SPECTRUM **April 2016 Vol. 53 No. 4**

The Official Newsletter of the

Auckland VHF Group Inc.

Spectrum

A recent lightning strike required purchase of new chargers to get Klondyke back in the air in a short time.

Celebrating 60 years : 1956 — 2016

Auckland VHF Group Inc.
Branch 66 NZART

PO Box 10138, Dominion Rd, Auckland 1446
Clubrooms: 30 Hazel Ave, Mt Roskill

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Repeater Trustee	John Dunn	ZL1JD	473 9514	021 731 907	john.dunn@clear.net.nz
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ATV Interest Group					http://www.qsl.net/zl1qf/atvug/ATVusers.html
ZL1VHD Dstar gateway administrator; Laurie ZL1ICU			634 5130	0274 817463	perma@xtra.co.nz
ZL1VHD Dstar gateway registration URL :					http://zl1vhd.dstar.org.nz

Club News and Net:

The combined Auckland VHF Group and Auckland Regional Branch News and Net are held on 146.625 MHz and 439.875 MHz at 8.15 pm each Sunday or after the ZL6A National Broadcast on the last Sunday of the month.

Club meetings are held at the Clubrooms at Hazel Avenue, on the second Monday of each month at 7.30 pm. For other details, listen to the News and Net each Sunday evening.

SPECTRUM is the official journal of the Auckland VHF Group Inc. Opinions expressed are those of the authors and do not necessarily reflect club points of view.

The closing date for SPECTRUM articles is by the 1st of each month. Articles to be submitted to the editor Peter ZL1UKG peterlov@ihug.co.nz

From the President

Greetings All,

Over the last few days I have been pondering the wonders of our present lifestyles.

My first line was how did we manage to live without TV, then it spread to computers, followed by the interweb thingy and so called "smart" phones. I guess the frustration of not finding anything on telly by way of a distraction to ease the discomfort of a sore knee led to a slight annoyance at finding that the old faithful computer was throwing a hissy fit. The TV was an easy fix. Just turn it off. The computer was a little more complex. It did involve turning it off, but then taking the covers off and re-seating plugs and sockets and doing the same to the memory modules gave a little satisfaction. More pleasing was the fact that it was functioning more or less normally.

With that sorted it was time to write this missive.

You might remember my comments about my (type)writing skills last month, well I have decided that I should have used a pencil and paper. Then when it was complete, deliver it by foot to our Editor. My ISP should only be called an IP. They seem to have forgotten what the S stands for.

On a more Amateur Radio note my thanks go to the team who visited Klondyke and found and more importantly appear to have cured some problems.

After our March meeting you might like to look at this Auckland Council Civil Defence page. It is open for input until 18 April.

http://shapeauckland.co.nz/consultations/auckland-civil-defence-and-emergency-management-draft-group-plan/about/

It is with sadness that I report that Rod Bradnam ZL1ULZ, passed away on 13 March. Rod was an active member of the VHF Group with a keen interest in ATV and data modes and served as our auditor for many years. The committee has expressed our sympathy to Rod's family.

73 Dave, ZL1TIA

Auckland VHF Group (Inc) Branch 66

MEETING NOTICE

11th April 2016 7.30pm, Hazel Avenue Club Rooms

(Located on left at the end of Hazel Avenue)

The Evenings Subject:

