# Ham Hum

## October 2015

The official newsletter of
The Hamilton Amateur Radio Club (Inc.)
Branch 12 of NZART - ZL1UX
Active in Hamilton since 1923


## Next Meeting 21st October : 19:30

## Contact Details

| | | | |
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| Currently vacant | | | |
| **QSL Manager:** | | | |
| Gary Lodge | ZL1GA | | |
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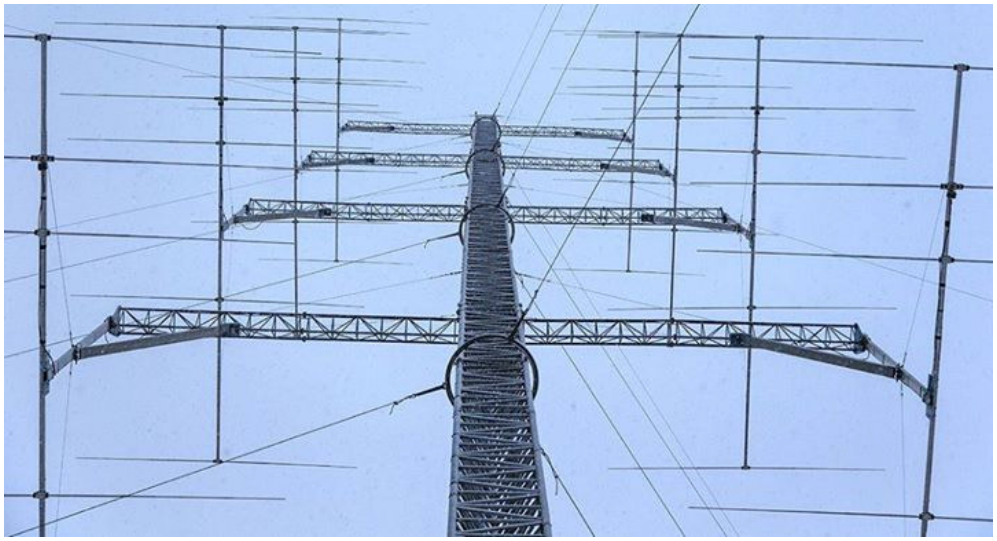
| **NZART Examiners:** | ZL1IC, ZL1PK & ZL1TJA | | |

# From the Editor

The Scout Jamboree happens this month down in the South Island. Listen out for young voices on air looking for someone to talk to.

That's about all I have this month.



# The K7RA Solar Update

02/10/2015

Solar activity spiked up again this week, with average daily sunspot numbers rising from 73 to 120.9. Likewise, average daily solar flux tracked upward from 106.7 to 122.7. Nice to have increased solar activity coincide with the autumnal equinox, right when HF hams are more likely to be active.

Predicted solar flux is 120 on October 2, 115 and 105 on October 3-4, 100 on October 5-8, 115 on October 9-10, 110 on October 11-12, then 115, 120 and 125 on October 13-15, 130 on October 16-18, 125 on October 19, 120 on October 20-24, then 130, 125, 120 and 115 on October 25-28, 110 on October 29 through November 1, 115 on November 2-6 and 110 on November 7-8.

Predicted planetary A index is 22, 24, 33 and 23 on October 2-5, then 14, 8, 5 and 10 on October 6-9, 8 on October 10-14, then 12, 10 and 12 on October 15-17, 8 on October 18-24, 7 on October 25-27, then 15, 10, 7 and 15 on October 28-31, and 12, 8, 12, 18 and 10 on November 1-5, and 8 on November 6-11.

The Australian Space Forecast Centre sent a geomagnetic warning at 2330 UTC on October 1. They expect increased geomagnetic activity from October 2-4 due to a high speed wind stream from a coronal hole. We should see active geomagnetic conditions on October 2-3, and active to minor storm on October 4.

Petr Kolman, OK1MGW, of the Czech Propagation Interest Group sees the geomagnetic field as quiet to active October 2-3, quiet to unsettled October 4-6, active to disturbed October 7-8, quiet to unsettled October 9-10, quiet to active October 11-14, quiet to unsettled October 15, quiet to active October 16-17, mostly quiet on October 18-20,

The monthly averages of daily sunspot numbers for May through September were 83, 77.4, 68.5, 61.7, and 72.5. The three month moving averages of daily sunspot numbers centered on January through August were 98.2, 78.1, 68.2, 72.4, 77.7, 76.3, 69.1 and 67.5. A three month moving average centered on August incorporates a sum of all daily sunspot numbers from July 1 through September 30, divided by 92, the number of days. A three month moving average centered on July incorporates all data from June 1 through August 31.

