RADIO THEORY COURSES AT RECLIFFE

If you would like to get your amateur license, upgrade, or do a refresher course, you can study for the theory, regulations and practical for Foundation, Standard or Advanced at Redcliffe Radio Club. See Alan VK4KZ, Laurie VK4BLE, Glenn VK4FZ, or anyone from the Executive. You don't have to be a Club member to participate. Special courses will also be arranged to prepare people for the Foundation License. Please let one of the above know if you wish to attend one of these. There may be limits to class sizes.

An advanced course is has recently begun and will probably continue until early next year.

MAINTAINING REPEATER RADIO EQUIPMENT

The Recliffe and Districts Radio Club's VHF and UHF repeaters are available for all amateurs to use, and all are welcome to use them, however, the radio equipment must be maintained and upgraded from time to time. If you would like to make a donation towards this upkeep, it may be forwarded to: The Secretary, Redcliffe and District Radio Club Inc, PO Box 20, Woody Point, QLD, 4019.

NEW WEBSITE

The Club has a new website, the URL is <http://vk4rc.we.net.au> Thanks to Brad VK4FAAF and his ISP business we.net.au for his generous contribution to the club. If you have internet needs, Brad can help you, and you would be supporting a member and sponsor of our Club – see advertisement at back page: wenet.au.

2005/06 COMMITTEE MEMBERS & CLUB DIRECTORY

President	David Close VK4FDRC	Phone: 3862 8700
1st Vice President	Steve Pearson VK4IT	Phone: 3284 8975
2nd Vice President	Peter Schrader VK4TGV	Phone: 0419676942
Secretary	Peter Richardson VK4TAA	Phone: 3261 4225
Treasurer	Glenn Wood VK4FZ	Phone: 3351 4295

Meetings: ***EVERY MONDAY** with regular guest speakers and ongoing projects*
***Time:** 1930hrs (local)*

WHERE: *Redcliffe and Districts Radio Club clubhouse - Cnr Klinger Rd & Macfarlane St, Kippa Ring*

Clubhouse: *Open every Monday evening 1930hrs (local) INCLUDING PUBLIC HOLIDAYS*

2nd Monday of each month : General Members Discussion Meeting

CLUB NETS: Sunday evenings at 1900K 2m on 146.925MHz Redcliffe repeater VK4RRC and 1945K 80m 3.618 MHz ± QRM VK4RC Net control : 27 MHz, channel 20, 27.205 MHz LSB, Thursday at 8pm

REDCLIFFE and DISTRICTS RADIO CLUB Inc.
PO Box 20, WOODY POINT QLD 4019
WEBSITE: <http://vk4rc.we.net.au>

EXAMS: Alan VK4KZ, Laurie VK4BLE & John VK4WX
NET_1: Sunday 1900K 146.925
NET_2: Sunday 1945K 3.618
REPEATERS: VK4RRC VR 146.925, 438.325

Contributions to Editor QRM - Alan Jenner VK4KZ

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The Editor thanks all contributors to QRM. Where possible, authors of non-submitted articles are contacted for permission to publish in QRM, and/or their authorship acknowledged. Some articles are printed with kind permission from the operators of Q-news, Clive@vk4cxx (Lee), Packet Teletext (Graham), Packet download and Internet. This magazine is not for sale and is distributed free to members of the Redcliffe and Districts Radio Club Inc. and other interested persons and clubs. ©2001

Forthcoming Events

- General business meeting, 2nd Monday of month
- Foxhunts, 4th Monday of each month
- Wednesday activities – mornings 8.30am each fortnight – next 23rd August and 6th Sept
- Trivia Nights every Wednesday evening on 70 cm repeater, 7.15pm for check-ins
- Redsun Rally, Sunday 19th November – see notices elsewhere in this QRM for details

