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# AMATEUR Radio

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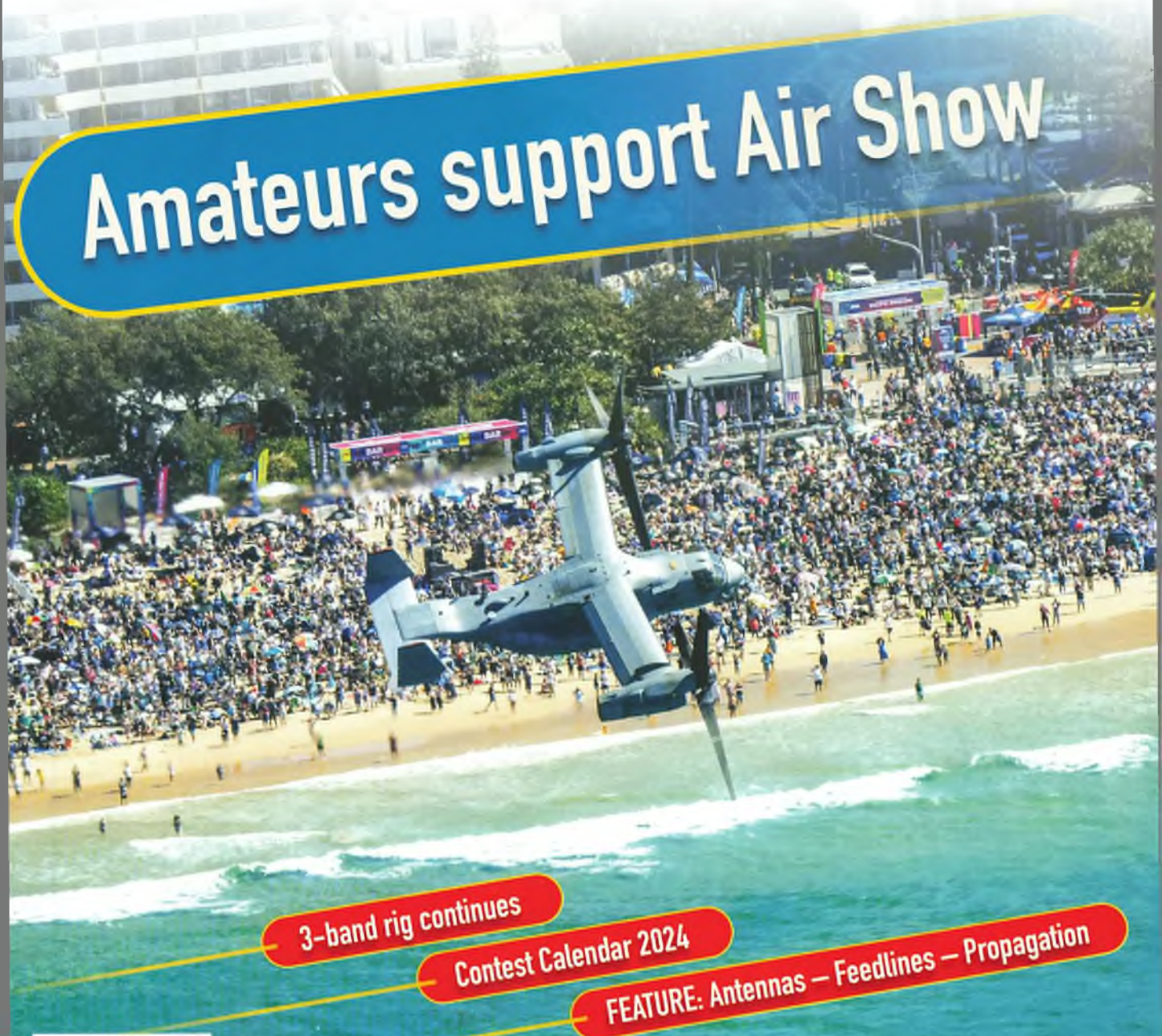

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Contest Calendar 2024

FEATURE: Antennas – Feedlines – Propagation

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* Photo shows the FT-710 AESS

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# AMATEUR Radio

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*This issue's cover: An Osprey MV-22B seduces the crowd on Surfers Paradise beach before astonishing all with its 'tilt rotor' flight capabilities during Australia's first Pacific Air Show in August. Photo: Code Four. Design by Sergio Fontana VK3SO.*

**NEXT ISSUE: Past Pioneers & Marketing Our Hobby**

### Contributions to Amateur Radio

Amateur Radio is a forum for WIA members' amateur radio experiments, experiences, opinions and news. Manuscripts with drawings and/or photos are welcome and will be considered for publication. Articles attached to email are especially welcome. The WIA cannot be responsible for loss or damage to any material. Information on house style is available from Phil Fitzherbert.

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## Amateur Radio Service

A radiocommunication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs; that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.

### Wireless Institute of Australia

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# Editorial

*Roger Harrison VK2ZRH*

## Let's work together

If together we stand, divided we'll fall
Come on now people, let's get on the ball
And work together
That's right, yes, let's work together, show everyone how
You know together we 'll stand up to any-anything now
Working together

You know when things go wrong, as they sometimes will
And the road you travel, it stays all uphill
Let's work together, come on, come on, let's work together, hey
You know together we 'll stand, and we will show all the way
Working together, it will matter for every working
new-bie or a ham

Think, think now, two or three minutes, two or three hours
What does it matter now, in this life of ours
Let's work together, come on, come on
Let's work together, now, now people
Because working together, we will stand up, every working
new-bie or ham

Let's go now, make someone happy, make someone smile
Let's all work together and make life worthwhile
Let's work together, come on, come on
Let's work together, now, now people
Because when we do that, we all do some good,
Every working new-bie or a ham

*After the song by Canned Heat, "Let's work together."*
*www.youtube.com/watch?v=wGGW4IezbC4*

# Reflections

*Giles Kirby VK5GK, WIA Board member*

## Say 'NO' to divisive practices, but say 'YES' to truth

We seem to live in a time where even well-placed words can be mistaken for a divisive call-to-arms. How did the title to this article make you feel? I was treading close to the line, but do you see how easy it can be?

Rapid growth of media fighting for your valuable attention has led to a continuous, sensational news cycle. We are no longer presented with facts and allowed to form our own opinion; instead, opinions are presented and we need to seek out the truth.

Everything is drama. Everything is sculpted to elicit the maximum emotional response. We are not built to cope with this onslaught of noise. It's apparent, particularly in recent years, that we need to take our psychological health just as seriously as our physical.

## Backdrop

As many of you are aware, I joined the WIA Board of directors this May. No one really knew me. I hadn't previously been involved with the WIA and I didn't play any significant role in the amateur radio community. But I do read a lot.

My profession has trained me to be critical of everything I read. Amateur Radio in Australia has had its controversies in recent years and like any modern consumer of media, I was sceptical while I tried to tease truth from the noise. This ultimately led to my volunteering to join the WIA board of directors.

## Pursuing truth

In the pursuit of truth, but also my willingness to contribute towards bettering things as required, I've spent the last six months doing a lot of listening, and will continue to do so. So, please always feel free to reach out to me and tell me what issues or thoughts you may have. My email address can be found on the WIA website.

I'm slow to form opinions; again, probably a result of my scientific background. A good scientist will try to remain open minded, drawing from all available sources of information. Distilling down, eliminating falsehoods. And in this crucible, the truth will always eventually emerge.

From my privileged position within the WIA board, I can tell you some truths that I've drawn.

My fellow board members are a wide-ranging collection of the most genuine gentlemen I've ever met. They contribute great swathes of their most valuable resource – time – to the betterment of Amateur Radio in Australia for all amateurs.

Like any good board, we don't always agree on issues (after all, we are drawn from a sample to be as representative of the community as we can). But, we discuss issues in a productive and respectful manner and the actions are always focused on what's best for the WIA members.

I'll be honest, I was a little surprised. Some of the noise (if it were to be believed) would suggest that the Board doesn't agree on courses of action or perhaps doesn't support the chair. I can honestly tell you, from first-hand experience, that this couldn't be further from the truth. And you know, this revelation has invigorated and inspired me. There may be problems, but I can assure you, they're certainly not going unaddressed.

## Our foundation – volunteers

As a volunteer-based organisation, the rate of change may not be as fast as some of you (and even I) hoped. But the volunteers we do have are amazing, hence my ongoing praise and respect.

So, why am I telling you all this? After all, I just told you not to believe what you read! My message to all readers is to be critical of what you're told – in all forums. Never trust a single source. Exercise your freedom to make up your own mind. But I encourage you to draw on as many sources as possible and try to eliminate historical or internal biases as you do so.

## Vigilance

I'm going to end by telling you about something rare and special to me. The amateur radio service and hobby has always been, and will always be, a stable place to explore science, build friendships and build community. Apolitical and free of religion.

We must always be vigilant in preserving this precious space. From the way we treat each other to the type of language we use. Sure, there will always be those negative opinions and influences. But we'll deal with negativity as we always have. Don't feed the trolls.

### WIA Contest Website

To keep up to date with all of the major Australian contests, including rules and results, check WIA Contest Website at:

www.wia.org.au/members/contests/about

# WIA news

## Bundaberg is go!

The Institute's 2024 Annual General Meeting and Conference weekend will be hosted at Bundaberg's new state-of-the-art Multiplex Convention Centre over 4-5 May.

The WIA's AGM event is now the top occasion in the calendar year for amateur radio in Australia!

A range of interesting activities is being planned for the weekend by the hosts, the Bundaberg Amateur Radio Club (BARC).

Results of the WIA elections will be announced along with the annual WIA merit awards.

The annual WIA Gala Dinner will be held on Saturday May the 4th, International Star Wars Day! It's an occasion to enjoy an attractive buffet meal and make many eyeball with other amateurs from all over Australia and, maybe, internationally.

Two days of interesting presentations are planned, covering many different aspects of amateur radio and communications.

Bundaberg Hamfest 2.0 is part of the whole event. A commercial Expo for equipment makers and suppliers will enable attendees to eyeball cutting-edge offerings from industry leaders. Plus, hamfest-style, there'll be buyers-and-sellers of new and used radio and electronics equipment.

BARC has announced an Open Day, providing hands-on demonstrations of systems and software, and a nostalgic display of vintage radio gear.

A live contact with the International Space Station is planned, involving communication between an astronaut aboard the ISS and students from the Bundaberg State High School.

There'll be soldering workshops for the kids, with interesting kits the youngsters can build and take home! Also planned are lots of great giveaways and raffle prizes over the weekend.

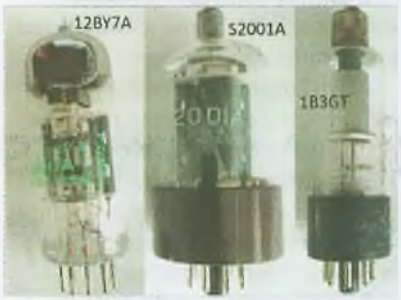
If you're planning to attend, it is advised you book accommodation early.

Bundaberg is RV-Friendly and there are plenty of camping areas available if you bring your motorhome or caravan. For those flying into Bundaberg, mini-bus shuttles will meet you at the airport and take you to your accommodation as well as to and from the venue.

May 4-5, 2024. Burnish the dates in your calendar.

## Collecting vacuum tubes is now 'a thing'

Hunting and collecting tubes, valves and suchlike has risen from the nadir




of not-a-thing to become now-a-thing among respected connoisseurs of the vacuum crafts.

Like many of those who grew up over the 1950s and 60s with an interest in radio and such stuff, the Editor-in-Chief was an avid acquirer of valves and tubes of wide variety and titular function.

This interest was aided by the location of a rubbish tip near school where valve-maker AWV dumped its over-runs and out-of-spec items. Never mind, anything that lit up could be – and often was – pressed into service.

Lacking foresight of future interest in long-past technology, said EiC later sold that comprehensive collection over time. Perhaps selected ones have wound-up in contemporaneous collections. Hamfests and such can be a rich source for tube collectors today.

When the global journal *Collectors Weekly* runs a feature on vacuum tubes, that means it's 'a thing' – even here. Check out the Luxaudio advertisement this issue. www.luxaudio.com.au

## When all else failed – ham radio help for bushwalker

On the afternoon of 30 October, a call for assistance came over the 146.7 MHz Gold Coast repeater, asking for urgent medical assistance following a bushwalker's fall.

There were three bushwalkers on the Border Track, near Binna Burra, just over 30 km southwest of Surfers Paradise. One man in the group required urgent medical assistance after suffering a short fall.

There was no mobile phone coverage along the track, which is in thick rainforest. Fortunately, two of the group were amateur licensees, Stuart VK4MSL and his father David VK4MDL, and they both had their handheld radios on them.

Stuart VK4MSL had put the call out for assistance and Geoff VK2DLA replied. It was later established that four other local amateurs were also monitoring the situation, right from the initial call.

A Qld Ambulance was despatched lights and sirens on the 36 km road trip up into the mountains, and backup from Qld Police. The PolAir helicopter was also sent to visually confirm the exact location of the patient.

The police requested that PolAir use the 146.7 MHz repeater so they could talk direct to Stuart. Geoff was happy to provide the frequencies and

tone access, as well as the option to use a simplex frequency, 146.5 MHz. But, programming amateur frequencies into the chopper in flight proved to be a bit difficult. APRS also played an important role as Geoff VK2DLA was able to receive regular updates on Stuart's latitude and longitude.

With Geoff relaying the communications, it was important that one operator only was involved with the exchange of messages.

By 1730, the patient was in the ambulance and on his way to hospital.

Mark VK4DMH

## Baud rate limit lifted

US amateurs will soon be able to use digital transmissions on the HF bands of any baud rate that can fit into a bandwidth of 2.8 kHz. The change follows a concerted campaign by the ARRL and many US amateurs.

The current baud rate limits were adopted in 1980.

Commissioners of the US Federal Communications Commission (FCC) reportedly voted unanimously to amend the Amateur Radio Service rules to replace the baud rate limit on the amateur HF bands with a 2.8 kHz bandwidth limit.

The FCC said that the change was to permit greater flexibility in data communications and ". . . incentivize innovation and experimentation in the amateur radio bands by removing outdated restrictions and providing licensees with the flexibility to use modern digital emissions.

"The amateur radio community can play a vital role in emergency response communications, but is often unnecessarily hindered by the baud rate limitations in the rules."

The ARRL said that, consistent with its request to the FCC, the amended rules will replace the current HF restrictions with a 2.8 kHz bandwidth limit. "We agree with ARRL that a 2.8 kilohertz bandwidth limitation will allow for additional emissions currently prohibited under the baud rate limitations while providing sufficient protections in the shared RTTY/data subbands," concluded the FCC Report and Order on the change.

Further, the FCC proposes to eliminate similar restrictions where they apply in other bands.

"We propose to remove the baud rate limitation in the 2200-meter band and 630-meter band . . . and in the very-high frequency (VHF) bands and the ultra-high frequency (UHF) bands," said the FCC.

It is proposed to eliminate symbol rate limits in favour of bandwidth limits where they apply on the VHF and UHF bands but perhaps the bandwidth limits themselves be reviewed in light of today's technology and tomorrow's possibilities, it said.

Continued on page 66

# Listening In

**A 'cheap-and-cheerful' way** to enjoy airband listening is to build a DIY kit, such as this one from Chinese supplier, Banggood (and others). For $23 to $33, you can get a bare bones kit of parts to build it yourself, or a completed board at higher cost.

A widely popular scanning pastime is listening on the "airband," where pilots communicate aircraft-to-aircraft and between aircraft and ground facilities. Capital city and regional airports also use the airband to communicate around the ground facilities and operations. So, there's lots to be heard.

The 118-137 MHz frequency band for aviation communications is generally universal around the world, which means receiver manufacturers have an enormous global market available to them. That means a lot of the equipment offered is generally very cheap compared to similar units for other frequency bands. But, you can still pay high dollars for feature-rich scanners with a host of bells and whistles.

The international specification for airband communications equipment requires amplitude modulation (AM), the simplest technology for voice communications. AM is used on the medium wave broadcast band.

## Starting out

Many scanning hobbyists like to start out with a handheld or portable style scanner. These include a rudimentary antenna because signals received can be very strong Handheld scanners often have a short "rubber ducky" antenna, perhaps as long as a finger.

Portable scanners include an extendable whip, which is convenient when extended to better receive signals.

At some point, however, to better pick up both close-in and far-distant sides of in-air pilot communications, you will need an outdoor antenna.

## More dedication

Desktop scanners, including dedicated airband-only units, are meant to be used with an external antenna, which connects to a BNC-type socket on the equipment (usually, the rear panel). SDR receiver "dongles" also work best when connected to an aerial somewhere outside.

While you can 'get away with' an airband antenna mounted in the roof, below the tiles, it's best that it is mounted in 'clear air.' Should you have a metal roof, you're best off mounting an external antenna above it!

One of the simplest and most effective air band antennas is known as a 'ground plane,' with a short vertical spike and three or four spikes around the base, generally drooping down. They're available locally off-the-shelf from both online and storefront suppliers. A colleague of mine bought a made-in-Australia model from local supplier Mobile One, which he mounted on the gable of his roof, as seen in the photo here.

**Easy-as:** a simple airband ground plane-style antenna is easily mounted to a bargeboard on the gable using TV antenna fixings. This gets the antenna well in the clear, for best listening. [Photo: Doug Friend]

**Typical** of what casual and beginner airband listeners use is the Tecsun PL660 portable radio. It features VHF airband coverage along with all the major broadcast bands, including AM-MW, FM, shortwave (including single sideband), and longwave. It comes with an inbuilt extendable whip antenna. Around $200, from Tecsun Radios Australia.

## Some online resources

### Facebook pages

Scanner Enthusiasts: <facebook>/groups/4188584134/ "For anyone interested in radio scanning for things such as public safety (Fire, Ambulance etc), and associated interests. 3900 subscribers.

State-based pages, e.g. <facebook>grops/2260841997532519/

SWLing.com – a global website: https://swling.com/

Local amateurs provided front-line comms for first spectacular event in Australia

# Amateurs play critical role supporting Pacific Airshow Gold Coast

*Roger Harrison VK2ZRH*

**This brace of MV-22B Osprey** vertical take-off and landing (VTOL) tilt-rotor aircraft were standout participants in the event. Stationed at the Gold Coast Airport in Coolangatta for the event, they came in from the US Marine Corps' Medium Tilt Rotor Squadron 363, based in Hawai'i. Photographer, Ron Hayman VK4AH, provides some idea of scale.

A series of chance encounters involving the Airshow event CEO from California, a local Uber driver, Greg Ackman VK4BBX of Mobile 1 fame, and Gold Coast Amateur Radio Society President Mark Hanrahan VK4DMH, led to the involvement of local hams in planning, building and operating key communications support for the Pacific Airshow last August. This article came about thanks to the efforts of Mark Hanrahan VK4DMH and Andrew Chapman VK4QF.

Following that serendipitous connection, the Gold Coast Amateur Radio Society (GCARS) received an official request from Code Four to provide radio communications for the Pacific Airshow planned for August at Surfers Paradise on the Gold Coast.

A little research by Mark VK4DMH threw up details of the USA's Pacific Airshow, revealing the involvement of the local RACES (Radio Amateur Civil Emergency Service), an affiliate of the ARRL (a similar organisation to WICEN in Australia). Mark was keen to hear how the US amateurs handled the same aeronautical event that has been running in California since 2016.

Multiple airfields are involved in putting on an Airshow. Amateur radio involvement requires small teams at each airport to communicate operational information to the show's Command Centre at the precinct housing the crowds. That's not all, but we'll get to that.

In early April, Mark spoke with Jon Welfringer WB6OZD of Huntington Beach RACES, who outlined what was expected of amateur radio support for the Pacific Airshow in Australia.

One of the key points of RACES support provided in the USA is that each amateur operator involved monitors the relevant air traffic control frequency (in the VHF airband) for the airfield where they're assigned. Jon WB6OZD advised

## ABOUT THE PACIFIC AIRSHOW

Gold Coast Freedom Flyers. [Greg VK4BBX]

Queensland's Gold Coast was the chosen location for the first Pacific Airshow to be staged in Australia, an outgrowth out of the established Pacific Airshow of Huntington Beach, California. Developed, promoted and run by Code Four, an event production company of Huntington Beach, the Pacific Airshow has run annually in the US since 2016.

Held for the first time on the Gold Coast, over 18 to 20 August, 49 aircraft participated, both civilian and military machines, some first flown in the 1940s. They showcased a range of aerial manoeuvres and over-water flypasts "... that pushed the boundaries of speed and altitude." From sea level to heights of 15,000 feet, stunts ranged from tailstands to thrilling near-supersonic flypasts, not to mention the skydiver displays.

The promoters promised "non-stop, live choreographed aerial performances by some of the best civilian and military aviators from around the world" and delivered in spades. The event demonstrated the extraordinary skills of the many pilots who participated, leaving audiences awestruck.

More than 200,000 spectators watched the Airshow, from the crowds at the event precinct on Surfers Paradise beach, to nearby beaches and high-rise balconies, in locations spanning from The Spit in the north to Burleigh in the south.

Commanding the beachside PA system from the show's beachside Command Centre, an "Air Boss" controlled the show and provided running commentary that included *on-air interviews* with the performing pilots!

The Pacific Airshow was a collaborative effort involving 116 dedicated volunteers across the Surfers Paradise event precinct and key airports, which included Brisbane, Coolangatta, the Southport Flying Club, and RAAF Base Amberley.

| Aircraft numbers based at each airport | | | |
|---|---|---|---|
| Southport Flying Club | 26 | RAAF Base Amberley | 9 |
| Gold Coast Airport | 11 | Brisbane International | 3 |

**https://pacificairshowaus.com**

Mark that this would be good to do here, too.

In June, Mark had an online video meeting with event organiser Steve Wray of Code Four California, Pacific Airshow Ground Operations. The initial plan by Code Four was to involve five airfields – Amberley RAAF, Brisbane International, Archerfield (Brisbane), Southport Flying Club (Gold Coast), and Gold Coast Airport at Coolangatta.

As it panned out, only four airports became involved, where Airshow planes were parked to wait their turn to take off, fly to the event precinct, do theirs stunts and return. On-ground communications at each airport was required to inform the Command Centre at the event precinct about aircraft movements so that the Air Boss could maintain critical timing of events. Amazingly, the local Airshow operations spread across four times the area of the US events!

From those first contact onwards, Mark exchanged emails with Code Four's Steve Wray and Ken Ashmore, followed by many Microsoft Teams meetings.

## As it happened

The Gold Coast Amateur Radio Society (GCARS) was involved in establishing and coordinating radio communications for the Pacific Airshow in roles providing schedule-timing and aircraft movement

**The infamous** Yakovlev Yak-110 – two Yak-55s bolted side by side with a jet added between them – delighted the crowds with hair-raising stunts. (Fargo AirSho)

updates from the various airfields back to the Airshow command in Surfers Paradise.

Ten amateurs were engaged for three days at the four different airfields and event precinct locations, scattered across some 100 km. Many also had aircraft radio certifications so that they could communicate with the pilots on the 118-137 MHz airband as necessary.

In initial planning, Mark VK4DMH thought it best to include amateurs from Ipswich & District Radio Club to cover the Amberley RAAF airfield to the west, along with WICEN Brisbane to cover Archerfield and Brisbane International airports, while amateurs from the Gold Coast club would cover the Southport Flying Club airfield, Gold Coast Airport at Coolangatta, and the Control Centre at the Surfers Paradise event precinct.

The final plan only involved Gold Coast Airport, Southport Flying Club, Brisbane International, and Amberley. Archerfield wasn't required. The RAAF would not allow radio amateurs to operate from

**The Gold Coast Airport** site was fortuitously located air side, adjacent to the Airshow participants' aircraft parking area. (Ron VK4RH)

their Amberley base, so their C-17 Globemaster, C-130 Hercules, the Roulettes aerobatic display team, and F/A-18 Hornet, all flew in and out of Amberley without our involvement, and were expected to be in the Airshow zone as and when required.

Code Four required small teams of amateurs to provide real-time aircraft movement reports to the Surfers Paradise Control Centre, detailing times for participating aircraft starting engines, taxiing to the runway, taking off, and safe return to the airfield. They also required reporting of any incidents at the airfields, or of aircraft experiencing mechanical issues and having to withdraw.

To knit this all together and provide on-demand intercommunication was going to require a quite sophisticated radio network. Mark brought into the discussions Andrew Chapman VK4QF, who conceived and established the south-east Queensland wide area repeater network (SEQ WAN – vk4nu.au/index.php/seq-wan). He was able to come up with a 70cm network plan that would provide reliable radio coverage to all Pacific Airshow venues.

Early in the planning, the matter of airband communications between aircraft and the Control Centre being blocked by the many high-rise buildings surrounding the Surfers Paradise event precinct was discussed between Ken Ashmore of Code Four Pacific Airshow Air Operations, and Mark VK4DMH.

The Airshow Control Centre was to be atop a three-story high scaffold on the Surfers Paradise beachfront, hosting the Air Bosses for the show, a show commentator, two amateur radio operators, two Air Services Australia representatives, a representative from the Civil Aviation Safety Authority (CASA), and a Queensland Police officer.

Mark VK4DMH suggested a cross-band aviation-to-commercial VHF-UHF repeater, to be placed on a nearby high-rise building that could be accessed by a handheld two-way radio at the Control Centre. As participating aircraft flying in a holding pattern to the north while waiting to fly-in were within a zone not monitored by an air traffic controller, Mark thought it best to have this cross-band repeater operate on the airband common traffic advisory (CTAF) frequency of 119.0 MHz.


**Local government areas** in southeast Queensland, showing locations of the four Airnet repeaters of the bespoke network created for the Pacific Airshow, along with the four airports involved. The Mount Glorious site is at 685 metres ASL, the Mount Coot-tha site at 268 metres ASL, the Springbrook site at 990 metres ASL, while Surfers Paradise was at 115 metres ASL.

## The bespoke "Airnet"

A complete new 70cm repeater network was commissioned specially for the Pacific Airshow event. Over a period of weeks leading up to the event, the Airnet was designed, built, and tested by Andrew VK4QF, with assistance from Mark VK4DMH, Aidan VK4APM, and Jamie VK4XD.

Four repeater sites were instituted at Mount Glorious to the northwest, Mount Coot-tha in Brisbane, Springbrook in the Gold Coast Hinterland to the southwest, and a site atop a Surfers Paradise high-rise building in Cavill Avenue at Surfers Paradise, behind the beach.

All the sites were interlinked via 70cm transceivers. The Airnet, along with the cross-band aviation-to-commercial (airband/UHF) repeater, gave the show's Air Bosses an expanded area of aircraft radio coverage.

## Showtime operations

Each airfield presented unique issues for our amateur radio operators, as we needed to see and report on each aircraft, ranging across pushing-out from the hanger, to engine start-up, then taxiing and finally, take-off. Even though two airports had Air Traffic Control towers, we weren't allowed access, so our radio operators had to make the best from airside ground positions.


**Local skydivers** entertained the crowds, leading with the event organisers' flag. [Code Four].

The Southport Flying Club airfield hosted 26 of the show's aircraft, including the incredible purpose-built Yak-110. This airfield is within a CTAF zone, which is pilot self-controlled with no Air Services Traffic Controllers.

The upper balcony of the Southport Flying Club gave the radio amateur team a good place to operate from, with a full view of the runway, and about a 60 per cent view of the taxiways. Handheld UHF CB radios enabled communications with ground support crew on the ground.

As Southport was within the 119.0 MHz CTAF zone, it became necessary to communicate on airband direct to the aircraft as they were warming up their engines, then taxiing to the runway. Incoming aircraft could be warned of any hazards, like a flock of birds on the field or if a kangaroo had strayed in from the neighbouring nature reserve.

At Coolangatta, the Gold Coast Airport hosted 11 aircraft, including the small privately-owned fighter jets, the US Marines' MV-22B Ospreys, and three WW2-vintage fighter planes. There was a Special Event Zone set up airside for the aircraft, allowing our amateur radio team to freely move about the parked aircraft and to talk with the pilots and crew.

As there were a few blind spots at Gold Coast Airport, the radio amateur team had to improvise to transmit aircraft status reports.

The Brisbane International Airport team of amateurs had a large area of airfield to deal with. They were situated over 5½ km from where the three military jet aircraft were parked, these being the US Air Force's C-17 Globemaster and KC-135 tanker, and a Canadian CC-150 tanker. Once again, the radio team improvised, making use of *Flightradar24* and binoculars so they could verify via radio the ground movements for these heavy-lift aircraft.

The Surfers Paradise Command Centre crew were well prepared to deal with the continuous loud aircraft noise from the airshow. They had noise cancelling pilot headsets connected into their handheld transceivers. With only two city blocks to the 70cm repeater, they had excellent radio coverage.

Seated alongside the team of two amateur radio operators in the Surfers Paradise Command Centre were two Air Services Australia representatives and a CASA representative. The three Air Bosses were able to get the latest aircraft updates from the amateur radio crew, and all three groups constantly liaised on aircraft movements, including those aircraft in the area that weren't in the airshow.

## Technicalities

Andrew VK4QF provided all these juicy details of the hardware deployed for the Airnet 70cm repeater network.