Rol, K3RA, from Elkridge, Maryland wrote on October 1:

“I saw so many signals in the RTTY segment on Sunday for the CQ WW contest that I couldn’t resist getting into the competition for a while. In less than five hours of on time between 1422Z and 1950Z I worked over 300 stations, virtually all in

Europe, with great signals.

“I did get called by HS5NMF (Thailand) at 1553z, and before that a couple of VU made it particularly exciting.

“Encouraged by the RTTY fun, on Monday morning I got on 20 meters and at 1245Z found VR2CD, then JT1AA/5, among the EU and near Asians.

“Went to 17 meters and worked a few really strong JAs. Then after working a lot of European stations, at 1420Z I went to 12 meters to work SU1IG (Egypt) and saw the band was wide open.

“I was on only briefly on Tuesday, but I did work A93JA (Bahrain) on 12 meters at 1309z. On Wednesday I went right to 12 meters at 1230z and ran EU with a few Middle Eastern and Western Asian stations thrown in until noon (local time), when I went off the air with the band still open.

“DF2OB, with his huge Optibeam farm, was incredibly strong at 1315Z, and I asked him to try 10 meters, which he did, and there was not a peep! Amazing what such a relatively small difference in frequency can do!

“Thursday morning I got on 12 meters at 1347Z and worked 4K9W with good signals, and then worked a few more Europeans before going to 15 meters to check for signals over the pole. I found YC1CZZ with his friends YB8TM and YC1QL on SSB, all three with good signals.

“I tried a CQ to Asia/OC over the pole, with no luck, but lots of Europeans were calling despite my directional CQ, so I ended up running a couple of hundred European stations on 15 meters before quitting at 1655Z with the band still open. I understand from a couple of the EU stations that N4BP was heard on 10 working EU during the morning. I wonder what tomorrow will bring?”

Check out this article on sunspot formation, at **http://bit.ly/1QPnXCP** .

For more information concerning radio propagation, see the ARRL Technical Information Service at **http://arrl.org/propagation-of-rf-signals**. For an explanation of the numbers used in this bulletin, see **http://arrl.org/the-sun-the-earth-the-ionosphere**. An archive of past propagation bulletins is at **http://arrl.org/w1aw-bulletins-archive-propagation**. More good information and tutorials on propagation are at **http://k9la.us/**.

My own archives of the NOAA/USAF daily 45 day forecast for solar flux and planetary A index are in downloadable spreadsheet format at **http://**

**bit.ly/1VOqf9B** and **http://bit.ly/1DcpaC5**.

Click on "Download this file" to download the archive, and ignore the security warning about file format. Pop-up blockers may suppress the download.

Monthly propagation charts between four USA regions and twelve overseas locations are at **http://arrl.org/propagation**.

Instructions for starting or ending email distribution of ARRL bulletins are at **http://arrl.org/bulletins**.

Sunspot numbers for September 24 through 30 were 86, 145, 138, 154, 120, 125, and 78, with a mean of 120.9. 10.7 cm flux was 106.8, 119.8, 120.2, 127.5, 124, 129.2, and 131.1, with a mean of 122.7. Estimated planetary A indices were 8, 7, 4, 4, 4, 6, and 3, with a mean of 5.1. Estimated mid-latitude A indices were 8, 6, 4, 4, 5, 5, and 2, with a mean of 4.9.

