



GATEWAY

**The Official Magazine of the Gippsland
Gate Radio & Electronics Club Inc A0016893M**

October 2024



Greetings from Japan.

RTTY Compression.

Eminar mixer repairs.

And More



WIA Affiliated Club

Cover photo,. How to tune an old style HF radio.
(If you have any good photos, please send them in)

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Event Queue

October:

18 th .	8:00	General Meeting
19-20 th		International Earth - Moon - Earth Contests - WIA

November:

1 st	7:30	Prac night
15 th .	8:00	General Meeting
16-17 th		International Earth - Moon - Earth Contests - WIA
24 th		VHF UHF Field Day - WIA

<p>Club run events are only possible with the involvement of ALL members. Without volunteers to coordinate and participate in club events the club will fail to prosper</p>
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President's Report October 2024

Greetings All

Yet another month has flown by, things are coming along nicely behind the scenes with some new equipment purchased and the IRLP node / echolink now operating on VK3RGW.

Big thanks to G&C Communications, Ian VK3BUF & Mark VK3PKT (Pockets) for making this all happen.

Wednesday 10am coffee mornings are still taking place with thanks to Mike VK3TDK & Mike VK3KTO for offering to open up as I'm currently back on day shift.

At last Friday's Prac night we had a great presentation from Mike VK3KTO which was well received, on tuning old Valve Transceivers.

By the end of the night we were able to tune a Yaesu FT-101E, and also a Keenwood TS-520.

This coming Friday is our General meeting followed by a talk/videos by Bruce (VK3BRW). The subject matter being Niagara Power Station part II. This will cover the lead up to the building of the 1904 Power Station and the untold inventors you should know about and what influences came into play.

JOTA is this coming Saturday with plans in place to entertain the Guides with various activities.

With Ian VK3BUF and Phill VK3VB currently away repeater works are on hold but rest assured when they return our next project is to fix VK3RWD then hopefully link it with VK3RGW.

Fred VK3FWR

President GGREC

BUNNINGS Sausage Sizzle

As most of our members would be aware of, a fundraising event is very important for our financial health. This year we encountered some difficulties to obtain a slot in our local Bunnings due to high demand.

The committee therefore decided to request Bunnings to place us on the replacement list with 7 days notice. This means if another organization is cancelling their slot we might be able to get in with a 7 days notice period. In order to be ready we ask our members to put their hand up to volunteer and prepare for a possibility of a short notice assignment. Please contact your committee@GGREC.ORG.AU if you would be able to assist in organizing this work.

If we are unable to raise funds we would need to dig into our savings and raise membership fees significantly.

Klaus VK3IU

Club Secretary

From The Editor



This month my attention has well and truly been caught by the SpaceX starship test flight 5 and the return and catching of the booster stage.

Boy did that thing come in hot, it was approaching the site at supersonic speeds, and created an almighty sonic boom on its final approach to the tower and its catching arms. (chopsticks) I'd hate to see what would have happened

if they lost control on final approach, as hitting that massive tower, or anything else there with a massive multi-ton rocket stage, complete with some fuel, at over a thousand miles an hour, would have been dramatic to say the least.

Personally, I would like to see all the high speed stuff be done over open water, then transition over to the landing site after things are traveling way slower, like 60Kmh, so if they bump the tower you just get a few dints, not total destruction of everything.

There appear to be a few contenders out there for these rocket designs & idea's, most notably in China, with designs that look remarkably similar – dare I say copy-cat. Let's see if they try and replicate this one, as dumb copying without any real design expertise is likely going to result in one very big kaboom.

It truly amazes me at the total disasters that result in blind copying, as in even copying speakers is beyond the copycats, they look near identical, but sound like absolute crap.

This leads me to thinking is there only a few decent 'designers' in the whole world. SpaceX is having great success however ULA, United Launch Alliance, a conglomerate of the once great in the industry are having all sorts of problems, even after years of Apollo missions to hone their talents and expertise.

Heck, their 'engineers' cannot even make an Apollo 'F1' engine from the original plans. Although admittedly this has more to do with the skillset of a modern engineer as opposed to an engineer back then. Back then an engineer was much more hands on with excellent hand skills in a workshop, so shaving a bit off here and there to make all the parts fit properly was not an issue, it was standard practice, whereas the modern engineers are pouring over the notepads of those old engineers to find out exactly what's needed to make those blueprints into a working engine, notes that are not there as it was never written down, it was in their everyday skills, all the team had them skills, so pointless writing them down.

