

Radio ZS

Volume 60 No./Nr 5

November - December 2007
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*A 40 m Direct Conversion Receiver
SARL – HMO Beacon Project
Determine True North*



Amateur Radio - Communication Technology in Action

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SOUTH AFRICAN RADIO LEAGUE
SUID-AFRIKAANSE RADIO-LIGA

RADIO ZS



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FRONT COVER / VOORBLAD

Bernie, ZS4TX and Barney, ZS4U working the DX from ZS9X
during the 2007 CQ WW DX Phone Contest

Bernie, ZS4TX en Barney, ZS4U werk DX vanaf ZS9X tydens
die 2007 CQ WW DX Foon kompetisie

Radio Technology in Action

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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 of die more ontvou,
Eer hul herinnering – ons sal onthou."

Servaas Harmsen, ZS6XL
Derrick George Hellyer, ZS6AWU / ZS5EU / ZS1EU
Bernie Ginsberg, ZS6ANU
Hennie Cilliers, ZS6BSF



CQ de ZS6GJH



Another year has flown by. For Amateur Radio it was a good year. The SARL took over the issuing of the HAREC and ZU License certificates from ICASA which helped us to substantially reduce the entry cost to amateur radio. The exam fee, inclusive of licence application and license fee for the first year or part thereof, is now only R300. Students under 25 years of age get a R100 reduction and pay only R200.

We have paid a lot of attention to the SARL website and are continuing with the process of providing more value for members. To this extent we have increased the frequency of Radio ZS to 6 times per year.

Power Line Telecommunication is a serious problem that the SARL has been working on. We expect that by the time you are reading this, the draft regulations for type approval will have been gazetted for comment. The SARL is already in the process of preparing a submission to ICASA opposing certain aspects contained in the draft. Although the draft once gazetted as the regulation is only an interim measure until the international bodies come to a final agreement, we want to make sure that Amateur Radio is not jeopardised in any way, not now and not in the future.

To this extent our numbers add strength to our argument. I know that I have been singing this song for a few years, it now has a new upbeat rhythm to it. It is now more important

than ever before. If every member convinces a non-member to join now, the picture could look a whole lot stronger in the New Year. Our numbers have grown over the past year but not nearly enough.

We are working on revisions to the regulations, particularly to include the extended 40 metre band and the newly, by WRC07 agreed, VLF band. Regulatory processes are slow but with changes at ICASA I believe that we will make progress early in the New Year. One must bear in mind that Sentech is broadcasting in the 7100 – 7200 kHz spectrum on behalf of international clients which complicates our negotiations.

With the festive season ahead of us, I would like to wish you and your families happy holidays and a prosperous and successful 2008. May Amateur radio prosper for you to continue to enjoy

73

Graham Hartlett, ZS6GJH
President



Ham Pride: Our Legacies and Traditions

By Dave Ingram, K4TWJ



One in a Series

As encouragement to join amateur radio's world of globe-spanning HF communications, our previous two "Ham Prides" overviewed the many attractions of Morse code, keys and operating CW. This time we take another step in that direction to discuss how you can get started in HF the easy and low-cost way with QRP.

Say you never considered operating HF with QRP, possibly assuming four or five watts was not enough power to span long distances? Think again! Under average to good band conditions, radio amateurs often communicate hundreds and sometimes thousands of miles with QRP. It is the hottest and most rapidly growing area of special interests in amateur radio today and it is very beneficial for emergency communications during these uncertain times. You can start "low key" style by home-assembling a simple two or three transistor transmitter and mating it with a portable AM/SSB shortwave radio and dipole antenna. All you need do is promise yourself you will give HF and CW a go. Why CW? Unlike SSB and other voice modes, you can copy dots and dashes of Morse code right down to the noise level - when voices are not discernible. CW just reaches out best, and that fact is proven every day!