# ESA invites radio amateurs to listen for AAUSAT -5 CubeSat

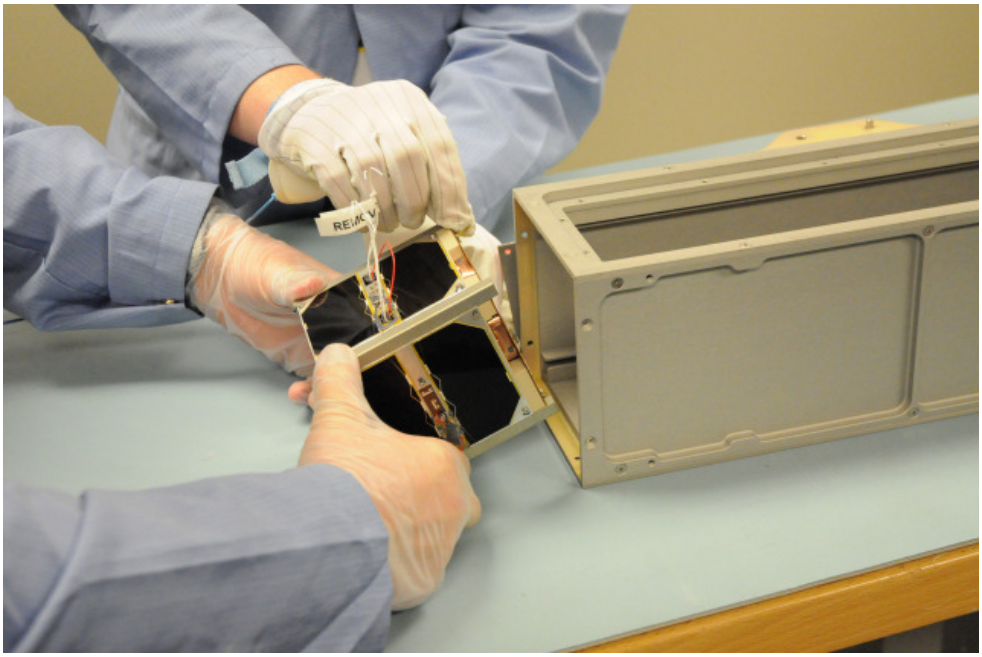
The AAUSAT-5 amateur radio CubeSat built by students at the University of Aalborg, Denmark is planned to be released from the International Space Station sometime in the week of October 5.

The European Space Agency (ESA) is inviting radio amateurs to listen out for the signals from the satellite. The first to send in a recorded signal from AAUSAT-5 will receive a prize from ESA's Education Office.

Launched on August 19, 2015 to the ISS, the Danish student CubeSat is now waiting for its deployment from the Japanese Kibo module's airlock. An astronaut will manipulate the Kibo robotic arm to lift AAUSAT-5 from the airlock and place it in orbit.

Once deployed from the ISS the CubeSat will begin transmitting signals to Earth that can be picked up by anyone with common amateur radio equipment. ESA challenges anyone to record the signal and send it to ESA (cubesats@esa.int) and Aalborg University (studentspace@space.aau.dk).

The satellite will transmit on 437.425 MHz using CW and GMSK. The 30 WPM CW beacon will transmit every 3 minutes and the 9600 bps GMSK every 30 seconds.



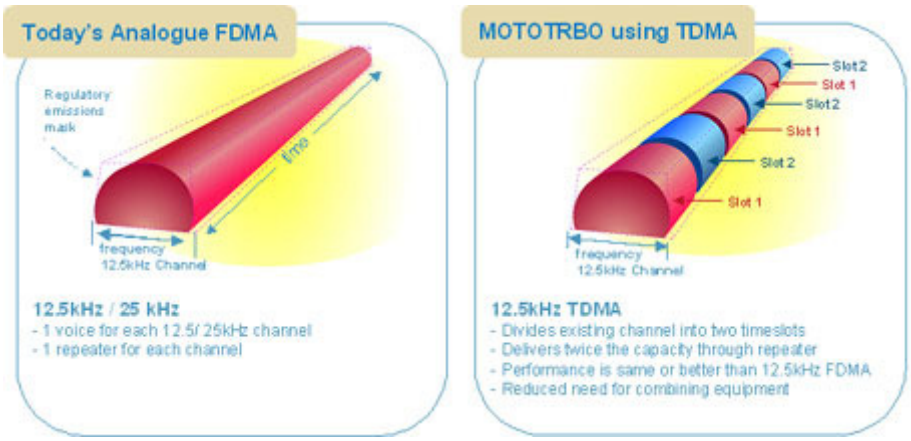
The first correct email received will win the following prizes:
• ESA/AAUSAT5 poster with signatures of the team members
• ESA Education goodie bag
• Scale 1:1 3D printed model of the AAUSAT-5 satellite

Read the ESA article at
http://www.esa.int/Education/CubeSats_-_Fly_Your_Satellite/Be_the_first_to_catch_the_signals_from_a_new_Satellite_in_orbit