Then there is the apparent lack of talent in the auto industry. For years each new model was all but body design changes with minor tweaks elsewhere. If they got too ambitious you ended up with something like the Leyland P76, troubles everywhere. Now with the transition to EV's, about the only successful manufacturers are Tesla and BYD from China, Everyone else, Rivian, etc. are making massive losses. There are many saying the only reason for China's success is the government propping them up, "Wear out the opposition and the market will be all ours." ??



Paul VK3TGX

Greetings from Japan

Di VK3JDI and myself are presently making our way around the Northern island of Hokkaido by train. Looking out the window of the Limited Express to Hakodate (pronounced hack-o-dar-tay) the tracks run parallel to open ocean. Sea foam is literally splashing the side of the train. If the windows opened and I didn't mind breaking several laws, I could spit in it. Should this article ends abruptly, you'll know I saw a tsunami and quickly hit Send.

In 2023 we did a short journey around the main destinations of the Southern half of Japan. We figured it was time to look at the other half.

Hokkaido is a long way North. Usually snowbound in winter, particularly in the mountains, of which there are plenty. After a pause for a couple of nights in Singapore, we arrived at Sapporo, an almost Melbourne sized city to Hokkaido's West. As is our preference we had already purchased a Japan Rail pass and had reserved seating on about sixteen different trains, to reach accommodation at ten different hotels. Making short hops every few days seemed like the way to go. Eventually we will reach Tokyo and head back to VK3 at the end of the month.



Sapporo is an interesting, well-organised place. In the winter they have an extensive ice festival and all sorts of fantastic ice sculptures adorn the streets. We got to admire the empty spaces these will be displayed two months hence. The coffee shop that advertised the 'World's Best Coffee' was somewhat misleading unless it was a competition for the best powdered motel room sachets that could be added to hot water. However, this city did have a pretty good beer museum to explore.



There is the little matter of fifteen kilometres of open ocean and mountain ranges between Hokkaido and the rest of Japan, but cleverly, there is a 54 km railway tunnel that passes under the mountains and sea and pops up on their mainland.

My command of the Japanese language is somewhat restricted, being limited to words such as Toyota and Hyundai. Unsurprisingly, this is not useful in a restaurant. Still, it is relatively easy to overcome such problems by pointing at food and rubbing one's belly. Hokkaido is a largely rural region. Lots of farms, small towns with compact two level homes. Many of these have immaculate little gardens that are a pleasure to behold. Quite often a modest HF array would be protruding from these homes.



One of our first stops was at the Diasetsuzan National Park in the centre of the island. Although there is no snow in October it is a popular ski destination. In autumn it is a spectacular vista of changing tree colours. The cable car and chairlift ride at Sounkoyo was a visual masterpiece. After a couple of nights we caught a bus, three more train rides and another bus and reached the popular destination of Noboribetsu. This is cited in a narrow valley next to a volcanic lake reminiscent of Mt Gambier. That is if Mt Gambier had active steam vents popping up, statues of giant demons, wild brown bears and a ninja theme park, of which the last time I checked, they didn't have. The Donan bus company in this town wins the prize for the most courageous corporate logo, but it was punctual.



Power outlets are earth-terminal free with funky spacing. While I didn't bring an adapter for my laptop charger, I did bring a tool kit with pliers, which is a close-second. Some things take a bit of getting used to. All the toilets come equipped with several playstations worth of buttons and LED lighting. Everyone drives little Postman Pat cars and 7-11 stores are spaced at fifty metre intervals throughout the country. Japan is universally tidy, organised, punctual and friendly. It is easy to move around and food options are both plentiful and diverse. I would recommend the experience.



Well, it looks like I am about to pull into Hakodate, sans typhoon or tsunami, so I shall try to find some free-wifi and add a couple of pictures to this travelogue. Somewhere up the road is a hotel called the Pension Puppy Tail, which if the pictures are accurate, will resemble a venue designed by a committee of Italian grandmothers.



Cheers.

Ian VK3BUF

Aliexpress Bits & RX-8025 IC



Recently I was trolling through some AliExpress ads and came across some 4 digit display modules that seemed handy, I had seen them earlier but was unable to find them again – the Chinese descriptions are a bit bizarre, so I was probably using the wrong terms.

LED displays don't seem that common anymore, seemingly displaced by OLED dot matrix, however I have a liking for the simpler 7 segment variety, so I ordered several.



Anyway whilst there I spotted this 6 digit clock module, unfortunately they didn't list the LED displays on their own, so I did an impulsive buy – just one, I was curious if I could hack it.

