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**ZS2BL's SA Hamshack**
*(Ye Olde Radio Shoppe)*

Direct importer of a wide selection of SWR meters, HF, VHF and UHF base and mobile antennas. Amateur radio transceivers, antenna analysers, etc. Affordable shipping costs for out of town customers and subsidized shipping to SARL members.

Check out all my amateur radio goodies at [http://www.sahamshack.co.za/index.htm](http://www.sahamshack.co.za/index.htm) and contact me on 072 026 8909
Silent Keys / Stil Sleutels

They shall grow not old as we that are left grow old
Age shall not weary them nor the years condemn
At the going down of the sun and in the morning
We will remember them.”

Hulle word nie oud soos ons wat bly vergrys,
Die jare sal hulle nie raak nog die tyd se eis
En, soos die son sak of die môre ontvou,
Eer hul herinnering – ons sal onthou.”

Dot Faber ex-ZS6BDB
Hubert von Heynitz, ZS6HUB

Interference from solar panel installations

Sweden's national amateur radio society, SSA, reports on work to identify and resolve the radio interference that is caused by solar panel installations. A translation of their post says:

Together with the Swedish Energy Agency, the Swedish Electricity Safety Authority has for some time been reviewing solar installations around the country. We wrote about this in December last year here on our site.

The Swedish Electric Safety Authority finds that it is mainly installations with so-called optimizers that cause radio interference. Some plants, on the other hand, have very good EMC properties, so you should not categorically accuse photovoltaic systems of interfering, says the Swedish ESA.

Radio amateurs in the Kungsbacka area have reported disturbances that they believe come from installations with solar panels and the Swedish Electric Safety Authority has recently been there and made measurements. The authority is happy to receive more reports of radio interference that may be due to installations with solar panels. This, in contrast to interference in general and which may conceivably come from radio broadcasts, you must report to PTS.

According to ITU radio regulations, amateur radio is not considered to be "safety service", which is why you cannot claim interference free in all situations. Occasional strong disturbances may also be tolerated, whereas it is more serious if entire frequency ranges are totally extinct.

In order to look after the neighbour, it is always good to communicate with the neighbour before a notification. Therefore, if you suspect a specific installation, you should first ask the neighbour to shut down your plant to confirm the suspicions.

When reporting a suspected malfunction from a photovoltaic installation to the ESA, it should be detailed. Describe whether the disturbance is continuous or how it occurs intermittently. Please attach audio file and pictures from your frequency display. State where and when the observations were made and preferably a little about your equipment. Do you think you know where the

(Continued on page 6)
source of the disturbance is located and who it is that has it, you can also specify this? Also, keep in mind that everything you write to an authority becomes public action. Send your application to registrar@elsakerhetsverket.se

Hans-Christian, SM6ZEM. Source SSA

ARISS Celebrating Successful Launch Carrying Interoperable Radio System to ISS

Amateur Radio on the International Space Station (ARISS) is celebrating the successful launch and docking of the SpaceX-20 commercial resupply mission to the International Space Station (ISS). One payload on the flight is the ARISS Interoperable Radio System (IORS), which ARISS calls "the foundational element of the ARISS next-generation radio system" on the space station. Amateur radio has been an integral component of ISS missions since 2000. The Dragon cargo capsule docked successfully with the space station on 9 March. ARISS-US Delegate for ARRL Rosalie White, K1STO, said hundreds of ARL members contributed to make the IORS project happen and ARISS is celebrating the 4-year-long IORS project.

"ARISS is truly grateful to ARRL and AMSAT for their co-sponsorship and support of ARISS since day one," White said. "ARISS greatly appreciates the hundreds of amateur radio operators who have stood by ARISS, sending financial support and encouragement. A robust amateur station is on its way to replace the broken radio on the ISS and tens of thousands of amateurs will enjoy strong ARISS packet and ARISS SSTV signals as a result. In addition, thousands of students will discover and use amateur radio to talk with a amateur-astronaut. We hope to see the trend continue where more ARISS teachers and local clubs set up school amateur clubs." The new system includes a higher-power radio, an enhanced voice repeater, updated digital packet radio (APRS) and slow-scan television (SSTV) capabilities for both the US and Russian space station segments.

White called the 7 March launch, "beautiful, flawless." ARRL President Rick Roderick, K5UR, told ARISS that he had his fingers crossed for a successful launch.

According to NASA Mission Control, it will take the three ISS crew members up to a month to unload and stow the 1 950 kg of cargo on board the Dragon capsule and the IORS is not a priority. The actual amateur equipment will be installed in the ISS Columbus module. Another IORS unit is in line to be launched and installed in the Russian segment of the ISS later this year.

The IORS consists of a custom-modified JVC Kenwood TM-D710GA transceiver, a multi-voltage power supply and interconnecting cables. The ARISS hardware team will assemble four flight units - and 10 IORS units in all to support onboard flight operations, training, operations planning and hardware testing.

ARISS-International Chair Frank Bauer, KA3HDO, said earlier this year that future upgrades and enhancements to the next-generation system are in various stages of design and development. These include a repaired Ham Video system - currently planned for launch in mid-to-late 2020, an L-band (uplink) repeater, a microwave "Ham Communicator," and Lunar Gateway prototype experiment.

Instead of “You are 59, QRZ!”

"You sound as bad as a pelican with a mouth full of porcupines!"
Dear Members,

With everyone now in preparation for the 21 day national lock down and disrupting our normal lives in a way that some of us have not seen before in our lifetimes, I would like to convey a few remarks that impacts on SARL services.

The office will be closed during the national lockdown. E-mails will be processed and answered.

No decision to postpone have been made regarding the RAE in May 2020. We will keep you informed.

Ensure to pay your amateur licence on time.

Don't forget the Club licences!

On a positive note, this time is a good opportunity to keep growing our skills, become more active on the air, start or complete the project that you have in mind and keep the interest in supporting amateur radio's future.

Be assured that while we are unable to control this crisis ourselves, it is the reaction and responds to the situation that determines how every one of our life's will develop. Make sure to follow the rules and guidelines as issued by the authorities. Ensure that you focus on the wellbeing of yourself and loved ones including domestic priorities.

Keep informed, be safe and let us keep our frequencies active.

73, Nico van Rensburg, ZS6QL

---

From the President’s Desk
Van die President se Lessenaar

Geagte Lede,

Met almal nou in voorbereiding vir die 21-daagse Nasionale af-sluiting en die ontwrigting van ons normale lewens op 'n manier wat sommige van ons in ons leeftyd nie gesien het nie, wil ek graag 'n paar opmerkings maak oor die impak op SARL dienste.

Die kantoor sal gesluit word tydens die Nasionale af-sluiting. E-posse sal verwerk en beantwoord word.

Geen besluit om uitstel is gemaak met betrekking tot die RAE in Mei 2020. Ons sal jou op hoogte hou.

Verseker jou amateur lidskaps fees behou.

Moet nie die Klub lidskaps fees vergeet nie.

Op 'n positiewe noot, hierdie tyd is 'n goeie geleentheid om te bou aan ons vaardighede, raak meer aktief op die lug, begin of voltooie die projek wat jy in gedagte het en hou die belangstelling in die ondersteuning van amateur radio se toekoms.

Wees verseker dat terwyl ons nie in staat is om hierdie krisis self te beheer nie, dit is die reaksie en verantwoordelijkheid in die situasie wat bepaal hoe elke een van ons lewens sal ontwikkel. Maak seker dat jy die reëls en riglyne soos uitgereik deur die owerhede volg. Maak seker dat jy fokus op die welstand van jouself en geliefdes insluitend huishoudelike prioriteite.

Bly op hoogte, wees veilig en laat ons ons frekwensies aktief hou.

73, Nico van Rensburg, ZS6QL

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2020/21 Amateur Radio Licence Payment

The 2020/21 Amateur Radio License fees will be implemented from Wednesday 1 April 2020. Radio Amateurs are reminded that it is their responsibility to ensure their license is up to date. If for some reason no invoice is received, check that ICASA has been informed of any address changes. Ensure that your Club licences are also paid on time (Club call sign and repeaters).

1 year licence - R 154.00; 2 year licence - R 294.00; 3 year licence - R 422.00; 4 year licence - R 537.00; 5 year licence - R 642.00

**You do not need an invoice.** You will need you **Licence Number** (7 character xxx-xxx-x on the top right of the licence form) or **Call Sign** (if you do not find your licence number) and decide if you want a 1, 2, 3, 4 or 5 year licence. On the EFT, state 1, 2, 3, 4 or 5 Year licence and your licence number and/or call sign!

Send an e-mail to specrev@icasa.org.za and dkuhr@icasa.org.za with a copy of the EFT payment. The correct account for your ICASA Licence Fee is NEDBANK Account number: 14 62 00 29 27, Branch Code: 146245 - Corporate Client Services - Pretoria and in the reference field type in your licence number and call sign.

ICASA Licence Fees - **DO NOT** pay the ICASA licence fee into the SARL bank account, all moneys wrongfully paid into the SARL account will be refunded less the bank charges associated with these transactions.
On Sunday evening 15 March 2020, Pres Cyril Ramaphosa spoke to the Nation about the virus and certain guidelines were given to the South African public about combating this virus. One of those guidelines was no meetings with more than 100 people.

At the Council Meeting held on Wednesday 18 March 2020, the following was decided in terms of Rule 21.2.15 of the Constitution:

a. That the National Convention be postpone until August.

b. That the AGM and the Symposium be combined into one event.

c. That the Budget and Subscriptions to be voted on by means of Electronic Voting (Rule 31 and 32).

d. That Members who have already paid for the 3 and 4 April event and wish to be refunded, contact Kelley at the National Amateur Radio Centre.

Further, Council decided that the preparation by Clubs and candidates for the May RAE may continue at their own discretion. At the end of April, Council and the RAE Manager will make the appropriate decision regarding the RAE on 16 May based on the relevant health situation and any directives from the Government at that time.

We will continue to update Members in line with the latest developments.

Op Sondag en 15 Maart 2020 het Pres Cyril Ramaphosa met die Nasie gesels oor die virus en sekere riglyne is aan die Suid-Afrikaanse publiek gegee oor die bestryding van hierdie virus. Een van hierdie riglyne was geen vergaderings met meer as 100 mense nie.

Tydens die Raadsvergadering wat op Woensdag 18 Maart 2020 gehou is, is die volgende besluit ingevolge Reël 21.2.15 van die Grondwet:

a. Dat die Nasionale Konvensie tot Augustus uitgestel word.

b. Dat die AJV en die Simposium in een gebeurtenis gekombineer word.

c. Dat die Begroting en Ledegelde by wyse van elektroniese stemmery oor gestem moet word (Reël 31 en 32).

d. Daardie lede wat reeds vir die 3 en 4 April-geleenheid betaal het en terugbetaal wil word, kontak Kelley by die Nasionale Amateurradiosentrum.

Verder het die Raad besluit dat die voorbereiding deur Klubs en kandidate vir die Mei RAE mag voortgaan op hul eie diskresie. Aan die einde van April sal die Raad en die RAE Bestuurder die toepaslike besluit oor die RAE op 16 Mei maak, gebaseer op die tersaaklike gesondheid situasie en enige voorskrifte van die Regering op daardie tydstip.

Ons sal voortgaan om Lede in lyn met die jongste ontwikkelinge op te dateer.

AMSAT SA 2020 Space Symposium

Date: Saturday 11 July 2020
Venue: Premier Hotel Midrand
Theme: Amateur Radio in Space – exploring VHF, UHF and Microwaves

While the call for papers is ongoing till the end of February, AMSAT SA is pleased to announce that Burns Fisher, WB1FJ, of AMSAT NA will deliver two papers at the symposium: Fox-in-a-box: Fox telemetry reception using an inexpensive Raspberry Pi and a J-pole antenna including a discussion on the optimal positioning for a J-pole antenna for satellite reception and an overview of what is in orbit currently and expected in the near future and their features.
Amateur radio has a demographic problem. In the US, there is a clear belief that members of the hobby are old. And getting older (not only in the USA, here in South Africa as well. Ed.) What that means in actual age distribution just is not known. Unfortunately, our “visions of grey” are based not upon accurate scientific measurement but on the assembled impressions we get through our personal “windshields” as we go about our daily travels. It is standard convention to hear us amateurs urge everyone in hearing or reading range: we need to get more young people into amateur radio!

But whose amateur radio? The extant one driven by us largely grey-haired middle-aged to geezer-dom adult (men)? Yep, that is the one generally being referred to in this wisdom. Our collective strategy amounts to getting them to come to “us.” How is that working out for us? Given that our knickers are a bit tangled up over the issue, I would say not so good.

Lee Corso, the curmudgeonly (bad-tempered, crabby, cantankerous, grouchy) ESPN television sports announcer, is famous for his “Not So Fast!” comment when he questions another view or approach to the featured college football game being broadcast. Our attempts to bring new, young amateurs to our clubs is, in principle, admirable and understandable. But how is that working? Imagine a hobby dominated by young people. Say, competitive eSports (video games). We geezer-dom adults are approached to come to a teen-driven club, learn about it and then join to continue to attend each month. How many readers would find that appealing? I would bet not that many.

My recent interview in Episode 319 of the ICQ Podcast with Graham Brody, KD9NTQ illustrates the clear market failure that this singular “come to us” approach has yielded https://www.icqpodcast.com/download-the-show/2020/3/1/icq-podcast-episode-319-launching-the-illinois-young-ham-club. Graham’s interview suggests that while this is a good outreach program for many young prospective amateurs, it is not enough to engage them broadly. And, it simply does not reach the market where the most likely candidates are socially engaged. Instead, Graham says help them get started… and get out of their way!

Graham, KD9NTQ started the Illinois Young Ham Club to engage young people to converse about amateur radio and grow into the hobby https://ilyh.org/. We should listen to him and learn what one approach is to do what we collectively tell one another must happen. Talk is cheap. The walk, well, is just more effort. I will let you listen to my interview with him for the nuances of the details. But here are some bullet points that are take-away strategies.

• Do encourage young people to get involved with adult-driven amateur clubs. But then encourage, sponsor and assist them to create their own youth-driven groups. Get out of their way but be available to help when called upon!
• Rich environments for exposing young people, both male and female, to amateur radio lie in Maker Spaces and Gamer Groups. Seek out, especially, maker spaces which tend to be advertised in local communities. Clubs should offer to give a demo, not longer than 30 minutes, without a lecture but with an actual demonstration of amateur radio operation.
• The ARRL and RSGB should “tag” youth-driven or youth-oriented clubs in their Find-A-Club databases. Graham found the North Shore ARC in the Find A Club database. The Illinois Young People Ham Club, for instance, should be tagged as a youth club as should any others. All ARRL-affiliated clubs should report annually the number of members who are less than 25 years so the League can track them. This should be a bench-mark metric to gauge progress in recruiting youth into amateur radio and the League itself. (To my knowledge, the ARRL is doing nothing released (Continued on page 10)
(Continued from page 9)

publicly to track youth members or contacts.)

• ARRL should offer a “build a club” set of actions to help young inquirers to the League start their own club. They will want to engage with others of a similar age range, Graham says and the League should explicitly foster that activity, perhaps matching them with an existing adult-driven club for assistance. Be there if asked but get out of their way when they are enjoying the hobby! Walking the walk here as the League has already been talking the talk.

• Should the ARRL and RSGB buy adverts (or give ad swaps) in gaming magazines, promoting amateur radio contesting as a greater challenge? Yes! Track the “how did you find out about us” using conventional “use this code” tags in the adverts. If one thinks they’ll just run across QST at their local Barnes & Nobles, they are very sadly mistaken. Graham bumped into amateur radio on Youtube!

• Help them get launched. Get out of their way. They will grow into mid-adulthood and join our extant adult-driven clubs. Plant the seed. And get out of their way!

It is unfortunate that many organizations are heavily imbued with a “not invented here” mindset. That is challenging for outsiders to the inner circle of power to break through. See the thread and comment by W9WHE on eHam.net regarding the ARRL, for instance https://www.eham.net/article/5803. There are many other examples of this opinion regarding the League. I suppose similar comments could be made about the RSGB, of which I am also a member. But whether “invented” by the central staff or Board of either organization, this teenager has given us a general road map to reaching young people, both boys and girls, similar to him: interested in technology but had to run across something called “amateur radio” on YouTube rather than the explicit efforts of the League. Quit talking without walking.

Graham’s a leader at age 15 already, just won his Extra license and clearly understands many of these issues. We have to resist the conjuring up of all the reasons of why they won’t work from a geezer-doom world view. Well, a guy like me can dream, right?

Win a SARL Membership with your project!

Your project can win you a membership to the SARL for 2020/21. With 21 days of lock down ahead, there is time for amateur radio projects (excluding mowing the lawn, fixing the leak in the roof, painting the bathroom).

The Editor of Radio ZS is looking for an article with photographs and diagrams of your project for the May and June issues of Radio ZS.

The best article each month will be award with a SARL Membership for the new financial year.

Send your article in MS Word or OpenOffice Writer - Calibri 12, English (South Africa) - with photos and diagrams for “My Project” to radiozs@sarl.org.za

It MUST be a new project, do not send me that project from 2 years ago.

Four CW Contacts per Day Certificates

The ZS-CW group have started a new initiative to get more people active on CW on all bands, this will get you a certificate at the end of the year.

Make four CW contacts per day and qualify for the following certificates: 200 to 250 days - Bronze certificate, 250 to 300 days - Silver Certificate and 300 plus days - Gold Certificate.

Send proof of your contacts by Excel log submission to Mike, ZS6MSW (zs6msw@gmail.com) or Andy, ZS6ADY (andyzs6ady@vodamail.co.za).
If you have ever setup a station outdoors only to discover there is not a pileup waiting for you, then you will understand the need for SARAH!

Amateur activity in South Africa is not very busy. Outside of a few regular nets, the bands are disturbingly quiet.

SARAH (Southern African Radio Active Ham) is a platform, a common marketplace for amateur activity in Southern Africa.

Background

The idea of Activators and Chasers is not new, nor is it unique to amateur radio. Radio amateurs travel to places like the Scarborough Reef – not for the beaches, hotels, or night life – but because they are Activators and they know Chasers need them! “Islands on the Air” is another well-known example of this behaviour.

This is a symbiotic relationship – activators need chasers and chasers need activators. Out of this need to activate and chase have come some amazing award programmes including a wide range of “…On The Air” programmes like Mills on the Air, Parishes on the Air and more popular ones like Summits on the Air (SOTA), Beaches on the Air (BOTA), Parks on the Air (POTA) and Lighthouses on the Air.

South Africa, being an outdoors orientated country, one would expect these activities to thrive. This is sadly not the reality and there are two major factors preventing them from flourishing:

1. There is simply not enough volume – of Activators, Chasers, or activity in general. South Africa has relatively few amateurs and of those amateurs, a small group are involved in SOTA, another small group in BOTA, POTA and so on.

2. These activities being typically QRP and the solar cycle being what it is, other countries are too far away for us to benefit from their volume. A small country in Europe would be able to get activators and chasers from countries around them, while we remain almost isolated at the bottom of Africa.

SARAH unites these activities at a local level

Those familiar with DXing will have their favourite “spotting website”. For SOTA activity this is the SotaWatch website and you can advertise your activation to the world. The POTA and BOTA guys each have their equivalent, but would it not be great to have ALL activity in one place?

SARAH does just this! On Sarah you can advertise your field station activity to all looking for some radio fun. Your field station might be in a park, on a SOTA summit, or perhaps on the beach just outside Bloemfontein! You register a field station, link as much activity to it as you can (perhaps you are on a SOTA summit, on a beach, in a park, next to a lighthouse) and record your QSOs! At very least you will be activating the WAGS grid square.

A common place for radio activity means two things. Firstly, if you are looking for a chat this is your list of “peeps on the air” – in addition, of course, to those at home in their shacks. Secondly and in my opinion, the more important, is that it will introduce “other activity.” Consider for example a Worked All Grid Squares (WAGS) chaser looking for a specific grid square. Not (yet) interested in SOTA, he is unlikely to look for SOTA activity in that grid square. He goes onto SARAH.ORG.ZA and finds a SOTA activation in his wanted grid square. He gets his grid square and Sid and Adele get another SOTA activation under their belts!

