OXTALES

First published 1980

Newsletter of the Oxley Region Amateur Radio Club Inc.
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Club Website: www.orarc.org

ORARC's Forty-first Anniversary Year

Club Nets on VK2RPM
146.700MHz
(CTCSS 91.5Hz)
Every Sunday at 0830
Every Thursday at 1930

January 2012

Compiled by VK2TT & VK2AYQ

PRESIDENT:	Henry Lundell	VK2ZHE	6582.0534
VICE PRES:	Bruce Walker	VK2HOT	6583.8360
TREASURER:	Keith Anderson	VKFKJA	6586.3988
SECRETARY:	John McLean	VK2KC	6584.6220

President's Report

Welcome to 2012. I trust everyone has had a safe and enjoyable festive season.

The Oxley Region Amateur Radio Club is now in its 41st year. We celebrated our 40th birthday last year on the 2nd of October 2011. We can't rest on our laurels though, and the club must continue to serve Amateur Radio and the greater community.

The ORARC 2012 Field Day takes place on Saturday the 9th and Sunday the 10th of June during the Queen's Birthday Weekend. At the club's January monthly general meeting we will make a firm decision regarding the Field Day venue. Last year the Tacking Point Surf Club building proved to be an excellent venue. Our long standing centrally located venue of the Sea Scout Hall in Buller Street has some advantages but the increase in traffic and competition for parking spaces have become major concerns in recent years. The Wintersun Festival will not be held in Port Macquarie this year so returning to the Sea Scout Hall is a viable option to consider.

Planning for the 2012 Field Day will commence this month so please consider offering your assistance. The committee will be very pleased to hear from you.

The club's communications caravan was on display at the club's Christmas barbeque at the Settlement Point reserve on Saturday the 3rd of December 2011.

The Christmas celebration was particularly enjoyable with an excellent attendance and perfect weather. Thank you to everyone who participated in the festivities, and a special thank you to the many people who assisted with the running of the day.

During the Christmas barbeque it was very heartening to hear the kind words of appreciation for the hard work done by John McLean VK2KC and his helpers in fitting the caravan with a new axle and wheels. The caravan now looks quite impressive with its much increased ground clearance and new support stands. There is still some hard work to be done in the next

(Continued on page 11)

In This Issue :

Down The Coax

Monthly meetings held in the S.E.S. Building Central Road, Port Macquarie,

Friday Night Get-Together
Friday 20th Jan. 2012 7.00pm

February Monthly Meeting
Saturday 4th Feb. 2012 2.00pm

Friday Night Get-Together
Friday 17th Feb. 2012 7.00pm

Central Coast Field Day
(Wyong Racecourse)
Sunday 26th February 2012

March Monthly Meeting
Saturday 3rd Mar. 2012 2.00pm

Friday Night Get-together
Friday 16th March 2012 7.00pm

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Reflects ALL changes notified up to 31st December 2011 for Current Financial Members

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Net Controllers' Roster

Nets on Voice Repeater VK2RPM 146.700 MHz

Sundays (0830 Local)		**Thursdays** (1930 Local)	
	Jan 2012		
VK2OA	**Jan - 01**	**VK2EM**	**Jan - 05**
VK2VIV	**Jan - 08**	**VK2ATM**	**Jan - 12**
VK2TT	**Jan - 15**	**VK2ZHE**	**Jan - 19**
VK2OA	**Jan - 22**	**VK2EM**	**Jan - 26**
VK2VIV	**Jan - 29**		
	Feb 2012		
VK2TT	**Feb - 05**	**VK2ATM**	**Feb - 02**
VK2OA	**Feb - 12**	**VK2ZHE**	**Feb - 09**
VK2VIV	**Feb - 19**	**VK2EM**	**Feb - 16**
VK2TT	**Feb - 26**	**VK2ATM**	**Feb - 23**
	Mar 2012		
VK2OA	**Mar - 04**	**VK2ZHE**	**Mar - 01**
VK2VIV	**Mar - 11**	**VK2EM**	**Mar - 08**
VK2TT	**Mar - 18**	**VK2ATM**	**Mar - 15**
VK2OA	**Mar - 25**	**VK2ZHE**	**Mar - 22**
		VK2EM	**Mar - 29**

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JOHN VK2FMJT	**vk2fmjt@gmail.com**

Tuesday 2-Metre Net Change

Please note that at our club's December monthly meeting, a motion was passed to change the mid-week 2-metre net from:

Tuesday evenings to Thursday evenings.

