

The Official Newsletter of the  
**PAPAKURA RADIO  
CLUB INC.**



*July 2022*



**AND THE SUN KEEPS GETTING MORE INTERESTING**



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### This Month's Meetings:

Wed 6 June – General Meeting – Remits & 10 Minute Talks  
Wed 13 June – AREC SAR-track Exercise  
Wed 20 June – Committee Meeting  
Wed 27 June – Project Night - Arduino

Also, remember there is a Thursday daytime meeting schedule starting at 11:00 and finishing around 13:00, Hopefully, this may appeal to members who may not find getting to the rooms at night so easy

## CLUB ACTIVITY:

A quieter month as we settle into winter mode, and some changes to the meetings this month to accommodate some more regular AREC training.

There is concerted effort to develop some improved Civil Defence structures and roles in Papakura which may expand our contacts and influence in the community. Hopefully there will be some more to report on this in the coming weeks and months

After the general meeting we will consider the NZART remits, and then we have some 10-minute talks which will conclude with a supper. It would be good to see some of your there.

## UPCOMING ACTIVITIES:

WED 6 JUNE – GENERAL MEETING

WED 13 MAY – AREC SAR-TRACK EXERCISE

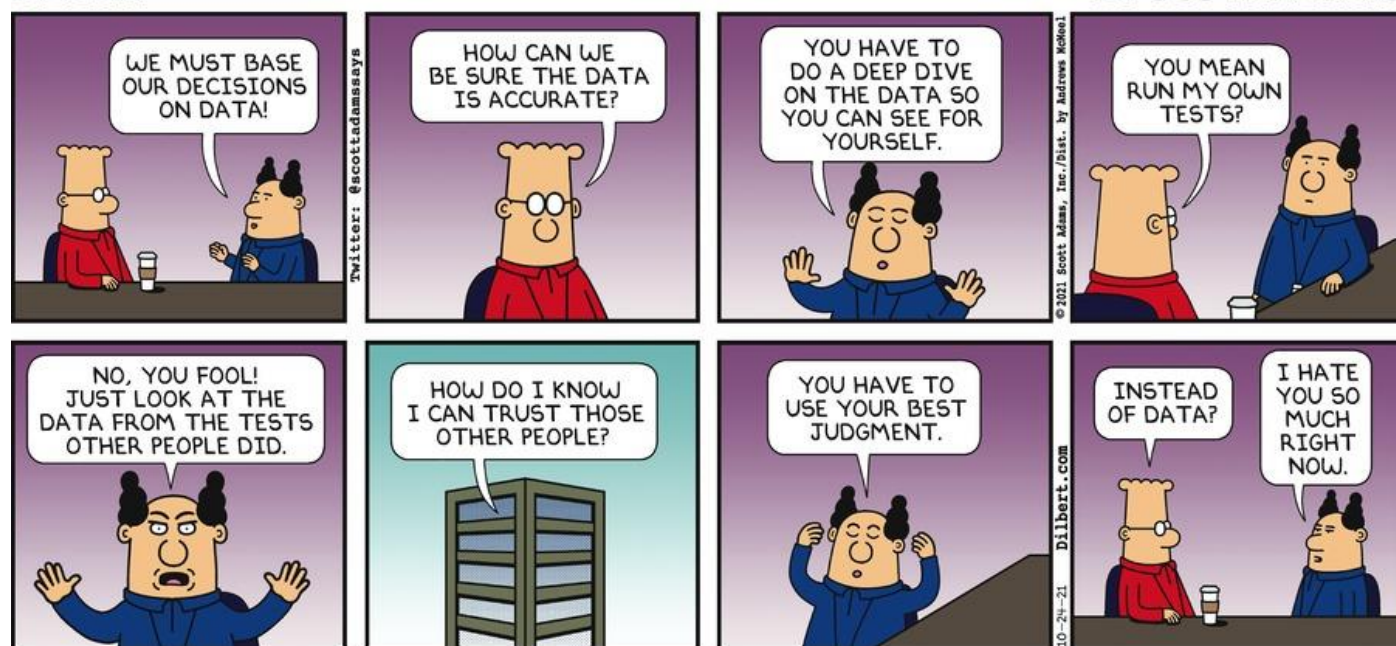
WED 20 MAY – COMMITTEE MEETING

WED 27 MAY – PROJECT NIGHT - ARDUINO

THURSDAYS 10:00 AM DAY MEETINGS

AS THESE ARE SUBJECT TO CHANGE - PLEASE LISTEN FOR UPDATES ON THE SUNDAY MORNING CLUB NETS. (SEE BACK PAGE FOR FREQUENCIES AND TIMES)

**DILBERT**



**BY SCOTT ADAMS**

# DX Calendar May 2022

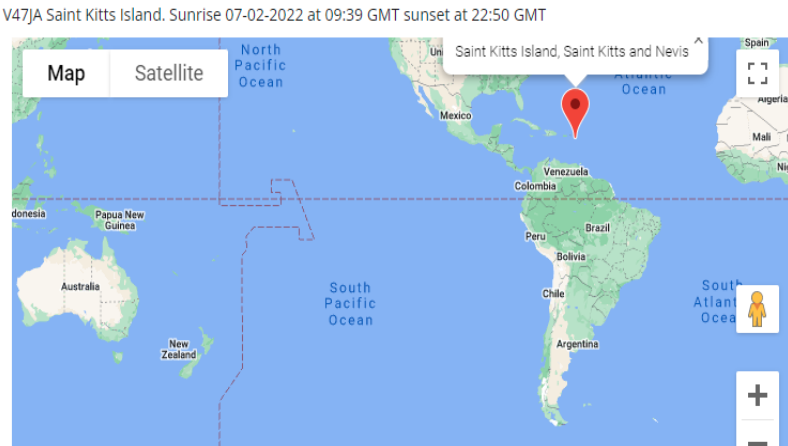
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						
<a href="#">OJ0MR</a>							<a href="#">SV9/OK6DJ</a>																				<a href="#">VX2I</a>									
<a href="#">OJ0JR</a>									<a href="#">A35JP/P</a>														<a href="#">K7K</a>													
<a href="#">FP/KV1J</a>													<a href="#">FS/W7NZJ</a>																							
<a href="#">5X3R</a>																																				
<a href="#">7Q5RU</a>																																				
<a href="#">6O1OO</a>																																				
											<a href="#">V47JA</a>																									
			<a href="#">YN2RP</a>																																	
<a href="#">JG8NQJ/JD1</a>																																				
<a href="#">VK0MQ</a>																																				
<a href="#">JX/LB4MI</a>																																				
<a href="#">FT4XW</a>																																				

## FEATURED EXPEDITION:

W5JON will be active again as V47JA from Saint Kitts Island, IOTA NA-104, 12 - 28 July 2022.

He will operate on 160 - 6 m (Including 60m), SSB, FT8.

QSL via home call direct, LOTW.  
 Ads for direct QSL:  
 JOHN V ABBRUSCATO, 22199 PINE TREE LN, HOCKLEY, TX 77447, USA.