While on the topic of Sid – many thanks to Sid for taking SARAH on several SOTA activities during the testing phase.

Being a computer programmer by trade, nothing seems less likely than me climbing a mountain and then doing data capture! Nope – the phone, tablet, laptop is all left far behind when I go out. Not so for Sid! His first comment was “What about live logging?” My reply was something along the lines of “Typing while you up there!” His reply indicated that he had a different idea of “data capture is fun” than I did.

However, out of this came one of the nicest ideas I think we have yet – live logging. More on that (Continued on page 12)
SARAH is a rewards system

The idea behind SARAH is to get participation. Not everyone wants to climb mountains, not everyone can pop out to the beach, but we all want to play radio!

Unlike the other “main” award programs, SARAH only gives points for QSLed contacts – and only one point per contact. If you as an activator do not engage the chasers, you will not get the points – so hopefully as people start to hear about SARAH, they will bring others into the fold as well. As I mentioned activators and chasers need each other and the more chasers out there the easier – and more likely – an activation will be.

As SARAH drives SOTA, BOTA, POTA and Lighthouses on the Air, you will get a point per QSLed contact for each of these programs. While the idea is not to be competitive, it is great to measure yourself against the others and so a simple leader board function has been created to easily see where you are in terms of the programs and your activator/chaser role. You can easily see how well you are doing as a Beaches on the Air chaser for example, or a Lighthouse activator.

It must be noted that these are SARAH points – not “actual SOTA” points. To get the programme points you need to sign up with the various award programmes and upload your QSO details to their respective databases.

SARAH is a gateway to the “real programmes”

SARAH is not an attempt to replace any of the programmes involved, but rather to create an awareness of them and potentially get new members for them. To this end, SARAH has a feature allowing you to download your QSOs. SOTA has a file format that allows you to upload a file of your contacts as either an activator or a chaser. SARAH will give you this file (in the correct format) and you can simply upload it to the SOTA database. BOTA, POTA and WAGS currently do not have a specific file format, but you can download your contacts in a spreadsheet and take it from there.

Another file format supported by SARAH is the SARL website format – so chasing your Worked All ZS (WAZS)? Get any contacts made on SARAH and simply upload the file to the SARL website!

You can find SARAH at https://www.sarah.org.za and get a list of activity on https://www.sarah.org.za/watch.php, so please register and join the fun!

SARAH is driven by Activators

Why would you do that? Well activators put in a lot of effort to get to the field station and run the risk of zero reward while the chasers sit at home with much less invested. There is nothing like climbing a mountain only to get 3 contacts and no points while 3 chasers out there get points!

Now do not get me wrong, we need chasers – as I mentioned previously, the relationship is symbiotic – without chasers, activators are useless and without activators, chasers get bored.

Activators plan the field station outing – be it Beaches, SOTA, or in a park and they know what time they will be active and the bands they are planning to use. They create an event on SARAH and their (hopefully growing following of chasers) see the “advert” and make sure to get into the shack well in time to make a contact. The activator then either logs the contacts live or once back into the shack. Chasers then log in, go to QSLs and either accept or reject the contacts. Only at this point does the poor old activator get a point!

Activators need chasers and because of that, they need to get chasers. As an activator you can look at your QSOs and see who has not QSLed and then engage them directly. Perhaps they do not have a SARAH account and need to signup first, or perhaps they simply forgot about the contact.

As a chaser, you cannot log a contact – so if you make a contact and the activator does not log it, jump on their heads!

Activators always sound like very fit, active people. The truth is you can be an activator from your vehicle, at a field station in a park, on a beach during your summer vacation. Anyone can activate – and
that includes you!

**SARAH as a watch tool**

SARAH allows you to create events and the activator then captures the QSO details – either after the event or using the Live Logging built into SARAH.

The SARAH watch tool at [https://www.sarah.org.za/watch.php](https://www.sarah.org.za/watch.php) allows you to see what activity is planned for the next few days. Rather like the way the SOTAwatch site works, nothing special!

I’d like to introduce you to something I think is special!

Sid, ZS5AYC and Adele, ZS5APT Tyler do a lot of SOTA! I asked Sid to take SARAH along next time they did a SOTA and he did – he logged in and created the event. When he returned, he captured the contact details and gave me a call.

Sid liked the idea but had a suggestion – what about logging the contacts as they happen. This is not something I even thought about doing. It’s my day off after all!

I thought about it and the impact it could have on the watch tool. One problem you have with sites like the SOTA watch site – and SARAH’s own watch tool – is that people can add an event and not go on the event. You can image for yourself – the weekend trip is all planned, the bags are packed, the batteries are charged, water bottles are in the fridge and you have thought of everything. Next morning life happens. Your plans go by the wayside and you adjust your schedule to the new challenges. Your chasers, however, are all in their shacks waiting for you to call CQ! Or perhaps you do get to go to the field station, but on arrival note that you have left your HF dipole at home (*or the microphone. Ed.*), so you simply QSY to something available – but your chasers are still in the dark.

So, chasers might not know if an event is happening or not, or if the times and frequencies are correct or current.

**Enter Live Logging!**

To use live logging, you need to have an internet connection at your field station. SARAH can run on a smart phone or tablet, so this is not out of the question. Granted, some places worth going do not have mobile phone coverage and that would prevent you using the live logging feature.

Live logging on your SARAH activation allows you to be “spotted” – with time, frequency and activity indicators. This is a great feature for activations where the start time might be variable: SOTA activations for example are very difficult to predict. The number of times I have tried to calculate the exact arrival time only to leave something in the car and must return after walking for 30 minutes or more!

**How does an activator use Live Logging?**

As an activator, you create an event on SARAH. When you are QRV at your field station, log into SARAH, go to events and click on the “L” button next to your event. This allows you to log contacts for this event. Click the “Start Live logging” button and the time and date are filled in automatically.

Setup the log sheet as per your requirements – you probably never need all the fields! You can enter a default value for the field and then click the Hide button next to the field. This is great for fields like Frequency, Band, Activator Call which do not change from one contact to another. When you do QSY to another frequency you simply show all fields, change the value and hide it again.

Some default layouts have been included – you can simply click the SOTA button to display the fields required for SOTA – or rather to hide the fields not needed for a SOTA activation.

RADAR is also there – with the ability to get your current activator grid square and a contest layout as well. If you do not need the field or the value of the field does not change, you can simply enter a default value and hide the field. This reduces the actual work required to log contact.

As you make contacts on the radio, you capture the callsign and any other information you need and click the post button. The contact is then recorded on the SARAH database (so you do not need to do that when you get home!) and it is immediately available for the watch tool. So now anyone looking at the watch tool not only sees your event – but also the contacts you have made. This tells them exactly what
frequency, who you are reaching and when the last contact was made.

It is also a great way for people to check when they are not sure if they are in your log or not – great for a field station during a contest too!

**How can chasers use live logging?**

By going to [https://www.sarah.org.za/watch.php](https://www.sarah.org.za/watch.php) you will see all the events that are current (i.e. have not yet finished) so there might be a week-long event that started yesterday, or events starting today. Each event is listed with information about the event, indicators of SOTA, BOTA, POTA, or Lighthouse activity and a link to view the event specific live log.

At the bottom of the page is a link to the **Full Log** as well. This will give you a list of all the QSOs logged on SARAH “today”. No matter what event they are from – you can see them in the live logger **Full Log** view.

So, if you are a SOTA chaser and keen on getting hold of Sid and Adele, open the watch tool, find their event and click the link to the live log for their SOTA event. Since the page refreshes automatically, all you need to do is watch until you see log entries coming up and you know what frequency and mode to use to get hold of them.

Live logging makes your event almost interactive (from the watch tool perspective anyway). You can find the SARAH watch tool at [https://www.sarah.org.za/watch.php](https://www.sarah.org.za/watch.php)

---

**SARAH for the Southern African Radio Active Ham**

Username: [Enter your username]

Password: [Enter your password]

Login

Register

**Register as a user on SARAH**

Once you register on SARAH you will be able to create events, check your outstanding QSLs and a whole lot more! Best of all - it’s free!

- Name: [Enter your name]
- Call sign: [Enter your call sign]
- QTH Grid: [Enter your QTH grid]
- Mobile: [Enter your mobile]
- Email: [Enter your email]
- Password: [Enter your password]
- Confirm: [Confirm your password]

Register

**SARAH – how to register**

To join the family at SARAH, all you need to do is to create a free account on SARAH.ORG.ZA. Open your browser and go to [https://www.sarah.org.za](https://www.sarah.org.za) you will be asked to log in or register. If you already have an account, you simply enter your call sign and your password and click **Login**. If you want to register, then click the **Register** button.

On the Registration form, you need to fill in your Name, call sign and a password (and confirm your password). The other fields are optional, so fill in if you want to or leave them blank then click the **Register** button.

If all goes according to plan you will get a message that your account has been added and that you can log in.

You can change your information (and/or your password) anytime you like - once you have logged in go to **My Info**.

**Late to the party?**

No problem. If you made any chaser contacts before you decided to take the plunge and sign onto SARAH
SARAH, you will be glad to hear that we have kept those contacts for you. Then you log in all the outstanding contacts with your call sign will come up when you go to QSLs.

What does it cost?
SARAH is and always will be free. Please understand that as a free service, support is done on a volunteer basis and changes and suggestions are worked through as time and resources become available.

The IARU Region 1 Operating Award

This award, available in three classes, may be claimed by any licensed radio amateur eligible under the General Rules who can produce evidence of having contacted amateur radio stations in the required number of countries whose national societies are members of the Region 1 of the International Amateur Radio Union (IARU).

The three classes are for contacts as follows: Class 1 — All member countries on the current list; Class 2 — 60 member countries and Class 3 — 40 member countries

The Members of IARU Region 1 are: (Total 99) Albania (AARA), Algeria (ARA), Andorra (URA), Armenia (FRRA), Austria (OEVSV), Bahrain (ARAB), Belarus (BFRR), Belgium (UBA), Bosnia & Herzegovina (ARABIH), Botswana (BARS), Bulgaria (BFRA), Burkina Faso (ARBF), Burundi (ABART), Cameroon (ARTI), Congo (URAC), Croatia (HRS), Cyprus including the UK Sovereign Bases (CARS), Czech Republic (CRC), Democratic Republic of Congo (ARAC), Denmark (EDR), Djibouti (ARAD), Egypt (EARA), Estonia (EARU), Ethiopia (EARS), Faeroe Islands (FRA), Finland (SRAL), France including TK (REF), Gabon (AGRA), Gambia (RSTG), Georgia (NARG), Germany (DARC), Ghana (GARS), Gibraltar (GARS), Greece (RAAG), Hungary (MRASZ), Iceland (IRA), Iraq (IARS), Ireland (IRTS), Israel (IARC), Italy (ARI), Ivory Coast (ARAI), Jordan (RJARS), Kazakhstan (KFRR), Kenya (ARSK), Kosovo (SHRAK), Kuwait (KARS), Latvia (LRAL), Lebanon (RAL), Lesotho (LARS), Liberia (LRAA), Liechtenstein (AFVL), Lithuania (LRMD), Luxembourg (RL), Mali (CRAM), Malta (MARL), Mauritius (MARS), Moldova (ARDM), Monaco (ARM), Mongolia (MRSF), Montenegro (MARP), Morocco (ARRAM), Mozambique (LREM), Namibia (NARL), Netherlands (VERON), Nigeria (NARS), Norway (NRRL), North Macedonia (RSM), Oman (ROARS), Poland (PZK), Portugal including CU and CT3 (REP), Qatar (QARS), Republic of Guinea (ARGUI), Romania (FRR), Russian Federation (SRR), San Marino (ARRSM), Saudi Arabia (SARS), Senegal (ARAS), Serbia (SRS), Seychelles (SARA), Sierra Leone (SLARS), Slovakia (SARA), Slovenia (ZRS), South Africa (SARL), Spain (URE), Swaziland (RSS), Sweden (SSA), Switzerland (USKA), Syria (SSTARS), Tajikistan (ex UJ) (TARL), Tanzania (TARC), Tunisia (CAST), Turkey (TRAC), Turkmenistan (ex UH) (LRT), Uganda (UARS), Ukraine (UARL), United Arab Emirates (EARS), United Kingdom (G GD GI GJ GM GU GW ) (RSGB), Zambia (RSZ) and Zimbabwe (ZARS)

A special version of this award is available, in the same 3 classes, for confirmed contacts on the 28 MHz band since 1 July 1983.

Submit a list of countries in Prefix Order, Call and all QSO details Band Mode, etc. A special application form is available by e-mail or SASE from the RSGB Awards Manager awards@rsgb.org.uk

Please note a certified list signed by the applicant and his National Society Awards Manager confirming QSL cards are held must be submitted for all Class 1 applications. For Class 2 and Class 3 Awards, GCR rules apply. General Certification by two other radio amateurs or local club officials stating the QSLs have been examined is satisfactory proof. Please note “eQSL’s” are not acceptable as proof of a QSO. Cost of this Award is US $6, 6 Euro or £3 GBP.
On Saturday 29 February and Sunday 1 March 2020, a SARL Hamnet Workshop was held at the National Amateur Radio Centre. Attending the Workshop were Michael Taylor, ZS1MJT; Andrew Gray, ZS2G; Dave Higgs, ZS2DH; Roy Walsh, ZS3RW; Riaan Greeff, ZS4PR; Keith Lowes, ZS5WFD; Leon Lessing, ZS6LMG; Brian Jacobs, ZS6YZ; Linda Lessing, ZS6LML; Anette Jacobs, ZR6D together with Grant Southey, ZS1GS.

The first session was attended by the SARL President, Nico van Rensburg ZS6QL and SARL Legal Advisor, Louw Erasmus ZS6LME. The first hour of the meeting was an introductory session by the SARL Council, in which they announced that Grant Southey would officially become National Director. During the session issues common to the SARL and SARL Hamnet were discussed. The council is extremely appreciative of the role that SARL Hamnet plays within the SARL, and encouraged members present to think creatively regarding the future of SARL Hamnet. The session was a good opportunity to realign the goals of SARL Hamnet with those of the League.

The second session was a discussion by the head of the Aeronautical Rescue Coordination Centre (ARCC), Ms Santjie White. The ARCC is responsible for the search and rescue of missing aircraft in a vast area in and around South Africa, as far south as the South Pole and starting at the Greenwich Meridian in the west to a boundary just east of Madagascar. SARL Hamnet and ARCC have a memorandum of understanding to assist with communications in the search for lost aircraft and passengers.

The rest of the weekend was dedicated to determining requirements to take SARL Hamnet forward. The items discussed included:

- **SARL Hamnet Identity** – we are aiming to create a single form of identity for all the regions so that there is one Hamnet
- **Uniforms** – based on the point above, we are looking for one uniform to be used by all regions so that other national organizations can easily identify Hamnet members
- **A Members Portal** – this was a useful function on the website previously, but is now non-functional and we will investigate a path forward to get this up and running

(Continued on page 17)
Membership Cards – these are required to have an expiry date, but many new members do not yet have one. The printer needs to be resurrected.

Training – a uniform approach is once again required, with various levels of competence as well as different areas of expertise for all members. It is not envisaged that all members will be required to be competent in all fields.

Events and Exercises. Every member is happy when practicing his hobby and everyone in attendance requested more exercises. Instead of placing the burden on one region, it was decided to rotate the responsibility. The 2020 exercise will be arranged by Divisions 3 & 4. Being regions with small membership, they will share the responsibility again in the future.

The Way Forward – a strategy with key areas of focus was devised. These areas are:
- Partnerships: We need to create partnerships with relevant agencies
- Uniformity: In the way we operate and appear
- Respect: By others such as fellow hams and in disaster circles
- Strength: By recruiting more members and improving competencies
- Evaluation, Introspection and Pro-activity: Becoming more relevant to our goals.

The future of the SARL Hamnet Division looks good if these goals can be realized.

My Project
Dennis Green, ZS4BS

On page 10, you get all the information about “My Project” and the SARL Membership you can win. It must be a new project, DO NOT dig up an old project, dust it off and submit it (it has happened before!) Submit your project with photographs and diagrams to radiozs@sarl.org.za for the May and June issues of Radio ZS.

To start the ball rolling, I will submit My Project for the April issue of Radio ZS and it does not qualify for a prize (I am a HLM)!

The Mast Holder Upper

Somewhere in 2019 there was a video clip on the Facebook page of the Woesrand ARC (or the West Rand ARC) about a project to support a mast when no other supports are available to tie the mast to. I thought this was a great idea for field day, SOTA, POTA, caravanning or even at home.

It is easy to make, lightweight and easy to erect. I have used it a number of times when out with the caravan.

I went to the hardware store here in Langenhoven Park (Bloemfontein is a suburb of LHP) and got a 3 meter length of size 80 DPH310 pipe, 10 metres of nylon rope and 2 worm clamps (no, not for clamping worms, Frikkie! Ed.). Back at home, took the tape (Continued on page 18)
measure and marked off 1 metre on the pipe and made the cut with the (t)rusty hacksaw. Next, I measured and cut 2 metre pieces of the rope and made a loop knot in the middle of each piece (where the tent peg must be placed). I tied a hand not on each end of the pieces of rope.

Starting at the bottom, I slid one of the worm clamps over the pipe and put the ends of 4 of the pieces of rope through - I then tightened the clamp. Moving to the top, I slid the other clamp over the pipe and did the same with the other ends of the rope. The top clamp is about 80 mm from the top of the pipe. Now the difficult part - setting it up! You need four tent pegs and a mallet (and don’t get your finger between the peg and the mallet!)
The West Coast Radio Group has a regular net every Monday at 19:30 on 145,500 MHz simplex. During one of these sessions, Charles, ZS1CF proposed to have a Fox Hunt. Everyone agreed and the work began.

A Fox transmitter had to be built and Charles started to work on it. It was decided to use an Arduino Uno as the basis and that needed a purpose built PCB board to plug into the top of the Arduino. This purpose built board provides the interface to the hand-held radio. The Arduino is programmed to generate the CW signal and also plays a musical tune. The CW is played, then the music and then there is a 20 second pause before the next cycle starts again.

The purpose built schematic diagram:

R1 to R4 and C1 to C4 is a filter that makes the square wave output into a sine wave output. I must admit, it works well and sounds very good on the air.

The first Fox Hunt

Everyone scrambled to get their Yagis and self-built antennas ready for the very first Fox Hunt in November 2019. Charles was the Fox and the rest of the team were Chris, ZS1FC, Marais, ZS1NOS and Fritz, ZS1KRF. Everyone except Charles got together at the Laguna Mall near Brights in Langebaan.

Charles and his wife Hanlie stopped at a picnic stop next to the R27 and about 3 km from the Engen One Stop. The first vehicle to leave at 12:00 was Marais and every 5 minutes there after another vehicle left.

After only 13 minutes, Fritz found the Fox! That is going to be very hard to beat. The second one to find the Fox was Marais and he did it in 42 minutes. Unfortunately, Chris could not find the Fox.

Fritz invited us all to his home for a braai. There were lots of discussions about the Fox Hunt and it was clear that everyone enjoyed it thoroughly.

Charles then handed 2 prizes to Fritz, the winner. Hanlie embroidered the cap and Charles made the portrait.

(Continued on page 22)
Above: Fritz Reinke, ZS1KRF and his prizes

Left: the prizes up for grabs
The Second Fox Hunt

Our second Fox hunt took place on 11 January 2020. Fritz having won the first one, now had to be the Fox. The rest of the group was Charles, ZS1CF, Marais, ZS1NOS and Tienie, ZS1HO.

We stood in the parking lot and tried to get a bearing, but we were all unsuccessful! The signal was strong in all possible directions.

Fritz had literally just driven about 100 m from the parking lot and bowled us all out. Eventually Marais found him by driving past him. Charles and Tienie gave up after a while.

Marais invited us all to the Spur Restaurant for a hamburger and chips. Again, a lot of discussions and everyone enjoyed it again. Marais was given a cap with a fox embroidered on it.

The Third Fox Hunt

Dawid, ZS1DK, is always on the road between Cape Town and Namibia in his truck. We asked him to schedule the next Fox Hunt and finally, on 14 March 2020 we had our third Fox Hunt.

This time Marais was the Fox and the rest of the team was Charles, ZS1CF, Chris, ZS1FC and Dawid, ZS1DK.