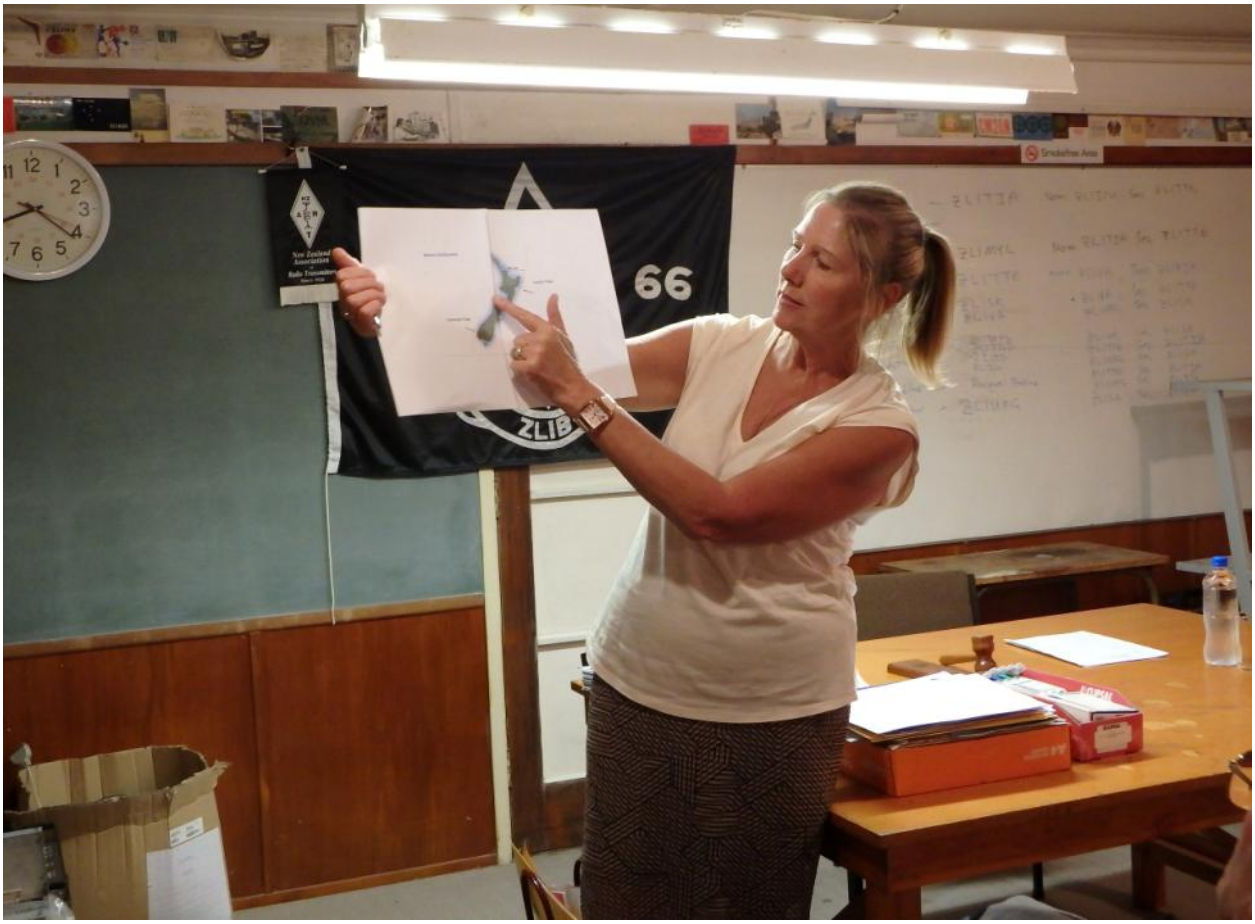
"Home brew transverters with professional input"

Greg Storz gave a quick preview at the Show & Tell following the AGM on November 2015. Now we will have a chance to find out what decisions Greg made to come up with a compact high performance design and what sort of new problems had to be solved to realise the design.

He may also have ideas about the IF radio and amplifier/antenna systems that go either side of his new creation.

Another meeting not to be missed!

EVERYBODY WELCOME



March General Meeting presentation

Janice Miller from Auckland Civil Defence gave a talk on Working together to build a resilient Auckland. Auckland Civil Defence and Emergency Management Committee have presented a Draft Group Plan 2016 - 2021. She handed out Summary documents along with Submission forms.

Those who want to submit suggestions online may do so at www.shapeauckland.co.nz

All those in attendance enjoyed her talk.

The President of the Auckland VHF Group Inc Dave Dingley ZL1TIA thanked Janice on behalf of all the members present & presented her with a bouquet of flowers.
All those present then enjoyed Tea, Coffee & Hot Cross Buns for supper.

Regards
Marlene ZL1MYL

Janice Miller then made a surprise presentation to Laurie Mathews ZL1ICU on behalf of Auckland Civil Defence and Emergency Management from the management and staff for outstanding commitment and enthusiasm in the support of Auckland Civil Defence & Emergency Management.

It is the support of Auckland City activities by AREC members that gets them this recognition. Here is the St Patricks Day Parade support team.

Rod Bradnam ZL1ULZ / ZL1CD – Silent Key

Rod was first licensed in 1983 as ZL1ULZ. His business and raising a family kept him from becoming very active but he did find time to attend the Auckland VHF Group meetings and took an interest in club activities.

From about 1995 onwards, Rod found more time for the hobby and became an active member of the Amateur Television Group, and enjoyed amateur television operation, especially when the Channel 39 ATV repeater was operational also on simplex. He enjoyed experimenting with different antenna designs to help improve his ATV signal and also reception of other stations. His home QTH in Meadowbank was on an elevated site and gave good access to the ATV repeater. He continued his interest in ATV and also experimented with data modes, becoming an early user of the packet radio network. In 2003 he upgraded his callsign to ZL1CD and also enjoyed some time on the HF bands.

In 2000, with the closure of his business and retirement, he and his wife Brenda spent the winter months on the Gold Coast, making many new amateur radio friends in the process.

Rod was our financial auditor from 1996 and apart from a short period in 2001 – 2002 continued to audit the Group's books until failing health required him to give up this position at the end of 2014. Rod was always unfailingly helpful to the treasurer of the day when auditing our financial accounts.

