Build A Double Bazooka Antenna

Stealth Amateur Radio

A Simple Fixed Antenna for VHF/UHF Satellite Work

“Amateur Radio - a Gateway to Science”
On the Cover

The RaDAR station - 1ENW - run by Eddie, ZS6BNE, during the first leg of the SARL National Field Day. (Photo provided by Eddie.)

Op die Voorblad

Die RaDAR stasie - 1ENW - bedien deur Eddie, ZS6BNE, tydens die eerste skof van die SARL Nasionale Velddag. (Foto verskaf deur Eddie.)

Deadline for articles

Contributions for the next issue must reach the editor on or before the last week of the month before publication. Closing dates are:
April 2017 – 27 March 2017
May 2017 – 24 April 2017
June 2017 – 25 May 2017
July 2017 – 26 June 2017
August 2017 – 25 July 2017
September 2017 – 24 August 2017
October 2017 – 25 September 2017
November 2017 – 24 October 2017
December 2017 – 23 November 2017

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South African Radio League
Suid-Afrikaanse Radioliga

Founded 20 May 1925 / Gestig 20 Mei 1925

The National Body for Amateur Radio in South Africa
Member Society of the International Amateur Radio Union, Region 1

Die Nasionale Liggaam vir Amateurradio in Suid-Afrika
Ledevereniging van die Internasionale Amateurradio-union, Streek 1
Radio ZS: Letter to the Editor

Hi Dennis

In the February 2017 edition of Radio ZS, the review on page 16 of Ted Hart's book "The Poynting Vector Antenna" rang alarm bells to me and I copied it to OM Brian Austin, GO8GF (ex ZS6BKW). His response did not surprise me and he suggested I write to the editor.

Although I don’t mind the publishing of new and controversial ideas, Brian pointed out that new a new Radio Amateur could be mislead and waste his money when it appears that Radio ZS endorses the book. Not only wasting his money on the book, but wasting his money trying to implement what it claims.

Perhaps it would be a good idea to publish something on the counter argument in the next Radio ZS.

For one thing, while the Chu-limit has never been proved (to my knowledge), neither has anyone succeeded in disproving it. Ever. Claims to have done so invariable involve dubious experimental methods and/or dubious mathematics. Attempts to revise Maxwell’s equations as Hart purports to do in Chapter 20 (Maxwell’s Equations under Revision) is a typical example of dubious mathematics. Radiation from feed lines is an example of dubious experimental methods used to provide "evidence" for dubious claims.

Perhaps a reference to the 'Small Antenna Handbook' of Bob Hansen and Bob Collin (Wiley, 2011) would be in order. Brian sent me a copy of a page from the chapter on "Pathological Antennas" and you will find it attached. The word "pathological" sums it up very well to me.

To counter the idea that Radio ZS endorses the book, it might also be in order to publish this on the SARL Forum, sooner rather than later, perhaps as part of the Radio ZS announcement, because by the time it can be published next month a number of people may have been parted with their money, having ordered it already.

73, Vincent Harrison, ZS6BTY

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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 die die mòre ontvou,
Eer hul herinnering – ons sal onthou.”

Eric Winter, ZS1EMC
Peter Lunow, ZR2PEL
Untangling coax cable with the Editor

Reading Southgate News the other day, I found the item ‘New Entry Level License for USA?’ It also appeared in the ARRL Newsletter.

The ARRL is seeking opinions concerning a possible new entry-level license. They say, “An Entry Level License Committee was established by the ARRL Board of Directors and appointed in September 2016. As part of its ongoing work, the committee is gathering member input and will make recommendations to the Board for possible rules changes to submit to the FCC.

The result could mean changes to the Technician license, but it could also be an additional, but simpler, license with privileges that would give a newcomer a taste of most facets of amateur radio from HF to VHF and UHF.

The committee has created an online member survey. Please complete and submit the survey no later than April 7, 2017. Survey results will be published on www.arrl.org/license.


Currently the lowest level US license is the Technician, which regarded as equivalent to UK and Australian Foundation. Technician requires a weekend training course to pass and permits 200 watts output on four HF bands and 1 500 watts output on all bands above 50 MHz.

South Africa’s entry-level license is called the Novice Licence and a ZU call sign is issued to successful candidate. South Africa is the ONLY country in the world to have an age restriction on its entry-level licence! This has been confirmed by enquiries to Member Societies in IARU Region 1, 2 and 3. And if you go and look at the above proposal, you will see there is nothing about age in the document.

At age 25, the Regulator is saying to the Novice licence holder “we are taking away your competency/qualification as a radio amateur.” I feel that is wrong!

There should be no age restriction on any licence class - I can agree to a time limit of holding a Novice licence before upgrading to the next level.

National Field Day

I have received a suggestion about the National Field Day pertaining to the start and ending times of the contest.

The suggesting made is that NFD starts at 16:00 UTC (18:00 CAT) on the Friday afternoon and ends at 16:00 UTC on the Saturday afternoon. The change in timings will provide different propagation conditions and better use of the lower bands for local contacts. Many Clubs and individuals go out camping for the weekend and starting on a Friday makes better sense.

Sunday mornings the 40 metre band is full of Club stations broadcasting their bulletins and now you have ZS4BFN operating NFD from Maselspoort trying to get some more QSOs, but at the same time ZS4BFN is broadcasting or relaying a news bulletin from Bloemfontein!

One of the soapbox comments about NFD - “Highlights of the event for me were working ZS2/GJ7LJJ, V51PJ, ZS4DZ on 80 m and an effortless contact with ZS4BS/5, all running QRP.

Lowlights were the number of 1F stations that couldn’t pick my signal out of the ambient RFI noise at their QTH’s..... about 6 or 7 contacts with 1F and Class A QRO stations couldn’t be logged because I couldn’t or wouldn’t be heard.”

SARL Hamnet 40 meter Contest

On Sunday 5 March, the annual SARL Hamnet 40 meter contest is on the air. I challenge you to get out of the house and set up a field station in the local park in your suburb or on the side walk in front of your house or as last resort in your garden! Go on, try it. I have done all three and it is great fun - to hell with what the neighbours think! Get the Hamnet members in the Club involved and taking part - wear your Hamnet jacket!

Get on the air!

Portable station of Eddie, ZS6BNE
Radio ZS Maart 2017

SARL Regulatory Workgroup

League President, Nico van Rensburg, ZS6QL, and Hans van de Groenendaal, ZS6AKV, the chairman of the SRWG, presented the South African Radio League position on the Draft Frequency Plan at the Independent Communications Authority of South Africa (ICASA) public hearing on Thursday 9 February. There are a number of issues in the draft plan that the League was unhappy about, including cutting back the 160 metre band to only 40 kHz and issues around the 5 MHz band.

During question time, ICASA requested the League to provide additional motivation to support the League’s request to make a 100 kHz allocation available to radio amateurs from 5 350 - 5 450 kHz. The 100 kHz allocation was the African bloc position at WRC-15 in Geneva in November 2015. South Africa was the proposer to the South African Development Community and ultimately to the African Telecommunication Union (ATU) for the support of this position when the Agenda item was discussed at WRC-15. The League will submit additional documents in time for the 17 February deadline.

The League submission to ICASA is available on the League’s web site under the ICASA heading. It is expected that ICASA will finalise the frequency plan to meet the 31 March deadline.

Should radio amateurs be concerned about the increasing RF noise floor?

This question was discussed at the first Skype meeting for 2017 of the SARL Regulatory Workgroup also known as the SRWG. The workgroup believe that the RF noise floor is of interest to probably all radio amateurs, as many operate at low signal-to-noise ratios. Many amateurs will be aware of rising RF noise levels in recent years from nearby sources of noise. It is a complex issue that includes many facets such as noise generated by geyser controllers, LED, CFL and neon lights, power supplies and many other devices and systems. The SWRG is planning to write a number of tutorials on the subject and to engage the SABS Technical Committee, TC73 EMC group, who meet this week, to make it an emerging concern that requires urgent attention.

The League is also planning to host a workshop at the National Amateur Radio Centre to develop a detailed plan of action. This will be an open meeting. Details will be published as soon as the date has been finalised.

https://en.wikipedia.org/wiki/Noise_floor

Advertising in Radio ZS and on the SARL web site

Radio ZS welcomes advertising. It is a source of information for readers. To place a strip advertisement in Radio ZS, contact the Editor at radiozsl@srw.org.za. To advertise on the League web site, contact Hans, ZS6AKV at artoday@srw.org.za.

Terms and conditions

All contract advertisements content may be changed monthly on 5 working day notice

The rates are based on the complete supply of material in Jpeg unless otherwise negotiated. For artwork additional charges may apply as agreed

The content of the advertisements must comply with regulations and norms acceptable in South Africa

All advertisements are payable in advance by EFT to SA Radio League, ABSA, account no 4071 588 849 branch code 632 005.

All correspondence and material must be sent to admin@srw.org.za with a copy to artoday@srw.org.za for web adverts or radiozsl@srw.org.za for strip adverts.

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Radio ZS Maart 2017
I recently saw someone looking for a Winkeyer on Swop Shop and this triggered my curiosity so I went looking for it using Google. I then came across the K3NG keyer, which uses an Arduino board and having an Arduino Uno available, I downloaded the code and programmed the Uno and it worked!

Now this is not something that happens all the time. My experience is that many people publish Arduino code on the Internet, but many of those programs have a problem of one kind or another. One of the problems is that because the Arduino system is open source, it is forever being updated and some of the newer versions do not work with code that was written using older versions. I now have several versions in my Downloads folder and it takes only a minute to uninstall one version and replace it with another. I also type into the program which version works with that particular program.

K3NG really went to town when he wrote the code for the K3NG keyer. I found that you need to use an Arduino Atmega2560 if you wanted to implement most of the important features. The UNO was just a little too small. Someone familiar with Arduino code can probably make it work on a Uno. However, the cost of the Atmega2560 on eBay is quite reasonable; you can get them for about R100.

I offered to build a shield for the K3NG keyer and the person looking for a keyer was happy to test it. At the time of writing, the keyer was in the mail to him.

You can have a look at K3NG’s website at https://blog.radioartisan.com/arduino-cw-keyer/

What you find is a more or less complete manual for the use of the keyer and a reference to Github where you can download the program in a ZIP file. K3NG’s website is one of the better ones I have visited and his code worked first time.

The keyer connects to your CW connector on your HF radio via optocouplers to isolate the keyer from the radio. There is a connector for a paddle key on the keyer, another for a keyboard with a PS2 connector and of course, the Atmaga2560 has a USB port so you can connect it to your computer as well. This is the most convenient way to program memories, set speed and so on.

The PS2 keyboard is also a pleasure to use with many keys having a function. You can change speed by using the Up/Down keys for instance.

All that remains is for me to show you what my shield looks like. Anyone who needs more help can e-mail me and I can send a more detailed document, which helps you to set up the Arduino system and load the K3NG program.

The shield plugged into the Atmega2560

The shield layout done on Sprint-Layout 6.0, size 69 by 96 mm.
Keeping New Radio Amateurs
Southgate News

A question asked at Club level (I hope), it is debated at League Council level and it will be discussed at the IARU Region 1 General Conference in Landshut, Germany in September 2017.

We have people studying for and writing the RAE, after getting their results and call signs, the majority disappear! What can we do to retain these radio amateurs? The Camb-Hams and the Cambridge University Wireless Society share some ideas. I would love to hear what your Club is doing about retaining the new radio amateurs - send what you are doing to radiozs@sarl.org.za.

Dom, M0BLF, of Camb-Hams and the Cambridge University Wireless Society (CUWS) [not to be confused with the Cambridge University Wine Society! Ed.] suggests a few ways to keep new radio amateurs once they are licenced.

After the candidate has got their licence, most of the CUWS 'responsibility' ends (except, of course, for students who get to use our shack). CUWS organises two or three lectures per year which are open to the public (recent topics have included APRS, GSM testing and DXpedition talks) but we do not believe talks are that motivating.

I wrote about the Camb-Hams in the April (or possibly May) RadCom. It is officially the 'social side' of Cambridgeshire Repeater Group, but operates fairly autonomously. The main Camb-Hams events are the monthly 'Pye and Pints' (CRG originated as Pye Radios' Radio Club) held in a local pub. This is a social event. There are no formal talks about radio, just a group of like-minded people chatting over pub food and a couple drinks. Pye and Pint meetings typically attract 30 to 40 people from an increasingly large area now that word is spreading out of the immediate area.

Crucially, the Camb-Hams have no committee, no finances (so no subscription) and any amateur who wants to call him/herself a 'Camb-Ham' is automatically a member. This means that the local politics, which blights so many radio clubs, cannot happen. If we could do one thing to keep more new licensees nationally, I think that having more local clubs adopt this model would be a great start. The Camb-Hams also organise contest entries (with no committee, this means that people just get on and do the organisation themselves). We are very active in the UKAC contests, from a number of locations across the area. We have found these a particularly useful vehicle and the phrase 'activity breeds activity' has been very pertinent. Even the most die-hard anti-contest local operators have started to come on Tuesday evenings to help contribute to the Camb-Hams score. Similarly, we have found the AFS Super-League very useful for demonstrating different aspects of amateur radio with the fact that a range of skills (VHF Contesting, HF Contesting and CW) is required. With the scoring model only counting the scores of the 'top' stations for each club, new licensees do not feel they are harming the entry by just having a play and getting their feet wet.

Once we have whetted their appetite, the Camb-Hams entries in field days and the CUWS entries in CQ WW are open to anyone who wants to take their skills further. We had fourteen operators in CQ WW this year, nine of whom were under 30 and three of whom had M3/M6 calls. Personally, the range of activities available has been very instructive even for me - until this year I would never have taken 23 cm contesting seriously, but the UKACs have let me try it out.