Marais was hiding the Fox close to the Saldanha Harbour on a small dirt road. Dawid found him after about an hour and 3 minutes after that Charles also found the Fox. Having lost out on the previous 2 hunts, you can imagine the big smile on Dawid’s face!!!

Chris again could not find the Fox and eventually gave up. Marais invited us to his home for a braai and Dawid paid for chops and boerewors. Chris also received a prize which was wrapped in newspaper.

The Fox Hunting is really great fun and everyone enjoys it each time, always looking forward to the next one. It brings our group of radio amateurs together and creates a strong bond. I really advise everyone to arrange one in your area as well.

West Coast greetings to all, from Charles, ZS1CF
Contact Charles at charles@cybersmart.co.za for more information about the Fox transmitter using an Arduino Uno.

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Playing with direct conversion receivers is fun. One of the problems with this type of receivers is that almost all sensitivity comes from the amplification given by the audio chain, from the mixing of the antenna signal with the local oscillator signal and up to the headphones/speakers. If we want to obtain 100 mV into headphones from a 1 microvolt signal resulted in the radio frequency mixer, we need 100,000 times amplification. Such an audio chain is susceptible to self-oscillation.

My initial goal was to reach a stable 4000 times amplification and eventually to extend this to a 40,000 times amplification. Just for getting a grip on those numbers. I mention here that a class AB audio amplifier with 2 complimentary bipolar finals and a bipolar driver transistor has an amplification of around 20 times. A 4 transistors class AB amplifier has around 200 times amplification.

In order to obtain a big amplification:

✓ The input and output impedances should be low in all amplification blocks, to lower the chance of self-oscillation.
✓ The output final amplifier should be separated from the preamplifier and somehow the high audio frequencies should be cut somewhere in the middle, by a filter (self-oscillation happens mostly at higher frequencies).
✓ The first audio active element needs to have low noise. The noise of the first element is amplified by the whole audio chain and heard into the speakers/headphones.
✓ The amplification should be adjustable in various points of the amplifier, for future expansion from 4000 times amplification towards 40,000 times amplification.

Following the above ideas, I made a final product on a 4 cm by 6 cm board that looks like this:

The schematics I got at is:

Note: All pictures used in this article can be found in higher resolution at: [github.com/danielromila/Audio-chain-for-direct-conversion-receivers](https://github.com/danielromila/Audio-chain-for-direct-conversion-receivers)
I use 8 pins integrated circuit TL072. The typical noise level is 15 nV/√Hz. TL072 is a high speed JFET input dual operational amplifiers incorporating well matched, high-voltage JFET and bipolar transistors in a monolithic integrated circuit. The device features high slew rates, low input bias and offset current, and low offset voltage temperature coefficients. For comparison, the 741 operational amplifier family of circuits have the noise level 60 nV/√Hz, so 4 times bigger than TL072. Even better results can be obtained using the integrated circuit NE5532, which has an Equivalent Input Noise Voltage of 5 nV/√Hz, or LM833-N, with 4.5 nV/√Hz typical at 1 kHz.

At the moment of writing this article, March 2020, LM833-N can be bought with 22 cents by piece (shipping and taxes included), versus 11 cents for a TL072. NE5532, TL072, TL082, LM833-N and OPA2134 have the same pinout and can be put in the above schematics without any modification. I also drawn the schematics having the real ICs put in it:
Before soldering everything on a double-sided perforated board I verified in a computer simulation. The setup for the computer simulation done with Multisim (above).

The first operational amplifier is connected in an inverter mode. The amplification is roughly dictated by R8/R4. The stronger the input signal, the stronger the effect of D1 and D2 diodes, which function in the nonlinear part of their characteristics diagram. Their equivalent resistance comes in parallel with R8, so the amplification becomes smaller for bigger input signals. R8 is an adjustable semi-pot with the value of 20 K Ohm. This would give a maximum amplification for the first block of around 20 times. This R8 component can be increased to 200 K Ohm (which I did) or even more. C8 capacitor, with a value of 100 pF is a kind of short-circuit for high frequencies, while having a big equivalent AC resistance (capacitive reactance) in audio frequencies. (TL072 amplifies up to 10 MHz, and I am not at all interested in amplifying RF with it, and it would eventually self-oscillate in RF.) In the above simulation, when the given input is 2 mV at 1 kHz peak to peak the output is 42.3 mV pp, for R8 being 20 K Ohm. That is around 20 times amplification.

The second operational amplifier is a low pass filter. C10 is selected from a bunch of 6.8 nF capacitors to have the value as close as possible to 7 nF. C9 has the standard marked value of 3.3 nF, but it was also selected to be 3.5 nF. The cutoff frequency is around 3 KHz. The amplification of this second op amp block is 1, or a little under 1, as seen comparing the values from the input and output. I used the calculator from: http://www.calculatoredge.com/electronics/sk%20low%20pass.htm

As a final audio amplifier, I used LM386. This is not my favorite IC; TDA2003 offers lower distortion and higher amplification, for example. But LM386 is incredible stable (TDA2003 is not). LM386 is cheap and it can be bought in 8 pins capsule for around 7 cents by piece, shipping and taxes included. The normal amplification is 20 times. It can be forced to 200 times by connecting a 10 microF electrolytic capacitor between the pins 1 and 8 of the IC. I did this in my schematics, but I also inserted a semi-pot of 2 K Ohm in series with the capacitor.

When the volume potentiometer R7 (10 K Ohm) is set for maximum volume, and the semi-pot is put at 2K Ohm, the obtained amplification is 184 times in the LM386 block. The virtual 4 channels oscilloscope shows sinusoidal signals everywhere, even with such a big input signal, 2 mV pp.
In the simulation I obtained 7.78 V on the speaker with an input of 2 mV at 1 KHz. That is 3890 times total audio amplification. Practical, on the PCB, I immediately replaced the R8 semi-pot 20 K Ohm with 200 K Ohm and it continued to be stable (I had to lower the input signal.)

There are various versions of my schematics on the Internet; one op amp amplifier, one op amp low pass filter, LM386 final. My version has the advantage that is adjustable. So, it starts with a stable amplification, where the hobbyist can see the amplifier in function and from there it can improve towards bigger and bigger amplification. For example, VU2UPX made a direct conversion receiver by using a similar audio chain with what I did, and just several components around the integrated circuit NE612 in the RF part. VU2UPX forced the amplification of the first op amp at over 500 times. He did not even put any resistor at the non-inverting input, so I suspect he forced the full audio chain just up to the self-oscillating threshold. www.qsl.net/va3iul/Homebrew_RF_Circuit_Design_Ideas/HF_DCR_VU2UPX.gif

Generally, the only possible source of problems is the R7 volume potentiometer. It is a big mechanic component which requires cables on the case, where it is supposed to be mounted. The pot can be soldered directly into the PCB and the whole audio and pot assembly to be together fixed somehow on the final case of the project (a receiver or transceiver, most probably). I also experimented with digital potentiometers, which require an IC planted on the PCB and a rotary encoder on the case. Only the digital IC is in the audio path, so long cables to the panel for the rotary encoder does not bring self-oscillation problems anymore.

LM386 is a low power amplifier integrated circuit. It is more suitable for listening into headphones than into a speaker. Whenever I use 3 terminals semi-pots in schematics that require 2 terminals semi-pots, I connect one of the extremes to the wiper. In this way it is less susceptible to collect noise and eventually to contribute to self-oscillations.
Following a very successful and interesting first Hobby-X display in 2019, it was without question some achievement to strive for this time round in 2020. The team started with small steps and in a wink of an eye the big date being the first week of March rolls in and was knocking at the door.

With a level head and wealth of experience Nico, ZS6QL rallied the troops and things started happening. The main challenge was to devise a theme and to present a display to capture the passing public attention.

This hobby of ours that includes from young to senior participation needs to be showcased and no better way could have been formulated by combining the Hammies, BACAR, an operational HF station as tried and test last year and the exciting additions of adding AMSAT SA and the AWA this time round to put a themed spin on things.

Wednesday started early and with only the carpets put down and the basic structure in place, the area and exhibitors started rolling in with goods in hand. Our set-up team started arriving and in no time at all, the tables were in place and the antenna construction had started. Gert, ZS6CG with his trailer and Hex Beam were parked and erecting the mast and antennas happened with the help of the younger amateurs on hand.

(Continued on page 29)
The Hex beam looked good in the midday sun as the tower was pushed sky wards. A bazooka dipole was added for the 40 m band operation. From a distance the antennas all looked small compared the massive dome of the Ticket Pro Dome arena in the back drop. Next was the cable runs with the addition...
of a CAT 5 and 75 Ohm TV type cable in the run, all secured with some well-known duct tape to the floor. This happened just in time as a bonsai displayed area appeared in all its glory out of nowhere between the SARL display stand and the entrance doors!

The display posters started finding their way to the partitioning boards and this really added life to the displays with eager anticipation of what was to come in the days ahead. A quick lunch break was taken before the antennas and rotators were tested with excellent results.

Once the HF radio was on the table and connected, Alastair, ZS6S did not waste time testing out the ICOM IC-7610 with a large screen display of the waterfall. A laptop running LOG4OM (https://www.log4om.com/) was now ready to capture and log the upcoming contacts. This operational radio station drew a constant line of spectators and with Alastair using the ZS95SARL call sign, we logged more than 1 195 contacts on various bands including some different digital modes during the show. Alistair started every morning calling CQ DX on various bands and it became clear that the various stories of the bands are closed is just a myth. Some surprises were found as is evident from the contacts made on 10 and 12 meters at times on voice and FT8. Even starting with a single QSO on 40 m brought in a pile up of contacts from all provinces. One would think it would not be possible to reach Cape Town or Durban as these were all in a southerly direction with the Dome in the way obstructing the path. With signal reaching S9 plus in some cases, it was clear that propagation on 40 m in the day goes straight up (NVIS) and signals received hundreds of kilometres away is not possible as some may believe.

The Antique Wireless Association

The AWA walked in with a selection of radios of yesteryear all in the midrange size and weight category in excellent restored condition. These radios on display became discussion topic for many of the

(Continued on page 32)
visitors mentioning that their father or grandfather used to have such radios or use to be amateur radio operators in the good old days. A lot of enquiries were made on how to restore and preserve similar radios and old technology. The SARL and the AWA will be receiving an influx of possible new members including enquiries to follow in the coming months.

AMSAT SA

AMSAT SA arrived noticeably with a shopping trolley full of equipment and a DSTV type dish. This equipment was quickly setup as a working QO-100 satellite station and was the reason for the CAT 5 network and 75 Ohm IF cable installed earlier. During the show the spectrum display on a laptop displaying a waterfall showing various QSO taking place in real time captured the interest of all who visited the AMSAT display including some of our current amateurs that visited the stand.

The Hammies ARC

The Hammies team setup a most interesting display of kits and electronics build by the youngsters during the past year. This display was admired by young and old supported with appropriate posters outlining the importance of the youth as the foundation of our hobby. Noel arrived with a very simple but effective light sensitive resistor kit that was eagerly built by the young visitors throughout the week and week end. A soldering contest was also started with the objective to place as many resisters as possible on a Vero Board to the delight of all. It was extremely pleasing to see our young radio amateurs helping other youngsters to find their way.

The Secunda ARC

The Secunda club setup their winning recipe of BACAR units supported with video’s show casing the YOTA experience from August 2018. This became the discussion topic for hours by onlookers with inquisitive questions throughout the duration of the show. Some visitors asked what happen to the little man on the end of the antenna seen on the poster. It was clear a winning and memorable formula for a display and we will have to ensure that the antenna man is definitely at the next show.

“We don’t sell anything..”

With the news of Corona virus spreading and the weak economic situation on the horizons it was clear that no matter how tough times

(Continued on page 33)
might be, people will always find ways to entertain themselves and show casing their leisure skills and interests. One person asked me how was the sales and he was astound to find out we did not sell anything, only sharing our passion for radio communication and its associated technology, being inventive and being able to reach both young and old, from grandchild to grandparent and everyone in between. Amateur radio definitely does have a future if we continue to share and showcase the amateur radio service to the general public.

Thank you to all who participated and contributed behind the scenes and at the show to ensure this marvellous and successful event.

Until Hobby-X 2021!
DualPatch

RX: 10 GHz
TX: 2,4GHz

David, ZR6DLG

Qatar OSCAR-100 is the first geostationary amateur radio transponder, a joint project between the Qatar Satellite Company (Es’hailSat), the Qatar Amateur Radio Society (QARS), and AMSAT Deutschland (AMSAT-DL) which provided the technical lead.

Here at home in South Africa there was a need for an antenna solution for the new Satellite, receive on 10,489 GHz and transmit on 2,4 GHz.

There are many different antennae designs available on the internet, Helical, Yagi, Patch and many more. From testing different methods, John, ZS6JON and David, ZR6DLG found that the patch antenna worked most efficiently. The Patch antenna design was found on the website https://uhf-satcom.com/blog/patch_antenna. On this website there are dimensions to make such a patch antenna known as the POTY (Patch of the Year). Designed by Mike Willis, G0MJW; Remco den Besten, PA3FYM and Paul Marsh, M0EYT.

This POTY antenna is available as a kit and needs to be assembled and tuned to the operating frequency of 2 400.150 Mhz. All the parts are well made and are easy enough to assemble. The problem starts with the tuning, not many amateurs have the required equipment to do this.

David and John worked on a few ideas from AMSAT-DL and other forums. The plans were to build a 2,4 GHz Patch Antenna, assembled and tuned ready to work stations on the QO-100 Satellite. There was still one remaining problem, how to receive on 10,489 GHz using a single dish with one Dual Band Antenna. John and David have put together a Dual band Patch\LNB call the DJ-Dual Patch that offers an ideal and simple solution for the QO-100. Using the Basics of the POTY for transmitting and a local LNB for receiving. The Dual Patch Antenna is fully assembled and tuned as a plug and play solution. All the Patch antennas are tuned to a -30 or better Return loss using an Anritsu Site Master.

The Johannesburg Amateur Radio Club has offered to take care of the distribution for the DJ-Dual antennas. Follow the link http://www.zs6tj-club.co.za for more technical information. To see the DJ-Dual Patch in action on the A21EME expedition, look at https://www.youtube.com/watch?v=dLnL2u0U5Ow.
Sometime during the 20th Century, I learnt that fuses (or circuit breakers) are used in electrical circuits to prevent catastrophic failure. Fuses open in response to an electrical fault that causes excessive current to flow. The job of the fuse is to minimize the damage and keep things from catching on fire. When I started installing amateur transceivers into vehicles, I learned that you should connect wires directly to the car battery (or darn close) and you should fuse both the positive and negative power leads. I was surprised by the need for two fuses, but there are technical arguments for it. Besides, the transceiver manufacturers recommend it in their manuals. (See figure below.)

I am focusing this discussion on a typical 2 m/70 cm FM transceiver installation – that is what I have the most experience with and that is the most common amateur mobile installation. Such a radio typically draws ~10 A on transmit, so the DC power is usually fused with something like a 15 A (or 20 A) fuse. Keep in mind that a 15 A fuse is not going to protect delicate circuitry but might stop more serious damage or fire.

Connect to the Battery?
Alan, K0BG has an excellent website www.k0bg.com/ that provides guidance on mobile radio installations. He points out that modern vehicles usually have an Electrical Load Detector (ELD) inserted into the negative lead of the battery, so that the vehicle control systems can monitor the state of the battery. It is important to connect your radio on the “other side” of the ELD, near where it connects to the vehicle chassis. Oh and never use the existing vehicle wiring to power your radio (especially not the 12 V accessory plug).

Mobile DC Power: One Fuse or Two?
Bob Witte, KØNR

DC power connection as shown in the manual for an ICOM amateur radio transceiver (IC-2730).

The negative power lead for a transceiver power should be connected to the chassis side of the ELD. Figure: k0bg.com website.
One Fuse or Two Controversy

Recently, I became aware of controversy with regard to proper fusing. Some people are questioning the practice of fusing both DC power leads, while others are vigorously defending it.

For example, there is a lively eham.net discussion here [www.eham.net/forum/view?id=topic=78710.0](http://www.eham.net/forum/view?id=topic=78710.0). Ed, W1RFI provides some useful insight on the ARRL forum [www.arrl.org/forum/topics/view/115](http://www.arrl.org/forum/topics/view/115). Alan, K0BG covers the topic of DC power on his wiring and grounding page [www.k0bg.com/wiring.html](http://www.k0bg.com/wiring.html). Tom, W8JI argues for the one fuse approach on his website [www.w8ji.com/mobile_ground.htm](http://www.w8ji.com/mobile_ground.htm).

What Do the Manufacturers Say?

Generally, you should follow the advice of the manufacturer on any equipment installation, so I took a look at a few owner’s manuals. Most (or all?) of the manuals for the amateur gear show the two fuse method. See the ICOM example below. (Note that they do not show the presence of the ELD.)

![DC power wiring diagram for a Yaesu amateur radio.](image1)

I also took a look at some commercial land mobile radio manuals. Motorola shows the single fuse approach.

![DC power wiring diagram from a Motorola land mobile manual](image2)
Hytera also shows a single fuse in its land mobile manuals.

ICOM makes both amateur and commercial land mobile gear, so I wondered what they recommend for their land mobile product line. Ha, funny thing, they show two fuses, with a comment that says, “Depending on version, the fuse holder may not be attached to the black cable.” Well, isn’t that special?

So, is the two-fuse thing some kind of ancient amateur radio practice and the land mobile industry has gone a different path? Sometimes industries adopt “standard” approaches and then forget why with time.

Right - DC wiring diagram from a Hytera land mobile manual.
Below - ICOM land mobile transceiver wiring diagram shows two fuses but says the negative one may not be there. (IC-F5021 manual)

Some Circuit Analysis

After reading through all of the arguments, I tried to distil them down to their essence. I created a wiring diagram that may help explain the concepts. Or maybe not. An automobile is a complex electrical and electronic system, so any practical diagram risks oversimplifying the situation. But here is my best shot at it (on page 25).

The centre of the diagram shows the body/chassis of the vehicle which is connected to the negative lead of the battery, through the ELD. The transceiver is directly connected to the + terminal of the battery (via Fuse 1) and the chassis side of the ELD (via Fuse 2). The engine starter is connected to the battery with heavy cables and is also connected to the body/chassis. While there are a large number of other

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electrical devices in a modern vehicle, only one is shown here as an example (with a switch and fuse).

The circuit shows the antenna connected to the radio with a coaxial cable. The shield of that cable is almost always grounded to the vehicle chassis at the antenna (magnetic mount antennas are one exception and I am sure there are others.) I can say that every mobile installation I have ever done had the coaxial cable connected to the chassis. This is an important point because it provides a chassis connection for the transceiver at point C (whether you wanted it or not). There may be other ways that a transceiver is connected to chassis (point B), including the mounting bracket, external speaker, microphone or other accessories.

**Arguments for and Against**

The argument for fusing the negative lead is to protect against return current from other devices that find its way back to the battery through the transceiver’s negative power lead. For example, the starter could have a fault in its negative cable, causing the current to flow through the chassis to the transceiver and back to the battery. The starter current can be hundreds of amperes which would likely overload the radio wire which is sized for 15 amperes. The fuse will open and protect the negative lead (and maybe the radio, to some extent).

The argument against fusing the negative lead is that if the fuse opens up, it could cause problems. Suppose Fuse 2 opens up due to some transient condition. If the transceiver is completely isolated, Fuse 2 would remove power from the transceiver. However, the return path at the antenna coax (point C) will most likely allow the radio to continue functioning using the coax as the negative return. Typically, this is RG-58 or similar cable, which is not intended to carry significant DC current and may fry under the load. If the current is coming from a fault in the starter wiring (big current), this is going to be a bad day for your mobile.

**My Conclusions**

I think both arguments have merit but choosing one fuse or two requires estimating which problem is most likely and judging the overall impact of the fault. The negative lead fuse can do only one thing well: protect the negative lead. It might provide some protection to the transceiver but there are a lot of sensitive circuits inside the radio that will get destroyed with 15 A flowing. Again, the connection at point C means that the radio will be connected to chassis and current can flow.