For information on other expeditions, click the link in the calendar above, or check out

news.com  
More than just DX News

electrician starter pack

drill

hand #3

strippers

hammer

I found the whatchamacall it



# CONTESTS JULY 2022

Date-Time		Date-Time		Bands	Contest Name	Mode	Exchange	Sponsor's Website
1	0000	1	2359	1.8-144	RAC Canada Day Contest	CW Ph	RS(T), VE province/territory or serial	www.rac.ca
2	0000	2	2359	1.8-28	Venezuelan Independence Day Contest	CW Ph Dig	RS(T), serial	radioclubvenezolano.org
2	0800	3	110 0	3.5	NZART Memorial Contest	CW Ph	RS(T), serial	www.nzart.org.nz/activities
2	110 0	3	1059	3.5-28	DL-DX RTTY Contest	Dig	RST, serial	www.drcg.de/dldxrtty
2	1400	3	1400	1.8-28	Marconi Memorial HF Contest	CW	RST, serial	www.arifano.it
2	1500	3	1500	3.5-14	Original QRP Contest	CW Ph	RST, serial, power category	www.qrpcc.de
2	1500	3	1500	50, 144, 432	TA VHF/UHF Contest	CW Ph	RS(T), serial, 6-char grid square	trac.org.tr
2	2000	3	2000	7	PODXS 070 Club 40-Meter Firecracker Sprint	Dig	RST, SPC	www.podxs070.com
4	1630	4	1729	3.5,7	OK1WC Memorial (MWC)	CW	RST, serial	memorial-ok1wc.cz
4	1900	4	2030	3.5	RSGB 80-Meter Club Championship, CW	CW	RST, serial	www.rsgbcc.org/hf
5	010 0	5	0300	3.5-28	ARS Spartan Sprint	CW	RST, SPC, power	arsqrp.blogspot.com
6	1200	6	1300	1.8-28	A1Club AWT	CW	RST, name	a1club.org/contest/awt
6	1700	6	2000	144	VHF-UHF FT8 Activity Contest	FT8	4-char grid square	www.ft8activity.eu
7	0000	8	0300	7	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or power; 13 WPM max	qrptest.com/pigwalk40
7	1700	7	2100	28	NRAU 10-Meter Activity Contest	CW Ph Dig	RS(T), 6-char grid square	nrrlcontest.no/index.php/nrrl-contests
7	1900	7	2100	1.8-50	SKCC Sprint Europe	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
9	1200	10	1200	1.8-28	IARU HF World Championship	CW Ph	RS(T), IARU HQ Society or ITU zone	www.arri.org/iaru-hf-world-championship
9	1200	10	2359	1.8-50	SKCC Weekend Sprintathon	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
10	2000	10	2300	1.8-28	QRP ARCI Summer Homebrew Sprint	CW	RST, SPC, mbr or power	qrparci.org/contest
11	0000	11	0200	1.8-28	4 States QRP Group Second Sunday	CW Ph	RS(T), SPC, mbr or power	www.4sqrp.com
11	1630	11	1729	3.5, 7	OK1WC Memorial (MWC)	CW	RST, serial	memorial-ok1wc.cz
13	1200	13	1300	1.8-28	A1Club AWT	CW	RST, name	a1club.org/contest/awt
13	1700	13	2000	432	VHF-UHF FT8 Activity Contest	FT8	4-char grid square	www.ft8activity.eu
13	1900	13	2030	3.5	RSGB 80-Meter Club Championship, SSB	Ph	RS, serial	www.rsgbcc.org/hf
16	0700	16	1459	7-28	Russian Radio Team Championship	CW Ph	RS(T), mbr code or ITU zone	srr.ru
16	0800	16	1400	1.8-7	Trans-Tasman Low-Bands Challenge	CW Ph Dig	RS(T), serial	www.wia.org.au
16	1400	17	1400	70	IARU Region 1 70 MHz Contest	CW Ph	RS(T), serial, 6-char grid	www.iaru-r1.org
16	1800	17	2100	50, 144	CQ Worldwide VHF Contest	CW Ph Dig	4-char grid square	www.cqww-vhf.com
17	0900	17	1600	3.5-14	International Low Power Contest	CW 10W Max	RST, serial, power	www.rsgbcc.org/hf
17	2000	17	2159	14	CQC Great Colorado Gold Rush	CW	RST, SPC	www.coloradoqrclub.org
17	2300	18	010 0	1.8-28	Run for the Bacon QRP Contest	CW	RST, SPC, mbr or power	qrptest.com/pigrun
18	1630	18	1729	3.5, 7	OK1WC Memorial (MWC)	CW	RST, serial	memorial-ok1wc.cz
18	1900	18	2030	3.5-14	RSGB FT4 Contest	FT4	4-char grid square	www.rsgbcc.org/hf
20	1200	20	1300	1.8-28	A1Club AWT	CW	RST, name	a1club.org/contest/awt
20	1700	20	2000	1.2G	VHF-UHF FT8 Activity Contest	FT8	4-char grid square	www.ft8activity.eu
21	0000	22	0300	14	Walk for the Bacon QRP Contest	CW	RST, SPC, name, mbr or power; 13 WPM max	qrptest.com/pigwalk20
21	0030	21	0230	3.5-14	NAQCC CW Sprint	CW	RST, SPC, mbr or power	naqcc.info
21	1900	21	2000	3.5-14	NTC QSO Party	CW	RST, mbr or "NM"; 25 WPM max	qsl.net/ntc/party.html
23	1000	23	2159	3.5-28	YOTA Contest	CW Ph	RS(T), age	www.ham-yota.com/contest
25	1630	25	1729	3.5, 7	OK1WC Memorial (MWC)	CW	RST, serial	memorial-ok1wc.cz
27	0000	27	0200	1.8-50	SKCC Sprint	CW	RST, SPC, name, mbr or "none"	www.skccgroup.com
27	1200	27	1300	1.8-28	A1Club AWT	CW	RST, name	a1club.org/contest/awt
28	1900	28	2030	3.5	RSGB 80-Meter Club Championship, Data	Dig	RST, serial	www.rsgbcc.org/hf
30	0000	30	2359	1.8-50	Feld Hell Sprint	Dig	Mbr, SPC, grid	sites.google.com/site/feldhellclub
30	1200	31	1200	3.5-28	RSGB IOTA Contest	CW Ph	RS(T), serial, IOTA # (if applicable)	www.rsgbcc.org/hf
30	1400	30	1800	144	WAB 144 MHz Low Power Phone	Ph	RS, serial, WAB square or country	wab.internip.net
30	1400	31	2200	3.5-50, Satellite	Tennessee State Parks on the Air	All	TN park abbreviation or SPC	www.tnpota.org
31	1700	31	2100	7-28	ARS Flight of the Bumblebees	CW	RST, SPC, power or Bumblebee number	www.arsqrp.blogspot.com

All dates and Times are in UTC and are not adjusted for local time

Mbr = Membership number. Serial = Sequential number of the contact. SPC = State, Province, DXCC Entity. XE = Mexican state.

Listings in blue indicate contests sponsored by ARRL or NCJ. The latest time to make a valid contest QSO is the minute listed in the "Finish Time" column. Data for Contest Corral is maintained on the WA7BNM Contest Calendar at

[www.contestcalendar.com](http://www.contestcalendar.com)

Check for updates and a downloadable PDF version online at [www.arrl.org/contests](http://www.arrl.org/contests).

