FREQUENCIES VHF, UHF, SHF NEWSLETTER NZ

This newsletter is compiled by Kevin Murphy ZL1UJG to promote operational and construction activity on the VHF, UHF and SHF Amateur Radio allocations in New Zealand (and overseas).

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ISSUE 11, APRIL 2003 Previous issues - http://www.netspace.net.au/~rpreston/index.htm

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CONTEST RESULTS CLIFF BETSON MEMORIAL JAN 11TH AND 12TH 2003

Station	Location	QTH Locator	Score
6m (52 MHz)			
ZL1UKG	Klondyke road	RF72JP	287
ZL2UTV	North Egmont	RF70BR	166
ZL2TMA	Wanganui	RF70KF	164
ZL2ALW	Titirangi	RF73HB	2
2m (144 MHz)			
ZL1UKG	Klondyke road	RF72JP	450
ZL2UTV	North Egmont	RF70BR	397
ZL2IP	Taranaki	RF70BS	284
ZL1TPH	Moirs Hill		229
ZL2ALW	Titirangi	RF73HB	58
ZL2TGQ	Newlands	RE78JS	15
70cm (432 MHz)			
ZL2UTV	North Egmont	RF70BR	1121
ZL2IP	Taranaki	RF70BS	729
ZL1TPH	Moirs Hill		483
ZL2ALW	Titirangi	RF73HB	13
23cm (1.2 GHz)			
ZL1UKG	Klondyke road	RF72JP	954
ZL2UTV	North Egmont	RF70BR	886
ZL1TPH	Moirs Hill		331
ZL2ALW	Titirangi	RF73HB	30
12cm (2.4 GHz)			
ZL1TPH	Moirs Hill		1526
ZL1UKG	Klondyke road	RF72JP	965
9cm (3.3 GHz)			
ZL1TPH	Moirs Hill		16

5cm (5.6 GHz)			
ZL1TPH	Moirs Hill		16
3cm (10 GHz)			
ZL1TPH	Moirs Hill		81
Aggregate Score			
ZL1TPH	Moirs Hill		2682
ZL1UKG	Klondyke road	RF72JP	2657
ZL2UTV	North Egmont	RF70BR	2569
ZL2IP	Taranaki	RF70BS	1013
ZL2TMA	Wanganui	RF70KF	164
ZL2ALW	Titirangi	RF73HB	103
ZL2TGQ	Newlands	RE78JS	15

Great DX!			
6m Local	ZL1UKG	ZL2TMA	272 km
6m International	ZL1UKG	VK3KXG	2480 km
2m Local	ZL1TPH	ZL2TGQ	539 km
70cm	ZL1IU	ZL2UTV	446 km
23cm	ZL1TPH	ZL2UTV	310 km
12cm	ZL1TPH	ZL1UKG	100 km
9cm	ZL1TPH	ZL1TBG	9 km
5cm	ZL1TPH	ZL1TBG	9 km
3cm	ZL1TPH	ZL1AVZ	45 km

STATIONS ACTIVE: 33 (27 ZL's & 5 VK's)

1AKW	1DK	1UGT	2ALW	2TPY	VK2APG
1ASD	1GSM	1UJG	2BYD	2UTV	VK2UBF
1AVO	1KA	1UKG	2IP	2WSP	VK2ZXC
1AVZ	1KB		2JC		VK3DUT
1BK	1TBG		2TAL		VK3KXG
1BOE	1TPH		2TGQ		VK7AR
1BQ	1UF		2TMA		

Comments from logs.