If Fuse 2 is eliminated it allows for the flow of high currents through the negative lead of the transceiver. This is not desirable but is it better or worse than the current flowing through the coax shield? Probably better. If a high current device (the starter) has a wiring failure that dumps large currents...
into the chassis, it may find a number of return paths. Lots of current is going to flow somewhere and potentially cause damage, with or without a negative lead fuse.

I will note that bonding the transceiver to the vehicle chassis has some benefit (point B in the diagram). You may or may not have this connection depending on how you mounted the radio. This electrical connection can shunt any currents away from the coaxial cable, hopefully doing less damage that way.

What am I going to do? My future mobile installations will have only one fuse in the positive lead. I will also bond the radio body to the vehicle chassis, with a hefty, low-resistance connection.

My existing mobile installations all have two fuses. I will not be changing them out because the risk of inducing a problem with the negative lead fuse is rather low. I do not see the negative lead fuse as a big risk. If you choose to follow the amateur radio manufacturer’s two fuse recommendation, I understand.

A Request

The amateur radio equipment manufacturers need to give this issue a fresh look. At a minimum, the presence of ELD’s needs to be addressed and the common recommendation of wiring directly to the battery is obsolete. But the one-fuse-or-two issue should also get a careful look by the manufacturer’s engineering teams.

That is my analysis. What do you think? (Runs and ducks for cover.)

Note: This article is my technical opinion, but my attorney says to tell you that you are responsible if you destroy your vehicle while wiring up your transceiver.

The post ‘Mobile DC Power: One Fuse or Two?’ appeared first on The KØNR Radio Site. Bob Witte, KØNR, is a regular contributor to AmateurRadio.com and writes from Colorado, USA. Contact him at bob@k0nr.com.

Comments on the Post

Bill, KI7HYI:

I spent a couple of years, in between my broadcast engineering gigs, doing 2-way radio work and none of the commercial radios that I worked on ever had any kind of protection on either of the ground leads. This was back in the days when there was a control head in the cab and a radio box in the truck or rear of the vehicle. There was a ground lead on the control head and another ground lead on the radio box. Both of the ground leads went to vehicle chassis and the one on the radio box never went back to the battery, due to the lesser voltage drop through the chassis.

Lowell, NE4EB:

The Ham Writer Standards Manual really should preclude using the words “fuse” and “protecting circuits, radios, electronic devices,” etc., in the same sentence. Fuses are to stop wiring that is carrying excess current from starting fires.

I would never connect a radio negative lead to the battery negative post in a vehicle. Use the same point the battery negative is bonded to the vehicle chassis if you feel you must route the ground back into the engine compartment. But far more often the ground was bonded to the chassis withing a few feet of the main radio unit.

One of my jobs at a Motorola MSS for over a decade was training our installers in power and signal wiring tie points. These type of connections for primary power were not negotiable.

Paul Montgomery, K8SFC:

I am retired now, but I was an avionics tech for 33 years at a major commercial airline. Before that I worked at a regional carrier as a shop tech and aircraft “R&E” (radio and electrical) tech. Before that I worked as an avionics installer at an FBO (fixed-base operator), installing all manner of electronic gee-
gaws in private aircraft, including communications and navigation systems. In all that time, I never saw a fused ground or chassis connection. All of the equipment chassis were bonded together and connected directly to the airframe, usually with copper braid of at least 1/2” width, without benefit of a fuse or circuit breaker. The “hot” DC connection typically went to a circuit breaker which was connected to a bus. This bus was typically connected to an “avionics master” breaker switch which went to +28 or +14 VDC, depending on the system. In commercial aircraft, control aircraft, control heads are mounted in the cockpit and the “R/T” units are remotely installed in racks in the avionics bay under the cockpit floor. The “R/T” chassis are all bonded together behind the racks and connected to the airframe as directly as is practical. I could be wrong, of course, but I wonder if the second fuse so typically seen in amateur transceivers might be for the accommodation of positive-ground vehicles like White Freightliners or MGs.

I should clarify two things... I installed a CB radio in a White Freightliner back in the ’70’s and I found out the hard way that this particular truck was positive ground. This was a long time ago and I should say that perhaps these vehicles are no longer positive-ground. Also, I mentioned MGs... many if not most English cars; Jaguar’s, etc., were positive ground back in the 50’s and 60’s. I am old and not at all up-to-date on what modern English automobile designers are up to. Hopefully everyone has switched over to negative ground by now! Also, I mentioned “R/T” units... for those who may be unfamiliar, this means “Receiver/Transmitter” units, which are typically remotely located. The operating frequency, audio levels and so-forth are controlled with a small box located in the cockpit for operator access. This is the same concept as used with most commercial radio systems as previously mentioned.

Moe, K2JDM:
Finally, an article that actually explains WHY you should use 2 fuses. I have worked as a mechanic years ago and you would be surprised what people think is acceptable for wiring a radio (AM or FM, or a combo, or Amateur equipment).

worked on a pickup truck where the driver used one fuse on the positive side of his AM/FM/cassette radio going to the battery and used a chassis ground point for the negative side. He kept frying out his radio and claimed it was a “factory defect”. After the third replacement, my boss asked me to check it all out. I found the problem. He had a starter cable that was chaffed and contacting other wires at times and apparently it WAS trying to draw from the battery. It did not do much good to his radio. He paid for the work I did, but it got correctly fixed, also using 2 fuses.

Ordering South African Radio League generic QSL cards
Bestel Suid-Afrikaanse Radioliga generiese QSL kaarte

The generic QSL cards are sold in batches of 100 at a price of R75 (postage included) - that is R0,75 per card. Do not make any deposits before confirmation of availability of cards. Deposit the amount in the League’s account at ABSA 407 158 884 9, Branch code 632005.

Please use your call sign or initials and surname as a reference during the payments e.g. ZS6X/WJ Weideman - QSL cards.

Send me an e-mail to zs6wwj@gmail.com with the proof of payment and I will post the cards to the address as listed on the League database.
Amateur Radio Portable Operation Notes

Amateur Radio portable operation can enhance your enjoyment of almost any outdoor activity and provide an even greater incentive to get out and about, see our beautiful country, meet interesting people and live a healthier lifestyle. Portable operation is easy, fun, safe, healthy and worth doing. Take your radio gear along with you the next time to venture out. You will be surprised what you can do with a portable Amateur Radio setup. But first, here are a few tips and tricks to help you get the most out of your next radio expedition. Good luck!

Prepare it

✓ Create a checklist of everything you will need. It is the obvious things you forget. Revise it as you go.
✓ Check and service your car, caravan, tent, backpack, camping gear or whatever it is you need.
✓ Work on your touring, camping, bushwalking or hang-gliding skills, or whatever it is you do.
✓ Figure out when, where and how you can responsibly include Amateur Radio operation into your trip.
✓ Get your radio gear, power supply, cables and antenna setup working properly at home first.
✓ Make sure your equipment is safe, sound, protected and will survive the expected conditions.
✓ Try a practice portable session at your local park.
✓ Create a relaxed itinerary and have a bad weather contingency plan.
✓ Plan your route, distances, travel times and operating periods.
✓ Use Google Earth satellite and street views to locate access roads, tracks, camps, facilities and trees.
✓ Checkout good portable operating spots including mountain peaks, coastlines, lakes, rivers and parks.
✓ Pack everything, fuel the car and charge your batteries the day before you go.

Share it

➢ Take someone with you: Involve them in your radio station set up, operations and logging.
➢ Inform other Amateurs of your trip; invite them along or invite them to meet you there.
➢ Travel in a radio-linked convoy or meet at pre-arranged checkpoints.
➢ Drop in on Amateurs who live along the way and show them your portable setup.
➢ Post your trip details on the various WhatsApp groups – HAMSAT, SOTA/POTA, VHF IG, RaDAR, etc.
➢ Post alerts on www.sotawatch.org website, make use of the Facebook pages and WhatsApp groups for SOTA, POTA, VHF/UHF, etc.
➢ Create your own website with all the details of your trip and then send around links via e-mail.
➢ Advertise your expedition on the weekly SARL News Bulletin.
➢ Pre-arrange mobile and night-time QSO schedules with your buddies.
➢ Use APRS to regularly broadcast your GPS location to others.
➢ Have QSOs on the way: It reduces fatigue, shortens the trip and lets everyone know your ETA.
➢ Call in on local repeaters. See who is about and let them know where you are heading.
➢ Create your own following and share the fun with everyone.

Enjoy it

⇒ The long journey there and back is just as important as the short portable operation.

* Julie holds an Australian Foundation Licence, the F in the suffix. The Foundation licence is like the South African Novice Licence BUT without the age restriction. Julie is married to Joe.
Leave early, refreshed, and do not be in a hurry to get there.

Think about where you are, not just where you want to be. Enjoy the moment.

Take the scenic route, visit a lookout, have a picnic, smell the roses.

Play I-Spy, sing songs, stop for geocaching, especially with the kids.

Practice your SOTA and DX code of conduct procedures on the air.

Operate calmly; work the pile up first, then QSY to have a rag-chew with your mates.

Stay active for the afternoon if you can, try different bands and modes. Make a snack and boil a kettle.

Camp overnight, work some rare DX without all the city QRN.

Wake up early, go fishing or bushwalking and checkout the surrounding area.

Be responsible

Apply for a council permit – check the bi-laws for the setting up of stalls and the placing of signage.

Get a signed Letter of Introduction from your club.

Check your Club’s Public Liability Insurance. Get a Certificate of Currency. Some venues mandate it.

Make a courtesy call to the property owners when you arrive on the site. Bring them a gift.

Get the property owners to sign a certificate permitting you access, setup and operation rights.

Drive and park your vehicles responsibly. Close all gates. Do not scare animals or disturb the peace.

Conduct setup and operations professionally and safely.

Set up your station in plain view, but always away from public thoroughfares.

Observe Total Fire Ban restrictions and all signs.

Leave the site as you found it, or even better: Bring along a garbage bag and clean up any litter.

When you see a Park Ranger introduce yourself. Explain the conservation value of promoting parks.

Be safe

Tell others where you are going and when you intend to return.

Bring adequate clothing, hats, sunscreen, maps and a first-aid kit.

Check the weather forecast and the weather radar.

Get a hands-free mobile kit for operating in the car.

Have a break on long trips, share the driving, stop for coffee and a snack.

Avoid storms, lightning, bushfires, campfires, falling branches, flooded rivers, snakes and cliffs.

Exercise great caution with batteries especially LiPo and LiFePo4.

Read battery warnings carefully. Do not short, overcharge or over discharge any battery.

Pack portable batteries carefully. Do not carry them in your pockets. Do not drop them.

Do not compromise the integrity of your car firewall or its electrical wiring.

Connect direct to your car battery via your own fused cables. Keep them away from hot surfaces.

Use lightning protection, grounding and heavy ground cables.

Use overcurrent protection on your auxiliary battery to avoid car fires.

Avoid tripping, electric shock and EMR hazards.

Use caution tape and keep-out signs around your guy wires and pegs.

Lock your car, remove your valuables and hide your stuff from view if you leave the campsite.

Be heard

There is not much point going portable and/or QRP if
no-one can hear you.  
- You often have a low-noise receive advantage, but a low-power transmit disadvantage.  
- Carefully consider your frequency, TX power, mode, antenna type, time of day and propagation.  
- The easiest solution is to bring along the best antenna you can carry and to rig it well.  
- Rig antennas in a clear area as high as possible using masts, squid poles or available trees.  
- You can get up to 9 m with a mast or squidy or up to 20 m with a line launcher and available trees.  
- A flat-top centre-fed dipole is 3 dB better than an inverted V or an end-fed at the same height.  
- Resonant single band (or linked) antennas are always better than non-resonant multi band antennas.  
- Use parallel line and an ATU on non-resonant antennas, or thin coax line on resonant antennas.  
- Try CW or digital modes.  
- Experiment with bands, operating times, antennas and propagation at home before you go.  
- Combine awards like SOTA, WWFF (POTA) and WAGS with other contests and be spotted on the DX cluster.

**Be seen**

- Do not be embarrassed by Amateur Radio – It is a great hobby and people are genuinely interested.  
- Actively meet and greet onlookers: Spend some time educating them about Amateur Radio.  
- Introduce Amateur Radio as a rewarding, fun, friendly and easy to join activity for everyone.  
- Explain what you are doing, who you are talking to. Be amiable, do not be pushy or distracted.  
- Explain the basic equipment and antennas needed; Also, clubs, meetings, hamfests, contests, etc.  
- Provide an on-air experience: “Would you like to press this button and say hello to John on the air?”  
- Display a world prefix map, a Morse key, Radio ZS magazines, a SARL poster, a FAQ sheet and pictures.  
- Hand out SARL brochures and RAE course dates and contact details.  
- Talk to park rangers. Explain you are promoting the environment using Amateur Radio.

**Be smart**

- Use a mobile network and your smartphone apps for everything you need including:  
  - Make emergency calls, phone calls, send and receive via SMS, E-Mail, Skype, EchoLink.  
  - Get the date and time (in UTC). Find your scheduled appointments and contacts.  
  - Use notes for your checklists and itineraries. Keep detailed notes on what worked and did not work.  
  - Check the weather forecast, weather radar and bushfire alerts (FireReady).  
  - Locate yourself and navigate with GPS, Google Maps and broadcast your position with APRS.  
  - Find nearby repeaters and IRLP nodes. Run BPSK31 from your phone.  
  - Use a logbook app to store and upload your QSOs to QRZ or eQSL or LOTW.  
  - Find out who is on with www.sotawatch.org and the DX Cluster.  
  - Check out what is happening on the SOTA, POTA, VHF/UHF, RaDAR, etc., Facebook pages. Google information about local events, attractions and accommodation.  
  - Make on-line restaurant and accommodation bookings and do Internet banking.  
  - Take pictures and videos of your team, your contacts and your surroundings.  
  - Try Geocaching [https://www.geocaching.com/](https://www.geocaching.com/) during the day and Star Walk at night.  
  - Run home surveillance and home control apps.  
  - Run a Wi-Fi Hotspot for your other mobile devices. Get accurate NTP time for JT65.
Get going

◊ Get your smartphone and a $50 portable VHF/UHF handheld and get going, it is too easy. *(AUD $50 is R509 – you do not get VHF/UHF handhelds in South Africa for that price!)*
◊ Add a spare battery and car charger for extended operation.
◊ Add a magnetic base antenna for mobile operation.
◊ Add a portable Yagi antenna for mountain-top operation.
◊ Get your portable HF setup going next: You will need a battery, HF rig and wire antenna.
◊ Experiment with different rigs and batteries: Power vs weight might be important to you.
◊ Experiment with different antennas, rigging and portable masts (e.g. squid poles).
◊ Get serious about road-trips with a proper mobile HF/VHF/UHF setup.
◊ Experiment with 12 V cabling, auxiliary batteries and mobile antennas.
◊ For weekend/contest work you will probably need auxiliary power and heavy antennas.
◊ Experiment with generators, solar panels, better antennas and higher masts.
◊ Do not forget CW and digital modes. That is where the DX is.
◊ Experiment with a laptop, rig interface and different digital modes: Try JT65 and BPSK31.

Have fun

There are many activities specifically for portable operation

• Awards: WWFF, WAGS, WAZS, Zone 38, Lighthouse Award
• Contests: QRP, Field Day, Hamnet, etc.
• Weekends: ILLW, IOTA, SOTA, POTA, RaDAR
• And many others which can also be worked while portable

Learn more

⇒ Avoid nightmare tangles in any long coiled antenna wires: Use PVC tape or Velcro cable ties.
⇒ Use hand-over-hand not hand-to-elbow cable coiling technique.
⇒ Check your antennas with a pocket antenna analyser. Height and soil effect feed impedance.
⇒ Bring tools, spares parts, gas soldering iron, wire and feed line to repair broken antennas and cables.
⇒ Bring adapters and cables to connect any battery to any rig to any antenna.
⇒ For mobile operation: Design your own 50 amp DC distribution system using Anderson connectors.
⇒ Take handhelds on bushwalks. Have several in a hiking group. Leave one in the car.
⇒ Use an auxiliary battery isolator switch and Low Voltage Disconnect unit to avoid flat car batteries.
⇒ Be gentle to trees: Use thick rigging lines and cam-buckle webbing straps to attach antennas to trees.
⇒ Use a safe and legal antenna line launcher (PVC conduit and a sinker).
⇒ Tape squid poles at each joint to avoid the catastrophic collapse scenario.
⇒ Use squid poles not to support a dipole, but to drop a lead filled tennis ball and a tie line over a limb.
⇒ Read the relevant contest rules thoroughly, every year. They change.
⇒ In contests use a CQer on one band while tuning around on another band.
⇒ Use paper logs and a waterproof pen for contests.
Transfer to the Internet later.

- A JetBoil™ and 300 ml water bottles is the quickest way to make a hot drink for two on a cold day. *(A Bleuet/Campingaz stove also works and much cheaper. The Jetboil R2 000 compared to R320.)*
- Avoid smoky campfires and mosquito infested swamps.
- Bring extra dry clothes, socks and shoes. Bring gloves for antenna work on cold mornings.
- Check your guy ropes and pegs regularly.
- Use the minimum power to get the job done. Be prepared for high current drain on digital modes.
- Position solar panels for maximum insolation. Avoid some noisy MPPT and PWM controllers.
- USB chargers and laptop car adapters are noisy. Try parallel-wound toroids and caps on the input.
- Use a gas-capsule lightning arrestor, a ground rod and heavy ground wire.
- For hard soil drive a 1,5 m ground rod, near horizontally just under the surface. Add water.
- Use short cam-buckle straps to tie together all your radio equipment into one easy-to-hold device.

### An Automatic Antenna Selector

**Henry Chamberlain, ZS1AAZ**

Any radio that has the facility to provide band data should be able to use this antenna selector. It was designed specifically for the Yaesu FT-991 which has a DIN socket on the rear panel that supplies the band data which shows which band the radio has been set to operate on. The same DIN socket is available on older radios such as Yaesu FT-90, FT9-20, as well as numerous older and current models. This is done with a four-bit binary data word that has sixteen combinations although only nine are implemented for the HF bands from 10 m to 160 m.

To use this data, it is first necessary to convert the binary code to decimal and this is done with a 74LS42 integrated circuit. This IC can only work on voltages up to 7 V so it is wise to run it on 5 V and besides, the signals from the radio are at 5 V level so it should be supplied power using a 5 V regulator. There are other integrated circuits that can do decoding, but the 74LS42 provides the nine outputs in an orderly manner with 160 m on pin 2, 80 m on pin 3 and so on.

The outputs of the 74LS42 are all at high levels with only the selected band being at low level. These outputs are connected to signal diodes so that several bands can be connected to the same antenna as one would want to do when using a multiband Yagi antenna. The board layout is such that the user can select which bands to connect to which antenna using wire bridges.

In this design it was decided to make provision for four antennas although it could be more. For each antenna there is a relay that connects the particular antenna to the radio. The relays are switched using 2N7000 FETs that need a positive level to turn them on but the 74LS42 provides a negative signal, so BC558 PNP transistors are used to do level shifting and supply suitable signals to the FETs.

On the PC board there are four small copper bus bars connected to the four level shifters and the user can then solder wire bridges between the signal diodes and each bus bar. On the front panel are four LEDs that indicate which band is in use.

Power for the decoder is provided by the radio although an external power supply can also be used. Below the schematic diagram is a table from the FT-991 manual showing how the binary code works.

Rassie, ZS1YT took the photos.
The Xiegu G-90

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SAM’s Radio

011 802 2976
The South African National Space Agency (SANSA), based in Hermanus, has developed a new App that will assist users of the High Frequency spectrum (3 – 30 MHz) to plan the frequencies that will provide the best and most reliable communication channel at any given time of the day or night between any two points or locations in between.

HF communications is dependent on the status of the ionosphere which in turn is affected by space weather and the 11-year solar cycle. The current solar cycle, cycle 24, is at its minimum with no visible sunspots on most days. Solar scientists are predicting that cycle 25 will start around the middle of this year, and over the next 5 or 6 years build to its maximum and then slowly start reducing to a minimum by 2031 when cycle 26 will be in the wings. Solar activity is measured by the number of sunspots visible on the sun and used as a major factor in predicting which frequency will provide the best communication between two points.

SANSA operates the Space Weather Regional Warning Centre for Africa and keeps a close eye on space weather, issuing warnings when solar flares occur. Solar outbursts may disrupt HF communication and if severe, may cause damage to satellites and even electrical infrastructure on earth.