The time of the net, 7.30pm, will remain unchanged.

This change resulted from extremely small attendances on the Tuesday evenings, and general agreement was reached that Thursdays would be more acceptable.

Crystal Oscillators and Circuits

Submitted by Bill - VK2ZCV
(continued from Nov. OXTALES)

Short-term stability is usually caused by component changes due to circuit heating, warm-up, temperature fluctuations, and instability of components, both electrical and mechanical. Generally time periods here are minutes to an hour or so. This is often temporary and tends to follow a pattern, but can be random due to cyclic temperature changes, etc. Even shorter term frequency drift involving periods of a few seconds down to millisecond intervals is caused by circuit noise and mechanical factors (shock and vibration). As the time interval gets shorter, we run into random frequency fluctuations caused by noise in the amplifier and circuit components, as well as naturally occurring thermal noise generated in resistances. This noise is generally called ‘‘phase noise” as it appears as random noise modulation in AM, FM, and phase modulation (They are mathematically all related) on the generated signal. This noise is generally measured in a given bandwidth at some specified frequency away from the main carrier. This is done with a spectrum analyser and notch filters to notch out the main carrier. Note that the main carrier is often 60-120 dB higher in amplitude than the noise level we are trying to measure. This measurement is then converted to a figure expressed in decibels per Hz of bandwidth with respect to the main carrier and expressed as dBc. One often sees oscillator phase noise measurements given in specs for oscillator circuits and pre-packaged oscillators. It is hard to say what a good figure is as it depends on application. Low phase noise is important in radio receivers and communications systems. It is less important in applications such as computer clocks, and non-critical timing oscillators used in digital systems and circuits. An oscillator that has high phase noise is said to be “dirty”. As an example, suppose a 10-milliwatt output oscillator running at 1 MHz is specified as having –70dBc/Hz @ 10 kHz phase noise. Sounds good at first? Let’s look at the noise at 1010 kHz (1.01 MHz) in a 10 kHz bandwidth. Since noise power is additive, in a 10 kHz bandwidth we will have 10,000 times the noise power, or 40 dB more. The noise power would be minus 30dBc in a 10 kHz bandwidth. Of course, the noise spectrum is not flat with frequency, but we will assume for illustration that it is. In this case our 1 MHz oscillator is producing 30 dB below 1 milliwatt (or 10 microwatts) of noise power and assorted garbage in the adjacent 1010 kHz channel. This is quite lousy performance, and unacceptable. If used as a receiver local oscillator, this noise power would act as a “spurious” local oscillator, causing unwanted noise from reception of signals 10 kHz away. This effectively overrides and effectively destroys any really good IF selectivity that the receiver may possess. Used to drive a 10kW AM broadcast transmitter, this oscillator would generate 1 watt of RF noise at 1010 kHz, causing interference with any weaker signals on that channel. This of course is unacceptable. Poorly designed frequency synthesizers would also behave like this. If the noise spec of the oscillator were –110 to –120 dBc at 10 kHz this would be much more acceptable. This concept may prove a little difficult to understand at first, but it is very important in practice.

The key component in determining oscillator stability is the feedback network, assuming the amplifier portion has relatively good noise performance. In the amplifier, a low noise transistor or other active device should be employed. The more stable oscillators tend to have better noise specs. Phase noise and drift are manifestations of frequency instability on different time scales. The stability of an oscillator, all other things equal, can be related to the rate of change of feedback network phase shift versus frequency. This, in plain English, implies something with very high selectivity and therefore high Q, the higher the better. These devices include quartz crystals, ceramic resonators, resonant cavities (UHF and microwave only), and other exotic devices.