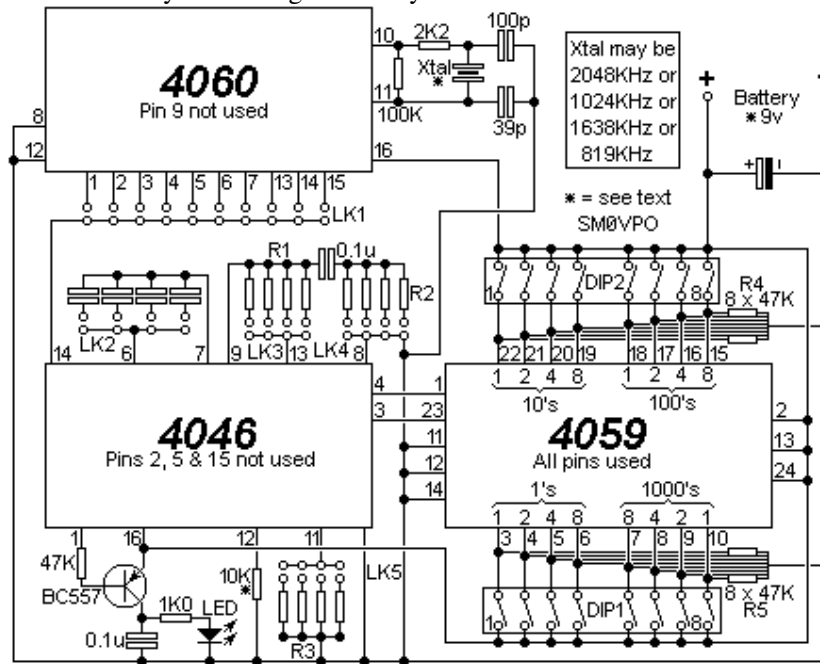
CMOS RF SYNTHESIZER

by Harry Lythall - SM0VPO

supplied by Laurie Pritchard (VK4BLE)

The Synthesizer

One of the most interesting projects to work with is that of a synthesizer that can accurately generate desired frequencies. This synthesizer uses just three CMOS chips and one PNP transistor. It is a fact that the transistor may be the hardest component to get in some parts of the world!! The synthesizer will generate a 3:1 frequency range anywhere from 300Hz to 4,000,000Hz (4MHz). Using the components shown you can feed the synthesizer with up to 12vDC but with only 9vDC the synthesizer may not achieve more than 3.5MHz. Tye lock-range of this synthesizer is about 10:1 or so.



The Reference Oscillator

The CD4060 reference oscillator divides a crystal reference oscillator successively by two. From each stage we can select a frequency that is half the value of the previous frequency. The reference frequency of the synthesizer is multiplied by the programmable divider divide rate to give the final frequency. If our reference frequency is 1KHz then the final output may be programmable in 1KHz steps. This is quite convenient for a decimal programable divider. Divide by 1000 = 1000KHz, divide by 1001 = 1001KHz etc. You could also select a crystal that would give you a 100Hz output then you could select frequencies in 100Hz steps. Divide by 1000 = 100KHz, divide by 1001 = 100.1KHz etc. Here are reference frequencies you could use for different oscillator crystal frequencies.

CRYSTAL/REFERENCE FREQUENCIES (FROM 4060)

Crystal	Q8 (pin13)	Q9 (pin15)	Q11 (pin1)	Q12 (pin2)	Q13 (pin3)
32.768KHz	64Hz	32Hz	8Hz	4Hz	2Hz
256KHz	500Hz	250Hz	62.5Hz	31.25Hz	15.625Hz

512KHz	1KHz	500Hz	125Hz	62.5Hz	31.25Hz
819.2KHz	1.6KHz	800Hz	200Hz	100Hz	50Hz
1024KHz	2KHz	1KHz	250Hz	125Hz	62.5Hz
1638.4KHz	3.2KHz	1.6KHz	400Hz	200Hz	100Hz
4069KHz	8KHz	4KHz	1KHz	500Hz	250Hz
8192KHz	16KHz	8KHz	2KHz	1KHz	500Hz
16384KHz	32KHz	16KHz	4KHz	2KHz	1KHz