The four digit one uses a TM1637 chip and the whole display is listed for only 81 cents! Maybe the 6 digit was similar.... However I was wrong, it uses an unknown processor chip, the part number being erased so figuring it out is going to be awfully hard, However at \$6 it costs way more than the 4

digit modules, so grabbing a pile to hack is a bit of a bad idea. I did figure out who makes the actual LED display, however I already have plenty of bare LED displays, so no, I'm only after modules that are I²C etc. connected. I want to be able to quickly bung a display into a project without wasting time implementing digit drivers etc., however I kind of stuffed up with the 4 digit units, Yes they have that elusive colon, but they have no decimal points – oops.

Later browses on the AliExpress website did reveal an alternative that has decimals, but no colon, oh well. As a side I do have the actual 4 digit LED from elsewhere, so maybe I can swap that into one of the colon module boards I bought....

Back to the clock, I bunged it into a handy box that had a 4x AA battery holder, and I'm kind of impressed by the accuracy of it, it uses a Seiko Epson RX8025 high stability clock module.

It is quoted as having "Frequency adjusted for high accuracy ($\pm 5 \times 10^{-6} / T a = +25 \text{ }^\circ\text{C}$)" so this looks like I accidentally bought something decent for a change.

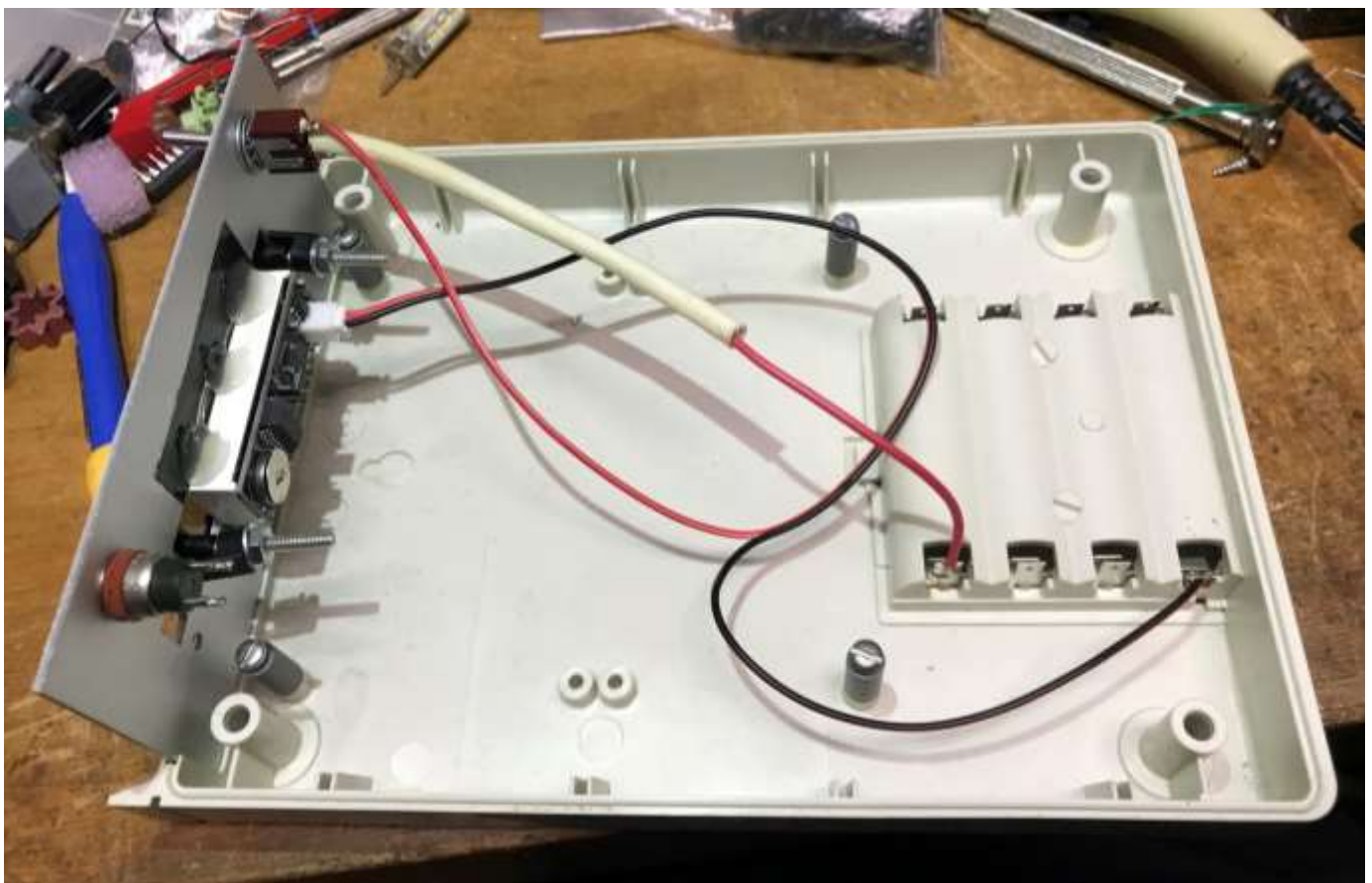
I've used clock modules before, but I have never been impressed by them, I've probably had my impressions of them tainted by seeing so many computers whose clocks are all over the place, I also used a clock IC in some of my earlier builds, same thing, a bit of a joke.