**Amateurs Involved in Pacific Airshow communications operations**

| Who | Where | When |
|---|---|---|
| Mark VK4DMH | Southport Flying Club | 3 days |
| Aidan VK4APM | Surfers Paradise Control Centre | 3 days |
| Ron VK4RH | Gold Coast Airport | 3 days |
| Simon VK4TSC | Brisbane International Airport | 3 days |
| Jamie VK4XD | Surfers Paradise Control Centre<br>Southport Flying Club | 1 day<br>1 day |
| Geoff VK2DLA | Gold Coast Airport<br>Surfers Paradise Control Centre | 1 day<br>1 day |
| Ed VK4JEN | Southport Flying Club<br>Surfers Paradise Control Centre | 1 day<br>1 day |
| Chris VK4CBX | Southport Flying Club | 1 day |
| Dylan VK4NFS | Gold Coast Airport | 2 days |
| Syd VK4TVR | Brisbane International Airport | 2 days |

**A 0800 morning briefing** at Southport Flying Club, with Ground Support, Safety crew, and club members; Mark VK4DMH is seated on the far side of the table, in the centre. [Mark VK4DMH].

The original concept called for saturated portable coverage for radio amateur teams at the major airfields involved with the airshow.

Because the VHF airband – at 118-137 MHz – is close to the 144-148 MHz amateur band, it was decided to use the 70cm amateur band (430-450 MHz) for the Airnet repeater network as it would have minimum impact on aviation band receivers. This is not to mention the lack of frequencies available on the 2m band. Something as large and important as this event required a dedicated network.

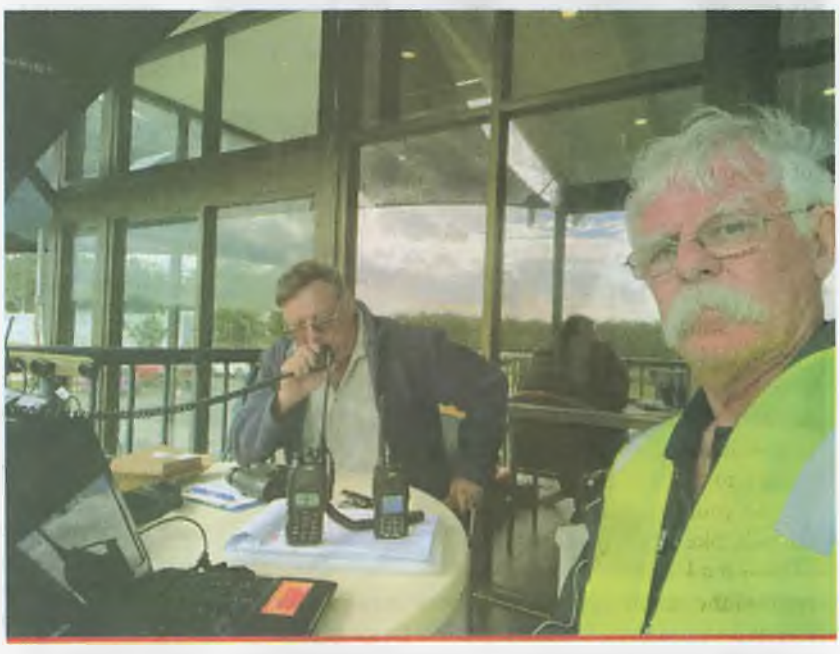
RF coverage plots were made of the general area to be covered. The following sites and repeater input frequencies were decided-on as giving the best 'bang for the buck.'

- 439.700 MHz VK4RES Mount Glorious (Greater Brisbane – Ipswich).
- 439.725 MHz VK4RMC Mount Coot-tha (Brisbane City – Brisbane Airport).
- 439.750 MHz VK4RGX Springbrook (Greater Gold Coast coverage – Gold Coast and Southport Airports) .
- 439.675 MHz Surfers Paradise high-rise (Surfers Paradise – Control Centre coverage).

VK4RES Mount Glorious had a local 70cm repeater on 439.700 MHz, along with a 'talk-thru link' on a 430/440 MHz pair, with VK4RMC, VK4RGX and Surfers being 'child sites' or end links.

The talk-thru link antenna was an RFI OA-40-67P offset array at the 50 metre mark on the tower; the 70cm repeater antenna was another RFI product, a BA40-67 binary array, at the 60 metre mark on the tower.

Equipment used at VK4RES was a Spectra Engineering MX800 UHF repeater, another Spectra Engineering MX800 UHF repeater as the talk-thru link, plus an Omnitronics 619EI Audiobridge and Telewave TPRD-4544 duplexers for both the



**Looking after 26 aircraft** at Southport Flying Club – Ed VK4JEN on the mic, Mark VK4DMH on the camera phone; looking after 26 aircraft. [Mark VK4DMH]

PACIFIC AIRSHOW GOLD COAST 2023
*Performer Schedule*
Saturday 19 August
V1 - FINAL

Air Boss: [illegible] Chris Tibbetts: [illegible]
Unicom: 119.0 Wayne Boggs: [illegible]
Discrete: [illegible] Ray Shaw: [illegible]
Ken Ashmore: [illegible]

| Start | End | Duration | Performer | Airfield | Airspace | Description | Helo | I/E |
|---|---|---|---|---|---|---|---|---|
| 10:16 | 10:22 | 0:06 | Opening Ceremonies | - | - | | - | - |
| 10:22 | 10:30 | 0:08 | All Australia Flag Jump | OOL | 3 / 4k | Gold Coast Skydive Circle the Jumpers - Boeroboon | | |
| 10:31 | 10:37 | 0:06 | Yak110 Jeff Boeroboon (USA) | SPT | 3 / 4k | Teaser | | B/N |
| 10:38 | 10:41 | 0:03 | RAAF C-130 | AMB | 5 / 8k | Flypasts 1 Pass / 270 Flares | | S/N |
| 10:42 | 10:45 | 0:03 | RAAF C-17 | AMB | 5 / 8k | 2 Flypasts | | N/N |
| 10:46 | 10:56 | 0:10 | Matt Hall & Emma McDonald | SPT | 3 / 4k | 2-ship Display MXS & Extra 300 | | N/N |
| 10:57 | 11:01 | 0:04 | Merlin Helo Flypast | | 3 / 4k | | | |
| 11:02 | 11:15 | 0:13 | Freedom Formation | SPT | 3 / 4k | Yak 55 plus [illegible] | | N/N |

**View of a daily runsheet.** This was essential for each amateur radio team as it set down the time windows when each aircraft was to be in the air and performing. [Roger VK2ZRH]

repeater and talk-thru link.

Antennas at the VK4RMC Mount Coot-tha 439.725 MHz repeater used half of an RFI BA4040-67 dual binary array at the 70 metre mark on the tower, with an RFI YB9 9-element Yagi pointed back to the Mount Glorious talk-thru link

The transmission hardware at VK4RMC included a Spectra Engineering MX800 on 439.725 MHz, an Omnitronics 619EI Audiobridge, and a Tait TM9455 link; the repeater duplexer used was a Telewave TPRD-4556.

**Greg VK4BBX** visiting the Surfers Paradise Control Centre crew; Jamie VK4XD on the left, Aiden VK4APM on the right. Note the special noise control headsets. The police officer's task was to spot illegal drone flights; yes, the drones were forcefully brought down!. [Greg VK4BBX]

Springbrook's VK4RGX 439.750 MHz repeater used an RFI BA80-67 binary array at the 30 metre mark on the tower, again with an RFI YB9 9-element Yagi pointed back to the Mount Glorious talk-thru link.

Similarly to VK4RMC on Mount Coot-tha, the transmission hardware at VK4RGX was another Spectra Engineering MX800 on 439.750 MHz, an Omnitronics 619EI Audiobridge, and a Tait TM9455 link. The repeater duplexer employed a Telewave TPRD-4544.

The Surfers Paradise 439.675 MHz repeater used an RFI SMD4-67 side-mount dipole around three meters off the deck on a 115 metre-tall high rise overlooking the official area where local amateur radio operators sat with the Air Boss and other Airshow officials. An RFI YB9 9-element Yagi pointed back to the Mount Glorious talk-thru link

At Surfers, the transmission equipment, yet again, used a Spectra Engineering MX800 on 439.675 MHz, an Omnitronics 619EI Audiobridge, and a Tait TM9455 link. Likewise, the repeater duplexer used was a Telewave TPRD-4544.

After testing Airband communications at Surfers Paradise, it became apparent that the Air Boss would have major issues communicating with aircraft on the Gold Coast CTAF frequency (119.000 MHz). A UHF crossband repeater was established at the same site as the Surfers amateur 70cm repeater to allow portable coverage across the official area.

The equipment for this crossband system was based on an Icom IC-A110 VHF Airband transceiver, modified to allow operation into an Omnitronics DSRI Audiobridge along with a Spectra MX800 UHF repeater on a commercial 456/466 MHz duplex frequency pair; a Telewave TPRD-4544 duplexer and a Power Box 12 VDC power supply completed the equipment manifest.

Antennas for the crossband system included an RFI SMD4-67 side-mount dipole for the UHF crossband and an RFI GP3 airband groundplane for the airband transceiver.

The advantage of the Omnitronics DSRI Audiobridge is that its operating mode can be changed by using Selcall. For this, a Tait TP9460 portable transceiver was used by the amateur radio team so that, in the event of an issue, a Selcall sequence

could be sent on the commercial UHF frequency to "break" away the airband crossband link.

The Air Boss radio was a Motorola APX6000 portable, for operation via the UHF/CTAF crossband repeater.

## The future

Code Four has announced that the Pacific Airshow Gold Coast will return in 2024. Lessons learned by the amateur radio support team will be applied for future events, said Mark VK4DMH.

## Acknowledgements

Andrew VK4QF said that the Airnet system would not have been possible without the help of the following people, and thanked them for their dedicated assistance:

- Mark Hanrahan VK4DMH, President GCARS
- Aidan Mountford VK4APM, GCARS member
- Peter Mill VK3PM, WIA Repeater Coordinator
- Marcus Bamford VK6ZMB, accredited frequency assigner.

Andrew especially thanks his employer, who allowed him to take leave quickly to build and commission the system, in particular Joel Muller, State Manager, Queensland Police, Radio & Electronics Section, and Adam Brown, OIC Toowoomba, Queensland Police, Radio & Electronics Section.

During Saturday of the event, Greg Ackman VK4BBX graciously gave the Editor in Chief a comprehensive tour of key sites and airfields with "access all areas" hospitality; thanks also for lunch.

## Northern Territory MV-22B Osprey crash

A week after the event finished, one of the Osprey MV-22B aircraft that participated, known by the call sign *Dumptruck*, crashed while on operations in the Northern Territory, with the loss of the three aircrew. However, the cargo of 24 Marines were saved, with three hospitalised.

The Pacific Airshow organisers and participants expressed devastation at the loss of Major Tobin "Smeagol" Lewis, 37, Captain Eleanor LeBeau, 29, and Corporal Spencer Collart, 21. As is said on such occasions, "blue skies and tailwinds."


**The Control Centre** at Surfers Paradise was atop this three-story high scaffold on the beachfront. From here, the Air Boss ran the show. [Roger VK2ZRH]

Another pilot from the Pacific Airshow, Stephen Gale, lost his life in a crash in Victoria in November. Stephen flew his private fighter jet in the Gold Coast event. *Blue skies and tailwinds.*

## Updating the design by Drew Diamond VK3XU

# A short vertical antenna for the 160m band

*Justin Giles-Clark VK7TW*

I am a definite fan of Drew Diamond's four-volume *Radio Projects* and have built many of his designs with great success. Volume 3 of *Radio Projects for Amateurs* and *Amateur Radio* magazine Vol. 72 No. 12, December 2004, and Vol. 73 Nos 1 and 2, January/February 2005, contain articles on the "Compact, effective vertical antenna for 160 metres." This article is intended to be read in conjunction with Drew's original articles.

I was looking for a compact 160m antenna to use instead of retuning my 630m Marconi-T each time I went on 160m, which is a major undertaking!

Associated with this search, the local amateur radio club, the Radio and Electronics Association of Southern Tasmania Inc. (REAST), received a donation of a HF Direction Finding Adcock antenna. This contained four, 6.5m-long vertical elements, each with an extensive groundplane and Adcock direction finding receiver. All beautifully made mil-spec equipment. After some deliberation, it was decided to distribute the vertical elements and groundplanes to the experimenters in the club.

## Updating the plans

In his plans, Drew uses a 6 – 6.5 metre length of 32 mm diameter aluminium tube, which I replaced with the vertical antenna segment. The 118 uH top-loading coil mounting arrangement was also updated from Drew's design.

If using aluminium tube, I would suggest trying to source 29 mm tube as the inside diameter of this tube is 25.4 mm (an inch!) and it snuggly fits the outside diameter of the 15 mm PVC fittings used for the updated loading coil mounting.

The aluminium tube can be sourced from a national non-ferrous metal supplier like Capral – 28.58 mm OD 1.4 mm aluminium tube with a 5.5 m length of 6060 material and the corresponding tube that fits neatly inside the larger tube with 25.4 mm OD 1.4 mm aluminium tube. These tubes come in 5.5 metre lengths of 6060 material.

I was able to source most of the other material from Bunnings – see Table 1.

| Description | Bunnings Part Number | Quantity |
|---|---|---|
| 15 mm PVC four-way cross | I/N: 0139318 | 2 |
| 15 mm PVC pipe length | I/N: 4750046 | 1 m length |
| 15 mm PVC coupling | I/N: 3140528 | 2 |
| 90 mm PVC pipe | I/N: 4770093 | 1 m length |
| PVC Priming fluid | I/N: 4750121 | 125 mL |
| PVC Cement | I/N: 4750114 | 125 mL |
| 17-32 mm 304 stainless steel hose clamps | I/N: 0111231 | 3 |
| 6 mm D-shape aluminium carabiners | I/N: 4220908 | 3 |
| 100 mm PVC pipe | I/N: 4770090 | 1 m length |
| 100 mm PVC pipe caps | I/N: 4770360 | 2 |

**Table 1.** Other materials required.

This mounting arrangement can be used for either the original 32 mm aluminium pipe or a tapered antenna vertical. Once all the mounting segments have been glued together and left for a day to fully set, you can carefully trim the radial pipes to the internal diameter of the 90 mm coil former PVC. I did this on a lathe, but it can also be done with measurements, a hacksaw and some careful filing.

The mounting segment is then PVC-glued into the 90 mm coil former PVC pipe and allowed to set over at least a day. Similarly to Drew's construction, the former was marked with a file to create the correct coil spacing.

The wire for the loading coil is 15 AWG (1.9 mm) enamelled copper wire; there are 65 turns on the 90 mm

### About Umbrella Antennas

An umbrella antenna is a capacitively top-loaded monopole antenna, consisting in most cases of a mast fed at the ground end, to which a number of radial wires are connected at the top, sloping downwards.

They are used as transmitting antennas in the medium frequency (MF) and low frequency (LF) bands – and particularly, the very low frequency (VLF) bands. At frequencies below 2 MHz and down to 20 kHz, it is impractical or not feasible to build a full-size quarter-wave monopole antenna.

With the umbrella design, the outer end of each radial wire, sloping down from the top of the antenna, is connected by an insulator to a supporting rope or insulated cable anchored to the ground; the radial wires may also be used to support the mast as guy wires.

The radial wires make the antenna look like the wire frame of a giant umbrella (without the cloth), hence the name. [Diagram: Wikipedia]

**The PVC coil former** assembly was trimmed on my lathe, but there are other ways to do it.

## Ensuring good joints outdoors

Products such as **Alminox** and **Duralac** are useful for protecting metallic joints that will be exposed outdoors.

We covered the features, benefits, and uses of these products in our **Hacks & Hints edition** earlier this year – *Amateur Radio*, Issue 2, 2023, page 47.

Alminox, is sold under the Dulmison (DULALM325G) and Utilux (H2397) brand names. It can be found in electrical trades and boating supply stores. Duralac is sold by automotive, boating and electronics retailers (e.g, Jaycar, Road Tech Marine – NA1026).

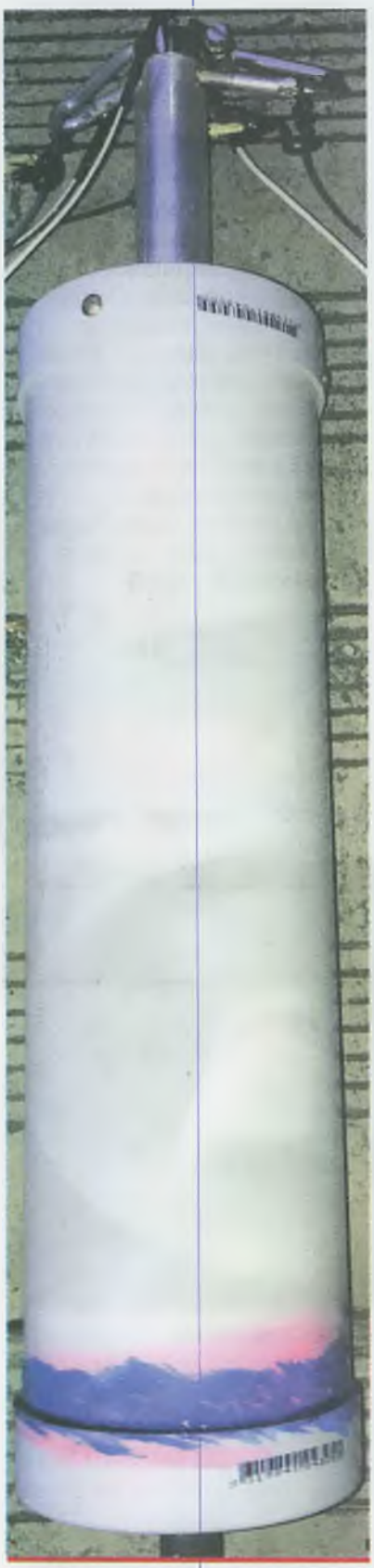

**he PVC coil former** marked ready for winding.

**The completed** top-loading inductor.

**The PVC coil former** glued into the 90 mm PVC tube.

coil former (total length of wire = 19 m). The ends are left long and the enamel is scraped off carefully with a sharp knife. I formed a copper wire loop and firmly clamped it with the stainless steel pipe clamp against the aluminium pipe.

I coated these connections with a special grease known as Alminox – a petroleum-based paste containing sharp zinc granules that aid making a sound electrical



**Showing** the weatherproof cover of the PVC loading coil.

connection between the metallic parts, while the petroleum base prevents moisture intruding, preventing corrosion. The coil is held in place with silicone sealant.

Slots were carefully sawn in the aluminium tube to allow it to collapse around the PVC couplings at each end of the loading coil. These are secured with stainless steel pipe clamps.

A PVC cover for the loading coil and connections was created from a 400 mm-long length of 100 mm diameter PVC tube and two 100 mm PVC end caps. PVC-glue the bottom cap and screw the top cap to the 100 mm tube to secure it. Both caps have a 30 mm centre hole. Silicone sealant was used around the top hole to also attempt to keep moisture from the loading coil.

## Guying

I live in a windy location. Adopting the original idea of the top loading wires being used as guy wires proved to be an issue requiring improvement.

Three holes, spaced 120 degrees, were drilled in the top 180 mm aluminium tube and three carabiners were employed to take the strain of the guy wires. The three top-loading wires are twisted around the guy wires and fixed with cable ties to each guy. This mounting arrangement has withstood significant winds.

## Performance testing

How does the antenna perform? My trusty NanoVNA-F V2 was calibrated and the antenna swept. The top-loading wires were shortened and the resonant frequency centred on 1850 kHz.

WSJT - WSPR mode is a wonderful tool for testing antenna performance as it can be setup and left running, with the results captured automatically to the wsprnet.org global database.

I left the antenna on 160m WSPR receive for several weeks and was surprised by decodes from AG0X over 15,319 km at -25, W1CK over 12,843 km at -27, and WB6YRT over 12,841 km at -23.

**I used** aluminium carabiners for strain relief with the capacitive hat.

| Number of groundplane radials | Effective radiation angle (degrees) |
|---|---|
| 0 | 25.1 |
| 4 | 24.8 |
| 8 | 23.6 |
| 16 | 21.5 |
| 32 | 18.6 |
| 64 | 15.4 |
| 128 | 12.3 |
| 256 | 9.6 |

**Table 2.** How the number of groundplane radials affects the antenna's effective radiation angle.

Subsequently, I had a notable FT8 contact with YE1AR and WSPR contacts made into ZL and VK1, 2, 3, 4, 5, 6 & 7.

## About ground radials

I then wanted to answer the age-old question of how many groundplane radials were required for a good 160m DX antenna.

Table 2 shows the theoretical effective radiation angle for this antenna versus the number of ground plane radials – modelled in MMANA-GAL.

I wanted to test the theory with some empirical data. My local club, REAST, has clubrooms that are the heritage-listed Coast Wireless Station on the top of the Queen's Domain above Hobart. This location used to house a large, biconical monopole for the lower HF bands.

**In situ** – my assembled 160m vertical antenna is just 6.5 metres tall.

Underneath this impressive antenna was a 120-radial groundplane that is still largely intact. I used this as a reference for the groundplane experiments.

For the test, the Field Strength Meter (FSM) I used was a Potomac model FIM-41, with built-in PCB antenna. Thanks to Kim Briggs VK7KB for the FSM loan and assistance with testing.

The testing arrangement was an IC-705 running 5 W with an Arduino keyer at the antenna base with a 300 mm feedline. The FSM was calibrated at the start and checked at the end of the testing. Investigations of the original 120-radial groundplane as to whether there was a low ohmic connection to it was hampered by a "jack jumper ants nest at the point of connection!


**The NanoVNA** sweep of my 160m vertical shows it is resonant close to 1850 kHz with a feedpoint impedance yielding an SWR of 1.49.

Measurements were taken without any groundplane connection, then connection to the existing groundplane, and then four, eight and sixteen 20 metre-long groundplane wires. The results are listed in Table 3.

| Table 3. | | FSM Measurement | |
|---|---|---|---|
| Test No. | Test Description | Volts/metre | dB |
| 1 | Field Strength Meter calibration level taken at 1 m height and 21 m from the antenna, transmitting 5 W CW. Checked before and after the measurements and confirmed same. FSM was then moved 335 m away. | 8.2 | -1.8 |
| 2 | No groundplane and base of antenna isolated from the dry sandy soil. | Nil | Nil |
| 3 | No groundplane and grounded base of the antenna in the soil. | Nil | <-20 |
| 4 | Antenna isolated from the soil and antenna ground connected to the original 120-radial groundplane. | 1.6 | -16 |
| 5 | Antenna isolated from the soil and antenna ground connected to a groundplane of 4 x 20 m-long wires. | 1.46 | -16.8 |
| Difference: | | 0.19 | 1.2 |
| 6 | Antenna isolated from the soil and antenna ground connected to a groundplane of 8 x 20 m-long wires | 1.65 | -15.6 |
| Difference: | | 0.2 | 0.9 |
| 7 | Antenna isolated from the soil and antenna ground connected to a groundplane of 16 x 20m-long wires. | 1.85 | -14.7 |

## Summary

Firstly, I thank Drew VK3XU for his very practical design. I have made some suggested improvements to the construction of the antenna; most of the material is available from your local Bunnings store. The aluminium tube can be sourced from a national non-ferrous metal supplier — Capral, for example.

Eight x 20 m groundplane wires appear to be equivalent to a 120-radial groundplane, although I am aware there are several breakages in the original groundplane and a large ants nest at the point of connection. Further testing with the original groundplane is certainly required.

There was about the same increase in signal strength between 4 to 8 and 8 to 16 groundplane wires; 16 ground plane wires gives an effective radiation angle of 21.5 degrees that resulted in DX contacts being made into the US and Asia. The practicality of how many ground plane wires an operator can deploy is dependent on many aspects.

Construction is relatively easy and certainly possible in a moderately equipped amateur workshop. Careful sawing and filing removes the need for lathe work and the use of a cordless drill to help wind the copper wire onto the PVC former is a definite suggestion.

If you're using a 6.5 m-long aluminium tube, it may be worth guying it at about the 3.5 m mark should the conditions warrant it. An operator can assemble and erect the antenna by themselves in about 15-20 minutes, making it an option for

**Test site** - the grounds of REAST's clubrooms atop the Queen's Domain above Hobart.

a 160m portable antenna.

Why not have a go on "top-band" with this easy to construct 160m vertical?

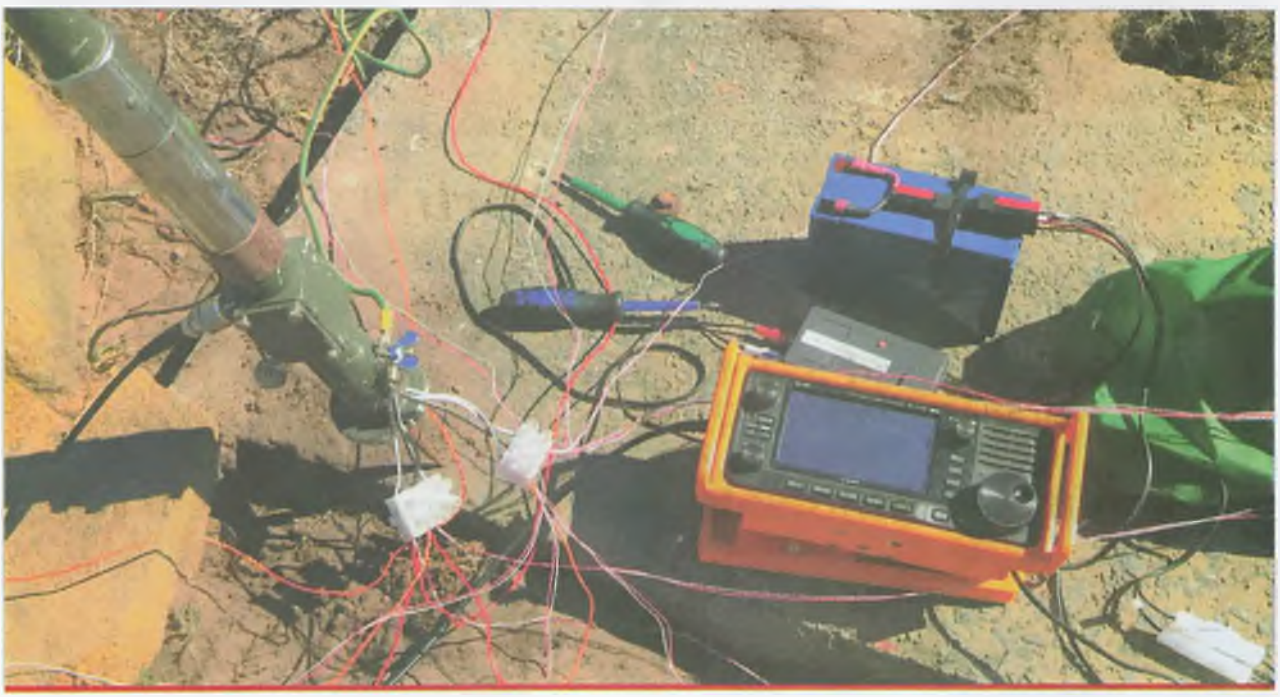
## References and Resources

*Radio Projects for Amateurs Volume 3;* "Compact, effective vertical antenna for 160 metres," Drew Diamond VK3XU; or *Amateur Radio* magazine Vol. 72, No. 12, December 2004, and Vol. 73 Nos 1&2, January/February 2005, "Compact, effective vertical antenna for 160 metres," Drew Diamond VK3XU.

*QEX*, May/June 2013, "Some Ideas for Short 160 Meter Verticals," Rudy Severns N6LF.

*QEX*, March/April 2012, "A Closer Look at Vertical Antennas With Elevated Ground Systems," Rudy Severns N6LF.

MMANA-GAL: http://gal-ana.de/basicmm/en/

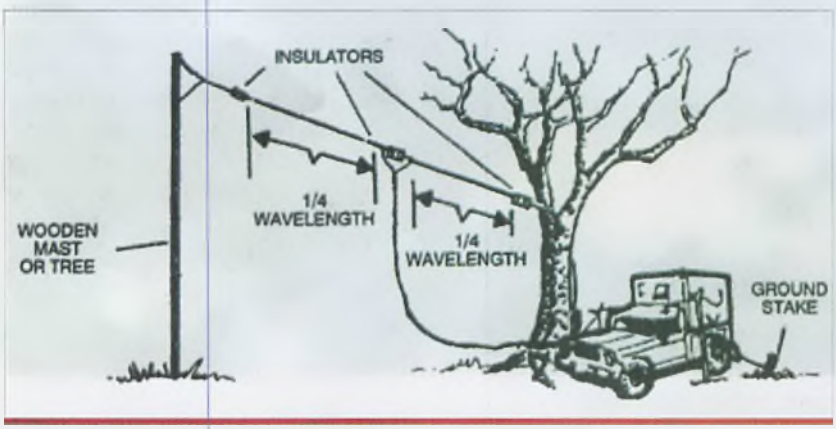


**Groundplane testing** in the field revealed some interesting results.

## In a hurry for a half-wave hantenna?

# A quick-n-dirty dipole for summer shenanigans

*Richard Murnane VK2SKY*




**A half-wave dipole**, as imagined by an illustrator for a US Army 'field manual.'

As the old saying goes, "any antenna is better than no antenna". If you're going portable, and you need an antenna in a hurry, try this . . .