Remember that the programmable divider will only divide up to 15999 and this limits the maximum frequency you can get out of this synthesizer. With a 100Hz reference frequency you can only get a maximum of 1.5999MHz. With a 1KHz reference frequency you can program up to 15.999MHz which is beyond the range of a CD4046. Incidentally, a 32,768Hz wrist-watch crystal will give you 2Hz so the synthesiser will generate from 6Hz up to 31,998Hz in 2Hz steps.

The VCO

The 4046 has a wide-range Voltage Controlled Oscillator (VCO) which uses C1 and R3 to determine the frequency. C1 is selected by LK2 and I used 33pf, 47pf, 68pf and 100pf. R3 is selected by LK5 and I used 4K7, 10K, 33K and 100K. The 10K resistor from pin 12 is an offset resistor which may be omitted. I only used it to push the VCO up to 4MHz which is about the maximum you will realistically get from a CD4046. The 74VHC4046 is supposed to go up to something like 20MHz.

There is no reason why you cannot use an external VCO, such as a VHF oscillator with a divide by ten prescaler. This should enable you to generate up to about 159.99MHz in 10KHz steps.

Programmable Divider

The output of the VCO is divided by a programmed figure in the 4059 IC. I just used two 8-pin DIP switches on the PCB but there is no reason why you cannot use "BCD thumbnail" switches. Each digit is in the form of Binary Coded Decimal (BCD) and so the range of each digit is 0 to 9. The 1000's digit however may be programmed up to 15 (F in hexadecimal) so the maximum divide rate is 15999. The minimum divide rate is 3 so that with a 100Hz reference oscillator the minimum output is 300Hz.

Phase Detector

The reference oscillator and the output of the programmable divider are both fed into the twin phase detectors in the 4046. One of these outputs (pin 13) gives a HIGH, LOW or TRISTATE (high impedance) levels which indicates whether the programmable divider output is above, below or equal to the reference frequency. This is used to control the VCO frequency and complete the loop. There is a second phase detector but this is little more than an Exclusive-OR gate. I have used this to give a loop locked indicator via the LED and the BC557 (PNP) transistor.

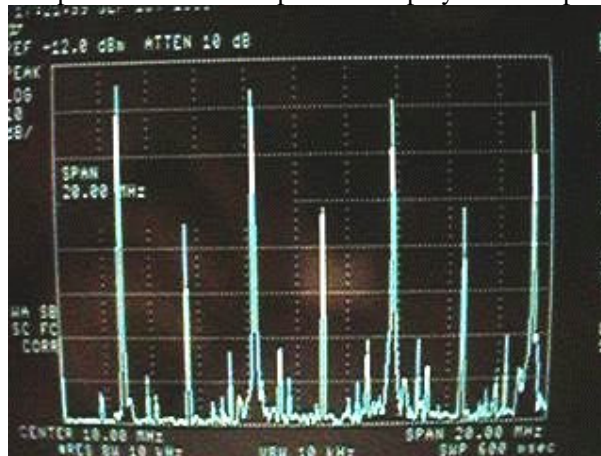
Loop Filter

The output of the phase detector is fed via R1 (10K, 33K, 100K and 330K selected by LK3) to a capacitor to form the loop filter. If the loop filter time constant is too short then FM modulation will be removed. If too long then it will take too long for the loop to lock onto a new frequency. There is also a damping resistor R2 (1K, 3K3, 10K and 33K) which is selected by LK4. The loop damping resistor should be