Do we sense some readers saying their knowledge of Morse code and CW operating techniques are too

weak for on-the-air use? Relax. At least 75 percent of usual and DX QSOs follow a preset format of exchanging RST, QTH and name (usually in that exact order). Practice hearing/copying those abbreviations a few days and the sounds will become so familiar that you will habitually start listening to recognize the numbers following RST and the letters comprising the other operator's QTH. Your second or concluding transmission is also easy...it is traditionally "TNX QSO and 73". The repetitiveness of such basic/one minute QSOs make them easy, fun and short burst of super DXcitement. We must mention that HFing can become pleasantly addictive however, especially considering the fact you are DX to amateurs in other countries - and they will clamour to exchange RST and QTH info with you.

Like to pursue some really special HF activities? Try operating QRP mobile - not while moving, but when stopped or riding as a passenger. Walking HF portable and bicycle QRP mobile are additional treats you can thoroughly enjoy with small battery powered gear, and the concept is so novel that operators will wait in line to contact you. Yes, you can do it! Have fun and remember to send a picture of your setup to this magazine

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(Ham Pride from page 6)

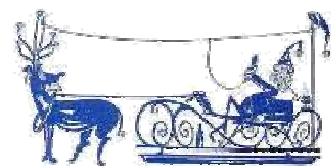
so everyone can admire your clever QRP item is the “Sudden” receiver ingenuity. Then you too will experience first-hand the sheer pride in being an HF-active amateur! 73, Dave, K4TWJ

Photo 1. One of the most continuously popular items in home-assembled QRP is the famous “Tuna Tin 2” transmitter designed W1FB and reproduced by numerous QRP clubs every few years since that time. Little 2 transistor delight runs 300 milliwatts on 40 metres and has been the focal point of many exciting DX QSOs.

Kits are presently available from www.QRPme.com.

Photo 2. Another always popular QRP item is the “Sudden” receiver designed and produced as kits by amateurs in the U.S.A. and the U.K. Easy to assemble 2-IC circuit is quite sensitive and works very good for its low cost. Kits are also available from www.QRPme.com.

Photo 3. Unbelievable but true: Bill Parker, W8QZA, has worked over 300 countries with QRP. His rig is the little small Yaesu FT-817 atop white box on desk. He also won first place in the QRP category of CQ 2006 Worldwide DX Contest as TI5N. Bill is so keen on QRP that he has never owned a 100 watt rig.



SARL – HMO Beacon Programme well on its way

The South African Radio League and the Hermanus Magnetic Observatory Beacon project is well on its way with the first six beacons operating. The project will ultimately have 30 beacons around the country operating on 7023 kHz in phase 1 and 60 in phase 2.

According to Dr Lee-Anne McKinnell, ZS2LAW, Ionospheric Research Physicist at the Hermanus Magnetic Observatory, the beacon service will be of great value in confirming actual propagation conditions in real time for research and prediction of the ionosphere.”

The Space Physics Group of the HMO includes an active ionospheric component, and provides ionospheric data for the purpose of Space Weather predictions, which includes HF propagation prediction. The HMO has recently become the Space Weather Regional Warning Centre for

which includes amongst other parameters the provision of HF propagation predictions. The HMO will collect data from participating Radio Amateurs and



Dr Lee-Anne McKinnell, ZS2LAW

Educational Institutions detailing the actual propagation paths between different areas in the country. This information will then be correlated with the HF propagation predictions that have been made for the given paths.

(Continued on page 9)

Frequency	7023 kHz
Frequency Stability	+/- 20 Hz after 10 minute warm up
Antenna Impedance	50 Ohms
Output Power	40 mW PEP
Spurious radiation	less than 65 dB
Final Amplifier Efficiency	62% typical
Operating mode	ASK Morse Telegraphy
Keying Mechanism	micro controller & gate
Keying speed	8 WPM
Transmission intervals	phase #1 every 30 minutes phase #2 every 60 minutes Otherwise oscillator off in sleep mode
Transmission period	55 seconds
Text capacity	500 letters

(Continued from page 8)

In this way, a validation procedure can be implemented and confidence levels placed on the predictions provided by the Space Weather Centre.

The 40m beacon system has been modelled on the International Beacon Programme. Volunteer Amateur Stations situated in all areas of South Africa will be provided with a 40 mw automatic beacon that will transmit within a prescribed time slot. This time slot is unique to each transmitter. The transmission period will be 55 seconds.