I like to keep a few BNC-to-banana socket adaptors in my connectors box. You can pick these up on eBay or your nearest Jaycar store (part number PA3666). They come in very handy for creating simple dipoles. While you're at it, get a few BNC female-to-female adaptors (PA0663 aka double BNC female), so you can connect a coax cable terminated in a male BNC plug.

Next, select the amateur band you want to fire-up on and, using an online dipole calculator, cut your wire to length, adding a little extra to allow for some fine tuning. There's a handy dipole calculator here: www.omnicalculator.com/physics/dipole.

The BNC-to-banana socket adaptor has extra holes that can be used for strain relief. Thread the wire through a shown in Photo A.

For this antenna, I had some electrical twin lead on hand, which I pulled apart. If minimising weight is a consideration, you can use thinner wire, such as clothesline wire.

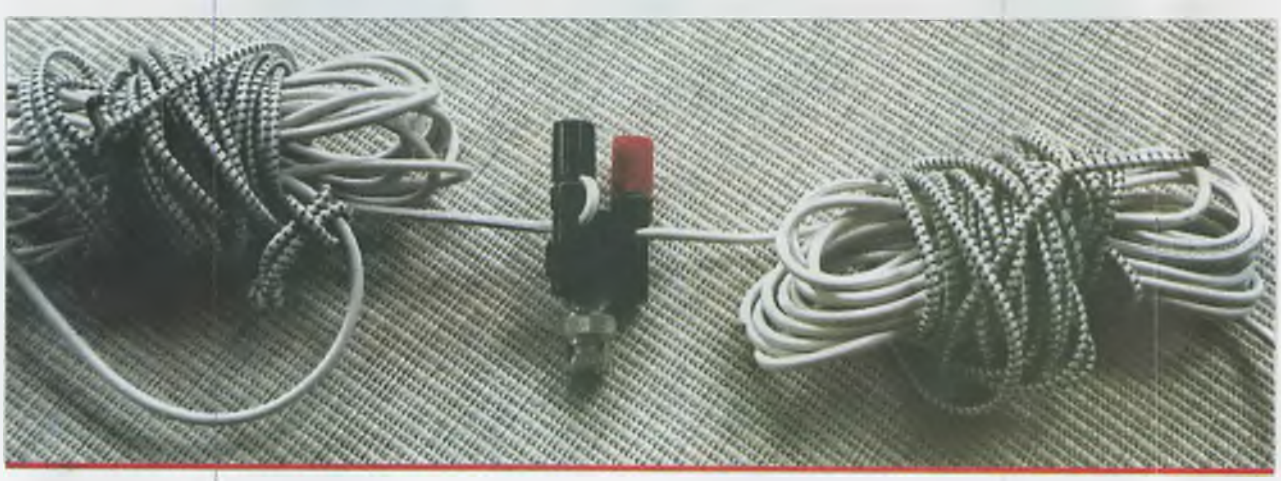
**The foundation** of a quicky-n-dirty dipole is a BNC-to-banana socket adaptor.

**A double-BNC** female connector allows a ready-made RG-58 coax cable to plug straight on.

To support the ends of the dipole wire in the air, I used tent pole "shock cord," available where you buy camping supplies. Finally, gaffa-tape the dipole centre to a squid pole, or similar skyhook, to hoist it off the ground, and then trim the ends of the wire to achieve resonance.

No doubt purists will be horrified by the lack of a balun or at least an RF choke, which means that your coax cable is likely to radiate RF and maybe cause some RF feedback. Or, you might "get away with it."

In practice, you will notice that the SWR minimum will not come right down to 1.0, though it's not



**Completed dipole** ready for shenanigans.

**Threading** the antenna wires through the handy holes in the BNC-to-banana socket adaptor provides strain relief.

likely to be an issue. Adding a short extra length of coax can help a bit, I find.

Or, you can insert a balun or a slip-on ferrite RF choke, but then it wouldn't really be quick-n-dirty any more, would it?

**It is suggested** that you could slip a few of these ferrite barrels up the feedline coax, right up at the dipole centre adaptor, to make an RF choke – the barrel is an FB43-540002 6.35 mm hole of #43 ferrite, "suitable for sliding over RG-58, and all 195 or 240 cables." – Editor. www.minikits.com.au

# Silent Key Barry Wilton VK3XV


Many readers will recall Barry VK3XV as the long-serving secretary of the Victorian Division of the WIA. Barry passed away in November 2022.

It seems that Barry first joined the Victorian Division Council in 1984 as an ordinary Councillor, continuing in a variety of roles from 1985 onwards.

To celebrate the WIA's 75th birthday WIA Federal obtained the special event call sign VI75A. The Victorian Division managed to score its first use, engineered by Barry. He set up his own well-equipped station to use VI75A and scored a cover photograph on Amateur Radio magazine for the July 1985 issue.

The cover photo caption for the issue read: *"VK3 was the first WIA Division to operate the special commemorative call, VI75A, which opened on SSB at 0001 UTC on 15 March [1985] from the station of Barry VK3XV and worked continuously for 48 hours. Operation was on 40 and 20 metres with some contacts on 2m FM and SSB . . . operated by Fred Mackiewicz VK3ZZN, John Amber VK3DJE, and Barry Wilton VK3XV."*

Following the 1987 AGM of the Victorian Division, Barry became President when past-president Jim Linton VK3PC stood aside following controversy over Jim's co-authorship with myself of the discussion paper *Amateur Radio and the challenge of change*, published earlier in 1987.

As 1987-88 President, Barry chaired a divisional sub-committee titled "Future of Amateur Radio Working Party," which conducted a survey of the amateur community, resulting in a submission to the federal Department of Transport and Communications calling for a restructure of the licensing system, extending privileges for Novice licensees to include VHF and UHF bands, introduction of a no-code class of novice licence, permission for Advanced and Limited licensees to transmit "data," and more.

**Barry's VI75A station featured on the cover of AR, July 1985. The equipment lineup included an IC-751 driving a pair of 3-500Zs in a homebrew linear, and an IC-271H.**

It seems that discussion paper had an impact. Following the 1988 AGM, Jim Linton returned as President of the Victorian Division and Barry took up the role of Secretary, in which he continued through to the 2000s.

In Jim Linton VK3PC's obituary, I wrote that Jim was always "in the thick of it." Jim and Barry worked together for the Victorian Division members over many years; importantly, both participated in the WIA Federal Council. Like two peas in a pod, when Jim was "in the thick of it" on any issue, Barry was right behind but rarely stepped into the limelight.

Barry's call sign has been acquired by Amateur Radio Victoria. So long, OM, good DX.

**Roger Harrison VK2ZRH**

## One propagation mode that's *always* available!

# The challenge and the thrill of Meteor Scatter propagation

*Kevin Johnston VK4UH*

In keeping with the theme in this edition, an introduction is offered to VHF Meteor Scatter propagation (MS), arguably one of the most unusual and challenging types of operation in common amateur usage.

Meteor Scatter propagation can support usable amateur contacts over great distances (2000+ km), particularly on the VHF bands (actually, from 10m through to 70cm) even during dead-band periods when no other modes of propagation are present.

MS is one of the few VHF DX propagation modes that is virtually independent of prevailing solar or atmospheric conditions.

## About meteors

So, what are meteors and what have they got to do with radio propagation? The physical basis for Meteor Scatter propagation is the reflection and refraction of VHF radio signals off the ionised trails remaining in our upper atmosphere after the ablation of meteors.

Meteors are tiny fragments of rock, typically comprised of nickel, iron and ice, originating from outer-space, that are drawn into the Earth's gravitational field and accelerated to enormous velocity on their path towards the ground. See **Figure 1**.

All meteors are, by definition, completely ablated (burned up) on descent through the atmosphere. This differentiates meteors from meteorites which, by definition, are sufficiently large to make it all the way to the ground without complete ablation.

Meteors give rise to 'shooting, falling or wishing stars' that have been seen in the night sky since the earliest of times. The brilliant streaks of light, often much brighter than surrounding stars, occur along the path of meteors when their enormous kinetic energy is released.

Air molecules ahead of meteors become compressed and super-heated to the point of becoming 'incandescent' and are seen by ground observers as a brilliant flash or a track of light across the night sky.

Ablation of meteors also results in long and persistent trails of ionisation in their wake. This ionisation is induced by the release of free electrons from the air molecules resulting from the enormous temperatures achieved.

It is actually the free electrons in this ionised trail that reflect VHF radio signals back to the ground that enables Meteor Scatter propagation, not the meteors themselves.

Ablation typically occurs at an altitude of around 100 km above the ground, the first part of the atmosphere sufficiently dense to slow down the meteors by air resistance. This is the region where both the visual meteor trail and Meteor Scatter occurs.

Incidentally, this is the same height as the E-layer of the ionosphere, where most short-skip HF daytime propagation occurs. Indeed, the very existence of the

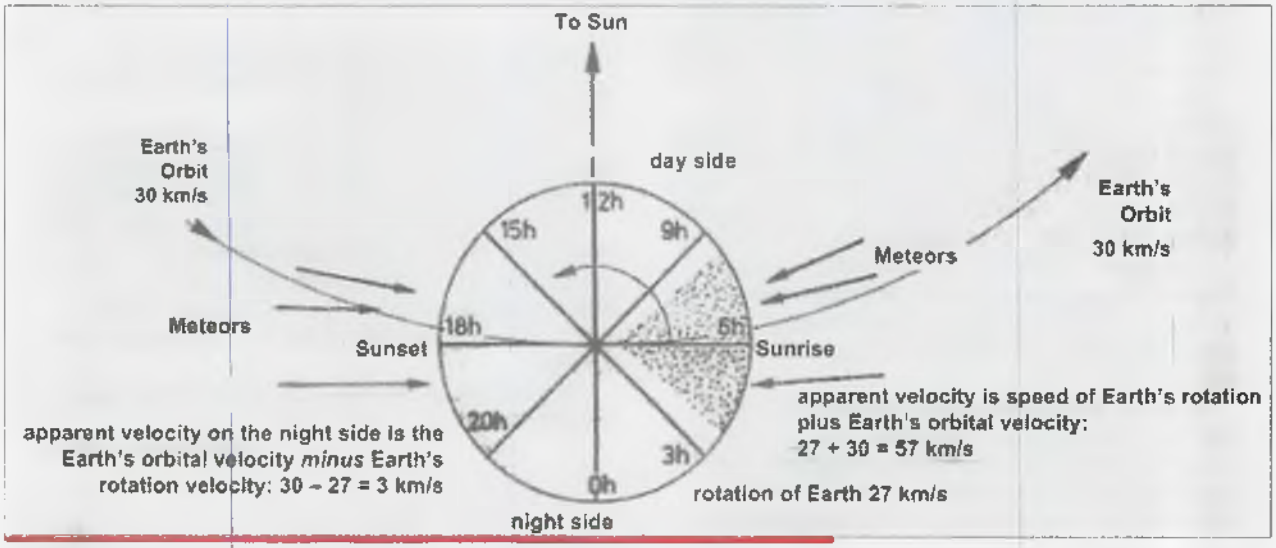



**Figure 1.** Illustrating how meteors reach the very high speeds to burn-up in our atmosphere.

E-layer is in part due to the iron and nickel ions released from meteors during ablation.

Meteors of interest for amateur communication are typically between the size and mass of a grain of sand ranging up to the size and mass of a dried pea (0.1-1.0 grams). Those responsible for MS typically achieve velocities of 10-100 km/second as they are accelerated by gravity.

Although a brilliant visual meteor trail lasts for only a tiny fraction of a second, typically less than one millisecond, the ionised trail of free electrons persists for much longer. Ablation of these 'optimum sized' meteors lead to ionisation persisting in the atmosphere from a few milliseconds, or occasionally to hundreds of seconds. The majority that produce radio returns (reflection) last for only 0.1 to 0.5 seconds.

Meteors enter the Earth's atmosphere at all hours of the day and night and across all seasons of the year. During daylight hours, however, the visual meteor trails are overwhelmed by ambient light and are not seen by the naked eye. The same reason that stars are not seen during the day.

**A typical** meteor trail 'falling star.' [Wikimedia]

## Of seasons and showers

Even though meteors are always there 24/7, Meteor Scatter propagation is not constant. There is a marked 'peak' in the rate of signal returns in the pre-dawn period and a corresponding minimum or 'dip' during the afternoon each day.

This daily cycle is superimposed on a much longer pattern with a peak in the Spring-Summer season in each hemisphere and a corresponding dip in the autumn/vernal-Winter season each year. See **Figure 2.**

The astronomy and physics behind this recurring pattern of "random meteor scatter" was explained in detail in a series of four articles in Amateur Radio back in 2020. [2]

Meteors are not rare. Even conservative figures estimate that the total mass of extra-terrestrial material, entering the Earth's atmosphere from outer space, to exceed 100,000 tonnes per year. A quick estimate of the number of grains of sand, each weighing one tenth of a gram, needed to make up 100,000 tonnes will give some idea of just how common meteors actually are.

There is another dimension to this amazing mode of propagation, that being the phenomenon of 'Meteor Showers.' Superimposed on this pattern of 'random' or 'background' meteor activity are regular periods throughout the year when there is enormous enhancement of both visual meteors and Meteor Scatter propagation.

These periods are called Meteor Showers and, again, the enhancement of visual meteor sightings at certain times of the year has been recognised for thousands of years.

Some showers present visual meteor sightings numbering tens or even hundreds every hour. Recorded

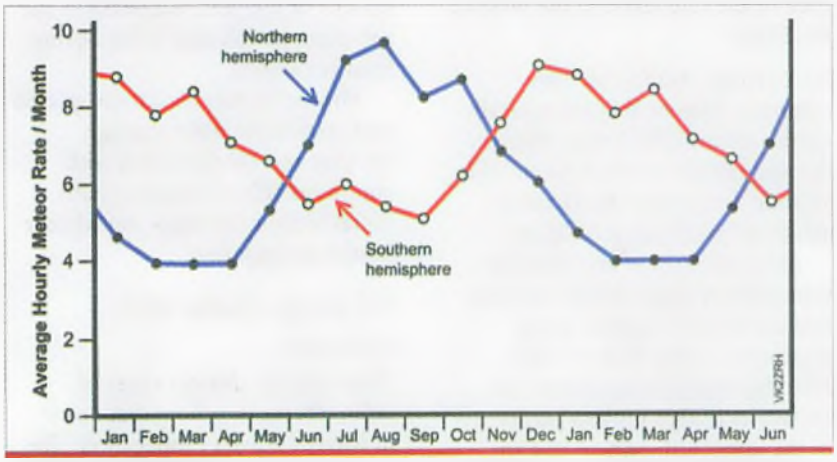



**Figure 2.** The rate at which meteors collide with our atmosphere varies month-by-month, peaking in the spring-summer period in each hemisphere.

events in history have been described as the "sky falling." Such events have been afforded magical significance in the past.

Meteor showers occur frequently and on regular and highly predictable dates each year. There are at least eleven major and a host of minor meteor showers each year. Almost one a month. Enhancement of Meteor Scatter propagation parallels the peaks in visual sightings.

Meteor Showers occur when the orbit of the Earth around the Sun takes it through bands of debris remaining from the earlier passage of comets or asteroids across our solar system. Since these bands of 'cosmic detritus' are effectively stationary in relationship to our Sun, then we cross each path on the same date each year.

Remember that it is the Earth's position in the solar orbit that actually defines the date and the seasons. The Earth's position also determines the dominant star constellations seen on that date. See Table 1.

A unique feature of meteor showers is that the visual meteors appear to be radiating from a single point in the sky, called the Zenith. Historically, meteor showers have been named according to the constellation of stars from which they appear to be emanating. Meteors apparently arising from the constellation of Leo in November each year are called the Leonids and occur as the Earth passes through the track remaining from Comet 55P/ Temple-Tuttle.

The Orionids shower in October, named after the constellation of Orion, is the aftermath of Halley's Comet, and the Geminids shower in December following the passage of asteroid 3200 Phaeton across the solar system. Clearly, the meteors are not arising from those stars, which are millions of light-years away from Earth, they only appear to do so as a trick of the calendar and the orbit of the Earth.

| Meteor Shower name | Date of peak |
|---|---|
| Lyrids | 22 April |
| Eta Aquarids | 5-6 May |
| Southern Delta Aquarids | 28-29 July |
| Orionids | 21 October |
| Leonids | 17-18 November |
| Geminids | 13-14 December |

**Table 1.** The top six meteor showers each year.

**Orionids meteor shower** from a time-lapse photograph. All meteors appear to be emanating from the centre of the easily recognised constellation of Orion 'The Hunter', with the three stars forming his belt.

So, to recap, meteors are very common. Meteor ablation typically occurs around 100 Km in altitude, the same height as the E-layer. This altitude determines the distances achieved by reflection of signals.

Ablation involves the complete vaporisation of the meteor particle and the released kinetic energy produces a visible flash of light. Free electrons displaced from air molecules in that process persist in the upper atmosphere and are capable of reflecting VHF radio waves back to Earth. It is the free electrons, not the meteors themselves that are responsible for Meteor Scatter propagation.

Random meteor scatter propagation occurs at all times of the day and night and throughout all seasons of the year, but peaks in the pre-dawn period and in the Spring-Summer season.

Meteor Showers occur on specific and predictable dates through the year and are associated with enormous enhancement of both visual Meteor sightings and Meteor Scatter propagation.

## Of pings, burns and contacts

There are two distinct types of radio returns or echoes that occur in Meteor Scatter Propagation. The vast majority are called 'pings' where signals appear for only a fraction of a

second (100-500 ms). Less frequent are 'burns' persisting for longer periods (500 ms to sometimes 100s of seconds), dependant on the size and mass of the meteors involved.

Meteor Scatter can support propagation from 10m up to 70cms. In general, higher frequencies are associated with weaker and shorter returns than on lower bands. In VK, most amateur MS activity occurs on the 2m and 6m bands.

So, the obvious question is – if Meteor Scatter only supports VHF propagation for a fraction of a second, how is it possible to make contacts?

Meteor Scatter has been used for VHF contacts since the 1960s using high-speed CW and multi speed tape recorders. The introduction of machine (computer) generated digital modes (MGM) in 2001, with the release WSJT software, changed the scene completely.

FSK441, a fast mode included in early version of WSJT, was created for VHF Meteor Scatter operation. This mode made VHF contacts over vast distances, often over 2000 km, easy and commonplace, on almost any day of the year, at times when no other modes of propagation were present.

Progressive developments, including a series of Forward Error Correcting (FEC) digital modes now allows reliable contacts with even briefer or weaker meteor returns. The current go-to mode here in VK is MSK144 using 15 second periods.

The fundamental cornerstone of digital meteor scatter operation is one of massive repetition. A short message string is transmitted repeatedly, at a high data rate, allowing the entire message, including callsigns and reports etc, to be propagated during a single 100 ms meteor ping.

## Of digits and decoding

As is common to most modern digital modes, FT8 and WSPR included, operation on MSK144 involves transmission and reception in one of two alternating time periods. However, there has to be a strict protocol for which period is selected depending on the location of the stations involved. [1]

Digital Meteor Scatter operating is unique, even compared to other amateur digital modes, in that many stations will be operating on exactly the same frequency and at exactly the same time. Even modes such as FT8, where many stations may be operating simultaneously, rely on stations "spreading out" in frequency, albeit over a very narrow frequency range, to allow individual transmissions to be decoded without causing mutual interference.

Even the narrowest of digital modes, such as WSPR, still rely on small variations in frequency and pseudo-random transmission periods to prevent the otherwise inevitable clashing of signals.


**Skeds** for weekend MS contacts are arranged like this. [2]

How is it possible for many stations to all be on the same frequency? The answer is actually the almost magical phenomenon of geospecificity. Meteor scatter only supports propagation along highly specific paths at any one instant in time.

Signals from two transmitting stations only a few tens of kilometres apart, when received in another call area, are often not superimposed on one another. Rather, one station may be received and not the other, or the two may be separated in time sufficiently to decode both, determined by the relative paths and intersection of the radio signal path and the trajectory of individual meteors.

An in-depth discussion of geospecificity is beyond the scope of this short introduction, but has been covered in the earlier articles. [2]

## Dimensions of the challenge

What can be achieved? Meteor Scatter can support contacts on the 2m and 6m bands in particular, out to a distance of around 2000 km, sometimes further if other modes of propagation occur at the same time. This allows QSOs between all the eastern and southern state capital cities on a daily basis and between the southern VK call-areas and New Zealand.

Some contacts may take 20-30 mins to complete. Although this mode of propagation is enhanced in the early morning it is present throughout the day with sufficient patience. Enhancement during Meteor Showers can be spectacular.

In terms of equipment and antennas required to use MS propagation, few additional resources are required above those found in most average VHF terrestrial amateur stations. Entry level will probably include an SSB or multimode transceiver for the intended band.

There is no special requirement for very high frequency stability or accuracy beyond that required for SSB contacts. The power limit for digital modes in VK is currently 120 watts on an Advanced licence. Most stations run an external linear amplifier to achieve this power level rather than overrun their transmitters.

Antenna wise, since MS signals may appear across a narrow arc across the direct beam heading,

then very high antenna gain, with a narrow beamwidth, can be counterproductive. Many consider an 8-element horizontal 2m Yagi as being optimum. Elevation control, as used for satellite or EME operation, is not required.

A basic computer or laptop, running the digital software, will be required to produce and decoded the audio signals in and out of the transceiver. A suitable interface is required to achieve this and to command the PTT functions.

The computer clock will need to be synchronised to an internet or other source, to an accuracy better than a second. The computing requirements of the current software is very modest and just about any machine with an OS that is still supported will likely be adequate for this purpose.

In-depth information about operating protocols and software operation is beyond the scope of this short introduction. Again, most aspects have been covered in previous articles. [2]

## References


[1] VK Meteor Scatter Activity Sessions and Protocols
Here in VK, taking advantage of the pre-dawn peak described above, regular MS activity sessions run on Saturday and Sunday mornings from around 20:00 UTC.
**Focus frequencies:** 2m 144.230 MHz, 6m 50.230 MHz
**Current Preferred Mode:** MSK144 Version 2.0 running 15 second periods.
A well-established protocol is followed to determine which transmission period is used by which call areas, during these weekend activity periods:
Southerly stations (VK1,3,5,7) ALWAYS run 1st period beaming North.
Northerly stations (VK4) ALWAYS run 2nd period beaming South.
Stations in the middle call-areas (VK2 and VK1) change period, depending on the day.
Saturday run 2nd period beaming South; Sundays run 1st period beaming north.

[2] Meteor Scatter Report column in Amateur Radio, Vol. 88 Nos 3, 4, 5, 6 for 2020.


Anyone considering trying MS communication for the first time can find additional information by registering with the VK-ZL Meteor Scatter group on Facebook. It is also worthwhile logging on to the VK-Spotter site to follow and report activity in near real time.

Those interested in knowing more can find previous articles, covering many aspects of MS communication, from my previous monthly columns in *AR* magazine. There are also several useful lectures and other presentations available for viewing on YouTube.

## Further Reading

*Meteor Detection by Amateur Radio*, Oswald G. Villard Jr, W6QYT: tinyurl.com/5hymzwpu

## WIA IT Manager

IT qualifications desirable - a CV detailing work experience is required.

The incumbent is expected to work for the best interests of the WIA and its members.

The incumbent will be asked to form a team of IT experts to manage the IT assets of the WIA ensuring systems are functional, up to date, secure, provided at a reasonable cost and provide recommendations to the Board for any suggested improvements.

Key areas to focus on:

- Transition of AWS servers to Azure (The WIA has secured a Microsoft not-for-profit grant)
- Maintenance of the Azure server instances (backend)
- Maintenance of the Office365 instances for the National Office, Board and Pubcom, Education Committee - plus any other WIA volunteers requiring Office365 Sharepoint/ OneDrive/Teams assistance
- Coordinate the public facing website renewal
- Maintain the WIA MEMNET subscription

## WIA Role Description - Digital Manager

The incumbent is expected to work for the best interests of the WIA and its members.

The WIA needs to improve its digital footprint to maintain relevance in a quickly changing environment. The intent is to get better at communicating with its members and prospective members and most importantly market the Amateur Radio service to the public.

The incumbent will be asked to form a team of experts to produce and curate digital content to supplement the *AR* Magazine by ->

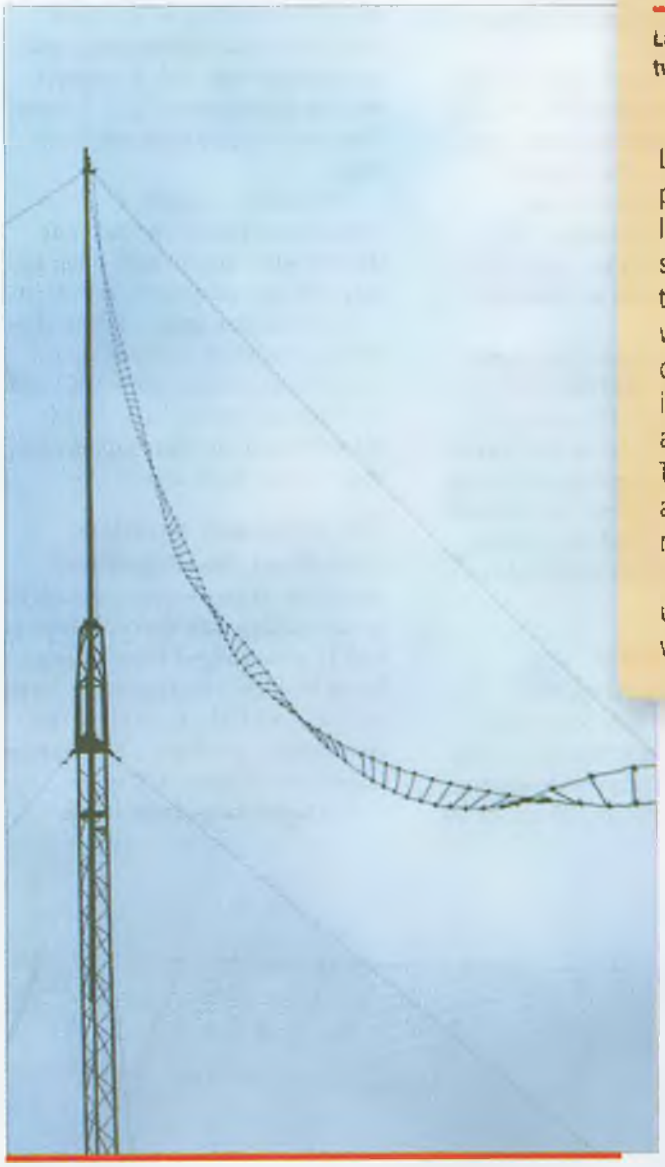
- Produce video content promoting WIA, Club and other general interest topics for the appropriate online video platforms, e.g. YouTube, TikTok etc
- Compose and post suitable information pieces and notifications to social media platforms, e.g. Tribel, X, Instagram, Facebook, Threads, SnapChat, Discord
- Maintain/moderate content on the WIA social media platform chat facilities
- Provide advice to the board as to which platforms will be the most effective

## The feedline that provides a 'stairway to heaven'

# Economical, rugged ladder line can be made from low-cost agricultural parts

*Donald Howarth VK6JDM*
e *donald.howarth@uwa.edu.au*

The purpose of this article is to briefly review some of the many ways amateurs can obtain or make ladder line, and to present the very low cost, effective and easy to make solution I have found.



**The stairway to DX** heaven! Ladder line installation at my home location, on the south coast of Western Australia.

## EXPLAINER

**Ladder line aka open-wire or two-wire line**

Ladder line is a form of parallel-wire transmission line. As the illustration shows, it comprises two wires held parallel with spacers or 'rungs' of insulating material at intervals to hold the wires at a consistent spacing. The arrangement looks like a rope ladder, hence the name.

The wires may be uninsulated or insulated with a durable enamel coating or plastic insulation. In the past, treated wood or ceramic was used to make spacers.

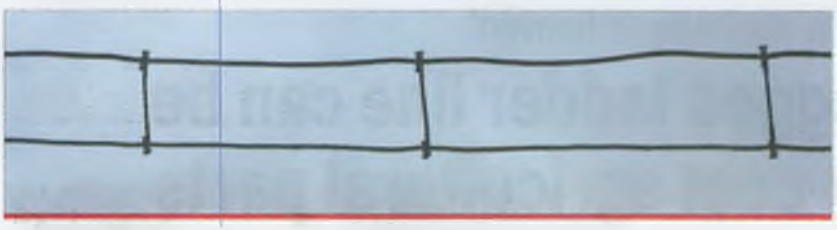
Although simple, ladder line is obtainable as a commercial off-the-shelf (COTS) product but can also be readily homemade.

The characteristic impedance of any parallel-wire transmission line is determined primarily by the ratio of the spacing between the lines and the diameter of the wires. Any insulation on the lines will lower the impedance, while the effect of the spacers generally has only a minor impact on the transmission line's impedance.

When ladder line is used by amateurs, it is generally to feed a dipole that is used over a range of frequencies. Ladder line was the usual way to feed an antenna before the advent of mass produced coaxial cable. While ladder line may be less popular than coaxial cable, it can still offer advantages over coax.