AAUSAT-5 amateur radio information http://www.space.aau.dk/aausat5/index.php?n=Main.HamInfo

ESA AAUSAT-5 Twitter hashtag #AAUSAT5 https://twitter.com/ESA__Education

Danish CubeSats head for ISS http://amsat-uk.org/2015/08/19/danish-cubesats-head-for-iss/



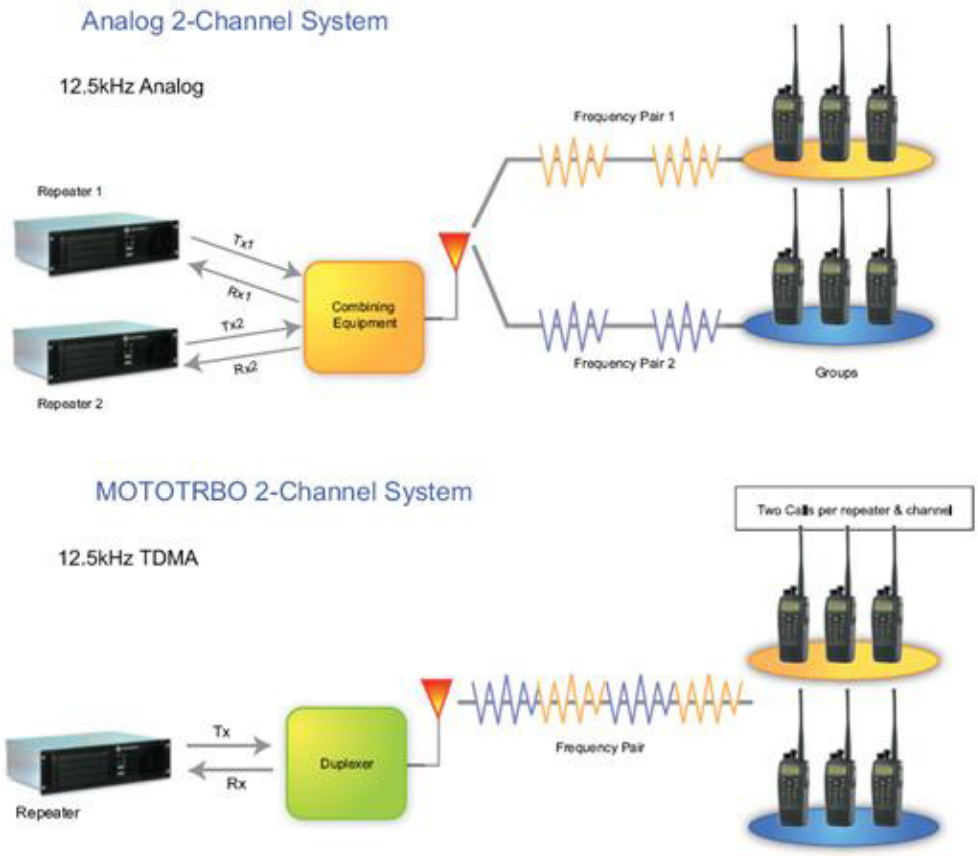

# Delivering Increased Capacity

MOTOTRBO (aka DMR) uses a two-slot TDMA architecture. This architecture divides the channel into two alternating time slots, thereby creating two logical channels on one physical 12.5kHz channel. Each voice call utilises only one of these logical channels, and each user accesses a time slot as if it is an independent channel. A transmitting radio transmits information only during its selected slot, and will be idle during the alternate slot. The receiving radio observes the transmissions in either time slot, and relies on the signalling information included in each time slot to determine which call it was meant to receive.

By comparison, analogue radios operate on the concept of Frequency Division Multiple Access (FDMA). In FDMA, each transmitting radio transmits continuously on a designated channel, and the receiving radio receives the relevant transmission by tuning to the desired carrier frequency.

TDMA thereby offers a straightforward method for achieving 6.25kHz equivalency in 12.5kHz repeater channels – a major benefit for users of increasingly crowded licensed bands. Instead of dividing channels into smaller slices of decreased bandwidth – which is what would be required to increase spectrum efficiency with FDMA methods, TDMA uses the full 12.5kHz channel bandwidth, but increases efficiency by dividing it into two alternating time slots.

