SPECTRUM **June 2017 Vol. 54 No. 05**

The Official Newsletter of the

Auckland VHF Group Inc.

Spectrum

Buyers enter the REG Market

Auckland VHF Group Inc.
Branch 66 NZART

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

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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

Auckland VHF Group (Inc) Branch 66

General Meeting notice

12th June 2017 7.30pm, Hazel Avenue Club Rooms

(Located on left at the end of Hazel Avenue)

The Evenings Subject:

Reports from NZART Conference followed by several videos.

Find out about Remits and any changes to NZART administration plus summaries of the forums.

EVERYBODY WELCOME

Emblems representing activities from Doug Cooke's life at the funeral service

General Meeting May 2017

General Business

As required by the constitution nominations must be requested for unfilled positions on the executive of the club. There were no nominations or volunteers for President or Secretary.

The remits to the NZART AGM were discussed and voted on. The summary of the discussion and voting was not received by the print deadline.

A selection of Trading Table items were taken to the Radio Electronics Group market day. It proved successful with just over $500 of sales made to the happy punters looking for bargains.

The guest presentation — "Elementary Field Strength Measurement"

An elementary approach to Field Strength measurement

How to make use of equipment you may already have

This inquiry began when the author was asked to help identify spurious radiation from a battery powered bike. There are standards that must be met to gain a certificate of EMC compliance. An examination of the magnetic fields close to the wiring harness did not show the same energy spectrum as the electric fields measured at a greater separation by the overseas factory that was building the prototype. While standards may not be the most stimulating reading they may contain a description of the method of measurement to be used while meeting the standard. This is the start that you needs to make your own measurements.

In this case the standard said that a dipole must be used up to 80 MHz and above 80 MHz the antenna must be resonant. Diagrams in the standard show that this can be achieved using log -periodic antennas. At 80 MHz a dipole will be 1.875 m long. Below 80 MHz this length becomes a progressively smaller fraction of a dipole. Amateurs are familiar with physically small active antennas. With a high impedance buffer very short antennas can give good results down to MF frequencies. In this case two buffers are needed for a balanced antenna. Signal strengths are measured in units of dBuV per metre. 0 dBuV = 1 uV.

Many amateur transceivers have an "S" Meter. They may not be very accurate but there is a standard for their performance. For HF and below S1 = 0.2 uV at the input to the receiver in a 50 ohm system. Each step on the scale is 6 dB or 2.0 times the voltage at the input up to S9 = 50 uV at the input. Above this the steps are 10 dB or 3.16 times in voltage terms. When many HF signal reports are 59 some manufacturers might not take much care in designing the meter circuitry. For VHF and above S1 = 20 nV at the input. This may be due to the lower noise floor in this part of the spectrum. 1 uV = S3.3 at HF and below or S6.7 at VHF and above. If you have access to a good quality signal generator the attenuator can be set to determine the "S" points of the receiver so that you can know the actual signal value for future measurements.

Signal strength	HF Received Voltage (uV)	HF Received Power (dBm)	VHF+ Received voltage (uV)	VHF+ Received power (dBm)
S1	0.2	-121	0.02	-141
S2	0.4	-115	0.04	-135
S3	0.79	-109	0.079	-129
S4	1.6	-103	0.16	-123
S5	3.2	-97	0.32	-117
S6	6.3	-91	0.63	-111
S7	13	-85	1.3	-105
S8	25	-79	2.5	-99
S9	50	-73	5.0	-93
S9+10	160	-63	16	-83

In the commercial world a spectrum analyser or a scanning receiver will be used. S1 above corresponds to -121 dBm (HF-) or -141 dBm (VHF+). When measurements are made in dBuV no distinction is made between HF and VHF. 0 dBuV = -107 dBm in a 50 ohm system. To resolve -107 the resolution bandwidth (RBW) would need to be 30 Hz. This will require a sweep rate of 1000 sec / MHz so a preamp with flat response would be preferred to speed up the measurement process. In the EMC world spurious signals don't become a problem until they exceed 20 dBuV or more where an RBW of 300 Hz and sweep rate of 10 sec / MHz can be used but this would still take a long time without a preamp. A preamp with voltage gain of 10 would allow a sweep rate of 10 MHz /sec provided it has a low noise figure.