Firstly, the chief advantage of ladder line as an antenna feeder is its low losses. If well-constructed, it also has the advantage of lasting a long time without its signal carrying capacity deteriorating. However, ladder line does have the disadvantage that, when installed, it needs to be kept a short distance away from metal surfaces.

Coaxial cable, on the other hand, deteriorates over time, especially if water gets into the outer braided conductor. I have found at my QTH that it



**One ladder line** I made with short-length clips intended for on-farm use.

needs to be regularly replaced after sunlight and birds damage the outer waterproofing insulation.

But then, with comparatively cheap ladder line, the problem of metal fatigue arises with the thin wires if the line is allowed to swing in the wind.

Despite the advantages of ladder line, it has been less used than coaxial cable since WW II, at least in part, because coaxial cable has been readily available while ready-made ladder line is comparatively rare.

## Options, options

For those wishing to use ladder line feeders, fortunately, there are several commercial and multiple homebrew options open to you.

Pre-formed slotted twin-lead is a form of ladder line that is commercially available, but is fairly expensive. It generally has thin conductors and is affected by rain. It is, however, possible to make a slotted ladder line from cheap 300 ohm standard twin lead by cutting out segments of the plastic web between the wires. [1]

At least one company custom manufactures quality ladder line in the USA. [2] This is relatively expensive, though clearly well-made and long lasting.

There are also many ways of homebrewing ladder line, several of which are promoted on YouTube and in various amateur radio journal articles. These homebrew options use a variety of materials for spacers, such as short lengths of half-inch PVC pipe, plastic cut from coat hangers, plastic pen cases, irrigation tubing, plastic sheeting, hair curlers, Leggo pieces, etc. [3, 4, 5, 6, 7, 8]

There are also purpose-made spacers available under various trade names. *Ladder Snap* is such a proprietary spacer. These cost about US$1 per metre of feeder length. They are made from UV-stable plastic and snap easily onto insulated wire. They can also be snapped-off the wire and used again on another balanced line. [9]

A different style of purpose-made spacer is available from DX Wire in Germany. They also are made from UV-stable plastic. These spacers are 80 to 180 euro cents each, depending on their length. [10] At least two spacers are needed per metre, making these an expensive option.

A similar spacer in clear acrylic is available from SOTABEAMS in the UK. Costing 3.15 pounds for enough to make three to five metres of ladder line, depending on spacing. [11] This manufacturer recommends using the spacers with the antenna wire they sell, which would add to the cost.

## The 'Ag' solution

There are also several types of agricultural clips that come from New Zealand, under the trade name *KlipOn*. [12] These provide spacing between wires of 6 cm, 10 cm, or 20 cm, depending on which of the clips you chose. The 6 cm clips come in bags of 1000 for AU$33. Using three clips per metre of ladder line, this works out at 10c per metre, making this by far the cheapest option.

The KlipOn clips are UV-stable black polypropylene, being designed to hold grape vines to vineyard support wires. The longer ones are designed to hold small branches of fruit trees to wires and are made of black nylon; they are considerably more expensive than the 6 cm-long clips.

These clips have been designed to grip well on 2.5 mm diameter agricultural fencing wire. I have found the 6 cm clips also grip well on insulated wire with a diameter over the insulation of 2.5 – 3.5 mm. They are very easy to attach to the wire.

To produce a length of transmission line, I stretched out the two wires next to each other and snapped clips on about every 30 cm.

I first became aware of these clips when I overheard a conversation about them between some VK2 and VK3 stations awhile back, which led to a search for their supplier and then trialing them myself.

## On wires and doublets

I have found wire salvaged from discarded 10 amp extension cords to be satisfactory with the 6 cm clips as well as wire salvaged from 10 amp house builders' electrical cable. Using such wire with the 6 cm clips, this combination produces a line with an impedance of about 450 ohms.

If a higher impedance line is

**Clips made for agricultural** applications are readily repurposed for ladder line.

required, then the 10 cm or 20 cm long black nylon clips should be used.

When ladder line is used to feed a multiband dipole, or doublet, the impedance of the line is not important. There will be instances where there is a major mismatch between the antenna and the feedline resulting in a high SWR, but it is the very low loss of the ladder line that makes the high SWR immaterial. That's the job of an antenna matching unit.

The 20 cm clips are much more expensive than the 6 cm clips. They also don't fit wire greater than 2.5 mm in diameter. Having used both clip sizes, I have found the 6 cm clips to be the obvious choice for feeding a multiband doublet antenna.

## Final, final

Once assembled, the line is very stable and the clips do not fall off even in the strong winds that we regularly get on the south coast of Western Australia.

Basically, these clips make true ladder line available to amateurs at a very low price. The vine clips were bought in VK6 from the agent for KlipOn – Crackpots Rural Suppliers.

**Window line is available** commercially, but while it's robust, it is expensive.

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## VK4SN's 2024 VK and POPULAR CONTESTS.

Last Updat

| January | | | February | | | March | | | April | | | May | | | June | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | M | ROSS HULL | 1 | T | | 1 | F | | 1 | M | | 1 | W | | 1 | S | PRIDE RADIO |
| 2 | T | all January | 2 | F | | 2 | S | ARRL DX | 2 | T | | 2 | T | | 2 | S | GROUP |
| 3 | W | | 3 | S | | 3 | S | SSB | 3 | W | | 3 | F | | 3 | M | |
| 4 | T | | 4 | S | | 4 | M | | 4 | T | | 4 | S | HA MEM | 4 | T | |
| 5 | F | | 5 | M | | 5 | T | | 5 | F | | 5 | S | | 5 | W | |
| 6 | S | ARRL | 6 | T | | 6 | W | | 6 | S | EA | 6 | M | | 6 | T | |
| 7 | S | RTTY | 7 | W | | 7 | T | | 7 | S | RTTY | 7 | T | | 7 | F | |
| 8 | M | | 8 | T | | 8 | F | | 8 | M | | 8 | W | | 8 | S | VK SHIRES |
| 9 | T | | 9 | F | | 9 | S | YB RTTY | 9 | T | | 9 | T | | 9 | S | DL RTTY ? |
| 10 | W | | 10 | S | CQ WPX | 10 | S | BERU | 10 | W | | 10 | F | | 10 | M | |
| 11 | T | | 11 | S | RTTY | 11 | M | | 11 | T | | 11 | S | Don Edwards CW | 11 | T | |
| 12 | F | V/UHF FD | 12 | M | | 12 | T | | 12 | F | | 12 | S | | 12 | W | |
| 13 | S | YB DX 24Hr | 13 | T | | 13 | W | | 13 | S | JIDX CW | 13 | M | | 13 | T | |
| 14 | S | DARC 10M | 14 | W | | 14 | T | | 14 | S | QRP HRS | 14 | T | | 14 | F | |
| 15 | M | | 15 | T | | 15 | F | | 15 | M | | 15 | W | | 15 | S | ALL ASIA |
| 16 | T | | 16 | F | | 16 | S | JMMFD | 16 | T | | 16 | T | | 16 | S | CW |
| 17 | W | | 17 | S | ARRL DX CW | 17 | S | RU DX | 17 | W | | 17 | F | | 17 | M | |
| 18 | T | | 18 | S | RU PSK | 18 | M | BARTG HF | 18 | T | | 18 | S | | 18 | T | |
| 19 | F | | 19 | M | | 19 | T | | 19 | F | | 19 | S | | 19 | W | |
| 20 | S | | 20 | T | | 20 | W | | 20 | S | CQMM | 20 | M | | 20 | T | |
| 21 | S | | 21 | W | | 21 | T | | 21 | S | CW | 21 | T | | 21 | F | |
| 22 | M | | 22 | T | | 22 | F | | 22 | M | | 22 | W | | 22 | S | V/UHF FD |
| 23 | T | | 23 | F | CQWW 160 | 23 | S | | 23 | T | | 23 | T | | 23 | S | V/UHF FD |
| 24 | W | | 24 | S | SSB | 24 | S | | 24 | W | | 24 | F | | 24 | M | |
| 25 | T | | 25 | S | | 25 | M | | 25 | T | | 25 | S | CQ WPX | 25 | T | |
| 26 | F | AX DAY | 26 | M | | 26 | T | | 26 | F | | 26 | S | CW | 26 | W | |
| 27 | S | BARTG | 27 | T | | 27 | W | | 27 | S | SP DX | 27 | M | | 27 | T | |
| 28 | S | RTTY 24hr | 28 | W | | 28 | T | | 28 | S | RTTY | 28 | T | | 28 | F | |
| 29 | M | CQWW 160 | 29 | T | | 29 | F | | 29 | M | | 29 | W | | 29 | S | |
| 30 | T | CW | | | | 30 | S | CQ WPX | 30 | T | | 30 | T | | 30 | S | |
| 31 | W | | | | | 31 | S | SSB | | | | 31 | F | | | | |

# The 2024 Contest Calendar

This annual calendar of contests popularly patronised in Australia (E&OE) has been prepared and provided by Alan Shannon VK4SN, WIA Contest Committee Chairman. **All times are in UTC.** Alan publishes his contest calendar annually on his website: www.vk4sn.com/Contests/Calendar

**Lift-out:** As this pair of pages is the centre sheet of the magazine, you can easily lift it out and post it to the noticeboard in your shack, on the door of your fridge, or anywhere at-hand.

| 0/2023 | All mode | SSB | CW | DIGITAL |
|---|---|---|---|---|

| July | | August | | September | | October | | November | | December | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M | | 1 T | | 1 S | | 1 T | | 1 F | | 1 S | |
| T | | 2 F | | 2 M | | 2 W | | 2 S | | 2 M | |
| W | | 3 S | BATAVIA FT8 | 3 T | | 3 T | | 3 S | | 3 T | |
| T | | 4 S | | 4 W | | 4 F | | 4 M | | 4 W | |
| F | | 5 M | | 5 T | | 5 S | OCEANIA | 5 T | | 5 T | |
| S | NZART | 6 T | | 6 F | | 6 S | SSB | 6 W | | 6 F | |
| S | MEMORIAL | 7 W | | 7 S | ALL ASIA | 7 M | | 7 T | | 7 S | FT |
| M | | 8 T | | 8 S | SSB | 8 T | | 8 F | | 8 S | ROUNDUP |
| T | | 9 F | | 9 M | | 9 W | | 9 S | JIDX SSB | 9 M | |
| W | | 10 S | WAE CW | 10 T | | 10 T | | 10 S | WAE RTTY | 10 T | |
| T | | 11 S | | 11 W | | 11 F | OCEANIA | 11 M | | 11 W | |
| F | | 12 M | | 12 T | | 12 S | CW | 12 T | | 12 T | |
| S | IARU | 13 T | | 13 F | WAE | 13 S | Makrothen | 13 W | | 13 F | |
| S | HF CHAMP | 14 W | | 14 S | SSB | 14 M | RTTY | 14 T | | 14 S | ARRL 10M |
| M | | 15 T | | 15 S | BARTG | 15 T | | 15 F | | 15 S | |
| T | | 16 F | | 16 M | PSK63 | 16 W | | 16 S | | 16 M | |
| W | | 17 S | RD CONTEST | 17 T | | 17 T | | 17 S | | 17 T | |
| T | | 18 S | | 18 W | | 18 F | | 18 M | | 18 W | |
| F | | 19 M | | 19 T | | 19 S | QRP HRS | 19 T | | 19 T | |
| S | VK T-TAS | 20 T | | 20 F | | 20 S | JARTS | 20 W | | 20 F | |
| S | | 21 W | | 21 S | | 21 M | RTTY | 21 T | | 21 S | OK RTTY |
| M | | 22 T | | 22 S | | 22 T | | 22 F | | 22 S | |
| T | | 23 F | | 23 M | | 23 W | | 23 S | CQWW | 23 M | |
| W | | 24 S | WW DIGI DX | 24 T | | 24 T | | 24 S | CW | 24 T | |
| T | | 25 S | ALARA | 25 W | | 25 F | | 25 M | V/UHF FD | 25 W | |
| F | | 26 M | | 26 T | | 26 S | CQWW | 26 T | | 26 T | |
| S | RSGB | 27 T | | 27 F | | 27 S | SSB | 27 W | | 27 F | |
| S | IOTA | 28 W | | 28 S | CQWW | 28 M | | 28 T | | 28 S | |
| M | | 29 T | | 29 S | RTTY | 29 T | | 29 F | | 29 S | |
| T | | 30 F | | 30 M | | 30 W | | 30 S | | 30 M | |
| W | | 31 S | | | | 31 T | | | | 31 T | |

## FT4 + FT8 in contesting

The popular *'express exchange'* digital modes FT4 and FT8 have found favour with contesters globally. FT4, introduced into the WSJT-X digital protocols suite in 2019, is designed especially for radio contests. Consult: https://wsjt.sourceforge.io/index.html

FT4 + FT8 have recently been adopted by VHF-and-above contesters entering the Australian VHF-UHF Field Days, following European VHF+ contesting practice. To use FT4 or FT8 in the WIA VHF-UHF Field Days, you need to be running WSJT-X and select the 'Advanced' tab in configuration *and* select 'EU VHF'. Your exchanges will then be spot-on. Note that, on 6m, the frequency will default to 50.323 MHz and the word TEST is added to the CQ call. Visit: https://europeanft8club.wordpress.com/user-guide/

Advice on using FT4 + FT8 in the **2024 Ross Hull VHF-UHF Contest**, is online here: https://tinyurl.com/2p8kuwcb

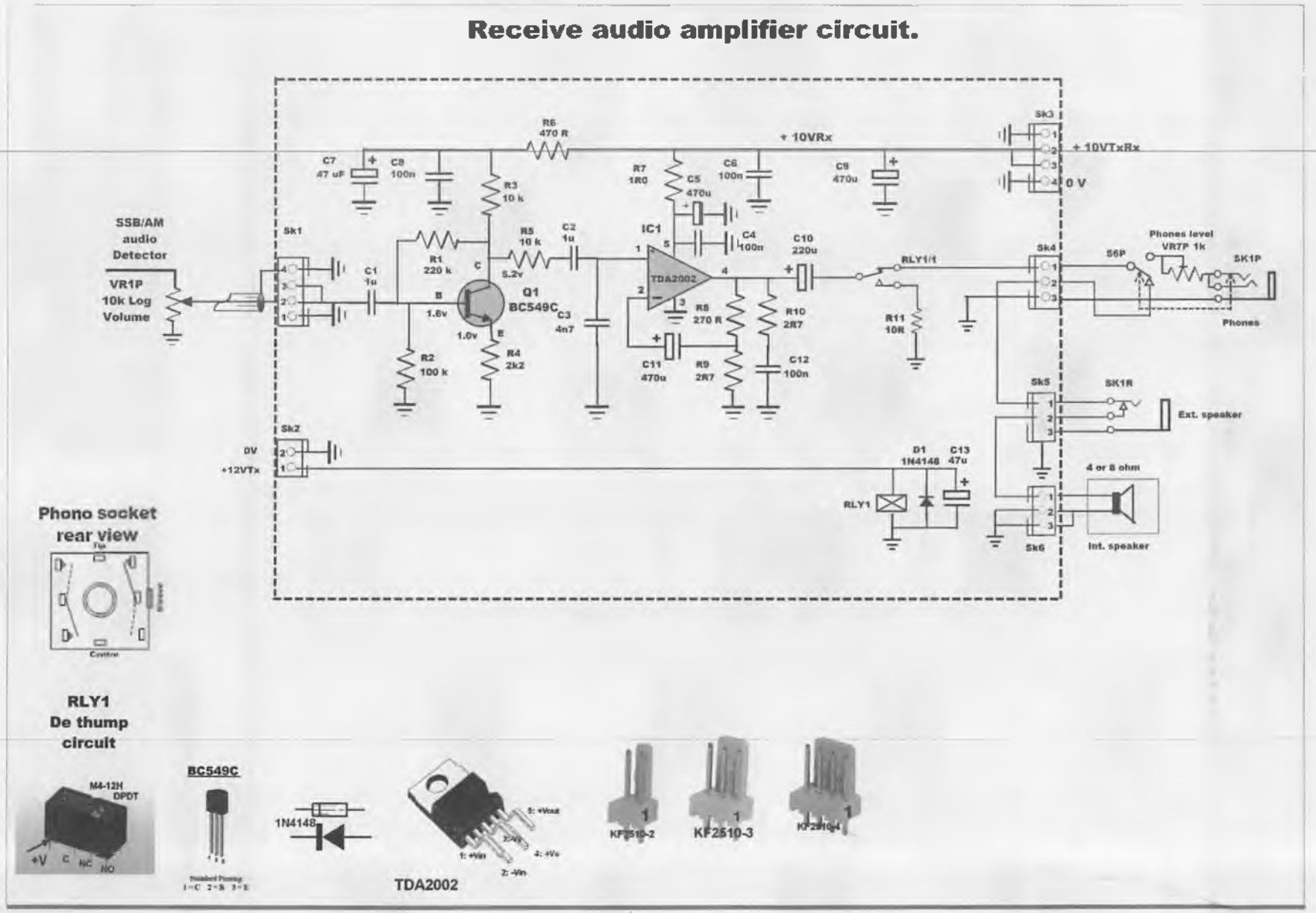



**Figure 12.** Receiver audio loudspeaker amplifier circuit. This features a TDA-2002 (LM2002), an 8 Watt all-in-one audio amplifier 'block' intended for automotive audio applications.

VK3AQZ describes his 80-40-20 metre 'rig for the road'

Part 2

# Homebrew three-band 100 W HF transceiver

*Lou Destafano VK3AQZ*

**First article: Receiver audio, then through the transmitter circuits up to the 10 Watt RF driver stage.**

## Receiver audio amplifier

The receiver's speaker amplifier circuit is shown in **Figure 12**. This module's PCB contains additional connectors for the internal speaker (SK6), an external speaker (SK5), and headphones (SK4). There is a small trimpot (VR7P) on the 6.35 mm phone socket for adjusting the audio level in the headphones through a hole in the side of the case.

The speaker amplifier can be seen in **Photo 3B** here (NB: **Photo 3** originally appeared in Part 1, First Article, Issue 4 for 2023, on page 23. [1A]

Now we can begin to focus on the transmitter section of the Mk5 transceiver.

## Transmitter balanced modulator

The circuit for this module is shown in **Figure 13**. Like the arrangement I used in the Mk4 rig, the MK5 balanced modulator uses the LM1496 (IC1) as a balanced modulator. This IC has proved a versatile device.

The beat frequency oscillator (BFO) feeds the carrier signal input at 425 mV peak-to-peak. A microphone processor level of 50-to-100 mV peak-to-peak feeds the audio signal input. **Photo 6** shows the balanced modulator module PCB.

## Microphone amplifier and speech compressor

I opted to include some audio compression for this rig design. Compression changes the audio level to reduce the differences between sounds that are loud and sounds that are quieter. This gives more 'punch' to the audio in another station's receiver, enabling better readability of the signal.

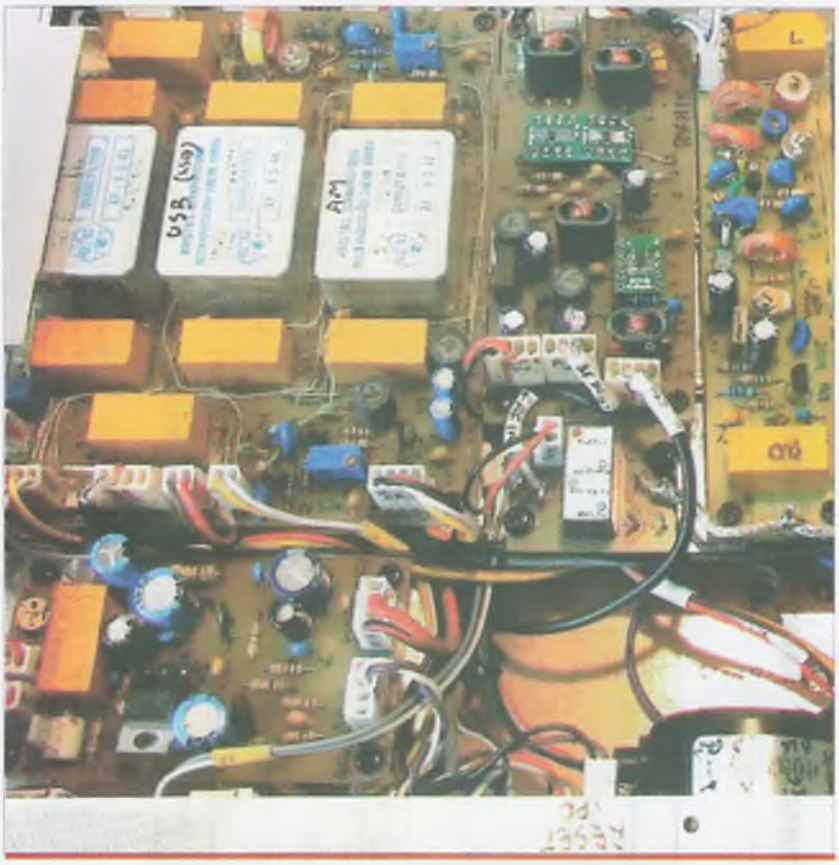



**Photo 3B.** Inside view of the Mk5, showing some of the receiver boards. The loudspeaker audio amplifier as at lower left, with the crystal filters above it. Immediately to the right is the receiver mixer, then the 20m RF preamp at far right.

**Photo 6.** The transmitter balanced modulator circuit board. Note the trifilar-wound RF output toroid and the three trimpots.

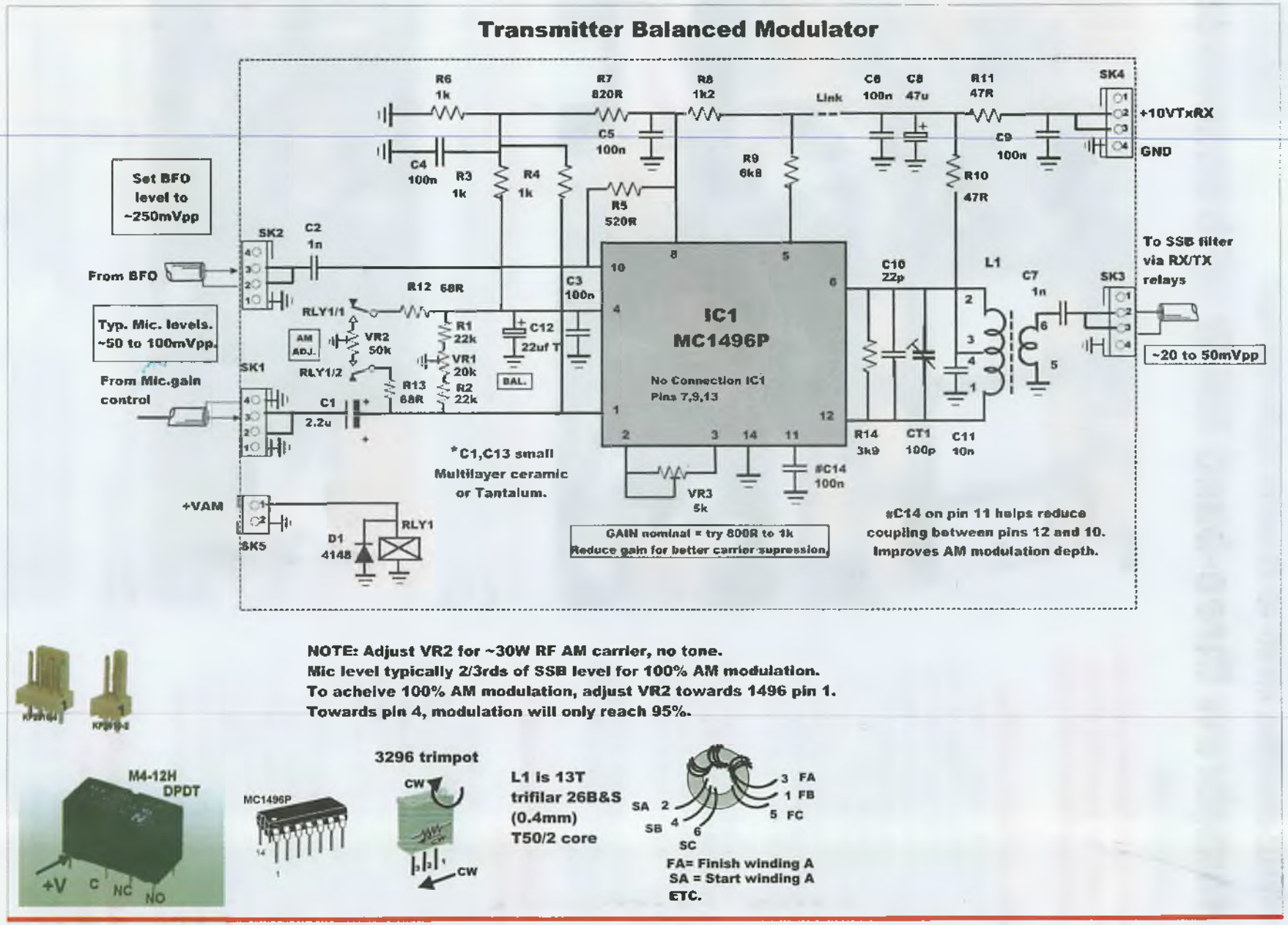



Figure 13. The transmitter balanced modulator employs the versatile LM1496 IC.

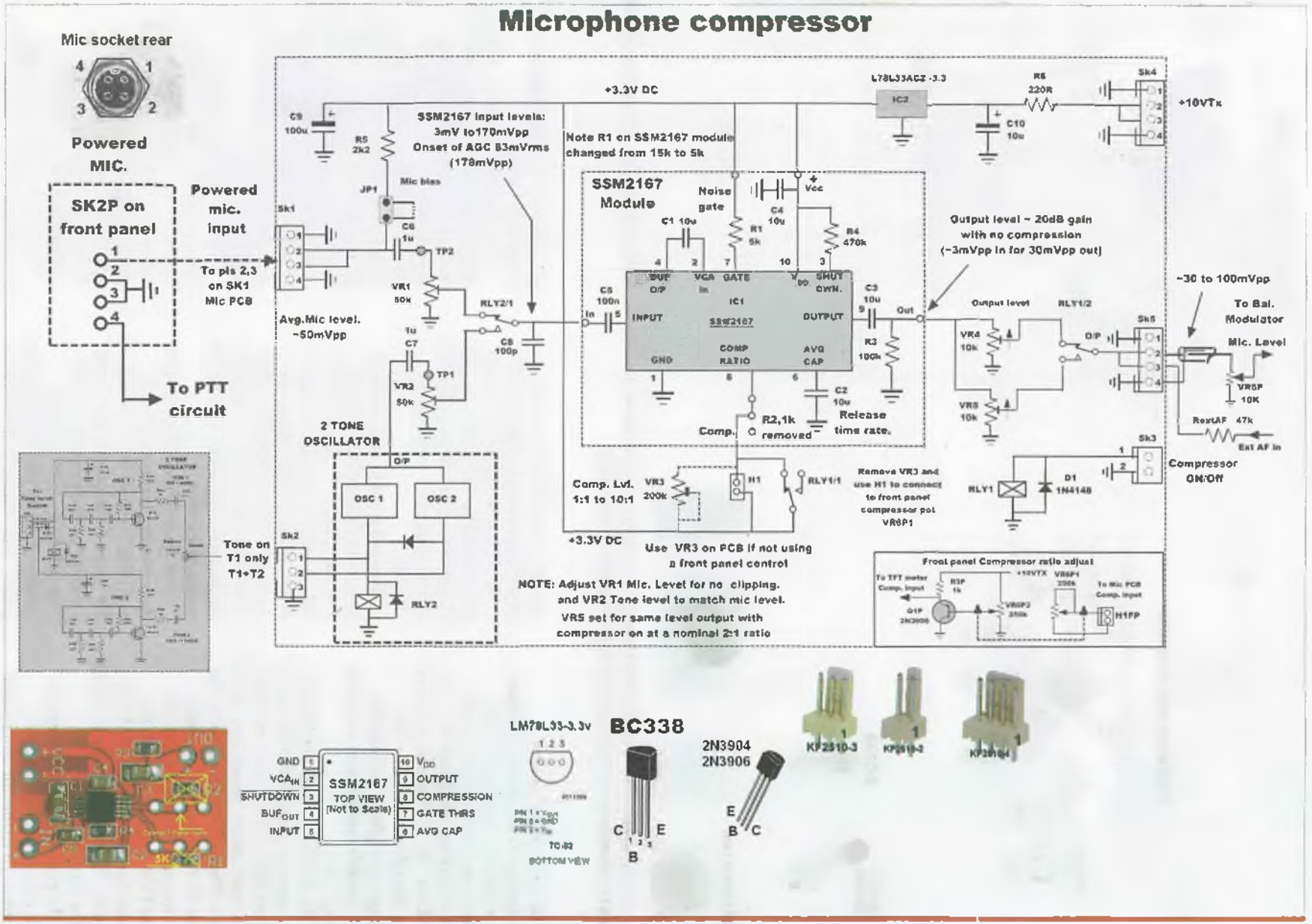



Figure 14. Microphone speech compressor circuit. IC1 is a chip developed specifically for speech processing, providing noise gating and compression in the one device.

