QUA

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April 2015 April

RaDAR

Apollo 13 Radio Communications Issue

The N2CX HALFER

Bloemfontein Amateur Radio Club
Bloemfontein Amateurradioklub

QUA

April 2015 April

Bloemfontein Amateur Radio Club
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On the cover you can see Pandora Mountain with a field of cosmos. The photo was taken at the 2015 Stars of Sandstone event held at the Sandstone Estate about 14 km north of Ficksburg from 2 to 12 April.

Ja, QUA is laat, gewoonlik is dit vroeg in die maand beskikbaar. Ek en Carina (en die ander lede van die SA Pantsermuseum) het op Dinsdag 31 Maart die pad gevat na die Oos-Vrystaat en 2015 Stars of Sandstone daar naby Ficksburg. Ons was daar tot Sondag 12 April - elke oggend was daar n militêre konvooi (of diesel voertuie of petrol voertuie) op een van drie roetes en smiddae/smiddags was daar n mobiliteit demonstrasie. Ek het ook vir die eerste keer die Poolse T-72 tenk bestuur - top spoed 60 km/h en in die veld 45 km/h!

Winter is approaching with the trees beginning to show their autumn colours and the gardens full of dead leaves. Now we start looking for those projects that will keep us inside, in the warmth of the radio room.

What about setting up a WSPR station and taking part in the propagation project. I am sure the antennas need a check-up before the winter - my 80 and 160 metre antennas need some TLC (thanks to the garden services!)

As you will have heard, the new radio regulations have been published and come into effect on 1 April 2015. The 160 metre band has changed from 1 810 to 1 850 to the enlarged 1 810 to 2 000 kHz, enough space for the Top Band QSO Party in June. Further we have an increase of power on many of the allocations on HF, VHF and UHF (see HF Happenings 651.) So, everybody will be looking for an amplifier!

What ever you do, be radio active.

Klub Bulletins
Maandag 19:30 op 145,600 MHz FM via die Naval Hill herhaler

Club Meetings
First Saturday of each month at 14:00 (winter) or 16:00 (summer) at the Club House at CBC School

Club meeting 16:00 on Saturday 9 May 2015
Klubvergadering 16:00 op Saterdag 9 Mei 2015

More information in the Club bulletin on Monday evenings at 19:30 on 145,600 MHz FM

Meer inligting in die Klubbulletin op Maandae-aande om 19:30 op 145,600 MHz FM

www.zs4bfn.co.za

https://www.facebook.com/groups/zs4bfn/

1 Apr - Coastal Schools close; 61st Annual Poisson d'Avril Contest
2 Apr - SARL 80 m QSO Party
2 to 12 Apr - Stars of Sandstone Festival, Ficksburg
3 Apr - Good Friday
3 to 11 Apr - KKNK, Oudtshoorn
4 Apr - Dries, ZS4AJ; Autumn RaDAR Challenge; Two Oceans Marathon
4 to 11 Apr - Pesach
5 Apr - Easter Sunday
6 Apr - Family Day
9 Apr - Lorraine, wife of Wiempie, ZS4WIM
10 Apr - Michael, ZR4MF
11 Apr - Stars of Sandstone Open Day; Autumn QRP Contest
13 Apr - Lizette, wife of Nico, ZS4N; All Schools open
14 Apr - Madi and Tommy, ZS4TOM (WA)
17 to 19 Apr - SARL National Convention, Bloemfontein

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RaDAR

Pieter van der Walt, ZS6BVT

Rapid Deployment Amateur Radio of RaDAR is begin met die oog om ’n amateur radio stasie vinnig en doeltreffend op te rig vir noodkommunikasie in ’n nood-situasie tydens ’n een of ander ramp.

Bestaande kommunikasie word gewoonlik met ’n ramp vernietig en dan word radio amateur radio operateurs met hul toerusting ingespan om noodkommunikasie te verskaf vanaf die rampgebied. So ’n amateur radio stasie moet onafhanklik kan funksioneer.

Die radio-stasie bestaan uit die volgende toerusting.

- Tweerigting radio en mikrofoon
- Battery en Sonpaneel
- Lugdraad
- Pen en Papier
- GPS

Soos gesien kan word is so ’n radio stasie nie ingewikkeld nie en met goeie beplanning kan die nodige toerusting baie kompak verpak word wat die vervoer van die radio stasie vergemaklik.

