

Ham Hum

March 2018



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



Next Meeting
21st March : 7:30pm
Gary on Disasters

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From the Editor

If you use any repeaters or beacons belonging to the Waikato VHF Group, you are welcome to help keep them running by sponsoring them. See <http://www.zl1is.info/sites.html> for more details.

Propagation de K7RA

10 March, 2018

Only one day (March 2) showed any sunspot activity over the past reporting week, with a daily sunspot number of 11 so average daily sunspot activity declined from 6 to 1.6. Average daily solar flux went from 68.3 to 67.6. No sunspots have been seen since March 2.

Geomagnetic indicators were quiet, with average planetary A index dropping from 10.4 to 5.1, and mid-latitude A index from 7.4 to 4.6.

Predicted solar flux is 68 on March 9-15, 70 on March 16, 72 on March 17-29, 70 on March 30, 68 on March 31 through April 11, 70 on April 12, and 72 on April 13-22.

Predicted planetary A index is 12 and 10 on March 9-10, 5 on March 11-16, then 15 and 18 on March 17-18, 5 on March 19-20, then 12, 18, 10, 5, 8 and 20 on March 21-26, 5 on March 27-29, 8 on March 30-31, then 5 on April 1-3, 8 on April 4-5, 5 on April 6-9, then 10, 12, 12, 15 and 18 on April 10-14, 5 on April 15-16, then 12, 18, 10, 8, 5 and 20 on April 17-22.

Geomagnetic activity forecast for the period March 9 to April 3, 2018 from F.K. Janda, OK1HH.

"Geomagnetic field will be: Quiet on March 12-13, 20, 29, April 1-2
Mostly quiet on March 9, 19, 24, 28, 30-31, April 3 Quiet to unsettled on March 10-11, 14-15, 19, 23, 25, 27 Quiet to active on March 16, 21-22 Active to disturbed on March 17-18, 26

"Amplifications of the solar wind from coronal holes cannot be predicted for the period before March 10, but I do not expect any significant upsurge. Then solar wind will intensify on March (10,) 16-18, (19-20, 25-26, April 3).

Regular contributor David Moore shared this Science Daily article

with us concerning how magnetic waves heat the Sun's atmosphere and propel solar wind:

<https://www.sciencedaily.com/releases/2018/03/180306093302.htm>

From Jon Jones, N0JK:

"I went out fixed mobile on 10 meters early Sunday afternoon around 1900z March 4 in the ARRL DX SSB from eastern Kansas. 1/4 wave whip with 5 watts. Didn't expect much on 10 with the SFI of only 68, but was pleasantly surprised with good conditions on 10.

"Sometimes the solar flux numbers don't correlate well to the actual ionization. Both TEP to deep South America and one hop F2 skip to the Caribbean and northern South America was in. PJ4G, FM5AN and 8P5A were up to an honest 40 dB over S9. They were loud!

"Skip zones were very evident with others closer or further away much weaker.

"Saw Hawaii spotted to the west coast, no copy here. K6IJ in northern California said the Hawaiian stations were very loud. Shortest F2 heard was C6. Kudos to PZ5K for pulling my weak signal out of the noise. Ended up with 14 contacts in 11 countries."

Jon sent this on March 8:

"Along with improved conditions on 10 meters March 4 in the ARRL DX SSB contest, on March 8, 6 meters opened for afternoon TEP across the geomagnetic equator between the Caribbean, Central America to deep South America starting around 2200z. Contacts were made using CW, SSB and the new FT8 digital mode. SFI 67, SSN = 0, K = 1."

This week I am not sure what Dr. Tamitha Skov means by "solar storms." I don't see any geomagnetic effects, at least since January 27:

<http://services.swpc.noaa.gov/text/daily-geomagnetic-indices.txt>

The latest from Dr. Skov:

"This week finds me knee-deep leading the Space Weather Certification Committee for the American Meteorological Society.

We've made some real headway this week and I wanted to share the good news. The committee has decided to focus its efforts on establishing a broadcast certification for getting information out to the public, instead of going for a science-related, but more technical consulting certification for industry. This means we put YOU first!