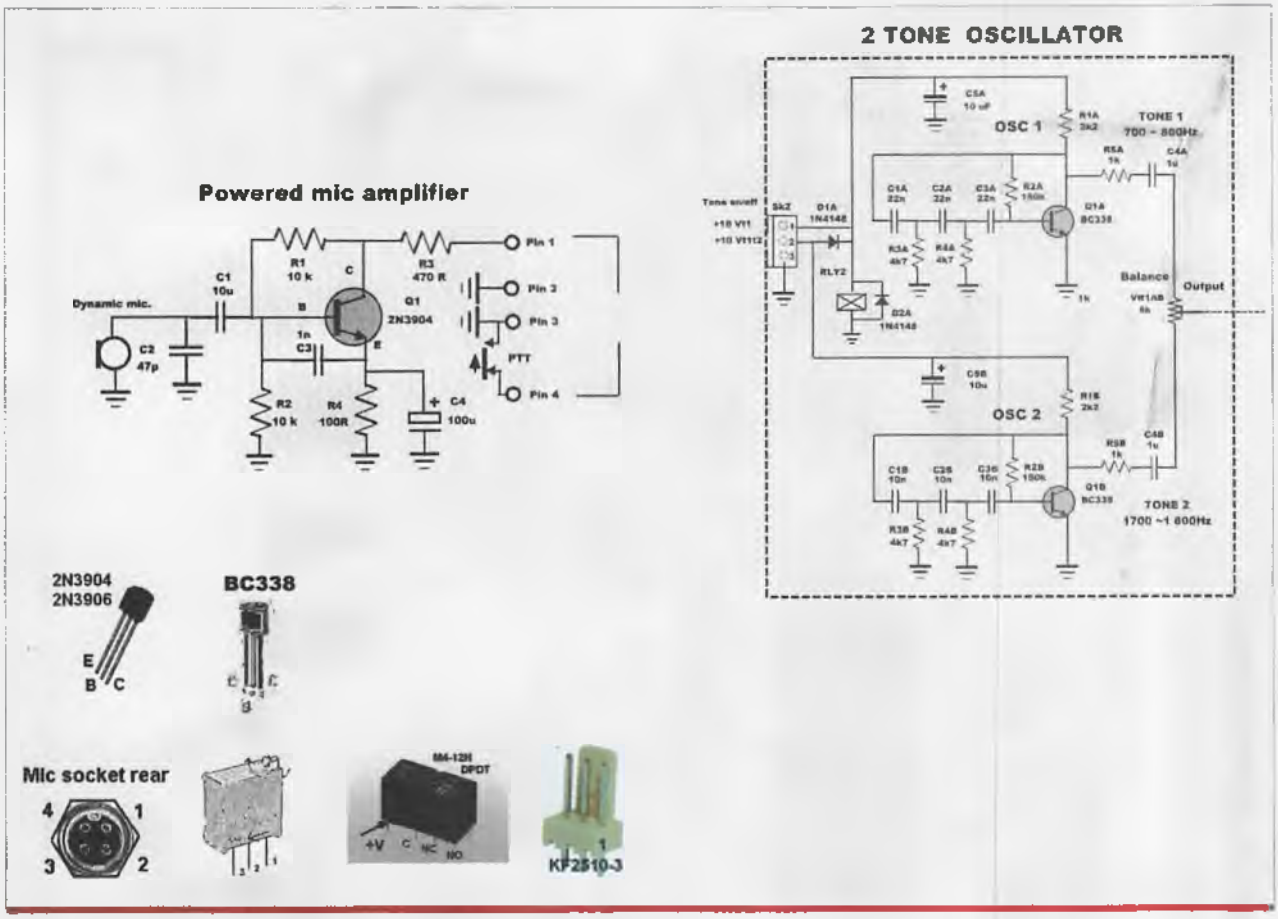



**Figure 15.** Transmitter two-tone oscillator and power microphone circuit diagrams.

The microphone speech processing circuit, shown in Figure 14, is like that used in the Mk4 transceiver. It is based on a small, multi-function, specialised IC – the SSM2167 (IC1). The manufacturer's data sheet describes it as a "low voltage microphone preamplifier with variable compression and noise gating" [Ax1].

The SSM2167 is obtainable as a "microphone preamp module" with related SMD components mounted on a small red PC board. You can see this in Photo 7, mounted above the main PCB to the right of centre.

I mounted header pins on the main PCB that line up with the connection holes on the SSM2167 module. This makes it easy to replace in the event of a failure.

The populated board is supplied with the compressor function disabled. To enable the compressor function, I removed R2 on the module's red board. I replaced R1 (15k) with a 5k resistor as the data sheet states that the maximum value for the noise gate resistor is 5k. This set the noise gate's sensitivity to -50 dBV.

The compression ratio is varied by a resistor placed between pin 8 of the SSM2167 and the 3.3 V rail. A value of zero gives a ratio of 1:1, while a 175k resistor sets the ratio at 10:1. I installed a dual 200k linear pot (VR3) – mounted on the rig's front panel – to vary the compression ratio.

One track of the VR3 pot varies the resistance between pin 8 on the SSM2167 and the 3.3 V rail. The second track on the pot sends a voltage to the transceiver's Thin Film Transistor (TFT) display (mounted at top left of the rig's front panel). This voltage is displayed as a value from 0 to 9, representing the compression ratio.

I mounted the two-tone oscillator components on the compressor PCB and used relays to select between Tone 1 and Tone 1 + 2. A front panel three-position toggle switch is used to select one tone (700 Hz), off, or two tones (700 Hz + 1800 Hz). You can see this function in the transceiver's overall block diagram – Figure 1 in Part 1, First Article, on page 46 of Issue 4 for 2024 – it's labelled S2P. [1A]

The microphone I used for this rig is an old, defective Foster handheld unit. Internally, the faulty microphone element was replaced with a salvaged element, but the repaired microphone suffered RF feedback when the rig was transmitting into an antenna.

It turns out that the salvaged element had a plastic casing. When

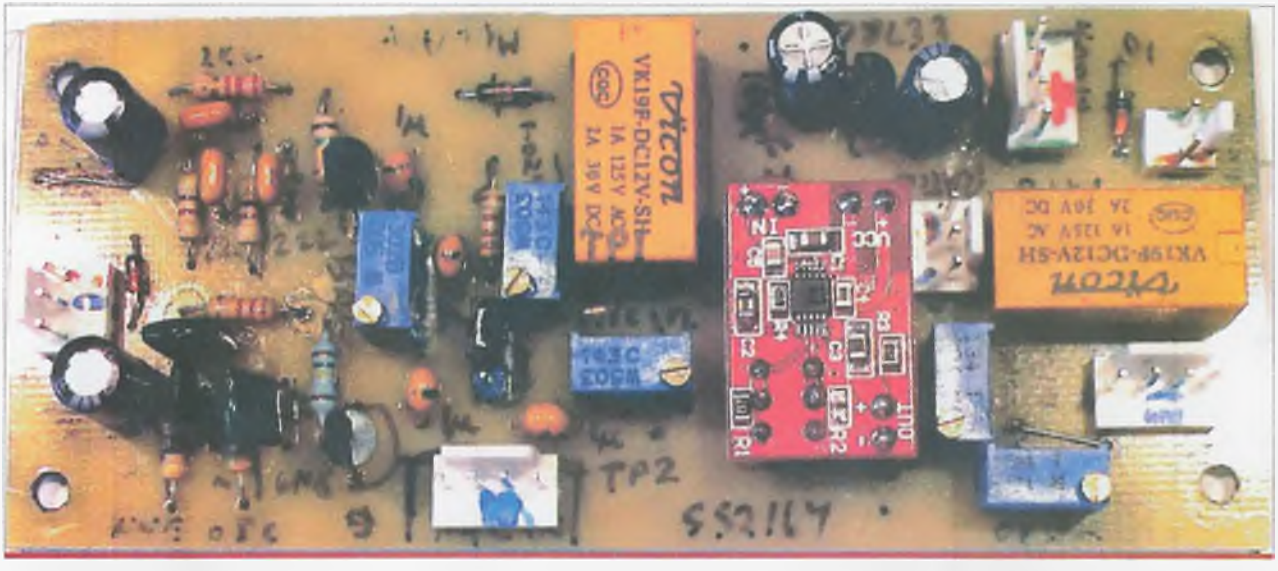



**Photo 7.** The microphone speech processor board. The small red board at centre-right is the mic preamp/compressor module.

I cupped the capsule with foil the feedback stopped, so I wrapped copper foil around the element and connected it to the microphone cord's earth braid, which cured the problem. It occurred to me that the previous defective element had a metal case that had acted as a shield – lesson learnt!

The two-tone oscillator and power microphone circuit diagrams are shown in **Figure 15**.

## Band mixer

The **Figure 16** circuit diagram shows the transmitter band mixer. The heart of this circuit is a passive diode-ring modulator, an SBL1 (IC1). The VFO and SSB (single sideband) inputs are each buffered by a grounded-emitter amp (Q1 and Q2). The mixer output is buffered by a low-Z input grounded-gate FET (Q3), the drain being matched via T1 to a grounded-emitter buffer (Q4) that drives the band-pass filters.

The double sideband (DSB) output from the balanced modulator (**Figure 13**) passes through the crystal filter board and the


**Photo 8.** Underside view of the rig's chassis, showing the transmitter's band mixer board at the righthand side. At upper left is the microphone speech processor module's PCB.

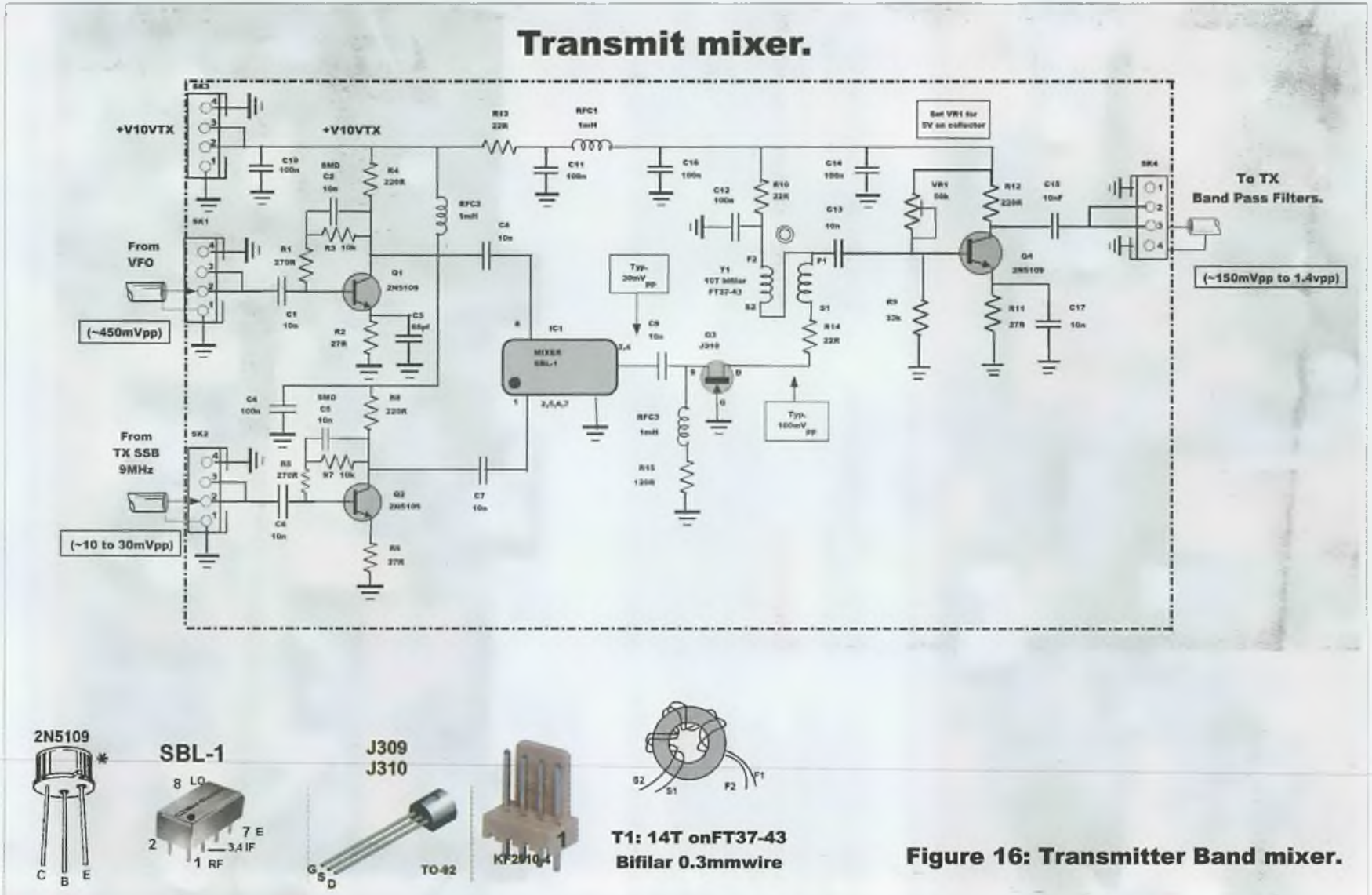



**Figure 16: Transmitter Band mixer.**

**Figure 16.** The band mixer circuit for the transmitter. This mixes the incoming VFO and SSB signals, with buffers on each input (Q1 and Q2) and a two-stage mixer output buffer (Q3, Q4).

resulting single sideband (SSB) signal connects to the input of the transmitter band mixer (top left in Figure 16). The band mixer combines the 9 MHz SSB signal with the variable frequency oscillator (VFO – lower left in Figure 16) to produce an output on the selected amateur band.

In Photo 8, the transmitter band mixer is visible at the righthand side. At upper left is the transmitter microphone audio processor board.

The design of the MK5 transmitter band mixer is like that in the MK4 rig, except that the relay-switched band-pass filters for 80, 40, and 20 metres are each mounted on a separate circuit board.

A trimpot (VR1) on the input of each filter is used to set the transmit level for each band. The trimpots are set so that the drive and microphone controls do not need adjusting when changing bands. The circuit diagram of the filters is shown in Figure 17; note that the coil details are included. The transmitter band-pass filters are mounted on a single board, shown in Photo 9.

## Power amplifier driver buffer

The circuit diagram for this stage is set out in Figure 18, while the circuit board is shown in Photo 10.

The output from each transmitter band mixer filter feeds an AD603 (IC1) voltage-controlled broadband amplifier. In the MK4, this amplifier was integral with the transmitter band mixer and filters. In this rig, the amplifier is mounted on a separate circuit board.

The main objective of the amplifier is as a transmitter automatic level control (ALC) and standing wave ratio (SWR) driven transmitter gain control. The gain control input of the AD603 is fed with voltages from the ALC and SWR control circuits.

An SWR bridge at the output of the PA filters feeds forward power and reflected power signals to the ALC and SWR control circuit [1A].

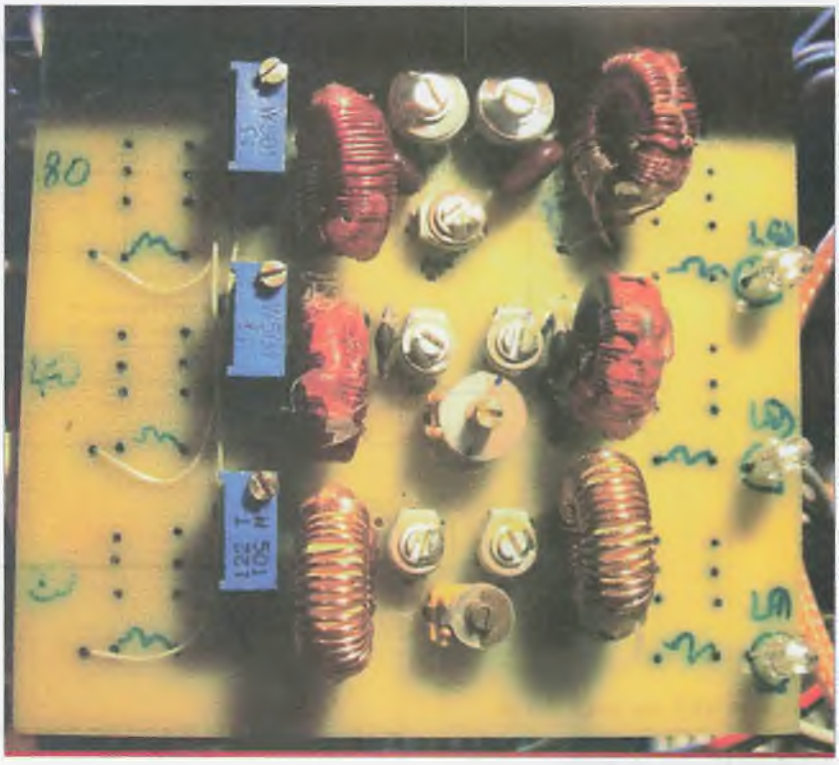



**Photo 9.** The transmitter band-pass filter board. Note the trimpots at the left. These enable individual adjustment of the transmit power level on each of the three bands so that they're equal.

In turn, this feeds ALC and SWR voltages to the gain input of the AD603 via the front panel RF drive control ("TX drive" from VR4P in Figure 1 [1A]).

The ALC voltage limits the RF power output to a given level (e.g. 90 W), and the SWR voltage pulls back the drive when a preset SWR value exists, such as 2:1. These presets are on the ALC and SWR control board (which is detailed in the next article).

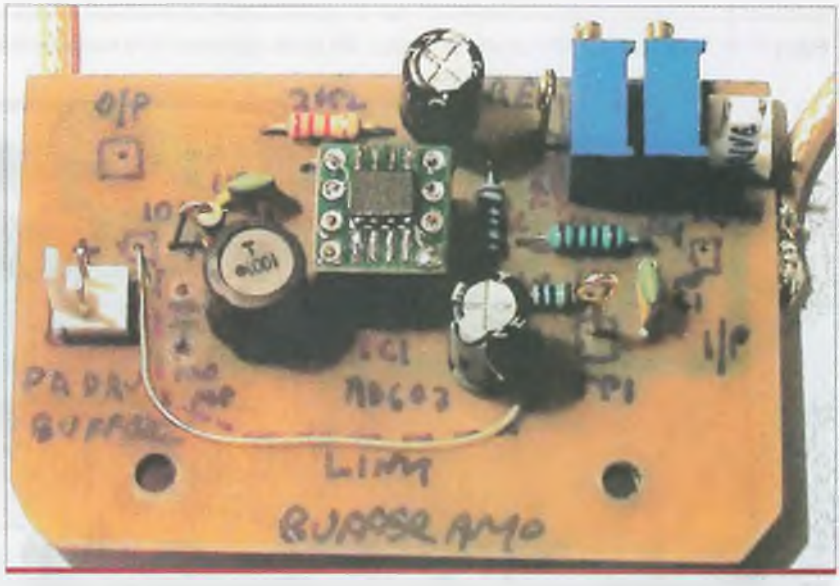



**Photo 10.** The transmitter power amplifier driver buffer board. The broadband amplifier chip is on the small PCB mounted to the main PC board on header pins.

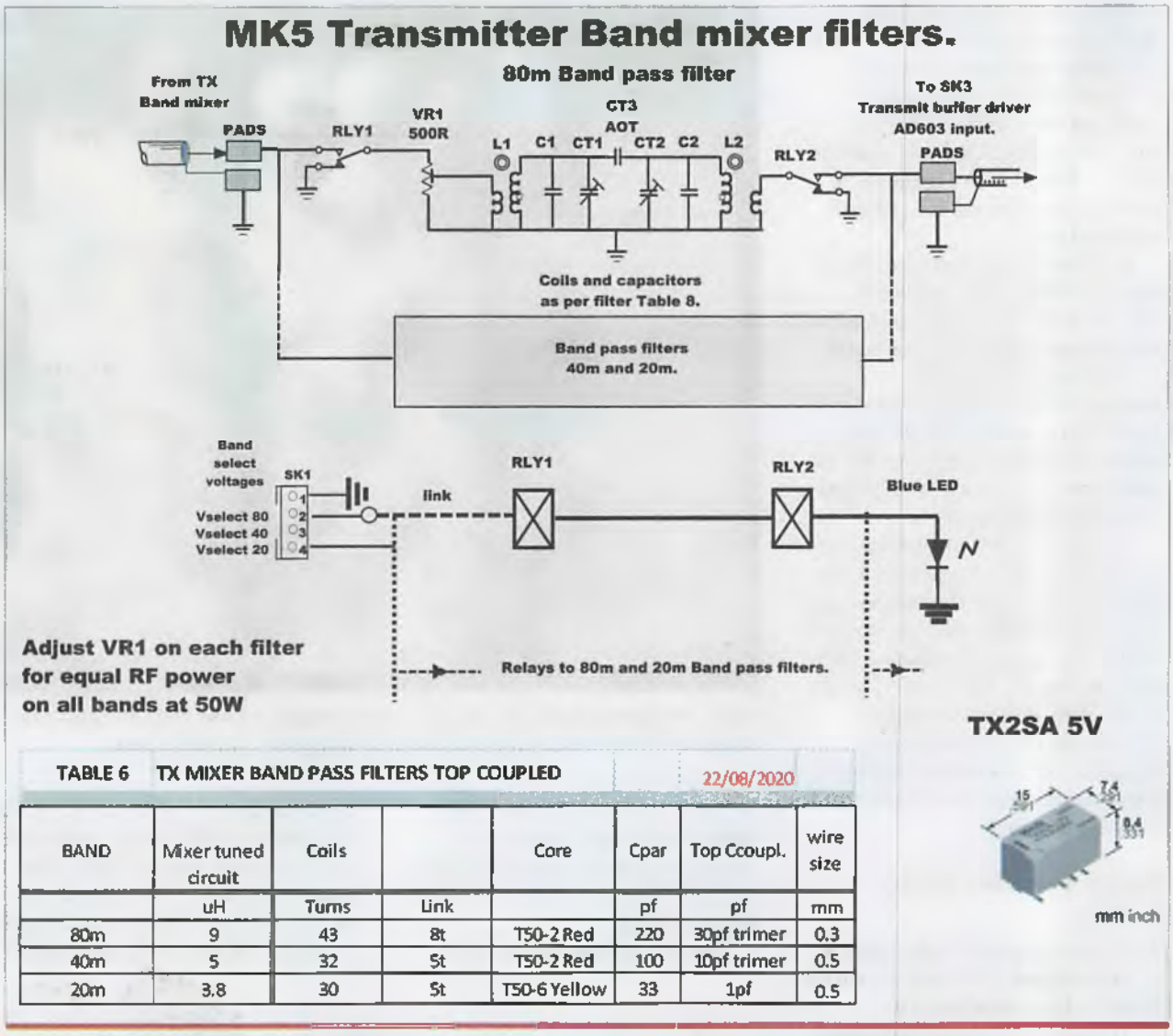



TABLE 6 TX MIXER BAND PASS FILTERS TOP COUPLED 22/08/2020

| BAND | Mixer tuned circuit | Coils | | Core | Cpar | Top Ccoupl. | wire size |
|---|---|---|---|---|---|---|---|
| | uH | Turns | Link | | pf | pf | mm |
| 80m | 9 | 43 | 8t | T50-2 Red | 220 | 30pf trimer | 0.3 |
| 40m | 5 | 32 | 5t | T50-2 Red | 100 | 10pf trimer | 0.5 |
| 20m | 3.8 | 30 | 5t | T50-6 Yellow | 33 | 1pf | 0.5 |

**Figure 17.** The three band-pass filter circuits are identical. VR1 allows adjustment of the transmitter level, as detailed in the note.

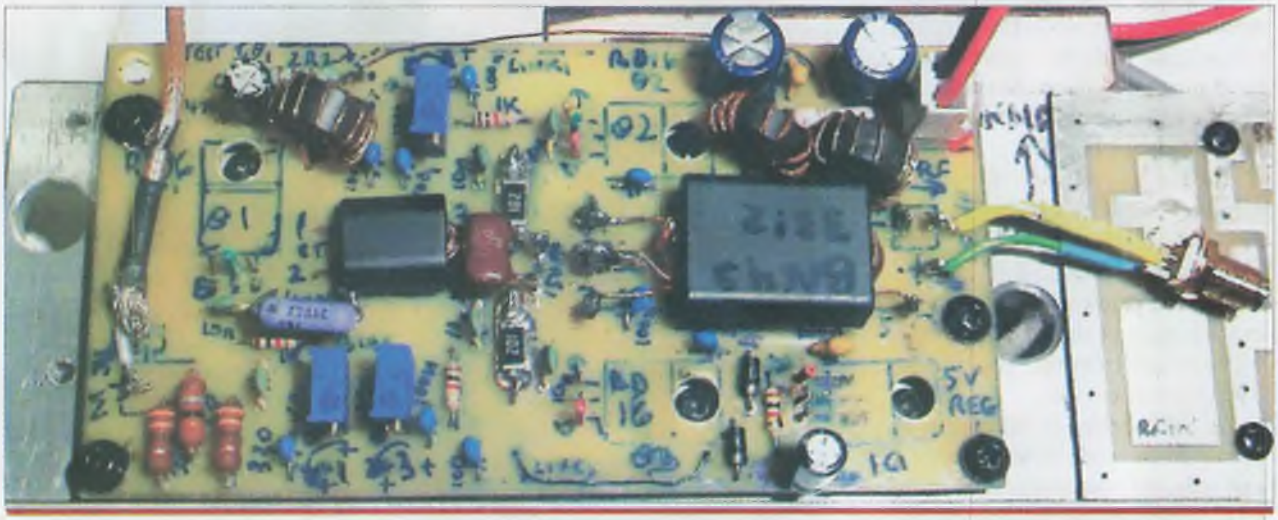
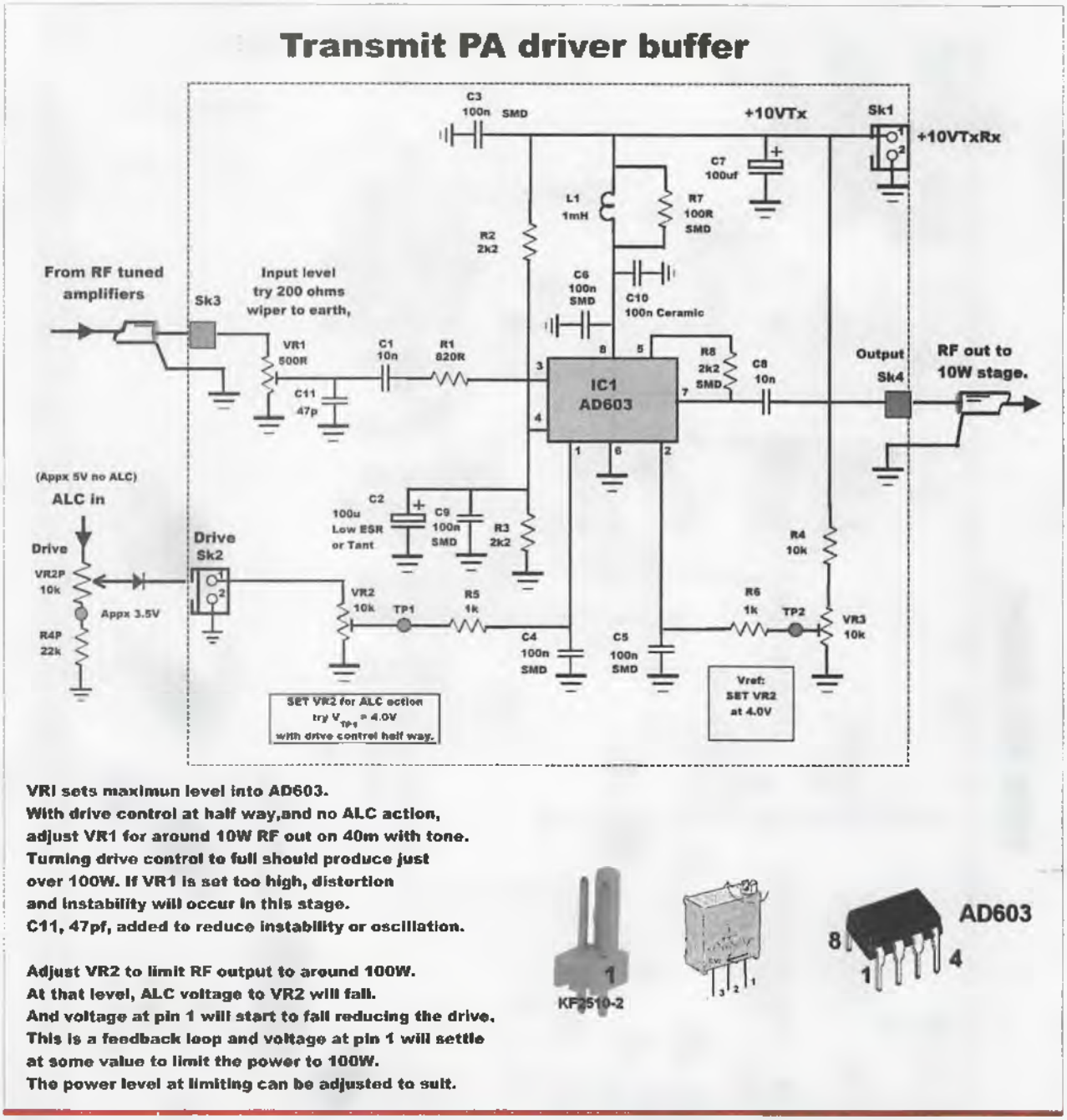


**Photo 11.** The partially completed 10 W PA driver board for the 3-band transmitter. Note the ferrite core coupling transformers, T1 (left) and T2 (right).