Measurements were made with some older radios on hand to see how good the S-Meters are. The stereo tuner has 3 LEDs as a tuning aid. S1, S3, S5 represent first glimmer of light, S2, S4, S6 represent full brightness so measurement only covers a limited range.

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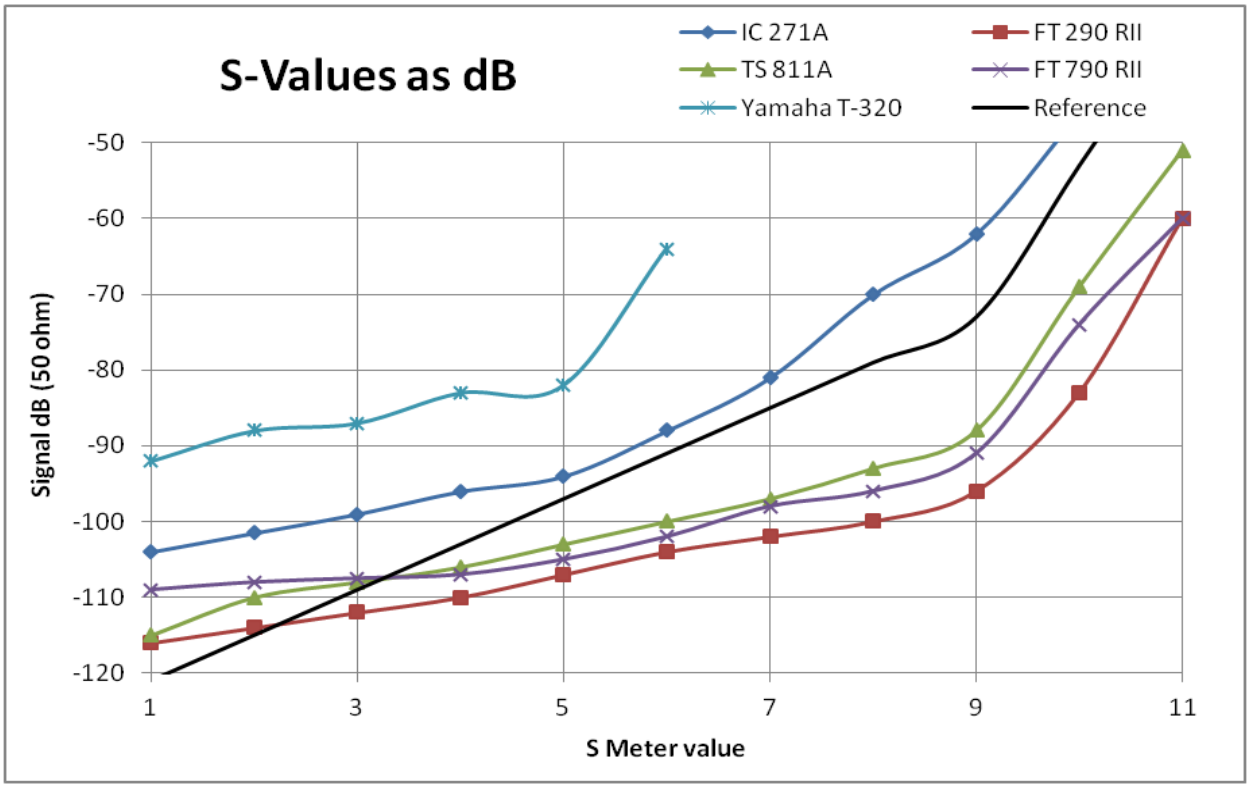
http://www.giangrandi.ch/electronics/radio/smeter.shtml