A minor problem was experienced when the car alarm refused to permit starting to return home. It is not every trip where one has the correct screwdriver, voltmeter, clip leads and battery to solve the problem. (ZL1UKG)
One way contact made with Ted ZL2IP at 305 km on 2400 MHz (ZL1TPH)
Conditions were worse than "summer average". Auckland 2m beacon on noise or worse.
Working ZL2ALW on 2m and 70cm beaming through the house. My beams were almost at ground level, I guess the 425m altitude helps a bit, but a lot of rough ground in -between (ZL2IP)
Tried Horizontal Antennas but signals were attenuated by trees (ZL2ALW)

VHF Contest Calendar 2003 + (New Wellington VHF Group Website)
HIBERNATION CONTEST APRIL 5, 6
Brass Monkey Contest July 5, 6
The rules were published in September/October 2000 Break-In, and can also be found at the new (soon to be operational) Wellington VHF Group Website: http://www.vhf.org.nz/
Please send contest logs within two weeks to:
Contest Manager, Wellington VHF Group,
P.O. Box 12-259, Thorndon, WELLINGTON

GENERAL ITEMS

New G3PHO website:- Peter Day G3PHO ,Editor of the RSGB Microwave newsletter, now has a new URL for his website. His site is well worth a visit http://www.g3pho.org.uk/

Cambridge Radio Club Annual Market Day

The 24th Consecutive Cambridge Radio Club Annual Market Day is to be held on Saturday May 10 th at Cambridge Town Hall. Main Doors Open 10am (Vendors at 9am) Book with Market Day Convenor Box 650 Cambridge.

NZART Technology Convention

This Easter on April 19th & 20th 2003, the Hamilton Amateur Radio Club is hosting the NZART Technology Convention. They will be using the premises of the Hamilton Astronomical Society, located in Brymer Road, Hamilton, which is adjacent to the Hamilton Zoo which has plenty of parking.
I have a form if you wish to attend. Numbers will be held to 100 maximum.
It is highly probable that I will have a test equipment setup loaned from work to check transceivers, transverters and oscillators (RF power up to 10368 MHz, Spectrum Analysis to 5760 MHz)