"I couldn't be more thrilled with this decision. We are now free to concentrate on finding ways to train meteorologists and give them the tools they need to bring Space Weather into our living rooms. I

have you to thank for keeping me honest and inspired as we continue building the future. We still have a long way to go, but today it feels like we are one step closer to the Sun.

"This week's forecast finds amateur radio operators disappointed at the dimming of old region 2699. We had hoped it would stay bright and boost the solar flux, but instead it has retreated back underneath the surface of the Sun. This means HF radio propagation remains poor. As a consolation, the Sun has launched several solar storms, including one that is Earth-directed.

"Along with some fast wind we are expecting over the next few days, this could bump us up to storm levels and bring us some more aurora, especially at high latitudes.

"Cheers, Tamitha!"

<https://www.youtube.com/watch?v=JPrusKIVV-M>

Sunspot numbers for March 1 through 7, 2018 were 0, 11, 0, 0, 0, 0, and 0, with a mean of 1.6. 10.7 cm flux was 67.2, 67.8, 67.8, 67.5, 67.6, 67.6, and 67.8, with a mean of 67.6. Estimated planetary A indices were 6, 4, 6, 6, 5, 5, and 4, with a mean of 5.1. Estimate mid-latitude A indices were 5, 3, 5, 7, 5, 4, and 3, with a mean of 4.6.

For Sale:

Satellite dish, petal type, C Band at present. Complete with mount. In very good order as has been power coated and all stainless steel nuts & bolts etc. before it was installed.

Available to view in Flagstaff, Hamilton. Could easily be moved in one piece locally on a trailer.