## MYSTERIOUS “RIGGERS” SEEN DISMANTLING A TOWER

Spotted at a member's QTH were two Papakura club members caught in the act of dismantling a tower. Earlier on, they had lowered the tower and removed the beam, rotator, and the top mounting section of pipe.

On this trip, they planned to remove the lower tilting section from the main upright. This went to plan and they had the section of pipe off and on the ground within 30 minutes of arrival.

The next and last section to be removed is the main upright, set in concrete, standing around 4 meters or so above the ground.

Rumour has it that a recently purchased crane truck might be used to attempt to remove the concrete block from the ground... hopefully. If not, there will be a lot of chipping away at the concrete by .... TBA.

The photo below shows one of the culprits up the ladder tying up the pipes.



If you spot these two, do not attempt to stop them, instead offer encouraging words, and maybe a hot cuppa. It may help to speed the process along.

## RAMBLINGS FROM THE EDITOR'S DESK

While I've spent a lot less time on the radio, than I expected to (for some reason, I have had a few technical challenges in the Hamshack), I have managed to catch up on some Ham radio news from the Dayton Hamfest. It seems that the world has moved on from the "Pandemic that shall not be named ... (*as we are running out of names*)" to a much more normal world, and in most cases, the new products were few and far between. A few new styles of mounts and adjustments to the odd antenna, with most people stocking up on items that were not easily freighted, or hitting the 2<sup>nd</sup> hand equipment tables for goodies. yet despite that, there was one very unusual product, and it seemed to raise a lot of interest

The ICOM SHF-P1 is not a commercial product, but the concept radio "ICOM SHF Project – Super High Frequency Band Challenge" is the first attempt to develop a dedicated industry product. While hams have experimented with 2.4 and 5.6 GHz bands, mostly this has been with modified internet routers and Wi-Fi equipment, such as the Mesh Networks and this has limited them to digital modes.



Design sketch of the controller

**Covers 2.4 GHz/5.6 GHz,  
All Modes including the DV/DD Modes**

**Antenna Mounted RF Module**

**PoE Power Source for RF Module**

**Advanced Frequency Stability  
with a GPS 1PPS Signal**

**Compact IC-705 Based Controller Design**

**Wide-span Real-time Spectrum Scope**

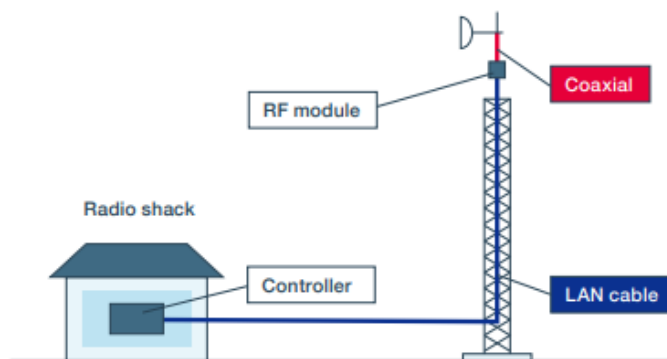


RF Module

Like many other commercial products, the IDU / ODU (Indoor Unit / Outdoor Unit) model is used to reduce coaxial losses and instead uses standardised Structured Cabling to connect the two units. To ensure accurate timing of DV or DD signals, there is a built-in GPS (GNSS) unit to provide accurate frequency compensation.

### PoE Controller to RF Unit Connection

Due to feedline power loss, Icom designed the RF module for an outdoor environment, placing the RF module at the antenna. This design minimizes the length of feedline used, thus reducing the RF loss. So, maximum output power is supplied to the antenna feed point.



By adopting PoE technology, the connection is made with a single cable, providing a more flexible mounting solution for the RF module. Additionally, the PoE technology makes it possible to use a higher voltage, reducing the current needed for a stable power source for the RF module.

### Ultimate Frequency Accuracy and Stability with a Clock Signal from GPS (GNSS)

We have adopted a high-precision 1 Pulse-per-second (1PPS) clock signal from a GNSS (GPS) receiver to enable advanced frequency management. By synchronizing with this reference signal, the OCXO frequency can be compensated with high accuracy.

There is no doubt that the concept is interesting and is designed to allow hams to operate in the allocated bands, which many in the commercial world would rather see turned over to either expand the existing unlicensed spectrum allocations or be used for licensing commercial channels in the spectrum space.

But with the availability of (relatively) cheap external Wi-Fi equipment and software like the AREDN software to convert the units into amateur radio equipment that operates in reserved space for amateur operations.



These can then be used to build a private TCP-IP network (technically an intranet) which can be connected to the network to create a LAN / WAN type interconnected network that can be used to provide communication and data sharing, even if the internet portion was to fail, and conversely, if the local network failed, then traffic can be carried over the internet until the affected node is restored. We have attempted some Mesh networks in the past, and probably should again, but while these will connect amateurs, and allow us to experiment with TCP-IP applications, I wonder if the commercial units would be a blessing or a curse in these frequencies. What is the best use of these SHF bands?

But ... The question that concerned with me was in the reverse.

Why are so many amateur radio tasks dependent on the internet?



I appreciate the value of digital communications, I appreciate the ability to connect to DMR repeaters that are internet linked, and talk to hams around the world, I get that Fusion and D-Star are improved versions of IRLP and echo-link, which are still in use, or All-Star which is the next generation of echo-link, but when I look at applications like SAR-Track, which is extensively used by AREC, I wonder what would happen if a Carrington level event (we discussed solar storms later in the newsletter) disrupted the internet, and we needed to perform some message handling, as the systems were down. Would our equipment still work?

Lately, I have had a personal experience of having to restore a damaged site, after a fire damaged part of my workplace, and this required power to be isolated from the site until repairs could be carried out. The experience of working from generators, solar and battery backed-up systems, and radio hardware, that I gained from field days and other outdoor operations, came to the fore, and we were able to restore limited operations for several days until parts of the building could again get power and lighting back on normal supplies.

With our automated systems, electric doors, access control systems, and lighting all off-line, we had to resort to manual methods to secure doors, Those that had a manual lock could be locked, but the auto glass doors, needed to be secured with rods and wood to prevent the doors being able to be opened. The lack of power also meant the backup batteries had been run down and needed to be recharged, this could be achieved by a power bank, or solar panels, but the batteries had to be connected to a charger (not mains powered) and LED lighting was run of generators, as was the kettle to ensure we could get a warm drink, heating, however, was off the bill, so jackets were the main order of the day, Eventually a 5G cell phone router gave us enough internet to check emails, and connect with staff working off-site. But this was only a single building. How would we have coped with a bigger event?



I did experience one a few years back when the Penrose substation experienced a fire in the underground cables that supplied the Mt Wellington area. In this situation, the large area affected left many sites closed for a week while crews worked to restore power. But even then, it was an isolated event.

We have assumed, perhaps correctly, perhaps not, that major infrastructure can continue to operate in emergencies, possibly because we have not experienced many large area events, despite us being on the ring of fire, we have not experienced a major event that hit multiple cities at the same time, But how long will our luck last?

If there was an Island wide event, how would we cope without power, water, electricity, and sewage? More importantly, how would we, as amateurs, operate without repeaters, or the internet? How about an NZ wide Event?