The quartz crystal is the most widely used frequency-determining element. It is relatively cheap, widely available, and comes in frequencies from audio to low UHF. Frequencies in the HF range (2-30 MHz) are most common. Distributors generally stock commonly used frequencies as “microprocessor” crystals. Since these are manufactured in large quantities, they are often available for less than a dollar. Custom frequencies specially manufactured are generally several times as costly. By varying the way the crystal is cut and its size, the resonant frequency and temperature characteristics can be controlled. There are many different cuts that are specified by the way the crystal is oriented and cut from the mother crystal (AT, BT, SC, etc). AT crystal cuts are generally used above 1

MHz. Crystals can be operated in a mode called overtone mode. Third overtone, and fifth overtone crystals are commonly used in the lower VHF range 30 to 150 MHz. Seventh and ninth overtone crystals are also used, and can operate up to a few hundred MHz. Most fundamental crystals can be operated on their third and often fifth overtone, and higher order overtone crystals can be operated on their lower order overtones and fundamental as well. Also, spurious modes may exist in many crystals, particularly higher overtone types, which can be totally unrelated mathematically to any "legal" overtones or frequencies. The circuit designer must be aware of these effects and may have to design in certain circuit features to ensure oscillator operation on the expected oscillator and crystal frequency. This may involve extra tuned circuits and components to suppress unwanted modes.

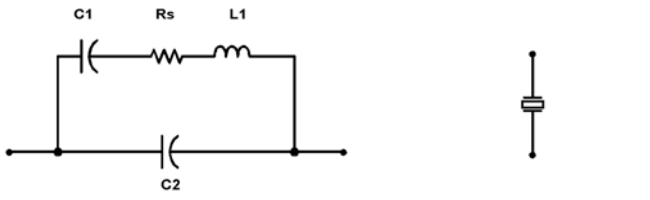


FIG 2
QUARTZ CRYSTAL AS A CIRCUIT ELEMENT

Fig 2 is an approximate equivalent circuit of a crystal. This circuit is a pretty good approximation near the crystal resonant frequency. It has two fundamental resonances, one series, the other parallel (anti-resonant). The crystal behaves as an inductor at certain frequencies as well. In many crystals, the effective series inductance may be measured in henries, while the capacitance is a small fraction of a picofarad, and the resistance is in the 20Ω to 100Ω range. Since the Q value of a series resonant circuit is $2\pi fL/R$, if the frequency is 1 MHz, the series effective capacitance C1 = .025 pf, the inductance L1 = 1 Henry, and resistance Rs = 50 ohms, the circuit Q is 125,600. The shunt capacitance C2 is usually a few pf. This resonator would have a bandwidth of about 8 Hz at 1 MHz centre frequency. Contrast this with a typical Q of 100 at 1 MHz with a 10 kHz bandwidth obtainable using conventional small size coils and capacitors. The crystal gives a 1250 times improvement in this example. Crystals may be purchased for series or parallel operation. Parallel crystals are usually specified with a circuit capacitance (Usually 18, 20 or 32 pF) load. This capacitance is that with which the crystal will operate on its marked frequency. Series crystals do not have this specification. Commonly parallel crystals are fundamental types and series crystals overtone types, but there are many exceptions to this rule, so no reliable data can be assumed for any crystal. Either a series or parallel crystal usually will work in a given circuit, but the oscillation frequency may be not as marked. This discrepancy could be several kHz, with inability to adjust the frequency to specs. The crystal should be placed in a suitable test circuit and measurements made to obtain reliable data.

Crystal oscillator circuits are similar to L-C oscillator circuits, often substituting the crystal for LC components. In some circuits the crystal is used as a series resonator, in others as a parallel inductor or resonator. The main difference is that in an L-C oscillator we can employ a tapped or multi-winding inductance. Since we cannot install taps on a crystal, capacitance divider techniques and configurations are used instead. It is no trick at all to get stability an order of magnitude better than the best L-C oscillators from a crystal oscillator. A few parts in a million (ppm) would be typical. (One ppm = .0001%). With careful design, proper choice of crystal cut, and the use of temperature compensation, 1 part in ten million is achievable over a reasonably wide (50 degrees C) range without too much trouble. These circuits are called temperature compensated crystal oscillators (TCXOs). With solid state components the entire crystal and associated circuitry can be placed in an oven heated by a watt or less of power, and the internal temperature maintained at a specified figure (60 to 85 deg C typically). Stabilities of another order of magnitude (1 part in 100 million) can result. These are called oven controlled crystal oscillators (OCXOs) and can be obtained as pre-packaged assemblies. There are circuits in which the amplitude of oscillation is also regulated with automatic gain control, keeping the amplitude of oscillation within the linear region of the circuitry. It is also possible to do this with L-C and crystal oscillators, rather than depending on circuit non-linearity for amplitude limiting. The Wein