Radio: Daar is ’n baie groot verskeidenheid van radio’s wat beskikbaar is, die keuse van die radio sal afhang van verskeie faktore soos grootte, frekwensie, uitset krag, ens.

Battery en Sonpaneel. Die battery is gewoonlik ’n herlaaibare battery wat deur ’n sonpaneel herlaai word. Dit is nie altyd moontlik om ’n sonpaneel saam te karwei nie. Die battery se kapasiteit moet groot genoeg wees om die radio stasie vir ten minste 24 uur aan die gang te kan hou.

Lugdraad: Daar is ’n magdom van opsies beskikbaar vir ’n lugdraad. Die keuse van ’n lugdraad sal bepaal word deur verskeie faktore soos hoeveelheid krag wat deur die lugdraad gehanteer kan moet word, wat nodig is om die lugdraad op te rig, die frekwensie waarvoor die lugdraad gemaak is, ens.

Pen en Papier: Pen en papier is baie noodsaaklik vir die afneem van notas en inligting wat verskaf moet word.

GPS: ’n GPS is nie noodsaaklik nie maar kan baie handig te pas kom om koördinate te verskaf wanneer dit benodig word.

'n Paar punte om te onthou wanneer ’n RaDAR stasie in ’n noodgeval gebruik word,

- hou uitsaai tyd so kort as moontlik om die battery te spaar
- Maak 100 % seker dat die inligting wat verskaf word korrek is
- Maak seker dat die stasie beskerm is teen reën, water, sneeu, vuur, ens.
- Skakel die radio af tussen geskeduleerde tye om die battery te spaar
- Pas jou stasie op, moenie dat enigeen met jou stasie peuter nie

Radio Amateurs gebruik nou hul RaDAR stasies wanneer hulle gaan kamp, op ’n stap roete gaan, wanneer hulle langafstande draf en op enige verlate plek waar hulle hulself bevind.

Dit is die ideale geleentheid om jou RaDAR opset te toets. Hoe jy jou RaDAR stasie ontwerp en opstel hang van jouself af. Gebruik jou Radar stasie om deel te neem aan die Veldstasie kompetisies wat gereeld gereël word en geniet Amateur radio op afgeleë plekke soos op ’n hoë verlate berg, in die woestyn, langs die viswaters, ens.

Ek hoop ons hoor jou veldstasie spoedig op die lug.

Apollo 13 Radio Communications Issue

part 3: Detuning the Saturn V's 3rd Stage Radio

Nancy Atkinson on 10 April 2015

To celebrate the 45th anniversary of the Apollo 13 mission, Universe Today is featuring "13 MORE Things That Saved Apollo 13," discussing different turning points of the mission with NASA engineer Jerry Woodfill.

Very quickly after the explosion of Oxygen Tank 2 in Apollo 13s service module, it became apparent the Odyssey command module was dying. The fuel cells that created power for the Command Module were not working without the oxygen. However, over in the Aquarius lunar lander, all the systems were working perfectly. It did not take long for Mission Control and the crew to realize the Lunar Module could be used as a lifeboat.

The crew quickly powered up the LM and transferred computer information from Odyssey to Aquarius. However, as soon as they brought the LM communications system on line another problem developed.

The Apollo 13 crew could not hear Mission Control. The crew radioed they were getting lots of background static, and at times, they reported communications from the ground were "unreadable."

Additionally, the Manned Space Flight Network (MSFN) tracking stations around the world were having trouble "hearing" the Apollo 13 spacecraft's radio broadcasting the tracking data.

"Without reliable knowledge of where the vehicle was or was going might result in disaster," said NASA engineer Jerry Woodfill.

Apollo 13 images via NASA. Montage by Judy Schmidt.

The seismic station at the Apollo 12 site. The seismometer monitors the level of ground motion to detect arriving seismic waves. The instrument (left) is protected by metal foil against the varying temperatures on the lunar surface that produce large thermal stresses. Credit: NASA

What was going on?