Offers wanted

Russell Richardson

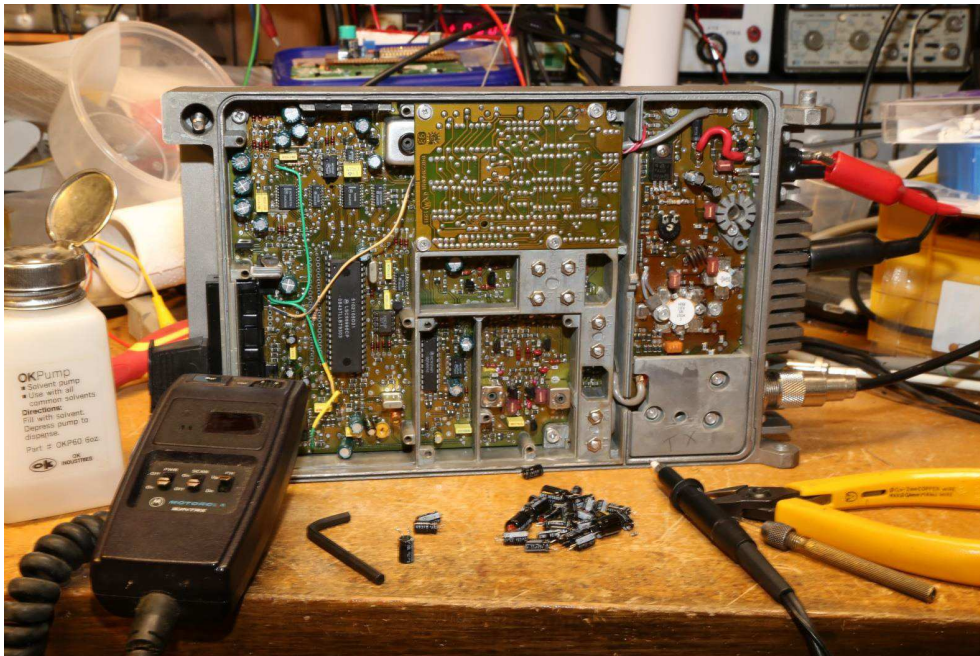
Phone 07 854 3801

Email: russell@rrichardson.nz

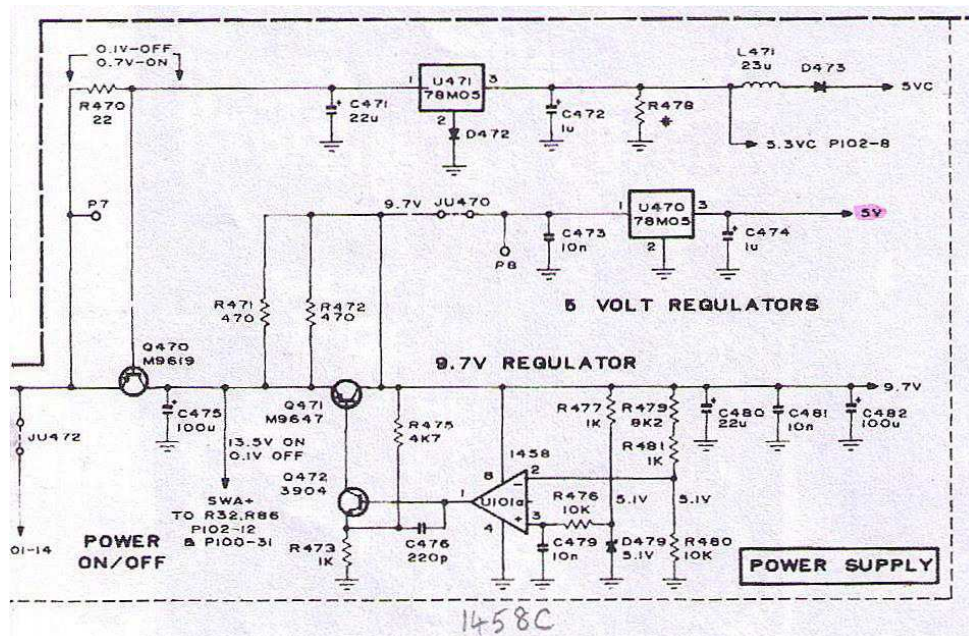


VK3RLP Repeater Repairs

The call went out, the repeater is dead, the repeater is dead – Long live the repeater.



Well if that call did Tx, all would be well, but it wasn't, as in no call was get-



ting out. Looking at the front panel of the repeater, one could see it was receiving, but there was no retransmission occurring. At the same time the local monitoring speaker was also silent – no audio at all.

Now at the basic component level the complete repeater system consists of 4 parts, the repeater itself, a power supply, a diplexer, and the antenna. Along with several connecting cables that one should never forget, (the TX to diplexer cable being the last fault we had). Whilst the repeater appeared powered, was it receiving the proper regulated and filtered 13.80 VDC it was expecting, yes. (The second last fault was the power supply). Using the manual TX switch on the repeater caused no transmission, monitoring the power supply suggested no extra power for a Tx session was being drawn either.

So the repeater proper was removed from the 19 inch rack/cabinet it lives in and opened up on the club room bench. The repeater has 3 parts, a transmitter, a receiver, and a controller. On the back of the repeater the club has added two extra boxes, those being a sub-audible tone generator & a voice ident module – basically a digital tape recorder that plays ident messages.

The transmitter & receiver are basically identical Motorola Syntrix plus radio's. Whilst both are capable of either transmitting or receiving, they only ever perform the one function, never the other way around. I thought this rather wasteful, as basically half of each radio is never used. However from Motorola's manufacturing perspective, easier, as they can just drop in two off the shelf radios and all the RF functionality is sorted.

Whilst we appeared to have two faults, no Tx & no Rx audio monitor, I settled on the Tx fault.

On the Tx radio, the PTT function shares the same input pin as the transmit audio. On the controller a NPN transistor basically pulls the transmitter radio's PTT low. Trouble was the PTT line was only measuring about half a volt. Now it would be nice if the circuit diagram mentioned the voltages to expect here, unfortunately it didn't, all we could see as a guide was a pair of 220K resistors pulling that line up to 5V. Also unfortunately the circuit board overlay diagram had been photocopied poorly and you could barely read it. External pins etc. were ok, but finding resistors among the track work was another story. Bruno VK3BFT thought he had found one of the pull-ups, but I could not verify it with a multimeter, and that said resistor also did not have 5V on it, so I had my doubts. At that time it was getting rather late, so we called it a day, with Bruno trying to talk me into coming back next Friday.

The next day, I thought I'd do better on my own at home, so I went back to the club rooms and took just the transmitter radio home. I knew I had a Syntrx microphone, so I was hoping that would be sufficient to make the radio work alone, free of the repeater controller etc.