Bridge oscillator is an example of an R-C oscillator that uses a tungsten lamp filament or a thermistor to do this. This improves noise performance, waveform purity, and frequency stability, as it minimizes drive to the crystal. This helps to keep thermal frequency drift to a minimum. However, these circuits will not be covered here, as they are not generally encountered by the hobbyist or experimenter. *(Continued in next issue)*

ORARC's Christmas Function 2011

The Venue at Settlement Point

The O.R.A.R.C. Inc., held its annual Christmas picnic on Saturday, 3rd December, at the Settlement Point picnic area. The weather was unseasonably cooler than what some attendees had expected, and the moderate breeze exhibited a detectable chill factor, prompting those who came prepared, to don a jacket, and those who lacked such foresight, to wish that they had been able to do similarly.

The head-count was a pleasing twenty-eight which included members, spouses/partners and friends.

The sausage-sizzle ingredients were arranged by Henry (VK2ZHE), and he was ably assisted in the cooking and presentation by Richard (VK2CHC), Bill (VK2ZCW) and Stuart (VK2KSM), ensuring that the entire group was well nourished.

The Club's caravan, having recently been modified with a new suspension and axle, was on site for all to see. John (VK2KC) brought it to the venue.

Whilst some more work is yet to be done on rust removal/prevention, this caravan project has enjoyed admirable progress to where it is now a credit to those hard working members who have devoted much time and effort to bring it to its current pleasingly cosmetic and operational stage.

Interesting "Show-and-Tell" items were contributed by Bruce (VK2EM) and John (VK2KC).

Bruce provided OXTALES with a description of his recent project, which follows below, without editorial mutilation or "spin" :-

My portable QRP HF equipment consists of...

A Yaesu FT-817 160m-70cm all mode 5Watt radio

An Elecraft T1 antenna tuner, with a data lead to connect to the radio.

A 12Volt 20Ah 'gel-cell' battery, second hand, but in good condition, courtesy of a motorcycle service centre.

Various antennae, homemade, including a magnetic loop for 40-10m, a magnetic loop for 6m, and a bottom loaded tapped vertical for 40m to 6m.

I have various coax leads to connect it all together, as well as various lengths of wire for counterpoises.

For the vertical antenna, I have a short length or RG-58 coax, fitted with ferrite tubes, to decouple the outside of the coax.

Basically that is it. Being only a 5W station, it needs patience and perseverance to make contacts, but it is fun trying.

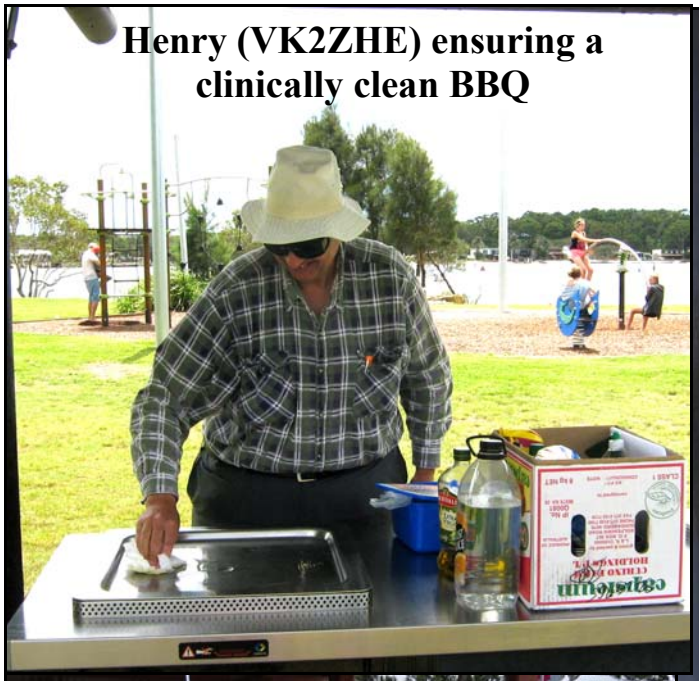
When bushwalking, I can take the radio, vertical antenna, a wire dipole, tuner, all leads and connectors, and a lighter battery pack in a backpack.

(See pictures on following pages)

John (VK2KC) brought along a new acquisition for demonstration. It was a new Comet Antenna Analyser, a CAA-500, fresh out of Japan. Its frequency range is continuous from 1.5 MHz up to 505 MHz.

The unit measures only the VSWR and feed-point impedance, unlike the MFJ Analyser.