Rod passed away in his 85th year on 13 March 2016 after a short period of illness. At Rod's request the funeral service was family only. On behalf of the Auckland VHF Group I extend our sincere condolences to his wife Brenda and family.

Report by Vaughan Henderson ZL1VH

Klondyke Repeater Site Report
By Vaughan ZL1VH and Peter ZL1UKG

The Klondyke Road radio repeater site has received a larger than usual number of visits over the last three months to look at and repair a number of faults.

On Monday 1 February, an indirect lightning strike or power surge took out both battery chargers and the D-Star internet gateway computer. It took a day or so to realise that the batteries were not being charged and on Wednesday 3 Feb, Laurie ZL1ICU visited the site and has removed the D-Star gateway computer for repair. He was also able to confirm that neither battery charger was working and found one of the AC supply circuit breakers for the battery chargers had tripped.

Two new battery chargers were ordered and on Saturday 6 February, Vaughan ZL1VH visited the site and replaced both chargers. An inspection of the two old chargers revealed some blown capacitors between ground and the negative connection on one charger, the other charger showed no signs of damage but was very dead! The state of the batteries was carefully monitored and the National System transmitters were shut down for a short time prior to the new battery chargers being fitted.

The new chargers are Victron Centaur 12V 80A units, replacing the older 60A chargers and will help bring the batteries back up to float (13.6V) more quickly.

Laurie ZL1ICU also made a visit to the site with a new D-Star gateway computer. The original computer was still running but the motherboard refused to talk to the outside world.

On Tuesday 1 March Harry ZL1BK, Vaughan ZL1VH and Alex ZL1MLD returned to the site with new micro-controllers for the 6625 repeater and the remote HF link. The 6625 repeater controller had failed and needed urgent repair or replacement. The new 6625 controller was plugged in and after some testing to make sure the switching was working correctly, was found to be working 100%. In addition to controlling the 6625 repeater, the controller also has a port which allows us to link it to the National System. This is used each Sunday night for the News and Net, and also to re-broadcast the NZART Official Broadcast at 8pm on the last Sunday of each month.

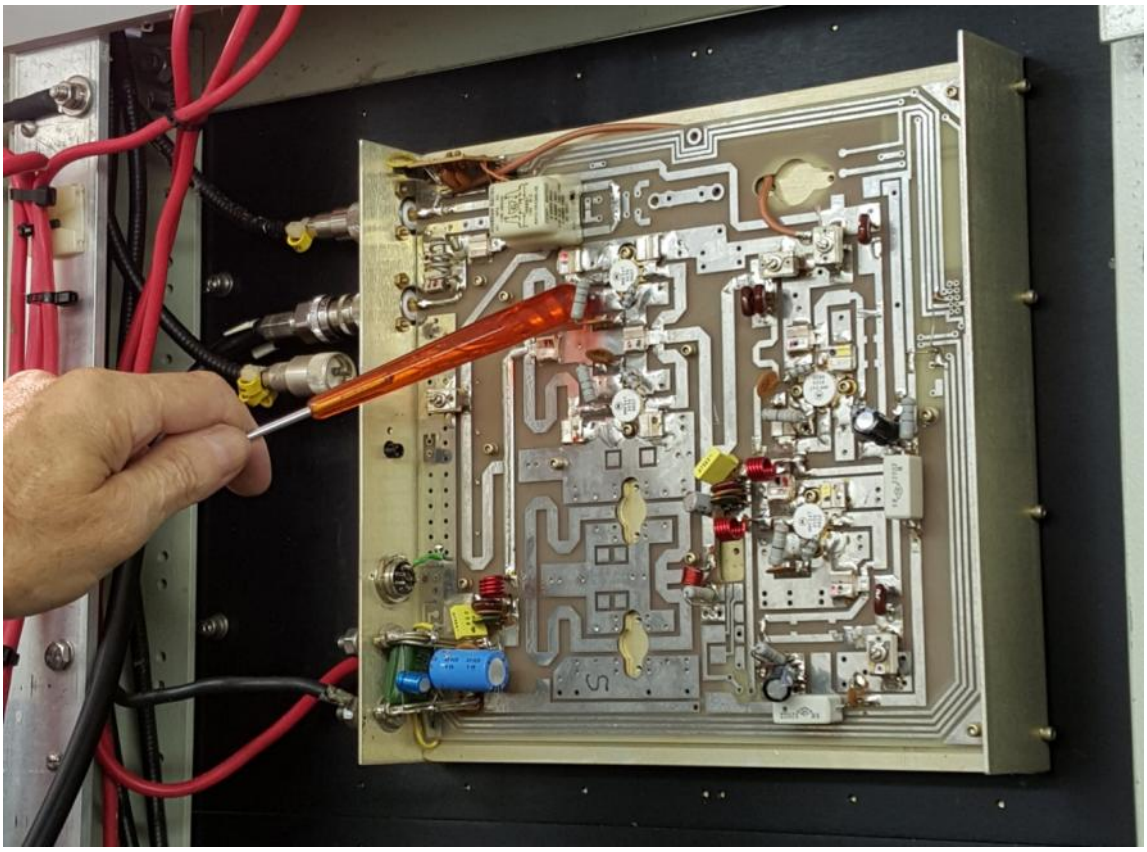
The micro-controller on the remote HF system was also tested and working correctly except for the port which links it to the National system. When the command to switch this on was entered, nothing happened. For now, the micro-controller has been left on site and the HF system is useable but other work at the site has resulted in a high – S5 – background noise on the TS440 transceiver and further work is needed to identify which of several switch-mode power supplies are causing the problem and get them replaced.