The 40 mw level has been determined by on the air experiments between a station in Gauteng and a station near East London in the Eastern Cape. This level has been found to give the best dynamic range of varying propagation conditions

The beacon transmitter operates in the CW mode on a frequency of 7023 kHz. Each transmitter will be identical and conform to the specification as shown on page 9.

Circuit Description

The Wall Transformer

A 240/12 VAC 1VA5 transformer has been wound with separate primary and secondary coils, not overlapping and on separate parts of the core. Additional insulation added together with a primary to secondary screen to reduce spurious emission onto the mains and provide a capacitance to lightning discharge. This led to the disadvantage of a high reactance supply and a primary inductance close to resonance. A resistor is inserted in series with the primary to reduce the Q and thus avoid a 50 Hz

resonant condition reducing the fast lightning discharge risk. The resistor serves a second function of acting as a load for the MOV across the primary winding thus avoiding MOV burn out. In addition, the secondary of the transformer is connected to a diode bridge with filter capacitor. The bridge and capacitor are the first stage of rectification but are not the main DC supply components. The supply still has a DC ripple component. The idea behind having an additional rectifier bridge and filters is two fold.

✓ To provide a low impedance to fast rising transients

✓ The DC provided is easily decoupled for RF noise to and from the beacon leaving the main supply beacon RF free.

Power supply

Three conditions had to be met.

✓ The low voltage supply for the uP and the driver stage must be as close to 5 VDC as possible to give the advantages of a power band before the battery voltage of 3V3 to 4V5 takes over to protect the clock function.

✓ A continuous supply is required on the uP to maintain the clock.

✓ Provision had to be made to program the uP a separate unloaded 5V to the uP had to be provided.

To achieve this diode switching was used between a 5V6 regulator, the battery and the 5V program pin.

The DC supply goes into a conventional bridge with ceramic decoupling capacitors and electrolytic filter capacitors.

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A 40 m Direct Conversion Receiver project to upgrade from ZR to ZS

Hannes Coetzee, ZS6BZP, B.Eng Elektronik (Pretoria)

A simple receiver with a low component count is described for the 40m Amateur band. A compact loop antenna is part of the receiver; thus no need to invest in tall towers and huge antennas to get very useful results. No need for a power supply either as the receiver is powered from a small 9 Volt battery. Constructing this receiver is a pleasant method to improve your knowledge and skills and also to upgrade to an unrestricted (ZS) licence.

Introduction

Although there have been many designs for simple receivers published in the past, all of them suffered in my opinion from some or the other serious shortcoming. For example many designs are not sensitive enough to drive a small loudspeaker. This feature is especially handy when giving demonstrations at JOTA, CQ Hou Koers and in the classroom. Some designs also make use of inductors and toroids that must be wound by the novice constructor. To some inexperienced persons this may be a daunting task. And then there are designs that make use of crystal controlled oscillators. This restricts the receiver to a very narrow portion of the 40m band and does not expose the enthusiastic newcomer to all the exciting aspects of the hobby. Use is also sometimes made of a variable capacitor (for the local oscillator) that may be very difficult to source in the cell phone age. Once again this is not suitable for the novice. I'm not even mentioning some other designs that make use of such exotic components that people in Africa haven't even heard of.

All the above gripes as well as low current consumption and low compo-

nent count are addressed in this design.