I bought this module near a month ago, where I set the time, look at it now, compared to an 'atomic clock' app on my iPhone. So basically internet time, as you can see it's pretty darn good.

However it's a bit of a joke in this box, it was handy and it had a four cell battery box – almost a rarity these days.

Maybe I'll pop an Arduino Nano in there and see if I can sniff the I²C buss and do something with it



It kind of seems a shame to hide that precision in there, so I'll have to dream up some whacky use for it, not for any good reason of course, just because I can. I don't know if I can sniff I²C, oh well, time to find out – as they say, nothing ventured, nothing gained.

REAL TIME CLOCK MODULE (I²C-Bus)
High-Stability



Product Number
RX-8025SA AA : Q41802552000100
RX-8025SA AC : Q41802551000200

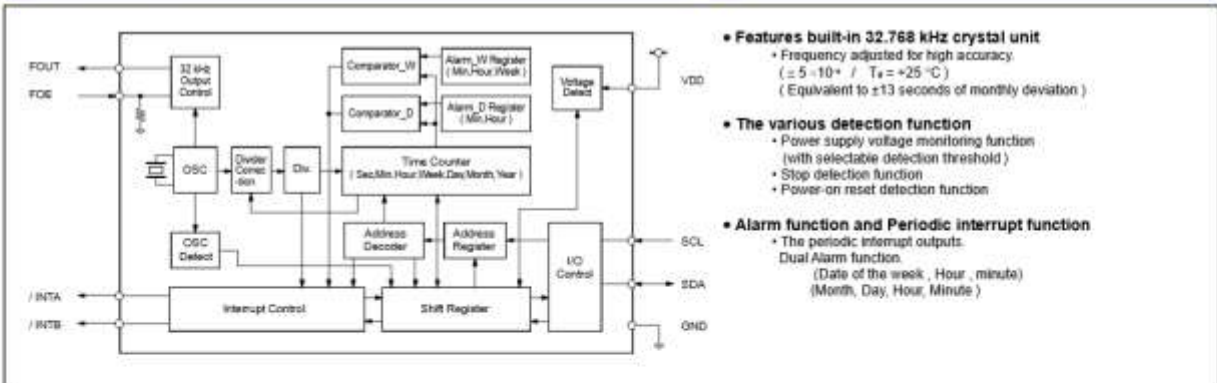
RX-8025SA

- Built-in 32.768 kHz crystal unit : Frequency adjusted for high accuracy ($\pm 5 \cdot 10^{-6} / T_a = +25^\circ\text{C}$)
- Interface Type : I²C-Bus Interface (400 kHz)
- Operating voltage range : 1.70 V to 5.5 V
- Wide voltage for timekeeping : 1.15 V to 5.5 V
- Various detection Functions : Ex. Oscillation stop detection function
- Low backup current : 0.48 $\mu\text{A} / 3\text{V}$ (Typ.)
- 32.768 kHz frequency output function : C-MOS output with OE pin.
- The various functions include full calendar, Dual alarm, Periodic interruption.

* The I²C-Bus is a trademark of NXP Semiconductors



Block diagram Overview

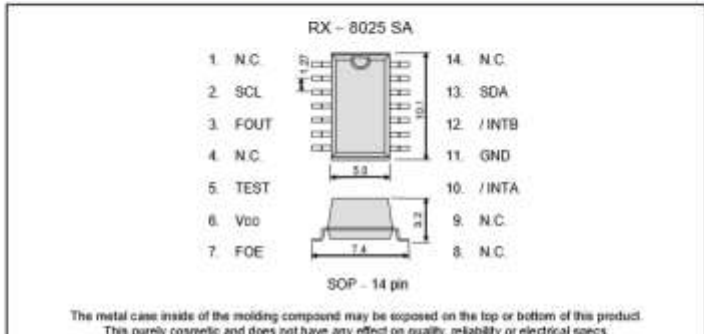


- **Features built-in 32.768 kHz crystal unit**
 - Frequency adjusted for high accuracy ($\pm 5 \cdot 10^{-6} / T_a = +25^\circ\text{C}$) (Equivalent to ± 13 seconds of monthly deviation)
- **The various detection function**
 - Power supply voltage monitoring function (with selectable detection threshold)
 - Stop detection function
 - Power-on reset detection function
- **Alarm function and Periodic interrupt function**
 - The periodic interrupt outputs: Dual Alarm function (Date of the week, Hour, minute) (Month, Day, Hour, Minute)