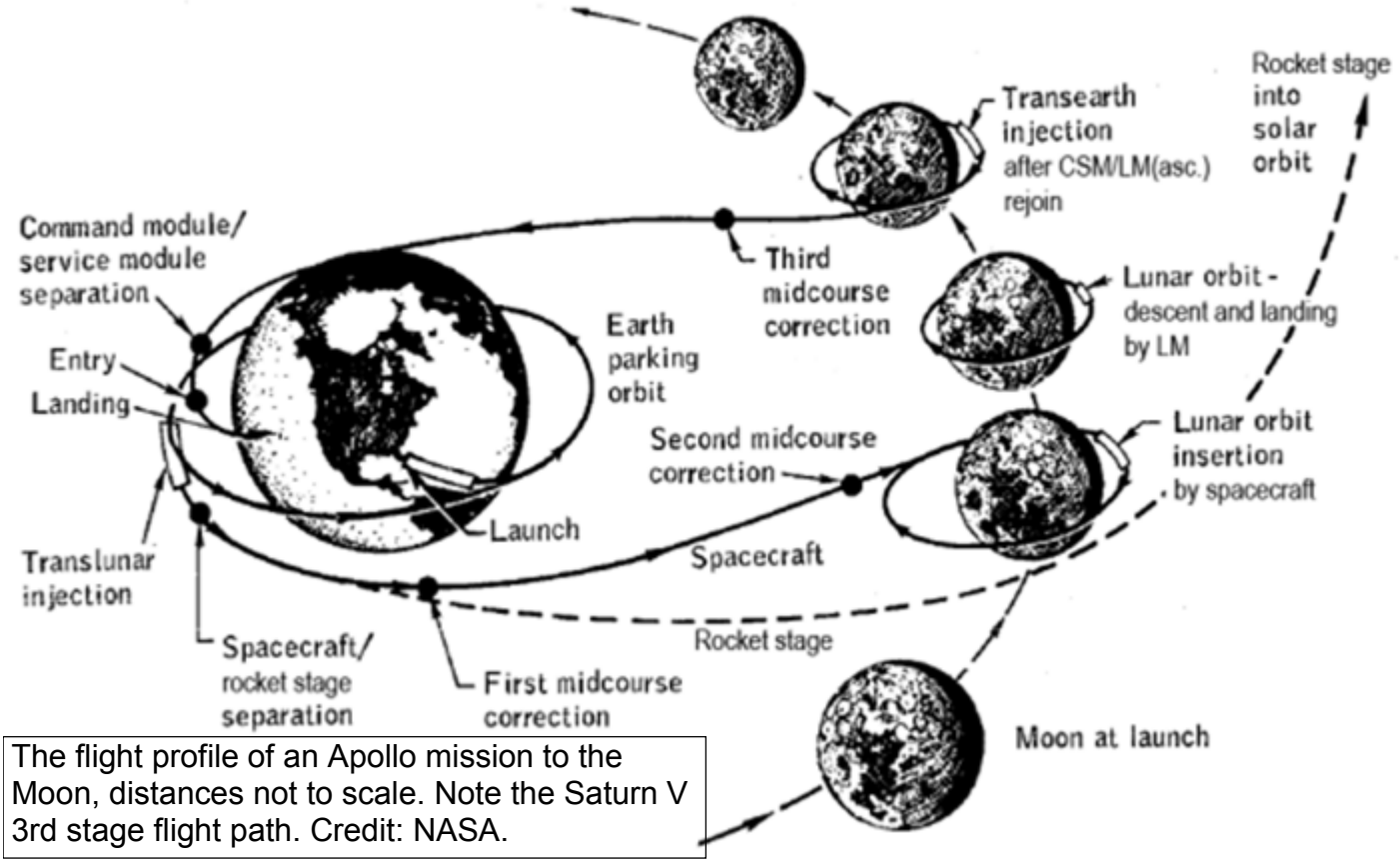
The dilemma was that two radio systems were using the same frequency. One was the transmitter from the LM's S-band antenna. The other was the broadcast from the spent third stage of the Saturn V, known as the S-IVB.

Screenshot from Apollo footage of Jim Lovell and Jack Swigert. Credit: NASA

As part of a science experiment, NASA had planned for crashing Apollo 13's S-IVB into the Moon's surface. The Apollo 12 mission had left a seismometer on the Moon, and an impact could produce seismic waves that could be registered for hours on these seismometers. This would help scientist to better understand the structure of the Moon's deep interior.