**VR1 sets maximun level into AD603.**
**With drive control at half way,and no ALC action,**
**adjust VR1 for around 10W RF out on 40m with tone.**
**Turning drive control to full should produce just**
**over 100W. If VR1 is set too high, distortion**
**and instability will occur in this stage.**
**C11, 47pf, added to reduce instability or oscillation.**

**Adjust VR2 to limit RF output to around 100W.**
**At that level, ALC voltage to VR2 will fall.**
**And voltage at pin 1 will start to fall reducing the drive.**
**This is a feedback loop and voltage at pin 1 will settle**
**at some value to limit the power to 100W.**
**The power level at limiting can be adjusted to suit.**

**Figure 18.** The transmitter power amplifier driver buffer circuit exploits the AD603, a low noise, voltage-controlled broadband amplifier.

## 10 Watt PA driver

The output of the power amplifier (PA) driver buffer feeds a three-stage broadband amplifier developing 10 Watts output. Figure 19 shows the circuit.

A 2N5109 (Q4) emitter-follower untuned amplifier drives Q1, an RD06HHF1 RF MOSFET [Ax3], and a pair of RD16HHF1 RF MOSFETs, Q2 and Q3 [Ax4] in a push-pull configuration. Resistors R1, R2 and R3 form a 3 dB pad between the Q4 output and the input of Q1, delivering a low reactance drive to ensure stability in Q1.

Resistors should be low inductance types. I have used metal oxide ones for the pads. Circuits through R8 – C6 and R9 – C7 are feedback loops for the RD16HHF1 MOSFET (Q2 and Q3) stages and need to be low inductance.

I decided to try some 1 W surface-mount (SMD) resistors for R8 and R9. I mounted a couple in parallel on a small piece of PCB material and attached some short pieces of wire at each end to form

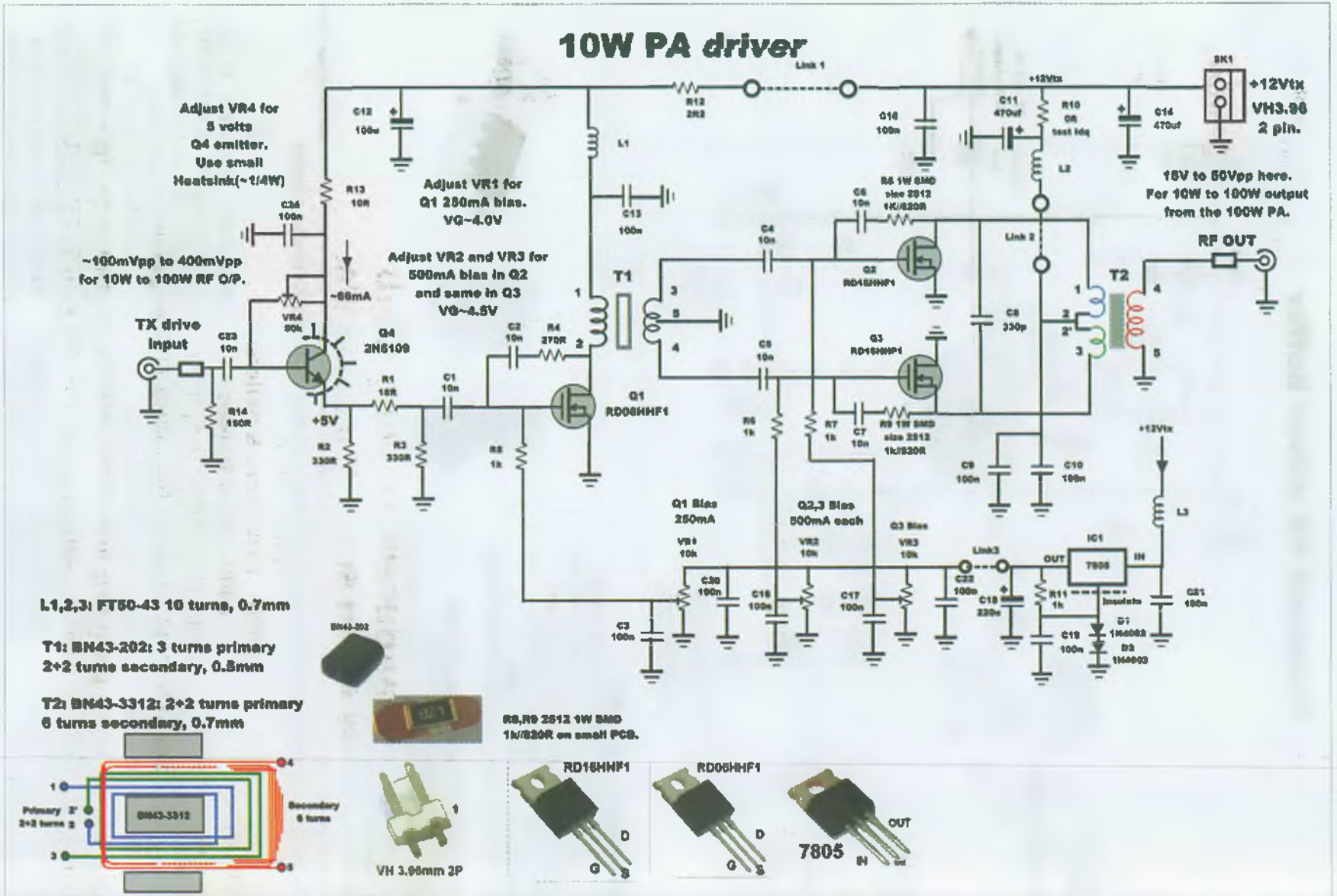



**Figure 19.** Circuit of the 10 W PA driver. A junction transistor broadband input stage (Q4) drives the intermediate stage using a silicon MOSFET power transistor (Q1), which in turn drives the push-pull MOSFETs output stage (Q2, Q3). T1 and T2 are broadband coupling transformers.

a resistor shape. That gave me a resistor with a 2 W rating made of SMD material, easily soldered into the PCB holes just like a leaded resistor.

Not ideal – well, it seems to work okay and has a low inductance value. If you stack these resistors, leave a small air gap between layers to maintain their wattage rating.

The MOSFETs are all biased from a regulated 6.2 Volt source. This is provided by a 7805 three-terminal regulator (IC1), with two diodes (D1 and D2) boosting the output to 6.2 Volts.

The 7805 (metal case version) regulator and the MOSFETs come in TO-220 style packages and are mounted flat under the PCB on a 6 mm-thick aluminium base plate to provide heatsinking. The 7805 requires an insulator on the back of its tag. The MOSFET tags do not require insulation.

The bias for the RD06HHF1 (Q1) is adjusted to achieve a drain current of around 250 mA, while the drain current of each RD16HHF1 (Q2, Q3) should be set to 500 mA. The PA driver input is around 100 mV peak-to-peak for a final PA output power of 10 W, increasing to some 350 mV peak-to-peak to produce 100 W output from the final PA.

Figure 19 includes the winding details for the two wideband ferrite core coupling transformers, T1 and T2. These are wound on double-barrel ferrite cores, readily available locally.

## Coming up

The next article in this series moves-on to complete the transmitter circuitry explanations along with the related ALC and SWR control modules.

## References and Resources


[1] Destefano L, 2019-2020, Homebrew HF Transceiver, Amateur Radio, Vol 87 No.6, 2019, through Vol 88 Nos 1-6, 2020. WIA.

[1A] Destefano L, 2023, Homebrew three-band 100 W HF transceiver, Amateur Radio, Vol 91 No.4.

[6] Ulich Rhode, Understanding and handling noise, Ham Radio magazine, Nov. 1986, pp 10 – 22.

[9] SSB Convention: >10MHz use USB, while <10MHz use LSB.

[Ax1] SSM2167 data sheet: www.analog.com/en/products/ssm2167.html

[Ax2] AD603 data sheet: www.analog.com/en/products/ad603.html

[Ax3] RD06HHF1 data sheet: www.qsl.net/df7tv/datasheets/rd06hhf1.pdf

[Ax4] RD16HHF1 data sheet: www.qsl.net/df7tv/datasheets/rd16hhf1.pdf

# Newcomers' Notebook

## This wave is best as a ripple – VSWR

*Jules Perrin VK3JFP*

**Photo 1.** The two units at the top represent the sort of run-of-the-mill VSWR/Power meters that you might see in many amateurs' shacks. The box at front is a homebrew milliwatt RF power meter.

Measuring Voltage Standing Wave Ratio (VSWR) on antennas and feedlines is one of the most common and frequent tests amateurs perform, typically carried out with the sort of equipment seen in Photo 1. The equipment in Photo 1 illustrates the sort of run-of-the-mill meters

The most common and frequent test amateurs perform with equipment shown in Photo 1, is the Voltage Standing Wave Ratio (VSWR) measurement on their antennas. In many instances, the V is dropped, and the term becomes plain old SWR.

The SWR value is expressed as figures such as 2:1, 5:1, etc. This is a numerical ratio and has no units. When there is a perfect impedance match between a transmitter and the load (generally, an antenna), the SWR will be 1:1. But when there is a complete mismatch with a short or open circuit, the SWR value is infinity-to-1.

We all do it. We all accept it. But, do we really know what we are doing? Hopefully this article will shed some light on the wave that should be a ripple.

### Impedance matching

When connecting an antenna to a radio (transmitter or receiver) there are three components, and their associated connections, to be considered in the match.

1. Transmitter (and receiver)
2. Transmission Line
3. Antenna

To achieve maximum power transfer from the transmitter to the airwaves, the output of the transmitter is designed to match the input impedance of the transmission line. The transmission line's impedance must match the input (feedpoint) impedance of the antenna.

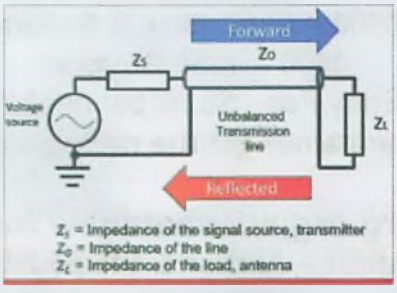



**Figure 1.** The 'workings' of unbalanced transmission line, such as coaxial cable.

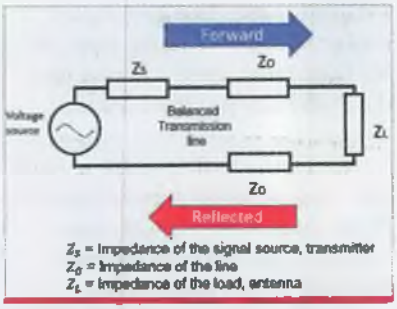



**Figure 2.** The 'workings' of balanced transmission line, such as 'ladder line' or open wire feedline.

Looking at **Figures 1** and **2**, if $Z_S = Z_0 = Z_L$, a matched condition exists. Attach an oscilloscope to the signal source (at left) emitting a simple carrier wave, the signal on the oscilloscope would be a perfect carrier wave. All the power is transmitted to the antenna.

Any mismatches and a portion of the signal from the transmitter is reflected to the transmitter, just like an echo in a bare room. If this reflection is a wave, this is not good. A ripple is OK. The comparison of this reflected wave is called the SWR.

An antenna is generally a complex load, with both resistance and reactance. In this article, for simplicity, I am only addressing the antennas' impedance as $Z$.

### SWR

A definition for SWR I found is this:

> *"SWR is a measure of impedance matching of loads to the characteristic impedance of a transmission line. Impedance mismatches result in standing waves along the transmission line, and SWR is defined as the ratio of the partial standing wave's amplitude at an antinode (maximum) to the amplitude at a node (minimum) along the line."*

That is a mouthful. Simply, it means – measure the high, measure the low, and compare.

SWR meters are passive instruments that measure forward and reflected voltage in a transmission line. As the examples in Photo 1 show, the SWR scale often include a power scale in Watts.

### Impact

The reason a standing wave is not good is that as the reflected wave from any mismatch adds and subtracts to the forward wave, producing a standing wave. The

forward and reflected waves are moving up and down along the transmission line. As the waves come into phase, the voltages add, and at that point are maximum (antinode). As the waves go out of phase, the voltages subtract, and are at minimum (node).

**Figure 3** illustrates how the waves moving in and out of phase can become produce a large standing. For example, an SWR of 1.2:1 means the peak voltage is 1.2 times the minimum voltage along that line.

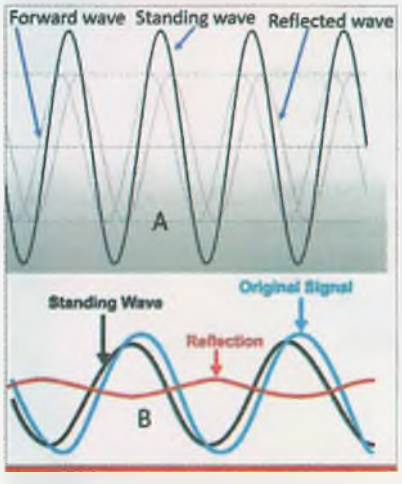



**Figure 3.** Showing how standing waves are produced.

The wave in **Figure 3A** is an example of an open or short circuit mismatch. The forward and the reflected waves are at the same amplitude. **Figure 3B** is an example of a more moderate mismatch.

## Consequences

Some negative side effects of a high VSWR include:

- Transmitter power amplifier (PA) stage(s) can be damaged.
- PA Protection in modern transmitters reduce output power.
- High voltage and current levels can damage transmission lines.
- Delays resulting from reflections can cause distortion in the signal.
- Reduction in signal strength compared to perfectly match system.

## Example

Say we have a transmitter delivering a maximum signal voltage on the transmission line of 200 V and a minimum of 100 V. Using the formula below, we get an SWR of 3:1.

$$VSWR = \frac{V_f + V_r}{V_f - V_r} \quad \begin{matrix} V_f = Forward\ voltage \\ V_r = Reflected\ voltage \end{matrix}$$

$$= \frac{200 + 100}{200 - 100}$$

$$= \frac{300}{100}$$

$$= 3{:}1 \quad \text{Not good}$$

**Calculation 1.** Calculating VSWR.

Not a great SWR, but looking at **Table 1** we get a better appreciation of what is happening to all that energy.

- The power loss is 25%, equalling 25 W lost. This energy must be dissipated as heat somewhere in the circuit.
- Voltage loss of 50%.

| VSWR | % Power Loss | % Voltage Loss | Reflection Coefficient |
|---|---|---|---|
| 1:1 | 0 | 0 | 0 |
| 1.1:1 | 0.2 | 4.7 | 0.047 |
| 1.15:1 | 0.49 | 7.0 | 0.070 |
| 1.25:1 | 1.2 | 11.1 | 0.111 |
| 1.5:1 | 4.0 | 20.0 | 0.200 |
| 1.76:1 | 7.4 | 27.3 | 0.273 |
| 1.9:1 | 9.6 | 31.6 | 0.316 |
| 2:1 | 11.1 | 33.3 | 0.333 |
| 2.5:1 | 18.2 | 42.9 | 0.429 |
| 3:1 | 25.1 | 50.0 | 0.500 |
| 3.5:1 | 30.9 | 55.5 | 0.555 |
| 4:1 | 36.3 | 60.0 | 0.600 |
| 4.5:1 | 40.7 | 63.6 | 0.636 |
| 5:1 | 44.7 | 66.6 | 0.666 |
| 10:1 | 67.6 | 81.8 | 0.818 |
| 20:1 | 81.9 | 90.5 | 0.905 |
| 100:1 | 98.2 | 98 | 0.980 |
| Infinite | 100 | 100 | 1.000 |

* Divide % voltage loss by 100 to obtain ρ (Reflection Coefficient)

**Table 1.** Comparisons of VSWR levels.

## Limits

- SWR 1.0-1.5: Ideal.
- SWR 1.5 - 1.9: There's room for improvement.
- SWR 2.0 - 2.4: Should not damage your radio with casual use.
- SWR 2.5 - 2.9: Performance decreased.
- SWR 3.0-plus: Could cause damage; will degrade performance.

## ATU

Such a simple acronym! When someone throws out the term ATU, they can mean – antenna tuner, or antenna matching unit, impedance matching unit, matchbox, matching network, transmatch, antenna match, antenna tuning unit (ATU!), antenna coupler, or feedline coupler.

The ATU is a passive electronic device, or "network," placed in between the radio transmitter and the transmission line. The ATU does not change the transmission line or the antenna impedance. The ATU only provides the transmitter with the impedance it requires.

## Dummy load

A good dummy load is an essential item of equipment in the shack. The dummy load not only dissipates the signal energy when adjusting a transmitter, it is a perfect impedance match to substitute as an antenna load.

Getting a high SWR in your feedline and antenna system and not sure where the mismatch is? Substitute the dummy load for the antenna at the end of the feedline (or feedline sections) to isolate the problem..

## Regular checks

Mismatches can occur with components of different impedances or a faulty connector. I had an active antenna in use for some time. After a holiday I checked the SWR and the reading was very high. Water had penetrated the connector and caused corrosion. So, check your VSWR regularly. It taught me a lesson to always have my SWR meter permanently in the equation.

## Further reading

While the examples used often refer to the transmitter, SWR affects receivers equally in terms of transmission line degradation and consequential receiver performance.

Information about related factors such as increased losses in coaxial cable due to high SWR, and how such losses can be mitigated with open wire feedline, is available in respected antenna publications by John D Kraus W8JK, William I Orr W6SAI, the ARRL, and RSGB et al.

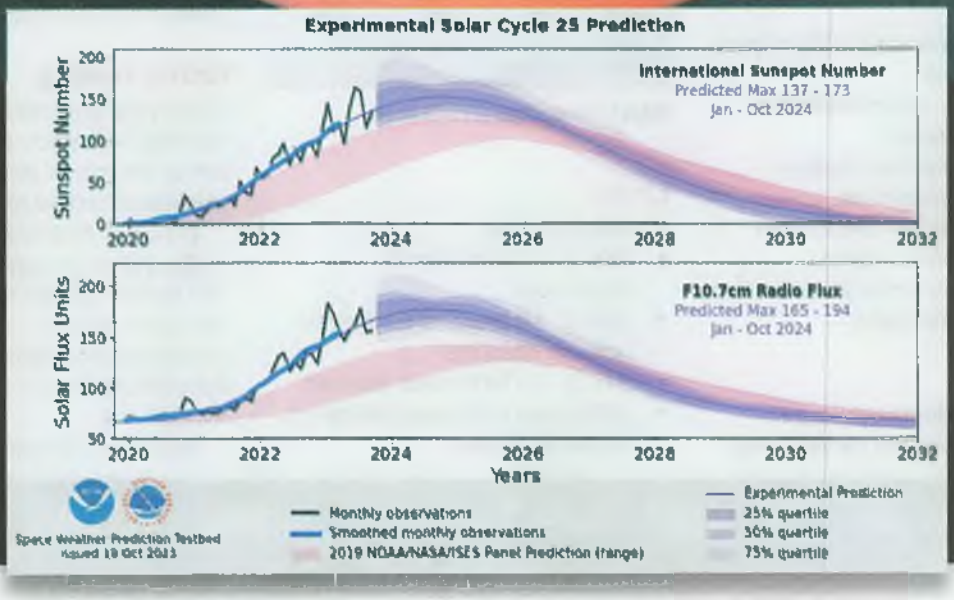
Have fun and stay safe.

# Solar Cycle 25 activity rising fast, to peak higher than earlier forecast

**In late October 2023, the Space Weather Prediction Center of the US National Oceanic and Atmospheric Administration (NOAA) issued a revised solar activity prediction. It says that activity will increase more quickly and Solar Cycle 25 will peak at a higher level than that predicted by an expert panel in December 2019. The updated prediction now forecast is for Solar Cycle 25 to peak between January and October of 2024, with a maximum sunspot number between 137 and 173. www.weather.gov/news/102523-solar-cycle-25-update**

Photo: NASA SDO

**More spots coming, and faster. NOAA's Space Weather Prediction Center published the below experimental prediction curves in late October 2024. People, get ready!**



Post this on the shack wall

# Survivors' Guide for Solar Cycle 25

Every day, check the 10.7 cm Solar Flux, and keep an eye on the A and K indexes. Scan these two tables to see what to do.

*"It's the flux wot brings pleasure and the flares wot brings the pain"*

## Follow the solar flux

| FLUX | CONDITIONS TO EXPECT |
|---|---|
| 50-70 | 160-40m favourable; higher bands RS to poor |
| 70-90 | 160-40m so-so to fair; higher bands RS to poor |
| 90-120 | Rising MUFs: 40-10m day. 160-80m – night is right |
| 120-150 | Improving MUFs & DX opportunities all bands to 6m |
| 150-200 | **Excellent** MUFs & DX opportunities all bands to 6m |
| 200-300 | **Pan-de-bloody-monium!** |

## Do what the A-K indices tell you

| A/Ap | K/Kp | Means |
|---|---|---|
| 0-3 | 0-1 | Quiet. Enjoy the peace. Get on with it! |
| 4 | 1 | Quiet to unsettled. Get on with it, but be alert |
| 7 | 2 | Unsettled. Get on with it, but stay alert |
| 15-27 | 3-4 | Active. Uh oh! Don't panic. Watch the indices |
| 48 | 5 | Minor storm. Expect 20-10m to be poor |
| 80 | 6 | Major storm. Hunt-n-Pounce opportunities! |
| 132 | 7 | Severe storm. HF DX RS. Time for local SOTA! |
| 208-400 | 8-9 | Very major storm. Panic now ! Go 2m/70cm |

Roger Harrison VK2ZRH

## Repurposing refugees from the server room

# A 13.8 VDC, 50 Amp power supply for less than $40?

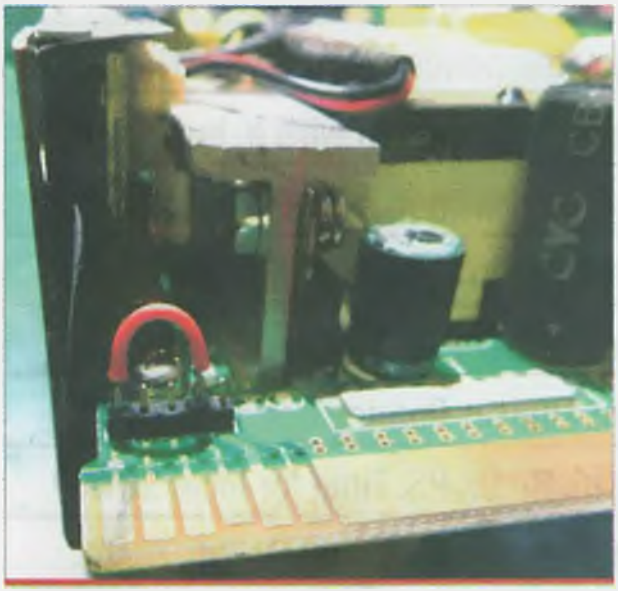
*Rob Streater VK3BRS*


**Refugee** from the server room, side and end view.

While working as a National Network Administrator at one of the "big four" consulting firms for a few years, I was constantly in the server room carrying out my duties, including the upkeep of the servers here in Melbourne. I looked at these servers and was amazed at what was shoehorned into them, including "hot swappable" RAID (redundant array of independent devices) hard disk arrays, memory, CPUs, cooling fans and power supplies to name a few bits.

I took particular interest in the power supplies because, at the time (20 years ago), they were formidable in their capacity – three, four, or five times what domestic computer power supplies were capable of. Back then, it was common to have a server power supply capable of 750, 1000 or even 1200 watts output at 12 VDC – all in the size of a box smaller than a carton of smokes.

Move forward 20 years and a lot of this gear is on the second-hand (or surplus) market now, including the power supplies. Great, I thought, I wonder if anyone has done anything with them? I was originally looking at a high current charger for my tractor, as it sits for long periods and the batteries need a quick top-up occasionally, before doing a bit of slashing.



**Two pins** on a header are bridged to start the supply on its own.

While looking at battery chargers, I stumbled across some information showing how to convert the above-mentioned power supplies into 13.8 volt power supplies. Interesting, I thought. I wonder how much they cost? A quick look on eBay and I was really surprised – $30 to $40 each, and locally available. I quickly snapped up a couple.

They duly arrived and the first test was to make sure they were working. After shorting-out two terminals to start it, I measured 12.3 VDC on the output and connected a 55 Watt car headlight. That worked fine; good enough. I then opened-up the power supplies that I'd acquired and started the modifications.

### First steps

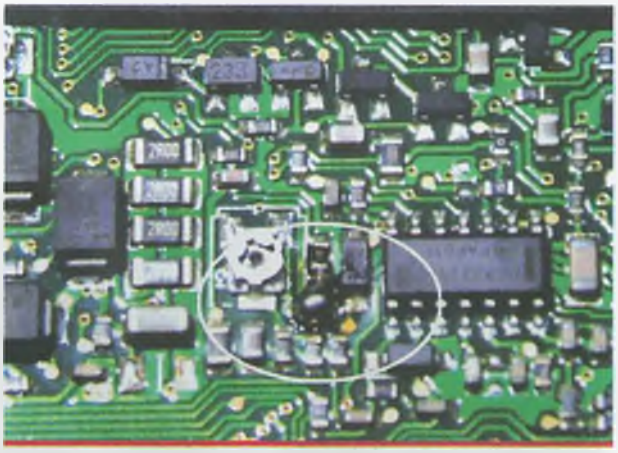
The first step is to install a jumper that turns the power supply on. This is required because the power supply is a "hot-swap" unit; in other words, nothing gets turned off when replacing a faulty power supply in the server. The new power supply automatically starts when inserted back into the vacated slot.

The second modification is to increase the output voltage, unless you are happy with 12.3 volts. The voltage adjustment potentiometer doesn't have enough range, so, by shorting-out one of the 'range' resistors on the pot, this gives you enough adjustment to get up to 13.8 volts.

Note: this was about the highest voltage I could achieve in this configuration. There is an approximate voltage sag of 200 mV (yielding about 13.6 volts supply output) when current

is drawn from the supply. So, if your happy with that, lets continue.

As it's a switchmode power supply, I thought I had better see what sort of noise was on the output because some switchmode supplies have a bad reputation of being very noisy electronically, and this can be introduced into a load, such as a transceiver.



**Volts boost.** A resistor adjacent to the output adjustment pot, is bridged to allow more range.

I was a bit surprised at what I first measured, but this was with the output of the power supply open-circuit. In other words, nothing except for my multimeter and CRO were connected. Note – the switching frequency is around 500 kHz.

I connected-up a few rigs (including AM) and found no degradation of the received signal via SINAD (signal, noise, and distortion) testing. I observed that there was no perceived noise on received signals, as well. Transmitter testing was done using an IFR-500A communications test set, with no noticeable noise on the transmitted signal.

## Pedigree

These power supplies have a good pedigree, being of Hewlett Packard design. Coming from HP and COMPAQ servers, I believe low noise was one of the design parameters when they were made.

At the Melbourne computer room, we had over 80 servers; most had dual redundant power supplies with a few having three, so I can imagine what chaos, data corruption, network issues could arise if the noise of these supplies wasn't kept in check.

I have ordered some edge connectors to make a neat connection to the supply itself and to offer a low-resistance connection on the high current terminals. From here, an on/off switch can be installed and, due to the high currents involved, I would strongly recommend an overvoltage crowbar circuit be added to the setup because we are not dealing with a couple of amps, now.

## Series 24 V

You can wire two of these supplies together to obtain 24 volts, *but* you must modify one supply first. The 13.8 V negative terminal on each supply is earthed to the chassis-sheet metal enclosure, which is then earthed back to the 240 VAC input. With two supplies connected in series, this places a dead short across the 12 VDC output of the 'first' power supply.

To get around this, remove the power supply PCB from the sheet metal chassis and the spigots on the three mounting posts must be filed down flat. Place three insulating washers between the three steel mounting posts and the PCB, then use plastic screws to secure the main PCB back onto the three mounting posts and sheet metal chassis. This keeps intact the earth to the sheet metal chassis in case of a failure.

Do not cut the earth on the 240 VAC input as this will leave anything that is connected to the power supplies exposed to the mains voltage if something fails in the power supply.

## Boosting the output

There are ways of increasing the output voltage much higher than 13.8 volts. This is not advisable as the very large electrolytic capacitor across the output in the supply is only rated at 16 volts and I would hate to see one go *bang!*

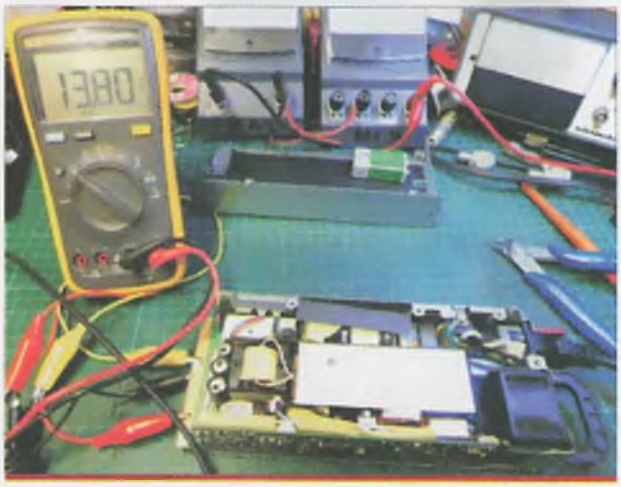
Upon initial tests with a decent load, a squeal was heard from the supply when drawing more than 10 A. I discovered that the supply was trying to shut down on the over-voltage safety. A quick adjustment of a second pot stopped the supply from trying to shut down and was as quiet as a mouse when loaded up to about 38 A, the maximum the load could draw from the power supply.