On my bench (the opening photo) the radio behaved identically to what was happening at the club rooms – this was good, as it indicated I had the faulty bit, and the fault was not back in the repeater controller, or power supply.

After much hair tearing and PCB track chasing, I found myself back at the same resistor Bruno had identified, he was correct (of course), not sure why the multimeter did not agree, maybe it was partly to do with my 54 year old eyes and surface mount components. One of the reasons I took it home was so I could spend time with magnifying glasses and no distractions to

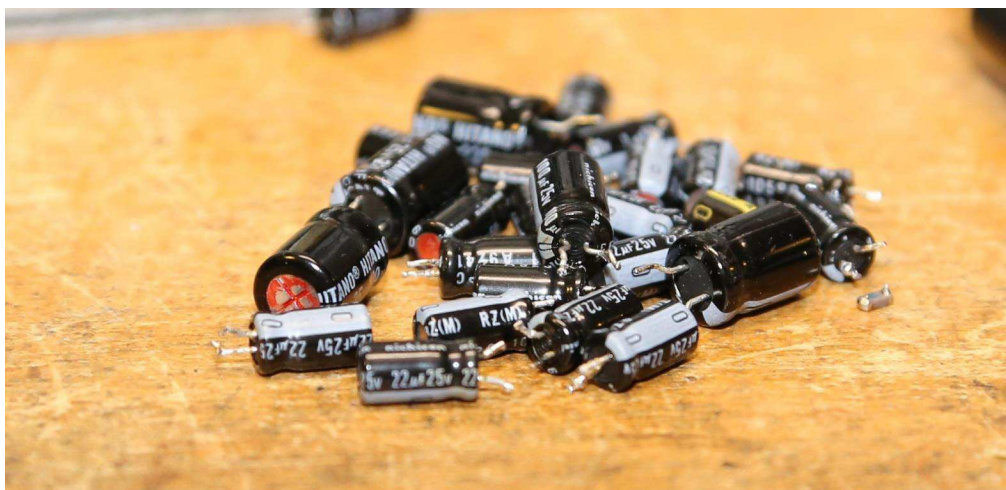


fully verify what I was looking at. I chased the 5V line back to a 3 terminal regulator, no output!.

This radio has two 5V regulators, one is always on, the other powered from a 9,5 V rail, which is switched by a transistor, driven from the microphone mounted power switch.

Obviously in the repeater this line is always switched on.

The 12V was getting through to Q471 but the 9.7V rail was down to about .8V,



and the 5V regulator U470 was outputting about half a volt – just what I had seen on the PTT pull up resistor. Now this regulator circuit has one good twist, the output of the regulator powers the circuitry – the 1458 op-amp U101a, so if there was no output how could it then turn on Q472 & Q471 to start the whole process? the only hint was the two 470 ohm resistors providing a token amount of current that bypassed Q471. The resistors checked out, but with the given load, that was only 1V, not enough to bring up the op-amp and turn on Q472

The first thought I had was is there too much load either directly on the 9.7 V rail, or was there an excessive load coming via the 5V regulator, U470. If you look at the diagram, there is a link just for this situation, unfortunately the link JU470 is actually a zero ohm surface mount resistor. I don't have any SMD desoldering tweezers in my kit, so I instead removed regulator U470. What, sucking out three plated through holes to remove a regulator is easier than pulling one resistor – in my case, Yes. You cannot just pull one leg of an SMD, unlike a leaded version.

It had almost no effect, so time for a different approach. How about providing my own 9.7V rail? So I set my bench supply to 9.0V and connected it across the 9.7 V rail. Why 9.0V rather than the full 9.7V?, well that way I can monitor the 9.7 V rail and easily tell which regulator, the Syntrx's, or my bench supply is doing the work. Surprise surprise the rail immediately shot up to 9.7V, and stayed there even with the bench supply disconnected. And guess what, when I did this with the 5V regulator re-installed, pushing PTT gave me 22W of RF, with mic audio.

The radio sat there for ages in this state, then all of a sudden the lights went out, no 9.7V.

I repeated this sequence several times, a mere tap of my 9V and the radio would spring into life, but for a somewhat random time, before going back to sleep.