Solar scientists, after a recent review of data collected from satellites and other solar observations, predict that solar cycle 25 will be the lowest in 200 years and only reach 60% of the sunspot numbers recorded during solar cycle 24.

The SANSA App, called “Ionospheric Characterisation Analysis and Prediction Tool” (IOCAP) comes at the right time, says its developer Piet van Zyl. “It will assist HF communication users, such as the SANDF and other government and civil agencies, to plan their communication channels”.

IOCAP is a very innovative tool that replaces older systems that were difficult to use and required specialists to obtain meaningful information and frequency predictions.

IOCAP includes a facility to consider the difference between the technical specification of radios and antennas used at either end. It is one thing to predict how well a high power fixed station at headquarters in Cape Town will be received by a field station in, for example, the bush of Mozambique, but it is quite another scenario how well the field station operating on very low power and a small whip antenna will be heard in Cape Town. IOCAP considers both sides and calculates the best possible frequency at any given time to facilitate two-way communication. This is of upmost importance in military and disaster relief communications.

HF communication is still widely used despite satellites which sometimes prove to be unreliable. This was clearly shown during various disaster relief operations in the USA, India and Indonesia, as well as more recently during the Mozambique hurricane disaster when cell phone communication systems became overloaded and collapsed, and satellite phones did not operate due to the heavy cloud cover.

The triangle of prediction generated for Sunday 24 November 2019 at 10:00 CAT. This proved 100% correct when compared with the actual observed transmission between Pretoria and Durban. Not shown here, the two-way transmission using different values for the local RF noise floor clearly showed up in the spreadsheet.
In civil aviation, many long-distance carriers keep contact with their base using HF radio. IOCAP can be used to calculate which frequency, at any given point during the flight, will provide the best communication. Sophistication by using smart software algorithms to evaluate all the options which, until now, were not possible. The tool also helps train new recruits on how to make sense of scientific theories behind frequency predictions, making it a valuable training tool”, Piet van Zyl said. “We have also included what we called the “triangle of prediction” which uses a colour displaying the quality of the prediction (as shown in figure 1). If all three triangles are green, there is a high reliability, 2 triangles green show a low to medium probability of communication and three red triangles, no communication possible.”

EngineerIT has for several weeks tested IOCAP using an amateur radio transmission from Durban and noted the signal strength as received in Pretoria from the Durban station as well as several radio amateurs who reported from various parts of the country. IOCAP was then used to determine the predicted reliability of communication between Pretoria and several other areas in South Africa. IOCAP predictions were spot on, every time. It would be interesting to carry out more tests with IOCAP when the solar cycle picks up, and during the winter months. IOCAP is about to be launched commercially.

For more information, e-mail spacesci-info@sansa.org.za

RaDAR News: Stay safe and healthy

Our president in South Africa presented a plan of action to limit the effects of the Corona virus from spreading quickly. As from Thursday the 26th of March 2020, midnight, everyone is to stay at home for 21 days with the exception of medical, police, security and army personnel.

This is serious stuff! The whole world is affected but our symptoms are only starting to show. Registered infections seem to be doubling each day. Not everyone is taking this seriously, yet!

My family and I are voluntarily locked down out of town with only a small number of permanent residents in the vicinity. On hearing the news, we started calculating whether we’d be able to survive for three weeks. We will need to ration what we have. Hopefully things will look more positive in three weeks’ time and that the outbreak will be under control. It may not be! We’ll have to revaluate the situation then.

I am already thinking about doing some fault finding on my FT-817’s finals again for it is really now I need to have a working radio. I am OK for the FM satellites if I really need to have communications with someone at least in South Africa. I am RaDAR ready in that regard.

Tomorrow it is my 62nd birthday (24 March every year. Ed.) so no chores for me to do, not even washing the dishes! I will spend my precious birthday time delving into the insides of the 817, I think. It did blow my battery’s fuse while doing an ATU tune-up on 15 m. Then there was a short to ground on the supply path to the finals which disappeared by itself! I never really took it further after the initial repair, totally disgusted with the situation but now this is part of RaDAR survival getting something operational because it is needed! Maybe a good exercise under real conditions.

Many things will change socially and psychologically. The whole world will feel the financial pressures too, but nothing can be worse than the loss of your loved ones.

Hoping that we all stay safe and healthy and that we emerge from this disaster relatively unscathed, but it will take time we do not know how long....
Indian YLs Net
Devulapalli Bharathi, VU2RBI says, “I would like to inform to our radio amateurs that I have started a YL/XYL net between 18:00 to 18:30 IST in India (12:00 – 13:00 UTC), conference on Echolink. Go to Asia - India VU2LHR-R. It is only for ladies. I request amateurs, please inform your YLs/XYLs about the YL net. Please encourage them to operate Echolink. Once they start operating Echolink, I am sure they will be active on HF and VHF too. Please tell them on my behalf. Please announce it on the regular nets. They can use their mobile phones wherever they are. We hope to see more activity by YL amateurs. Please join hands with me. I need your cooperation.”

Ja-Well-No-Fine
Kristyn Weed, KR1SS and Lyn, KJ7DSE, Quartzfest Organizers have sent me a write up with pictures, on Quartzfest 2020, an Amateur Camping event.

Quartzfest 2020
Happening the last full week of January just south of the town of Quartzsite Arizona, is an Amateur Radio event called Quartzfest.

Quartzfest is a weeklong Operating Specialty Convention sanctioned by the American Radio Relay League and is packed with seminars on a wide variety of topics ranging from technical radio operating modes and practices to survival, first aid, RV’ing, solar and battery technology and many other topics. This year, among other talks, we had a talk and slide presentation on “Parachute Mobile Operations” where these guys jump at 14 000 feet (HAHO) and open immediately which gives them close to 15 minutes of float time to operate their radio’s during descent and we had an awesome and very informative talk and demo on DStar by ICOM’s Ray Novak, N9JA and AC, N4SVD.

Not to be left out are the ladies who attend who are not interested in the tech talks. For them we have a tent set up for games and crafts as well as for talks of interest. This year we even had a talk on “the Well

(Continued on page 54)
- Armed Woman."

The week also consists of morning and evening campfires, an off road trip, an old fashioned “Hootenanny”, a potluck dinner which begins with a class on “Cast Iron Cooking”, nighttime talks and movies and amateur radio licensing exams.

We also have in operation a Special Event Station featuring an HF (high frequency) radio where attendees are free to pick up the microphone and make contacts across the country or around the world. Some folks prefer to operate Morse Code and make their contacts using that mode of operation. Next year we’ll have the ability to have digital operations including PSK and FT8.

We have raffles every day which are free and a free grand prize raffle at the end of the convention where we gave away a radio that covers the HF, VHF and UHF bands donated to us by ICOM plus to another winner, a handheld radio that covers VHF and UHF donated to us by Kenwood.

We just wrapped up our 24th year with close to 900 in attendance. For those of you wondering how much it costs to attend a spectacular event like this... it’s absolutely FREE to attend. As we camp in RV’s, tents and cars in the middle of the desert, we learn what it’s like to live off the grid for a week or two.. no water, electric or dump stations at our site (we do provide port-a-potties for our tent and car campers).

You can find us on the web at http://quartzfest.org or on Facebook groups by searching “Quartzfest”. Quartzfest 2021 will be our 25th annual convention and will be held from 17 to 23 January 2021. We hope you can join us.

Contact for the YL Beam Newsletters: Editor Eda zs6ye.yl@gmail.com and Anette Jacobs ZR6D ihjacobsza@gmail.com

The Maritime Net

The Maritime Net is on the air daily at 06:35 UTC (08:35 CAT) and 11:35 UTC (13:35 CAT) on 7,120 MHz LSB and 14,316 MHz USB. The morning session covers coastal conditions from Maputo, Durban, East London, Port Elizabeth, Mossel Bay, Cape Town and Saldanha Bay … with “live updates” at end of bulletin. The 11:35 UTC session is the coastal forecast as per the South African Weather Service (SAWS) for up to 50 km seaward, also with a live update of conditions as at 11:45 UTC.

The team is Kelvin Killian, ZS5IW, Ron Gillespie, ZS5RG; Peter Wolf, ZS1CH; Marjoke Schuitemaker, ZS5V; Bill Hodges, ZS2ABZ and myself, Woody, ZS3WL.
One of the things those of us involved in amateur radio for a number of years tend to forget is that things we have learned over time are not necessarily common knowledge even among our peers. So, when I am operating HF portable and I tell people I am running a linked dipole I expect them to know what I mean. The truth is rather sad in that more often than not they do not have a clue. For the majority of UK amateurs at least the G5RV is as adventurous as it gets. Try to tell them their antenna is a poor choice and you might as well be an atheist preaching from the pulpit to a church full of Southern Baptists. For home use even something as simple as an Off Centre fed dipole could offer a better bet than the a G5RV in a similar space, but that is a discussion for another time.

For now, I want to talk about the linked dipole as used by numerous SOTA operators for two reasons. One - several people have asked me to write something and Two - an Internet search for linked dipoles did not come up with anything useful. The main advantage of a linked dipole is there is no requirement for an ATU (antenna tuning unit) so we have one less heavy item to carry in our back packs. Because on SOTA we as the activators choose the frequencies, we work on we can optimise our antennas for the very frequencies we operate on. So on 10 metres I can normally be found around 28,5 MHz and so I started my linked dipole by cutting a half wave dipole for about 28 MHz and then using an antenna analyser or the Yaesu FT-817 and an SWR bridge I fold back the ends until the lowest dip in SWR (or max field strength if you have facility to measure it) is at 28,5 MHz.

Note: Fold back. Do not trim until you have determined where to cut. A lot of amateurs trim a ¼ inch a time until the SWR is acceptable, but that way you end up with an antenna that has had either too much or too little lobbed off.

Next, I add an insulator as seen above and a link. I have Used Anderson Power Pole and automotive type bullet connectors. I would also recommend the small gold bullet connectors used by the radio control model community and bought cheap in bulk on eBay. Power Poles have the advantage that they are easy to deal with cold fingers or in gloves. Then I add the section of wire required to make the total length suitable for 20 metres and tune in the same way and so on.

The pictures are of a linked dipole made by John GW4BVE and available on Flickr. I made my linked dipole independently of John and when I did a joint activation with him was surprised at the similarities of his design and mine. The differences are I use a commercial dipole centre, I do not bother with a balun and I use RG-58 coax. I have actually never seen RG-174 coax or plugs for sale other than mail order, which is the main reason I do not use it. It would be much lighter to carry of course. The main surprise I got was when I measured my dipole elements, they matched John’s sizes in the above picture exactly. However, if you are using a thicker wire than we used or tuning for the CW end of the bands your lengths could vary a little from the sizes shown. I have since constructed a second dipole blind using John’s
measurements and when I checked later with an antenna analyser it needed no adjustment.

For deployment in the field the antenna can be strung from handy trees, but as on most hills' trees are not an option then a telescopic 6 to 10 metre fishing pole (also known as a Roach Pole) is used as a mast. The antenna is deployed in an inverted vee formation.

The fishing pole mast is held up by guys. I use a collar made from PVC which fits just above the bottom section of the fishing pole with three short guys and use heavy duty rock pegs, that look like huge masonry nails to hold the ends. Other activators guy the mast near the top, while some use a single guy and let the antenna act as the other two guys. The choice is yours.

The reason I guy at the bottom is that it keeps the guys short and easier to manage. I do not like the single guy method as it adds additional strain on the antenna. Easy of management is the reason for the next image. Winders can be made from ply as John shows here or made from plastic card (available from model shops) like mine or purchased from kite suppliers, eBay or from Richard, G3CWI’s SOTApole website.

The ends of the dipole as shown in John’s images have an insulator and then a length of thin guy rope. When deploying the dipole, it is a good idea to get the ends as high off the ground as possible. Tests have shown that the difference between having the ends of the dipole low to the ground and at a mere three feet (1 m) off the ground can be considerable. As a result of these tests I now raise the ends of the dipole by using my walking poles, extended to their full length, to hold the guys on the dipole ends just before

(Continued on page 57)
they pegged. To simplify this a Y shaped double guy can be fitted to simplify the support. Because I rarely activate alone I use a single guy and a pair of walking poles on a cross formation to do the same thing.

This last image shows John’s dipole centre made from a disc of Perspex with a hole for using the single guy method of supporting the dipole and a choke balun. As I said I use a commercial dipole centre and although the choke balun is a good idea I have never noticed any RF feedback running even 100 watts without one.

My thanks to John Clifford, GW4BVE for use of his images. John says:

I have been asked to publish some photos of my /P HF antenna. It is a dipole with the element lengths adjustable by plugging/unplugging connectors. The antenna weighs 580 grams including feeder and winders. The wire is surplus thin connecting wire and the feeder is RG-316 (PTFE RG174). Insulators are small pieces of scrap plastic. It is normally erected inverted V fashion with the centre supported by a 7 metre fibreglass fishing pole and the ends by my walking poles. This antenna covers 80 m, 60 m, 40 m, 20 & 10 m, but it can be made for any combination you chose. No ATU is required. The winders are made from Lightply, which is sold by good model shops.

The drawing shows approximate dimensions of my HF dipole. The balun has been omitted for simplicity and I now use RG-316 feeder which I find is higher quality and of course has less loss, although as the feeder is so short the loss at HF is negligible. Please note that you should tune the antenna at the height you are going to use it on the hills. Make each section slightly longer and cut to minimum SWR starting at the highest frequency and working to the lowest. You will not get full coverage on 80 m, so it is best cut for your preferred operational frequency.

The balun could be omitted to make the antenna lighter. The balun core is 3,5 cm diameter and is made of type 77 ferrite with about 20 turns of coax.

The insulators ensure that there is no strain on the connector itself. The connectors are Powerpoles and are available from CPC and Farnell in the UK or can be ordered from the USA. Of course, any reliable single pole connector could be substituted.
HF Update for April
Dennis Green, ZS4BS

IARU Region 1 Contests
Radio amateurs will share the concerns of everyone about the seriousness of the COVID-19 outbreak. Governments all over the world are advising “social distancing” to slow the spread of the virus and to give health services the chance to cope.

Field days bring radio amateurs together and so represent an environment where social distancing is difficult to achieve. We must recognise that many radio amateurs are in the older, higher risk age groups. IARU Region 1 therefore asks national societies which promote field days and multi-operator contests to reconsider their position on these events for the next few months of 2020. Field days are essentially team contests, and so IARU will not sponsor the Region 1 HF-CW Field Day in June. It is a matter for national societies to decide whether and how they continue with their national field day events.

IARU Region 1 believes more generally that multi-operator contests are not consistent with the principle of “social distancing” and should not be promoted at this time. The position on other IARU events in 2020 which involve multi-operator categories is under review.

Single operator contests, however, remain a great way for those forced to stay at home to enjoy the magic of amateur radio!

Don Beattie, G3BJ, President IARU Region 1

This year’s International Marconi Day (IMD) has been cancelled

The FUNKAMATEUR reports this on their website (funkamateur.de) - The IMD is a 24-hour radio activity that commemorates the merits of Gugliemo Marconi for international communication via radio waves. Marconi was born on 25 April 1874 and every year on a Saturday closest to this date, numerous special stations are active on the amateur radio bands in North America and Europe. These are located at sites where Marconi himself was active or which were important for his projects.

Contesting in April
On Thursday 2 April, the first leg of the SARL 80 m QSO Party is on the air, page 30 of the Blue Book.

On Saturday 4 April is the first RaDAR Challenge for 2020 with lock down it can be a challenge, page 27 of the Blue Book.

Contest Calendar for April
<table>
<thead>
<tr>
<th>Contest</th>
<th>Time</th>
<th>Date</th>
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<tr>
<td>QRP Fox Hunt</td>
<td>01:00 - 02:30 UTC</td>
<td>1 April</td>
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<tr>
<td>Phone Fray</td>
<td>02:30 - 03:00 UTC</td>
<td>1 April</td>
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<tr>
<td>CWops Mini-CWT Test</td>
<td>13:00 - 14:00 UTC and 19:00 - 20:00 UTC</td>
<td>1 April and 3:00 - 04:00 UTC 2 April</td>
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<tr>
<td>UKEICC 80 m Contest</td>
<td>20:00 - 21:00 UTC</td>
<td>1 April</td>
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<tr>
<td>NRAU 10 m Activity Contest</td>
<td>18:00 - 19:00 UTC (CW) and 19:00 - 20:00 UTC (SSB) and 20:00 - 21:00 UTC (FM) and 21:00 - 22:00 UTC 2 April</td>
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<tr>
<td>SARL 80 m QSO Party</td>
<td>17:00 - 20:00 UTC</td>
<td>2 April</td>
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<tr>
<td>SKCC Sprint Europe</td>
<td>19:00 - 21:00 UTC</td>
<td>2 April</td>
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<tr>
<td>NCCC RTTY Sprint</td>
<td>01:45 - 02:15 UTC</td>
<td>3 April</td>
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<tr>
<td>QRP Fox Hunt</td>
<td>02:00 - 03:30 UTC</td>
<td>3 April</td>
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<tr>
<td>NCCC Sprint</td>
<td>02:30 - 03:00 UTC</td>
<td>3 April</td>
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<tr>
<td>RaDAR Challenge</td>
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<td>LZ Open 40 m Sprint Contest</td>
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<td>PODXS 070 Club PSK 31 Flavours Contest</td>
<td>10:00 UTC 4 April to 04:00 UTC 5 April</td>
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<tr>
<td>Nebraska QSO Party</td>
<td>13:00 UTC 4 April to 01:00 UTC 5 April and 13:00 - 22:00 UTC 5 April</td>
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<tr>
<td>Missouri QSO Party</td>
<td>14:00 UTC 4 April to 04:00 UTC 5 April and 14:00 - 20:00 UTC 5 April</td>
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<tr>
<td>Florida State Parks on the Air, 14:00 - 22:00 UTC 4 April and 14:00 - 22:00 UTC 5 April</td>
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<td>Mississippi QSO Party</td>
<td>14:00 UTC 4 April to 02:00 UTC 5 April</td>
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<tr>
<td>Louisiana QSO Party</td>
<td>14:00 UTC 4 April to 02:00 UTC 5 April</td>
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<tr>
<td>SP DX Contest</td>
<td>15:00 UTC 4 April to 15:00 UTC 5 April</td>
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<tr>
<td>EA RTTY Contest</td>
<td>16:00 UTC 4 April to 16:00 UTC 5 April</td>
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<tr>
<td>North American SSB Sprint Contest</td>
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<tr>
<td>UBA Spring 6 m Contest</td>
<td>06:00 - 10:00 UTC</td>
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<tr>
<td>RSGB RoLo SSB</td>
<td>19:00 - 20:30 UTC</td>
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<tr>
<td>IQRP Quarterly Marathon</td>
<td>08:00 UTC 6 April to 20:00 UTC 12 April</td>
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<tr>
<td>144 MHz Spring Sprint</td>
<td>1900 local - 2300 local 6 April</td>
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<tr>
<td>RSGB 80 m CW Club Championship</td>
<td>19:00 -</td>
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</tbody>
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On Saturday 18 April is the Autumn QRP Sprint and the ZS4SRK Balloon Contest, page 42 and page 63 of the Blue Book.

Sunday 19 April is the ZS4 Sprint, page 59 of the Blue Book.

On Saturday 25 April is the second leg of the SARL 95 40m Club Sprint, page 65 of the Blue Book.

Some DX

Egypt, SU. Tom, DL2RMC is currently active as SU9TH from Cairo, Egypt at least until the end of April. He operates FT8/FT4, also CW and SSB during weekends in operating events on 40, 20, 15 and 10 metres. QSL via DL2RMC; he will upload his log to Club Log, LoTW and eQSL.

The Netherlands, PA75. Harm, PA0HPG, Michel, PA0VCC, Ad, PA2PCH, Nico, PA3ADU, Gerrie, PA7TT, Harm, PD0GIB, Bert, PD2B and Gerard, PD2VV will activate special event station PA75ASN between 1 April and 7 May. Activity is to commemorate the 75th anniversary of the liberation of Assen City. Operations will be on 80, 60, 40, 30, 20, 17 and 15 metres using CW, SSB and FT12 (FT8 + FT4). QSL via PA0VCC, direct or by the Bureau. NO eQSL.