S-Meter Observations

Signal	IC 271A	FT 290RII	TS 811A	FT 790RII	Yamaha T-320		Reference
	dB	dB	dB	dB	dB FM	dB AM	Ref dB
1	-104	-116	-115	-109	-92	-96	-121
2	-101.5	-114	-110	-108	-88	-95	-115
3	-99	-112	-108	-107.5	-87	-94	-109
4	-96	-110	-106	-107	-83	-91	-103
5	-94	-107	-103	-105	-82	-90	-97
6	-88	-104	-100	-102	-64	-72	-91
7	-81	-102	-97	-98			-85
8	-70	-100	-93	-96			-79
9	-62	-96	-88	-91			-73
10	-46	-83	-69	-74			-53
11	-30	-60	-51	-60			-33



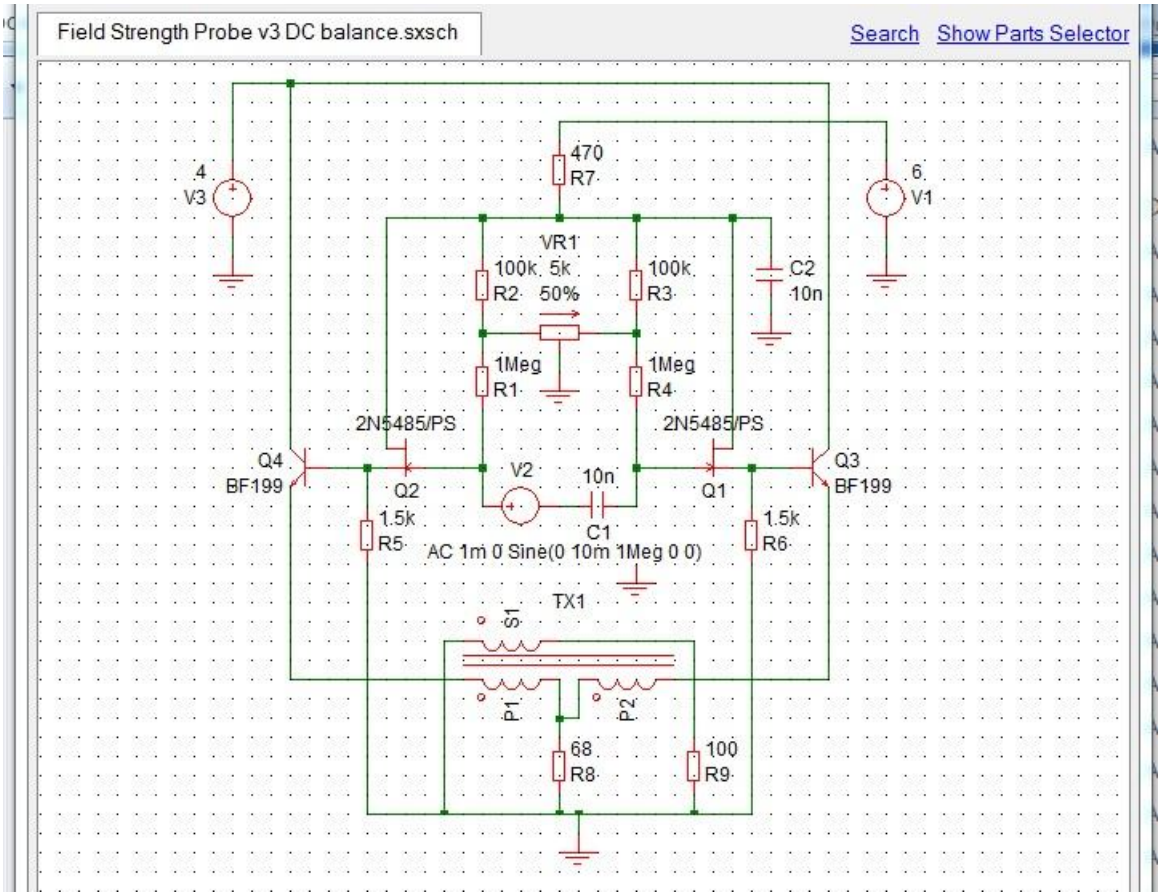
All of these VHF+ radios can receive carriers below S1 (HF). They are not suited to accurate measurements but can give a ball-park figure in conjunction with a calibrated antenna. Calibration requires the antenna gain in dBd to be known plus any losses in the matching network and feedline to the receiver and the impedance of the system. The signal generator used to calibrate the S-Meter is likely to be 50 ohm and a correction will be required should your system be different. The driven element must be less than 0.5 wavelengths and its physical length must be

known to eventually calculate received power (as voltage) per metre.