Pin Function

Signal Name	Input / output	Function																								
SCL	Input	Serial clock input pin																								
SDA	Bi-directional	Data Input and output pin																								
FOUT	Output	32.768 kHz clock output pin with the output control function. (C-MOS)																								
FOE	Input	<table border="1"> <thead> <tr> <th>FOE input</th> <th>/OEEN1</th> <th>/OEEN2</th> <th>FOUT output</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>X</td> <td>X</td> <td>OFF (LOW)</td> </tr> <tr> <td>0</td> <td>0</td> <td>0</td> <td>32.768 kHz</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>32.768 kHz</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>32.768 kHz</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>OFF (LOW)</td> </tr> </tbody> </table>	FOE input	/OEEN1	/OEEN2	FOUT output	X	X	X	OFF (LOW)	0	0	0	32.768 kHz	0	1	1	32.768 kHz	1	0	1	32.768 kHz	1	1	1	OFF (LOW)
FOE input	/OEEN1	/OEEN2	FOUT output																							
X	X	X	OFF (LOW)																							
0	0	0	32.768 kHz																							
0	1	1	32.768 kHz																							
1	0	1	32.768 kHz																							
1	1	1	OFF (LOW)																							
/INTA	Output	Interrupt output A pin (N-ch open drain)																								
/INTB	Output	Interrupt output B pin (N-ch open drain)																								
TEST	—	Used by the manufacture for testing. (Do not connect externally.)																								
VDD	—	Connected to a positive power supply																								
GND	—	Connected to a ground																								

Terminal connection / External dimensions (Unit:mm)



Specifications (characteristics) Refer to application manual for details.

■ Recommended Operating Conditions

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power voltage	VDD	—	1.7	3.0	5.5	V
Clock voltage	VCLK	—	1.15	3.0	5.5	V
Operating temperature	T _{OPR}	—	-40	+25	+85	°C

■ Frequency characteristics

Item	Symbol	Conditions	Range	Unit
Frequency tolerance	$\Delta f/f$	T _a = +25 °C VDD = 3.0 V	AA: 5 - 5 ⁻¹⁰ AC: 0 - 5 ⁻¹⁰	$\cdot 10^{-4}$
Oscillation start-up time	t _{STA}	T _a = +25 °C VDD = 2.0 V	1 Max.	s
Frequency voltage characteristics	f/V	T _a = +25 °C VDD = 2.0 V to 5.5 V	- 1 Max.	$\cdot 10^{-4}$

*1) *2) Equivalent to ± 13 seconds of monthly deviation (excluding offset).

■ Current consumption characteristics T_a = -40 °C to +85 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Current Consumption	I _{SC}	f _{SC} = 0Hz FOE = GND FOUT ; output OFF (LOW)	VDD = 5 V	-	0.60	1.80	μA
	I _{SC}	f _{SC} = 0Hz VDD, FOE = 5.5 V FOUT ; output ON (Output=OPEN, CL = 0 pF)	VDD = 3 V	-	0.48	1.20	
Current Consumption	I _{SC}	f _{SC} = 0Hz VDD, FOE = 5.5 V FOUT ; output ON (Output=OPEN, CL = 0 pF)	VDD = 5.5 V	-	3.0	6.5	μA

■ Power supply detection voltage T_a = -30 °C to +70 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
High-voltage mode	V _{DETH}	VDD pin	1.90	2.10	2.30	V
Low-voltage mode	V _{DEL}	VDD pin	1.15	1.30	1.45	V

\$8.25 from Mouser, cheaper to buy complete clocks from China.....



VK Shires Contest VK3BJA result

WIA Contests

Contesting Introduction

General Rules

Contest Managers

Contest Champion

WIA Contest Champion Rules

WIA Contest Champion List

Official WIA Contests

Australia Day Contest

Remembrance Day Contest

John Moyle Memorial Field Day

Ross Hull Memorial VHF/UHF Contest

Oceania DX Contest

VHF/UHF Field Days

Harry Angel Contest

Trans-Tasman Low-Band Contest

VK Shires Contest

Field Day Log File Uploader

VHF/UHF Field Day Log File Uploader

VK Shires Contest

VK SHIRES 7th - 8th June 2025

Contest Manager

Diane Main: VK4DI. Long time contester and DXer.

Contest Introduction

Held the Saturday and Sunday of the weekend prior to the second Monday of June every year.