Czech Republic, OK. Celebrating the 30th anniversary of the Czechoslovak DX Club, special call sign OL30DXC will be active on all bands and modes from now until 31 December. A special QSL card will be sent automatically via the bureau; direct cards go via OK2PXJ.

Czech Republic, OK. Special call signs OL700CO, OL700DKO and OL700LTV are active until 31 December to mark the 700th anniversary of the Czech city of Dobruska. See http://www.ok1kqi.com/ol700/ol700.html for information about the award programme. QSL via Club Log’s OQRS.

Slovenia, S5. Radioclub Slovenska Bistrica (S59FOP) will be active as S50EARTH in April for the 50th anniversary of Earth Day. QSL via eQSL only. Established in 1970, Earth Day is an annual event celebrated around the world on April 22 to demonstrate support for environmental protection.

Poland, SP. Commemorating the 100th anniversary of the birth of Pope John Paul II, born Karol Wojtyla (1920 - 2005), special event station SN100KW will be active from 1 April to 31 May. QSL via SP3PGS.

Turkey, TA. The Istanbul based Tango Alpha Ham Radio Club (YM1KE) will be active as TC1STAYHOME from 27 March to 20:30 UTC 6 April

ARS Spartan Sprint, 01:00 - 03:00 UTC 7 April
Phone Fray, 02:30 - 03:00 UTC 8 April
CWops Mini-CWT Test, 13:00 - 14:00 UTC and 19:00 - 20:00 UTC 8 April and 03:00 - 04:00 UTC 9 April
NCCC RTTY Sprint, 01:45 - 02:15 UTC 10 April
NCCC Sprint, 02:30 - 03:00 UTC 10 April
QRP ARCI Spring QSO Party, 00:00 - 23:59 UTC 11 April
JIDX CW Contest, 07:00 UTC 11 April to 13:00 UTC 12 April
FTn DX Contest, 12:00 UTC 11 April to 12:00 UTC 12 April
F9AA Cup, PSK, 12:00 UTC 11 April to 12:00 UTC 12 April
SKCC Weekend Sprintathon, 12:00 UTC 11 April to 24:00 UTC 12 April
OK/OM DX SSB Contest, 12:00 UTC 11 April to 12:00 UTC 12 April
New Mexico QSO Party, 14:00 UTC 11 April to 02:00 UTC 12 April
Georgia QSO Party, 18:00 UTC 11 April to 03:59 UTC 12 April and 14:00 - 23:59 UTC 12 April
North Dakota QSO Party, 18:00 UTC 11 April to 18:00 UTC 12 April
Yuri Gagarin International DX Contest, 21:00 UTC 11 April to 21:00 UTC 12 April
WAB 3,5,7/14 MHz Data Modes, 10:00 - 12:00 UTC (FT8) and 12:00 - 14:00 UTC (RTTY) and 14:00 - 16:00 UTC (PSK) and 16:00 - 18:00 UTC (FT8) and 18:00 - 20:00 UTC (RTTY) and 20:00 - 22:00 UTC 12 April (PSK)
International Vintage Contest HF, 12:00 - 18:00 UTC 12 April
Hungarian Straight Key Contest, 15:00 - 16:00 UTC 12 April
4 States QRP Group Second Sunday Sprint, 00:00 - 02:00 UTC 13 April
NAQCC CW Sprint, 00:30 - 02:30 UTC 15 April
Phone Fray, 02:30 - 03:00 UTC 15 April
CWops Mini-CWT Test, 13:00 - 14:00 UTC and 19:00 - 20:00 UTC 15 April and 03:00 - 04:00 UTC 16 April
RSGB 80 m SSB Club Championship, 19:00 - 20:30 UTC 15 April
NCCC RTTY Sprint, 01:45 - 02:15 UTC 17 April
NCCC Sprint, 02:30 - 03:00 UTC 17 April
Holyland DX Contest, 21:00 UTC 17 April to 21:00 UTC 18 April
ZS4SRK Balloon Contest, 05:00 - 09:00 UTC 18 April
ES Open HF Championship, 05:00 - 05:59 UTC
25 May. This is a "COVID-19 Awareness Special Event" to stress the need to stay at home to avoid contamination.

Denmark, OZ. Special call sign OZ75MAY will be active on all bands and modes between 2 and 10 May to celebrate the 75th anniversary of the end of World War II in Denmark (5 May 1945). QSL via Club Log's OQRS, LoTW and eQSL or via OZ1ACB. A special award will be available for working OZ75MAY/p and OZ75MAY/xx using different suffixes; see https://oz75may.oz0j.dk/ for information.

Alaska, KL. Yuri, N3QQ; Vyacheslav, OK8AU; Yuri, UA9OBA and maybe a couple of other operators expect to be active as KL7RRC/p from Kiska Island (NA-070) between 10 and 15 June and as KL7RRC from Adak Island (NA-039) between 17 and 19 June. They will operate CW, SSB and FT8 (Fox and Hound) with three stations. QSL via N7RO. Bookmark https://www.na-234.com/ for updates.

Kosovo, Z6. A German team will be active as Z66DX from the capital city of Prystina in Kosovo between 15 and 28 October. Operators mentioned are Werner, DJ9KH; Rainer, DL2AMD; Günter, DL2AWG (Co-leader); Peter, DL3APQ; Franz, DL9GFB and Wolf, DM2AUJ (Team Leader). Activity will be on 160, 80, 40, 30, 20, 17, 15, 12, 10 metres using CW, SSB, RTTY and FT8, with three IC-7300 stations on the air running 800 watts into Spider-Beams and vertical antennas. QSL via Club Log's OQRS (direct or Bureau; recommended) or via DL2AWG, by the Bureau or direct. LoTW will be activated 6 months after DXpedition. No eQSL! QSL requests with insufficient return postage will be avoided. For more details and updates, see www.z66dx.de/?Welcome

Cancelled or Postponed DXpeditions

Over the last few weeks there has been many present and upcoming cancellations of DXpeditions due to the virus or travel restrictions caused by it. Many of the DXpedition
have postponed, rescheduled for later in the year or planned to be active next year in 2021. The current list of cancellations is as follows (as of print time):

- 3B8XF Mauritius (cut short);
- 4V5H Haiti;
- 9A1A Croatia;
- 9K2F Failaka Island (AS-118);
- CE0Y/VE7ACN Easter Island;
- CP6/R7AL Bolivia;
- CP6/RW9JZ Bolivia;
- CP6/RK8A Bolivia;
- CP6/RZ3K Bolivia;
- CQ3W Madeira Island;
- CT9/DF7EE Madeira Island;
- D4C Cape Verde;
- DU2/SP5APW Calayan Island (OC-092);
- FK/C Chesterfield Island;
- HS0ZME (cut short);
- JW/DF3TS Svalbard;
- JW/DC8TM Svalbard;
- KH7M Hawaii;
- NH7A Hawaii;
- PJ2/DK5SON Curacao;
- PJ7AA Sint Maarten (cut short);
- PZ5G Papegaaien Island (NA-092);
- T30ET West Kiribati;
- T88HS Palau;
- T88SM Palau;
- T88UW Palau;
- TG9BBV Guatemala;
- TO7BP Martinique;
- TU2R Côte d’Ivoire (Ivory Coast);
- V62P Polap Atoll (OC-155), Micronesia;
- V62S Satawal Atoll (OC-299), Micronesia;
- VP5/AF3K Turks and Caicos Islands;
- VP5/W2TT Turks and Caicos Islands;
- VP5P Turks and Caicos Islands;
- W8S Swains Island;
- XR8RRC/p Riesco Island (SA-091);
- XV4XR Laos;
- ZA/HG2DX Albania;
- ZC4MK UK Sovereign Base Areas on Cyprus;
- ZD7VJ St Helena Island;
- ZF2PG Cayman Islands

**DAY-XENIA Hamvention**

The Hamvention Committee cancelled Hamvention 2020. In a press release posted by Henry, W8HJR, the Media Chairman, dated 15 March, it states: The Hamvention Executive Committee has been monitoring the pandemic. We have worked very closely with our local and state health Departments. It is with a very heavy heart the Hamvention Executive Committee has decided to cancel Hamvention for this year. This decision is extremely difficult for us but with around two months until the Great Gathering we felt this action necessary. More specific details regarding the closure will soon be posted here. Thank you for your understanding in this time of International Crisis. Jack Gerbs, General Chairman HV2020

**Kevtronics CC**

Kevtronics CC offers a variety of high-quality radio equipment and accessories. Their products include VSWR Meters, Antenna analysers, and portable VHF & UHF dual band radios. Customers can find a range of features such as Fixed 13.8V DC, Adjustable 9V to 15V DC, Noise offset feature, and a Local warranty. Their contact information is also provided: 012 752 1670, www.kevtronics.co.za

**RSGB FT4 Contest Series**

April 2020 Radio ZS
Introduction

I guess it must be human nature to try to sort and rank similar items. Discover the best place to take a vacation, the fastest sports car, the golf ball that will travel the furthest, the safest part of town, the best football team. Much of life seems to consist of debating the correct ranking with the people around us. I am all for learning and debating, but often times these exchanges end up heated and painful. The usual reason is that one or both sides decides that their opinion on some single topic is a referendum on their whole character and value as a human being. So, when I disagree with your choice for fastest sports car, you hear that I am saying that you are a dumb, ignorant fool. Of course, some people do indeed put forth their case in such a personal attack style and that is not much fun to witness either.

Sometimes, two parties will have a disagreement without even really understanding what their assumptions and goals are. For example, there could be a disagreement over the best sports car. After much debate, we learn that one side is really talking about the fastest sports car and the other is talking about the sports car with the best handling in tight curves. Until this difference becomes apparent, the discussion is, at best, a waste of time.

Another common source of argument and disagreement is not being clear about the difference between best and best value. In the world of amateur radio, this is often seen in disagreements about different radios. Every so often a new top of the line radio comes out from one of the popular brands. Some people point out the new features and performance and if it is truly a top of the line radio it probably is excellent (for that point in history). But then other people will chime in that they will never trade in their old and faithful Boat Anchor 100, noting that it can make about all of the contacts that the fancy new radio can. When you look closely at the different points of view, it is often clear that one side is discussing features and performance without concern for the cost of the radio. The other side is unable to separate the cost part of the equation. They always need to be considering value, which could be expressed as cost per function, as opposed to pure function. If you do not make it clear what you consider important, then these discussions can turn into arguments and mainly due to misunderstanding. My own experience and not just in radio, is that you usually pay a premium price to obtain the latest and best, but that the best value is always obtained in something which is a few years old and probably used. A 10 year old transceiver which might cost $500 (R8 665) on the used market will make probably 99% of the contacts that a new $3 000 (R51 900) transceiver can. I am happy to say that the used radio is a better value. On the other hand, the new radio probably does have a lot of extra bells and whistles, as well as provide higher performance. I am happy to say that it is the better radio. Sometimes the people who seek better value ridicule the person willing to spend top dollar for the new gizmo. I have always found this thinking a bit puzzling since it is necessary for somebody to buy the new and expensive item in order for it to become used and a better value. As they say, it takes all kinds.

One of the classic arguments in amateur radio is whether a dipole or vertical is the best antenna. I get the sense that conventional wisdom believes that the dipole is better. This is usually summed up with the criticism that a vertical is an antenna that radiates equally poorly in all directions. Part of the reason that the debate rages is that different operators report wildly different results when using the two different antennas. This particular debate is often carried out without benefit of the details of the circumstances and expectations of the operators. As such, it is usually never an apple to apple comparison, but rather an apple to orange fruit salad.

I would like to try to use this page to look at some of the differences between dipoles and verticals. Part of that journey will be through the prism of my own experiences.

My Own Experiences

I was first licensed back in 1969. I was a 15 year old who had to convince his mother to drive 60 miles into Chicago so that I could take a radio exam. That was back in the days when (for other than the novice license) you had to visit an FCC Field Office to take the amateur radio exams, administered by FCC (Continued on page 63)
employees. The FCC Chicago Field Office was in the Federal Building and that was also the time of the Chicago Seven trial. That heated trial caused the installation of metal detectors at the building, which were very new at the time. Just driving into Chicago from the rural farming area was an experience, then, we had to go through a metal detector, which seemed like some sort of science fiction device. Who would have guessed that 30 years later they would become standard at so many places, such as schools?

The testing room was a rather cold office with a set of school-like desks. In the middle of one room was a Morse Code generation machine. My fate rested with that machine. Back then, you were given the receiving test first, which could be given to a number of people at once. If you flunked out, you had to leave, no sense in taking the transmission test, or the written test, after all, you failed. I handed in my written page and all that came back was the news that I passed. That put me in line for the transmitting test. Now, one by one, each passed receiving applicant got to take centre stage and transmit. While the test was specified to be several minutes long, it seemed to be a common convention that once the examiner decided you passed, he told you to stop. After all, there was a line waiting.

Finally, you got to the written exam. In many ways this was easy part. In fact, on one day I took the 13 WPM Morse Code test, as well as the General and Advanced tests, as well as a commercial license test. I never used the commercial license, but when you are 15, everything seems to be about getting licenses, especially that driver’s license.

Licenses gave way to radios and I was able to convince my parents that helping me buy a Heathkit HW-100 would lead to a good learning experience.

All of this was going very smoothly, but then I needed an antenna. We lived in an apartment at the time, we were on the top floor and very fortunately, on the end of the building. We were on the third floor, which really was the 2½ floor, since the first floor was partially underground. After a few poor ideas (well, poor antennas), my solution was to take a bare solid wire and hang it out of my window, dropping about 60 feet of wire down to the ground. I went outside in the middle of the night and using a long wooden pole, I was able (after a lot of work) to bring the wire around the side of the building, under our bathroom and kitchen windows and around the other corner, ending on our balcony. The building had a brick exterior and I was able to run the wire in the mortar joint between the bricks. That helped support the wire and made it nearly invisible. Back in my bedroom, the shack, I had a simple L network tuner consisting of a variable capacitor and inductor mounted on the lid of a wooden box, which was a wood shop project at school.

This end-fed wire actually worked and worked better than all of the other dumb ideas I played with. In retrospect, I realize that 1969 was near a peak in the sunspot cycle and that will make about any antenna look good (on the shortwave bands). I spent a lot of time rag chewing with several other amateurs in the area on 40 metres. Another helpful circumstance was that one of the amateurs (AI, K9CCL) ran a Collins S-Line with the 30S-1 amplifier and had a delta loop antenna for 40 metres pulled to the top of his 90 foot tall tower. In many cases I would work stations because they would call AI and I would end up getting a (poor!) signal report out of it. For example, this is how I worked Antarctica on 40 metre SSB. This situation helped that antenna work a lot better than it really was.

My point is that circumstances started me down the road of using an end-fed long wire with a tuner on all of the lower bands. If nothing else, the antenna was great value, costing next to nothing and allowing me to make contacts on all of the bands available on the radio.

After high school came college and some moving around to several rented places where antennas had to be temporary. The end-fed long wire was replaced with a dipole fed with twin lead back into a Johnson Viking Matchbox tuner. The dipole was as long as it could be to fit between the two highest trees which I could use. This antenna was also a very good value, providing coverage on all shortwave bands for very little investment.

What happened next was a lot of my adult life, including moving to a house on a 5 acre lot. I was rather inactive in the hobby then, but I always had that station (a Kenwood TS-440 replaced the HW-100) with the all-band dipole and in the back of my mind I knew that more space would open up all sorts of antenna choices, if I wanted to put them up.

(Continued on page 64)
Finally, some invisible force drew me back into the hobby. As I started to operate a little more, I found that my home intercom system was very sensitive to RF and my transmitter would generate interference, especially on 40 metres, what had been my favourite band, in the old days. Being an intercom, noise and interference was efficiently distributed to all 9 wall speakers located all over the house. My own conclusion was that the problem was that I had open wire line so close to the house. I wanted to replace it with coax, but still have that all-band antenna. Even then I was smart enough to know that it’s usually acceptable to run rather high SWRs on open wire line, but a bad idea (due to excessive loss) on coaxial cable. So, I needed a multiband antenna that matched well to 50 Ohms on all bands. The antenna that caught my attention was the Butternut HF-6 vertical.

Yes, I had heard that a vertical was an antenna that radiated equally poorly in all directions, but this one offered all-band operation with a good match to coax. But what about the need for radials? Radials always seemed to introduce magic to verticals. Are they essential or optional? Can they be elevated, or laid on the ground, or do they have to be buried? Boy, that seemed like a lot of work. How many radials? How long?

While I had few answers to begin with, the good news was that I had a large open area about 150 feet from the house which also happened to be located over my septic tank leech field. It was just open field and I figured that it was far enough from the house that RFI would be greatly reduced and hopefully eliminated. The feedline would have to run over the grass, but this was an experiment, after all and if the antenna worked out, I could consider burying the feedline.

I drove down to the local Amateur Electronic Supply (AES) store and came back with a small box all full of aluminium tubes and inductors. I drove a few feet of metal pipe into the ground to act as a mount and in an afternoon, I had the Butternut vertical antenna proudly pointing at the sky. From living in a more rural area I had already started shopping at stores that catered to farmers and I knew that I could buy an entire 1/4 mile of wire for electric fences for something like $7 (USD). So, I got a spool of electric fence wire and for good measure I drove an 8 foot copper ground rod into the ground next to the mounting pipe. I simply wound the fence wire around the top of the ground rod and as I added radials, I kept making a big nest of wire around the ground rod. After 24 radials, I got out the propane torch, heated up the mass of metal and applied a few feet of solder. My radials were some strange mix of 20, 40 and 60 feet long wires. It probably looked more like an antenna crop circle than anything else. I was unclear about the length versus resonance issues and these lengths seemed to be nice for bands such as 80, 40 and 20 metres.

Upon going back into the house, my whole amateur radio experience changed. First, the RFI was gone. No noise, no interference, no hot microphone on the lips, all gone. The important difference was that I was now hearing and working stations that I never knew existed. I should also mention here that again, this was at a good point in the 11 year sunspot cycle. Still, this antenna was clearly much better than the dipole, especially on DX, which now seemed almost easy to work. I remember a turning point when I happened to wake up on a weekend morning, right near sunrise. It was the weekend of some contest, although I didn’t know which one and really didn’t care. I set the radio to the 80 metre phone DX window and there was a station in New Zealand calling CQ contest. I gave him a quick call and without smoke or mirrors, I worked a ZL on 80 metres. The other side of the world on 80 metres with 100 watts and a vertical. This seemed impossible with the dipole.

Perhaps more than anything else, I now had two antennas to play with. It was possible to switch back and forth and note that in some cases the vertical was better and in some cases the dipole was better. Speaking very generally, the vertical was better for DX and the dipole was better for local stations. But the truth is that I could still work local stations with the vertical, even if they were stronger with the dipole. That twin lead hanging out of the window, with its associated RFI, soon became a real ugly sight and it was a happy day when the dipole came down. It was a good trade-off (for me) to steal some signal strength from the armchair copy locals and give them to the DX, which often times brought the DX out of the noise.
Not that I was amazed, but it was soon clear that antennas were the primary factor in having a station that could work the largest number of other stations. Over the years a tower and beam went up and I currently have 7 verticals, several miles of radials and a whole mess of strange receiving antennas for the lower bands. The drawing board is still full of ideas. I certainly have better antennas, but I bet that the best antenna value was the Butternut. I added the 17 and 12 metre kit and that one antenna gave me 7 band operation for around $300 (USD). Yes, that was more than the dipole with open wire transmission line, but for what interested me, it also performed much better. In the spirit of full disclosure, I also added linear amplifiers, going through the 800 watt and then 1500 watt level. That certainly helps, but a lot of my antenna work happened before I added the first amp and on reception the amp does not matter. I can tell that I can hear more and as we all know, if you can’t hear them, you can’t work them. Now, my 5 acres seems way too small for a real antenna farm. As they say, the grass is always greener on the other side of the fence.

All along this journey I had to confront many of the rumours, old wife’s tales and conventional wisdom about antennas. It was not so much that all of this lore was wrong, but rather the devil was in the details and often times there were unstated assumptions which created confusion until you took them into account. Another factor that entered the picture was that I started to model and simulate antennas. This added an analytical dimension to the experimentation.