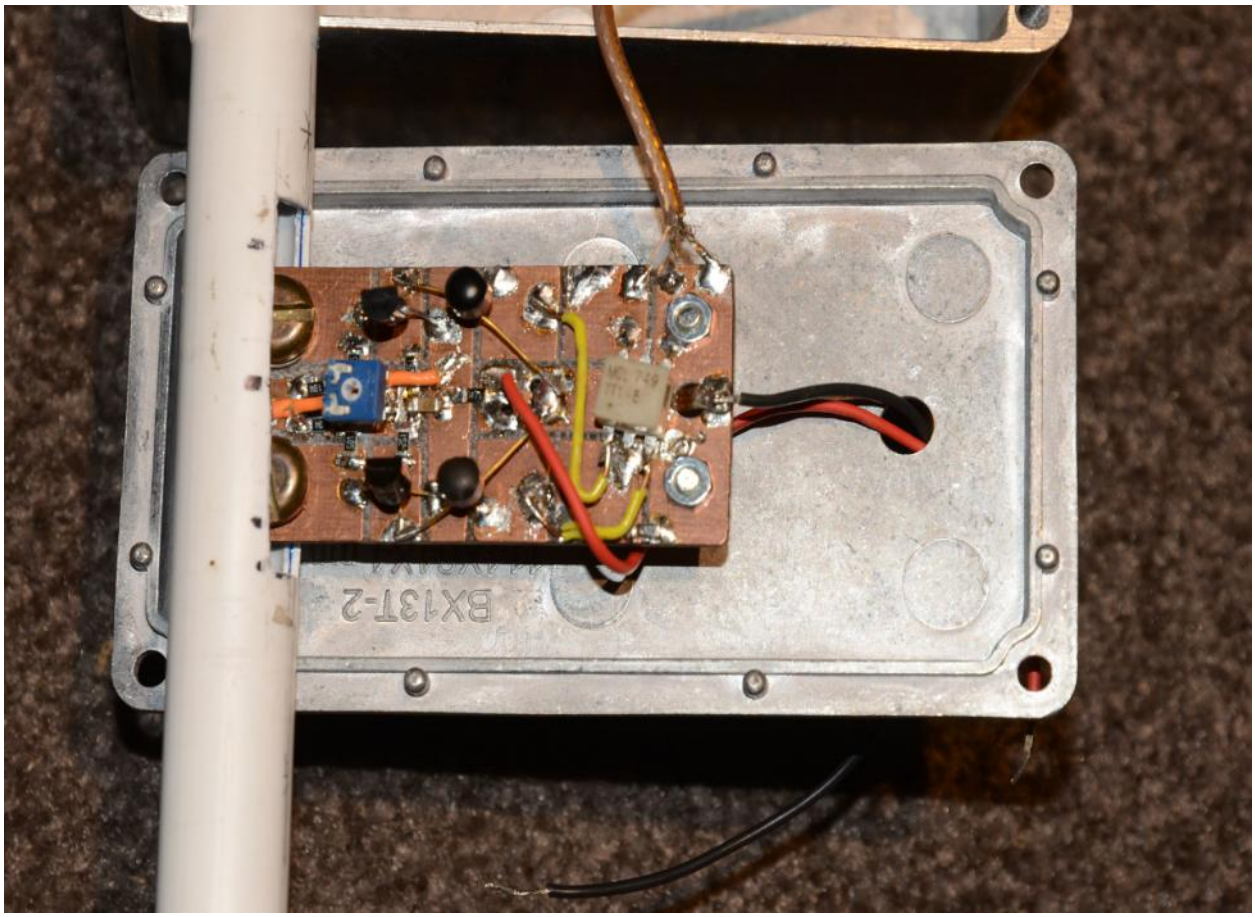
In comparison with a spectrum analyser an amateur receiver has a much narrower band width allowing greater sensitivity as a detector but can only make a measurement at a single frequency at a time. The spectrum analyser can provide a complete scan subject to the scan rates described above. The standard discusses Analysers and Scanning Receivers for use as detectors and the RBW for these instruments.