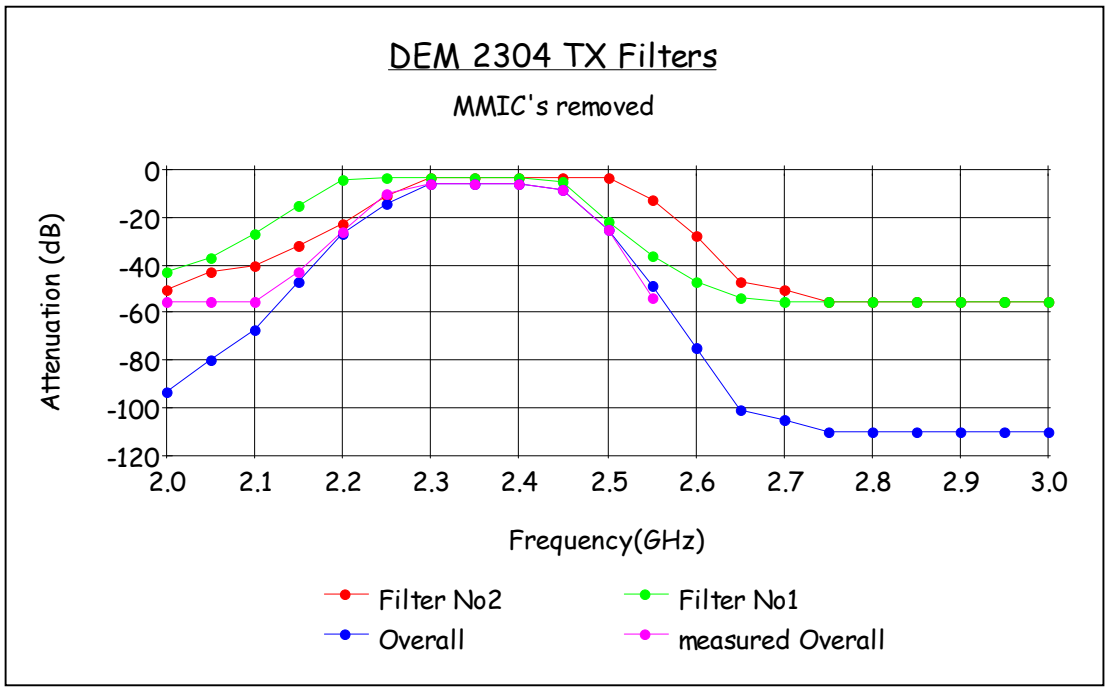
Hamilton 2M Beacon

Steve, ZL1TPH alerted the editor on Tuesday, April 01, 2003 that the Hamilton 144.256 Beacon was transmitting a 2 tone signal (due to the presence of hum). The unit is being extracted from service (it has been operating close to 20 years +/-) and normal transmission will be resumed as soon as possible

2304/2424 MHZ DEM TRANSVERTER PROGRESS

Kevin ZL1UJG

The graph shown in the last issue is of the 2nd TX filter [filter between MMIC's]. The response is shown in red in the graph below. I assumed that both TX filters were tuned the same frequency. **This is not correct.**



The frequency plot adjacent shows the filter response of both the 1st and 2nd TX hairpin filters. The 1st TX filter after the mixer, Filter No 1, (green) (~ 2.2 - 2.4 GHz) passes the wanted (2424 MHz) and the LO (2280 MHz) with minimal attenuation. With both these signals present in the following MMIC amp there will be added intermod, generating higher levels of unwanted products. The 2nd TX filter, Filter No 2 (red) passes signals between 2.3 and 2.5 GHz, while offering only minimal attenuation to the LO at 2280 MHz. The overall response (blue) shows that the overlapped TX filters provide a response across the 2.3 to 2.4 GHz band.

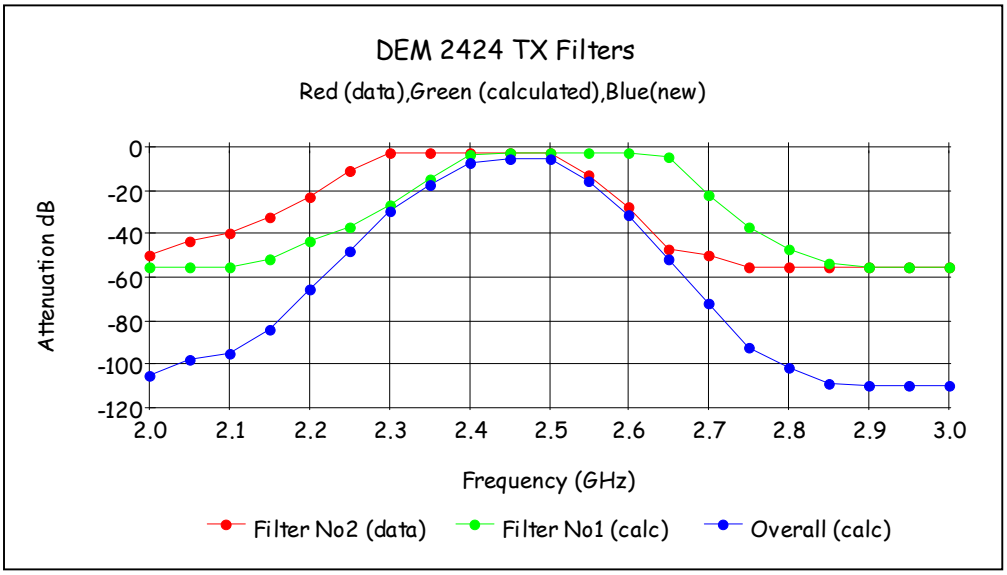
Both TX filters could be shifted HF by 100 MHz to provide a 2.4 to 2.5 GHz response (Sounds like hard work!). However if I did this, the 2280 MHz and 2424 MHz components will still have minimal attenuation after the 1st TX filter.