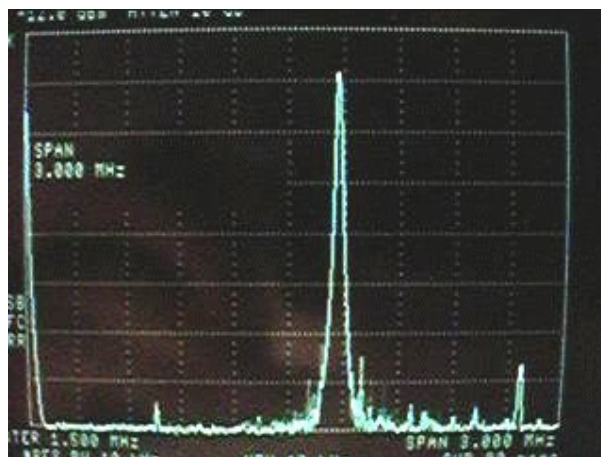
included to prevent loop over-correction. This would result in the VCO constantly swinging above and below the correct frequency.

Output Signal

The PCB does not give any particular output socket since it was designed for training dealer staff and was only to be viewed with an oscilloscope. A high-level buffered output is available from pin 10 of the 4046 VCO but this must have a load resistor of 10K to ground. The output is a square-wave with odd harmonics extending throughout the HF spectrum. Here is a spectrum display from the prototype - 0 to 20MHz:

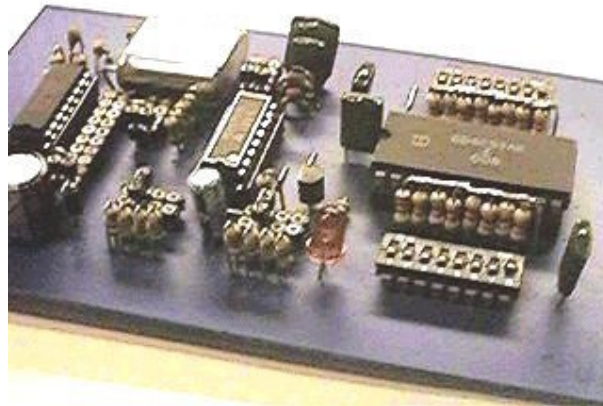


As you can see, there are both odd and even harmonics throughout the HF spectrum with the odd harmonics being the strongest. This means that you will need to filter the output if you intend to use it for transmitting or receiving. A closer view of the spectrum, also at 1.8MHz centre frequency shows the output to be relatively clean:

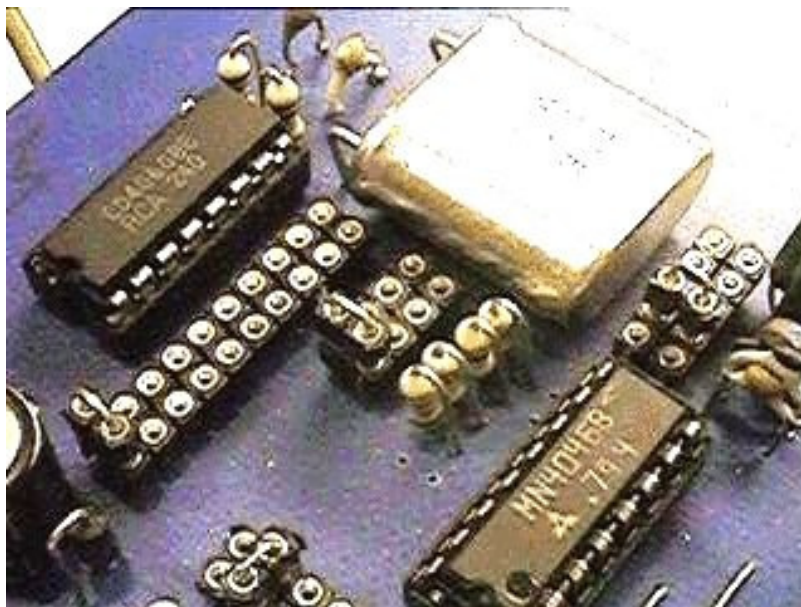


Construction

The completed synthesizer PCB is 108mm x 64mm and has only battery (and output?) connections. I fitted all three ICs to sockets even though modern sockets cost more than the CMOS chips (I am VERY old-fashioned, I even like to see girls in black seamed stockings!).