The antenna was made of copper wire supported in plumbing tubing. The buffer was built in part with SMT components by scribing islands with a handheld saw blade into the double sided PCB surface. After a number of experimental balance transformers had been evaluated a Mini-Circuits TT1-6 was purchased from EBAY in order to get sufficient flat response out to 100 MHz. The DC bias adjustment was required to compensate for the variation in JFET bias voltage and reduce the imbalance current in the transformer primary.

Peter Loveridge 07 June 2017



SIMetrix Simulator Schematic



Implementing the schematic as developed in SIMetrix

Introducing OCAN - Oceanic Activity Nights

OCAN is a series of regular weekday evening events designed to promote activity on the VHF-SHF bands. They are run in the form of a relaxed mini contest that promotes band activity on our under-used VHF bands, that gives an impetus to try something new, and gives reassurance that if you build something you will have someone to try it out with on a regular basis, versus listening to white noise for weeks!

OCAN is open to everyone in the OC region and we openly promote activity from some of the rarer OC entities found on VHF. You don't need to submit logs if you don't want to. Simply enjoy the activity, but the primary aim of **OCAN** is to create an atmosphere where people can enjoy a bit of light contesting in an activity style environment. You can see the results of improving your station, may be try a new band or mode, or perhaps even get the local club involved, all in the knowledge that on a particular night there will be some activity from across Oceania on the bands to enjoy.

For those who like to enjoy a bit of light hearted contesting we have created some sections to participate in and have some fun. We have made it easy to submit logs and at the end of the year we will hand out some certificates and a trophy to the winners.

How do I get onto OCAN? Go to OCAN.ONLINE (Type it into your search engine or Google it!) – create you own logon using your email address and a password of your choosing. Once you are logged in, there's a wealth of information.

Activity nights:	50 MHz	First Monday of each month
	144 MHz	Second Monday of each month
	432 MHz	Second Monday of each month
	925 MHz	Third Monday of each month
	1.2 GHz	Third Monday of each month
	2.4 GHz	Fourth Monday of each Month
	3.4 GHz	Fourth Monday of each Month
	5.7 GHz	Fourth Monday of each Month
	10 GHz	Fourth Monday of each Month
	24 GHz	Fourth Monday of each Month

All activity nights take place between 1900 – 2300 local time. Each hour is classed as a new period i.e. 4 periods per evening.

The first activity night was Monday 5 June but it's not too late to take part. Login, join up and let's have some more activity on our VHF/UHF/SHF bands.

Final Auckland Unitary Plan Update

7 June 2017

The last Unitary Plan Update of 30 October 2016 talked about a person called K Vernon who appealed against the Decision Version of the Unitary Plan on a range of issues, one of which was "Height". As Amateur Radio Configurations depend very much on height, our solicitors together with Peter Loveridge and I attended a Court Assisted Mediation session, the outcome of which made no changes to the Amateur Radio rules in the Partly Adopted Unitary Plan. The final set of rules affecting us are attached.

What do the rules mean?.

On the face of it, the rules appear to say that a main supporting structure with a 300mm across face dimension, has a height limit of "Zone Height" plus one third. For residential areas in Auckland, this comes to 10.67 metres.

But under clause 25(d) a mast of 102mm attached to a building may be up to 18 metres high. It was a little bit ambiguous what this meant, and in a previous advice to amateurs it was recommended that dealing with of this was not a planning matter, but a matter of legal interpretation, in which case it would be better to consult a lawyer than to argue with the Unitary Plan compliance officers.