There are also numerous opportunities each year for going on DXpeditions, whether with CUWS or the Camb-Hams. We tend to find that a number of younger operators often regard DXpeditions as an excuse to travel, rather than the radio being the primary interest. (I would probably include myself in this category, in fact.) That is fine - the radio can come later.

We also have a very active RAYNET group, with monthly training evenings, typically assisting at 12 to 15 public events per year. We do not tend to use these as a recruiting opportunity directly (we would normally be far too busy with the actual event to talk to the general public about the hobby) but it is another avenue that new licensees are encouraged to investigate and of course we are exposing the hobby to the local user services (St John Ambulance, et al.), some of whom express more interest.

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interest in how our skills can assist their role.

I hope that the picture I am painting is one where there are lots of opportunities for new amateurs, served by a number of complementary (but not competing) local groups. This is probably partly achieved by having a number of very (excessively?!) enthusiastic people who are involved in all of the different clubs, but who strive to keep their roles distinct. It is time consuming but this model helps us not to cause confusion.

A new amateur might be attracted via Cambridge 105 or through direct contact with us, takes their license through CUWS, becomes involved in local activities through the Camb-Hams, is encouraged to become active weekly through the UKACs, with the promise of DXpeditions if they are keen and/or Raynet operation if they are publicly spirited. If someone interested in getting a licence approaches the Camb-Hams or Raynet or the RSGB DRM, they are immediately referred to CUWS. This ensures that groups concentrate on doing what they are best set-up to do.

Obviously we are lucky in having a number of very energetic amateurs (of whom I am but one) who are happy to devote almost every evening of the week to the hobby, wearing multiple hats, but I would hope that other parts of the country might be able to learn from our experiences... and we're still evolving the way we work too, of course!

Radio ZS Awards

The Gary Immelman RA Heritage Award Floating Trophy

Awarded by the SARL Council for the best article of a historic nature describing an event that occurred more than five years previously or an interesting personality that has played an important part in the development of Amateur Radio in years gone by. Donated by Gary Immelmann in 1993.

The JJ Pienaar Trophy

Awarded by the Editor of Radio ZS for the best article published in Radio ZS during the past year.

The Radio ZS Shield

Awarded by the Editor of Radio ZS to a South African Radio League affiliated Club or member who best supported Radio ZS during the year. Donated by the Port Elizabeth Branch in 1966.

St Patricks Day 2017 On Air

The worldwide St Patricks Day celebrations are nearly upon us. Once again it is hoped to turn the bands green as part of the St Patrick Award on the 17 and 18 March.

Whether as an official station or a chaser why not join the celebrations and go green. For more information go to http://stpatrickaward.webs.com/
Participation in the SARL HF Field Day by the East Rand Radio Club was organised by Theo Wessels, ZS6JFW, Tommie Mostert, ZS6THM, and Bianca Wessels, ZS6BWZ. The event took place on the farm Witkop about 35 kilometres from Nigel in the direction of Devon. A word of thanks to Theo’s parents and their son Danie for the hospitality afforded to the participants to the event on their farm. The participants were Tommie, ZS6THM, Theo, ZS6JFW, Bianca, ZS6BWZ, Connel, ZS6CNP, and Michael Stokes, ZS6AI from KARTS. Thanks Mike to all the knowledge and words of advice from you.

The Competition started midday Saturday and ended midday Sunday by UTC timings. The Club was running a Windom antenna erected on Mike’s mast and a 20/40 Inverted Vee on a John Deere tractor. Have a look at www.facebook.com/shanebaileyza/videos/1219461118123345/

The rules of the competition you need to run off solar, battery or generator. You are given a code denoting how many radios you are running and what type of operation field or base and then see how many calls you can log. We logged about 85 calls. On making a contact, you exchange call signs and code. The radios used were a Yaesu FT-707 and a Kenwood TS-480, both running about a hundred watts.

As usual, there were times when bands played the game and other times it was very noisy. We

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stopped at about 8 pm, had a braai and were back on the job till about 12. An interesting call was into Namibia and St Helena. We could hear the Americans and Russian but they could not hear us and we also stumbled into a CQ CQ competition being held by the Americans. All in all protocol was upheld by most concerned with little aggro.

In the morning, we got points from Willem, ZS6WIM, Pieter, ZS6XT, Judy, ZS6JDY and Francois, ZS6COI. Francois and Judy paid us a visit on Sunday morning and stayed for an hour.

The bands went quiet until 11:30 and then there was a mad rush until 12 o clock. Two calls on 40 meter mobile came pumping in from Bloemfontein. I am sure the wind was blowing the correct way so it brought the HF to our site. All in all a great weekend was held by all.

From bike ride in Italy to battleship in Hawaii

The Waxahachie Daily Light reports on the activities of members of the Ellis County Amateur Radio Club (ECARC).

During a recent meeting, David Shuford and Jim Hasse presented Ellis County Amateur Radio Club (ECARC) President Robert Crosby and members with a cheque for $2 000 for their participation in the Tour d'Italia bike rally on 18 June 2016. Shuford thanked the members for their roles in providing communications and as SAGS (support and gear). SAGs drive around in front of, or behind, groups of bike riders making sure they remain safe. Should they decide they cannot make it any further, SAGs are the ones who pick the rider up and bring them back to the start-finish line. The next Tour d'Italia bike rally is set for 17 June 2017.

In other news, club members Leo, KW5P, and Sharon, K5SMW, were in Honolulu, Hawaii at the end of January. While there, they met with members of the Battleship Missouri Radio Club and were able to work the radio in the original radio room of the USS Missouri in Pearl Harbour as guest operators. "CQ CQ CQ This is King Henry 6 Bravo Bravo KH6BB calling from the USS Battleship Missouri in Pearl Harbour calling any station anywhere," they called.

Thys, ZS1TBP, and I spoke on 5,260 MHz on 31 January 2017 over a distance in excess of 500 km. The QSO lasted some 5 hours with breaks in between.

Thys was mobile, as he usually is, in his truck and he departed from Hanover in the Northern Cape (Grid KF28fw) at 05:00 UTC headed for Jeffreys Bay. His route was the N10 via Middelburg, Cradock, Cookhouse and then on to Port Elizabeth.

We decided seeing that the "band" was cooking that we would see just how far we could get communications. The frequency was quiet with noise level of about an S3.

In his mobile radio shack, Thys uses a Kenwood TK80 running 80 w into a LDG AL100 Autotuner and his long wire (23 m of copper) is laid on top of the load.

I use a Kenwood TRC 70 running 150 w into an inverted Vee half wave Dipole 11 m up the tower with legs due west and east.

I was worried that I would lose Thys as he got inside the skip distance and went over Carlton Heights (1 630 m ASL) located about 15 km south of Noupoort. However to both our surprise, no drop in signals. I kept notes of highlights and the journey was as follows.

Hanover (Grid KF28fw) 05:00 UTC signals 59
N10 junction south of Carlton Heights (Grid KF28lq) 06:00 UTC signals 59
Middelburg (Grid KF28mm) 06:30 UTC signals 57
Cradock (Grid KF27tu) 07:16 UTC signals 57
Rietrivier (Grid KF27vn) 07:57 UTC signals 58
Daggaboersnek (Grid KF27wl) 08:09 UTC signals 58

Just short of Middelburg, we were joined by Thani, ZS4AZ, operating from his home in Ladybrand, who blasted me away with a 59 +40 signal and Thys received him at just under a 58.

As Thys approached Cradock, Cobus, ZS1DJR, from Saldhana Bay joined us. I could get Cobus from my home at 49, but amazingly, Thys received Cobus at an excellent 52, bearing in mind the distance.

I spoke to Andrew, ZS1SBM, who was mobile between Cape Town as Mossel Bay a few days later and he confirmed that he had been following the conversations most of the morning.

So who says the bands are dead? It is just a case of making notes as to propagation trends on a daily basis and using the information accordingly.
The dipole antenna is said by many to be the perfect antenna for a specific frequency. For the most part, this is true. If you want to use a dipole for a band of frequencies, you cut it to the centre frequency on that band, and hope it has a low enough SWR at each end of the band. A dipole is very simple to build. It is two long wires, each cut to ¼ wave of the frequency. One wire is connected to the centre conductor of the coaxial feed line, and the other wire is connected to the shield of the coaxial feed line.

Dipoles are usually strung up horizontally so it beams the signal in two horizontal directions. Therefore, it is important to have the antenna facing in the two directions you most want to transmit in. The signal emits off the long sides. The signals emitting off the ends of the dipole are greatly reduced.

A dipole can also be strung up in an "Inverted Vee" configuration. This means the centre of the dipole is mounted on a mast or tower several feet up, and each side of the antenna from the centre are angled downward on a 45-degree angle (give or take a few degrees). It looks like an upside-down (Inverted) letter "V." Hence the term Inverted Vee.

An inverted Vee is still somewhat directional in the same two horizontal directions, but it now has more of an omnidirectional pattern. This is due to the wires being sloped downward on each side. The signal can now radiate off the wire in partly a vertical, and partly a horizontal polarization. It actually works better in more directions with stations using both vertical and horizontal antennas.

Dipoles have a narrow bandwidth due to the simple 2-wire design. There are no loading coils and no DC ground. They are also subject to noise and static. There is a way to help both the bandwidth and static problems. It is not a cure for those problems, but it really helps.

It is Called a "Double Bazooka"

The Double Bazooka is a unique design alternative to a dipole. It is made of coax cable, instead of a single strand of copper wire. The braided copper shield of the coax is the actual RF radiator, and the centre conductor acts like a balun or matching transformer to provide a DC ground. The larger diameter of the shield-braid acting as the actual elements, gives the Bazooka a wider bandwidth, and reduced noise over the old wire dipole. Therefore, it covers a wider range of frequencies on each band with lower SWR. As with the dipole, the feed line can be either 50 ohm coax or 400 ohm ladder line. Every comparison has shown the Bazooka to outperform a standard dipole. Now I am going to show you just how simple this antenna is to build.

The Double Bazooka is a very popular antenna. However, the following design is my slightly modified version from the original. The main difference is in the tails. The original uses an added piece of twin lead or solid copper wire. My version uses an extended unshielded portion of the centre conductor for added strength and easier SWR tuning.

First, Some Important Notes before You Begin

Before we get into the instructions, it is very important that all measurements are checked and checked again to be sure that everything is correct. I cannot stress this fact strong enough. Too many guys make a quick measurement and starting cutting and soldering. Then the antenna does not perform correctly. The reason is they made a big mistake in the measurements.

If the length of the main covered section on one side of the feed point is longer or shorter than the same section on the opposite side of the feed point, the antenna will not perform at its best. You will not be able to get a low SWR and the broad banding will be poor. So be extra careful to make sure that the main covered elements on each side of the centre feed point are exactly the same. This is a crucial point to making the Bazooka live up to (Continued on page 14)
Refer to the Table above for the length of L2/2
Also Very Very Very Important To Know

Do NOT use any coax that has a foil shield wrapping. It will work, but the Bazooka was designed to work best with a leaky type of coax. A foil shield wrap will defeat this concept and the antenna will not perform as well.

Another thing about foil shield coax is the centre feed point. The instructions for the Bazooka will describe how to separate the shield wire in the centre to make two separate elements. The foil shield is also part of the braided shield line. The foil shield must also be cut and removed in the centre. If this is not done, the two main elements will be directly shorted at the feed point.

Do not use thin RG-58 coax. It will not be any better than a basic 2-wire dipole. The severe thinness of the braided shield of RG-58 will allow the Bazooka to perform no better than a basic straight wire dipole.

In addition, DO NOT worry about the Velocity Factor of the coax you use to build this antenna. It does not matter and will have no effect on the length calculating formulae. Check out this article about Velocity Factors of coax: www.k3dav.com/velocityfactor.htm

50 vs 75 Ohm Coax

The Bazooka was originally designed to work with a 50 ohm coax that is a little leaky, and a foil wrap defeats that idea. The two most popular coax types are typical RG-8 or RG-8X (Mini). The RG-8 is the best for this design. RG-8 is a larger diameter radiator, which makes the antenna a little more broad banded. However, the RG-8X (Mini) is a good second choice but slightly less broad banded.

If you decide you want to use a 75 ohm type of coax to build your Bazooka, just consider these facts before you make the decision. 75 ohm coax will not make the Bazooka perform better. Using the low grade 75 ohm, RG-59 coax will not perform as well as a basic wire dipole. In fact, the wire dipole will work better. A 75 ohm RG-11 type coax will work fairly well as long as it is the type that does NOT have a foil shield wrapped around the centre wire.

(Fig. 1) K3DAV Double Bazooka Antenna

Fig. 1 shows the completed antenna. First, you need to figure out the length of coax you need to make the Double Bazooka. There are simple formulas to figure out each section length. The formula we are going to use will work with any frequency band. For our example, we will use 40 metres to show how the formula works.
How Long To Make The Bazooka?
For the full length of the antenna, enter the following formula into a calculator. The average centre frequency of 40 metres is 7,100 MHz, so this is the frequency we will stick with to build our 40 metre Bazooka.

The simple formula is $460 \div 7,100 = 64,788732$. This is roughly 64 feet 9 inches or 20.07 metres. It is always best to cut the antenna longer than you actually need. So cut the coax length at 21 metres. You can always cut off what you do not need later to match the SWR.

Now you have the total length of the antenna. Next, measure exactly half of the entire length to find the very centre of the antenna and mark it with a small wrap of electrical tape. This will be important for building the rest of this antenna.

Measuring for the main element
Next you need to calculate the amount of the wire that will retain the shielding and how much will not retain the shielding for the tails. In Fig 1 above, you see the black part of the antenna that represents the radiating element. This part has to be calculated exactly.

This time we will use the magic number of 325 as the formula and the same centre frequency of 7,100. So on your calculator enter $325 \div 7,100 = 45,7746$ or 13.94 metres. This becomes the entire length of the black part (Radiator) of the antenna. Now divide the total 13.94 metres $\div 2$, which equals 6.97 metres.