Because this unit was used for training I needed to adjust some of the settings so I used header sockets and U links. In this way I could select any clock frequency, VCO parameters and loop-filter settings I wanted.



Frequency Programming

I set the frequency by means of two eight-pin DIP switches. Note that the place values of the switches are 1 2 4 8 from left to right EXCEPT the fourth (most significant digit) which is backwards: 8 4 2 1.



Let us assume I want to generate the frequency 1.815MHz. With a 4.096MHz crystal I set the following links and DIP switches. Note that the MHz switch is backwards.

LK1 = 1KHz (Q11)	LK2 = 33pf	LK5 = 4K7
Loop filter	LK3 = 100K	LK4 = 10K
DIP-1 (5KHz)	1 & 3 = ON	2 & 4 = OFF
DIP-2 (10KHz)	1 = ON	2 3 & 4 = OFF
DIP-2 (800KHz)	8 = ON	5 6 & 7 = OFF
DIP-1 (1MHz)	8 = ON	5 6 & 7 = OFF

Setting Links

LK3 and LK4 are entirely optional. If LK4 is omitted and R2 is made a total short circuit then the circuit will never stabilise but oscillate up and down the band. LK4 should be a mirror of LK3. LK3 sets the loop time constant. If you add DC blocked AF to the VCO voltage (4046 pin 9) via a 270K resistor then you will be able to generate an FM signal. With LK3 set to 10K then AF below about 1KHz will be removed (the loop feedback will see modulation as a frequency error). With LK3 set to 1M0 then the loop will take an eternity to stabilise but will give good quality modulation down to to about 100Hz.

The PCB

A printed circuit board is available but I drew the artwork before I had a computer so I used drafting pens with old fashioned ink on good old tracing paper. I have scanned my [PCB Artwork](#) which works, but I have not bothered to tidy it up. I have not yet drawn a component overlay as I think that it should not be too difficult for anyone of modest intellect to identify the component locations. Anyway, you can not complain, it's for *free!!*

Did You Know that ...

To make an RF VCO that works in the VHF spectrum, forget about buying those expensive VariCap diodes - you don't need them. Ordinary high voltage Zener Diodes work. A 20v zener diode operated at 1v to 13.8v exhibits a capacitance of typically 10pf to 2pf as the voltage is varied. I have even used this effect to make a 5.0MHz - 5.5MHz VCO for this synthesizer, just as an experiment.

Have fun, de **HARRY**.

QRM

----- Club second hand market -----

Do you have any radio gear, components, bits and pieces you would like to sell or swap. You can advertise in QRM for free. Please call, email or send details to the QRM Editor, Alan (VK4KZ). Similarly if you want something you think someone might have, you can also advertise in QRM. Your Club is there working for you. For current items for sale/wanted, see below.

~~~~~ FOR SALE ~~~~~

From the Club: a Syntrex Citizen Band radio to be sold. Price \$200. Unit is set to transmit high power. See Peter (VK4TAA) Club Secretary.

1 - Triband antenna - Junior (we think). Not sold at the auction. If you would like this Triband antenna for \$50 please let Glenn or Peter know.

~~~~~ WANTED ~~~~~

We are looking for a Dummy Load for the club to be located in the new radio room. The Dummy load will be used for Foundation training courses & for repairs as & when needed. A larger power rating would be nice but will be happy with up to 100watts.

Power supplies - 10 amps. We are looking a couple of suitable power supplies to run the club 2m & 70 cm radios. These are the ones that remain in the club rooms for calls etc.