The existing micro-controllers at Klondyke are all the original models, developed by John Yaldwin ZL2TRV and Peter Williams ZL2ARW some 30 years ago! These micro-controllers are based on the RCA CMOS 1802 microprocessor and finding someone willing to make software changes to the programme has got into the "too hard" basket. Hardware-wise these controllers are also reaching their use by date with electrolytic capacitors needing replacement and the I/O interface I.C.'s giving problems. The new micro-controllers are based on the Atmel ATmega16, and the programming is done using Atmel Studio 4.19 which produces the machine code for the microprocessor. The new controllers have been developed by Richard ZL1BNQ. I'd like to express our thanks to Richard for the work done in providing the new controllers.

Another new micro-controller is under development to replace the old one on the 439.875 MHz repeater, part of the National System. This is a somewhat more complex controller as it controls not only the UHF repeater but also the links from Klondyke to Taranaki, the Waikato and north.

The Klondyke Working Bee on 19 March saw Peter ZL1UKG, Harry ZL1BK, Michael ZL1ABS and Vaughan ZL1VH on site. The aim was to conduct a check of all the repeater equipment, check SWR on the coaxial cable feedlines up the tower, climb and make an inspection of the cables and antennas on the tower and generally tidy-up the site. We would also check the batteries and new chargers and look over recent installations of antennas and equipment.

For some time users to the south of Klondyke had reported that the signal strength was down compared with past experience. A check of the transmit output power to the south antenna bays showed the we were only putting out about 4 watts after the filters, and this should have been about 30 watts. The north transmit power was just under 30 watts, as expected. Further testing found that the south 2m power amplifier was the cause of the low output power and a little time was spend trying to decide what to do – i.e. remove the amplifier and repair it back in Auckland, or try to repair on site. With the back cover off the amplifier, and some gentle "tapping" of the circuit board, we could make the amplifier output power go from 4 watts to 30 watts. A closer inspection found that the collector tab on one of the MRF247 output transistors had developed a dry joint. A quick repair using available tools on site and some new solder got the amplifier going again. A future visit with better soldering equipment will be needed to make the repair more permanent!



With the south amplifier repaired, SWR checks on the feed lines showed minimal reflected power on both north and south arrays. Thanks to Harry ZL1BK, we had his spectrum analyser on site and the return loss measured at -16dB. This equates to an SWR of just over 1.3 : 1, an acceptable value. The 2m D-Star antenna gave a return loss of -15dB.

Peter ZL1UKG volunteered to make the climb up the tower to check feed-lines, antennas and replace cable ties as required. He also checked on the condition of our "spare" feeders – there are two runs of LDF5 and one LDF4 up to the top platform plus a run of aluminium jacket LDF5 equivalent to the bottom platform and a second LDF4 to a lower point on the tower. These will be enough to allow for any new projects, at least for a while.

Peter reports that up to the level of the HF dipole the rust on the tower structure is minor with spots here and there. Above this it becomes deeper and swellings of 2 – 5 mm appear in some places. Higher up on the vertical section these become more frequent. Treatment of these will require wire brushing to expose the metal beneath the rust followed by rust inhibiting primer to slow down the process. See Spectrum March 2015 for the report and photos. This lends weight to the recommendation that a repaint be considered for 2018.

The battery health looks good under control of the new chargers. The cells of the two battery banks were within approx. ±10 mV of each other at just over 2 volts per cell (battery chargers off).

The summer weather with plenty of rain had encouraged grass to grow vigorously around the building. Thanks to Michael ZL1ABS, a spade and grubber were used to discourage it from overtaking the concrete paths. The same was done around the base of the building and ZL1VH applied some weed killer to further discourage re-growth. This also helps dry the soil around the base of the building and contribute to less damp inside. As an experiment, Vaughan ZL1VH used some liquid concrete crack sealer between the building and the adjacent path. We'll know more about the effectiveness of this after future visits. Inspection the roof of the building showed that the crack sealing work done last year seems to be effective with no deterioration and no internal leaks to be seen. Michael ZL1ABS provided some sausages and bread for lunch, cooked over a small gas ring. The working bee finished at 2.30pm, leaving the site in good shape for the coming winter months.