Now measure from the centre mark of the antenna 6.97 metres towards one end of the Bazooka and mark it clearly and exactly. Then do the same from the centre mark to the other end of the Bazooka and mark it clearly and exactly. Now you have marked the full length of the main radiating element and the extra length beyond the new markings will become the tails.

We will get back to the tails in a moment.

Attaching The Feed line To the Bazooka
Now we are going to connect the coax feed line to the antenna. As shown in Fig 2 (left side of pic), you need to use a sharp knife to cut away the black jacket of the coax to expose the copper braid. From the centre mark, remove 5 cm to the left and 5 cm to the right of centre. As in Fig 2, you
should have removed 10 cm of the black jacket. Be careful not to cut into the copper braid. You just want to remove the black jacket only.

Now, with the knife, cut the copper braid in the exact centre, all the way around the coax in a circle. However, do NOT cut into the white foam that covers the centre conductor. All you are doing here is separating the braided shield in the centre to make two separate braided wires on each side of centre. As shown in Fig 2 (right side of pic), un-braid the copper shield and twist the wires together to make two pigtails, 1 from each side. One of the pigtails will connect to the centre conductor of the coax feed line. The other pigtail will connect to the braided shield of the coax feed line.

Special Note: If you use 400 ohm ladder line as the feed line, attach one pigtail of the Bazooka to one lead of the ladder line and of course, attach the other pigtail to the other lead of the ladder line. Be sure to use stand-offs with the ladder line so it is not close to the metal tower or mast. This will change the impedance of the ladder line and increase the SWR. The ladder line can also act as part of the antenna and radiate some of the signal. In addition, it can act as a balun to make the Bazooka more broad banded. However, using coaxial cable for feed line will work perfectly as well. Both options are good ones, but the final decision is yours on which to use.

Solder both connections well. Make sure connections are solid, clean and cannot touch each other. Then seal the entire open wire area with silicone or any non-conductive epoxy to make the area waterproof and allow to completely harden. Just remember that once the silicone has hardened,
you cannot go back and repair the connections. So be sure to do it correctly the first time.

As an option to give the Bazooka a connector feed point, you can cut the feed line that you have just soldered to the Bazooka, a few metres or centimetres down and put a PL-259 on it with a double female coupler. This gives you a new feed point that accepts a PL-259 and makes it easy to disconnect the feed line and work on the antenna.

**Now it is Time to Make the Tails**

You are almost done. Now you have to make the tails. Remember the earlier measurement you made of 6,97 metres from the exact centre of the antenna? Then you marked that point on each side of the antenna? Good. Now, from the 6,97 metres mark to the very outer end, remove the black jacket to expose all of the copper shielding.

Next, you will remove all of the copper shielding except for about 5 cm from the black jacket. However, do NOT remove any of the white foam that covers the centre conductor. Leave the white foam insulator on the centre conductor to protect it from the weather. See Fig 3 below.

Unbraid the 5 cm of the copper braid and twist the wire strands together to make another pigtail. As in Fig. 3 below, make a slice in the white foam about 2,5 cm from the black jacket. A thin slice in a circle around the foam, but do NOT cut into the centre conductor. Pull the white foam back about 1 cm to expose a tiny part of the copper centre conductor. If you cannot slide back the white foam, then you will have to remove a small portion of the white foam. However, not more than 2,5 cm. In addition, remember; do not cut into the centre conductor.

Wrap the pigtail around the bare centre conductor and solder them together well. Then slide the white foam back as far as possible to the solder point. This new open wire area also needs to be sealed very well with silicone or non-conductive epoxy to make it waterproof. Now repeat this entire step at the other end of the antenna. Your antenna is now built and ready to be strung up.

**Alternate Tail Construction**

On those extra long tails that you get with 40, 60, 80 and 160 metre Bazookas. It may be a lot harder to remove the coax jacket and shield wire from such long lengths of the coax. Therefore, here is an alternative method.

In figure 3B, the jacket and braided shield are still on the tails section. However, the shield and centre wires are connected together at the same solder point as before.

Where the main element ends and the tail are calculated to begin, do the following work.

**Step 1:** Cut at least 5 cm of the black outer jacket away with a knife or razor blade. Cut only the jacket and not the wire.

**Step 2:** Cut ONLY the braided copper shield in the centre of the exposed area, all the way around the outer surface so you can separate the shield into two sides. Much like you did when you separated the two shields in the centre of the Bazooka to connect the feed line. You should now have 2,5 cm of shield on the main element side and 2,5 cm of shield on the tail side. Fold both copper shields back over the black jacketed part of the coax to fully expose the 5 cm of foam insulation covering the centre wire.

**Step 3:** Remove 2,5 cm of the foam centre conductor insulator from the centre of this area, but do not cut into the centre conductor wire. You only want to remove 2,5 cm of the insulation to expose the copper centre conductor wire.

**Step 4:** Sleeve both braided shield wires back over the now exposed centre conductor wire and wrap them together so both shields and the centre conductor wire are all connected together.

**Step 5:** Use a gas torch type-soldering device to solder this section well. Make sure that all three wires have soaked up enough solder to make a good solid connection to each other. Then seal up the entire area for waterproofing.

**Step 6:** At the very tip-end of the tail, cut away the insulation to expose just enough of the braided shield and the centre conductor wire so they can be tied together and soldered well.

You are now using the braided shield and centre wire as one single large diametre wire for the tail that is the same size as the main radiating element. This keeps the tail larger for good wide broad banding and strengthens the total length of the Bazooka, which is all one uncut or spliced antenna.
The only drawback to using this method is a minor one, but mostly just an inconvenience. If you need to cut the end to trim for SWR, you must recut and resolder the centre and shield wires back together again each time to cut more off. If both conductors are not connected at the tip-end, the tails will not tune the Bazooka correctly and a high SWR will result.

This method does not change any of the calculations used to build the Bazooka, nor does it have any different effect on its performance. It is simply an alternative to making the tails without having to strip away the entire jacket and shield on longer Bazookas for lower HF bands.

Just remember that the tails are just an extension of the main element and is a single wire conductor. The tails can be made from any type of single wire conductor like solid or stranded electrical wire, several smaller wires all tied together at each end of the tail, even speaker wire, or any kind of wire conductor. The two methods I have shown above were used as the best for strength and support. However, it is up to you what to use to make the tails.

**Hanging Support Mount**

Figure 3A is one good way to hang the Bazooka. Using a non-conductive nylon rope, (shown as BLUE) make a loop of the rope. About 20 cm from the centre of the Bazooka, attach the nylon rope as shown above in figure 3A. Use four heavy-duty plastic wire ties (shown as RED) around the Bazooka and one piece of the rope. Then use four more wire ties that go around the Bazooka and both pieces of the rope. Do this to both sides from the centre of the Bazooka. You now have a rope that can hang on a hook on the tower or mast. Alternatively, you can wire tie the rope to a brace on the tower or mast. Remember to leave a large enough loop of the rope to give the antenna flexibility.

Special Note: If you hang this antenna from a tower, it would be a good idea to use an arm brace that holds the Bazooka out and away from the metal tower by at least 30 cm. If any part of the Bazooka is resting against the metal tower, it will effect the SWR and broad banding of the Bazooka. However, hanging the Bazooka from a simple pole or single thin mast, or any non-conductive support mount, will not effect the performance of the antenna. The only metal that should ever come in contact with a Bazooka antenna is the feed line. This is why I stress the importance of using non-conductive silicone and epoxies and using nylon rope to support the Bazooka.

**Supporting the Tails and Adjusting the SWR**

Here is the best way to support the ends of this (Continued from page 17)
antenna. Only use a non-conductive nylon or rope to hang this antenna. This is important because the rope runs alongside the antenna-radiating element and it cannot contain any metal to interact with the antenna. In Fig 4, you see the rope (in **blue**). From the area that was soldered and sealed, take the rope back about 1.2 or 1.5 m along the black jacket. In the middle of this section, put a couple of large heavy-duty wire ties around the rope, coax and tighten firmly. Then fold back the rope to overlap itself, as shown in Fig 4 above. Then put four or more of the same heavy-duty wire ties around both pieces of rope and the coax to hold the rope firmly to the antenna. I said to go back with the rope 1.2 or 1.5 m. This is for longer antennas on low HF bands. For shorter antennas, you can cut back to 0.6 to 0.9 m. Use your own judgment as to what you feel is a safe amount for supporting this antenna. Just do not use too little. The rope that is supporting the antenna will have a lot of stress on it to hold the long length of the Bazooka tightly in place. So use enough rope along the black section of the Bazooka to safely support it.

**Simple SWR Adjustments**

To adjust the SWR of the Double Bazooka, you just need to cut off the ends of the tails in 5 mm increments. If the SWR is lower at the lowest frequency of the band, than it is in the centre of the band, begin cutting off the tails by 5 mm at a time. Since the antenna was cut longer than it needs to be, you will most likely be cutting off some of each tail more than once.

**IMPORTANT NOTE:** Equal cuts must be made at both ends on each tail at the same time. When you cut 5 mm off one tail, go to the other end and cut off 5 mm from that tail. Then check the SWR again. If it is still lower at the lowest end of the band than in the centre, keep cutting 5 mm off each end until the SWR is lowest in the centre of the band at our original 7,100 MHz. Then put a wire tie near the end of the tail around the tail and the rope to support the tail section. This antenna is ready to talk some DX.

However, if the SWR is lower at the highest end of the band than it is in the centre of the band, you made a mistake in one of the calculations and need to add wire to the tails. However, if you followed my instructions, this is unlikely to happen.

Photos provided by Max, ZSSMAX, of the Highway ARC. ZSSHAM used a Double Bazooka for the National Field Day.

(Continued from page 18)
The Value Logistics Fast One Cycle Race took place on 29 January 2017. This article tells of Hamnet’s involvement ensuring effective communications and coordination between the organisers, the lead vehicles and the EMS vehicles via the Joint Operations Centre (JOC).

Hamnet Gauteng South was called on to assist in this event. They are very well experienced in these types of sport events and decided to approach Hamnet Vaal since they know the area and could provide additional hands. Glynn, ZS6GLN, Leon, ZS6LMG, Phillip, ZS6PHS, and Riaan, ZS4PR, met with the organisers from Value Logistics, the Midvaal Emergency Services and the main role players to arrange how the interaction would suit everyone.

On Saturday 28 January the Hamnet Vaal team were first to arrive. They arranged where the JOC, the logistic support and main Hamnet venue would be located. The Gauteng South team arrive shortly after and immediately the two groups merged seamlessly to become one group: Hamnet. From the view of the organisers and all the roll players, only one communications provider was present.

The equipment was set up and antennas installed in the JOC. Two portable UHF repeaters were set up to allow communications to the EMS vehicles. The Vaal Triangle repeater on 145,6375 MHz would provide the main channel of communications to all the Hamnet vehicles at the various water points and intersections. Very close interaction with the EMS and the Midvaal traffic department ensured that everyone was kept up to date with the race incidents and possible accidents. At the JOC, a Wi-Fi hotspot was set up as well. The aim was to allow APRS feedback and tracking of the key vehicles in real time. The lead vehicles and the sweeper service vehicles were also fitted with tracking units and this enabled the organiser to see the activities in the race. The organisers had a database of the participants that enabled them to retrieve immediate information based on QR-codes and the entry number.

By 19:00 on Saturday evening the braai fires were lit, the main systems active and the Vaal and Gauteng South teams were discussing and planning the next morning’s activities. The Vaal team decided to ensure that the fellowship and tummies would receive good support. Saturday evening the braai allowed the teams to get to know each other even better and Glynn made use of the opportunity to brief all on the task that lay ahead for the next

(Continued on page 21)
At 03:00 Sunday morning, the Vaal team was up and started preparing fresh hotdogs for everyone as breakfast. By 04:30, everyone was up and busy with preparation of handhelds and radio equipment. The ambulances of St John Ambulance and ER24 were also equipped with radios and APRS trackers. By 05:00, the organisers had their briefing and by 05:20, the HAMNET team had theirs.

Everyone was ready to do his or her part. The Vaal team saw the opportunity to learn from the Gauteng South team and again the interaction between all the members was notably positive.

The race started on time and during the day, the communications was well handled. When an accident or incident occurred, the message was clear and to the point and effectively relayed to the JOC. In the JOC there was members of the organising team, Hamnet, both ambulance services and traffic and fire department personnel. Gideon, ZS4GJA, did a tremendous job to interact with all in the JOC and Leon, ZS6LMG, coordinated all the Hamnet personnel.

By 13:00, the last of the cyclists arrived back at the raceway. This allowed Hamnet members to takedown and collect all the hardware and equipment. For lunch, the Vaal team prepared scrumptious boerewors rolls with a special sauce. The Hamnet team were fed and then the project was closed.

A lot of positive feedback was received from the organisers and HAMNET in this region left a positive footprint on the community of Midvaal and Meyerton.

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.
GETTING THE HOBBY IN FRONT OF THE PUBLIC IS KEY, BUT IT’S IMPORTANT TO THE RIGHT FIRST IMPRESSION. A FEW IDEAS ON HOW TO PROMOTE AMATEUR RADIO AT EVENTS:

Does your event appeal to passers-by? Headphones-on and backs-to-the-public is pretty off-putting, so be visible, smile and if you are more interested in operating than promoting the hobby, have a colleague on hand to chat to the public.

Do you have plenty of literature on hand for anyone who seems keen? At a minimum, consider some generic SARL leaflets, information about your club’s activities, plus details of training in your area. Business cards work too. Are you showing multiple aspects of the hobby? As well as voice (and CW), how about a recording of some PSK31 traffic, SSTV, or a scrolling video about the hobby.

Take many photos, put them on your website and social media and see if the venue will also post them to their site and followers. Could the local press be interested?