Starts: 00.00 UTC Saturday Ends: 23.59 UTC

VK Stations work VK Shires and CQ Zones whereas international stations only work VK Shires

Reworking stations is allowed in 4-hour blocks. The rules for the blocks are, however, somewhat different to what is allowed in the John Moyle Memorial Field Day or VHF-UHF Field Day use, so read the rules carefully.

Aim Of The Contest

The objectives of this contest are for amateurs around the world to contact as many VK shires as possible in the contest period. VK amateurs are to work the world including VK, whilst the rest of the world can only work VK

This Years Winners

2024

Statistics and full results at vklogchecker.com

Due to a discrepancy, the entries have been re-evaluated and the final results with adjustments in the Rover Section being made.

Single Operator:

- 1st place VK2TTL Rhod Rowe
- 2nd Place VK3XV Tony Hambling
- 3rd Place VK4M Alan Shannon (VK4SN)
- 4th Place VK7C/VK6 Catherine Hammond (VK7GH)
- 5th Place VK3ABK Dave Lord

Single Operator 10w

- 1st Place VK7MAT Matt Mclean
- 2nd Place VK2GRH Glen Harrison
- 3rd Place VK7KPC Peter Dodd

Multi Operator

- 1st Place VL4R (Bill Main VK4ZD, Diane Main VK4DI)
- 2nd Place VK2RIZ (Wendy and Gordon Radio Club) (VK2HAO, VK2JEH, VK2KET, VK2HBM)
- 3rd Place VK3BJA (VK3IU, VK3FWR)

Single Operator Rover

- 1st Place VK3PF Peter Freeman
- 2nd Place VK7QP Linda Luther
- 3rd Place VK3YV Tony Linford
- 4th Place VK2YW John Eyles

Single Operator 10w Rover

- 1st Place VK1CHW Chris Winter



Good work Klaus VK3IU and Fred VK3FWR

This was the day we invited the members to come and participate in the VK Shires Contest.

I set up two radios and interlinked the log book sw N1MM of two PCs.

Basically I operated the whole setup as everyone else as usually was just sitting around and talking to each other

Secretary GGREC

Klaus Illhardt [VK3IU]

RTTY Transmission & Compression

TTY is basically just serial data, when I worked at Telstra it was sent straight down good old copper telephone lines as such, albeit bumped up to Plus Minus 25mA at 50V (alternatively as a 40Ma current loop) Bar the 50V bit, it can be just run straight into the serial port of a PC – remember those – serial ports – kind of forgotten almost like RTTY

All you need to make it safe, computer wise, is a couple of resistors for a voltage divider, to drop the 50V down to about 12V. Actually if you have 'proper' old school 1489 receivers in your serial port they are good up to 30V, unlike the wimpy USB to serial converters seen these days that only output 6V or their about. (some of the crappier ones don't even do the negative part)



To make it compatible with a radio, as in Radio TTY, or RTTY, you need to convert it to audio tones that can be fed into a microphone socket, using something like this Codan box, although some radio's do allow you to feed serial data straight in and the radio will do the rest – I've never had one of those. However you still need something to convert the received FSK 'tones' back into marks and spaces. These days most would probably just use a computer program to do it all via a sound card – so don't worry about trying to find this extra rare Codan box.

These days about the only RTTY you'll find is Amateur radio based, the commercial boys having long abandoned the air waves and moved onto the internet. There may be some military traffic out there, but it will be highly encrypted so don't even bother thinking about it.

So strangely enough that only leaves the internet as a source of copy to feed to one's old TTY gear. I covered that quite a few editions of the GGREC mag ago. As in <https://www.rtty.com>

I have played with converting TTY to ASCII and sending it over the internet using the Telnet protocol, this works kind of ok, however some software, notably mobile phone based, gets in a bit of a muddle seeing a stream of Telnet packets containing just one character, but at a rate of 6.67 packets a second. I could send bigger packets containing a dozen of more characters, maybe a whole line, however I wanted to emulate the feel of seeing a steady stream of 50 baud characters. Yes Amateur radio generally usually uses 45.45 Baud; however my box is a commercial thing, as well as the Codan 7816 so 50 Baud is my play thing. (I worked for Telstra)

Telnet does add quite a bit of overhead as it verifies the transmitted text etc., however that is nowhere as much 'overhead' as RTTY.com uses as they encode the TTY traffic into audio tones and transmit that, or rather stream that over the web.