## On the spec-an

Out of curiosity, I stoked up the spectrum analyser and had a look at the broadband noise being emitted by the supply across the spectrum from 10 kHz to 30 MHz. It was a very rudimentary test as I was just waving an antenna around the power supply under all loads.

I did not have enough space on the bench to properly set up and test the radiated EMI/EMC using my LISN (line impedance stabilization network) attached and the spec-an set up in EMI/EMC mode The photo here of the spec-an screen is the result obtained with the antenna positioned at the 'noisiest' part of the power supply.

So, for an outlay of about $40 AU, an hours work ( including a coffee ) we have a formidable 13.8 volt power



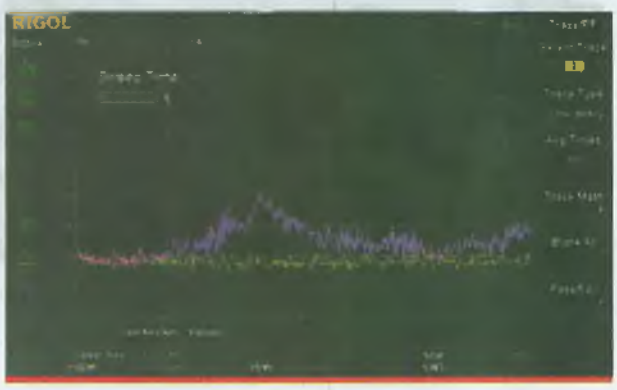

**Bench check.** I successfully set the output of this supply to 13.8 VDC.

**What the CRO saw.** Noise on the output with no load is just less than 200 mV peak-to-peak.

supply that will supply over 50 amps and satisfy 95% of your shack requirements. Not bad for less than an afternoon's work

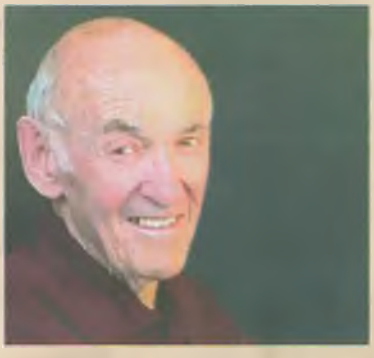
## Epilogue

I have not given a step-by-step description of how to fire-up these supplies and have purposely left out some specific information due to the high voltages and currents involved. For those interested, repurposing these supplies would be an ideal project for a club "prac/project night" with the activity supervised and the safety aspects explained before proceeding. vk3brs@dcsi.net.au




**Spectrum analyser check.** The yellow trace is the noise floor with the power supply turned off - a bit under -100 dBm, which is an ambient noise level of 1.77 uV. The purple trace shows the power supply turned on. The -80 dBm peak at 12 MHz is about 22.36 uV, which all fairly modern radios should reject with ease and not fill up the shack with noise. I had no trouble with my rigs of 30 and 40 years age.

# Silent Key David Richard Box VK5DB



David Richard Box, a well-known and dedicated amateur from Murray Bridge, South Australia, died on 24 June 2023.

David was born in Kalgoorlie and spent much of his childhood in the area. Following WWII, his family moved back to Adelaide where he attended Norwood Primary and Secondary schools. Later, David was successful in obtaining an Electricity Trust of South Australia (ETSA) cadetship to study engineering. He graduated in 1961.

Much of David's working life was in the distribution side of electricity with the ETSA, and in 1969, he was appointed Distribution Engineer for the Lower Murray Region, based at Murray Bridge.

After moving back to Adelaide in 1977, David was transferred to the Trust's Distribution Standards Group, associated with construction standards. However, for about three of those years, following the Ash Wednesday bushfires, he worked with the Trust's lawyers together with other staff to develop improvements to the Trust's lightning protection and earthing systems. David retired from ETSA in 1991.

His original amateur call sign was VK5OV. The earliest callbook entry is 1960, showing him living at Maylands, therefore a licensed amateur for at least 63 years. In 1976 David, married Meg, who almost immediately took up amateur radio, obtained VK5AOV and became an ALARA member. Meg later changed her call sign to VK5YG. During 2010, David also changed his call sign to VK5DB. Meg and David were regular attendees at ALARA functions.

David was a quiet achiever. After moving back to Murray Bridge in 1992 after retiring, he became involved with the Lower Murray Amateur Radio Club. He became president around 1998 remaining so for 18 years, and was granted Life Membership.

On a broader state-wide and national scale, David's contributions to amateur radio included being on the Council of the South Australian Division of the WIA, and for several years (early 2000s), SA Federal Councillor. Following the re-structure of the Institute in 2004, each state formed an Advisory Committee, and David served on the SA Advisory Committee from 2005 to 2010, of which he was Chair for several years.

During May 2017, the now National WIA held its AGM at Hahndorf, SA, and David contributed by providing information for an AGM souvenir booklet dealing with amateur radio in South Australia: "Some South Australian Experimenters, Their Activities and Legacies". Murray Bridge got a reference as it had a well-documented radio club in 1922 - one of, if not the, first in South Australia.

David was also a member of the Adelaide Hills Amateur Radio Society. It was only a week before he unexpectedly died, that he attended its monthly meeting and was granted Life Membership of that club.

Valé David Box VK5DB - we miss your cheery voice; "You bet!"

**Peter Wolfenden VK3RV, WIA Historian**

# SPECTRUM HORIZONS

*Keith Gooley VK5OQ*

## My Road to a 20 km DX contact on the 122 GHz band

**The loneliness** of the long-distance milliwave DXer.

After my retirement some 16 years ago, I decided I would extend my interest in amateur radio into the upper UHF and SHF region of the spectrum. To that end, I built a 23cm (1296 MHz) transverter of Minikits design and used it with an elderly Icom IC22S FM radio to have some contacts, mostly on VHF-UHF Field Days.

### First steps

In those days, there was quite a bit of interest in the microwave bands in the Elizabeth Amateur Radio Club (EARC). I soon learnt that you could make an elementary microwave radio using an intruder alarm that contained a metal casting resonator on about 10 GHz which, when coupled to a wideband FM receiver such as the "scanner" type, gave you a simple receiver on that band, provided that you and the person at the other end of a QSO used frequencies separated by the IF that the scanner was set to.

I recall my first contact on 10 GHz was over a distance of about 100 metres. This was using the intruder alarm as it was, just a simple low gain horn antenna that was part of the resonator casting.

To improve the range possible, I learnt that you could fold up a horn of higher gain using a template printed from a PC application. Initially, I used tinplate, but brass or copper would have been better. The tinplate rusted after a few years. Screwed to the front of the intruder alarm, the simple horn gave me an extra 18 dB of gain.

### Next steps

I was interested to fill in the big gap in the spectrum from 1.2 to 10 GHz. There are three more amateur bands where contacts could be made in the various VHF-UHF contests, these being 2.4, 3.4 and 5.7 GHz.

Various kits and parts were available (online) from Minikits [1] and other PCB-type kits from Kent Britain W1GHZ [2]. For each band, you need the transverter itself and the local oscillator that converts the received frequency down to either 144 or 432 MHz. The same LO converts the transmit IF up to the output frequency.

The IF radio can be a single- or dual-band FM mobile; or, for greater versatility, an all-mode single-band or multi-band unit. Quite a few operators on the microwave bands use a Yaesu FT-817 for their IF radio as it is small, portable, and very versatile.

W1GHZ has a recently updated website with information on transverters and local oscillator multipliers up to 10 GHz. Minikits has an extensive inventory of kits, including those for 1.2 and 2.4 GHz transverters.

As antennas for these two bands, I use Yagis as they are easy to make and high gain versions can be made, which take up little space.

### Moving up

Over the last few years, it has become easier to get panel antennas for 3.4 and 5.7 GHz. These consist of an array of dipoles fed in-phase to make a gain antenna.

On 10 GHz, it becomes practical

to make an antenna using a parabolic reflector. I did this by borrowing a parabolic mould from Iain VK5ZD. I laid aluminium foil over the mould and then used fibreglass fabric covered with resin to make a rigid reflector. I first covered the mould with Vaseline so the reflector would release from the mould.

In my case, the feed to the reflector is a piece of waveguide I scrounged or bought at a junk sale. It has a circle of copper soldered over the end with notches in the end of the waveguide to let the RF out. This is referred to as a "penny feed."

You need to be aware that a given-sized piece of waveguide only allows the microwaves to go through it over a limited range of frequencies. References on the net will tell you how to work that out.

The next band I became interested in was 24 GHz. For this band, I bought a suitable mixer, a PLL signal source on about 11 GHz with a 10 MHz reference. Then a X2 frequency multiplier generated the required LO signal on about 23 GHz. The mixer output on transmit was amplified to about 0.5 Watt, again using a surplus module, and that signal applied to another parabolic dish antenna.

For each of these transverters, besides all of the above, you need a sequencer for each band. This is a switching device that applies power to the transmit and receive circuits along with the antenna and IF relays – in the correct order and with suitable delays so that, for example, transmitter RF isn't applied to the antenna relay before it has finished switching.

While Minikits has a sequencer kit to do the job, I built one for each band using a PICAXE micro-controller.

For one or two of the Field Days, I borrowed transverters for 47 and 76 GHz, but so far haven't progressed to acquiring the gear for these bands myself. But, some of the hams in my area have, namely Iain VK5ZD, David VK5KK and Tim VK5ZT.

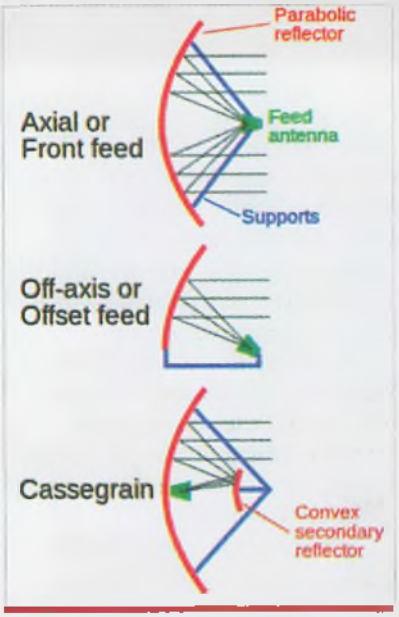
## Final steps

In recent years, a small transverter board for the 122 GHz band became available. It contains a single chip with transmitter, receive down-converter and two patch antennas. It is designed for use in vehicle anti-collision radar systems. The transmitter output power is about 0.5 mW!

I bought one of these boards from VK5ZD, together with a small 18 dB horn antenna that I screwed to the PCB directly over the chip. I mounted the PCB in a diecast box with the horn poking out through a hole.

I bought a 45 cm aluminium dish from Edmund Optics in Singapore for about $240. VK5KK then kindly 3D-printed the plastic components required to mount the dish on a frame along with a hyperbolic mirror out in front of the dish so the dish is illuminated Cassegrain-style by having the horn "shining" through the centre of the dish from the rear – visible in the photos.

The secondary mirror is supported by three M5 stainless steel, threaded rods so that its position can be adjusted for best focus.




**Common**, practical feed arrangements for parabolic dishes.


**Front view** of my Cassegrain-style dish, showing the secondary mirror mount.

Along with the transverter PCB in the diecast box there is also the 10 MHz reference required to ensure the transverter is close to the operating frequency.

This reference is a crystal oscillator in a heated thermostat-controlled enclosure (an OCXO) with the facility to vary the frequency over a small range by voltage control. Such OCXOs are readily available on the internet for just a few dollars, having been removed from mobile phone base stations.

The ability to change the frequency of the reference is important if the need is there to use FM for contacts.

Audio from the microphone is amplified to a level (a few volts), which will modulate the frequency of the reference sufficiently to give the usual deviation at 122 GHz. Since the operating frequency is 12,000 times higher than the reference, a 1 Hz shift in the reference frequency gives a 12 kHz shift at 122 GHz. This is about double the required deviation.

In my case, there was quite a lot of bass cut and treble boost required

in the mic audio to make the audio sound OK in a receiver. So, I built a tone control circuit with sufficient gain above the mid-range and a drop in gain towards the low end. This circuit is contained in a tin-plated, round 'box' in the mic lead.

## Finally . . .

My 122 GHz system was tested with Iain VK5ZD on the 31st October 2023 over a path of about 50 km, but without success. I moved about 30 km closer and Iain moved a couple of km to a better site. We then had success, with S9 signals both ways!

We hope to do better in the forthcoming Spring VHF-UHF Field Day on 25th and 26th November. Reports in a future instalment!

## References and Resources


[1] Minikits: www.minikits.com.au/electronic-kits
[2] W1GHZ: www.w1ghz.org/
[3] 122GHz User Group – The122GProject at: groups.io
[4] Edmund Optics: www.edmundoptics.com/p/18quot-diameter-parabolic-reflector/26252/


**Rear view** of my 122 GHz rig. The diecast box houses the 122 GHz PCB, the sequencer and OCXO. Note the bubble level at the left. The round can at right is the mic audio amplifier.

# Silent Key

## Kevin Charles Trevarthen VK3AKT, VK3VC

It is with great sadness that we announce that, on the 5th of June 2023, after being in Baptcare Karana Community at Kew for over three years and not enjoying good health, Kevin VK3AKT, VK3VC became a silent key.

Kevin was born in Burnie, Tasmania, on 14 October 1935. At age 11 he started piano lessons and later became the school pianist at Burnie High School, entering and winning several Eisteddfods in Tasmania. In 1950, Kevin started as an apprentice watchmaker at Joyce's Jewellery shop, where he worked for three ye ars.

With his parents and two brothers, the family moved to Melbourne in 1953. Once in Melbourne, Kevin continued his apprenticeship at Dunklings the Jewellers and stayed there for 25 years.

Kevin was called-up for National Service and served at Point Cook in 1955 and 1956.

His cousins suggested that Kevin might like to join the Victorian Baptist Youth Choir, where he became the associate pianist and played at all the choir concerts until he retired in 1962.

Kevin joined the Ashton Smith Singers in the 1990s and was with that choir for over ten years.

Kevin and Jean were married on 2 April 1960. In 1962, Kevin started the Broadcast Operator's Certificate course at RMIT and, in December 1980, he began work as a Broadcast Operator at the ABC. He retired at the end of 1996.

In 1964, Kevin had his first call sign as a radio amateur - VK3ZDG. Then, in 1987, VK3AKT; in 2014 he gained VK3VC. He was very active on both HF and VHF. On his telescopic tower he had mounted a 5-element Yagi for HF, with another Yagi for 2m above it, plus various HF dipoles.

In 1965, Kevin and Jean's daughter, Kerryn, was born, followed in 1968 by their son, Paul.

Kevin was a member of the WIA, a foundation member of the Eastern and Mountain District Radio Club (EMDRC), and a member of the Radio Amateurs Old Timers Club (RAOTC).

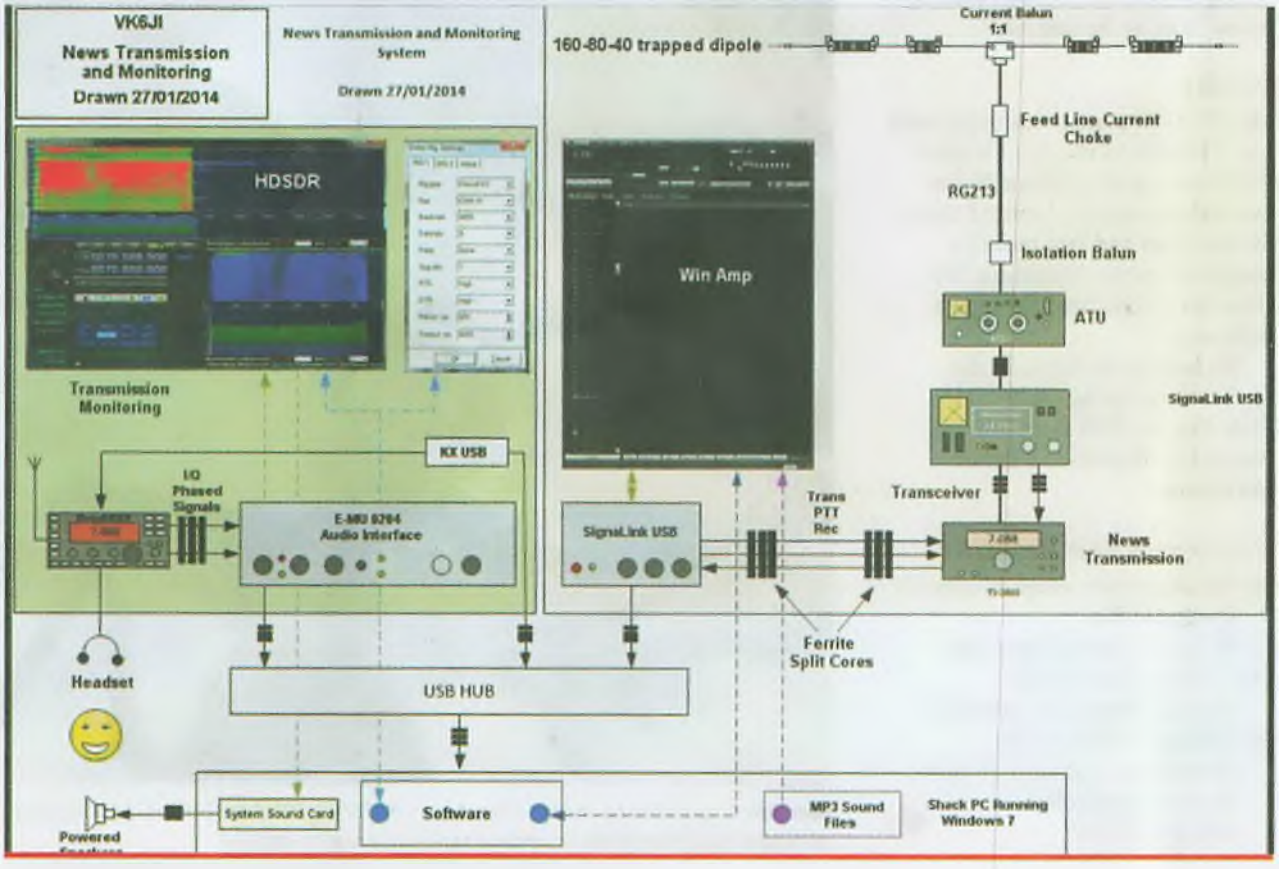
My family and I came to live in Blackburn in 1981, just around the corner from Kevin's QTH. It didn't take me long to notice those Yagis and dipoles and I soon met Kevin. Since then, we never stopped talking about antennas and everything radio. We became firm friends and I certainly miss him.

Our sympathy to all his family. Farewell OM, RIP.

**David Williams VK3RU**

# WestNews

*Will McGhie VK6UU*
*e will2@iinet.net.au*




**Detailed block diagram** of the VK6JI news broadcast setup operating in Perth.

## VK6 Broadcasts & history

As in other states, the WIA broadcast has been a large part of what we know about amateur radio, no less so than in VK6. The first mention of VK6WI, which was the WIA West Australian Division's official call sign and used for news broadcast, was in September 1929. The *West Australian* newspaper reported "the new (WIA) headquarters will be in the Young Australian Building where its transmitter will be installed."

It was later reported that "Plans are now in hand for an official opening of VK6WI, the institute's transmitter. This will probably take the form of a smoke social." The official opening was reported in the Western Australian newspaper, *The Daily News*, on Monday 23 March 1931. See the clipping from the newspaper here.

The SSB radio broadcast of the VK6 news on the HF bands are of surprising quality. SSB going back a few decades was for me not always pleasant on the ears. Put a few stations together and apart from the varied quality and often the need to have the hand on the clarifier was a distraction.

THE DAILY NEWS.
MONDAY, MARCH 23, 1931

**WIRELESS INSTITUTE ACTIVITIES.**

(By VK6FG)

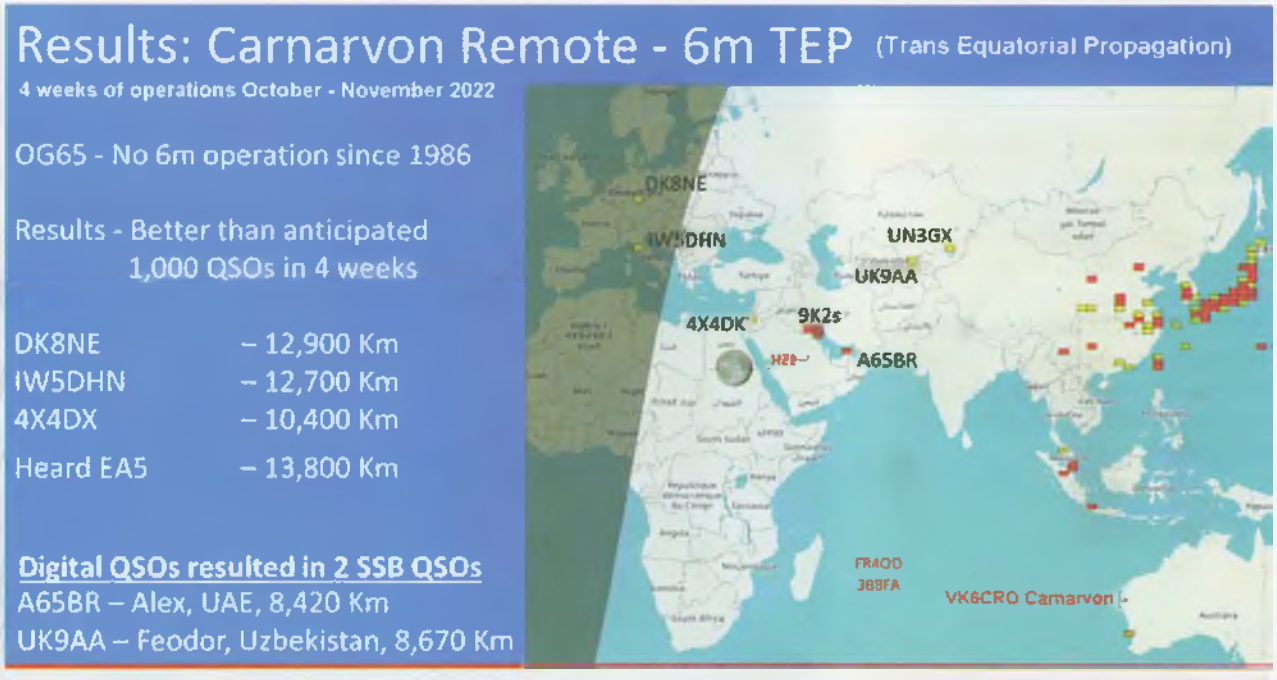
The institute's transmitter VK6WI will go on the air on 'phone on Saturday evening, March 28, using the 80-metre band. This will be a test transmission in preparation of the dissemination of institute news to country members, technical lectures to members and the testing of the set for 'phone, and demonstration of the principles involved, for members preparing for their A.O.P.C. certificates.

**Clipping** from a Perth newspaper records WIA history.

With the introduction of radios that have much better frequency stability, and now SDR radios, the audio quality is close to FM.

Not having a HF station in my shack for a couple of decades, and then with the purchase of an Icom IC-7300, I could not believe how good the audio was on the 160 metre band VK6 news transmissions. It was a pleasure to listen to. Listening to other bands, all the VK6 news relays were equally as good.

I asked Chris VK6JI how does he achieve such good quality? Chris does the 80m and 40m relays and has stood in on 160m when




**Results of four weeks** of 50 MHz FT8 operation – October-November 2022 – from the VK6CRO remote station at Carnarvon, WA. The map details contacts over an amazing geographic distribution, from Japan, China and Mongolia, down through East Asia to Indonesia, Darwin, Malaysia, India, Pakistan, the middle Asian countries , across to the Mediterranean, and clustered over western Europe. Conditions did allow for SSB contacts to happen when signal levels were high enough, particularly to Japan. (Image and details from Nigel VK6CPU).

required. Chris responded and his reply follows. For me, the associated block diagram tells the story, in particular the monitoring of his transmissions.

## On audio quality – Chris VK6JI

For me, now retired, I miss the technical aspect I got from working, so I use amateur radio to fulfil that need in me. Having an operational station to broadcast the news requires me to maintain some degree of technical skills.

On the subject of audio quality, my hearing change has highlighted the fact that each of us hear a given source differently, we can't assume everyone is hearing what you are hearing. I have an inbuilt band stop filter at about 1.2 kHz which is about 200 Hz wide, right in the zone where most of the intelligence is contained, so I need all the spectrum each side of my band stop filter to be present.

In general, the lower frequencies give the audio a warm soft feel. However, lower frequencies without matching highs sound muddy and very hard to hear. The higher frequencies make the audio sharp and clear, but highs without the matching lows make the audio sharp, and thin. While maybe good for DXing it does not make for long term listening.

Keeping in mind that most of us require a different audio response to achieve the above, individual audio profiles cannot be done at the transmitter, if you do, you may make it better for some and worse for others. The transmitter needs to transmit the full audio spectrum without any bias. This then enables each listener to adjust the audio response to match their individual hearing.

I went to some trouble to ensure I had a flat response over the audio range, including the bass (which most people cut out). In addition, I have configured the transceiver to use a wide filer to use the full communication audio of the transceiver.

Looking through the files on my PC, I drew a block diagram of my transmitting and monitoring setup way back in 2014. I used the waterfall of an SDR with the time constant set long to get an average frequency response of the TX signal. The diagram here shows the transmitting and monitoring setup. Things have changed a little, but the basics are the same.

## 50 MHz TEP from VK6CRO

In the last issue (pages 27-29), details of the 6m equipment installed at the VK6CRO remote station in Carnarvon (grid square OG65) were described by Nigel VK6CPU. This issue, visual details of results described last issue are published in the accompanying images.

To recap the details – the 6m equipment at VK6CRO is based on a Yaesu FT-991 all-mode MF/HF/6m-2m/70cm transceiver featuring multi-mode operation on CW, AM, FM, SSB, and digital modes, providing 100 Watts on the

bands through 6m, and 50 Watts on the 2m and 70cm bands.

On 6m, a 3-element LFA Yagi looking towards Europe and the Middle East is on a smaller tower adjacent to the primary transmission tower at the Carnarvon Space Tracking Museum (photo on page 27 last issue). The same pole holds a vertical 4-element 2m Yagi for APRS pointed at Indonesia (YB) that transmits a packet every 15 mins on 144.390 MHz. Both antennas are shown in the accompanying photograph.


**The 3-element LFA** (loop-fed array) Yagi at VK6CRO. While fixed on the EU-Middle East direction, contacts have been made extending from western Europe, across the Mediterranean, and to the Asiatic Region.

## The Wireless Institute of Australia ACN 004 920 745

# Election of Directors - Call for Nominations

Pursuant to clause 14.1 of the Constitution the Wireless Institute of Australia, the Board has determined that the election of directors shall be conducted by ballot.

Three directors retire at the conclusion of the next Annual General Meeting which will be held in May 2024, namely Lee Moyle VK3GK, Chris Dimitrijevic VK3FY and Steven Green VK2TSG. Each retiring director is eligible for re-election.

Nominations are called for from persons seeking election as a director of the WIA.

A director must be a voting member of the WIA and must hold an Australian amateur radio license and a Company Director Identification Number.

Any person wishing to nominate as a candidate for election as director of the WIA must deliver or cause to be delivered to the Returning Officer by not later than 2.00pm on 10th December 2023:

A statement signed by the candidate signifying their willingness to be a candidate for election as a director together with; the full name, age, occupation, membership number, callsign of the Candidate and Director Identification Number, and such other biographical details or other information as the candidate wishes to accompany the ballot papers, but in all not exceeding 250 words.

A nomination form is available on the WIA web site.

Candidate information will be posted online and emailed to members. Members are requested to ensure that their email address is correctly recorded on the WIA membership register.

Delivery to the Returning Officer may be made by hand when the WIA national office is open at:

Unit 20
11-13 Havelock Road
Bayswater
Victoria 3153

or by mail to:
PO Box 2042
Bayswater
Victoria 3153

Nominations received by facsimile, email or by other electronic means cannot be accepted.

Authorised by
**John Marshall**
*WIA Returning Officer*

**Don't forget to register for MEMNET.**

# 2024 Ross Hull Memorial VHF-UHF Marathon rules

*Tom Blunt VK2TBC, Contest Manager*

Ross Hull 3JU pioneered use of the amateur bands above 30 MHz and demonstrated that atmospheric conditions extended propagation beyond the line-of-sight horizon.

The Contest runs through the month of January, hence 'marathon.' Get on the VHF+ bands and work as many local and DX stations as you can, then send in your entire log. Your log will be entered automatically into all applicable categories. Logs are due in by **February 14th**.

## Contest background

The WIA maintains a perpetual trophy in honour of the late Ross A Hull and his pioneering achievements in VHF and UHF operation. The contest is open to all amateurs worldwide.