The antenna used for the demonstration was one of John's earlier creations, a Skeleton Sleeve Fed Monopole device that was featured in the January 2011 Oxtales.



Henry (VK2ZHE) ensuring a clinically clean BBQ

The three lower pictures show Bruce (VK2EM) demonstrating his QRP equipment to interested attendees, L to R: Larry (VK2CLL), John (VK2KHB) and Bill (VK2ZCW), with the equipment in close-up.

People
At
The ORARC
Xmas BBQ
2011

L to R: Pat Edmondson, Norah Wyles & Charles (VK2KCE)

L to R: Ailsa (VK2FABJ) & Yulia (XYL of VK2EM)

Richard (VK2CHC) preparing the "snorkers" for the sizzle.

Pam Green & her OM, Lewis (VK2AG)

One of ORARC'S Major Tangible Assets

The Club's rejuvenated caravan on show at the Xmas BBQ venue, showing the redesigned undercarriage. A credit to the members who have devoted many hours of painstaking work to bring it to this operational status.

More attendees at the Club's Xmas BBQ

**Rear (near Post) Jim (VK2VIV)
Leaning on table Dave (VK2DFN)
Seated L to R: Keith (VK2FKJA)
Bill (VK2ZCV), Coralie
(XYL of Bill)**

Following the luncheon, the club's monthly meeting was held in the picnic shelter.

Pictured are those hardy souls who stuck it out to stay for the meeting, despite the unseasonable weather experienced on that day.

Some members and their spouses found the weather a little on the chilly side and tendered their apologies and made their way home to seek comfort from the unusually chill wind. Quite understandable, really!

**OXTALES co-Editors L to R:
John (VK2AYQ) and Trevor (VK2TT).
One of them accidentally left his camera at home! The picture clearly shows the guilty one!**

Thanks to those members who contributed pictures of the event to help compensate for the laxity of one of the co-Editors. Those contributors were Bruce (VK2EM), Lewis (VK2AG) & Pam, and of course, John VK2AYQ.

Happy & Healthy New Year to all!

WINTER PROJECTS

(David A. Pilley VK2AYD)

I love our winters, cool at night, but mild during the day. It's the time of the year I can get out into my workshop and work comfortably. In the summer the high temperatures conducted from the steel roof and walls makes it unbearable. Winter is time to build some of those projects I was thinking about all last summer.

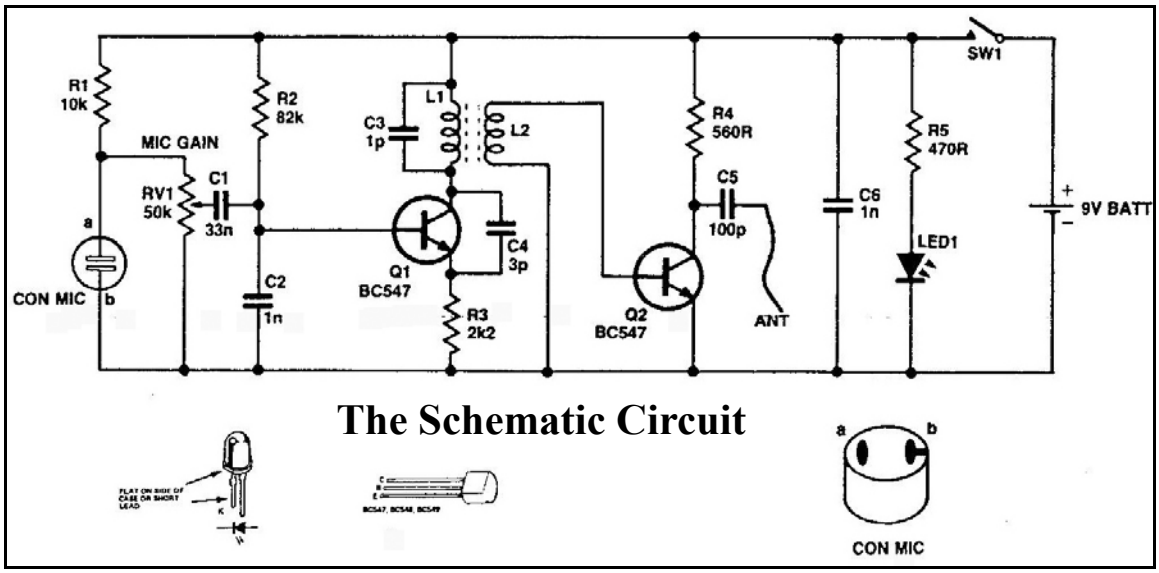
I'm a keen HF Contester, so my thinking tends to circulate around how to improve the ergonomics of my station. Things like easy antenna switching, good interface systems between rig and computer, etc. This year I completed 4 small useful projects, all of which have found a place on or near my operating desk. I'd like to share them with you.