So this recently got me thinking, assuming audio streaming, just how far can the audio compression commonly used for streaming audio, be wound up before the TTY traffic becomes a garbled mess and becomes totally unreadable. After all, all of these audio compression schemes/codecs were invented for the human voice, or for music, never for data,

Converting serial data to an audio tones, then digitising that, basically turning it back into data, that it natively was in the first place is kind of nuts. If your gong to stream some data, why not

just stream the original data, not a version with an absolute truckload of overheads. – in the end it's all data, nothing can kind of change that. About the only advantage is it uses off the shelf software, nothing needs to be written for the receiving end.

Anyway, I digress, just how far can I compress it. Obviously a WAV file, as in uncompressed audio, even if it's only 8 bits works just fine. But RTTY is not music, so mp3???

T&D Gen New hopefully right side up 4.mp3	2/10/2024 3:23 PM	MPEG Layer 3 Aud...	8,789 KB
T&D Gen New hopefully right side up 9.mp3	2/10/2024 3:24 PM	MPEG Layer 3 Aud...	4,759 KB
T&D Gen New hopefully right side up 8k const.mp3	2/10/2024 3:26 PM	MPEG Layer 3 Aud...	651 KB
T&D Gen New hopefully right side up, unc.flac	2/10/2024 3:29 PM	Free Lossless Audi...	33,226 KB
T&D Gen New hopefully right side up.txt	2/10/2024 9:44 PM	Text Document	4 KB
T&D Gen New hopefully right side up, u-law.wav	4/10/2024 11:51 AM	Microsoft Wave S...	28,681 KB
T&D Gen New hopefully right side up, pcm8.wav	4/10/2024 11:53 AM	Microsoft Wave S...	28,681 KB
T&D Gen New hopefully right side up, 8k - Copy.mp3	4/10/2024 11:57 AM	MPEG Layer 3 Aud...	651 KB
T&D Gen New hopefully right side up, 8k.wav	5/10/2024 2:18 AM	Microsoft Wave S...	5,205 KB

Here are the files I ended up with, from the text file of about one minutes worth of text, to the various codecs I tried. As you can see converting 4KB of text into 33 MEGABYTES of 16 bit, 44.1 K samples (CD quality) for the exact same resultant text is PURE NUTS. The best I could do was the 651KB file, my audio software does not offer any compression scheme lower than that. Admittedly I was using a sample rate of 8K, so audio tones up to 4KHz would pass, so if I shifted the tones down to lower frequencies, maybe 4K samples could be used – I didn't go there.

So how did it all go, RTTY wise, well I was disappointed in that they all decoded with no issues!



Saving Photos To . . . A Voice Recorder?

<https://youtu.be/qAGT1SSicOo>

Then the other day, I stumbled across this YouTube video, where they were kind of doing the exact same thing, but with SSTV rather than RTTY, however the Sony codec on his digital voice recorder was way less forgiving than mp3, have a look, it's a pity I cannot try one of these.



Paul VK3TGX

EMINAR 150-4 Powered Mixer repairs



Eminar was a Melbourne based manufacturer of PA equipment aimed at the music industry.

I was handed this mixer to fix, the owner suspected water damage, however I saw nothing like that. On power up there was a burst of AC hum, then that was that, all but completely dead.

These are pretty bare bones these days, all but completely unsellable as they have no cannon balanced mic inputs. However the owner was happy, apparently using it with electronic musical instruments, keyboards, that only have unbalanced outs, so kind of well suited to his use case.



On opening it up it was pretty clean inside, and a quick electrical check only showed a bad mains earth connecting, so I made that my first task. Usually one connects the mains earth wire to the chassis using an unpainted area, for good electrical connection, something Eminar neglected to do, so the earth lug was nicely riveted to the chassis, but with a few mega ohms of resistance.... Not good. So I drilled out the rivet, ground back the paint then fitted a few serrated washers and a socket screw so as to tighten it all down nicely – this hole also doubling as a hinged lid mount, so now a few layers to tighten down. I was still not happy, so I added two more grounding locations, the IEC socket mount and the power transformer.



So now it was time to feed in some 400Hz audio tone and start chasing it through the system. I got slightly side tracked on the mixer strips as the audio was very distorted, but I then realised that if this was the fault I'd have a badly distorted output. However this was not the case, I was just expecting those mixer strips to put out way more than they did, and the the fault actually resides in the power amp at the back. I was simply over driving them. Usually an op-amp on plus/minus 12V can easily output several volts of audio – not this time.

amp on plus/minus 12V can easily output several volts of audio – not this time.