I have recently tested this with Council. I had earlier applied for a Building Consent under the previous Rodney District Plan rules (before the Unitary Plan came into effect) for a tilt-over mast 12 metres high. I built the mast, and obtained a Code Compliance Certificate (CCC) for it. I mounted my Moseley TA53M (with 40m extension) on the mast at the 12m height, knowing that the Yagi had a stay brace to support the long elements. This extended the height to nearly 13 metres. I am blessed with having a very litigious neighbour, and in due course he complained to council, which resulted in an incident investigator of the Resource Consent Compliance Unit paying me a visit.

I stated that the aerial was mounted at 12m but admitted that the Stay Brace was higher. I explained that because I had to get a building consent for my tilt-over mast, it must be classed as a building, and because I had put this up after the Unitary Plan had become partly operative, then rule 25(d) applied – i.e. I could extend the height of my tilt-over without a Resource Consent.

The Incident Investigator went back to her office, and the following week she emailed me as follows:

> Hi Douglas
> Thank you very much for all your information.
> My Team Leader and I have discussed the relevant Unitary Plan Rules along with those you have referenced and agree that the structure complies with Standard E26.2.5.3(25) – copy attached for your reference.
> Please be advised the Resource Consent Compliance File is now Closed.
> Thanks <<Incident Investigator>>

I believe this sets a precedent for any other amateur with a compliant mast, anywhere in Auckland or Wellington (Wellington has the same rules as Auckland). The only thing to watch is that you are also limited by the Height in Relation to Boundary rules. This means, for residential zones in Auckland, your mast must fit within an envelope which is 2.5m high at your boundary, rising by 1 metre for each metre you move in from the boundary. Exceptions apply if your boundary abuts a reserve.

Douglas Birt, ZL1BFS
Local Government Liaison Officer *lglo@nzart.org.nz*

(a) 25m continuous length of pipe that is aboveground in any one section; and

(b) 300mm in diameter.

Amateur Radio Configurations

(25) Amateur radio configuration activities must comply with the following standards:

(a) no limit to the number of supporting structures less than 102mm in diameter. Where guy wires are used, these must not exceed 10mm in diameter;

(b) a maximum of one supporting structure greater than 102mm. The maximum height of the supporting structure shall be the relevant building height. The maximum horizontal diameter of the pole or supporting structure is 800mm. The minimum setback from any boundary is 1.5m. Any guys used to support the pole must not exceed 10mm in diameter;

(c) dish antennas located less than 5m above ground have a maximum horizontal diameter of 4m and a minimum boundary setback of 1m. Dish antennas situated more than 5m above ground have a maximum diameter of 1.2m;

(d) the maximum height of antennas mounted on buildings using a supporting structure less than 102mm diameter shall be 18m in the residential zones, and 18m or the relevant permitted or actual building height plus 5m (whichever is greatest) in all other zones;

(e) all antennas must be designed and operated in compliance with New Zealand Standard NZS 2772 : Part 1 : 1999 Radiofrequency Fields Part 1 – Maximum Exposure Levels – 3 kHz to 300 GHz at all times and in all places to which the public has access; and

(f) no amateur radio configuration may be located on a site that is, or contains, a scheduled historic heritage place. In respect of a scheduled historic heritage place, no amateur radio configuration shall be located on a site with a extent of place or any area of legal road within that extent of place.

Licensed amateur radio operators have an important role in civil defence activities in the city. The rules recognise this by permitting certain amateur radio configurations for use by licensed amateur radio operators.

Electric vehicle charging stations

(26) Electric vehicle charging stations must be:

(a) maximum height of 1.8m;

DMR Newsletter #11

Repeater update

ZL1BQ	Auckland	439.7000 MHz operational
ZL1UX	Hamilton	439.7250 MHz operational
ZL1TEC	Tauranga	439.7500 (moving to new site)
ZL2DMR	Porirua	439.7500 MHz operational
ZL2OA	Wairarapa	433.8250 MHz operational
ZL2KO	Manawatu	439.7125 MHz operational
ZL2KB	Kapiti	439.7000 MHz operational
ZL2WA	Wellington	439.7250 MHz operational
ZL2GK	Tasman	439.6875 MHz operational
ZL3DMR	Christchurch	439.7000 MHz operational
ZL4AA	Dunedin	439.7000 MHz operational

Network news

ZLGK Tasman and ZL4AA Dunedin are now working to the ZL3DMR Christchurch master. The move took place this week and thanks to Geoff ZL2VBO for the IT work at Tasman. The change helps balance the network loading and reduce latency will improving resilience.