SPREAD THE WORD

Word of mouth or the family connection are obviously the most common ways we tend to spread the word, but here are some other ideas on who you could tell about amateur radio:

YOUNGSTERS

It can be a hard slog getting youngsters interested, but get them while they are young. Some ideas:

Schools. A talk/some practical demos.

TDOTA, JOTA and CQ Hou Koers – World Thinking Day for the Guides (February), Jamboree on the Air for the Scouts and Guides and CQ Hou Koers for the Voortrekkers (October). A great way to get youngsters interested

YOTA – Youth on the air. Various initiatives going on nationally. Contact the SARL Youth Coordinator.

TECHIES

Those into technical already may find amateur radio fits in nicely. Consider:

Local makers faire / Raspberry Jam / computer clubs

Technical events and talks in your area

How about model aircraft and drone fliers, balloon launchers, pilots, boat owners?

COMMUNITIES

Some want to put their radio skills to good use and others have a need for radio communications. Some ideas:

Quite a few people have an interest in emergency communications, working with councils, helping on community events or prepping for the end of the world. Obvious links with SARL Hamnet.

Charities and hobbyists may want to make use of radio and amateur radio gives them more power and flexibility than walkie-talkie PMR communications

Neighbourhood Watch – a talk on using radios and radio procedures/practical demonstrations

Homeowners’ Association (HOA) – a talk about amateur radio and the value it brings to the community (and they need such a talk!)

THE OLDER GENERATION

How about doing a talk at the local MOTHS or SA Legion, or one of the many daytime social groups and clubs in the area?

A presence at events for veterans, community archivists, history societies, museums, etc.

EVERYONE!

Field days – Show the hobby in action – and let people try it

Museums, open days, family activities, church bazaars, ‘boeremark’ – just being there with a stand and some leaflets could be enough to grab some interest

OTHER PROMOTIONAL IDEAS

A few extra thoughts on how to get a little more

(Continued on page 23)
Ask your club’s members to mention your club and/or events on their Facebook and Twitter feeds.

When attending any event, including those not run by your club, have a leaflet or business card on hand.

Find places to promote the hobby. Got a friend or family member who might let you leave leaflets on their shop counter or staff noticeboard? Perhaps think libraries, colleges, schools and community centres. The more amateur radio can be seen in the community, the better.

Could you have a small stand at the Saturday morning market in your suburb or town?

Can SARL Hamnet help supply radio communi-

Operating a Class E station during the National Field Day
Dennis Green, ZS4BS (sometimes /portable Div 5 and not /P5)

According to the rules for the National Field Day in the 2017 Blue Book (ver 11 February 2017, e-mail address update), a Class E station is – Ultra Light Portable. Light weight self-contained stations, operating QRP or low power such as RaDAR, Summits on the Air, Parks on the Air (game and nature reserves), Islands on the Air, Heritage sites, etc. The operator must carry the entire station, antenna included, to the operating site. The distance carried must not be less than 1 km. Okay, the admin has been dealt with!

Carina and I have been in Harrismith since 14 January managing our son’s Backpackers while they went to Bloemfontein for the birth of their son (we will not delve into the intricacies of how mothers-to-be and gynaecologists calculate the 40 weeks of pregnancy - Angus was born 7 days after the determined date!)

I did a SOTA on 22 January - Carina and I went to Mount Paul (ZS/FS-012 at 2 043 m asl). On the way to the metal ladder to the summit, Carina and a snake met - following the scream, Mount Paul is clear of snakes!

Granny decided we cannot go home yet, must spend time with young Angus, so what to do for Field Day? I would love to activate Platberg (ZS/FS-004 at 2 273 m asl) BUT! In a new money making scheme, the municipality will not have you just climbing the mountain. You must drive to the gate of the Drakensburg Botanical Gardens, pay R25 for your car and R15 per person inside and hope you get a receipt with the permit. Then drive back to the start of the hiking trail (about a 10 km round trip). At the gate, the person does not know where the hiking route starts, where Dead Man’s Pass is or that there is a ABW Blockhouse on top of Platberg. He cannot provide you with a map of Platberg. Just pay the money! Then I find out I am the only one with hiking shoes and as I learnt in Scouts, you do not hike alone.

Plan B. Use the car, there is a great spot near the Border Post (with craft beer) at the top of Oliviershoek Pass and you are in KwaZulu-Natal. Sterkfontein Dam (the third largest dam in South Africa, no 1 and 2 are also in the Free State) has some nice parking places along the water. Both you can use free of charge.

So, on Saturday 11 February, I packed my FT-817 into its new carrying bag with the LDG Z100 in the next pouch, plus all the cables. 12 v SLAB and solar panel, inverted V and buddipole mast. Granny Green provided the cold water, apples, grapes, bananas and a peach with a worm living in it (she

(Continued on page 24)
claims she was not aware that a worm has taken up residence!)

And off I went down the N5, onto the R712 and turned off onto the R74. After about 23 km, I stopped at the viewpoint opposite the Border Post (with craft beer), the previous owners called it the Caterpillar Catfish Restaurant - KG41mk and 1EKN. The wind was blowing something terrible, but an Englishman makes a plan. Anchored the mast and antenna and connected up the radio and remembered the log sheets are still at the Backpackers. Found paper in the cubby hole (glove compartment!)

ZS4BS portable div 5 was ready (maybe I should have called ZS4BS/P5 - just think of the write-ups in DX bulletins, “South African Ham activates North Korea!” One must be careful operating portable in KwaZulu-Natal.)

First into my log was ZS6CEN operating from the Scout Hall of 37th Springvale Scout Group, then the Northern Natal ARC, ZS5NAK, and the Sandringham Scout Group, ZS6SSG. I could hear Peter, ZS1PHD, quite well, but I was in the noise to him. Then I got blasted off the viewpoint by the Highway ARC, ZS6WR, was next into the log followed by Pieter, ZS6XT. The Welkom Radio Club, ZS4WRC, and Johan, ZS4DZ, in Ficksburg were added. I also heard Thanie, ZS4AZ, in Ladybrand, but he moved from the frequency. The wind was getting stronger and I decided to pack up and move to a new spot.

Everything back into the car and off I went back into the Free State (no passports or visa’s required) and headed for the Sterkfontein Dam. Nineteen kilometres further and I found a spot near the waters of the Sterkfontein Dam - KG41mo. Now signing ZS4BS/p and 1EFS, I worked the Sandringham Scout Group, ZS6SSG, the Welkom Radio Club, ZS4WRC, the Sasolburg Radio Club, ZS4SRK, Highway ARC, ZS5HAM, and the East Rand ARC, ZS6ERB.

Also into my log went Christie, ZS4CGR/6 in Zeerust, Eddie, ZS6BNE (1ENW), Mario, ZS6TAN, and the West Rand ARC, ZS6WR.

I think is was during my QSO with the East Rand guys that Mother Nature crept up behind me and let go with a peal of thunder! I will not repeat what I said! And then the rain and lightening came. Quick pack-up and back to Harrismith.

Sunday 12 February saw me drive to the viewpoint opposite the Border Post (with craft beer) in the last outpost of the British Empire - now called KwaZulu-Natal. The wind had changed to a nice breeze. I set up my station and switched on, but propagation had taken the day off. I added Geoff, ZR6XZ/1, somewhere along the southern Cape coast and Cobus, ZS1DJR, from Saldanha into the log. Last entry in the log was Pieter, VS1PJ, from Rosh Pinah.

Well not quite, the last entry goes to Rickus, ZS4A, in Bethlehem who I worked on 144,300 USB using the 3 element Arrow Yagi (did not add the 70 cm elements), but this contact does not (yet) count for the National Field Day.

I posted some photos on my Facebook page, where after Pierre, ZS6A, brought it to my attention that I had transgressed two very important contest rules, namely Page 37 Para 3.2(b) “No competitor is allowed to have fun.” and Page 73 Para 1(a) “Field stations with premium views will be penalized by a point reduction as deemed appropriate by the contest sponsor”

Bloemfontein Amateur Radio Club ZS4BFN

Die Klub vergader die eerste Dinsdag van die maand om 18:30 by die Klubhuis te CBC-Skool, Waverleyweg, Bloemfontein. Die Klubse herhalers is die Naval Hill herhaler - 145,600 MHz met Echolink; Brandkop herhaler - 145,650 MHz en eersdaags die Springfontein herhaler - 145,700 MHz op die N1.

The Club has a 2 metre beacon on 144,415 MHz as well as a WSPR beacon on 5 290 MHz. Reports are welcome at zs4bfd@mweb.co.za. The Club holds the call sign 7P8BFN.

Web: www.zs4bfd.co.za
E-mail: zs4bfd@mweb.co.za
Club Chairman: Andre v Rensburg, ZS4APA, zs4apa@telkomsa.net
Club Secretary: Dennis Green, ZS4BS
The greatest challenge still facing VHF radio amateurs is to bridge the Atlantic Ocean on 144 MHz via Tropo Ducting. Many attempts have been made, but so far, none were successful. Here is a review of the more serious attempts that were conducted and described by the different participants.

Trans-Atlantic test planned at Ardnamurchen, IO66vr

Bill Ward, GMØICF, describes the preparation for the trans-Atlantic test. Date: 13 May 1999: “With site approval obtained the final plan is to operate from Ardnamurchan Point, from Saturday 26 June to Sunday 4 July 1999. The team will be Graeme, GM4KHE, Jim, GM0NAI, Drew, GM3YOR, and myself, Bill, GM0ICF. We will be using 2 x 17 element Yagis, on 30 ft tower, GaAsFet pre amp and a 3CX800 amp, rig will be a Trio TS790. Beam heading will be fixed at around 270 degrees. We will have an HF radio on site as well and will put up antennae for 20 m (VHF net frequency) and 80 m. Once the station is up and running Graeme and I will be there for the 9-day run using the call sign 2S0ICF/P. We will be using CW only around 15/18 wpm and will call CQ CQ CQ de 2S0ICF/P 2S0ICF/P 2S0ICF/P K, listen and repeat for the given period, exact timings will depend on information I’m awaiting from other stations. I will get this info to you ASAP. Let us hope the propagation treats us kindly.

Six weeks to go... Date: 17 May 1999. We plan to TX our CQ on the hour and on the half hour for 5 minutes with a short listen between the individual calls and will listen at all other times for any other stations but we ask other stations to call specifically at 15 minutes past and 45 minutes past the hour. We will be using 144,075 MHz. We will start at 18:00 UTC on Saturday 26 June 1999. Due to numbers we will be limiting our operation period from between 12:00 UTC and 00:00 UTC each day through to Sunday 4 July when we will be listening between 09:00 UTC and 16:00 UTC before we finally shut down (but the radio will be ON ALL the time during our rest (this is our holidays over here HI!) periods. However we will come on at ANY time i.e. hours out with those above if other stations want to arrange a specific sked. This is our final plan and will go ahead barring any disasters!”

The Transatlantic test failed

Bill Ward, GM0ICF, tells us about the actual trans-Atlantic test. Date: Tuesday 6 July 1999: “Well, unfortunately I was let down by people so this curtailed the activities slightly in as much as the weather was bad on arrival at the site and we could only get one antenna up in the air. The lighthouse foghorn sounded for around 12 hours through the night so I did not get any sleep. Things improved weather wise but we did not hear a thing except one possible partial call, which we think, might have come from an English station also calling on the frequency but nothing from across the Atlantic. The weather got REALLY bad on Wednesday and I took down the HF antennae for safety, the rain was so heavy and the wind was very strong, the water was actually being blown through the fabric of the tent like an aerosol!, it was not very pleasant. Thursday was better and Friday not too bad but the forecast did not sound too good so I decided to pack up early and head home on Saturday morning. My colleague on HF certainly fared better working several hundred stations. I logged just over 55 hours of listening to white noise over the 6 days. Given the weather and the fact that I was running the VHF entirely on my own some of the operation got a little ragged but especially with limited sleep. A learning experience if nothing else

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however if nobody does it this year I'll be back next year to have another go BUT only if the other station can run the same power and length of time as me. I have to thank Dave Ferguson who is the lighthouse local manager who helped us out tremendously and I personally would not have stayed passed Wednesday if it had not been for his very kind offer of a bath and a bed in one of the disused lighthouse keepers' cottages. This was a lifesaver! A bit disappointing all round but I will be back! Cheers, Bill.”

**WA1ZMS Transatlantic beacon on 144,285 MHz**

Brian Justin, WA1ZMS, has been running a beacon on 144,285 MHz from Virginia, USA, since July 2009 and beaming in the direction of Ireland. The transmitter runs at 500 Watts radiating 7 kW ERP. The beacon is GPS locked and the antenna comprises two 5-element stacked Yagis beaming at 60 degrees from IARU locator FM07fm.

**Transatlantic test from Newfoundland**

From 4 to 12 July 2014, a group of dedicated amateur radio operators, who operated VC1T, attempted to achieve one of the few remaining amateur radio distance records. Their goal was to transmit a two-meter (144 MHz) signal from Newfoundland in North America, across the Atlantic Ocean, to Ireland and receive a reply in return! VC1T used a 43 element Yagi, 30 meters long.

Breath taking news occurred on 6 July at 13:41 UTC when John Regnault, G4SWX, VHF Manager of the RSGB, received a CQ meteor burst (FSK441 mode) from VC1T. It was confirmed that the received burst was in the format transmitted by VC1T. They started the 4 hours timeframe and no further information on chat or e-mail exchanged. During that timeframe, G4SWX received three other bursts from which two were CQ and one other where only the VC1T call sign was readable. Screenshots from WSJT are available as well as maps from the current Tropo situation on the North-Atlantic. The Hepburn Forecasts of the North Atlantic have indicated very poor Tropo Ducting conditions so far, but there was a chance that tropospheric conditions could improve from 11 - 12 July 2014 when the tests came to an end.