Additionally, this method preserves the well-known radio frequency (RF) performance characteristics of the 12.5kHz signal. From the perspective of RF physics – that is, actual transmitted power and radiated emissions – the 12.5kHz signal of two-slot TDMA occupies the channel, propagates, and performs essentially in the




same way as today's 12.5kHz analogue signals.

With the added advantages of digital technology, TDMA-based radios can work within a single repeater channel to provide roughly twice the traffic capacity, while offering RF coverage performance equivalent to, or better than, today's analogue radio.

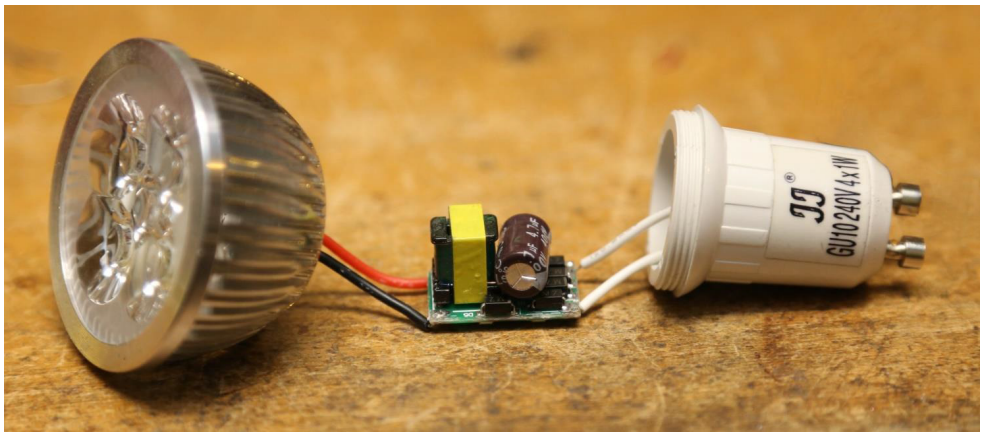
Two-Slot TDMA Reduces Infrastructure Equipment

As we have seen, two-slot TDMA essentially doubles repeater capacity. This means that one MOTOTRBO repeater does the work of two analogue repeaters (a MOTOTRBO repeater supports two calls simultaneously).

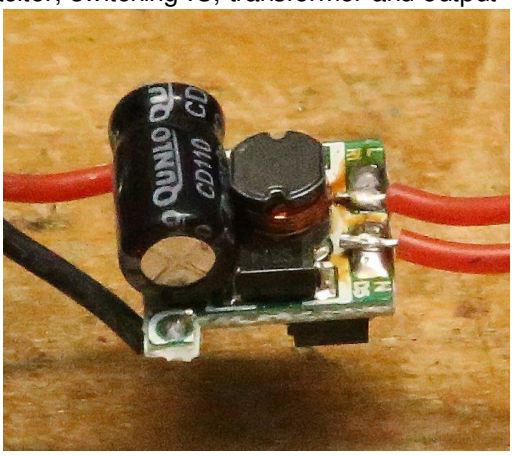
This saves costs of repeater hardware and maintenance, and also saves on the cost and complexity of RF combining equipment necessary in multichannel configurations.

Just as importantly, there is no need to obtain new licenses for the increase in repeater capacity, and compared to alternative technologies that may operate on different bandwidths, there is no comparative increase in the risk of interference with or from adjacent channels.

## VK3TGX and LED lights




When I pulled them apart, I was a little horrified at what I found. The unit above runs directly from 240V, but as you can see the component count is extremely low. A bridge rectifier, 4.7uF 400V filter capacitor, switching IC, transformer and output rectifier (but no output filter cap). You would be hard pressed to be able to simplify it further. Now two things scared me about it, 1, the amount of isolation between the 240V input, and the output LED array seated in an exposed metal heatsink. 2, The complete lack of any RFI filtering.



Next I pulled apart a 12V unit and I found almost the same story, A slightly smaller board, but again not much to give any confidence to a radio operator.

I connected the earth clip of my scope test lead to the probe tip (making a pick up coil) and looped it around the assembled light. and I soon had a semi-stable signal on the scope screen. So yes, they do radiate.