The remainder of this page will consist of some of the lessons I learned along the way. Looking back, the journey was, is and I bet will be, the fun.

Can My Antenna Be Too High?

Another piece of conventional wisdom is that you should get as much wire as high as you can in the air in order to have the best antenna. Within reason, there is a lot of truth to that simple idea. There are (Continued on page 66)
cases, however, when an antenna can indeed be too high.

One example is the height of a directional antenna such as a Yagi or quad located on top of a tower. It might very well be true that higher is not better.

Can I ever have too many Antennas?
No!

From time to time and contact to contact, the best antenna will change. Even what might appear to be a much weaker antenna will have its moments. I would suspect that a 5-element 20 metre monoband Yagi mounted at 70 feet would be generally much better than a 20 metre inverted vee mounted at 15 feet (the apex) off of the ground. Still, there will be contacts when that low inverted vee will provide a stronger signal. If a given operator happens to favour operating in large roundtable contacts with many participants (such as the typical net), they may prefer an omnidirectional vertical to a directional antenna, even if the directional antenna has substantially more gain in its favoured direction.

Perhaps the only antenna which is ever excessive is the one that falls down on your neighbour’s property.

I started off in amateur radio with one antenna for all bands. Now, I seem to want many antennas for each individual band. I would certainly choose many antennas over many radios.

Lowe’s Loop for 432 MHz
Ben Lowe, K4QF           First published in QST, July 2006

Your brand-new rig covers 432 MHz, but you do not have an outside antenna for that band? Here is an easily constructed antenna that will get you on 70 cm

Introduction

Many of the small modern transceivers on the market today are supplied with 432 MHz capabilities, but often operation on this band is not utilized due to the lack of a suitable antenna. This can be a great band for local contacts and when propagation is good almost any simple antenna with the right characteristics — horizontal polarization and a low SWR — will permit some long-range contacts.

The purpose of this article is to present an antenna that is easy to construct in a couple of hours and is easy to match. It uses inexpensive material readily available at Lowe’s Home Improvement, Home Depot or your local hardware store. After all, putting up a 432 MHz antenna and generating some activity on this band would have to be considered a “home improvement” by any true-blue amateur! The antenna described in this article is a halo loop with a matching scheme that is easy to implement.

Construction

I fabricated this loop with an emphasis on ease of construction and low cost. To that end, I used standard ¾-inch (19 mm) diameter copper water pipe, 5 or 10 feet (1,524 or 3,048 m) long for the mast and ¼ inch (6,35 mm) copper tubing, normally used for ice makers on refrigerators, as the radiating element. Icemaker tubing normally comes in a 10 foot roll at Lowe’s, but I only use about 1 foot (30,48 cm) unless I construct a multi-element array. One roll of tubing will be plenty for you and several of your friends to construct antennas.

This project also requires some #6 (3,505 mm) brass wood screws, some #8 (4,166 mm) brass wood screws both ½ inches (12,7 mm) long and a ¼ inch (6,35 mm) nylon spacer 1 inch (25,4 mm) long. These...
Fabricating the Pipe

The basic approach to construction is straightforward. Use a tubing cutter to cut the radiating element from the ¼ inch (6,35 mm) tubing for a length of 13 inches (330,2 mm). Centre punch all holes before drilling so that the drill bit does not “walk off” the desired location. Exactly at the centre of the element, 6,5 inches (165,1 mm) from each end, drill a small tap hole using a drill bit of 3⁄32 inches (2,38125 mm). The precise size of this hole is not critical since a screw will hold the element in place until it is soldered. Once you have drilled the centre hole, the element is bent around a 4 inch (101,6 mm) form to create the halo loop. Keep the tap hole on the inside portion of the circle. That is, place the hole directly against the circular form facing in toward the surface of the form instead of facing out.

The precise diameter of the halo is not too critical since the element diameter can later be adjusted by slightly bending it. I shaped the element into a circular form using a piece of 4 inch (101,6 mm) diameter PVC pipe obtained from Lowe’s and wrapped the 13 inch long (330,2 mm), ¼ inch (6,35 mm) diameter, ice maker tubing around the pipe. However, any 4 inch (101,6 mm) diameter circular form can be used. Figure 1 shows the loop element. You will be drilling a total of six holes in the ¾ inch (19 mm) mast. Using a sharp felt tip pen or a pencil, at a distance of 2 inches (50,8 mm) from one end of the ¾ inch (19 mm) pipe, mark the position of the first hole to be drilled. At this point along the pipe you will gauge the precise circumference using a piece of masking tape. See Figure 2C.

Wrap the masking tape around the pipe, offsetting the edge as you wrap just enough so you can see the starting point. Mark the beginning and end points on the tape.

Inserting the Elements

Remove the masking tape and temporarily stick it to a flat surface. Use a ruler to measure the distance along the masking tape. Calculate ¼ of the total circumference distance. Mark points along the tape, each spaced ¼ of the circumference around the pipe. Mark the centre point in between two marks. This mark will be used to line up with the tap hole you’ve already marked on the pipe. (The tap hole is for the #6 element screw that will be used to temporarily hold the radiating element in place while it is soldered.) Rewrap the masking tape on the pipe just below the 2 inch (50,8 mm) circle previously marked on the pipe using the tap centre hole as a reference.

On each side of the centre hole, at 90° to each other, you will drill two other holes for the radiator to pass through the mast. Mark the positions for these holes on the pipe, along with the holes 1 inch (25,4 mm) farther down the pipe used for the nylon insulating spacer and ¼ inch (6,35 mm) farther from that down the pipe for the #6 ground tap screw. See Figure 2 again.

Drill the two mounting holes for the radiator, starting with a small starter bit, following with larger diameter bits. You will need to use a rattail file to open up the holes to the shape of ovals to allow the radiating element to pass through the pipe.

Insert the radiating element through the oblong holes and fasten it temporarily in place with a #6 brass set screw. Then, solder the element into place using a high wattage iron or small propane torch. After the element cools to the touch, the element can be bent to make it exactly horizontal when the mast is vertical. Insert a ¼ inch (6,35 mm) diameter, 1 inch (25,4 mm) long nylon spacer, available from Lowe’s, into the spacer hole. This spacer extends approximately 1/8 inch (3,175 mm) out each side of the pipe mast, forming a standoff insulator for the balun centre conductors that make up the antenna feed.

(Lowe’s Loop for 432 MHz from page 66)
(Continued on page 68)
system. The matching scheme itself is taken from a well-known technique for the delta match using the “plumber’s delight” approach. It got this name because the radiating element does not require insulation from the mast and thus can be fabricated from plumbing fixtures.

### Wiring it Up

Next, construct the 4:1 balun from RG-58 coax cable that is \( \frac{1}{2} \lambda \) long as shown in Figure 3. While coax with foam insulation exhibits slightly lower loss, the foam can also act like a sponge for water, changing the characteristics of the dielectric and corroding the shield. Therefore, be sure to use RG-58 coax with solid polyethylene insulation, which is not nearly so susceptible to water. Even though the loss is slightly higher, the length is so short that the difference is negligible.

The RG-58 coax is rated at 70 W at 432 MHz. With SSB or CW operation, the duty cycle is well below 50%, so I would not hesitate to run as much as 100 W of RF into this antenna. If you plan to run more than 100 W to the antenna, a larger, higher power coax should be used. Also, with a typical station installation using a nondirectional antenna such as this, most setups will probably have something in the order of 3 dB feed line loss from the shack to the antenna. Therefore, even a transmitter with a couple of hundred watts of output can supply only 100 W to the antenna. As described later, a four-bay array of loops, each at 70 W capability, could take 280 W of average power or 560 W peak power supplied to the antenna array.

(Continued on page 69)
Final Test

If the loop and balun dimensions have been followed precisely, very little tuning should be necessary to obtain a low SWR for the antenna. One factor that could require tuning, however, is a variation in the velocity factor of the particular run of coax used to construct the balun. If this is the case, one way to compensate is to make slight adjustments in the length of the balun. This is easier said than done since it requires cutting and soldering the balun each time an adjustment is made. An easier way to make slight adjustments is to vary the spacing between the ends of the loop. You can make slight tweaks in the resonant frequency of the antenna by slightly changing the diameter of the loop. If the SWR is no more than 1.6:1 or 1.7:1, change this spacing by simply holding both sides of the loop and spreading or squeezing the spacing. This should allow the SWR to be brought down to an acceptable level.

For the test antenna and subsequent models, I easily adjusted the SWR to 1.2:1. Most of the models fabricated did not require any adjustments to achieve this SWR. One model required that the spacing be adjusted to 2 inches (50.8 mm) to obtain an acceptable SWR.

Quick Fix Four-Bay Array

One useful feature of the Lowe’s Loop is the ability to stack these loops vertically to narrow the

(Continued on page 70)
elevation beam width and achieve omnidirectional gain in the azimuth plane. Stacking four of the loops separated by \( \frac{5}{8} \lambda \), or 16 inches (406.4 mm) between loops at 432 MHz, yields a total height of 48 inches (121.92 cm) for the four loops shown in Figure 4 and should yield about 6 dB gain, minus any losses in the power divider. While you can fabricate one loop on a \( \frac{3}{4} \) inch (19 mm) copper mast, it isn’t much more effort to prepare the mast and cut the elements for three more of the loops. If you pay careful attention during the construction, you can achieve a low SWR for all of the loops. Then, it is necessary to provide four equal-amplitude and in-phase drive signals to the four elements.

If all four loops in the array are fed with equal length feed lines, then each element receives the same amplitude and in-phase signal provided by the four way divider.

Tying four identical 50 \( \Omega \) feed points in parallel results in a feed impedance of 12.5 \( \Omega \). I fed the four loops in my array with equal lengths of 50 \( \Omega \), RG-58 coax, each with a BNC connector on its end. This provided an easy mechanism to check each antenna individually before combining them into the four bay array. I drilled four holes in the side walls of a \( \frac{3}{4} \) inch (19 mm) cooper end pipe cap to permit insertion of BNC female chassis mount connectors into the pipe cap, as the divider in Figure 5 shows. I sweat soldered the BNC connectors to the copper end cap.

For the particular version of the BNC connectors used, the centre conductor pins had to be cut off a slight amount to allow all four connectors to join together at the centre point and still have the ground rings of the connectors seat against the sides of the pipe cap. I did this easily with a pair of wire cutters on the soft metal centre pins.

I needed to transform the 12.5 \( \Omega \) impedance back up to 50 \( \Omega \). I decided to use a \( \frac{1}{4} \) Q section, which requires a 25 \( \Omega \) characteristic impedance line. You can make a line with this impedance simply by paralleling the centre conductors and the shields of two \( \frac{\lambda}{4} \) lengths of 50 \( \Omega \) coax. The photo in Figure 6 shows four BNCs mounted through the bottom pipe end cap, together with the two paralleled Q section coaxes before inserting them into the \( \frac{3}{4} \) inch (19 mm) copper pipe and top end cap to finish the final assembly.

I started out by cutting two 5¼ inch (133.35 mm) lengths of RG-58. I removed \( \frac{3}{4} \) inches (19 mm) of the

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**Figure 4.** Four Lowe’s Loops mounted in a stacked array for additional horizontally polarized gain.

**Figure 5.** Four-way divider/transformer to feed stacked array of four Lowe’s Loops.

(Continued on page 71)
outside jacket from each end of each coax. I then removed half of the centre insulation at each end to expose the bare centre conductors and soldered these centre conductors together. After some experimentation, the final length of the paralleled cables was 3¼ inches (95.25 mm), as shown in Figure 7. The difference in length from the calculated value was likely due to the end sections, which act like additional short transmission lines with a different $Z_0$.

Incidentally, the same approach should be applicable for building two way dividers using paralleled pieces of 72 Ω coax. The paralleled coax characteristic impedance should be 35 Ω to transform the 25 Ω impedance of two 50 Ω antennas in parallel to 50 Ω. The required 35 Ω is very close to two paralleled pieces of 72 Ω coax cut to λ/4 in length.

Once I cut the Q section coax lines to length, I soldered their centre conductors to the junction of the BNC centre pins and then soldered the four short ground lead pigtails onto the ground of each BNC connector. I soldered another BNC connector to the top end of the transformer at 90° to the coax to minimize lead lengths.

It was now time to test the divider/transformer assembly. I connected a 50 Ω termination to each of the four BNC connectors and measured the SWR, which was 1.2:1. After testing, I placed the entire Q section inside a 3 inch (76.2 mm) long, ¾ inch (19 mm) diameter copper water pipe, together with an end cap with a hole in its side for the top BNC connector. Figure 8 shows a photo of the completed divider/transformer assembly.

![Figure 7. Making a 25 Ω, λ/4 transmission line by paralleling two RG-58 lines.](image)

**Conclusion**

This antenna is relatively easy to construct and to put into service. The materials are available at almost any building supply or hardware store. While one antenna provides omnidirectional coverage, the four-bay array should approach 6 dB gain over a single element in all azimuth directions. This gain comes from compressing the elevation pattern, the same way that TV transmitting stations obtain gain in their omnidirectional antennas.

I have taken the same approach for a 2 metre halo simply by multiplying all dimensions by three. I have also constructed a 6 metre version, but that required capacitive loading to keep the dimensions of the antenna from getting too large. So far, my best DX on 70 cm has been Texas from Alabama. I have used the 2 meter Squalo to log Toronto to the northeast and Houston to the southwest, among the 42 grids that I have worked since putting it into operation a year ago.

I want to express my appreciation to Dieter Schliemann, KX4Y for the use of his antenna analyser and SWR meter and to George Hall, W4BUW for review of this manuscript.
Australia's first ever moon bounce remembered as a feat that shocked industry experts


You probably have not heard of Ray Naughton's feat of science - not many people have. But 55 years ago, the quiet electronics store owner from Birchip, in western Victoria, successfully completed Australia's first ever moon bounce.

Key points:
- A quiet electronics store owner in Victoria is responsible for Australia's first ever moon bounce
- Ray Naughton was told at the time, 55 years ago, that it was impossible with what experts said was limited equipment
- But he proved industry experts wrong, resulting in an all-expenses-paid trip to the US to share his knowledge with scientists.

The amateur radio fanatic had spent most of his time alone in a paddock, tinkering away on a 250 metre wide, 30 metre tall antenna capable of bouncing a radio signal off the moon and back again. Mr Naughton was driven by news that astronauts would soon be walking across its surface. When that day came, on 20 July 1969, Mr Naughton used his antenna to tune into conversations between astronauts and NASA. A small group of locals watched on in wonder, realising for the first time what their private neighbour had been working on.

American scientists shocked by amateur feat
The moon bounce itself was not remarkable - scientists in the US had already experienced the rush of

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hearing a signal return from the moon exactly 2.6 seconds after they sent it up.

But Mr Naughton was not a scientist. Nor did he have access to money or equipment. He was a freelance tinkerer, developing grassroots knowledge that would shock industry experts. His only connection to the professionals was through amateur radio chat from his home-office 'shack' in rural Victoria.

American scientists ridiculed Mr Naughton's basic 100-watt set up, telling him he would need at least a kilowatt of electrical power to achieve the bounce. When he proved them wrong, those scientists invited Mr Naughton to the US - all expenses paid - to share his extensive knowledge.

"This epitomises what amateur radio is all about," Wireless Institute of Australia former president Justin Giles-Clark said. "It is experimentation and being able to do these sorts of feats of science in a paddock in the middle of nowhere."

Career, hobby, obsession: a life dedicated to radio

The network of people who experiment with radio frequencies is vast and extensive.

'Radio amateurs' do not bother with names; they use identity codes that inform peers about their location. In amateur radio circles, Mr Naughton will forever be known as VK3ATN.

Most radio amateurs live double lives, balancing regular careers and interests with their wireless hobby. But there was no duplicity for VK3ATN, who was either working in his Birchip radio and electronics store or tinkering in his radio shack at home.

"He'd come home, perhaps have tea, and then he'd go and talk on the radio," his wife, Margaret, said. Mr Naughton was so averse to leaving his shack, he created a buzzer system to beckon his wife from the kitchen when needed. Often, he would be on the radio through the night, in order to connect with radio amateurs on the other side of the world.

"[Our four children] got a bit browned off because he never had time for them," Mrs Naughton said.

Few Birchip locals knew what VK3ATN was up to, but neighbours offered up paddocks for his monstrous towers. They proved irresistible for the couple's two-year-old son, Peter. "I went outside and here he was halfway up the 100-foot tower [30 metres]," Mrs Naughton said. "The high school is just across the road, so I rang up and asked if a teacher would come over and get him down."

Young Peter went on to embrace heights, installing antennas and towers as part of his father's business. When the radio and electronics store closed down, father and son started selling VK3ATN inventions to radio amateurs across the globe. "He
was making quite a good living out of selling the antennas and aerials,” Ms Naughton said.

VK3ATN also joined a team of professionals and amateurs in launching Australia’s first ever satellite — Australis Oscar 5.

When he died in 2012, aged 83, radio amateurs mourned a "pioneer". The Sunraysia Radio Group created the ’VK3ATN Technical Merit Award' in his honour.

Hello and welcome back to Contesting 101. Please send me your questions or comments, whether you are a newcomer or an old timer. I can be contacted via e-mail at k4ro@k4ro.net, or at my call book address.

September has arrived and I am working on antenna repairs and other station improvements. I hope your plans are proceeding on schedule.

**Competition - Winning, Losing and Playing the Game**

Many operators who enter the game of contesting do so in a very casual fashion. Our first few forays into contesting might only involve a few hours of operation, sandwiched between chores, work and family duties. Little attention is paid to overall score; the operation is simply for the sheer fun of making contacts. Such casual contest operation is the “meat and potatoes” of contesting. Without all of the casual operators on the air, contesters would run out of people to work in a hurry. The simple joy of “Can you hear me now? Yes, I can!” lures us in and the outside world with all of its responsibilities disappears while we are on the air.

After participating in a few contests, some operators may discover the joy of competition. It usually starts off in a subtle fashion. We might find that we placed higher than the guy across town with the better station. Maybe we received a certificate for 1st place in our section, state, or division. Perhaps a concentrated effort in a state QSO party resulted in a plaque or other nice award. After a few such achievements, a little light bulb goes off in our head which says “hey, I'm not too bad at this and it's fun to boot!” Some contesters might discover a fierce competitive streak within themselves which they did not even know existed. Competition is a peculiar phenomenon. What else could drive a person to sit in front of a radio for hours and hours on end to the point of utter exhaustion?

Contesting is ultimately a competitive game and therefore brings out all of the uniquely human behaviours associated with competition. Some of those behaviours are exemplary and some are, well, not so exemplary. The recent (this was written in 2008) Olympic Games documented several examples of true championship behaviour and a few bozos as well. Ultimately, each operator must decide for themselves what matters most to them. Winning a contest requires a lot of effort and the winners are to be respected for their dedication and skills. However, winning a major contest is not the only way to gain the respect of your fellow operators.

The mountain of contesting achievement is a tall one indeed. Like some other skill-oriented human endeavours, there is no top to the mountain. There are only views from different heights. When you see the same operators placing in the Top Ten in the same contests year after year, it usually represents decades of contest efforts, with dozens if not hundreds of forgettable losses throughout their contesting careers building up to that point.

**Is Contesting Fair?**

Ultimately it depends on how you look at it. From one perspective, it seems that only the largest stations in the best locations with the greatest operators have a chance of winning. While this may appear that the little pistol has no chance, it makes sense if you think about it. The big stations and top operators usually took a long time and a lot of work to get there and it should be very difficult to compete with them. While it’s true that the bar seemingly gets raised higher and higher every year, history has shown that operator skill is still the most important factor in the equation. Big stations could not win a single contest without great operators behind the radios. The bad news is that there is really no “level playing ground.” The good news is that those willing to maximize their advantages and skills can choose to compete at whatever levels they choose.

One of the bigger challenges facing the new competitor is understanding the playing field. Many new operators...
ops get discouraged before they have had a chance to understand how the folks at the top typically climbed and scratched their way up through many years of effort. I believe it was N5KO who said (paraphrasing) "new contesters can't understand or appreciate what the masters are doing or why." They do not know about the countless forgettable losing efforts that preceded the big wins. The new operator does not understand the amount of time and practice involved perfecting SO2R techniques or copying CW accurately at 40 - 50 WPM. I personally became very disillusioned with contesting several years ago, primarily due to my lack of understand the playing field. It took me a while to realize that I really enjoyed the operating and the competing immensely, regardless of the outcome. I learned to choose my battles carefully. I now have a better understanding of what is possible from my station. I am a lot less frustrated and less disappointed as a result. I have even found a contest or two that I can win from home. I have travelled for contest DXpeditions and tasted the thrill of world-class competing as a team. I am hooked on contesting for life now, but it took some real effort and a deeper understanding of the playing field to get over the hump of feeling like cannon fodder for the big guns.