Internal View

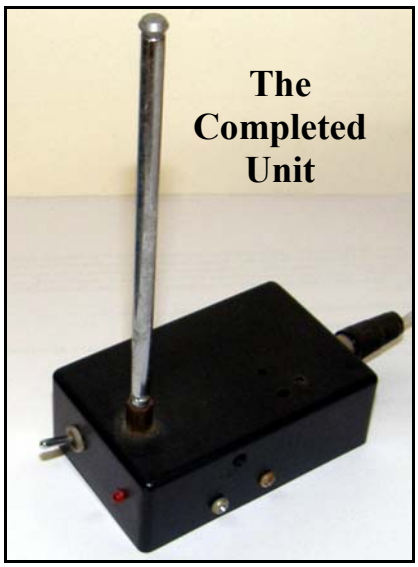
Project 1. The lead on my headphones annoyed me. I tried various positions around the operating table for the cord outlet socket, but was never happy with them. My XYL would bring me in a cuppa and I'd turn to thank her and off would fly the phones!

So I purchased (for $25) an Infra-Red transmitter with headphones. It interfaced well with my speaker selection system and was a great improvement, but it was directional. If I turned my head left or right the volume would change. So the solution was – don't turn your head – however, remembering my learning's of the past – there must be a better way and Project 1 was born!

Some time back my granddaughter had given me headphones that had a built-in FM receiver so why not build a simple FM transmitter? Searching through the magazines there were quite a few circuits and kits offered by various suppliers at very low prices. I selected one that had been designed by S. K. Hui and Jon Fairall described in ETI back in December '85 that was very simple and it all fitted into an 80 x 50mm jiffy box, including battery.



The Schematic Circuit


The Completed Unit

The circuit used a pair of BC547 transistors and fitted on a simple one-sided pcb 44 x 22 mm. A kit was available from Jaycar (Ref KE 4711). As you can see from the circuit, the design is simplicity in itself. The audio frequency from the microphone (or audio from your receiver) modulates a tuned circuit formed by the coil and some capacitors to derive an FM signal. Output from this is buffered and amplified by a single transistor amplifier

and then fed to an aerial. The assembly time took about 3 hours, including the drilling on the case, which was minimal. It worked first time and was easy to tune to a frequency away from the general FM broadcast frequencies around 88 MHz.

The infra-red transmitter was removed and the FM unit plugged in. Eureka. It worked! There didn't seem to be any problem matching the speaker output at very low level. Head turned left, then right, no change in volume. I left the room with the head-set on and was still able to hear everything. It wasn't Hi-Fi FM quality, but what can you expect from a pair of transistors! I had expected it to go off frequency, but it seemed to hold. I used it for the next contest and was pleasantly surprised. I could even leave the shack to visit the "little room" and still hear what was happening on the frequency – even knew who stole my frequency!

Since making this unit I was looking in a "Under $5" shop and found they had FM Microphones on sale for $2.99. Yes, I purchased a couple and found they worked well on a single AA battery. Not much good for the shack, but my granddaughter thought it great!

I'll tell you about the other projects later.

(**President's Report** *Cont from Page 1*)
few weeks in order to rust proof the underside of the caravan. Thank you to those people who have offered to undertake this task.

The committee is eagerly anticipating receipt of the Club Grant for the upgrading of the Communications Caravan that the Wireless Institute of Australia announced before Christmas. John McLean VK2KC and Keith Anderson VK2FKJA put a lot of effort in preparing the club's application for the grant and it is very pleasing that the application was successful. The final task to complete the scope of works of the grant application will be the addition of some new sign writing on the caravan.