Some measurements were made with both filters combined down to -55 dB and these results agreed well with the 2 individual filter measurements added together.

In order to remove the 2280 MHz LO component, I have considered moving the 1st TX filter from its present 2.2 to 2.4 GHz position to **2.4 to 2.6 GHz**. This is a move of 200 MHz. I interpolated the new figures by moving the data figures 200 MHz higher. See Graph over page.

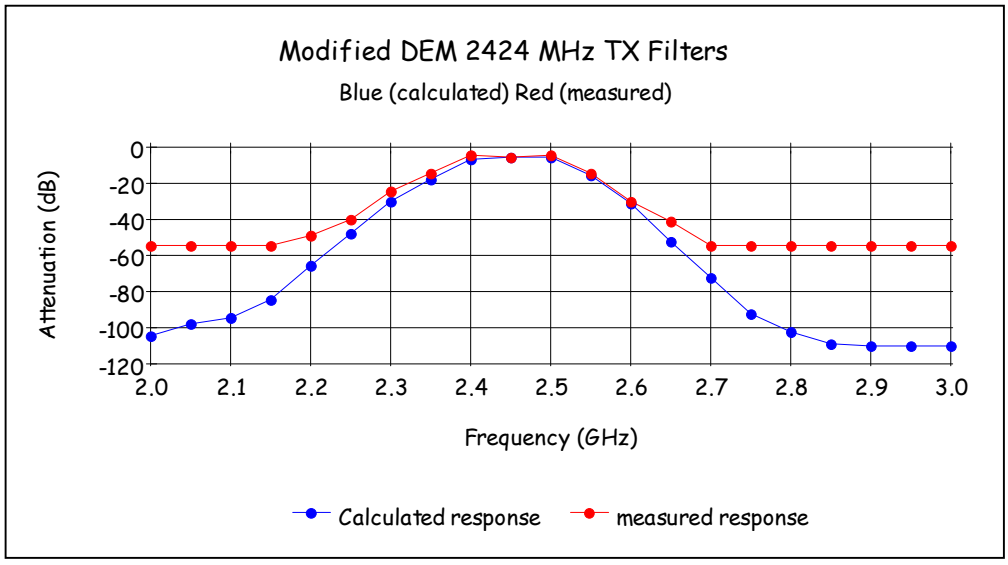
The overall filter response is centred over 2.4 GHz to 2.5 GHz and the overall filter rejection at 2280 MHz, compared to 2424 MHz is now (on paper) ~ 30 dB. This reduces possible intermodulation in the first TX amp significantly. The 1st TX filter No1, thus needs trimming.

An additional 3 dB attenuator (in SMD) is to be fitted on the RF output of the mixer, before the 1st hairpin filter. This improves the mixer and filter termination (over a wider frequency range) reducing signals reflecting back into the mixer which may cause increased intermodulation products.



I carefully measured the dimension of the hairpin stripline along its centre line carefully with a pair of digital calipers. The 1st filter was to be moved from it's centre frequency of 2300 MHz to 2500 MHz or be shortened by a factor of 0.92. This equates to ~ 3.6mm off the filter length or 1.8mm off each each open end of the hairpin.

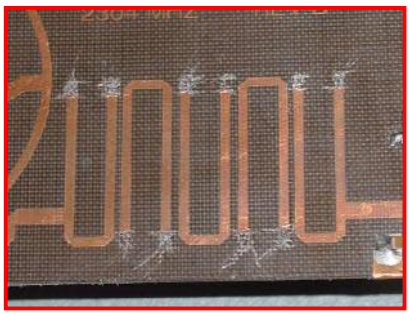
I measured the 1.8 mm off as best as I could and cut with a scalpel. I used a soldering iron and scalpel to remove the remanents of the unwanted section. (see picture of the trimmed pcb). With trepadation I measured the response of the combined TX filters (new centre frequency of ~2450 MHz) and this is shown below.