A terrestrial two-way contact between North America and Europe has not been achieved so far on 144 MHz and it appears to be even more challenging than making EME contacts over a total distance of 800 000 km on this band.

**Transatlantic test from Rosh Pinah, Namibia**

When Pieter Jacobs, ZR1AEE, was located in Cape Town he ran Transatlantic tests on CW with PY1ANE in Brazil and they heard traces of each others signal. When he relocated to Namibia and settled in Rosh Pinah, about 100 km from the sea, he started to conduct a new series of Transatlantic tests with Marcos Jose Da Silva Da Almeida, PY1MHZ, at Rio de Janeiro.

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An e-mail arrived at 04:09 CAT on 5 October 2016 from Pieter Jacobs, V51PJ, informing us about a great amateur radio pioneering achievement. He said that he and Marcos, PY1MHz, made the first two-way contact across the Atlantic on VHF 144,250 MHz digital using QRA64 software, which is a new protocol of WSJT-X. Pieter’s signal was received by Marcos at 20:38 UTC on 4 October at –37 dB, and the signal from Marcos was recorded at –36 dB at 00:28 UTC on 5 October. Pieter in Rosh Pinah is equipped with 2 x 13 element stacked Yagi array and a kilowatt of power, whereas Marcos used a 2 x 12 element horizontal Yagis with 16 dB gain.

The digital images of the above contacts were analysed by Joe Taylor, K1JT, who reported via the ARRL that the new software QRA64 could not verify the call signs and therefore the contact is null and void, but Pieter and Marcos must be congratulated for their attempt. The Brendan Trophies are still safe in Dublin, Ireland.

The antenna array at Pieter, V51PJ, looking towards Brazil

Marcos, PY1MHz, (on the left) and his team. (I do not think the young lady in the background is part of the team! Ed.)

Backscatter signals from across the Atlantic on 144 MHz

Pieter, V51PJ, at Rosh Pinah was running skeds with Marcos, PY1MHz, in Brazil on 144 MHz JT65b, when Bernie, ZS4TX, alerted him that he could see Pieter’s signal at –28 dB on the Moon. The Moon was at the time very low down on the western horizon in Namibia and Pieter was beaming at 259 degrees. Later after the Moon had set, Bernie reported that he could still see Pieter’s JT65b signal on the waterfall, which appears to be more than 900 km behind him across the Atlantic. When Meteor bursts occurred, Bernie recorded a Doppler shift around 200 Hertz off frequency and when he changed polarization from horizontal to vertical the signals were weaker and did not decode.

Many years ago Professor J.A. Gledhill and his team at Rhodes University discovered strong Sporadic-E propagation near the South Atlantic Anomaly at night. So one could infer that the medium, which produced the above backscatter on VHF, might have been caused by Sporadic-E clouds over the Atlantic Ocean. It could be worthwhile to investigate this phenomenon further and determine the direction where the reflected VHF signals peak.

Results of the PEARLS National VHF and UHF Contest 2017

Poor Tropo conditions limited the analogue range to 390 km, as well as the number of contacts made. Koos, ZS3JPY, at Kleinzee and Lee, ZS5LEE, in Durban stated that they only worked one station each, Cobus, ZR3CVB in Port Nolloth and Rickus, ZS4A, at Bethlehem, respectively. Nevertheless at least 25 logs were received countrywide covering all six categories of the contest. What Tropo lacked Meteor Scatter made up for in the Digital contest where new records were established. Last year the overall analogue winner

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scored 82 075 points, whereas the current digital overall winner has now surpassed the 100 000 mark for the first time in the history of the PEARs contest. PEARs can now claim to be truly a National VHF/UHF Contest.

Overall Digital Winner
1st Pieter Jacobs, V51PJ (Base) - 101 430 points
2nd Rickus de Lange, ZS4A (Base) - 19 250 points
3rd Paul Smit, ZS6NK (Base) - 17 552 points.

Overall Analogue Winner
1st Cape Radio Group, ZS1CRG (Club) - 24 956 points (operated by ZS1DUP, ZS1HE, ZS1ABU, ZS1DWH)
2nd Christo Greyling, ZR6AUI (Field) - 19 680 points
3rd Rickus de Lange, ZS4A (Base) - 3 261 points.

Longest Distance on Digital
50 MHz: Pieter Jacobs, V31PJ, and Paul Smit, ZS6NK - 1 347 km
70 MHz: Pieter Jacobs, V51PJ, and Paul Smit, ZS6NK - 1 347 km
144 MHz: Pieter Jacobs, V51PJ, and Rickus de Lange, ZS4A - 1 138 km

Winner Limited Category (Digital): Andre Botes, ZS2ACP (Base) - 43 832 points.

Winner Rover Category
1st Alex Gogos, ZR2T (Rover) - 4 142 points
2nd Andrew Gray, ZS2G (Rover) - 915 points.

Winners of the Divisional FM Category:
Division 6:
1st Max Bouckley, ZS6MAX (Base) - 490 points
2nd Kevin Suckling, ZS6KGS (Base) - 280 points

Division 2
1st Dakota Watson, ZU2DW (Field) - 180 points
2nd Hugo Ras, ZS2HR (Field) - 120 points.

Divisional Analogue Winners
Division 1
Cape Radio Group, ZS1CRG (Field) - 24 956 km.
Division 2
Al Akers, ZS2U (Base) - 1 574 points
Mike Higgs, ZU2MOO (Field) - 1710 points
Division 4
Rickus De Lange ZS4A (Base) - 3 261 points

Amateur television (ATV) starting in Cape Town
Raoul Coetzee, ZS1C, announced that he is currently running ATV on 1 265 MHz FM, about 4 Watts into a log periodic antenna with about 9 dB gain. He is located in Kraaifontein and is beaming in the direction of Bellville and Brackenfell and can aim it in any direction of anybody interested to do a test.

Raoul says that you could use an old FM analogue satellite receiver, simply connect an antenna and tune. These receivers are not very sensitive on their own, so he is looking for a band pass filter for 1,26 GHz. He is running a 4 MHz bandwidth, so any bandwidth setting seems to work on the receiver. If you see his call sign on a piece of wood, you found it! The transmitter is a modified SM data transmitter and he is only using a small portion of its intended use. There is no sound yet as he needs to build a 6 MHz oscillator, FM it and inject with the composite video into the main VCO in order for the satellite receiver to receive the audio too. He
would like to thank Leon Korkie, ZS1MM, for the transmitter and information on how to modify it.

**VHF activity is increasing around the country**

In Cape Town, Mike, ZS1TAF has been running a net on 144,300 MHz SSB every Thursday evening for the past year or two. Recently the Coastal Radio Group operated a successful field station ZS1CRG on the Piketberg for the first time during the PEARS VHF/UHF contest and it was manned by Derrick, ZS1DUP, Shaun, ZS1HE, Keverne, ZS1ABU, and Dietier, ZS1DWH. The West Coastal Group, which included Charles, ZS1CF, and Tienie, ZS1HO, often work Koos, ZS3JPY at Kleinzee and as far north as Andre, V51LZ at Oranjemund. Andre, ZS3AG, at Kimberley has often heard traces of signals from the group and has been heard by Pieter, V51PJ.

Pieter, V51PJ, has hooked up with stations as far afield as Andre, ZS2ACP, and Andre, ZS2BK in Port Elizabeth, including Rickus, ZS4A, Bernie, ZS4TX, Christian, ZR6AUI and Paul, ZS6NK, on digital or analogue. Carl, ZS6CBQ, established a very successful net on 144,300 SSB some years ago on Saturday and Sunday mornings that covered Divisions 4 and 6. He has now added a new net on 432,200 MHz SSB during the same period. Hugo, ZS5HV, at Scottburgh, and Lee, ZS5LEE, in Durban, have joined a Monday evening net run by Peter, ZS2ABF, in East London with David, ZS5DJ, on 144,300 MHz SSB. It could later extend as far south as Port Elizabeth. Now that we are at the minimum Solar Cycle and DX on HF is declining, give VHF a try for a change, it is both a challenge and fun. So make an effort, join these VHF groups and help to advance VHF and amateur radio.
In the episode of the famous TV comedy series, "Hancock's Half Hour" called "The Radio Ham," Tony Hancock says: "It's a wonderful hobby. I have friends all over the world. None in this country, but all over the world!"

If you live in a modern urban or suburban development, it can be difficult to be a radio amateur and stay on good terms with your neighbours. Times have changed since the days when power and telephone cables were routed overhead on poles, every house had a large H or X antenna for TV reception and a ham antenna would go largely unnoticed - or at least, not make the skyline look any worse than it did already. Nowadays, phone and power lines are buried, most houses have nothing more in the way of antennas than a UHF TV antenna and a small satellite dish and an elevated dipole, full-sized vertical or tower and beam would stick out like a sore thumb. Your housing development may have restrictions on the types of antenna you are allowed to have, or you may simply wish to avoid being the person who spoils the look of the neighbourhood by putting up something that most non-hams will find visually offensive.

The more people value the look of a neighbourhood and spend time and money making their home and garden look nice, the more they are likely to object to anything that spoils the view. So whenever I see this subject discussed in online forums and someone (inevitably) replies, "Tell the neighbours to go to hell, it's your property and you have the right to put up an antenna," I always think of that line from Tony Hancock. Is your hobby more important than being liked by your neighbours? Not to me, it is not.

Good neighbourliness is not the only reason for wanting to avoid conspicuous antennas. If you live in an apartment or a small town house with no garden, outside antennas may simply not be possible. However, all is not lost. The solution is to restrict yourself to antennas that are small, invisible or hard to see. This is stealth amateur radio.

Realistic expectations

Contrary to popular belief, an inability or desire not to have large, high antennas does not mean that you should take up a different hobby. Sure, a beam or tower are out of the question, so you'll never be a "big gun" top DXer or contest winning station able to get instant replies to your CQs. However, there are many other ways of being able to enjoy the hobby than chasing the rarest DX or participating competitively in contests.

It is possible to win DX awards, even using low power and modest antennas. It just takes longer. If you like taking part in contests then you can compete against yourself, trying to beat previous scores, or use them as an opportunity to log some DX that would be hard to work at other times.

Besides a less than ideal antenna, it may also be necessary to restrict the power you run so as to avoid the RFI problems that can occur with indoor antennas, or to avoid blowing your cover by causing RFI to a neighbour. This may seem like a double blow to your chances of success. Nevertheless, operating low power (QRP) can actually increase your fun.

The key to not being disappointed with what you can achieve with low power and a restricted antenna system is to develop realistic expectations. Compare your results to other similarly equipped stations, not big guns. Join QRP clubs and take part

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in QRP contests. The number of participants is smaller and the playing field is more level, making the chances of winning actually greater than if you were one of hundreds of "average" participants running 100 W into dipoles or other modest outdoor antennas.

Part of the fun of amateur radio is in improving your station to get better results. Improving your station performance within the parameters of complete stealth, low visibility or whatever limits on your activity your particular situation dictates becomes part of the challenge.

Stealth antenna options

If you want to get on the air without highly visible antennas then the best solution will depend very much on your personal situation and what you can get away with. One of the first decisions you need to make is whether to go for stealth or covert operation. I do not know if there is an official definition of these terms, but for my purposes, stealth operation means "under the radar." It implies the use of outside antennas that are hard to see, whereas covert operation requires that your activities are completely undetectable. Covert operation may be required in a neighbourhood that has covenants or CCVs specifically banning antennas, but many hams in that situation opt for the stealth approach and get away with it because nobody notices.

While researching compact antenna options I discovered the following rule of thumb:

An antenna may have two of the attributes small, efficient or broadband (work over a wide frequency range without retuning) but never all three.

This is something you should always bear in mind when considering your options for low profile or hidden antennas. If it is small, it is either going to be inefficient or have a narrow bandwidth.

Stealth antennas that work very well are:

**Flagpole vertical.** In the USA, I am given to understand, it is the right of every citizen to erect a flagpole on their property, so that they can show they are patriotic Americans by flying the Stars and Stripes. A flagpole can easily be used as, or conceal, a full sized vertical to make an efficient disguised antenna. You can even buy ready made flagpole antennas. In the UK, however, we have no such right and blatant displays of patriotism tend to be regarded with suspicion, so for most of us it is not an option.

**Invisible wire or dipole.** Another good option is a long wire or inverted L made of thin wire, which is hard to see from a distance. If the feeder can be disguised then a centre-fed dipole or doublet is also possible. This option does rather depend on the availability of suitably high supports to hang the wire from. Personally, I do not like this idea because I am also a birdwatcher and fond of wildlife and I do not want to risk injury to birds that fly in to the invisible wire. In addition, in the high-density housing developments, here in the UK where antenna restrictions are likely to apply, the plots are not big enough to accommodate an effective long wire and not far enough apart for such a wire to be really invisible to neighbours. But it is a good option if you can use it.

**Magnetic loops.** My top choice for use where disguised or hidden full-sized antennas cannot be erected, a magnetic loop can give full-sized antenna performance for a fraction of the size. Because a magnetic loop does not look like how most people expect an antenna to look and does not need to be mounted up high, you may be able to install one without anyone realizing what it is. Try mounting it on top of a pole from which you hang bird feeders, or on top of one of those metal obelisks you grow climbing plants up.

**Short vertical dipoles** such as the TransWorld Adventurer. I have not tried one, but I have heard nothing but great reports on them. They stand about 3 m high and actually work better (with lower angle radiation) close to the ground than elevated on a mast. Coated matt black, they are pretty

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Multiband antennas

Creating stealth wire or vertical antennas for a single band is relatively easy. Creating stealthy antennas that work on multiple bands is more difficult. Wire is fairly easy to conceal. Traps and loading coils are not. Non-resonant antennas tuned using an ATU in the shack ideally need to be fed using open wire, which again is hard to conceal.