Surplus parabolic dish clearance

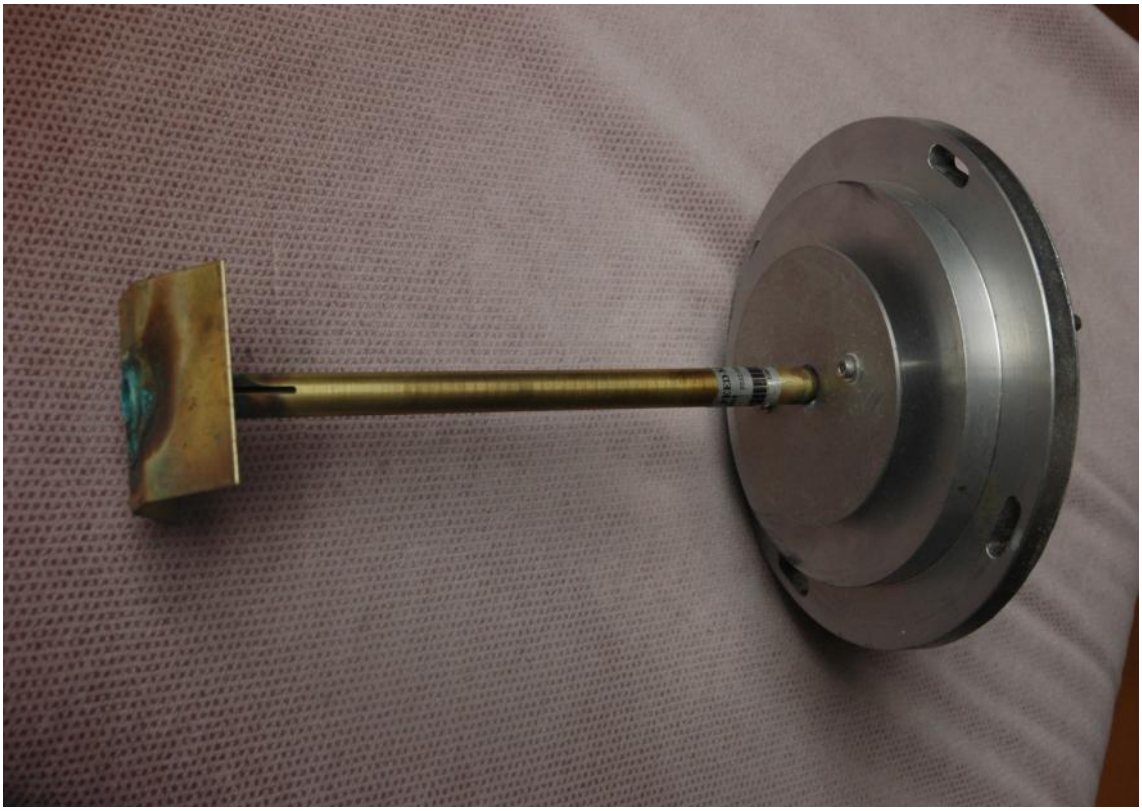
Auckland VHF Group, Inc.

The Auckland VHF Group had an opportunity to assist a company that was about to write off some old stock that had never been used in the field. The dishes were mostly made by RFS of France and have size SU2 corresponding to a nominal diameter of 0.6 m. Rim to rim it is 0.75 diameter. Some of the dishes have feeds but they are not on Amateur bands. Weight is of the order of 8 – 12 kg. The awkward shape makes it desirable to pick them up from the club-rooms. This size is ideal for 6 cm and 3 cm bands and acceptable for 9 cm.

F/d is not specified for these dishes but measurement to the centre of the dipole of a "splash plate" feed is approx 19.6 cm above the surface (SU2 35AN). Where there is an existing feed the position can be recorded. Mounting hardware to a pole is available for several of the dishes for pointing in fixed directions as point to point links. The plate which mounts the feeds could be modified to support a feed built to match the dish or a new circular plate could be cut or turned from sheet aluminium if starting from scratch.

The asking price is NZ$ 50 each.
The SU2 35AN dish has a feed for 3.4 – 3.6 GHz with an N(f) connector and should be usable at 9 cm (3.3 – 3.41 GHz). The price for this model is $60 each.

Contact
Vaughan Henderson 09-4181071 or Peter Loveridge 09-3773398 for further information



Amateur Radio Emergency Communication.
Volunteers in radio communications.
Using our resources to help the community.

INFORMATION

The Auckland VHF Group has an active AREC section that works closely with Auckland City Civil Defence. They provide advice, resources and manpower to assist in times of need. The Auckland VHF Group clubrooms provide a backup system to complement the existing systems maintained by Auckland City Council Civil Defence.

The AREC section is headed by Section Leader Laurie Mathews ZL1ICU.