APRS has been a major topic of discussion amongst club members ever since the inspirational lecture on APRS by Ashley Anderson VK2XSO at the club's monthly general meeting on the 1st of October 2011. APRS is short for Automatic Packet Reporting System. The club's 145.175 MHz VK2RPM-1 APRS digipeater destined to be installed at the VK2RPM repeater site at Middle Brother Mountain is currently on test. Various little gremlins have conspired to make the testing more challenging than expected but the installation will be carried out once the system has proven itself to be reliable. It is intended to install a second APRS digipeater at the VK2RCN repeater site at Telegraph Point in order to provide reliable coverage in the Port Macquarie and Wauchope areas.

Several club members have taken up the challenge to build APRS trackers and Arthur Monck VK2ATM and John VK2KC have sourced the hardware and will place orders immediately after the Monthly General Meeting on the 7th of January 2012. As previously mentioned in Oxtales, to learn more about APRS visit the APRS Australian web site http://www.aprs.net.au/ Also, have a look at the Google Maps APRS tracking display at http://aprs.fi/

The club's 2012 calendar is still in preparation and will be printed soon. As we now have 59 members, preparation of this year's calendar represents a lot of detailed work on the part of Trevor Thatcher, VK2TT. The annual calendar has become highly sought after for its member picture gallery and club information. It should be available at the January Friday night get together on the 20th of January, and at the Monthly General meeting on Saturday the 4th of February 2012, and at subsequent meetings.

The Mid North Coast Amateur Radio Group (MNCARG) has advised that there will not be a Radio Expo in Coffs Harbour in January 2012.

The Central Coast Field Day at Wyong Racecourse is on Sunday the 26th of February 2012. The gates and the Flea Market open at 6:30am and the traders open at 9:00am.

Best wishes for a happy and healthy 2011.

Henry Lundell VK2ZHE
President

Further Reminder
There will be no Radio Expo at Coffs Harbour in January 2012

OXLEY REGION AMATEUR RADIO CLUB Inc.
MEMBERSHIP REGISTER.

(As at December 31st 2011)