A flagpole vertical could be made of fibreglass pole (yacht mast?) and a conventional trapped vertical fitted inside.

Long wires can be effective radiators, but they require a good RF ground, which can be problematic to create in a restricted situation. Without a good ground, long wires are more prone to RF in the shack, which can cause RFI. That can be particularly undesirable if you are trying to keep your operation covert. Because it may not be possible to get the wire up really high, most radiation will be at higher angles, so local contacts will be easier than DX.

A dipole requires no RF ground and no tuner, but will be good for only a single frequency. A more versatile choice is a doublet, which is essentially a non-resonant dipole. Because the feed point impedance is far from being 50 ohms on most bands, a doublet should be fed with open wire feeder when tuned using an ATU in the shack, to avoid feeder losses. This may present an obstacle to achieving low visibility. One way round this may be to use a battery powered remote auto-tuner at the feed point in the centre of the antenna, which would allow the doublet to be fed with thin coaxial cable and minimize feeder losses over a wide range of frequencies.

Small antennas

If it becomes necessary to reduce the size of the antenna in order to achieve stealth operation then some performance compromise is almost inevitable. The secret of success is to compromise as little as possible. This is where you need to be careful, as there are many antennas on the market, often with hefty price tags, that claim to defy the laws of physics by offering high performance and broadband operation in something a couple of metres long or high. Well, it just is not possible!

Antennas that I just do not believe to be worth considering include the Crossed Field Antenna (CFA), the EH Antenna and the Isotron. They cost a lot of money, but I would have been willing to purchase any one of them if I was convinced that they lived up to the claims made about them. However, after spending much time searching for reviews and other reports of how well these antennas perform, I concluded that these antennas work on the principle that anything will radiate some kind of signal as long as you can match it to a transmitter and that customers who have low expectations are easily satisfied. I have never worked anyone using any of these antennas. If the manufacturers of these products feel I am wrong, they are welcome to lend me an example to evaluate. I am just not convinced enough to risk my own money finding out.

Ones to avoid

Other small HF antennas often suggested for attic installation or temporary outdoor deployment which I consider to be a waste of time and money include:

Hamstick dipoles. These are dipoles made from two helically wound mobile whips mounted back to back.
back. The problem with these is that they are simply too inefficient. Helical whips have been tested to be more than 10 dB down on a full sized dipole.

**Tripod mounted helical verticals.** Another type of antenna often marketed as the solution for antenna-restricted locations is a helical whip such as an Outbacker, mounted on a tripod stand. Outbackers are electrically a lot like Hamsticks, except that they have taps and a fly lead to short out turns and enable one antenna to cover multiple bands, so the same issue of inherent inefficiency applies. The High Sierra, with its high Q loading coil and a base extension, would be a far better bet. The problem of inefficiency is compounded if the whip relies solely on coupling between the tripod and the earth for a ground. Even full sized verticals need many ground radials to achieve best efficiency and short mobile whips are no exception.

**Tripod mounted loaded dipoles** such as the Buddipole. Although more efficient than a tripod mounted vertical, short loaded dipoles suffer from the fact that they have a very narrow bandwidth and so need constant retuning whenever you QSY. This has to be done manually, by adjusting taps on a coil, making them tiresome to use. Short loaded trapped dipoles with fixed frequency coils, as offered by some Japanese manufacturers, will be very inefficient. Moreover, at the low height attained by tripod mounting, DX performance will be poor.

**Slinky dipoles** made using those steel spring Slinky toys. A dipole made from one Slinky each side stretched to about 15 feet end to end will have a broad resonance on 40 m; a pair of Slinkies soldered together to make each dipole leg, stretched to about 30 feet will resonate on 80 m. They will radiate a signal on those bands but it is clear that they are still very inefficient and it is a struggle to make contacts on 80 m at night with 100 W. Contrary to the claims made by those who advertise these antennas commercially they are not multi-band. Performance on bands other than the one the dipole is resonant on is very poor.

There are various compact HF base antennas from Japanese manufacturers such as Maldol, Comet and Diamond that may seem suitable for stealth operation. Their slim line appearance and fixed tuning on each band deny the use of any high Q components and I simply do not believe that these manufacturers have managed to discover a new law of physics that allows an HF antenna to be small, efficient and broadband!

**Narrow bandwidth is good!**

Many people find it inconvenient to have to retune an antenna every time they move a few kHz in frequency but remembering the rule of thumb mentioned earlier, narrow bandwidth is normally proof of a high Q, which suggests that the antenna should work better than you would expect for its size. So if you are forced to use an electrically small antenna look at the SWR bandwidth figures. Contrary to what you might think when choosing an antenna, in this case, the narrower the bandwidth the better.

That means that you really want the antenna to be tunable unless you wish to confine your operation to a narrow section of each band. This is one more reason to consider the magnetic loop. Using an ATU may compensate for a small antenna’s narrow bandwidth to some extent, but though it will keep your finals happy a high Q antenna will not radiate as good a signal when it is a long way from its resonant frequency.

**Indoor and attic antennas**

If you need to keep your operation covert, then you probably need your antennas to be indoors either in the attic or in the last resort, in the shack itself. Whether or not this is possible in practise de-
pends a lot on the form of construction used for your house, or its roof. If you have metal walls or a metal roof, or your roof lining is foil backed, then you are out of luck.

If you cannot have an indoor antenna, then there are still a few options left. Some operators have laid dipoles in the plastic guttering - or better, pinched the wire between the guttering and the fixing brackets, so it does not lie in the water and impede the run-off of mud and leaves from the roof. I have even heard of people who have metal guttering using that as the antenna, though you would need to ensure good electrical contact between the sections. Another possibility is to tape a wire to the back of a plastic downpipe and use that as a vertical, fed at the top or bottom against a counterpoise, or in the middle as a dipole.

If you have an attic you can use, then it can be turned into an effective antenna farm, ideal for experimentation. There is no need to bother about making your antennas water- or weather-proof and you don’t have to work at heights - a major plus as far as I am concerned. If your garden or yard is as small as ours is, you will be sacrificing little in terms of the size of the antenna you can put up and it will be hard to gain any extra height while maintaining full stealth. The most significant downside is the proximity to wiring radiating the noise of all the switched mode power supplies used to power your electronic devices.

Antennas that work well in the attic include

Dipoles. Dipoles are cheap and easy to make, easy to put up and easy to match, since on the frequency they are designed for they present a close to 50 ohm load. The main disadvantage is that you need a dipole for each band and that dipoles for the lower bands are too long to fit in the average British attic. (Even a 20 m dipole would need to be bent in to a U shape to fit into mine.) The solution for multiband access is to make a fan dipole, as described (with pictures) by MOWYM (who clearly has an attic much bigger than ours.) I would endorse Peter’s use of a balun at the feed point, to eliminate radiation from the feeder - a potential cause of RFI. [www.radiowymsey.org/FanDipole/fandiploe.htm](http://www.radiowymsey.org/FanDipole/fandiploe.htm)

Doublets. A doublet is a dipole that is operated over a much wider range of frequencies than those for which it provides a good match. For this to work, you must either use a remote ATU at the feed point, or use open wire feeder and a special ATU designed to tune open wire such as the MFJ-993B.

Horizontal loop. This is similar to a doublet, except the antenna is a continuous loop of wire instead of two separate elements. This is often a better solution than a dipole/doublet, as you can get more wire in the air (or in the attic) and a loop tends to pick up less noise. Since you will be tuning it over a wide range of frequencies matching arrangements will be the same as for the doublet.

Magnetic loop. As already mentioned, a remotely tuned magnetic loop is my top recommendation for an antenna in situations where a full sized antenna mounted at optimum height cannot be used. It is small enough to fit any attic, radiates a better signal than anything that even approaches its size and can be tuned for a perfect match on any frequency within its design range. It is also inherently less sensitive to electrical noise than a dipole - a useful attribute for an antenna that is used indoors. This is my current main antenna and is likely to remain so for the near future.

Short vertical dipole. If you have sufficient height in the attic and enough space to allow sitting away from metal or pipework, then one of the portable vertical antennas such as the TransWorld Adventurer can give good results. Perhaps someone will come up with a design for a home-brew QRP version.

Using low power

Though not an essential for stealth or covert operation, it can be advisable to use low power when using an indoor (or in-attic) antenna. It is hard to avoid EMC problems when the antenna is...
so close to your electronic appliances and house wiring. You should also ensure that you or other family members are not exposed to excessively high RF power levels through proximity to your transmitting antennas. 5 watts, the generally accepted level for QRP operation, will not do any harm. 100 watts might do.

If you are concerned about your ability to make contacts, remember that the difference between 100 watts and 5 watts is only two S-points, which is usually a lot less than the QSB at any given time. This means that if you can work someone using 100 watts you can almost certainly still work them using low power, with a bit more patience.

The best way to compensate for using lower power and a less effective antenna is to use the most efficient modes of communication. CW and PSK31 will enable you to get the same kind of results you would need 100 W and a full sized dipole to manage on SSB, or even better. I have had ragchew contacts with Stateside stations on PSK using 4 watts to a loop of wire strung round the perimeter of my attic. Who needs QRO and tons of aluminium?

Conclusion
Antenna restrictions are no reason for giving up ham radio. It is still possible to enjoy the hobby without spoiling the enjoyment of the view from their back garden for your suburban neighbours. So do not be deterred. Become a covert radio operator and get on the air!

Pretoria Amateur Radio Club
Home of Amateur Radio/Tuiste van Amateur Radio

The Pretoria Radio Club was formed in 1929/30. In 1935 the PRC was incorporated in Division 6 of the SARRL. The club abandoned all activities during World War II and in 1944, PARC resumes its amateur activities. In 1945, PARC rejoins the SARRL after its own revival. PARC became an independent branch in 1946. The Pretoria Branch became a Club affiliated to the League with its own logo in 1996. In 2015, a new Club logo was accepted.

PARC aims at - Promoting the interest of Amateur Radio - Creating awareness of the club initiatives, through more active public relationship programs both internal and external through various media channels - Providing emergency and public service communications when normal means of communications are disrupted - Conducting programs and activities to increase the general interest and welfare of Amateur Radio within the club and the bigger community through collective initiatives and projects and Supporting lawful, responsible conduct by its members and the amateur fraternity in general.

Regular events - Club flea markets - Monthly club meetings on the first Saturday afternoon of the month at 14:00 CAT - RAE classes in preparation for the May and October Radio Amateur Exam - Club news bulletin every Sunday morning at 08:45 CAT on 145.725 MHz and other HF frequencies including Echolink.

Contact information: Web: www.parc.org.za
Club Chairman: Johan du Bruyn, ZS6JHB zs6jhb@gmail.com

“Sorry OM, I can only work QRP at the moment!”

Despite the fact that I do not get a lot of time to go on the air I have worked North and South America, Antarctica, Japan, South Africa and the Philippines. The only continent I have not yet worked is Australia. European contacts are always possible. In addition, I have fun doing it.

Conclusion
Antenna restrictions are no reason for giving up ham radio. It is still possible to enjoy the hobby without spoiling the enjoyment of the view from their back garden for your suburban neighbours. So do not be deterred. Become a covert radio operator and get on the air!
When we are just getting interested in amateur satellite operation, the thought of investing in a complex azimuth-elevation rotator system to track satellites across the sky can stop us in our tracks. For starters, we need a simple, reliable, fixed antenna - or set of antenna - to see if we really want to pursue this aspect of Amateur Radio to its limit. We will look at the basics of fixed antenna satellite work and develop a simple antenna system suited for the home workshop. There will be versions for both 145 and 435 MHz.

Turnstiles and Satellites

For more than decades, many fixed-position satellite antennas for VHF and UHF have used a version of the turnstile. The word “turnstile” actually refers to two different ideas. One is a particular antenna: two crossed dipoles fed 90° out of phase. The other is the principle of obtaining omnidirectional patterns by phasing almost any crossed antennas 90° out of phase. The first idea limits us to a single antenna. The second idea opens the door to adapting many possible antennas to omnidirectional work.

Figure 1 shows one general method of obtaining the 90° phase shift that we need for omnidirectional patterns. Note that the coax centre conductor connects to only one of the two crossed elements. A ¼-λ section of transmission line that has the same characteristic impedance as the natural feed point impedance of the first antenna element alone connects one element to the next. The opposing ends of the two elements go to the braid at each end of the transmission line. If the elements happen to be dipoles, then a 70 to 75 Ω transmission line is ideal for the phasing line. However, the resulting impedance at the overall antenna feed point will be exactly half the impedance of one element alone. Therefore, we will obtain an impedance of about 35 Ω. For the dipole-based turnstile antenna, either we will have to accept an SWR of about 1.4:1 or we will have to use a matching section to bring the antenna to 50 Ω. A parallel set of RG-63 ¼ λ lines will yield about 43 Ω impedance; about right to bring the 35 Ω antenna impedance to 50 Ω for the main coax feed line. For all such systems, we must remember to account for the velocity factor of the transmission line, which will yield a line length that is shorter than a true quarter wavelength.

The dipole-based turnstile is popular for fixed-position satellite work. Figure 2 shows, on the left, one recommended system that has been in The ARRL Antenna Book since the 1970s. For 2 metres, a standard dipole-turnstile sits over a large screen that simulates ground. Spacing the elements from the screen by between ¼ and ½ of a wavelength is recommended for the best pattern. For satellite operation, the object is to obtain as close to a dome-like pattern overhead as possible. The most desirable condition is to have the dome extend as far down toward the horizon as possible to let us communicate with satellites as long as possible during a pass.

The turnstile-and-screen system, while simple, is fairly bulky and prone to wind damage. However, the turnstile loses performance if we omit the screen. One way to reduce the bulk of our antenna is to find an antenna with its own reflector. However, it must have a good pattern for the desired goal of a transmitting and receiving dome in the sky. The dual Moxon rectangle array, shown in outline form on the right of Figure 2, offers some advantages over the traditional turnstile. First, it yields a somewhat better dome-like pattern. Second, it is relatively easy to build and compact to install.