In Apollo 13's nominal flight plan, the lander's communications system would only be turned on once the crew began preparing for

(Continued to page 5)



The flight profile of an Apollo mission to the Moon, distances not to scale. Note the Saturn V 3rd stage flight path. Credit: NASA.

(Apollo 13 from page 4)

the lunar landing. This would have occurred well after the S-IVB had crashed into the Moon. However, after the explosion, the flight plan changed dramatically.

However, with both the Saturn IVB and the LM's transmitters on the same frequency, it was like having two radio stations on the same spot on the dial. Communications systems on both ends were having trouble locking onto the correct signal, and instead were getting static or no signal at all.

The Manned Space Flight Network (MSFN) for the Apollo missions had three 26 metre antennas equally spaced around the world at Goldstone, California, Honeysuckle Creek, Australia and Fresnedillas (near Madrid), Spain.

According to historian Hamish Lindsay at Honeysuckle Creek, there was initial confusion. The technicians at the tracking sites immediately knew what the problem was and how they could fix it, but Mission Control wanted them to try something else.

http://www.honeysucklecreek.net/msfn_missions/Apollo_13_mission/hl_apollo13.html

"The Flight Controllers at Houston wanted us to move the signal from the Lunar Module across to the other side of the Saturn IVB signal to allow for expected doppler changes," Hamish quoted Bill Wood at the Goldstone Tracking Station. "Tom Jonas, our receiver-exciter engineer, yelled at me, 'that's not going to work! We will end up locking both spacecraft to one up-link and wipe out the telemetry and voice contact with the crew.'"

At that point, without the correct action, Houston lost telemetry with the Saturn IVB and voice contact with the spacecraft crew.

However, luckily, the big 64 metre Mars antenna at Goldstone was already being switched over to help with the Apollo emergency and "their narrower beam width managed to discriminate between the two signals and the telemetry and voice links were restored," said Wood.

That stabilized the communications. Then it was soon time to switch to the tracking station at Honeysuckle Creek.

There, Honeysuckle Creek Deputy Director Mike Dinn and John Mitchell, Honeysuckle Shift Supervisor were ready. Both had foreseen a potential problem with the two overlapping frequency systems and before the mission had discussed it with technicians at Goddard

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(Apollo 13 from page 5)

Spaceflight Center about what they should do if there was a communication problem of this sort.

When Dinn had been looking for emergency procedures, Mitchell had proposed the theory of getting the LM to switch off and then back on again. Although nothing had been written down, when the emergency arose, Dinn knew what they had to do.

"I advised Houston that the only way out of this mess was to ask the astronauts in the LM to turn off its signal so we could lock on to the Saturn IVB, then turn the LM back on and pull it away from the Saturn signal," said Dinn.

It took an hour for Mission Control in Houston to agree to the procedure.

"They came back in an hour and told us to go ahead," said Mitchell, "and Houston transmitted the instructions up to the astronauts 'in the blind' hoping the astronauts could hear, as we couldn't hear them at that moment. The downlink from the spacecraft suddenly disappeared, so we knew they got the message. When we could see the Saturn IV downlink go way out to the prescribed frequency, we put the second uplink on, acquired the LM, put the sidebands on, locked up and tuned away from the Saturn IVB. Then everything worked fine."

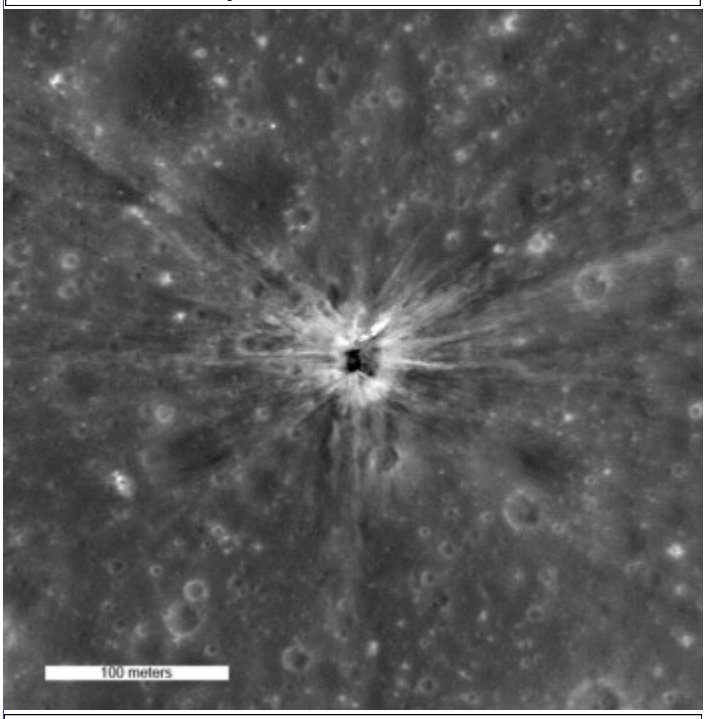
Dinn said they were able to "pull" the frequencies apart by tuning the station transmitters appropriately. This action, said Jerry Woodfill, was just one more thing that saved Apollo 13.