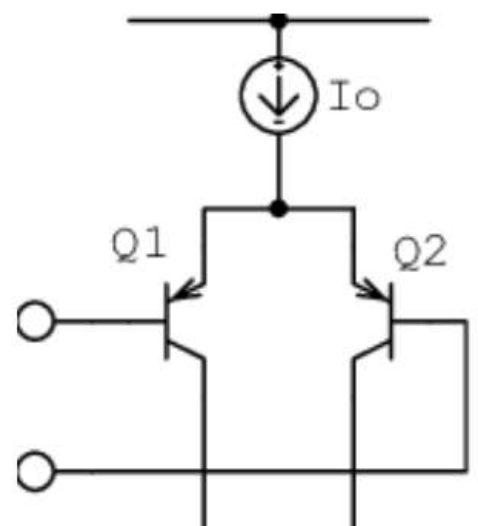


The actual amp board was not made by Eminar, but rather by Jade, another local manufacturer that now sells imported gear.

The amp runs on plus/minus 55V, so those filter caps are getting a hard lesson (actually I've just spotted that fopah)

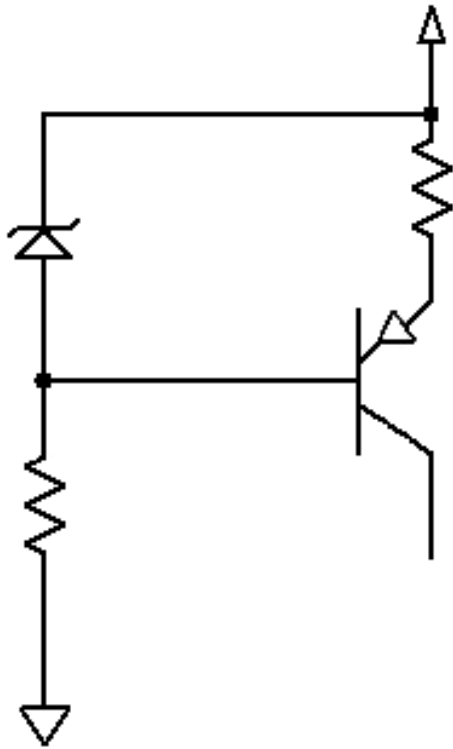
The audio comes in on that grey wire, wrapped with the green and red, yuk, mixing input and output wiring, however they seem to be getting away with it.

The incoming audio goes to those two transistors below the input, these form a 'long tailed pair', or differential amp.



One transistor gets the incoming audio, whilst the other is fed from the amplifiers output, basically trying to correct the non-linearity of it to give us way lower distortion.

The trouble was the output, from the emitters was only showing negative? Excursions, the constant current source was dead – no current at all.



The constant current source works by putting about 2.5 volts onto the base of this transistor, after you allow for the normal 0.6V of the transistors Emitter – Base junction, you now have about 1.9 V on the emitter resistor, as that voltage is constant, the current through it is also constant. As the emitter current is the same as the collector current, you now have a constant current source to feed the differential amp above. You could just use a resistor, however the diff amp works way better, over a wider voltage range using a constant current source.

Well it would do if there was this 2.5 odd volts feeding the base, for the Zener diode to do this that resistor feeding it from the negative amplifier supply line must be intact, it wasn't, it was open circuit. Even me connecting my 10 megaohm meter across that resistor started the amplifier producing some output. This 18K resistor had not

gone high, it was completely open circuit. For some strange reason they connected this resistor to the negative voltage line, earth would have done, this means that resistor had over a hundred volts on it.... Resistors do have a maximum voltage rating, even if you are not exceeding the wattage rating, you can still be exceeding the voltage rating. This is why you sometime see a string of resistors in a circuit, sometimes that is to increase the wattage rating, however it is also done to limit the voltage stress on them. As this resistor appeared in perfect shape, as in no signs of distress, like overheating etc., that only leaves the voltage – or just good old dumb luck, nothing lasts forever.

So all fixed? Well yes, and no. It now has a way better earth and it's back to how it was producing output, BUT why the exceedingly high voltages on the amplifier? With 50V capacitors I would have though 35 to 40 volts each side would be about right, not 55 volts. In trolling the web I did see mention of a version of this mixer using 35V rails

The transformer only has a single primary, no taps to allow it to be used in other countries etc., 40 - 0 - 40 secondary, so what gives – did they accidentally fit the wrong transformer at the factory? It certainly does not seem to have been changed, it all looks original.

So what's the solution here? replace it? That will probably exceed to worth of this mixer – and the owner usually has little money... The only other option is a hack, add an extra transformer wired up in a buck configuration to loose say 7 volts, that should bring it down to 45 volts DC.

If I was super keen, I could rip it out and apart, and change the windings.....

Knowing the owner, he'll probably not bother – “she's right mate”, it's been like that for 50 odd years, surely it will be right for a few more.



Paul VK3TGX

Meeting 4/10/2024



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