Almost every fixed satellite antenna shows deep nulls at lower angles, and the number of nulls increases as we raise the antenna too high, thus defeating the desire for communications when satellites are at low angles. Figure 3 shows the elevation patterns of a turnstile-and-screen and of a pair

(Continued on page 37)
of Moxon rectangles when both are 2 λ above the ground. A 1 λ height will reduce the low angle ripples even more, if that height is feasible. However, the builder always has to balance the effects of height on the pattern against the effects of ground clutter that may block the horizon.

The elevation patterns show the considerably smoother pattern dome of the Moxon pair over the traditional turnstile. The middle of the turnstile dome has nearly 2 dB less gain than its peaks, while the top valleys are nearly 3 dB lower than the peaks. The peaks and valleys can make the difference between successful communications and broken-up transmissions. Therefore, for obtaining a good dome, the Moxon pair may be superior.

A reasonable suggestion offered to me was simply to add reflectors to a standard dipole turnstile and possibly obtain the same freedom from a grid or screen structure. Figure 4 shows the limitation of that solution. The result of placing reflectors behind the dipole turnstile is a pair of crossed 2-element Yagi beams fed 90° out of phase. The pattern is indeed circular and stronger than that of the Moxon pair. However, the beam width is reduced to only 56° at the half-power points. The antenna would make an excellent starter for a tracking AZ-EL rotator system, but it does not have the beam width for good fixed-position service.

The Moxon pair, with lower but smoother gain across the sky dome, offers the fixed-antenna user the chance to build a successful beginning satellite antenna. The pattern will be circular within under a 0,2 dB difference for 145.5 to 146.5 MHz and within 0,5 dB for the entire 2-metre band. Since satellite work is concentrated in the 145.8 to 146.0 MHz region, the broad banded antenna will prove fairly easy to build with success. A 435.6 MHz version, designed to cover the 435 to 436.2 MHz region of satellite activity will have an even larger bandwidth. Like the dipole-based turnstile, the Moxons will be fed 90° out of phase with a ¼ λ phasing line of 50 Ω coaxial cable. The drivers will be connected just as shown in Figure 1. Since the natural feed point impedance of a single Moxon rectangle of the design used here is 50 Ω, the pair will show a 25 Ω feed point impedance. Paralleled ¼ λ sections of 70 to 75 Ω coaxial cable will transform the low impedance to a good match for the main 50 Ω coaxial line to the rig. In short, we have "turnstiled" the Moxon rectangles into a reasonable fixed-position satellite antenna.

Building the Moxon Pairs

The Moxon rectangle is a modification of the
reflector-driver Yagi parasitic beam. However, instead of using linear elements, the driver and reflector are bent back toward each other. The coupling between the ends of the elements combined with the coupling between parallel sections of the elements combine to produce a pattern with a broad beam width. By carefully selecting the dimensions, we can obtain both good performance (meaning adequate gain and an excellent front-to-back ratio) and a 50 $\Omega$ feed point impedance.\(^1\)

In fact, a single Moxon rectangle might be used on each band for reasonably adequate satellite service. When pointed straight up, the Moxon rectangle pattern is a very broad oval, although not a circle. The oval pattern also gives the Moxon another advantage over dipoles in a turnstile configuration.

If the phasing line between dipoles is not accurately cut, the normal turnstile near-circle pattern degrades into an oval fairly quickly because the initial single dipole pattern is a figure 8. The single Moxon oval pattern allows both dimensional inaccuracies and phasing line inaccuracies of considerable amounts before degrading from a nearly perfect circle.

Figure 5 shows the critical dimensions for a Moxon rectangle. The lettered references are keys to the dimensions in Table 1. The design frequencies for the two satellite antenna pairs are 145.9 MHz and 435.5 MHz, the centres of the satellite activity on these two bands. The 2 metre Moxon prototype uses 3/16 inch (4.7625 mm) diameter rod, while the 435 MHz version uses #12 AWG wire with a nominal 0.0808 inch (2.05232 mm) diameter. (Single Moxons built to these dimensions would cover all of 2-meters and about 12 MHz of the 432 MHz band.) Going one small step up or down in element diameter will still produce a usable antenna, but major diameter changes will require that the dimensions be recalculated.

The reflectors are constructed from a single piece of wire or rod. I use (Continued from page 37)\(^1\) (Continued on page 39)

Figure 3. A comparison of elevation patterns for the turnstile and screen system (with $\frac{3}{4}\lambda$ spacing, shown in blue) and a Moxon pair (shown in red), both at 2 $\lambda$ height.

Figure 4. A comparison of elevation patterns for 2-element turnstiles (crossed 2-element Yagis, shown in blue) and a Moxon pair (shown in red), both at 2 $\lambda$ height.

Figure 5. The basic dimensions of a Moxon rectangle. Two identical rectangles are required for each “turnstile” pair.
a small tubing bender to create the corners. The rounding of the corners creates a slight excess of wire for the overall dimensions in the table. I normally arrange the curve so that the excess is split between the side-to-side dimension (A) and the reflector tail (D). Practicing on some scrap house wire may make the task go well the first time with the actual aluminium rod. The total reflector length should be A + (2 x D).

The driver consists of two pieces, since we will split the element at its centre for the feeding and phasing system. I usually make the pieces a bit longer before bending and trim them to size afterwards. The total length of the driver, including the open area for connections, should be A + (2 x B).

Perhaps the most critical dimension is the gap, C. I have found nylon tubing, available at hardware depots, to be very good to keep the rod ends aligned and correctly spaced. When everything has been tested and found correct, a little super-glue on the tubing ends and aluminium stands up to a lot of wind. I usually nick the aluminium just a little to let the glue settle in and lock the junction. For the UHF version, a short length of heat-shrink tubing provides a lock for the size of the gap and the alignment of the element tails.

It is one thing to make a single Moxon and another to make a working crossed pair. Figure 6 shows the general scheme that I used for the prototypes, using CPVC. (Standard schedule 40 or thinner PVC or fiberglass tubing can also be used.) The support stock is ¾ inch (1,9 cm) nominal. The reflectors go into slots at the bottom of the tube and are locked in two ways. Whether or not the two reflectors make contact at their centre points makes no difference to performance, so I ran a very small sheet screw through both 2 metre reflectors to keep their relative positions firm, I soldered the centres of the 435 MHz reflectors. Then I added a coupling to the bottom of the CPVC to support the double reflector assembly and to connect the boom to a support mast. Cementing or pressure fitting the cap is a user option.

The feed point assemblies are attached to solder lugs. The phasing line is routed down one side of the support, while the matching section line is run down the other. Electrical tape holds them in place. For worse weather, the tape may be over-sealed with butylate or other coatings. Likewise, the exposed ends of the coax sections and the contacts themselves should be sealed from the weather. The details can be seen, as built for the experimental prototypes in one of the photos, before sealing, since lumps of butylate or other coatings tend to obscure interesting details.

The overall assembly of the two antennas appears in the second photograph. The PVC from the support Ts can go to a centre Tee that also holds the main support for the two antennas. A series of adapters, made from miscellaneous PVC parts to fit over a standard length of TV mast. Alternatively, the antennas can be separately mounted about 10 feet (3,048 m) apart. The 10 foot

Table 1. Dimensions for Moxon Rectangles for Satellite Use

<table>
<thead>
<tr>
<th>Dimension</th>
<th>145.9 MHz</th>
<th>435.6 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inches</td>
<td>Cm</td>
</tr>
<tr>
<td>A</td>
<td>29,05</td>
<td>73,79</td>
</tr>
<tr>
<td>B</td>
<td>3,81</td>
<td>9,67</td>
</tr>
<tr>
<td>C</td>
<td>1,40</td>
<td>3,55</td>
</tr>
<tr>
<td>D</td>
<td>5,59</td>
<td>14,21</td>
</tr>
<tr>
<td>E (B + C + D)</td>
<td>10,80</td>
<td>27,43</td>
</tr>
<tr>
<td>¼ wavelength</td>
<td>20,22</td>
<td>51,56</td>
</tr>
<tr>
<td>0.66 velocity factor phasing and matching lines</td>
<td>13,35</td>
<td>33,90</td>
</tr>
</tbody>
</table>

(Murphy’s Laws from page 38)
height of the assembly has proven adequate for general satellite reception, although I live almost at the peak of a hill.

The antennas can be mounted on the same mast. However, for similar sky-dome patterns, they should each be the same number of wavelengths above ground. For example, if the 2 metre antenna is about two wavelengths up at about 14 feet (4.26 m) or so, then the bottom of the 435 MHZ antenna should be only about 4.5 feet (1.37 m) above the ground. Placing the higher-frequency antenna below the 2 metre assembly will create some small irregularities in the desired dome pattern, but not serious enough to affect general operation.

There is no useful adjustment to these antennas except for making the gap between the drivers and reflectors as accurate as possible. Turnstile antennas show a very broad SWR curve. Across 2 metres, for example, the highest SWR is under 1.1:1. However, serious errors in the phasing line length can result in distortions to the desired circular pattern. There is no substitute for checking the lengths of the phasing line and the matching section several times before cutting. The correct length is from one junction to the next, including the portions of exposed cable interior.

These two little antennas will not compete with tracking AZ-EL rotating systems for horizon-to-horizon satellite activity. For satellite work, however, power is not always the problem (except for using too much) and modern receiver front-ends have enough sensitivity to make communication easy. Therefore, when the satellite reaches an angle of about 30° above the horizon, these antennas will give a very reasonable account of themselves. When you become so addicted to satellite communication that you invest in the complete tracking system, these antennas can be used as back-ups while parts of the complex system are down for maintenance!

1See “Having a Field Day with the Moxon Rectangle,” QST June 2000, pp 38-42, for further details on the operation of the Moxon rectangle, along with the references in the notes to that article. Also included in the notes is the source for a program to calculate the dimensions for a 50-Moxon rectangle for any HF or VHF frequency using only the design frequency and the element diameter as inputs. 

http://p1k.arrl.org/pubs_archive/99026

This article is used with acknowledgement to the August 2001 issue of QST, the journal of the ARRL.

The Museum Piece
Dave Gemmell, ZS6AAW

SAAF Museum News
Not much to report about the Museum Station as the on going renovations at AFB Swartkop has hampered any possible amateur activities at the Amateur Radio Station ZS6MUS.

Anyway, we are doing our best to “catch-up” with the paper work, which had good results. I discovered the connection between radio amateurs and the SAAF, namely, their help starting the SAAF Wireless Section as told in the February 2017 issue of Radio ZS.

ZS4AFV at Stars of Sandstone

SA Armour Museum News
Dennis, ZS4BS, reports that the SA Armour Museum will once again participate in the Stars of Sandstone.
Sandstone from 30 March to 9 April 2017 at the Sandstone Estate just north of Ficksburg.

The Museum will be taking along its T-34, T-55 and T-72 tanks as well as a Rooikat Armoured Car and an Olifant Mk 2 MBT. The various armoured vehicles in the Sandstone collection will also be participating in the various morning drives and afternoon demonstrations.

An addition this year is a display of weapons and other military equipment in the Armour hangar. This will include a Radio Set No 19, a Radio Set C13 (HF) and C42 (VHF) and the newer B56 (VHF) and B26 (HF) radios. And the Museum call sign, ZS4AFV, will be on the air on HF and the digital modes for the duration of the event. A QSL card will be available on receipt of your QSL card.

Visiting radio amateurs are welcome to operate the station and bring your CW key with.

Noise Floor

Should radio amateurs be concerned about the increasing RF noise floor? I refer to SARL News of 12 February 2017.

My answer to this question is “YES!” When tuning around the amateur bands, the operator should have an idea to what he is listening. Is it a genuine signal, CW, SSB, SSTV or one of the many digital types! Alternatively, horror of horrors, QRM coming from the fridge! Sounds like a second rate TV show!

My second comment is ... Has any one investigated the action of the AGC on the reception of the signal? Remember automatic gain control or the older term, automatic volume control (AVC)! Selective fading may have more of an effect on a relatively broad signal such as SSB or DSB but little effect on CW, which has a relatively narrow bandwidth. The bottom line is ... Do you know what type of AGC is used in your receiver?

Another question I have is ... what is the effect of selective fading on the modern digital modes and how do the latest receivers cope? Those of us whom use CW should be less bothered but what would the effect of selective fading on a CW signal.

It is a bit ridiculous to think that when we are trying to identify the source of any QRM we have to answer the question, “Is it the fridge or the washing machine!” Funny, but true! Even funnier is the story that even Fido the family mutt could contribute to the mystery. Electronic ultrasonic flea repellents are available to attach to the dog’s collar! Even though the main signal is just above AF there is a strong possibility of harmonics. Especially when the dog in the room with you!

AGC Action in Solid State Receivers

I apologize to the owners of the latest semiconductor sets but I am still trying to up-date my knowledge of AGC as used in amateur receivers.

A Parting Shot

Has any one thought of tracing the history of receiver AGC? Please let me know. Occasionally the subject of a section of circuitry arises and you wonder when it was first used.
South African Radio League Hamnet 40 m Simulated Emergency Contest

This SSB Contest is open to all Radio Amateurs in South Africa, Namibia, Botswana, Zimbabwe, Swaziland, Mozambique, Lesotho, Marion Island and South African Antarctica. Only contacts with these areas will count.

The Contest runs from 12:00 to 14:00 UTC on Sunday 5 March 2017 and it is a phone contest in the band segments 7 063 to 7 100 kHz and 7 130 to 7 200 kHz. You can participate as a Single operator stationary mobile; a Single operator portable; a Multi-operator portable or a Single operator base station.