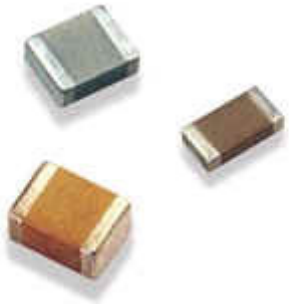
I did a quick dial around on a HF receiver but I didn't find anything obvious, but as I live in a S9 noise 'rubbish tip' I wouldn't take that to mean they are clean, just that they are not absolutely bad!.

I picked up a 12V unit a few years ago at a bargain price from a big name super-market while caravanning up bush. It was unbelievably bad, it knocked out all TV, broadcast radio and … basically anything I had that used RF. I still have it, maybe I should have pulled it apart also, it's not useful for anything else!

*{I'm not sure if this applies to all LED light fittings. But I'm not sure how to tell when at the store as I doubt you'll be allowed to dismantle them to find out—Editor}*

# Surface mount soldering by M0TGN

If, like me, you have had an irrational fear of surface mount devices for some time, you will be glad to know its not as bad as you may think. I recently started working with SMD and while I suffer from shaky hands and have poor eyesight, its actually quite a methodical process and not as fiddly as you would think.



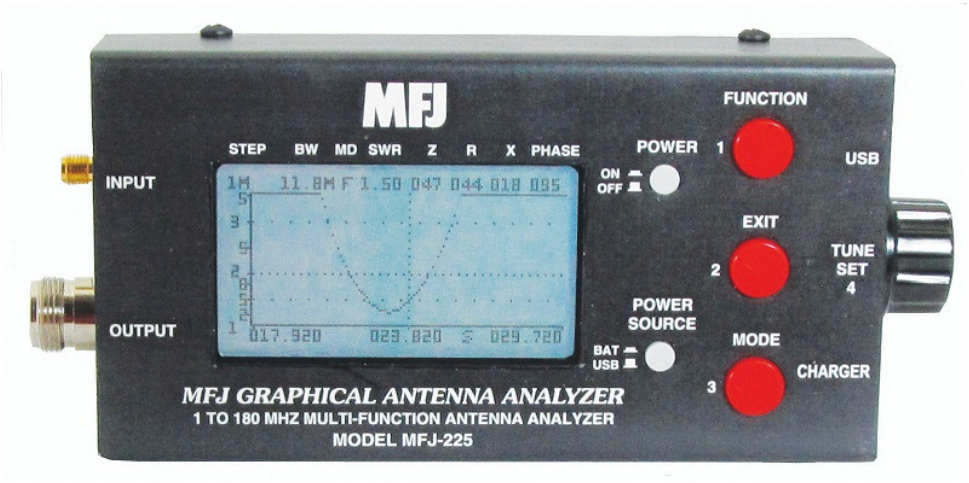
I created a 2 part video on SMD soldering using a hot air (reflow) station and using solder paste. In this video I created a QRP dummy load which is a great introduction into Surface Mount Components and at a great price of £5.95 available from Kanga Products

Part 1
https://youtu.be/_IjNZc8U5ik

Part 2

https://youtu.be/5x96GudQIg8

# MFJ-225 HF/VHF, 1.8-170 MHZ GRAPHIC ANALYZER




MFJ-225 HF/VHF Two-Port Graphic Antenna Analyzer

Take RF testing to the next level with the new MFJ-225! All the basic analyzer functions you`ve come to depend on plus a host of advanced features like builtin LCD graphics, two-port VNA measurement, PC-Interface using IG-miniVNA freeware, precise DDS frequency control, self-calibrating . . . easy-to-use!

Seeing is Believing
Get a big picture every time with MFJ-225`s built-in back-lighted 3-inch LCD graphic display. Make fine circuit adjustments using full-screen easy-to-view SWR bar graph, capture vivid swept displays for SWR, impedance, return loss, phase angle, more! Operation is simple, you can adjust the center frequency, tuning step, and sweep width instantly while viewing your plot, literally shaping it before your eyes.

Continuous HF-VHF Coverage
Tunes from 1.5 MHz to 179.9 MHz with rock-solid stability and no gaps. That`s because the MFJ-225`s VFO is a state of the art programmable DDS (direct digital synthesis) generator with pin-point 1-kHz frequency resolution. DDS control means no mechanical band switches or tuning elements, just a reliable velvet-smooth optical encoder to glide across the spectrum.