"The booster stage's radio was de-turned sufficiently from the frequency of the LM S-Band so that the NASA Earth Stations recognized the signal required to monitor Apollo 13's orbit at lunar distances," explained Woodfill. "This was altogether essential for navigating and monitoring the crucial mid-course correction burn which restored the free-return trajectory as well as the set-up of the subsequent PC+2 burn to speed the trip home needed to conserve water, oxygen and water stores to sustain the crew."

You can hear some of the garbled communications and Mission Control issuing instructions how to potentially deal with the problem at this link from Honeysuckle Creek's website. http://www.honeysucklecreek.net/audio/A13_audio/A13_comms_problems.mp3

As for the S-IVB science experiment, the

The Honeysuckle antenna by night. Photo by Hamish Lindsay.



On 14 April 1970, the Apollo 13 Saturn IVB upper stage impacted the moon north of Mare Cognitum, at -2.55° latitude, -27.88° East longitude. The impact crater, which is roughly 30 meters in diameter, is clearly visible in the Lunar Reconnaissance Orbiter Camera's (LROC) Narrow Angle Camera image. Credit: NASA/Goddard/Arizona State University.

3rd stage crashed successfully on the Moon, providing some of the first data for understanding the Moon's interior.

Later, on hearing that the stage had hit the Moon, Apollo 13 Commander Jim Lovell said, "Well, at least one thing worked on this mis-

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sion!" (Actually, in spite of the Apollo 13 accident, a total of four science experiments were successfully conducted on Apollo 13. http://www.lpi.usra.edu/lunar/missions/apollo/apollo_13/experiments/)

In early 2010, NASA's Lunar Reconnaissance Orbiter spacecraft imaged the crater left by the Apollo 13 S-IVB impact.

Thanks to Colin Mackeller and Hamish Lindsay and his excellent account of the Honeysuckle Creek Tracking station and their role in the Apollo 13 mission. http://www.honeysucklecreek.net/msfn_missions/Apollo_13_mission/hl_apollo13.html

Technicians at the Honeysuckle Creek tracking station near Canberra, Australia work to maintain communications with Apollo 13. Credit: Hamish Lindsay.

'n Kompakte vinnige-ontplooibare antenna vir 20, 30 en 40 m

SOTABeams

Die SOTABEAMS Verlaagde Grootte Antenna (in Engels - Reduced Size Antenna (RSA)) is ontwerp vir situasies waar 'n volle grootte antenna onprakties is.

Die RSA is die gevolg van baie ontwikkelingswerk hier by SOTABEAMS om die beste balans tussen die grootte en prestasie te vind. Die RSA werk as 'n magnetiese lus antenna op 40 en 30 m en meer as 'n konvensionele lus op 20 m. Twee aanpassings en instem stelsels word gebruik vir die beste resultate. Op die kruin van die lus word wisselbare koaksiale

'stubs' gebruik om die bande te verander terwyl by die basis van die lus word 'n bypassende netwerk gebruik vir beweging binne die bande. Die basiseenheid is toegerus met 'n BNC sok.

Die RSA is 'n volledige stelsel. Dit word voorsien met sy eie veselglas mas, 'n stutstel vir die ondersteuning van die mas, self verstelbare toue vir die laer lus hoeke en penne. Die RSA kom in 'n netjiese drasak.

Afgesien van die ooglopende gebruike soos 'n draagbare antenna, dink ons dat die RSA sal byval vind as jy net 'n beperkte ruimte by die huis het, want dit sal toelaat om jou vanaf enige plek op die bande te kry. Sy lae visuele impak maak dit ideaal vir gebruik in moeilike situasies.