**An article about Hull's exploits at the ARRL's QST magazine over the 1930s was published in Amateur Radio magazine, Issue 1 for 2022. You can download a copy of this article from the magazine website, here:** www.wia.org.au/members/armag/2022/january/

PDF certificates will be awarded to all entrants. The winner of the Ross Hull Trophy will be the highest scoring single operator in category A (this is a function of the log checking software).

## Duration every year

00:00 UTC 1 January to 23:59 UTC 31 January.

## Sections

### Single Operator

Single transmitter on-air rule applies.

### 7-day

A Best 7 days, All Modes (total score in categories BCD and FGH).

B Best 7 days, SSB/FM/AM (Phone).

C Best 7 days, CW.

D Best 7 days, digital.

### 2-day

E Best 2 days, All Modes (total score category FGH).

F Best 2 days, SSB/FM/AM (Phone).

G Best 2 days, CW.

H Best 2 days, digital.

### Multiple Operator

Best 7 days, All Modes, SSB/FM/AM (Phone) + CW + digital.

Digital modes are defined as those in which the decoding of the received signal is done by a computer (not including CW).

## General Rules

- Stations may operate from any location.
- You may claim one contact per station, per band, per valid mode (Phone, CW, digital) per UTC Day.
- Repeater, satellite, EME, and cross-band contacts are not permitted. NB: split frequency operation inside the one band is permitted.
- Calling frequencies should be kept as clear as possible so as not to interfere with other stations making or listening for calls.
- Courtesy: if Phone contact is established on any recognised DX calling frequency (e.g, 50.110, 144.100 etc), stations should QSY above 150 kHz of the band edge to make the contest exchange(s).
- All rulings of the Contest Manager will be regarded as final.

## Contest Exchange

Entrants must exchange RS (or RST) reports plus a serial number and the log must show a six-digit Maidenhead locator for the station. Owing to variations in different modes, the serial number must be exchanged, but the Grid Square can be sourced by alternate means.

## Logs

Station callsign must head the log. The following details must be recorded for each contact in the log:

- Date and UTC time.
- Mode, band or frequency, and call sign of station worked.
- Reports and serial numbers sent and received.
- The contesting station must include the 6-digit grid location of both ends of each contact in the log for the purposes of checking distance claims.

Important: the log must include *all* contacts.

## Scoring

Scoring will be based on the best tallies for 2 or 7 UTC days. For each contact, score 1 point per 100 km, or part thereof (i.e., up to 99 km: 1 point, 100 – 199 km: 2 points, etc.).

Multiply the total by the band multiplier as follows:

| 6m | 2m | 70cm | 23cm | Higher bands |
|---|---|---|---|---|
| 2 | 3 | 5 | 8 | 10 |

Then: total the scores for all bands.

## Entries

**Logs are due in by 14 February 2024. Electronic logs can be emailed to: rosshull@wia.org.au. Acceptable log formats include Cabrillo 3:0, VKCL.**

## Complete details

www.wia.org.au/members/contests/rosshull/

# ALARA

*Jenny Wardrop, VK3WQ*
*e secretary@alara.org.au*
*w www.alara.org.au*

## ALARAmeet Update

While I am writing this, ALARAmeet 2023 is still a couple of weeks away. We are hoping for good weather, and for everyone to enjoy themselves. ALARAmeet does not happen without support.

Thanks to those who donated prizes for our activities. In particular, Icom gave us the ID-50A hand-held; Tet-Emtron gave us two generous vouchers, and the Puzzle People who gave us a wide range of puzzles. Also, thanks to the Tasmanian Government who contributed a grant toward our costs.

Thanks to the speakers who presented at ALARAmeet: Alison Alexander, Tasmanian historian, and Phil Tyson, from the Sound Preservation Society of Tasmania, who spoke spoke at our dinners. Norma VK2YL, Michelle VK2AYL, Shirley VK5YL, Catherine VK7GH/VK7C, Marija VK5MAZ, and Sue VK5AYL shared their activities on the air to entice us to try different things.

Thanks to Justin VK7TW, who hosted the Mystery History tour for the OMs, and Tony VK7VKT plus all of REAST, for the BBQ and Open Day at the club rooms. The support from the club has been unstinting.

Finally, thanks to the ALARAmeet planning group: Catherine VK7GH, Angela VK7AMP, Jane VK7BJ/VK7JN, and Kathy VK7KJJ. Kathy's daughter Becc designed and prepared all the printed material for ALARAmeet and deserves special thanks.

We look forward to the next national event which will be ALARA's 50th birthday. This will be held in Melbourne on 26 July 2025. Michelle, VK2AYL is coordinating this and will share details as the program is developed. See you there. Linda VK7QP

Sadly, again we must report on two silent keys; this time they are not YLs, but the OMs who encouraged and supported them. I'm sure that there will be full obituaries for them elsewhere, in this or subsequent issues of the magazine. This is just a small tribute to two of the many OMs who guide and support us YLs.

David VK5DB, formerly VK5OV, was the OM of Meg VK5YG, formerly VK5AOV. Meg and David met in Murray Bridge, South Australia, around 1986 when Meg moved-in to the house next door to David! David had already been licenced for many years, and when they subsequently married, Meg was persuaded to study for her licence.

Anyone who had attended an ALARAmeet from the 1987 Adelaide one onwards, would have met David. He supported Meg in all her many and varied ALARA activities. David passed away suddenly at the end of June. His funeral, a month later, was well attended by many OMs and ALARA members.

Valé David Box VK5DB.

**Silent Keys:** Denis Babore VK3JN and David Box VK5DB at ALARA's 40th birthday celebrations in July 2015.

Denis VK3JN, formerly VK3BGS, was the partner of Kaye Wright VK3FKDW, our former ALARA Newsletter Editor, who also served as the Publications Committee Secretary over some years up to 2019. Sadly, Kaye passed away in January 2020 from Motor Neurone Disease, closing what Denis described as "the best ten years of his life," living with Kaye. Denis passed away in September this year and, once again, his funeral was attended by many OMs and YLs.

Valé Denis VK3JN, we appreciated your support.

**VK3 ALARA lunch in Bendigo.** Left to right Mike VK3AHA, Peter VK3RV, Cheryl VK3FCYL, Charlie VK3ZD and John VK3DQ, Margaret VK3FMAB, Judy VK3FIAG, Jim VK3ZKK, Jen VK3WQ, Heidi VK3HID and Jean VK3VIP.

## ALARA CONTEST 2023 RESULTS

| Callsign | Name | Result | Notes |
|---|---|---|---|
| VK7C | Catherine Hammond | 858 | Top scoring Australian YL (Trophy), Top score YL overall, Top score YL phone only, Top VK7 Member. |
| VI7ALARA | Linda Luther | 624 | |
| VK2FASH | Alisha Ashley | 319 | Top scoring Foundation Licence ALARA member (Trophy), Top VK2 Member |
| VK2SJC | Stacey Chatwin | 309 | |
| VK6DEE | Deena Abrahams | 245 | Top score YL Echolink only, Top VK6 Member |
| VK4ZOE | Carinka Connew | 239 | Top VK4 Member |
| VK4SWE | Lyn Battle | 174 | Top score YL CW only |
| VK7NB | Tanya Michałek | 141 | |
| VK3DL | Dean Lamson | 140 | Top VK3 OM |
| VK2VH | Robert Janoska | 136 | Top VK2 OM |
| VK3HAG | Ashley Geelan | 136 | |
| VK2YW | John Eyles | 135 | |
| VK3WQ | Jennifer Wardrop | 122 | Top VK3 Member |
| VK7KPC | Peter Dodd | 94 | Top VK7 OM |
| VK2IKT | Julie Thompson | 92 | |
| VK5YL | Shirley Tregellas | 75 | Top VK5 Member |
| PA5UL | Paul | 66 | Top OM from Europe |
| ZL3VZ | Bill Cousins | 65 | Top OM from New Zealand |
| VK2XGB | Geoff Barr | 60 | |
| VK3SAT | 1st Sandringham GG | 51 | |
| VK1CHW | Chris Winter | 45 | Top VK1 OM |
| VK3YV | Tony Linford | 45 | |
| VK3BAP | Brendan Parkinson | 45 | |
| VK3AMO | Robert Warnecke | 40 | |
| VK7WN | Warren Nicholas | 35 | |
| VK7ID | Phill Groom | 35 | |
| VK2DB | Dot Bishop | 30 | |
| VK2YL | Norma Ohare | 29 | |
| VK1CB | Cheryl Bollard | 25 | Top VK1 Member |
| YC2DOP/ZL | Ary B Pramono | 25 | Top OM from Asia |
| VK2AYL | Michelle O'Hare | 20 | |
| VK1OMG | Mike Kreuzer | 15 | |
| VK2TTL | Rhod Rowe | 15 | |
| **TOTALS** | **33** | **4485** | **15** |
| **Honourable Mention** | | | |
| VK3SAT | 1st Sandringham GG Fiona, Ruby, Abbie, Lizzie, Lis | 51 | |

## VK3 ALARA lunch in Bendigo

On Saturday 7 October, 11 YLs and OMs traveled up to Bendigo in Central Victoria, for a very pleasant lunch at a café called "The Eight Sisters". As one 'wag' had pointed out to me a few days earlier: "A very appropriate name for an ALARA get-together!"

Our thanks to Heidi VK3HID for organising the venue.

## Jenny Wardrop VK5ANW/VK3WQ

**At the WIA's 75th** anniversary, Adelaide, 1985.

Jenny obtained her amateur licence in 1977, allegedly brought on by 'a Christmas present' – a Weston 551, 2m transceiver. When her husband Mike (SK) upgraded to a full call from VK5ZBI to VK5AMW, Jenny passed her 'Z call' and took over his old 'ZBI' call. A couple of years later (1980) she upgraded and obtained VK5ANW (the phonetics used by some of the locals was, 'Australia's Nicest Woman'). Deep-down it's thought that she relished that!

Some individuals just quietly support amateur radio and the WIA, often over many years. Others make a big noise for a year or two, perhaps contributing something towards amateur radio, but then 'disappear.' Jenny was (and still is), certainly in the former category. She was always there to help when asked. Although bringing up three children, she was prepared to and did contribute to amateur radio, not only in South Australia, but later, Australia-wide through her involvement with ALARA and the Federal Council of the WIA.

In early 1981, Jenny became SA Divisional Minute Secretary and attended her first WIA Federal Convention (AGM) as an Observer. Probably because she did such a good job, in July 1981 she was appointed Federal Councilor for VK5 and became the first YL on the National Federal Council in April 1982.

For some 10 years now, Jenny has been your ALARA Columnist in AR magazine. Her contributions to our magazine started back in July 1982, 40-odd years ago, as a columnist for the new '5/8 Wavelength' column (which she named), reporting on South Australian and Northern Territory activities. At this time, the VK5 Division's responsibility included looking after VK8 interests within the WIA. Originally, this AR magazine reporting was to be shared with others, but they all seemed to stand back because, again, Jenny was doing such a good job! Seems to happen regularly in amateur radio to some people!

But that is only part of the story. Jenny's involvement with ALARA went down similar lines as those with the WIA when, in May 1989, after five and a half years as ALARA Secretary, and more than three years as Vice President, Jenny became President, until May 1991.

Jenny, we all wish you a very happy 'Significant' birthday, and thank you for your interest, contributions, and commitment to Australian amateur radio, the WIA, ALARA (and AHARS) over the years and we continue to look forward to reading your AR column in the years to come.

**- a contributor**

# DX Awards

*Graham Alston VK3GA*

Below are listed all New DX awards issued from 2023-08-22 to 2023-10-26

To use the online award system, go to: www.wia.org.au/members/wiadxawards/about/

## New awards

### DXCC Multi-band (3)

| # | Call | Name | Mode | Band | Count |
|---|---|---|---|---|---|
| 255 | VK2SKI | Malcolm Warwick | Open | 20-17-15m | 347 |
| 256 | VK2SKI | Malcolm Warwick | Digital | 20-17-15m | 343 |
| 257 | 7N4SQJ | Hikaru Noguchi | Open | 20-17-15m | 465 |
| 258 | 7N4SQJ | Hikaru Noguchi | Digital | 20-17-15m | 425 |
| 259 | VK6APK | Aleksandar Petkovic | Triple Play | 40-20-15m | 349 |
| 260 | VK3TU | Albert Gnaccarini | Digital | 20-15-10m | 352 |

### DXCC Multi-band (5)

| # | Call | Name | Mode | Band | Count |
|---|---|---|---|---|---|
| 180 | VK3XV | Tony Hambling | Digital | 40-20-17-15-10m | 624 |
| 181 | VK3XV | Tony Hambling | Open | 40-20-17-15-10m | 681 |
| 182 | VK3NX | Charlie Kahwagi | CW | 40-30-20-17-15m | 626 |
| 183 | VK2NN | Peter Garoufalis | Open | 40-20-17-15-10m | 699 |
| 184 | VK2SKI | Malcolm Warwick | Open | 20-17-15-12-10m | 558 |
| 185 | VK2SKI | Malcolm Warwick | Digital | 20-17-15-12-10m | 553 |

### DXCC Multi-band (7)

| # | Call | Name | Mode | Band | Count |
|---|---|---|---|---|---|
| 117 | VK4TW | Robert Waegele | Open | 40-30-20-17-15-12-10m | 908 |
| 118 | VK4TW | Robert Waegele | Digital | 40-30-20-17-15-12-10m | 908 |
| 119 | VK6DU | Lance Martin | Digital | 40-30-20-17-15-12-10m | 1084 |

### DXCC Multi-mode (Digital)

| # | Call | Name | Count |
|---|---|---|---|
| 178 | VK2PX | Peter Pratt | 100 |
| 179 | VK3XB | Mark Beacham | 102 |
| 180 | 7N4SQJ | Hikaru Noguchi | 225 |

### DXCC Multi-mode (Open)

| # | Call | Name | Count |
|---|---|---|---|
| 558 | VK3XB | Mark Beacham | 102 |
| 559 | 7N4SQJ | Hikaru Noguchi | 239 |

### DXCC Single-band

| # | Call | Name | Mode | Band | Count |
|---|---|---|---|---|---|
| 1344 | VK2TDS | Darryl Smith | Open | 15m | 101 |
| 1345 | VK2TDS | Darryl Smith | Digital | 15m | 101 |
| 1346 | VK6DU | Lance Martin | Digital | 30m | 120 |
| 1347 | VK2SKI | Malcolm Warwick | Open | 20m | 115 |
| 1348 | VK2SKI | Malcolm Warwick | Open | 17m | 120 |
| 1349 | VK2SKI | Malcolm Warwick | Digital | 20m | 111 |
| 1350 | VK2SKI | Malcolm Warwick | Digital | 17m | 120 |
| 1351 | VK2PX | Peter Pratt | Open | 15m | 105 |
| 1352 | VK3XV | Tony Hambling | Digital | 17m | 102 |
| 1353 | VK3XV | Tony Hambling | Open | 17m | 102 |
| 1354 | VK3NX | Charlie Kahwagi | CW | 40m | 102 |
| 1355 | VK4TW | Robert Waegele | Open | 30m | 103 |
| 1356 | VK4TW | Robert Waegele | Digital | 30m | 103 |
| 1357 | VK2SKI | Malcolm Warwick | Open | 15m | 112 |
| 1358 | VK2SKI | Malcolm Warwick | Open | 10m | 107 |
| 1359 | VK2SKI | Malcolm Warwick | Digital | 15m | 112 |
| 1360 | VK2SKI | Malcolm Warwick | Digital | 10m | 106 |
| 1361 | VK4IM | Adam Jaroszuk | Open | 20m | 113 |
| 1362 | VK4IM | Adam Jaroszuk | Phone | 20m | 113 |
| 1363 | VK3BDX | David Burden | Triple Play | 20m | 101 |
| 1364 | VK3NX | Charlie Kahwagi | CW | 10m | 100 |
| 1365 | VK5SA | Chris Levingston | Open | 12m | 150 |
| 1366 | VK5SA | Chris Levingston | Open | 10m | 150 |
| 1367 | 7N4SQJ | Hikaru Noguchi | Open | 20m | 136 |
| 1368 | 7N4SQJ | Hikaru Noguchi | Open | 17m | 153 |
| 1369 | 7N4SQJ | Hikaru Noguchi | Open | 15m | 176 |
| 1370 | 7N4SQJ | Hikaru Noguchi | Digital | 20m | 132 |
| 1371 | 7N4SQJ | Hikaru Noguchi | Digital | 17m | 141 |
| 1372 | 7N4SQJ | Hikaru Noguchi | Digital | 15m | 152 |
| 1373 | VK6DU | Lance Martin | Digital | 40m | 102 |
| 1374 | VK2NN | Peter Garoufalis | Open | 17m | 109 |
| 1375 | VK2SKI | Malcolm Warwick | Open | 12m | 104 |
| 1376 | VK2SKI | Malcolm Warwick | Digital | 12m | 104 |
| 1377 | VK3BDX | David Burden | CW | 40m | 100 |
| 1378 | VK1MES | Malcolm Stephens | Open | 15m | 100 |
| 1379 | VK1MES | Malcolm Stephens | Digital | 15m | 100 |
| 1380 | VK6APK | Aleksandar Petkovic | Triple Play | 15m | 100 |
| 1381 | VK3TU | Albert Gnaccarini | Digital | 15m | 107 |
| 1382 | VK3TU | Albert Gnaccarini | Digital | 10m | 109 |

### IARU Worked All Continents (Basic)

| # | Call | Name | Mode | Band |
|---|---|---|---|---|
| 107 | VK3NX | Charlie Kahwagi | Open | |
| 108 | VK3NX | Charlie Kahwagi | CW | |

## Grid Square

| # | Call | Name | Mode | Band | Count |
|---|---|---|---|---|---|
| 730 | VK3NX | Charlie Kahwagi | Digital | 70cm | 28 |
| 731 | VK3NX | Charlie Kahwagi | Digital | 23cm | 12 |
| 732 | VK4KX | Bernard Terry | Phone | HF | 318 |
| 733 | 7N4SOJ | Hikaru Noguchi | Open | HF | 753 |
| 734 | 7N4SOJ | Hikaru Noguchi | Phone | HF | 130 |
| 735 | 7N4SOJ | Hikaru Noguchi | Digital | HF | 662 |
| 736 | VK3HAG | Ashley Geelan | Open | HF | 449 |
| 737 | VK3HAG | Ashley Geelan | Digital | HF | 440 |

## Oceania

| # | Call | Name | Count |
|---|---|---|---|
| 95 | VK3OI | George Vellis | 25 |
| 96 | 7N4SOJ | Hikaru Noguchi | 39 |

## Worked All VK Call Areas HF

| # | Call | Name | Mode |
|---|---|---|---|
| 2459 | 7N4SOJ | Hikaru Noguchi | Open |
| 2460 | VK2VEL | Edwin Lowe | Phone |

# Activate VK90AR to celebrate 90 years of continuous publication of *Amateur Radio* magazine

In October 2023, *Amateur Radio* magazine (AR), the official journal of the WIA, reaches 90 years of continuous publication.

To mark this milestone, the WIA has obtained the special event call sign VK90AR for use by any member of the WIA as well as any affiliated club.

Get it on the air and make some noise! Use of VK90AR expires on 31 December 2023.

Getting to use VK90AR is a simple process. Apply on the WIA website **Online Event Calendar,** at:
www.wia.org.au/newsevents/events/index.php

From the left hand menu column:

- choose Submit A Calendar Event.
- this opens the **Event Registration Form.**

To complete the form, enter your details like this:

**Your Name:** Kim Smith or Rosemary Kopp, etc

**Your Callsign:** VK1ZYX etc

**Your Email Address:** vk1zyx@wia.org.au, or vk1zyx@coldmail.dum

**Club Or Group Running The Event:** if just you – enter your call sign (e.g. VK1ZYX); for a club, enter the club's name (e.g. Capital Amateur Radio Club). *The calendar event will be registered to you or your group.*

**Event Name or Title:** VK90AR-VK1ZYX *(your callsign)*

**Category:** select VK90AR from the menu

**State:** e.g. VK1 – ACT, *or VK9*

**Event Date:** *e.g.* 25/12/2023

**Event Duration (in days):** *e.g.* 2 (or 1, or scroll to 5, etc); *you chose how long you/the club want to use it.*


**Event Start Time:** your local time *(e.g. for VK1)*

**Event End Time:** your local time *(e.g. for VK1)*

**Event Brief Description:** Activation of VK90AR by *(e.g.) VK1ZYX*

**Event Detailed Description:** *give a detailed description of frequencies/modes/operators, etc.*

- An email approving the registration, or otherwise, will be sent to you by the event managers.

The Event Managers for use of VK90AR are Technical Editors for *AR* mag, Bruce Kendall VK3WL/9V1WL and Tom George VK3DMK.

## LOGGING

All VK90AR activations must be logged electronically (hardcopy cannot be accepted) using one of the many amateur radio logging applications that are ADIF compatible (Amateur Data Interchange Format). For example – VKCL, N1MM, Log4OM, DXKeeper, HRD, et al.

- Logs are to be emailed to the event managers, at: vk90ar@wia.org.au

## QSLs

Logs will be consolidated and uploaded to Logbook of The World (LoTW) for generation and distribution of QSL cards from M00X0 QSL Manager Services.

Here's a sample of the QSL card front page design.

## MORE

Archived copies of *AR*, from 1933 to 2012, are available online, at:
www.armag.vk6uu.id.au/
https://tinyurl.com/AR-past
https://tinyurl.com/ARarchive

## Correction

**Page 10, issue 5.** VK7RH is *not* SK! When highlighting the new *Listening In* column in Issue 5's Editorial, I mistakenly said that Robin Harwood VK7RH, author of the earlier *Spotlight on SWLing* column, was a silent key. Mea culpa. Roger (nobody's perfect) Harrison VK2ZRH

## Boost for amateur radio in Africa

The African Telecommunications Union (ATU) and the International Amateur Radio Union (IARU) have signed a landmark agreement that will also enable expanded use of amateur radio during emergency telecommunications operations.

The agreement seeks to leverage ATU's membership of 51 African countries and IARU's global membership of communities in 160 countries, including 36 in Africa—allowing IARU and ATU to combine valuable expertise and knowledge, empowering amateur radio operators in Africa through capacity building initiatives built into the agreement.

ATU Secretary General John Omo said, "One of the most remarkable aspects of amateur radio is its resilience during times of crisis. When disasters cripple conventional communication infrastructure, leaving communities cut off and isolated, amateur radio operators step up to bridge the communication gap. Therefore, we warmly embrace this agreement for the immense value it brings to our continent."

Both organisations committed to supporting development and deployment of emergency communication systems and infrastructure, and to cooperate in disaster preparedness and response activities.

Further, the agreement focuses on the promotion of Science, Technology, Engineering, and Mathematics (STEM) education in Africa using amateur radio applications and joint efforts to advocate for amateur radio policies across African countries.

## EVENTS

**4 February 2024, BARG Hamfest, Ballarat.** It will all happen next door to the BARG clubrooms at Ballarat Airport, from 10:00 am. Get the skinny from barg.org.au.

**10 February 2024, PARGFEST Swap-Meet.** Roll up to the Mandurah Bowling Club, 80 Allnutt Street, for an open-door Aladin's Cave of stuff to consider, as done for ages at swap-meets near and far. Roll your eyeballs over to parg.org.au/whatsnew to keep on top of what's coming.

**5 May 2024. MAYHAM.** Going forth on the 5th! The Central Coast ARC has made it known that that'll be the Sunday for return of Mayham following a hiatus, or a hernia. Whatever, it's back. All the usual suspects will be there, including the dude your last met 22 years ago.

# Hamads

### WANTED - WA

Glass octal vacuum valves/tubes for restoration of WW2 National HRO MX receiver.
Those needed are type 6D6, 6C6, 6B7 and 42. The radio uses four 6D6 and three 6C6 valves, so these are particularly needed!
Even if you only have one of the above, it'd be wonderful! Please drop me a line, at: stevevk6vz@tpg.com.au, or 0408 183 742, with your details/price. Thank you!
Steve Ireland, VK6VZ QTHR

### FOR SALE - QLD

COLLECTORS ITEMS
Vintage set of Marconi Inductors, boxed. $150.00 (neg.)
Vintage Universal AVO meter set, meter, probes & accessories. $200.00 (neg.)

Being sold by Brisbane Amateur Radio Club as surplus to requirements. Rod Chisolm VK4ACF (Vice President) handling the sale. 21 Rochedale Rd, Rochedale South. https://barcvk4ba.com.au/

### WANTED - QLD

The following valves, used or New Old Stock, VT4C/211, 833, PX50, PX4, EL34, EL37, KT66, KT88, 2A3, 300B, 350, E212. CASH PAID.
Contact John, at: johnmurt@highprofile.com.au

### WANTED - SA

I'm looking for the following copies of Australian Electronics Monthly magazine, preferably clean & unmarked if possible, to complete my archive.
1985 – July, August, September. 1987 – January, February, March. 1988 – January, June, July, August, September, October, November, December.
Contact Terry VK5TM. vk5tm@vk5tm.com. ph 0412 226 083.

## About Hamads

- Also available online: www.hamads.com.au
- Free service. Online Hamads are also published in *AR*.
- If you want to advertise in AR, please submit your copy by email (MUCH PREFERRED), or if written and mailed please print carefully and clearly, use upper AND lower case.
- Deceased estates Hamads will be published in full, even if some items are not radio equipment.
- WIA policy recommends that the serial number of all equipment for sale should be included.
- QTHR means the address is correct in the ACMA Register of Radio Licences: https://web.acma.gov.au/rn/register_search.main_page
- Ordinary Hamads from those who are deemed to be in general electronics retail and wholesale distributive trades should be certified as referring only to private articles, not being re-sold for merchandising purposes.
- For commercial advertising, contact editor@wia.org.au
- Copy must be received by the deadline on page 3 of each issue of AR.
- Clearly label For Sale and Wanted items. Include name, address STD telephone number and WIA membership number.

**'Hamads'** editor@wia.org.au



## ADVERTISERS INDEX

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In becoming a radio amateur, you have joined the ranks of more than 13,000 Australian radio amateurs and a worldwide fellowship of some 3 million, from all wa ks of life

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- The trusted source for Australian amateur radio since 1933
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- Produced ***by*** Australian amateurs ***for*** Australian amateurs
- Hamads free – For-sale/Wanted – print and online

***Discount* Card – gets discounts at vendors**

**WIA Online Bookshop – supporting your self-learning**

A curated list of recommended books from trusted sources

- WIA books discounted to members, e.g. Foundation Manual

**QSL Service – supporting your on-air activities**

Send and collect your precious QSL cards. Free to members!

**Awards**

Go for gold! Well, at least a certificate

**Contests**

Want to test yourself? And your station?

- HF, VHF/UHF. Field days. Local and multi-national contests

### The WIA – the one source you can trust

**Advancing and protecting our privileges**

- Every licensee has a stake!
- Collective action over decades achieved all we enjoy
- Your trusted voice with the authorities – nationally and globally
- Effective, regular consultations with the amateur fraternity
- Always ensuring our privileges are aligned internationally

**Protecting our spectrum**

- Retained continuing access to the 6m, 70cm, 13cm & 9cm bands
- Always acting to have intruders removed from our bands
- Opposing interference threats

**National news service – VK1WIA**

- Keep up-to-date – local, global and space news
- Weekly *nationwide* broadcasts – 30 minutes of audience-based news
- On the bands and online in text, audio and video
- Trusted support for amateur radio clubs and societies

**Member Engagement**

- Website – www.wia.org.au
- Facebook – www.facebook.com/wiavk
- Podcast – www.wia-files.com/podcast/wianews.xml
- Twitter – twitter.com/VK1WIA
- Youtube – tinyurl.com/WIA-News-Videos
- Memnet – member-exclusive email bulletins

### WIA history

Our origins go back to 1910, when the first Institute was formed to represent wireless experimenters to the government. Major reform of the Radiocommunications Act over the early 2000s, and to amateur radio licensing worldwide, saw a single national organisation formed in 2004 to meet the emerging challenges

### WIA around the world


The WIA represents you internationally. We're a member of the International Amateur Radio Union (IARU), which advocates for amateurs' interests to the International Telecommunications Union, particularly at its World Radio Conferences. These determine global radio regulations and frequency allocations. The WIA is the only Australian amateur radio body with membership of the International Amateur Radio Union.

WIA national office: Unit 20, 11-13 Havelock Road, Bayswater, Victoria 3153
Hours: 9am-5pm EAST, Mon-Fri. Postal: PO Box 2042, Bayswater, Vic 3153

### Join or renew / encourage a friend

Use our Online Membership system, visit:
www.wia.org.au/joinwia/wia/onlinejoin/
Or call (03) 9729 0400.

## GOT A NEW LICENCE? 1-Year Additional Membership on us!

If you have received an Amateur Operators Certificate of Proficiency (AOCP) – Foundation, Standard or Advanced – or if you are an Amateur Radio Operator, SWL or other interested party and at any time have not previously been a member of the WIA, you may be eligible for an additional 1- year membership extension to your first years WIA membership subscription*.

If this is you, or someone you know, all that is needed is to complete a WIA membership application form (hard or soft copy) along with a copy of the relevant AOCP qualification (or equivalent if applicable) showing the date of qualification attainment and send them to the WIA head office for processing.
Join now and start receiving all the benefits of WIA membership.

(* Subject to WIA Membership being approved and WIA Membership Terms and Conditions being fully met.)

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