Location Location Location

It is helpful to understand the impact of geographical location on a given contest operation. From the United States for example, the east coast enjoys better propagation to Europe and thus has a considerable advantage in DX contests over the rest of the US. The high bands open earlier and longer to Europe and the low band paths are shorter distances, over mostly salt water. In the Sweepstakes contests, the place to be is often somewhere between Louisiana and New Mexico – not necessarily the greatest locations for DX contesting. The point is that different regions experience different propagation and not all locations are created equal. There is a reason that DX contest world titles are often won from northern Africa or "3-point" countries in the Caribbean or on the equator. These areas offer terrific propagation paths to the major contesting population centres. That’s why top operators go to great lengths to build stations and compete from such areas.

You have Got to Play to Win!

One interesting aspect of contest operating is that the newcomer is essentially competing on the same playground as the Olympic level operators. So, what is a beginning competitor to do? The most important thing a new operator can do is operate a lot of contests and submit their log. One way to earn

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a little wall decoration for the shack is to choose a contest or category which has smaller hardware requirements than a major DX contest. Some of the state QSO parties offer great competition, without the need for a mega station in an exotic location. The big guns usually prefer to slug it out in the Single Operator High Power category of the major contests. SOHP is generally agreed upon as the ultimate proving ground of an operator, so we should expect very serious competition in that category. The Low Power, QRP and single band categories offer great competition as well, with a little more chance for the good operator at an efficient station to succeed. Study the results of previous year’s contests and see if there is a category that might be within reach. Operate the contest full-time, or as close as possible and send in your log. I have seen some contest categories won with fewer than 10 QSOs. It always pays to send in our logs, no matter what size the effort. Operating in the mobile, QRP or rover categories also offer a chance to compete and be recognized. The National Contest Journal NAQP and Sprint contests offer great competition and tend to emphasize operator ability over station hardware.

An excellent place to start competing is right in our own area. We can study the contest results and identify the operators who are doing well in our area. We can compare our scores with other similarly-equipped stations in our area. If they did better than us, we might want to try to find out why. Did they operate more hours than we did? Perhaps they chose different times to be on the air than we did? Perhaps their station is more effective on one or more bands, or they have better receiving antennas. Joining a contesting club can be very helpful when trying to measure our success. Seasoned operators from our own geographical area can enlighten us on local propagation patterns. The old timers can help us to understand the possibilities and help us form reasonable expectations. The advent of more regional reporting has helped a lot towards recognizing great efforts from less advantaged areas. Some contests also offer rookie categories, or categories for limited antennas such as the CQ WPX contests “Tri-bander and Single-element” category. Finally, do not forget the multi operator categories! Competing with multi op teams is a great way to experience the thrill of competition and learn some valuable skills at the same time.

**Is Competing Still “Fun?”**

For many of us, throwing everything that we have at something like a radio contest is beyond fun. It is a full-blown escape. It is a blood-pumping eye-bugging exhilarating and exhausting rush that lasts from the starting bell to the finish. While there are surely tough times of “grinding it out” in any full time effort, operating an entire contest can be a very gratifying experience. Competition can be incredibly fun, indeed.

**It Really Only Matters to You**

Winning is great and is certainly the goal of most top competitors. However, something even more valuable than winning is earning the respect of other contesters. There are ways of earning other contesters’ respect besides winning contests. Of prime importance is how we handle ourselves on the air. Efficient and accurate operating technique is the best way to earn the respect of top contesters. I personally respect the operators with very low error rates, regardless of their score. They are the ones I would want to handle my emergency traffic.

Ultimately, it comes down to finding satisfaction in the pursuit itself, regardless of the score. We get out of this game exactly what we put into it. I will close this instalment with some thoughts from two guys who have seen the view from the top more than once.

N6TJ wrote: “At the end of the day, only you will rejoice if you met any of your goals.” As my dear friend Ville OH2MM opined to me when we were together in Brazil at PTSA years ago, ‘Jim, only you will remember your Number One’s. Realize that, have fun and only take yourself seriously.’ Great thoughts to absorb from one of contesting’s top operators.”
Most of my operating at this point is portable - lunch time portable to be exact. So, I have tried a couple different portable QRP antennas, in my search for the best QRP antenna.

I started out with an end fed half wave - one wire cut for 40 metres and one wire cut for 20 metres. These fed into a small matching box that I built using a schematic I found online. The wire was either thrown up in a tree or attached to my 20 foot (6 m) collapsible fishing pole. This worked well, but was a pain to change bands, and I only had the two bands to work.

With the KX3 I wanted to be able to work all bands without switching a wire - tuned with the internal KX3 tuner.

Doing some web surfing I found the EARCHI End Fed plans on their club website http://www.earchi.org/92011endfedfiles/Endfed6_40.pdf. You can order the matching box assembled for a reasonable price - but I like to build, so I ordered the parts and built my own.

I put it in a small Radio Shack box. This setup uses a wire that is about 30' (9,144 m) long and can tune multiple bands. I have tuned 40 to 10 metres on my KX3 - I have not tried to tune any other bands.

Then I attached this box with some wire ties to a 31' (9,44 m) Jackite pole. The 30' wire is just some cheap speaker wire, again from Radio Shack.

I also wire tied on some clips that are used to secure PVC conduit to the Jackite, this allows me to store the 30' wire right on the pole for easy QRP portable operation.

I bungee tie the Jackite to a bollard, tie on the wire to the eyelet and extend the pole. Then I have about 15' (4,5 m) of coax that screws to the match box and I run it into my car window to my operating position in the driver’s seat. This portable QRP antenna takes about 2 minutes to put up - 3 if you get the wire tangled!

How well does it work? The only way I have to judge is that I have basically been able to work anyone that I can hear! And that is with just 5 watts CW. Plus, it is so nice to simply use the KX3 internal tuner and easily change bands.
The Parts List as per [http://www.earchi.org/92011endfedfiles/Endfed6_40.pdf](http://www.earchi.org/92011endfedfiles/Endfed6_40.pdf)

1 small plastic enclosure
1 powdered iron toroid T130-2
3 20” (508 mm) pieces of 18 AWG solid insulated copper wire in red, green, and black
2 # 8-32 x 3/4” hex head machine screws
2 # 8 lock washers
2 # 8 ring wire lugs
2 # 8 flat washers
2 # 8 lock washer/nut combination
2 # 8 wing nut
1 SO-239 panel mount connector to fit keyed enclosure opening
30’ (9,144 m) # 18 AWG insulated stranded wire antenna with ring lug attached
Small amount of clear silicone caulk to secure toroid in place

(Now where does one find a T130-2 in South Africa? Ed.)
Typical lunch time portable operating position

Lunch time portable QRP antenna deployed
For years it has been believed that electric bulbs emitted light. However, recent information from Bell Labs has proven otherwise. Electric bulbs do not emit light; they suck dark. Thus, they now call these bulbs dark suckers.

The dark sucker theory, according to a spokesman from the Labs, proves the existence of dark, that dark has mass heavier than that of light, and that dark is faster than light.

The basis of the dark sucker theory is that electric bulbs suck dark. Take for example the dark suckers in the room where you are. There is less dark right next to them than there is elsewhere. The larger the dark sucker, the greater its capacity to suck dark. Dark suckers in a parking lot have a much greater capacity than the ones in this room.

As with all things, dark suckers do not last forever. Once they are full of dark, they can no longer suck. This is proven by the black spot on a full dark sucker. A new candle has a white wick. You will notice that after the first use, the wick turns black, representing all the dark which has been sucked into it. If you hold a pencil next to the wick of an operating candle, the tip will turn black because it got in the path of the dark flowing into the candle. Unfortunately, these primitive dark suckers have a very limited range.

There are also portable dark suckers. The bulbs in these cannot handle all of the dark by themselves and must be aided by a dark storage unit. When the dark storage unit is full, it must be either emptied or replaced before the portable dark sucker can operate again.

Dark has mass. When dark goes into a dark sucker, friction from this mass generates heat. Thus, it is not wise to touch an operating dark sucker. Candles present a special problem, as the dark must travel in the solid wick instead of through glass. This generates a great amount of heat. Thus, it can be very dangerous to touch an operating candle.

Dark is also heavier than light. If you swim deeper and deeper, you notice it gets darker and darker. When you reach a depth of approximately fifty feet, you are in total darkness. This is because the heavier dark sinks to the bottom of the lake and the lighter light floats to the top.

The immense power of dark can be utilized to a man’s advantage. We can collect the dark that has settled to the bottom of lakes and push it through turbines, which generates electricity and helps push it to the ocean where it may be safely stored. Prior to turbines, it was much more difficult to get dark from rivers and lakes to the ocean. The Indians recognized this problem and tried to solve it. When on a river in a canoe traveling in the same direction as the flow of dark, they paddled slowly, so as not to stop the flow of dark, but when they travelled against the flow of dark, they paddled quickly so as to help push the dark along its way.

Finally, we must prove that dark is faster than light. If you stand in an illuminated room in front of a closed, dark closet, then slowly open the door, you would see the light slowly enter the closet, but since the dark is so fast, you would not be able to see the dark leave the closet.

In conclusion, Bell Labs stated that dark suckers make all our lives much easier. So, the next time you look at an electric light bulb, remember that it is indeed a dark sucker.

Members are welcome to contribute items of scientific interest to our readers. Send it to the Signs and Teknologi editor via radiozs@sarl.org.za
High-speed telegraphy (HST)
From Wikipedia, the free encyclopaedia and IARU Region 1

In amateur radio, high-speed telegraphy or HST is a form of Radiosport that challenges amateur radio operators to accurately receive and copy and in some competitions to send, Morse code transmissions sent at very high speeds. This event is most popular in Eastern Europe. The International Amateur Radio Union (IARU) sponsors most of the international competitions.

History
The first international high-speed telegraphy competition was the HST European Championship held in Moscow, Russia in 1983. Two more HST European Championships were held; one in 1989 in Hannover, Germany and another in 1991 in Neerpelt, Belgium. The first HST World Championship was held in Siófok, Hungary in 1995. A world championship has been held in every odd-numbered year since then.

Most international, national and local HST competitions are held in the countries of the former Eastern Bloc. Every world championship has been held in Europe. While many competitors are licensed amateur radio operators, there is no requirement that competitors have an amateur radio license and many pursue the sport without one.

Competition events
There are four main competitive events at HST meets. One standard event is the copying or sending of five-character groups of text. Two of the events are based on simulations of amateur radio activity and are referred to as the Radioamateur Practicing Tests (RPT). The RPT includes the copying of amateur radio call signs and a “pileup” competition, where competitors must distinguish between call signs sent during several simultaneous transmissions. Not all competitors are required to enter every competition and some competitors specialize in just one competitive event.

In the five-character groups event, random letters and numbers are sent in Morse code, five characters at a time, at a high speed. Separate competitions are held for the reception of just the twenty-six letters of the Latin alphabet, just the ten Arabic numerals, or a mixed content of letters, numbers and some punctuation symbols. Competitors may choose to record the text by hand on paper or by typing on a computer keyboard. The competition starts with one minute of transmission sent at an initial speed defined for the entry category (usually 50 letters per minute for juniors and 80 letters per minute for the other age categories). After each test, the copy of the competitors is judged for errors. Subsequent tests are each conducted at an increased speed until no competitor remains who can copy the text without excessive error.

In addition to reception tests, some competitions feature transmission tests where competitors must try to send five-character groups in Morse code as fast as possible. Competitors send a printed message of five-character groups at a specific speed, which is judged for its accuracy by a panel of referees. Like the receiving tests, there

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are separate competitions for sending five-character groups of just the twenty-six letter of the Latin alphabet, just the ten Arabic numerals, or a mixed content of letters, numbers and some punctuation symbols. Most transmission tests restrict the type of equipment that may be used to send the Morse code message.

The Amateur Radio Call Sign Receiving Test use a software program called RufzXP that generates a score for each competitor. Rufz is the abbreviation of the German word "Rufzeichen-Hören" which means "Listening of Call Signs". In the RufzXP program, competitors listen to an amateur radio call sign sent in Morse code and must enter that callsign with the computer keyboard. If the competitor types in the call sign correctly, their score improves and the speed at which the program sends subsequent call signs increases. If the competitor types in the call sign incorrectly, the score is penalized and the speed decreases. Only one call sign is sent at a time and the event continues for a fixed number of call signs (usually 50). Competitors can choose the initial speed at which the program sends the Morse code and the winner is the competitor with the highest generated score.

The Pileup Trainer Test simulates a "pileup" situation in on-air amateur radio operating where numerous stations are attempting to establish two-way contact with one particular station at the same time. This competition uses a software program called MorseRunner. In the MorseRunner software, more than one amateur radio call sign is sent at a time. Each call sign is sent in Morse code generated at different audio frequencies and speeds, timed to overlap each other. Competitors must record as many of the call signs as they can during a fixed period of time. They may choose to do this either by recording the call signs by hand on paper, or by typing them in with a computer keyboard. The winner is the competitor with the most correctly recorded call signs.

The rules of international and European championships are defined in the document IARU Region 1 Rules for High Speed Telegraphy Championships. https://www.iaru-r1.org/index.php/hst/hst-rules

**HST Championship Introduction**

HST at its basic is a competition where competitors are trying to transmit and receive the symbols of Morse code at the highest speed possible during a given period of time, usually 1 minute. During the official HST championships, competitors take part in 4 official tests:

a. **Receiving of Morse code signals**

   Competitors are receiving texts comprised of 26 Latin letters in the following format ZGAIB QNEST xxxxx xxxx. Each text last one minute. A maximum of 5 errors is allowed at each test. The lowest speed is 50 marks/min. Each competitor is allowed to choose up to 10 speeds at which he will attempt reception. Three texts can be submitted for check. The best one will be taken as the competitor’s entry.

   10 figures (0 – 9) with the following format 46390 64352 xxxx xxxx. Each text last one minute. A maximum of 5 errors is allowed at each test. The lowest speed is 50 marks/min. Each competitor is allowed to choose up to 10 speeds at which he will attempt reception. Three texts can be submitted for check. The best one will be taken as the competitor’s entry.

   26 Latin letters and 10 figures (0 – 9) and 5 punctuation signs (., ? / =) with the following format A1?=E 79./E xxxx xxxx. Each text last one minute. A maximum of 5 errors is allowed at each test. The lowest speed is 50 marks/min. Each competitor is allowed to choose up to 10 speeds at which he will attempt reception. Three texts can be submitted for check. The best one will be taken as the competitor’s entry.

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b. Transmitting of Morse code signals

Competitors are transmitting texts comprised of 26 Latin letters in the following format ZGAIB QNEST xxxxx xxxx. Each text last one minute. A maximum of 3 errors is allowed at each test. Each competitor is trying to transmit each text with the highest speed possible with the lowest number of errors.

10 figures (0 – 9) with the following format 46390 64352 xxxx xxxx. Each text last one minute. A maximum of 3 errors is allowed at each test. Each competitor is trying to transmit each text with the highest speed possible with the lowest number of errors.

26 Latin letters + 10 figures (0 – 9) + 5 punctuation signs (. , ? / =) with the following format A1? =E 79./E xxxx xxxx. Each text last one minute. A maximum of 3 errors is allowed at each test. Each competitor is trying to transmit each text with the highest speed possible with the lowest number of errors.

c. RUFZ

Competitors receive 50 real amateur radio call signs. Two attempts are allowed. Competitor choose the initial speed of the first call sign. If received 100% correctly, the next sign will be transmitted at an increased speed. If received with error, the next sign will be transmitted at a lower speed. The higher the speed, so more points are gained.

d. Morse runner

This test is a simulation of real pile-up situation. Each test last 10 minutes. Two attempts are allowed. Pile-up is consisted of 4 calls at a time. The competitor chooses the speed of operation. As more contact are made, so the score rises.

Entry categories

HST competitions generally separate the competitors into different categories based on age and gender. The following are the entry categories specified in the IARU rules used for European and World Championships - (A) Women aged 16 years and younger; (B) Men aged 16 years and younger; (C) Women aged 17 to 21 years old; (D) Men aged 17 to 21 years old; (E) Women, regardless of their age; (F) Men, regardless of their age; (G) Women aged 40 years and older; (H) Men aged 40 to 49 years old; (I) Men aged 50 years and older.

Note that there is an additional male category, which is justified by the high number of participants in the corresponding age group. A maximum of 18 competitors from those 9 categories can take part as a national team.

HST championships

16th World HST Championship took place in Albena, Bulgaria from 13 – 17 September 2019
15th World HST Championship took place in Astana, Kazakhstan from 25 – 29 August 2018
14th World HST Championship took place in Esztergom, Hungary from 08 – 12 September 2017
13th World HST Championship took place in Igalo, Montenegro from 21 – 25 September 2016
12th World HST Championship took place in Ohrid, Macedonia from 9 – 13 September 2015
5th IARU Region 1 Championship took place in Bar, Montenegro from 12 – 16 September 2014
11th World HST Championship took place in Borovets, Bulgaria from 22 – 26 September 2013

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10th World HST Championship took place in Beatenberg, Switzerland from 17 – 21 October 2012
9th World HST Championship took place in Bielefeld, Germany from 19 – 23 October 2011
4th IARU Region 1 Championship took place in Skierniewice, Poland from 5 – 9 October 2010
8th World HST Championship took place in Obzor, Bulgaria from 11 – 15 September 2009
3rd IARU Region 1 Championship took place in Pordenone, Italy from 23 – 27 April 2008
7th World HST Championship took place in Belgrade, Serbia from 19 – 23 September 2007
2nd IARU Region 1 Championship took place in Primorsko, Bulgaria from 20 – 24 September 2006
6th World HST Championship took place in Ohrid, Macedonia from 13 – 17 June 2005
1st IARU Region 1 HST Championship took place in Nis, Serbia from 15 – 19 September 2004
5th IARU World HST Championship took place in Minsk, Belarus from 4 – 8 May 2003
4th IARU World HST Championship took place in Constanta, Romania from 6 – 10 June 2001
3rd IARU World HST Championship took place in Pordenone, Italy from 28 April – 2 May 1999
2nd IARU World HST Championship took in Sofia, Bulgaria from from 6 – 10 October 1997
1st IARU World HST Championship took place in Siofok, Hungary from 18 – 22 October 1995

IARU world records

The IARU Region 1 HST working group maintains a list of HST world records, set at official IARU HST competitions. Top speeds vary strongly between the different events of the competition and categories. While reception and transmission of letter groups are limited to approximately 300 characters per minute, mainly due to physiologic difficulties in sending or writing at high speeds respectively, the maximum speeds in the RufzXP competition are more than twice as fast.

Note that the system to measure the telegraphy speed at IARU HST events has changed. Before 2004, the PARIS standard was used, which has since been changed to real characters. Old records have been recalculated accordingly.

Official HST World Records as at 14 October 2019

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Transmitting Tests: Females

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<td>Letters</td>
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<td>Morse Runner</td>
<td>Alexandru Mancas</td>
<td>YO8TTT</td>
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<td>Teodora Getsova</td>
<td>LZ2CWW</td>
<td>252 082</td>
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<td>Morse Runner</td>
<td>Anna Sadoukova</td>
<td>RA4FVL</td>
<td>4 686</td>
<td>Bielefeld</td>
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External links

- JARU Region 1 HST Working Group
- RufzXP Software by DL4MM and IV3XYM
- NØHR.com: RufzXP and stats Using statistics to track CW speed improvement in RufzXP
- MorseRunner Software by VE3NEA
- PED software by JE3MAS (PED was used in official competitions until 2005, now replaced by MorseRunner)

References

- Kutner, Barry W2UP. "High Speed Telegraphy Competition in Macedonia". QST. 2005.
- Lindquist, Rick N1RL. "World Championship in High Speed Telegraphy Set." QST. Apr. 1997, p. 75.
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