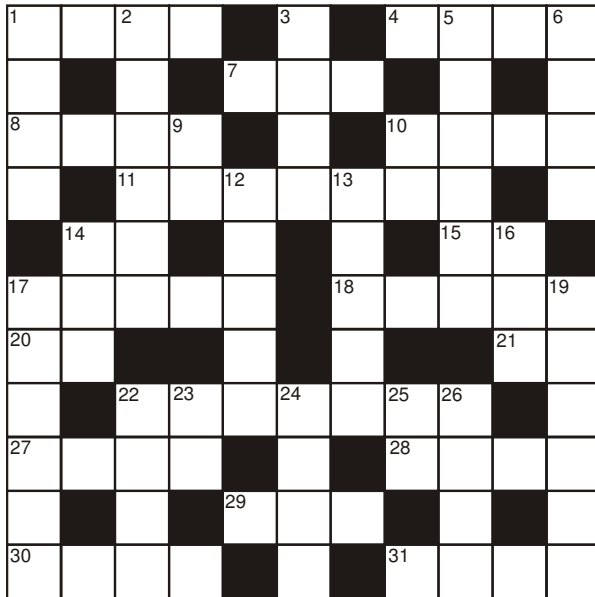
----- ☹☹☹ LOST ☹☹☹ -----

One Dick Smith 100W 6m amplifier belonging to Charlie (VK4YZ), probably loaned to someone after a field day. If you have it, or know where it is, please return to Charlie.

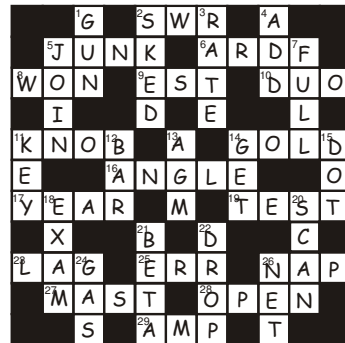
----- WIA Membership -----

Please let the Secretary, Peter know if you have recently become a member of WIA. WIA membership of our Club members is important because we are able to derive insurance benefits. If you are not in WIA, please consider this seriously – it is our representative body.

R & DRC Crossword No. 14 (Solution next QRM)



R & DRC Crossword No. 13 solution



ACROSS

- 1 Oposing EMF in inductive circuit
- 4 Transistor with high impedance input
- 7 ARDF transmitter
- 8 Imaginary line about which a body may rotate
- 10 Deeds
- 11 Competitive amateur radio event
- 14 Acceptable (colloquial)
- 15 Word connecting alternatives
- 17 At very beginning
- 18 Harmful bacteria
- 20 Referring to (abbrev)
- 21 Saint (abbrev)
- 22 Damage beyond repair
- 27 Atmospheric rare gas
- 28 Unit of power
- 29 Main computer processor (abbrev)
- 30 Numbers divisible by 2
- 31 Metal commonly used in dry cell

DOWN

- 1 Ray of light
- 2 Short, sharp sounds
- 3 Connection point (computers)
- 5 Multiplying term
- 6 Throw
- 9 Thus
- 10 Arsenic (chemical symbol)
- 12 Observes and remembers
- 13 Enthusiastic
- 14 Single number
- 16 Usual measure of AC quantity (abbrev)
- 17 Resistor colour code for 3
- 19 Stationary as in electric charges
- 22 Deliberately introduce impurity to pure semiconductor
- 23 "-- garde!"
- 24 Classification
- 25 Exclamation after pain!
- 26 Beam antenna

© aj&jhj

----- Contest Calendar -----

CQ WW DX (SSB)	28/29 Oct	Japan Intl DX (SSB)	11/12 Nov
Worked all Europe DX (RTTY)	11/12 Nov	Spring Field Day (VHF+)	11/12 Nov
CQ WW DX (CW)	25/26 Nov	Ross Hull Memorial VHF	26 Dec

Notes from the Executive/Club Meetings

General Meeting, 15/8/06

- **Reminder the membership fees are now due.**
- 2006 Call books are available – **See Glenn for your call book.**
- Foundation books available. Cost \$16.50. Get your copy from Glenn.