Die RSA is ontwerp vir tydelike buite gebruik. As jy dit wil gebruik as 'n permanente antenna, sal die instem eenhede beskerming teen die reën nodig hê.

Spesifikasie

(Na bladsy 8)

(RSA vanaf bladsy 7)

Gewig: 825 g
Krag gradering: 100 Watts
Verpak grootte: Lengte 55 cm Wydte 16 cm
Opgerig grootte: Hoogte 3 m Breedte 3,5 m
Kabel: BNC na BNC

The N2CX HALFER

... a Simple Portable QRP Antenna

N2CX wrote an article for 72 newsletter sometime back in 1997 or 1998 in which he discussed the theory and operating characteristics of End-Fed Half-Wave Antennas. Visit http://www.njqrp.org/n2cxantennas/halfer/index.html to read this article.

What is a Halfer?

The Halfer is a "minimalist" End-Fed Half-Wave Antenna for the 7 or 10 MHz amateur bands intended to provide a very simple to erect yet effective portable QRP antenna. It features are:

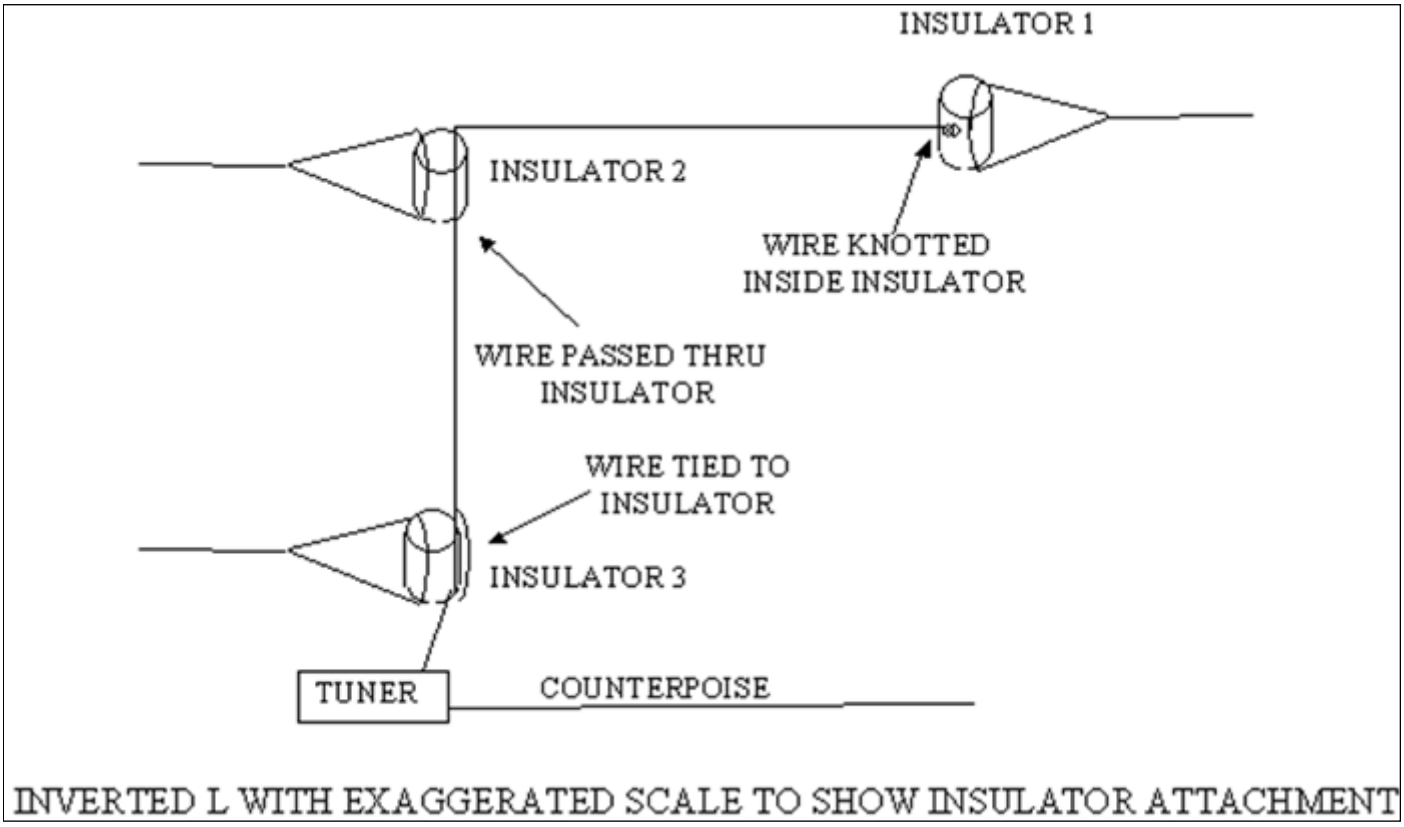
Lightweight - about 218 g
Small Size - fits in a litre zip-lock bag
Efficient - same as a half-wave centre fed dipole
Effective - can be configured for local or DX operation
Simple - single antenna wire and single counterpoise wire