Are we still improvisers and “jury riggers”, or would we all be better just using a smartphone app, instead of our radio hardware?

It goes without saying that a major event in the internet age is not on the immediate horizon, but I do worry that we might be losing our can-do attitude, and no longer do many of the number 8 wire solutions, we once did, is professionalism such a great thing?



I am not suggesting the internet is evil, *ok maybe Hamsphere is*, my home QTH has an HF noise floor of S8-S9 on a good day, and +20 over 9 on a bad day, so my HF listening on many nets is either via a remote receiver, or a Web SDR receiver, But if the power went off, and noise floor dropped, I could still communicate over HF, VHF and maybe UHF on simplex. I have “go boxes” and battery banks, that can be tossed into the back of a car, along with some wire antennas, or folding units, that would allow me to work all bands, and both portable solar as well as a large capacity system on the Motor home, that would let me travel to a location and take care of myself and my family for days, If we were stuck here, we have enough supplies and water to last for days, Gas for cooking, and I can even burn a fire for heat and cooking in a fire pit, and I’m not beyond a bucket loo in the backyard if required. But how about the rest of us?

The old civil defence guideline was “Could you look after yourself for 3 days”, but as housing food, fuel and electricity prices rise, and supply is under a cloud of doubt as to its long-term availability, is it a good time to get some local resilience back, and take some control over our options? A home vegetable garden and alternative heating options might be a good place to start, but in the age of convenience will we be able to look after ourselves if the systems stop, or will we be hoping that someone else will keep the systems running, and shelves at the supermarket stocked .... and of course, our precious internet running.

It's strange that in the US ham growth is being driven by preppers, and in the post, covid New Zealand, clubs that had closed are starting back up, and new clubs are even being formed. Maybe they understand the value of the tools we have better than we do. Maybe it’s time to shake off the convenience of the remote control, and get some of the old-fashioned do-it-yourself, grab the number 8 wire, and give it a go attitude.

As the world situation seems to get less stable every day, having some options that don’t rely on someone else's network, is starting to look a lot more attractive.

And it's also a good way to save some of the money I would otherwise be spending on things that maybe, I don’t need as much as I thought I did.

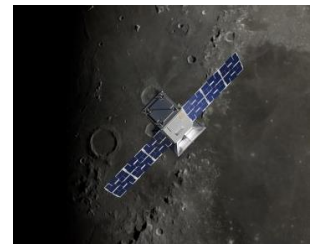
It’s food for thought, If nothing else.

de ZL1NUX

# ROCKET LAB FIRES CAPSTONE SATELLITE INTO SPACE

Californian launch service provider Rocket Lab has successfully fired a pioneering new NASA satellite towards a 'lunar orbit.'

Launched via the firm's 3D printed engine-powered Electron rocket, the microwave-sized 'CAPSTONE' CubeSat is designed to pave the way for humanity's return to the Moon, as part of NASA's Artemis mission. Specifically, the device is set to become the first spacecraft to enter a Near Rectilinear Halo Orbit (NRHO), the planned trajectory of the Gateway outpost being built to support lunar excursions.



Launched from Launch Complex 1 on New Zealand's Mahia peninsula on the 28<sup>th</sup> of June Rocket Lab Founder and CEO, Peter Beck congratulated all involved and said. "Rocket Lab was founded to open access to space and enable ground-breaking missions like this that push the limits of what's possible with small satellites."

NASA's Cislunar Autonomous Positioning System Technology Operations and Navigation Experiment or 'CAPSTONE' satellite has been built to facilitate the Artemis mission. For those unfamiliar, the program's primary goal is to return humans to the Moon for the first time since 1972 and set up a base on the celestial body's surface.

Built by Tyvak Nano-Satellite Systems, the CubeSat will do so by trialling NRHO, an orbit that'll see it pass as close as 3,000 km and as far as 70,000 km from the lunar surface, in a way that enables it to get caught between the Earth and Moon's gravitational forces and rotate in tandem with the latter, keeping it in position.

CAPSTONE's primary objective is to test and verify the calculated orbital stability of a Near Rectilinear Halo Orbit around the Moon, the same orbit planned for Gateway. NASA's Gateway is a small space station that will orbit around the Moon to provide astronauts with access to the lunar surface. It will feature living quarters for astronauts, a lab for science and research and ports for visiting spacecraft. CAPSTONE will also test a navigation system developed by Advanced Space that will measure its absolute position in cislunar space using interaction with NASA's Lunar Reconnaissance Orbiter without relying on ground stations for navigation support.

CAPSTONE is one of the first steps to learn how to operate more robust missions in this unique orbit, thus laying the groundwork for future exploration of our solar system.

Having now fired its internal engines, CAPSTONE is now travelling towards the Moon at 24,500 mph, setting it on a ballistic lunar transfer that's expected to take four months. With the help of the Sun's gravity, it's anticipated that the CAPSTONE satellite will go as far as 963,000 miles from Earth, before being pulled towards the Earth-Moon system, in a sinuous track that follows deep space gravitational contours.

Those interested in following the CubeSat's journey can do so via [NASA's Eyes on the Solar System real-time 3D data visualization tool](#), sometime in the next week or so.

Learn more about the CAPSTONE mission:

- <http://www.rocketlabusa.com/missions/lunar/>
- [www.nasa.gov/directorates/spacetech/small\\_spacecraft/capstone](http://www.nasa.gov/directorates/spacetech/small_spacecraft/capstone)
- <https://nasa.tumblr.com/post/683165720838864896/capstone-testing-a-path-to-the-moon>

## Contests

### RETURN OF THE ZL SPRINTS.

Thanks to Mark ZL3AB for resurrecting the Winter Sprints, a quick, friendly way to have fun on a winters evening. Great for new testers to try out too. See summary below and check out the full rules on the NZART Contests website.

#### 1. Objects:

- For amateur radio stations to contact as many other amateur radio stations as possible within the 1 hour time limit
- To improve operator skills
- To have fun!

#### 2. When: Each Tuesday from 2 August to 30 August 2022 0800-0900 UTC (2000-2100 NZST):

- 0800-0829 UTC (2000-2029 NZST) CW only
- 0830-0859 UTC (2030-2059 NZST) SSB only

#### 3. Band: 80 m

### IARU HF CHAMPIONSHIP

IARU HF Championship 9/10 July 2022 is one of two international contests where Member States HQ stations are active. After a fantastic effort in BERU, Jacky ZL3CW is again running the ZL6HQ callsign. This time he's looking for operators to assist, enabling multiple bands to be active simultaneously. If interested, please contact Jacky via email (good on QRZ.com).

### REVIEW OF 2 M/70 CM BAND PLAN

The review of the 2 m/70 cm Band Plan is progressing well, and remember if you have any input, please make your view known to Warren Harris ZL2AJ. Details are on the NZART Website.

### CONFERENCE REGISTRATIONS:

A reminder conference registrations close Monday 8 August 2022. After this date a \$50.00 late fee will be required.

Please ensure when registering that you complete the registration form that can be found on the NZART Conference web site, or in your latest Break-In.



## CALL BOOK 2022/2023

NZART Council at their meeting in June, has made the decision that a Call Book will NOT be produced this year. This decision was based on the current deficit NZART is running for the 2022 Financial year.