- **Club renovations**

Over the last month we installed the radio room air con, security grills, Zippy hot water service, New improved sink in the wash rooms, Set up the radio rooms with both computers & radios, installed the projector, stereo system & remote mike for presentations. The electrical switchboard has now has 1 master switch to turn off, on leaving the site & the white boards have been relocated to be better utilised.

The next working bee will be on Saturday 2 September where we will paint the outside of the building & finish the last 2 security bars for the toilet & wash room.

- **Fund Grant Jupiter's Community** – The meeting endorsed Reg VK4KMP & Andy VK4KY to proceed with the submission for the coming rounds. Reg presented some points to the exec for discussion. We need to put these to the next general meeting for a decision.
- **The Redcap grant** – As above, planned for the 2nd September. Lots of help required for this fiddly job. At the last Exec meeting Reg reported that we need to complete the current grant before we can lodge a new one. The exec decided we should work on lodging a new application in the new year for a fridge.
- **Web site** – Steve (VK4IT) reported that our new club web site is now up & running. [HTTP://VK4RC.WE.NET.AU](http://VK4RC.WE.NET.AU) with over 50 new hits per week.
- **IRLP** – Brad(VK4FAAF) has brought the new IRLP card down & over the next week it will be installed on the 70 cm repeater. Node 6404. A special thanks to Brad for donating this card to the club.
- **Redcliffe City award & the round Australia rally awards** – John, Charlie & Steve are to review the 2 awards for recommendations regarding rule changes & or proceed or not based upon costs & an organiser.
- **JOTA** – A Special call sign for the event has been granted (VK4SMB). Advertising in Scout & Guide magazines has occurred & further coms is planned. The event this year will be 21/22 October & we will need members support over the weekend.
- **Q5** – Steve has found that there are scripts that can automate the broadcasts. Now that the IRLP card has arrived we will progress this item. Watch this space!
- **Donations from businesses in the Area** – David reported positive discussions with Bunnings & other local businesses. More on this as it is confirmed.
- **Communications** – Steve reported that we have an article in this months AR mag.. Steve & Ces to review possibilities with the local FM radio station 99fm. In progress.

- **Repeater report** – Peter VK4YRU reported that the new repeater is to be worked on over the coming week to optimise its performance. Keep a listen out on the 2m repeater as the new one is expect to nearly double the power output of the previous one.
- **Our Kitchen** has received some recent donations from Glen, Ces & Ken, electrical, cooking & cutlery & plates have been donated to improve the kitchen infrastructure.
- **The Remembrance Day Contest** was held last weekend with over 20 people visiting over the weekend. 3 members slept over & I can report that the new facilities are both comfortable & a delight to use. We made over 150 contacts for the weekend & the radio room was operating while other were watching a movie Saturday night, so the sound proofing works like a treat.
- **Amateur Licence training courses** – Alan reported that Advance licence course is to start early September, so If you do not have your name down with Alan VK4KZ you had better hurry.
- **Our Ces** (VK4VKC – Ray) has now completed his inaugural transmission on the Qnews. His next one is planed this weekend so listen the WIA news & the Q news follows it. 147.000 at 9 am every Sunday.