20,4216 m foot insulated antenna wire
10.3632 m counterpoise
Three antenna insulators
Copy of End-Fed Half-Wave Antenna article from 72 newsletter

As described in the accompanying article www.njqrp.org/n2cxantennas/halfer/index.html the half-wave end-fed antenna can be as effective as the common centre fed dipole antenna yet is simpler to put up and much easier to carry along for portable operation. This information sheet, in conjunction with the included article, will provide all you need to know to erect and use the Halfer.

First, you must decide whether you want to use the Halfer on 40 or 30 metres. It is already cut for 40 metres. For 30, both wires must be shortened. The half wave wire should be about 14,3256 m and the quarter-wave counterpoise wire should be cut to about 7,1628 m. The lengths for both 40 and 30 metres are slightly longer than an electrical half wavelength. This

(Continued on page 9)



INVERTED L WITH EXAGGERATED SCALE TO SHOW INSULATOR ATTACHMENT

(The Halfer from page 8)

is intentional for several reasons. If the wires need to be adjusted in length, it is obviously easier to shorten them than to lengthen them. Secondly, an antenna that is *exactly* a half-wave long has theoretically infinite impedance so it would be very difficult to match that impedance. If the wire is longer than a half-wave at the lowest frequency in an amateur band, it will not misbehave within that band.

The Halfer is actually just a familiar half-wave antenna oriented ”on end” rather than being centre fed as is the common dipole familiar to radio amateurs. The makes it much easier to put up. The EFHWA article illustrates several different configurations. For casual short-range contacts, the inverted L is the easiest way to put up the Halfer. If the horizontal section is at least 6,096 m above ground, most of the radiation will be at a fairly high angle which will bounce off the ionosphere close to your location. If the antenna is erected vertically, most of the radiation will take place at a very low angle, and will favour DX type operation in good conditions. As with the usual centre fed dipole, the Halfer can be put up in an inverted Vee shape. This may be the easiest installation since it needs only a single high support.

A couple of compromise configurations are also useful. If the inverted L is arranged with half the wire vertical and half horizontal, it puts the radiation portion at the highest point. Since energy is radiated from the middle, it combines both vertical low-angle and horizontal high-angle components. If the Halfer is set up as a “sloper” less than 45 degrees from the vertical, it combines low angle radiation with some directivity toward the low end of the antenna. The sloper is also often the easiest way to put up a single wire antenna like the Halfer.

The figure on the back of this sheet shows some detail on the inverted L. The three insulators are used as follows. One is used at the far end to attach to the support line. The end of the wire is already passed through a hole in the insulator and knotted. The support line can be simply run through the insulator and tied in a common “granny” knot. The antenna wire is run thorough the second insulator and not tied. The second support line also is passed through, but tied to the insulator. This allows the antenna wire to "free float" for ease of erection. The third insulator is tied to the lowest part of the antenna and another support line is passed through the insulator and tied off to a support. The free end of the wire goes to the antenna tuner.

Mounting and orientation of the counterpoise quarter-wave wire connected to the ground side of the tuner is non-critical. Most of the time it can simply be laid out on the ground out of the way, but not coiled up. Its primary purpose is to decouple the feed line to the antenna tuner by providing low impedance to ground. If a large metal object or very short ground connection is available, the counterpoise may not be needed.