NZART this year, has financially supported the District Plan Review in Porirua which required a substantial investment of funds. NZART Council agreed to this investment, as if Porirua had followed the Kapiti District Councils outcome, amateur radio in Porirua would be severely curtailed.

NZART Council believe that other Wellington region-based District Councils would look to Porirua's outcome and then use it for their own.

By standing against the Porirua District Plan and receiving a much better outcome, the whole of the Wellington Region has benefitted. This includes Wellington City, Lower and Upper Hutt cities, and the Wairarapa Councils. Titahi Bay Branch 42 has also contributed as much as possible, financially to the process, the costs were clearly beyond their ability to pay the full amount.

To ensure that members are not disadvantaged by this decision, the repeater maps and beacons will be re-produced via the NZART web site and where possible in Break-In. This will also include Branch and Club listings, also within Break-In where there is space to do so. This decision was to use NZART funds in this way was also signed off by NZART's Treasurer.

## SIGNS OF THE TIMES?



## NASA'S SOLAR FORECAST IS TURNING OUT TO BE WRONG. THIS TEAM'S MODEL IS STILL ON TRACK.

Solar cycle 25 kicked off last year. Forecasters thought it would be a mild one, but it's turning out to be quite the opposite. From its onset, this solar cycle has been steadily outpacing predictions, producing more sunspots and spewing way more solar wind, flares and eruptions than the world's leading experts predicted. But while most space weather scientists are scratching their heads, saying "We still know very little about our star," one heliophysicist has become the dark horse in space weather forecasting. His model of the sun's behaviour seems to have gotten it right.



### The two forecasts

Cycle 24, which officially ended in December 2019 but overlapped with the ensuing cycle 25 for quite a while, was one of the weakest on record. When a group of experts from NASA and the National Oceanic and Atmospheric Administration (NOAA) came together to estimate the sun's activity for cycle 25, they predicted that the upcoming cycle would be just as weak.

But at about the same time, another forecast came out. Put together by a team led by Scott McIntosh, a solar physicist and deputy director of the U.S. National Center for Atmospheric Research, this forecast predicted the exact opposite: that cycle 25 might be among the stronger ones in recorded history.

"We looked back over 140-plus years of data about the sun's magnetic activity and its relation to the number of sunspots," McIntosh said "And there was a pattern that shaped how large or small the upcoming sunspot cycle was going to be. We predicted the same pattern to take place before solar cycle 25. Based on that, we made a wild scientific guess that cycle 25 could possibly be as high as double the amplitude of cycle 24."

The team published their predictions in the journal *Solar Physics* in November 2020. Since then, while experts at NOAA and NASA were puzzled, McIntosh and his colleagues watched the sun do exactly what they expected.

For example, whereas NOAA and NASA predicted a meager 27 sunspots for December 2021, the sun produced 67 — more than double the estimate. And in May 2022, instead of the 37 sunspots predicted by NOAA and NASA, there were 97, producing solar flares and coronal mass ejections. The intense solar activity also caused geomagnetic storms on Earth, wreaking havoc on satellites in orbit and triggering magnificent auroral displays.

The official forecast for the peak of the solar maximum, which is expected in April 2025, is 115 sunspots that month. But if the curve follows the current trend, which reflects McIntosh and his team's forecast the sun will easily reach 115 monthly sunspots by the end of this year and peak two years later at over 210 monthly sunspots.

"It's really wild that the sun continues to do this," McIntosh said. "Month after month, it continues to follow the track. But we'll see. The sun sometimes does weird things, and the cycle could completely fall over tomorrow."

Tzu-Wei Fang, a space scientist at NOAA's Space Weather Prediction Centre, agrees that the official solar cycle forecast is not working out and admits that scientists' current understanding of the factors driving the sun's behaviour is rather limited.

"We don't know what is driving this strong solar activity," Fang said. "The sun's behaviour changes based on different cycles, from short cycles of 11 days to long cycles of 80 years. There are still a lot of unknowns, and we just don't have enough data points or knowledge to accurately predict solar activity."

## The Hale cycle

So on what, exactly, do McIntosh and his colleague base their "wild scientific guess"? The team studied the relationship between the roughly 11-year cycle of sunspot generation and the so-called Hale cycle, a 22-year cycle of magnetic activity during which magnetic waves of opposite polarity move from the sun's poles toward the equator, where they eventually meet and cancel each other out.

The Hale cycle, discovered in the early 20th century by American astronomer George Ellery Hale, is likely driven by the so-called solar dynamo, the motion of molten material in the sun's core that generates the sun's magnetic field. The Hale cycle encompasses two sunspot cycles, with the magnetic poles of the star swapping when each sunspot cycle ends. The Hale cycle concludes after 22 years, when the magnetic field returns to the original state.

McIntosh and his colleagues think the interference of the magnetic waves during the Hale cycle drives the creation of spots on the sun's surface.

"Since about a decade ago, we've been tracking the evolution of the Hale cycle," McIntosh said. "Once you know what you're looking for, you can go back all the way to 1860 and extract those features from observations right at the dawn of photography."

The scientists modelled the progression of the magnetic cycle and compared it with historical observations of sunspots. They found a corresponding pattern: At the beginning of every new 11-year cycle, sunspots appear at solar midlatitudes and only later start springing up nearer and nearer to the equator, which matches the motion of those magnetic waves.

"It takes (*the magnetic waves*) about 19 years to reach the equator, but when they meet, then literally over the course of a few months, the sun goes from having (*sunspot*) activity at the equator to having nothing," McIntosh said. "And when it goes to having nothing, then new activity springs into life at midlatitudes and a new sunspot cycle starts."

## The "terminator"

This "meeting in the middle" is when the opposing magnetic fields neutralize each other. The event seems to terminate the previous solar cycle and kick-start the new one, leading scientists to nickname the event "the terminator." Exactly how this terminator event occurs seems to have particular importance for the strength of the next solar cycle, McIntosh said.

"We first spotted (*the terminator*) about nine years ago," McIntosh said. "And when we looked through the 140 years of data, we were able to make crude measurements of these terminator events at the equator and measure the overlap of the magnetic systems. When you plot that against the upcoming cycle strength, you get a very strong linear relationship."

The data seemed to suggest that the more time between the terminators, the weaker the next solar cycle.

The terminator between solar cycles 24 and 25 was a bit delayed, McIntosh said; solar cycle 24 didn't seem to want to go away. The event finally occurred in December 2021, which enabled McIntosh's team to finalize their solar cycle forecast.

"It will be just above the historical average with a monthly smoothed sunspot number of  $190 \pm 20$ ," McIntosh told Space Weather Archive in February.

Fang, however, cautions that it's too early to make conclusions about the current solar cycle.

"The fact that we have a strong solar activity now doesn't mean that we are certainly looking at a much higher solar cycle," she said. "It still requires some work for scientists before we can make that conclusion."

## The Satellite Problem.

In late 2021, operators of the European Space Agency's (ESA) Swarm constellation noticed something worrying: The satellites, which measure the magnetic field around Earth, started sinking toward the atmosphere at an unusually fast rate — up to 10 times faster than before. The change coincided with the onset of the new solar cycle, and experts think it might be the beginning of some difficult years for spacecraft orbiting our planet.