Antennas are limited to antennas with less than unity gain relative to a dipole. Stationary Mobile stations shall use antennas that rely solely on their vehicles for support and shall not exceed a height of 5 metres above ground. Portable station antennas may not be erected and installed before the day of the contest and no permanent manmade structure may be used to either house equipment or for antenna supports.

Stationary Mobile and Portable stations shall operate from the same site for the duration of the contest and all power used shall comply with the requirements for Field Stations in the general rules.

The exchange is a signal report followed by a three-figure number as follows:

Category a: Starting with 201 for the first contact
Category b: Starting with 401 for the first contact
Category c: Starting with 601 for the first contact
Category d: Starting with 801 for the first contact
Non-participants start with 001 for the first contact

Scoring consists of points accumulated from all contacts, multiplied by a multiplier. Contact with a station in:
Category a, b and c in own area - 3 points
Category a, b and c in another area - 4 points
Category d or non-participant in own area - 1 point
Category d or non-participant in another area - 2 points

The Areas are as defined in the following list:
Area 1: ZS1; Area 2: ZS2; Area 3: ZS3; Area 4: ZS4; Area 5: ZS5; Area 6: ZS6; Area 7 (eastern group): 3DA, 7P, C9, Z2, ZS8 and Area 8 (western group): A2, V5, ZS7

The multiplier consists of the number of call areas worked, multiplied by a power multiplier. The power multiplier is 2 for an output power of over 50 W PEP and 3 for an output power of less than 50 W PEP.

Log sheets must be submitted by 12 March 2017 by e-mail to contest@peham.co.za or to Hamnet Eastern Cape, Al Akers, ZS2U, 53 Clarence Street, Westering, Port Elizabeth, 6025.

South African Radio League VHF/UHF Analogue/Digital Contest

The VHF/UHF contest is a test of operator ability and station design. To promote activity on the VHF/UHF and microwave bands. To encourage Amateurs to work greater distances than usual by operating portable/field stations in favourable locations and by optimising equipment and operating techniques at both field and home stations. To provide opportunities for Amateurs to activate and work new grid squares. The Contest is open to all licensed Radio Amateurs in South Africa, Namibia (Continued on page 43)
(V5), Botswana (A2), Zimbabwe (Z2), Mozambique (C9), Lesotho (7P) and Swaziland (3DA). Only contacts with these states will count.

The general rules covered in pages 4 – 9 of the SARL Contesting Manual (Blue Book) are to be followed.

The first leg of the SARL VHF/UHF Contest will run from 10:00 UTC Saturday 11 March to 10:00 UTC Sunday 12 March 2017.

You can participate as a Single Operator - Analogue (SSB, AM, FM, CW) or Digital (RTTY, PSK, WSJT but not limited to these modes). Multi operator - Analogue (SSB, AM, FM, CW) or Digital (RTTY, PSK, WSJT but not limited to these modes). Portable / Field Station - Analogue (SSB, AM, FM, CW) or Digital (RTTY, PSK, WSJT but not limited to these modes). Limited 4 Hour - Contestants who cannot operate for the full 24-hour period can use the category. Logs must be for a 4-hour continuous period in the contest.

Definitions for the contest.

**Single operator.** A station operated by one person, who receives no assistance whatsoever from any other person in operating, log keeping, checking and so on.

**Multi-operator.** A station operated by more than one person, either for the entire duration of the contest or part of the time. There is no limitation on the number of operators that may be used. One operator must act as Entrant and submit the entry.

**Portable/Field Station.** A temporary station operated from a fixed location other than that of the registered main station address of a licensed amateur. Antennas should not be supported by any permanent man-made structure or building. The power for the station shall be drawn from a source other than the normal mains supply. One or more amateurs may operate it but they must use one call sign only.

Contacts must be two-way point to point. Stations shall exchange signal reports as well as their location e.g. (latitude and longitude or full six-digit Maidenhead locator or accurate area/address/location).

Self-Spotting will be allowed, e.g. you may announce that you are calling CQ on 144,250 on a repeater frequency or an internet logger or any group. The contact itself or any information related to the contact should be unassisted. No information may be sent between third party stations or by any other medium to assist with completing of the contact.

No station may be worked twice on the same band however; a station may be worked in both analogue and digital modes on the same band.

No EME, repeater, satellite or IRLP (Echolink, etc.) contacts are allowed.

No points will be forfeited if a non-competing station cannot provide a grid locator. However, the receiving operator shall receive and record sufficient information to be able to calculate the distance. (Typically latitude and longitude) or the nearest street address and area.

No cross band contacts are allowed.

Operators of a multi-operator station may not be claimed as contacts by that station.

Contacts with licensed friends or family members residing with the operator shall not count for points or multipliers.

Stations may be worked only once except as stated above. Working various alternative calls owned by a station, or working a club station and then logging various different operators from a club station is not permitted.

To ensure fairness and good sportsmanship like behaviour, all participants, including those who are not actively competing i.e. those stations “handing out points”, should be encouraged to make as many QSOs as they possibly can with other competing stations and not only make contacts with their club members and or friends.

50,090 – 50,100 MHz CW
50,200 - 50,250 MHz SSB
50,250 - 50,300 MHz Digital
50,350 - 50,400 MHz FM
51,400 - FM
70,090 - CW

(Continued on page 44)
70,100 - 70,150 MHz SSB
70,150 - 70,175 MHz Digital
70,200 - 70,275 MHz FM
144,050 - CW
144,250 - 144,300 MHz SSB
144,200 - 144,250 MHz Digital
145,500 - 145,575 MHz FM
432,100 - CW
432,250 - 433,300 MHz Digital
433,350 - 433,400 MHz FM
1 296,195 - CW
1 296,200 - 1 296,250 MHz SSB
1 296,250 - 1 296,300 MHz Digital
1 296,350 - 1 296,400 MHz FM

Higher frequencies as per band plan

Note 1: The 70 MHz band is a shared band; please avoid QRM to commercial users.

Note 2: ZU stations are currently not permitted to operate on 50 MHz (6 m) or 1 296 MHz (23 cm) according to the Government Gazette.

Band Multipliers - 6 m x 3; 4 m x 5; 2 m x 2; 70 cm x 7; 23 cm x 9; >23 cm x 15

Grid Multiplier: A grid is the first 4 digits of the Maidenhead grid locator.

Distances are calculated automatically when using the SARL VHF/UHF Log sheet provided on the SARL contest page. If for any reason the log sheet cannot be used, the “Tinylocator” program must be used to calculate distances.

The Distances on each band are summed and then multiplied by the number of different grids worked on that band to give the band score. This is done automatically for you when you use the SARL VHF/UHF Log Sheet.

The final score is the sum of the band scores.

Copies of the VHF/UHF log sheet and summary sheet is available in MS Excel format at http://www.sarl.org.za/public/contests/contestrules.asp. (See General Rules.) The log sheet will calculate distances and multipliers automatically. You do not have to type distances in on the log sheets. (Please read the instructions on the Summary page of the SARL VHF/UHF Log Sheet.)

Log sheets shall be submitted by 3 April 2017 by e-mail to contest@sarl.org.za

Awards and trophies will only be awarded to South African Radio League members. Certificates will be issued for the first three places in each category. A prize will be on offer for the overall winner of the contest. Submitted logs that contain 10 or more contacts will be placed in a lucky draw and the lucky person’s name drawn will receive a prize. A participation certificate will be issued to all participants that submit a log that contains ten or more entries. In an attempt to increase the awareness and participation of the younger amateurs (under 25s), it has been decided that for all the SARL contests to give separate recognition for the best performing youngsters i.e. 1st, 2nd or 3rd. The U25 group still compete with the main field and stand a chance to win a place in the standings as per normal. All youngsters that qualify i.e. U25 must state their age when submitting their logs.

The 80th RSGB Commonwealth Contest

The Commonwealth Contest promotes contacts between stations in the Commonwealth and Mandated Territories. A more relaxed contest environment gives the opportunity to work some choice DX. This CW only contest takes place over the weekend of 11 and 12 March 2017. Visit http://www.rsgbcc.org/hf/rules/2016/rberu.shtml for the rules.

A vast amount of background information, statistics and photographs related to the Commonwealth Contest may be found on https://berucontest.wordpress.com/ run by Bob Whelan, G3PJT.

25 and 26 March - the CQ WPX SSB Contest https://www.cqwpx.com/

The Antique Wireless Association of Southern Africa - ZSØAWA

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yesterday’s radios and associated equipment. To encourage all likeminded amateurs to do the same, thus ensuring the maintenance and preservation of our amateur heritage.

Please visit our website: www.awasa.org.za. Sign up for our monthly newsletter or download any backdated issues at www.awasa.org.za/index.php/newsletters. Membership of AWASA is free and by association.

We are on the air every Saturday morning, starting at 04:00 UTC on 3 615 AM, then 06:30 UTC on 7 140 SSB relayed on 14 140 to the Western Cape and 12:00 UTC on 7 020 CW. You can also connect to our Echolink node to listen to the Saturday SSB nets - ZS0AWA-L

The Wednesday evening AM net is held at 17:30 UTC on 3 615.

Radio ZS March 2017
Die Sasolburg Radioklub, ZS4SRK, was weer ouder gewoonte aan die gang met 'n volledige HF Velddag stasie.

Die oggend is die voornemende RAE kandidate van die streek genooi om saam te kom stasie opslaan. Dit is 'n gulde geleentheid om die nuwe manne hulle vra te laat vra en om ook op 'n groter skaal voor te berei vir die HF assessering wat voor die Mei 2017 Radio Amateur Eksamen nog afgelê gaan word.

Die klub het hierdie rondte besluit om slegs twee radios op die lug te sit, maar heelwat verskillende antenna ontwerpe het die lug gesien om die verskillende bande te werk.

Die Sasolburg Radioklub en die Klerksdorp ARK span kragte saam om Adruino projekte te bou hierdie jaar. Ons sal in 'n volgende artikel meer hieroor vertel. Maar op die kompetisie naweek is 'n praktiese praatjie en demonstrasie aangebied om die vervaardiging van tuis projekte uit te lig.

Chris, ZS6CRT, en Carl, ZS6CFW en hulle gades van die Klerksdorp ARK het deurgery vir die middag omdat hulle uitgenooi is om die “home brew PCB” proses wat die klub gebruik te gaan mee leef.

Carl het op FaceBook die volgende geskryf: “Het 'n heerlike dag saam met Sasolburgklub deur gebring waar hulle die SARL HF kompetisie aan gepak het en nog tyd in geruim het om 'n praktiese demonstrasie van hoe om jou eie PCB te maak. Van die laser uitdruk tot pragtige stryk-yster vaardighede wat hoë kwaliteit diagramme op koper PCB vasbrand. Na die papier af gewas was, begin die magiese stryd tussen koper en Riaan se groen bottel. Terwyl die koper die stryd verloor het, is Frik gebombardeer met eindlose tegniese vrae terwyl die dames besluit het dat Riaan "nice" is...maar dit is 'n storie vir 'n ander keer.

Nodeloos om te sê, ek en Chris het elk met pragtige werkende nuwe "lambic cw keyers" huiswaards terwyl die dames alreeds die volgende geleentheid beplan met Sasolburgklub.

N.S. Moet darem noem dat Sasolburgklub nie rondspeel met kompetisies nie, nee, hulle het operateurs wat die radios warm werk het, bo-baas broodbakkers en chef-braaiers wat 'n worsbrooddie kan maak praat, en hy het mooi gepraat.

N.S2. Die oorspronklike Vrystaat gasvryheid, ge-bottel en beskikbaar by Sasolburgklub... gaan proe...”

(Continued on page 46)
Die ZS4SRK Klub Komitee bedank die lede en vele besoekers vir die twee dae vir hulle betrokkenheid. Sasolburg radio klub se sukses is geskoei op die wyse hoe mense hulself beskikbaar maak om in die stokperdjie saam te kom en lekker radio te speel.

Master Chef Erich, ZS4VW, is aksie

Nico, ZS6MN; Jaco, ZS6IMG, en Chris, ZS6CRT

Nico, ZS6MN, Rynhald, ZR6R en Chané, ZS4CG, besig om seker te maak die mas bly staan
A photo of the bald patch belonging to Peter Leonard ZS5PL
Policy on Club Advertising in the Radio ZS magazine

1. Each SARL affiliated club and Hamnet is eligible to place an advertisement of 1/4 page in Radio ZS.
2. The content of all advertisements shall be restricted to Club activities and shall not include any material of a commercial or personal nature.
3. The magazine covers (inside or outside) are not available for Club advertising.
4. The location of advertisements inside the magazine is decided during the final layout process and no particular page, or position on a page, can be guaranteed.
5. The publication of the advertisement is always subject to the availability of suitable space, to be decided at the discretion of the Editor.
6. Where two or more affiliated Clubs are acting jointly in organising an event, one larger advertisement may be placed within Radio ZS, by combining the individual club concessions, up to a maximum of half-a-page. This concession is subject to space availability, but early booking can avoid that problem.
7. Clubs seeking to take advantage of this concession are advised to first discuss their requirements with the Editor of Radio ZS at radiozs@sarl.org.za.
8. It is strongly preferred that all advertising copy be delivered electronically by e-mail. All text material should be sent in Microsoft Word and diagrams/photos in tif or jpg format, to ensure that the original is faithfully reproduced during publication.
9. The Editor shall always have the right to reject, or require changes to, any advertising for any reason.

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Radio ZS is a forum for South African Radio League members to share their amateur radio experiments, experiences, opinions and news.

Manuscripts with drawings and/or photos are always welcome and will be considered for publication. Articles on e-mail are especially welcome. Material may be submitted in MS Word, Open Office or rtf format, using Calibri 12 pt and English (South Africa).

Material may be e-mailed to radiozs@sarl.org.za or mailed to The Editor, Radio ZS, PO Box 12104, Brandhof, 9324. The League cannot be responsible for loss or damage to any material. http://www.sarl.org.za/public/RadioZS.asp

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