The red trace was only made down to -55 dB, this being the noise floor of the setup. Filter rejection continues further. Ripple appears in the top of the filter which I think is due to the interaction of the filters at their common point. The MMIC amp will be replaced at that point and I expect the ripple to reduce. Filter rejection of the LO at 2280 MHz improved from ~ 5dB to ~25 dB (30 dB filter loss @2280 MHz - 5 dB filter loss at 2424 MHz).

Rejection of the TX image at 2136 MHz has improved from the mid 40 dB's to ~ 55 dB+. On the high side of 2450 MHz the rejection is worsened, due to the shifting of the centre frequency of the filters. TX products in this area are primarily due to the IF harmonics mixing with the LO (2IF + LO, 3IF + LO)

Further cancellation of the LO is expected in the mixer. This is dependant on the balance (LO isolation) of the mixer, due these factors: - balance of diode pair, termination on the mixer ports, the accuracy of the PC track dimensions, as well as the centre frequency of the hybrid ring. Most mixers of this type of design are tuned to the centre frequency between LO and RF output (normally LO + ½ IF) with a bandwidth of ~10 %. This hybrid ring was optimised for use at 2160/2304 MHz and ~10 dB cancellation was measured at 2280 MHz. (Overall LO rejection ~35 dB)



A quick measurement gave maximum LO cancellation at 2080 MHz ? Some probing on the mixer hybrid ring with a tuning stick (LO at 2280 MHz) improved LO rejection to ~ 60 dB!!

Further work on completing the unit will be in later issues… The PCB is revision B. See previous issue for image

A useful article on mixers is http://www.setileague.org/articles/ham/1296mixr.pdf

NEWS FROM MURRAY, ZL3MH

Murray ZL3MH

First image is of Murray's 5 meter long 2 m array designed by VK2ZAB using 25 mm square boom and 9.5 mm elements which is ideal for the Aluminium obtainable here in New Zealand.

The second image is of the AM17 2M amp. This is a pair of 4CX250B tubes in push pull giving 400 Watts pep.
This was an amplifier made in Australia for the CAA (Civil Aviation Authority) for aircraft Beacons on 119 MHz. There are about 100 of these amplifiers in service on 2m in VK. (& NZ)
With this antenna and AM17 amplifier I hope there are many reports of Murray ZL3MH putting excellent signals into Australia and other parts of NZ.

For the last few weeks I have had a causal look for the Hawkins Hill beacon in Wellington on 144.275 MHz. For a while I did not think it was a runner because in the South Island of New Zealand all of the listed beacons are not going. I put an email on VK-VHF reflector about the above 2 meter beacon and Dick ZL2TGQ came back and said it was active. I then started a more intensive look for the beacon especially at first light in the morning and at dusk in the evening. I have had my new 12 element yagi on a 5 meter boom at 10 meters doing next to nothing so I pointed it north to see if I could receive it.
This antenna was designed by Gordon VK2ZAB for aluminium available in ZL, as we only can buy it in 5 meter lengths except for the bigger sizes in scaffolding tube at 6 meters and irrigation pipe up to 10 meters. The antenna users 25 mm square by 3 mm thick aluminium for the boom and 9.5mm tube for the elements.
It uses stainless steel PK screws through the boom to hold the elements exc ept for the driven element. The dipole goes around the boom with a 4:1 coax balun to match to the 50 Ω coax.