In the last five, six years, the satellites were sinking about two and a half kilometres [1.5 miles] a year, but since December last year, they have been virtually diving. The sink rate between December and April has been 20 kilometres [12 miles] per year.

Satellites orbiting close to Earth always face the drag of the residual atmosphere, which gradually slows the spacecraft and eventually makes them fall back to the planet. (They usually don't survive this so-called re-entry

and burn up in the atmosphere.) This atmospheric drag forces the International Space Station's controllers to perform regular "reboost" maneuvers to maintain the station's orbit of 250 miles (400 km) above Earth.

This drag also helps clean up the near-Earth environment from space junk. Scientists know that the intensity of this drag depends on solar activity. Denser air means higher drag for the satellites. Even though this density is still incredibly low 250 miles above Earth, the increase caused by the upwelling atmosphere is enough to virtually send some of the low-orbiting satellites plummeting.

It's almost like running with the wind against you, it's harder, it's drag so it slows the satellites down, and when they slow down, they sink. ESA's Swarm satellites are not the only spacecraft struggling with worsening space weather. In February, SpaceX lost 40 brand-new Starlink satellites that were hit by a solar storm just after launch. In such storms, satellites suddenly drop to lower altitudes. The lower the orbit of the satellites when the solar storm hits, the higher the risk of the spacecraft not being able to recover, leaving operators helplessly watching as the craft fall to their demise in the atmosphere.



Many of these new satellites don't have propulsion systems, which means, they can't be pushed into a higher orbit. That basically means that they will have a shorter lifetime in orbit. They will re-enter sooner than they would during the solar minimum.

By coincidence (or beginner's luck), the onset of the new space revolution came during that sleepy solar cycle. These new operators are now facing their first solar maximum. But not only that. The sun's activity in the past year turned out to be much more intense than solar weather forecasters predicted, with more sunspots, more coronal mass ejections and more solar wind hitting our planet.

## **The Ham Radio Perspective.**

Amateur Radio operators who use HF generally like increased sunspots because they correlate with better worldwide radio propagation. When there are more sunspots, the sun puts out radiation that charges particles in the earth's ionosphere. Radio waves bounce from (refract from) these charged particles, and the denser these clouds of ions, the better the HF propagation.



When the ionosphere is denser, higher frequencies will refract off it rather than passing through to outer space. This is why every 11 years or so when this activity is higher, 10 meters gets exciting. 10 meters is at a high enough frequency, right near the top of the HF spectrum, that radio waves propagate very efficiently when the sunspot count is high. Because of the shorter wavelength, smaller antennas are very efficient on this band, so mobile stations running low power on 10 meters can communicate world wide on a daily basis when the sunspot cycle is at its peak. There are also seasonal variations, and 10 meters tends to be best near the spring or fall equinox. If the ionosphere is not so dense, the Maximum Usable Frequency may be below 10 meters, and perhaps only signals with frequencies as high as 15 meters or below will propagate.

Other solar activity of concern to HF operators are solar flares and coronal holes, which emit protons. Since the charged ions in the ionosphere are negative, a blast of protons from the sun can neutralize the charge and make the ionosphere less refractive. These waves of protons can be so intense that they may trigger an event called a geomagnetic storm. In addition, energy from a solar flare may energize the D-layer of the ionosphere, which absorbs radio waves.

While sunspots have been higher, the geomagnetic effects have been brutal on the ionosphere and solar storms have wrecked havoc with the ionosphere in recent weeks. In fact, a G1-class geomagnetic storm hit the Earth last Saturday, causing bright auroras over Canada. The only problem is that nobody saw this storm coming until it was quite late.

Solar scientists have been watching the skies with anticipation of solar activity after a sunspot grew enormously earlier last week, and then a huge coronal mass ejection (CME) was spotted on the solar surface. A big solar storm was expected due to the latter, but scientists were not very sure if it was heading towards the Earth.

After a long two-day wait, no worrisome geomagnetic activity was noticed, and solar scientists may have breathed a sigh of relief. But the recent report showed that even after watching the solar surface so closely, our Sun is full of surprises and, from time to time, throws us a curve ball.

## **How bad was the geomagnetic storm?**

According to the Newsweek report, the geomagnetic storm was predicted by the Space Weather Prediction Center (SWPC) of the National Oceanic and Atmospheric Administration on the evening of June 25. The space weather prediction agency also said that the storm would last through the night and into the morning.

The SWPC predicted the geomagnetic storm to be of G1-class, the lowest classification in terms of power and impact of the storm. A G5-class is the highest classification of a geomagnetic storm that we have so far.

A G1-class geomagnetic storm carries risks such as an impact on satellite operations and power grid fluctuations. However, due to the relatively weaker intensity of the storm, the impact of the risks is also lower. Energy transfers during such events also produce some beautiful auroras that are visible in the night sky, and astronomers told Newsweek that they observed auroras in Calgary, Alberta.

## **What caused the geomagnetic storm?**

Even as the geomagnetic storm made little difference other than the shimmering natural lights, it also set astronomers looking through their data for what could possibly explain how they missed spotting such an event earlier.

At first, the scientists were looking for occurrences of CMEs that may have gone unnoticed. However, further analyses showed that the geomagnetic storm was caused by a rare and harder-to-spot phenomenon called the co-rotating interaction region (CIR) of the Sun.

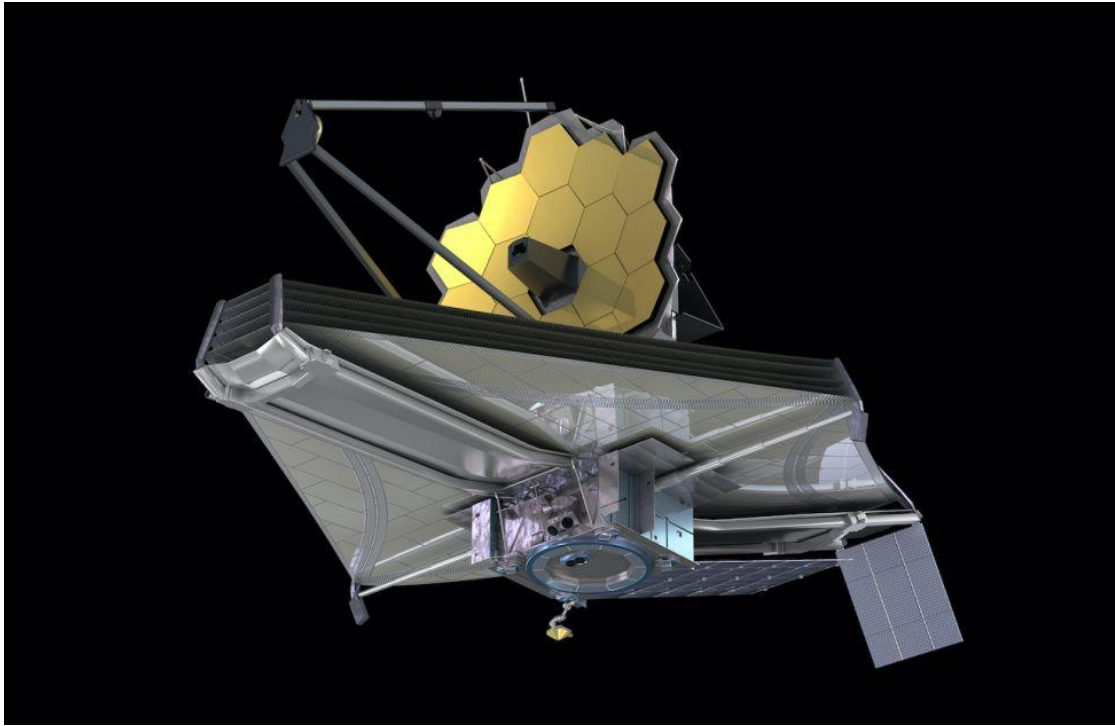
According to Spaceweather.com, a CIR is a transition zone between the slow and fast-moving streams of solar wind. These zones can also cause build-ups of plasma which have intensities of a CME, but they are not accompanied by the formation of a sunspot. Since space weather predictions largely look at sunspots, this geomagnetic storm was missed until late and hit the Earth at 1.57 million miles (2.52 million km) per hour. This is more or less in the region of how CIRs hit, Live Science said in its report.