Talkgroups

ZL (TG530) this is the primary New Zealand wide talkgroup, carried on all repeaters on TS2
ZK (TG8) the primary NZ wide area AREC talkgroup, carried on all repeaters on TS1
LCL (TG9) local to a master and its peers
WW (TG1) the World Wide calling channel
WWE(TG13) World Wide English language talkgroup
UAE1(TG113) and UAE2 (TG123) user access talkgroups

DMRplus US (TG133) carried on all repeaters on TS1
DMRplus UK (TG143) carried on all repeaters on TS1
DMRplus South Pacific (TG153) carried on all repeaters on TS1

Note that the DMRplus talk groups are still experimental (see below) and changes are possible.

Codeplugs

ZL-TRBO structure codeplugs developed by Jeff ZL2JG are available for download at:

http://arec.info/downloads/

South Pacific and New Zealand DMRplus servers

A dedicated DMRplus reflector **4851** has been established in Wellington for the **South Pacific** on TG153 open to all. A second DMRplus reflector **4850** for **New Zealand** is also now in operation testing on ZL TG530 for ZL amateurs only. The 4850 reflector is mainly to support ZL amateurs at home or abroad who want to use dongle based personal DMR hotspots to keep in touch. It's getting regular use already.

The original AREC DMR network is a funded AREC project, it started in 2010 as a private venture while the technology was evaluated before it was eventually proposed to the AREC management team as a means to deliver on the expectations set by the SAR partners of AREC. Most of the support effort of Jeff ZL2JG and your scribe John ZL4JY now goes into improving access to and reliability of the AREC DMR network.

Recently we have established the DMRplus or DMR+ service, sometime known as IPSC2, using software from DG1HT, DL5DI, and OE1KBC. This is not an AREC funded project and like the NZ participation in the original DMR network this DMR+ service is experimental, as noted here:

http://arec.info/arec-dmr-network/

This is a trial system to support new technology (such as personal DMR hotspots) and a wider range of connected devices (such as Hytera repeaters) and is intended for experimenters. It is not an official AREC system.

You can monitor the status of the AREC DMR and experimental DMR+ systems from the AREC.info web site using the DMR Network drop down selection.

Support for Hytera repeaters, homebrew MMDVM repeaters and base stations, the upcoming DV4mobile, and the DV4mini is now possible. The IPSC2 program that powers the DMRplus network has been developed by Thorsten DG1HT, Kurt OE1KBC, and Hans-Jürgen DL5DI. Both reflectors are running on a single IPSC2 instance on Centos Linux installed right alongside the existing cBridge. Both systems run on compact 1RU IBM servers.

Further information

Head over to the http://arec.info/ and explore the DMR Network links.

73, John ZL4JY

NAME	**Mr/Mrs/Miss/Ms**	**Christian or given name**	**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		
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.		

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 2017

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!

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 **2017***

Repeater frequency and name	Repeater location	Sponsorship advised for 2017	Amount paid
53.725 Repeater	Klondyke Road		
14**4.253** Beacon	Nihotupu		
14**5.625** Data Rptr	Klondyke Road	**NON-operational**	
14**5.650** Dstar repeater	Klondyke Road	ZL1ICU	50.00
14**6.625** Repeater	Klondyke Road	ZL1ICU	50.00
14**6.70**0 Repeater	Ruaotuwhenua		
14**6.90**0 Repeater	Mt Puketutu Radio		
43**2.253** Beacon	Nihotupu	**Under repair**	
43**8.175** Dstar repeater	Klondyke Road	ZL1ICU	50.00
43**8.50**0 Repeater	North Head		
43**9.850 Link Tx to Kaimai**	Klondyke Road		
43**9.875** Ak Nat Sys Rptr	Klondyke Road		
43**9.900 Link Tx to Egmont**	Klondyke Road		
43**9.950 Link Tx to Brynderwyn**	Klondyke Road		
1291.9 Repeater	217 Glenfield Rd		
		Total Sponsorship	**$150.00**