So I started poking around with my oscilloscope, hoping for a hint, the best I could find was some rather erratic noise on the output of the op-amp, U101a. I was then drawn to C476, a ceramic cap across the base-emitter junction of Q472, but as I was checking this I noticed the two electro's next to it didn't look the best. I had a sniff, it was a smell I'd experienced when fixing Philips radio's. at Telstra in the electronics lab in Carlton. They referred to it as 'nappy shit' smell, never having had any kids, I'll take their words for it. However when I applied my solder sucker, the heat made it 100X worse. So I kept pulling caps and quickly realised this set needed a complete re-cap.

This capacitor is one of the worst, it looks like is has a lime green sleeve on the negative leg, No that is leaking electrolyte and corrosion

The black gunk on the positive lead also had me worried.

Unfortunately I have seen this electrolyte soak right through a PCB appearing on the opposite side to that of the capacitor, And no in that case it wasn't via the plated through holes, I'm talking surface mounted capacitors here.

Once this stuff gets into a PCB its game over.

Whilst one can clean an electrolyte spills off the surface of a PCB, how on earth do you clean it from inside a sheet of fibreglass, the answer is you don't. – You just give in and throw it away.

The end result is lots of noisy and low insulation resistance faults, followed by disappearing tracks.

After several trips to Jaycar (Yes, one should have done, I just kept missing one) I ended up with this pile of dead caps, now only suitable for gracing the pages of this magazine.

You maybe also be able to see the chip cap in alongside the pile, unfortunately Jaycar and Altronics seem to be getting out of SMD's, so I had to replace it with a leaded type.

So after a pile of isopropyl alcohol and cotton tips, most of the visible gunk is gone, but is this the end of the story, only time will tell, but I would not now count on this radio living all that long, it's on the final slippery slope to radio hell. At least it now smells like a radio.

I can think of one reason for all the leaks – Heat. A typical two-way radio at most has a 50/50 duty cycle, this one, especially during the 10:00 net is coping over 90% duty, and on a hot day I'd hate to guess a temperature – so next job on this repeater is a fan. Why Motorola never fitted one I'll never know.
So anyone for a new digital repeater?

-VK3TGX



**There is only one
NEW ZEALAND ASSOCIATION
of
RADIO TRANSMITTERS.**

It serves you at
local, national and international
levels.

*It deserves our full support
if we are to continue to have
the frequencies and operating privileges
we currently enjoy.*

**The Association
is what you and I make it.**

Upcoming Happenings & Events

<i>Date</i>	<i>Happenings & Events</i>
2nd March	NZART HQ Infoline
3rd March	Te Puke Junk Sale
5th March	HF Net, 3.575 MHz, 19:30
6th March	VHF Net, 146.525 MHz, 20:00
12th March	HF Net, 3.575 MHz, 19:30
13th March	VHF Net, 146.525 MHz, 20:00
16th March	NZART HQ Infoline
19th March	HF Net, 3.575 MHz, 19:30
20th March	VHF Net, 146.525 MHz, 20:00
21st March	Club General Meeting
25th March	NZART Official Broadcast
26th March	HF Net, 3.575 MHz, 19:30
27th March	VHF Net, 146.525 MHz, 20:00

6th April—NZART HQ Infoline
7-8 April—NZART Low Band Contest
18th April—Club General Meeting
20th April—NZART HQ Infoline
4th May—NZART HQ Infoline
18th May—NZART HQ Infoline
9-10 June—NZART Hibernation Contest
4-5 August—NZART Brass Monkey Contest
6-7 October—NZART Microwave Contest
1-2 December—NZART Field Day Contest

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

Club Information



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Business Meeting: 1930 First Wednesday of each month except January
88 Seddon Road, Hamilton

General Meeting: 1930 Third Wednesday of each month (except Jan)
88 Seddon Road, Hamilton

Homepage: <http://www.zl1ux.org.nz>
eMail: branch.12@nzart.org.nz

HF Net: **3.580 temporarily** (3.575MHz LSB)1930 Mondays

VHF Net: 146.525MHz simplex 2000 Tuesdays

2m Repeater: 145.325MHz -600kHz split
STSP 146.675MHz -600kHz split

Repeaters: 438.725MHz -5 MHz split

ATV Repeater: Off air pending channel changes

Cover Photo: AREC

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