The incident reinforces the need to keep looking at our Sun using a variety of techniques, especially when it is going through an active phase of its solar cycle, as a Carrington-like event (a G4 or G5 storm) could be really devastating today on satellites, power grids and even earth based electronic equipment.

IF the “Really Gig One” does come. Will we, or our system, be ready?

## **JAMES WEBB PHOTOS ARE JUST WEEKS AWAY.**

The days are ticking away before NASA's massive new observatory shows us the cosmos as we've never seen it before.



NASA, in partnership with ESA (European Space Agency) and CSA (Canadian Space Agency), will release the James Webb Space Telescope's first full-color images and spectroscopic data during a televised broadcast beginning at 10:30 a.m. EDT (14:30 UTC) on Tuesday, July 12, from NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Released one by one, these first images from the world's largest and most powerful space telescope will demonstrate Webb at its full power, ready to begin its mission to unfold the infrared universe.

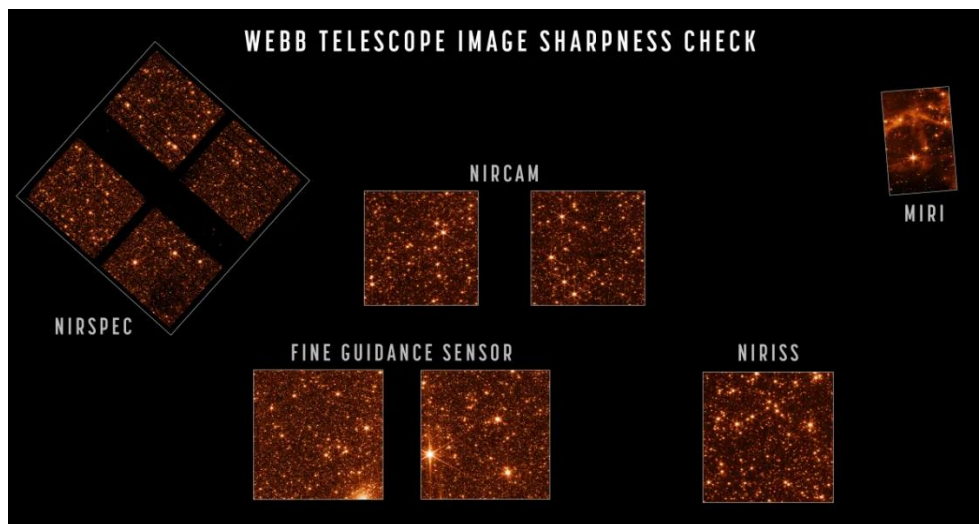
Each image will simultaneously be made available on social media as well as on the agency's website on this page.

Embargoed access to Webb's first images will not be available prior to their public release.

### **What should we expect from JWST's first images?**

By now, you might've seen a few preliminary JWST pictures. I know I've spent quite a bit of time musing about them. But they're not exactly the scope's "first images."

In short, NASA has to get through a total of 17 testing "modes," which can be thought of as checkpoints, prior to booting up the telescope. And as the agency has been making its way down the list, we've been blessed with a bunch of luminescent, red-orange peeks into JWST's eventual vision.



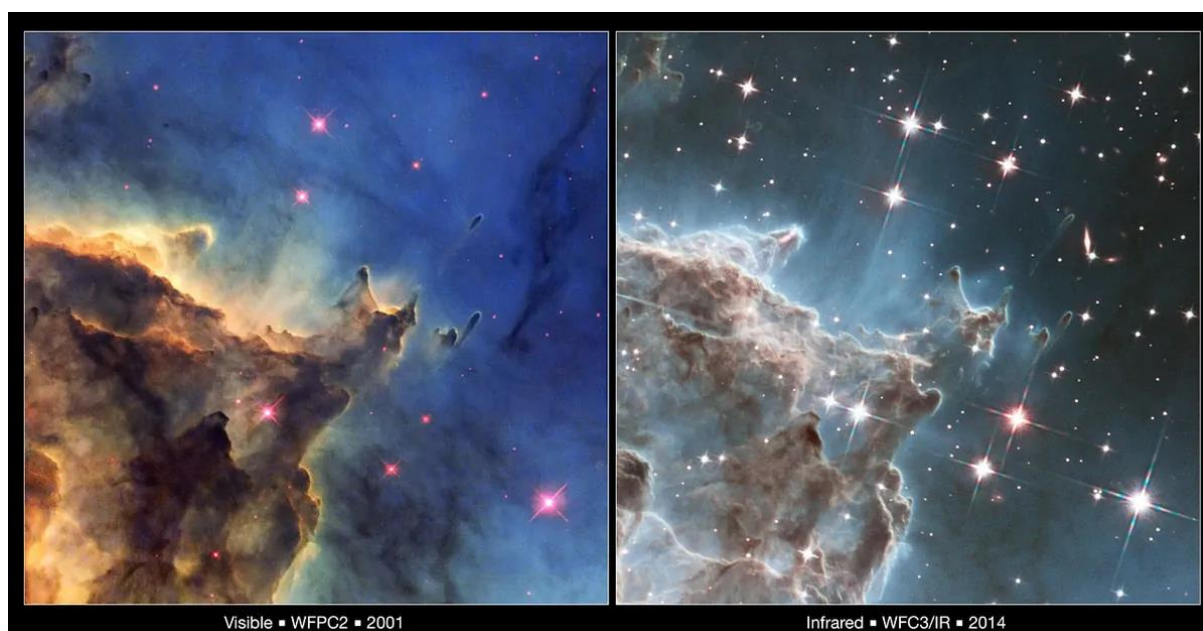
However, these are pretty much the products of calibrating all the telescope's instruments not the finalized, highly anticipated conglomerate images scientists are calling JWST's "first light."

But in a press conference held on Wednesday, NASA members who've already caught a glimpse of JWST's true first light said they were absolutely blown away and moved to tears. "What I have seen moved me, as a scientist, as an engineer and as a human being," Pam Melroy, NASA's deputy administrator, said.

In general, I'd argue that scientists are so enthralled by JWST simply because we don't know what to expect. That's kind of the point. This telescope is often headlined as "trailblazing" and "groundbreaking" because it's built to find things in the universe we might've never thought existed and answer questions about the evolution of time we didn't know to ask.