NZART Inc: Branch/Personal donations	
Franklin Radio Club. Br: 10	$200.00
Papakura Radio Club. Br: 65	$500.00
Auckland Radio Club. Br: 02	$
Manukau Radio Club. Br: 21	$
Martyn Seay ZL3CK donation	$
Donations	**$700.00**

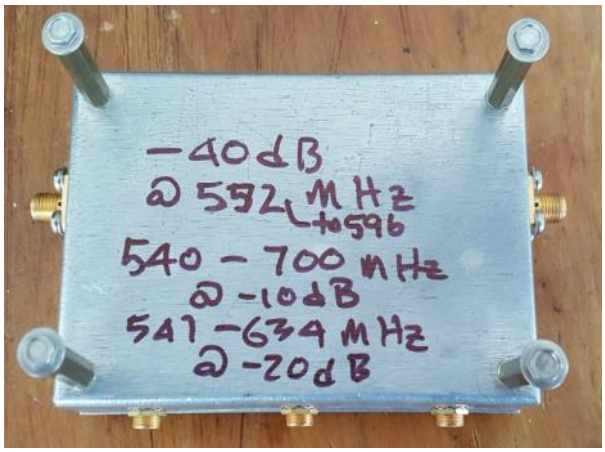
Current as at 13/02/2017

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 2017 or donate towards the Group's repeater Operations.

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.

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.



23cm LOOP YAGI KITS FOR SALE

The Group has two Model 2325LYK kits to make a high gain 23cm Loop Yagi. The price for these kits is $130.00 each. Support boom cost is additional.

The kit consists of all the parts to make up a 25 element loop Yagi including the element mounting hardware. What is not supplied with the kit is the boom. This can be either a 25mm diameter aluminium tube, or a 25mm square section (square or "U" section).

When built up, the 23cm Loop Yagi has the following performance:

Frequency Range:	1.25-1.30 GHz
Number of Elements:	25
Boom Length:	1.83m (72")
Boom diameter:	25mm (round or square)
Gain:	18 dBi
-3dB Beamwidth (E plane):	30°
F/B Ratio:	> 20 dB
Maximum power:	550 Watts

NEW – 4 Ohm Speaker

We have a good quantity of small 4 Ohm speakers completer with a black plastic bezel. The speakers are 50mm square and 33mm deep. Only $2.00 each.

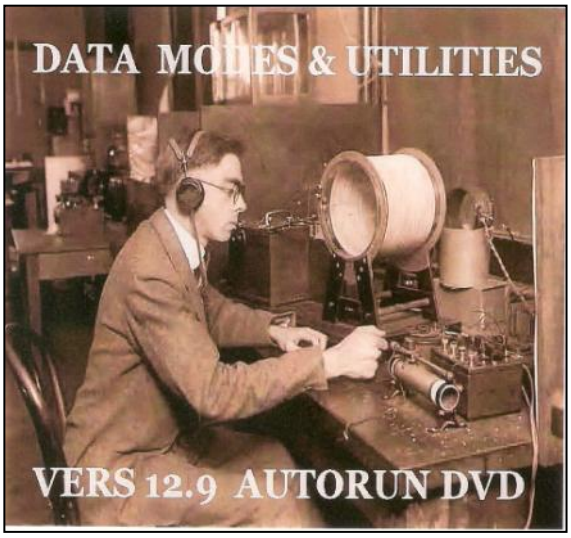
Need Crystals for your next project?

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

How about RF 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	$0.50 each
	RF Transistor. Use in UHF/VHF amplifiers with collector currents in the 100 uA to 30 mA range, and in low frequency drift, high output UHF oscillators.	
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 programs 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,

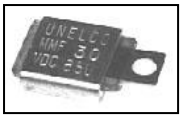
22pF, 33pF, 68pF, 82pF, 270pF, 470pF, 100nF.

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:

5 – 1000MHz 6dB insertion loss, +17dBm LO drive, 40dB isolation
$25.00 each

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