General Meeting, 11/9/06

- **Club renovations** – The working bee was a huge success with all the outside painting finish the last 2 security bars for the toilet & wash room installed. This brings all the projects pertaining to the grant completed. The exec are now working on the closure reports for both the Gaming commission & Redcap grant.
- **Redcap** – We a letter inviting the club to submit a request for this coming years redcap grants. We need to have this completed by end of the months so David will progress this. We will ask for \$ for a new fridge.
- **Jupiter's Community Fund Grant** – The meeting endorsed Reg VK4KMP & Andy VK4KY to proceed with the submission for the coming rounds. Reg presented some points to the exec for discussion. We need to put these to the next general meeting for a decision. – carried over.
- **Red Sun Rally & Grand opening** – We decided to do the grand opening on Sunday 19th November along with the Redsun Rally. The Redsun Rally will start from the club rooms at 10am & will return back to the club rooms for lunch. The club will supply "Slugs on a Rug" (Sausage Sizzle) BYO salads. Tea Coffee & Soft Drinks are available for purchase. The grand opening will be at 1pm which where we will have the important dignitaries present for the opening ceremony. After the ceremony we will do the fox hunt followed by the presentations to the winners for the day.
- **Redcliffe City award & the Round Australia Rally awards.** John WX showed previous copies of both awards. John is to send copy of the rules to the secretary so we can publish the rules. John recons we need to get 1000 printed as these will become hot items. He suggests the cost should be \$5 to enter ether competition. Action: Ken will check with RCC contacts to see if Council will sponsor the printing of the awards.
- **JOTA** – A Special call sign for the event has been gtanted (VK4SMB). The event will be held at the Scout campsite no 6 off Scouts rd Petrie. This is the same site we used for the John Moyle comp. The event this year will be 21/22 October & we will need members support over the weekend.
- **Donations from businesses in the Area** – David reported that Bunning's provided a ladder & paint for the club. This is fantastic outcome. Please support those who support your club.

David is also talking to a local aluminium supplier. More on this in the future.

- **Repeater report** – Peter VK4YRU reported that the new repeater has now been installed. We do need to do some work to both the 2m & 70cm antennas. A day will be planned were the antennas will be upgraded & a tie support added to the mast for the winds. We need assistance when this occurs. Watch this space.
- **Amateur Licence training courses** – Advance licence course is to start 15th September, please contact Laurie as Alan is on holidays at the moment.
- **General business from the floor**

Ken asked about cleaning the carpets before the grand opening. The general decision was to leave this at this stage until we resolve the bar spaces of concrete... Once we have covered these we can review the carpet cleanliness.

Gary reported that he has been given a tent that will be donated to the club. He is sourcing poles & ropes & doing minor repairs before bring this down to the club. This will be a great asset for competitions etc.

David thanked the many people who have contributed to the different projects in the last 6 months. There has been a huge amount of work completed & the facilities are looking great.

Peter TGV has installed the Chip burner on the PC in the library. Over the coming months programs will be loaded on the PC for writing programs either direct the radio or to chip. A chip eraser was also donated by Peter TAA. We still need to build our own program cable for the different radios. This setup is for all club members so take advantage of this new facility.

CELEBRATIONS (*September/October*)

Birthdays: Alfred McDonald (harmonic), Doug McDonald (VK4KET), 3rd September
Brian Bartlett (VK4UW), 12th September
Charlie Strong (VK4YZ), Lawrie Hill (VK4DAH), 14th September
Andy Wood (VK4KY), 15th September
Emily Pritchard (harmonic), Laurie (VK4BLE) and Alison (VK4HAD), 18th September
Anne Isdale (harmonic), Bill (VK4TWI), 19th September
Donna Wood (XYL), Andy (VK4KY), 24th September
Daphne Nunn (XYL), Arne (VK4AX), 13th October
Kevin McDonald (harmonic), Doug (VK4KET), Peter Harrison (VK4YRU), 20th October
Vanessa (XYL), Jason (VK4YOL), 30th October

Celebrations: Stewart (VK4TSB), & Vicki Bondarenko, 1st September
Don (VK4KZT) & Linda Laing, 21st September

Congratulations and best wishes to all above.

Apologies to anyone who has been left out. If you are not the Celebrations List, please give Secretary Peter your details as soon as possible. Peter is currently updating the list.

Further scenes from the working bee



Peter (VK4TGV) fabricating security screens (1)



Peter (VK4TGV) fabricating security screens (2)



Finishing touches to the front guttering



Glenn (VK4FZ) advancing to the next stage

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