It's all because JWST operates very differently than other high-tech telescopes, including Hubble. It uses what's known as infrared imaging to show us a region of the universe we can't see with our naked eye -- and even Hubble can't see with its ultra-powerful lens.

The possibilities are endless, but they'll begin to spool out on July 12. Until then we can only look at some of hubble's images, and wonder just what we might see on the 12<sup>th</sup>. Only then will we see what the 10 Billion dollars (US) is able to show us.





## GENERAL NEWS

### HAMILTON AMATEUR RADIO CLUB MARKET DAY

- Date: Saturday 20 August 2022
- Venue: Gordonton Hall
- Address: 1024 Gordonton Road SH 1B
- Vendors: Access from 8:00 am
- Opens: Selling commences 10:00 am
- Fee: \$2.00 entry/raffle
- Contact: Robin ZL1IC (021 127-9998)
- Call In: 146.525spx

### CAN YOU HELP?

I am looking for any Morse code key collectors amongst you, can you please contact me. I am looking for a NZ-made AKRAD or ULTIMATE Morse key. I am happy to purchase or to exchange for a British Bathtub key.

Regards, Herman Willemsen VK2IXV

email: [hermanusw@gmail.com](mailto:hermanusw@gmail.com)

+61 434 510 308



## SOME NETS – FOR WHEN YOU ARE LOOKING FOR SOME COMPANY

Day	Time (Local)	Freq (MHz)	Group
Sunday	08:00	3.750	Southern Net
	09:00	3.700	Bch 10. Franklin.
	09:15	3.755	Bch 65. Papakura.
	16:00	7.125	SPAM Net (AM Mode)
	19:00	146.625	YL Net
	20:00	3.710	Bch 42. Titahi Bay
	21:30	3.595	Duran WIA Net.
Monday	19:30	3.757	Bch 12. Hamilton
	20:00	3.540	CW Practice Net
	<i>updated</i> 20:00	3.605	Br 80. Hibiscus Coast
	<i>updated</i> 20:00	Nat System	W.A.R.O
	20:30	3.870	O.T.C (Old Timers Club)
Tuesday	09:00	7.096	Ex Post Office Techs
	21:00	1.850	160m Net _ Ron ZL4JMF
	19:30	3.690	QRP ZL2BH
	20:00	3.581	CW improvers Net
Wednesday	20:00	3.660	Geek Net
	20:00	3.645	Bch 02. Auckland
	20:00	3.745	Bch 84. Bay of Islands
	20:30	146.525	W.R.S.C
Thursday	09:00	7.096	Ex Post Office Techs
	19:30	3.690	QRP ZL2BH
	20:00	3.540	CW Practice Net
	20:00	3.615	Bch 89. REG Net
	20:30	3.696	ZL10A
	20:30	3.666	LF Net ZL2CA
	20:00	3.690	ZL QRP SSB Net
Friday	20:00	3.850	SPAM (AM Mode)
	20:30	3.650	W.S.R.C.
	20:30	3.560	Digital Modes Net
Saturday	10:30	28.530	10-10 Down Under
	19:30	3.650	Christian Fellowship
	20:00	3.760	???
	20:30	3.600	Ch 62. Reefton/Buller
Daily or Other	07:30	3.696	ZL20A
	08:30	3.730	ZL3RP
	15:00	14.300	Pacific Seafarers
	17:30	3.760	Home Brew
	05:00 Zulu	14.183	ANZA DX Net
	18:00	7.115	VK7OB
	19:30	3.720	ZL1MO
	18:30	3.766	ZL3LE
	08:30/20:00	3.730	ZL3RP
	20:30	3.725	ZL2HN / ZL4RF
	21:00	3.677	Counties Net ZL2MA
	21:00	3.535	New Zealand Net (CW)

This is designed to be a living list, Please update whenever you are able:

Also: Calling Frequencies: Courtesy of Murray ZL1BPU	Daily	Sunset-Sunrise	3580 USB	NZ FSQCall
	Daily	Sunrise-Sunset	7105 USB	NZ FSQCall
	Daily	24/7	7104 USB	International FSQCall

I'm told the last of these sees some amazing DX, especially around sunset.

**Papakura Radio Club Inc.**  
**Branch 65 NZART Club Directory 2017**  
 Wellington Park, 1 Great South Road.  
 PO BOX 72-397 Papakura 2244  
 PHONE 09 296 5244  
**Westpac 03-0399-0019896-00**  
**Club website:** <http://www.qsl.net/zl1vk>  
**Club email:** [zl1vk.club@gmail.com](mailto:zl1vk.club@gmail.com)

**Elected Officers**

<b>President</b>	ZL1NUX	Gavin Denby	021 459 192
<b>Vice President</b>	ZL1BNQ	Richard Gamble	021 729 270
<b>Secretary</b>	ZL1AOX	Ian Ashley	021 198 1810
<b>Treasurer</b>	ZL1MR	David Wilkins	021 185 7903
<b>Committee</b>	ZL1DK	David Karrasch	021 560 180
	ZL1IRC	Ian Clifford	021 082 48400
	ZL1ASN	Rolly Adams	021 042 7760
	ZL1RAH	Rodger Hanson	027 568 7659
	ZL1RIC	Ricky Hodge	027 533 8155
<b>AREC Section Leader</b>	ZL1BNQ	Richard Gamble	021 729 270
<b>CD Liaison</b>	ZL1AOX	Ian Ashley	021 198 1810
<b>Newsletter Editor</b>	ZL1NUX	Gavin Denby	021 459 192
<b>Hall Custodian</b>	ZL1AOX	Ian Ashley	021 198 1810
<b>Newsletter.</b>	Contact:	<a href="mailto:zl1nux@outlook.com">zl1nux@outlook.com</a>	

Our newsletter is published monthly and normally distributed just before the club meeting. Please forward articles etc to the editor Wednesday 1 week before the general meeting. Please notify any change of address. Including E-Mail Address to the secretary.

**Meetings**

General Meetings are held at the Clubrooms on the 1st Wednesday of each month, starting at 7.30 pm. Look at your calendar and mark these nights. The speaker follows the General Meeting.

Project Evenings are on the 4th Wednesday of each month.

Committee Meetings are held on the 3rd Wednesday of each month at 7.30 pm unless advised.

Activity Nights are held on the 2nd Wednesday starting at 7.30 pm.

AREC Meetings are on the 5th Wednesday night, also starting at 7.30 pm

**AGM:** Held in November

**Subscription:** Full membership and newsletter \$25.00  
 Family Membership and newsletter \$40.00

**Bank Account number: 03-0399-0019896-00**

**Working Bees** As required.

**Branch 65 21 Award:** For contacts with ZL1VK (5 Points) and 8 Papakura Radio Club Members (2 Points each) after January 2011. Total 21 Points. Cost \$5-00. Certified list and \$5-00 to Secretary, Papakura Radio Club. Address above.

**ZL1VK Club Nets**

146.900 MHz Sunday at 8.30 am. Controller ZL1NUX, Gavin Denby. If the repeater is not available, listen 146.475MHz simplex.

3.755 MHz Sunday at 9.15 am. Controller ZL1BNQ Richard Gamble. (Linked to 146.675 & 438.775)