No.	Cat.	Surname	Given	Spouse Name	Call	Location	Tph
1	O	ANDERSON	KEITH	(HEATHER)	VK2FKJA	LAKE CATHIE	02 6586.3988
2	O	BAILEY	JOHN	(FLORENCE)	VK2KHB	PORT MACQUARIE	02 6582.2192
3	D	BELL	ALAN		VK2BEL	COOLONGOLOOK	02 6554.1689
4	D	BLACKMORE	MARK		VK2XOF	BAULKHAM HILLS	02 9639.0663
5	L	BLYTH	BOB		VK2XIQ	TELEGRAPH POINT	-
6	O	BOYD	ROSS		VK2RR	LAKE CATHIE	02 6585.4903
7	D	BRICE	GRAHAM	(CYNTHIA)	VK2VV	SCONE	02 6545.0411
8	L	BRODIE	BOB		VK2EJK	PORT MACQUARIE	02 6582.0592
9	F	BROOKE	AILSA	(BILL)	VK2FABJ	PORT MACQUARIE	02 6581.0547
10	F	BROOKE	BILL	(AILSA)	VK2ZCW	PORT MACQUARIE	02 6581.0547
11	L	BURGES	ROY	(JUNE)	VK2YOR	PORT MACQUARIE	02 6583.8801
12	O	COURT	RICHARD	(LINDA)	VK2CHC	PORT MACQUARIE	02 6584.6872
13	O	DANIEL	JIM		VK2FJKD	PORT MACQUARIE	02 6583.1933
14	O	EDMONDSON	CHARLES	(PAT)	VK2KCE	PORT MACQUARIE	02 6584.0495
15	D	EKERT	BRUCE	(YULIA)	VK2EM	FORSTER	Mob 0414532496
16	D	ELLIS	STAN	(BETTY)	VK2DDL	TUNCURRY	02 6554.7996
17	F	FLETCHER	CAROLINE	(PETER)	VK2CZF	PORT MACQUARIE	02 6584.5191
18	F	FLETCHER	PETER	(CAROLINE)	VK2HPF	PORT MACQUARIE	02 6584.5191
19	O	FROST	ROBERT	(SUSAN)	VK2CRF	PAPPINBARRA	02 6587.6129
20	O	GILSON	BARRY	(FAY)	VK2FBRG	PORT MACQUARIE	02 6583.8814
21	L	GREEN	LEWIS	(PAMELA)	VK2AG	PORT MACQUARIE	02 6584.9162
22	D	GREENWOOD	GRAEME		VK2ZIS	McMAHONS POINT	-
23	L	HANLON	KEITH		-	PORT MACQUARIE	-
24	O	HANSEN	JOHN		VK2AYQ	PORT MACQUARIE	02 6582.7932
25	O	HARDING	DAVID	(ISABELLA)	VK2AIF	WAUCHOPE	02 6586.4980
26	O	HOLMES	JOSH		VK2FJDH	BONNY HILLS	02 6585.5148
27	D	HUTCHESSON	COLIN	(PAULINE)	VK5DK	MT. GAMBIER	08 8725.5527
28	D	JANES	LES	(BEVERLY)	VK5JL	SALISBURY HEIGHTS	08 8281.3878
29	O	JONES	PAUL	(SANDRA)	VK2DEL	PORT MACQUARIE	02 6584.3772
30	O	KOPPEL	HORST		VK2FHKO	LAKE CATHIE	02 6585.5992
31	L	LINDSAY	LARRY		VK2CLL	WAUCHOPE	02 6587.1155
32	L	LUNDELL	HENRY		VK2ZHE	PORT MACQUARIE	02 6582.0534
33	O	MADIGAN	ALLAN	(DAWN)	VK2OA	WAUCHOPE	02 6585.2043
34	O	MARTIN	CRAIG	(JENNY)	VK2ZCM	SANCROX	02 6585.3452
35	O	McGUIRE	MARK		VK2FMGM	PORT MACQUARIE	02 6583.8875
36	O	MCLEAN	JOHN	(CORRINE)	VK2KC	PORT MACQUARIE	02 6584.6220
37	O	MEEHAN	TERRY		VK2KL	PORT MACQUARIE	02 6584.2997
38	O	MELVILLE	STUART		VK2KSM	BONNY HILLS	Mob 0419043316
39	D	MILLS	TIM		VK2ZTM	BEECROFT	02 9868.1434
40	D	MINAHAN	CHRIS		VK2EJ	HALLIDAYS POINT	02 6559.3516
41	L	MONCK	ARTHUR		VK2ATM	PORT MACQUARIE	02 6581.0960
42	O	NEIL	JIM	(CAROL)	VK2VIV	PORT MACQUARIE	02 6581.2481
43	F	NEWEY	DAVID	(LEONIE)	VK2DFN	PORT MACQUARIE	Mob 0439925065
44	F	NEWEY	LEONIE	(DAVID)	VK2LPN	PORT MACQUARIE	Mob 0401015220
45	O	NEWHAM	LAURIE	(ROBIN)	VK2ELN	PORT MACQUARIE	02 6583.5387
46	D	NIVEN	TREVOR	(BETH)	VK5NC	MT. GAMBIER	08 8723.2432
47	O	PILLEY	DAVID	(DEE)	VK2AYD	KING CREEK	02 6585.2647
48	O	ROMAINE	PAUL		VK2UPR	PORT MACQUARIE	Mob 0428466075
49	O	SANDFORD	NEIL	(VERENA)	VK2EI	PORT MACQUARIE	02 6582.5830
50	L	SINCLAIR	BILL	(CORALIE)	VK2ZCV	PORT MACQUARIE	02 6583.9302
51	O	SMITH	LYLE	(JEANNINE)	VK2FCVI	WAUCHOPE	02 6585.2497
52	O	STOFMEEL	BILL	(TONI)	VK2BST	PORT MACQUARIE	02 6582.5612
53	D	TARRANT	DAVID	(AILEEN)	VK2TBC	ILUKA	-
54	O	THATCHER	TREVOR		VK2TT	WAUCHOPE	02 6585.2278
55	O	THOMPSON	DES	(BETTY)	VK9FLHI	LORD HOWE ISLAND	02 6563 2152
56	O	TRAYNOR	JOHN		VK2FMJT	PORT MACQUARIE	Mob 0487748338
57	O	WALKER	BRUCE	(GWEN)	VK2HOT	PORT MACQUARIE	02 6583.8360
58	O	WARD	MICHAEL	(RUTH)	VK2FMDW	PORT MACQUARIE	Mob 0427291276
59	O	WINCHESTER	JOHN	(PAULINE)	VK2FGAA	PORT MACQUARIE	02 6580.3031

Cat Key: O = ORDINARY A = ASSOCIATE D = DISTANT H = HONORARY L = LIFE F = FAMILY