From time to time the VHF Group has training sessions and exercises. Members also assist with sports events, parades and Rally NZ.

For further information about AREC please see the NZART web site.

JOIN BRANCH 66 AREC

All members of the Auckland VHF Group are encouraged to join the AREC section. Your contribution, large or small is appreciated by all involved.

For further information about joining branch 66 AREC contact the Section Leader or his Deputy.

AREC:

Section Leader; Laurie Mathews ZL1ICU 634 5130 0274 817 463 perma@xtra.co.nz

Deputy Section; George Raffles ZL1TUX 626 6944 021 735 361 zl1tux@xtra.co.nz

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AUCKLAND VHF GROUP (INC)

SUPPORT THE EFFORTS OF THE VHF GROUP THROUGH YOUR SUBSCRIPTION

SUBSCRIPTIONS FOR 2016

THE SUBS GO TOWARDS;

- Maintenance and on-going improvements to beacons, repeaters and linking systems for the national system, including the Klondyke repeater site.

- Provides on-time and free access to spectrum magazine as soon as it is available.

- Provides facilities for good speakers and lecturers at our general meetings.

- Discounted access to our trading table goodies.

- Access to test equipment and technical help when needed.

FULL MEMBERSHIP **$45.00**

ASSOCIATE MEMBERSHIP **$40.00**

FAMILY MEMBERSHIP ADDITIONAL **$10:00**

SEE ATTACHED MEMBERSHIP RENEWAL FORM (next page)

REMEMBER TO KEEP US INFORMED OF YOUR INTERNET ADDRESS!

OTHERWISE WE CANNOT SEND YOU SPECTRUM!

NAME	Mr/Mrs/Miss/Ms	Christian or given	Surname
	Mr		
Address			
		Phone: (home)	
		Phone: (work)	
		Phone (Cell)	
		Email	
Occupation:		**Callsign**	
NZART Member		**Branch assigned**	
AREC Member		**Branch assigned**	
Category			To pay
Membership	Full	$45:00	$
New/Renewal/Change	Associate	$40:00	$
Receipt #	Family Add	$10:00	$
Donations	Auckland ATV		$
	Auckland/Klondyke		$
	Brynderwyn		$
	Data/D-Star		$
	IRLP		$
	Beacon/Repeater/Links/ATV Licences		$
	Other		$
		Total	$
Payment			
Circle one -->	Cash	Cheque	Internet deposit
Invoice/Statement required	Please Advise Treasurer		

Internet	To account ASB 12-3020-0473626-00. Account name is: Auckland VHF Group Inc. Include your Name/Callsign for us to track. Note: this form needs to be returned to update records. FAX to 028 25544801 or Email d-jcooke@ihug.co.nz
Post	The Treasurer, Auckland VHF Group Inc., PO Box 10138, Dominion Road, Auckland 1446.
In Person	Bring this form and payment to the next club meeting, 2nd Monday of the month or to the Committee meeting last Monday of the month.

The Auckland VHF Group Inc Branch 66 NZART

gratefully acknowledges the sponsorship of Branch 66 Beacons, Repeaters and Fixed Links license fees and the Group's repeater operations by the following radio amateurs and NZART Branches for ***2016***

Repeater frequency and name	Repeater location	Sponsorship advised for 2016	Amount paid
53.725 Repeater	Klondyke Road	Gwynne Rowe ZL1AAR	$50.00
144.253 Beacon	Nihotupu	**Under repair**	
145.625 Data Rptr	Klondyke Road	**NON-operational**	
145.650 Dstar repeater	Klondyke Road	L/M Mathews ZL1ICU/ZL1MYL	$50.00
146.625 Repeater	Klondyke Road	L/M Mathews ZL1ICU/ZL1MYL	$50.00
146.700 Repeater	Ruaotuwhenua	Dennis Thornton ZL1TAY	
146.900 Repeater	Mt Puketutu Radio		
432.253 Beacon	Nihotupu	**Under repair**	
438.175 Dstar repeater	Klondyke Road	L/M Mathews ZL1ICU/ZL1MYL	$50.00
438.500 Repeater	North Head		
439.850 Link Tx to Kaimai	Klondyke Road		
439.875 Ak Nat Sys Rptr	Klondyke Road		
439.900 Link Tx to Egmont	Klondyke Road		
439.950 Link Tx to Brynderwyn	Klondyke Road		
1291.9 Repeater	217 Glenfield Rd	Vaughan Henderson	$50.00
		Total Sponsorship	**$250.00**
NZART Inc: Branch donations			
Franklin Amateur Radio Club. Br: 10			$200.00
Manukau Radio Club, Br: 21			$100.00
Papakura Radio Club. Br: 65			$500.00
		Donations	**$800.00**
Prepared by Merv Thomas ZL1SK and current as at 28/3/2016			

The Auckland VHF Group, Branch 66, would like to thank all those who came forward to sponsor the licence fee for our Beacons, Repeaters or Fixed Links for the year 2016 or donate towards the Group's repeater Operations.