Worked All Continents (WAC)

In recognition of international two-way amateur radio communication, the International Amateur Radio Union (IARU) issues Worked-All-Continents certificates to amateur radio stations of the world.

Qualification for the WAC award is based on an examination by the International Secretariat or a member society of the IARU of QSL cards that the applicant has received from other amateur stations in each of the six continental areas of the world. All contacts must be made from the same country or separate territory within the same continental area of the world.

All QSL cards (no photocopies) must show the mode and/or band for any endorsement ap-

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PO Box / Posbus 33211, Fichardt Park, 9317
e-mail: zs4bfn@gmail.com Web: http://www.zs4bfn.co.za

(From page 2)

18 Apr - World Amateur Radio Day
25 Apr - HABEX-10 launch
27 Apr - Freedom Day
28 Apr - Carina, wife of Dennis, ZS4BS; Anna-Marie, wife of Andre, ZS4APA

(Hamnet Contest from page 9)

plied for.

Contacts made on 10, 18 and 24 MHz or via satellites are void for the 5-band certificate and 6-band endorsement. All contacts for the QRP endorsement must be made on or after 1 January 1985 while running a maximum power of 5 watts output or 10 watts input.

The following information should be helpful in determining the continental area of a station located adjacent to a continental boundary. North America includes Greenland (OX) and Panama (HP). South America includes Trinidad & Tobago (9Y), Aruba (P4), Curacao & Bonaire (PJ2-4) and Easter Island (CE0). Oceania includes Minami Torishima (JD1), Philippines (DU), Eastern Malaysia (9M6-8) and Indonesia (YB). Asia includes Ogasawara Islands (JD1), Maldives (8Q), Abu Ail Island (J2/A), Cyprus (5B, ZC4), Eastern Turkey (TA2-9) and Georgia (4L). Europe includes the fourth and sixth call areas of Russia (R1-6), Istanbul (TA1), all Italian islands (I) and Azores (CU). Africa includes Ceuta & Melilla (EA9), Madeira (CT3), Gan Island (8Q), French Austral Territory (FT), Socotra Island (7O), and Heard Island (VK0).

For amateurs in the United States or countries without IARU representation. WAC application forms are available in MS Word www.iaru.org/wac/wac.doc and Adobe PDF format www.iaru.org/wac/wac.pdf. Once completed, applications should be directed to the WAC Awards Manager, ARRL, 225 Main Street, Newington, CT USA 06111. After verification, the cards will be returned and the award sent soon afterward.

Also, approved DXCC card checkers can verify WAC program applications. For the latest list of DXCC card checkers visit www.arrl.org/awards/dxcc. There is a $13.00 fee for US applicants. Sufficient return postage, or, a self-addressed stamped envelope, is required for the return of QSL cards. US amateurs must have current ARRL membership. Membership in an IARU member society is required for all applicants. At the present time credits in the ARRL Logbook of The World (LoTW) system cannot be claimed for WAC credit. Applicants who have a current DXCC award in the DXCC computer system can apply for WAC by completing the WAC application form and sending it to the address noted above, listing credits to be claimed on the application form. In this case QSL cards are not required. Send questions to wac@arrl.org.

For other amateurs. Applicants must be members of their national amateur radio societies affiliated with the IARU and apply through the society. For South African Radio League members, you can send your application to Tjerk Lammers, ZS6P.

Afrika Wysheid

Forgiveness says you are given another chance to make a new beginning. – Desmond Tutu

Het jy al ooit gewens dat jy iets oor kon begin? Dalk het 'n drooggemaak in 'n verhouding of dalk het 'n verkeerde keuse jou gepootjie. In sulke gevalle sou dit lekker wees om te kan oor begin. Daar is sekere onherroeplike situasies, maar in die meeste gevalle is dit moontlik om 'n nuwe begin te maak. Die geheim is vergifnis. Ons moet leer om onsself te vergewe vir ons foute en dan om ander te vergewe vir hulle foute. Wanneer ons mekaar vergewe, kan ons almal oor begin. Vandag is opstanding Sondag, die dag van 'n nuwe begin. Ek is *vrygespreek, omdat ek in Christus glo* (Fil 3:9).

Jy is vergewe. Waarmee gaan jy nuut begin hierdie week?

© Leon M Foot (ZS4Y)