What I have worked and heard so far. A high pressure system has been sitting over ZL since Monday and today Saturday it is now moving away. (17th -22nd March, 2003)

Tuesday 18th ZL2TGQ 4/3
Wednesday 19th ZL2TGQ at 5/2 and ZL2WAO 5/5
Thursday 20th Beacon
The Christchurch to Wellington path is ~ 350km

Friday 21st Beacon morning and night
Saturday 22nd Beacon all morning

Antenna Dimensions

Element	Spacing	Length	Element	Spacing	Length
REF	0.0mm	1037mm	D5	2083mm	879mm
D.E	350mm	999mm	D6	2592mm	881mm
D1	500mm	958mm	D7	3142mm	862mm
D2	837mm	920mm	D8	3613mm	852mm
D3	1068mm	896mm	D9	4387mm	888mm
D4	1565mm	906mm	D10	4960mm	868mm

MARK ALL DISTANCES ALL FROM THE REFLECTOR. All elements except driven element to be made in 9.5mm ∅ aluminium .Driven element to be made in 6.35 mm ∅ aluminium. 9.5mm may be used. For further details contact editor.

For Sale

432 MHz TRANSCEIVER:- Belcom Liner 430, 10 watt SSB/CW transceiver VXO controlled. (similar to Icom IC402)
In good condition and comes with instruction manual and circuit diagram. $100 ono + freight.
Contact Scott ZL1KB 09 828-5891 or packet ZL1KB@ZL1AB

AMPLIFIER:- Home Made 432 MHz, 2 stage, 40 watt transistor Amplifier with MRF646 output device. Gain is suitable for driving with a Yaesu FT790 or Icom IC402. Has bypass relay. Offers to the editor.

SPECTRUM ANALYSER:- Takeda Riken.
TR4113A RF unit and TR4110M Display unit
Frequency to 1.7 GHz. Bandwidth 300 kHz to 10 Hz. 200 MHz/div to 200 Hz/div scan.
Digital display for frequency, bandwidth, scanwidth and reference level.
For sale on behalf. Contact editor for more details

2304/2424 MHZ DEM TRANSVERTER PROGRESS…

TX Amplifiers

I have used a MAR3 and NGA 386 (ERA-3) as the 1st and 2nd TX amplifier stages giving ~ 20 dB gain from 1st TX filter input to TX power out. This particular transverter is used in this configuration to produce 8-10 mW RF output to drive a PA.
I had some MAR3's available, so they were used as the 1st TX amplifier in this unit, however an ERA-1 MMIC could be used as an alternative device in the 1st amp without much gain change. An ERA-2 MMIC could be used to increase the gain a few dB and a NGA-586 (ERA-5) MMIC could be used to increase the output power a few dB. The supply feed resistors to the MMIC's have a single turn in the resistor lead near the MMIC to add a little inductance, thereby reducing the losses.

LO X4 Multiplier/Amp on DEM transverter PCB

I started looking at the oscillator chain and decided to remove the MMIC's and diode. I replaced the diode with a MAR 8 biased into the non-linear region by the addition of a 2k2Ω in the input side. I measured less than satisfactory output power from the X4 multiplier… The loss of the 1st LO filter alone was in the region of 6-7 dB…? Strange…
NOTE:-It appears that the DC supply track feeding the LO MMIC amps in between the filters looks like a ½ wave stripline with both ends grounded. The track runs very close to the 1st LO filter (see images in the next issue). This gives a notch in the passband of the filter. I added a 100 pF SMD 0805 chip capacitor to ground in the centre of the track, (via a veropin) and the loss reduced to about 2 dB as well as flattening the response considerably. As this issue goes to press, I will be reconnecting the X4 multiplier (using the MAR8) to see what power is achieved, before deciding which is the most suitable MMIC to fit as the LO amplifier.
ERA-X and MAR-X devices are made by Minicircuits. NGA-X86 devices are made by Sirenza.

INPUT FOR THE NEWSLETTER Please send any news/ activity/ ideas/ projects/ articles/ photos/ etc to Kevin, ZL1UJG, at the email or mail address at the top of the newsletter. Thank you for information received for this issue of the newsletter.
I hope to see a number of you at the Technology Convention being held in Hamilton during April,2003.
Picture of the newsletter editor (right) will help recognition at the convention. The other character in the picture is "Bandit" who lends support during writing of the newsletter.

73's
Kevin
ZL1UJG