Merv ZL1SK – m.r.thomas@vodafone.co.nz

TRADING TABLE

Currently our Trading Table is only open on meeting nights. Opening on Saturdays may resume later in the year so keep an eye out for announcements in Spectrum.

NEW – NEW - NEW

We have heaps of parts from dismantled commercial analog TV gear – transmitters, filters, circulators, patch panels, power supplies, cabinets. Too much to list individually, so come along to the clubrooms and have a look

And there's

more….

Motorola Oncore VP GPS Receivers

The VP Oncore is Motorola's original credit card-sized 8-channel GPS receiver. It measures just 2" x 3 1/4" x 1/2", has very low power requirements, and is well suited for embedded applications. The VP Oncore has the capability of acting as a DGPS reference station for greater position accuracy.

The units on offer have been in storage for some time, and the tinplate screen covers show some signs of corrosion – see photo. Most of the units have a sticker attached saying "Prog NMEA" and are likely to output data in NMEA V2.0 serial format.

Interface is via a 10-pin board header – see reference below for pinout details. Power supply is 5.0v +/-0.25V. Module requires an external active GPS antenna (5V power supplied by receiver module). GPS connector is a snap-on type OSX. Output data includes a 1PPS (one pulse per second) output and TTL level Tx and Rx data lines.

More details can be found at : ftp://ftp.tapr.org/gps/motorola/oncore.eng.notes.pdf

$20.00 each – limited quantity.

N-Type connectors for LMR-400

Crimp-on only. $5.00 each

Other coaxial connectors available from the Trading Table:

Please note we have sold out of TNC connectors – these are no longer available.

BNC plugs 50 ohm for RG58 coax (solder/clamp type)	$2.50 each
BNC plugs 50 ohm for RG58 coax (crimp on type)	$2.50 each
BNC sockets 75 ohm – single hole mounting	$1.50 each
N Type male solder on suit RG213 coax	$4.00 each
N Type male right angle, suit RG213 coax	$4.00 each
N Type male crimp on suit RG213 coax **	$3.00 each
N Type socket crimp on suit RG213 coax **	$3.00 each
N Type male right angle, solder on suit RG213 coax	$4.00 each
N Type male sliver plated solder/clamp on suit RG58 coax	$3.00 each
N Type male crimp on suit RG58 coax **	$2.50 each
N-Type adaptor Male to Male	$3.00 each
Adaptor TNC Male to UHF Female	$3.00 each

** Crimping service available for these at club meetings.

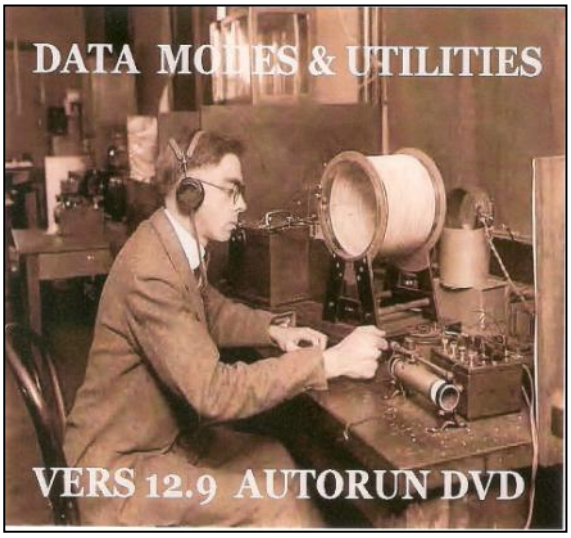
Need Crystals for your next project?

3.579545 MHz HC18/U wire ended holder	
4.194304 MHz HC18/U wire ended holder	$1.00 each
4.1952 MHz HC18/U wire ended holder	$1.00 each
4.33618 MHz HC18/U wire ended holder	$1.00 each
6.000 MHz HC49/S SMD package 20pF load capacitance	$1.00 each
8.000 MHz HC18/U wire ended holder	$1.00 each
8.192 MHz HC18/U wire ended holder	$1.00 each
8.867238 MHz HC18/U wire ended holder	$1.00 each
10.000 MHz HC18/U wire ended holder (KDS Brand)	$1.00 each
13.875 MHz HC18/U wire ended holder	$1.00 each
14.31818 MHz HC18/U wire ended holder. Rakon J30G-4H spec	$2.00 each
14.7456 MHz HC49/S SMD package	$1.00 each
17.472 MHz HC18/U wire ended holder	$1.00 each
18.432 MHz HC18/U wire ended holder	$1.00 each
20.0000 MHz HC49S SMD package P/No.7D20000183BSAF25Q3	$1.00 each
24.567 MHz HC18/U wire ended holder	$1.00 each
45.600 MHz HC18/U wire ended holder	$0.50 each