Powerful Clean Signal Source
The MFJ-225 DDS stimulus generator also gives you a leveled -5 dBm signal source for driving mixers, low-power amplifiers, filters, networks, diplexers, and antennas on the test range. And, your test signal is always clean, with over -50 dBc of harmonic and spur suppression. That`s better than many precision lab generators costing thousands of dollars! Connect an external step attenuator, and it becomes a highquality signal generator for peaking sensitive receivers and preamplifiers.

Information Powerhouse
The MFJ-225 simultaneously compiles and displays all important parameters you
need on a single screen, giving you a wider range of results at a glance. You`ll work faster and smarter without the inconvenience of scrolling through menus or making tedious conversions to get your data.

What the MFJ-225 Measures:
• SWR (1:1 to 9.9:1)
• Complex Impedance (R+jX)
• Impedance Magnitude (Z)
• Return Loss (RL, 0-30dB)
• Phase (0-180°)
• Capacitance (0-9999pF)
• Inductance (.1uH-80uH)
• Cable Length (0.5-45m)
• Cable Loss (0-30dB)

Two-Port Flexibility
In addition to traditional single-port (S11) reflected-power measurements, MFJ features an invaluable advantage of making two-port (S21) forward-power measurements, essential for optimizing filters, diplexers,matching networks, etc. It bridges the gap between a simple scalar analyzer and true vector-analysis performance.

Ergonomic Operation
“Advanced features” conjure visions of greater complexity and more buttons to push . . . not true for MFJ-225! The graphic display is “advanced” because it places more information at your fingertips without needless scrolling and searching. Also, the layout is unique with three large soft-touch selector buttons located on the front panel next to the screen and a large side-mounted frequency control knob conveniently positioned for your right hand. Everything is located where it needs to be for intuitive operating and unobstructed screen view!

## Upcoming Happenings & Events

| *Date* | *Happenings & Events* |
|---|---|
| **2nd October** | **NZART HQ-Infoline** |
| **3-4 October** | **NZART Microwave Contest** |
| 5th October | HF Net, 3.575 MHz, 19:30 |
| 6th October | VHF Net, 146.525 MHz, 20:00 |
| 12th October | HF Net, 3.575 MHz, 19:30 |
| 13th October | VHF Net, 146.525 MHz, 20:00 |
| **16th October** | **NZART HQ-Infoline** |
| 19th October | HF Net, 3.575 MHz, 19:30 |
| 20th October | VHF Net, 146.525 MHz, 20:00 |
| **21st October** | **Club General Meeting** |
| **25th October** | **NZART Official Broadcast** |
| 26th October | HF Net, 3.575 MHz, 19:30 |
| 27th October | VHF Net, 146.525 MHz, 20:00 |
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**6th November—NZART HQ-Infoline**

**18th November—Club General Meeting**

**20th November—NZART HQ-Infoline**

**27th-29th November—Bridge to Bridge Ski Race (AREC)**

**29th November—NZART Official Broadcast**

**5-6 December—NZART Field Day Contest**

**6-7 February 2016—NZART DX Weekend Contest**

**27-28 February 2016—NZART Jock White Memorial Field Days Contest**

**2-3 April 2016—NZART Low Band Contest**

**21-22 May 2016—NZART Sangster Shield Contest**

**4-5 June 2016—NZART Hibernation Contest**

**2-3 July 2016—NZART Memorial Contest**

**6-7 August 2016—NZART Brass Monkey Contest**

For more information on any of the above please contact myself or any committee member.

**Club Information**

| | |
|---|---|
| **Contacts :-** | |
| **Business Meeting:** | 1930 First Wednesday of each month except January<br>88 Seddon Road, Hamilton |
| **General Meeting:** | 1930 Third Wednesday of each month (except Jan)<br>88 Seddon Road, Hamilton |
| **Homepage:** | http://www.zl1ux.org.nz |
| **eMail:** | branch.12@nzart.org.nz |
| **HF Net:** | 3.575MHz LSB 1930 Mondays |
| **VHF Net:** | 146.525MHz simplex 2000 Tuesdays |
| **2m Repeater:** | 145.325MHz -600kHz split |
| **STSP Repeaters:** | 146.675MHz -600kHz split<br>438.725MHz -5 MHz split |
| **ATV Repeater:** | Off air pending channel changes |

*Cover Photo: JOTA/JOTI*

| | |
|---|---|
| Sender | Hamilton Amateur Radio Club (Inc)<br>PO Box 606<br>Hamilton 3240 |