Radio Frequency Transistors

ATF55143	Low noise E-PHEMT 0.6dB noise figure. Low noise amp for frequencies between 450MHz and 6GHz. SMD package SOT343 (4 lead).	$1.00 each
MGF1302	Low noise GaAs FET Nf = 1.4dB @ 4GHz, 4dB @ 12GHz.	$5.00 each
BFR91	NS RF Amp. 5GHz 1.9dBnf @ 500MHz	$2.00 each
BFY90	NS 30V 50mA 2.5dBnf @ 200MHz TO72 VHF/UHF	$1.50 each
MFE121	Dual gate N-MOSFET 20V 5mA VHF Amp BF352 equiv.	$0.50 each
MPS5179	NS TO92 12V 50mA 200mW fT 2000MHz Nf 5.0dB RF Transistor. Use in UHF/VHF amplifiers with collector currents in the 100 μA to 30 mA range, and in low frequency drift, high output UHF oscillators.	$0.50 each
BFG67	NS 8GHz 50mA rf amp/preamp SOT143B package	$1.50 each
MPS5172	NS 25V 100mA Ft 120MHz	$0.10 each
MPS6507	NS, VHF Mixer, 20V, 100mA, Ft 700MHz [data]	$0.20 each
MRF237	NS RF Pwr. VHF 4.0W 12V TO39	$3.00 each
MRF559	NS RF Pwr. 806-960MHz 0.5W 12.5V	$0.50 each
MRF904	NS RF Small signal amp. Ft 4GHz 15V TO206	$3.00 each
2SC908	NS TO39 RF Amp 1W @ 500MHz 13.6V [data] Designed as driver and RF power amplifier. 0.5 to 0.8W output at UHF land mobile band. Gain 15dB (Vce=6.0V, Ic=5mA, ft=2000MHz)	$1.00 each
3SK45	Packaged as ECG221, dual-gate N-channel MOSFET for vhf amp and mixer applications.	$0.75 each
3SK73GR	Dual-Gate MOSFET N-channel 30V 7mA	$1.50 each
3SK74L	Dual-Gate MOSFET N-Channel 20V 25mA(max)	$1.00 each
3SK192GR	Dual-Gate MOSFET 15V 30mA(max)	$1.00 each
2SC5488	NS 30V 70mA low noise rf pre-amp	$0.10 each
BF199	NS 25V 25mA, 500mW ft = 550MHz TO92	$1.00 for 10
BF494	NS 20V 30mA Low noise mix-osc/ IF amp TO-92	$1.50 for 10
40673	Dual-gate N-Mosfet – See MFE121	$0.50 each

DATA MODES & UTILITIES CD



Version 12.09 has even more updates and new programmes on this latest release. This is an excellent selection of software, notes, links to web sites compiled by the late Doug ZL1AVY and this latest edition has over 300 applications, references and notes. These cover all digital modes, useful software applications for your pc, contest logging and e-qso programmes, radio interfaces, software defined radio information, slow scan tv software, test equipment utilities, satellite tracking software, and much, much more. **Still only $10.00**

SMD Quartz Crystals: In addition to our selection of leaded holders, now have 6MHz and 20MHz crystals in SMD style housings:

6.0000 MHz HC49S SMD package 20pF load capacitance $1.00 each

20.0000 MHz HC49S SMD package P/No. 7D20000183BSAF25Q3 1.00 each

Capacitors, Surface Mount – most are 1206 size. Packed in bags of 10 for 50c

NPO 50V working: 0.68pF, 1.2pF, 1.8pF, 2.2pF, 5.6pF, 6.8pF, 8.2pF, 10pF, 15pF,

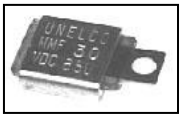
22pF, 33pF, 68pF, 82pF, 270pF, 470pF, 100nF.

63V working: 10pF, 47pF, 100pF, 270pF, 330pF, 470pF, 1nF, 1.2nF, 2.2nF, 4.7nF, 10nF
10uF 25V electrolytic

Capacitors, Metal Clad Mica (Unelco, Semco) $2.20 each

Values (in pF): Or 10 up for $2.00 each

3.9, 4.7, 6.8, 10, 12,15, 20, 22, 24, 27, 30, 33, 34, 47, 51, 62, 82,
100, 120, 130, 150, 220, 240, 300, 360, 680pF
Most are rated 350V working ±5% tolerance.
Similar to illustration, tab does not have hole:



Mixers:

Mini-Circuits Model TFM-2-408-1:
+17dBm LO drive, 40dB isolation
$25.00 each

5 – 1000MHz 6dB insertion loss,

Note: some of these mixers are labeled TFM-2-408-2. They are identical to the TFM-2-408-1.