Description

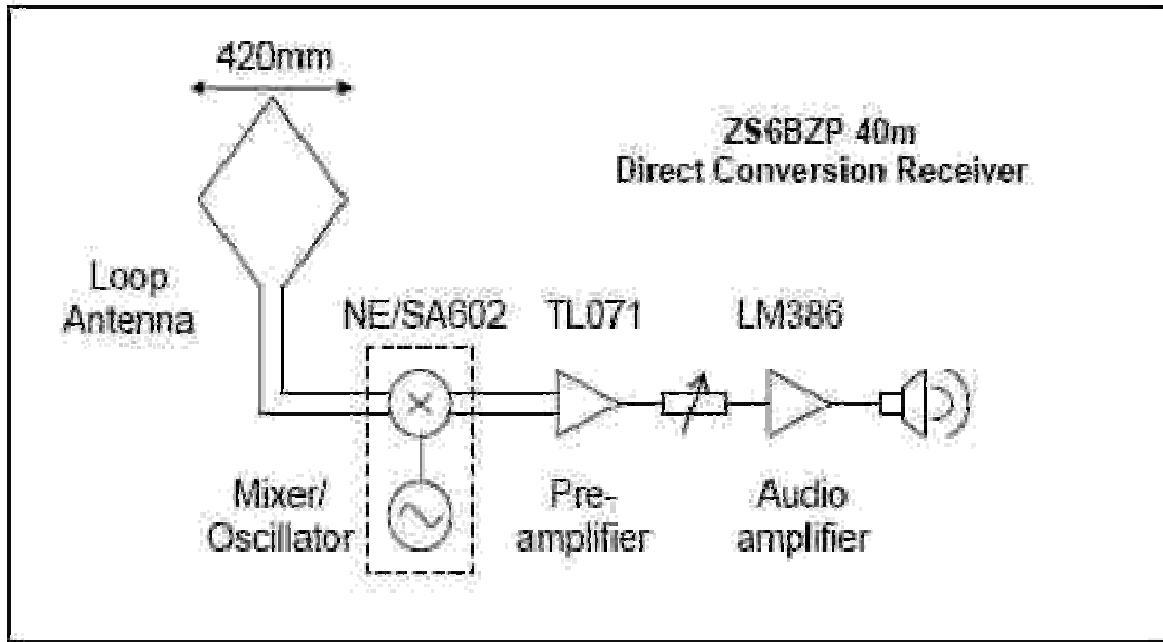
The receiver functions on the direct conversion principle. Although the receiver actually demodulates double sideband, suppressed carrier signals, it is possible to also demodulate single sideband (both upper and lower sideband) as well as Morse and Data signals. If care is taken while tuning the receiver, it is also possible to demodulate AM signals to some extent.

The local oscillator (LO) functions at very nearly the same frequency as the signal of interest. The output of the mixing process between the received signal and the LO signal is two signals, one being the sum of the signals at 14 MHz and the other the difference that lies in the audio band. In this receiver use is made of the audio band component. This signal is filtered and then amplified until the level is sufficient to drive a small loudspeaker.

Antenna

A compact, single turn resonant

(Continued on page 11)



(Direct Conversion Receiver from page 10)

loop antenna forms part of the receiver and also acts as input band-pass filter. It is in the shape of a diamond with a diameter of 42 cm. The antenna is brought to resonance in the 40m band with the aid of CV1 and C5 (270 pF). Dowel sticks are used to form a cross for the approximately 1 mm diameter copper wire used for the antenna element.

The diameter of the loop can be increased, resulting in a more efficient antenna (with the necessary adjustment to the value of C5), but I have found the diameter of 42 cm quite optimum. It is compact enough not to be unwieldy while still intercepting adequate signal power.

It is also possible to make use of a shielded loop to reduce the effect of local interference (computers, video displays, etc) but that is beyond the scope of this article.

The described loop antenna is already amazing effective in reducing local interference simply by turning it to position one of the nulls on the source of interference.

RF Strip

Use is made of the ever-popular NE/SA602 IC to fulfil all the required RF functions. (It is becoming difficult to source a leaded version of the '602 but a SMD version can be used on a dedicated SMD to leaded carrier board.) The resonant loop antenna is directly connected to the inputs of the balanced mixer stage. The input impedance of the mixer is high enough (3 kΩ) not to load the loop antenna. This ensures maximum energy transfer while also helping to filter unwanted out-of-band signals.

The mixer is fed with a balanced signal (by the antenna) and the output is also implemented as a balanced audio signal. This helps to reduce AM breakthrough from very strong commercial transmitters, a serious drawback of Direct Conversion receivers.

The onboard oscillator of the NE/SA602 is used in an inductor, variable capacitor (L-C) configuration. The oscillating frequency is electroni-

(Continued on page 12)

(Direct Conversion Receiver from page 11)

cally adjusted by varying the reverse bias on the Varactor diode, D1 (BB809). The current 40m amateur band is covered with some overlap on both the bottom and top end. The centre frequency of the oscillator is aligned with a trimming capacitor (CV2), due to component tolerances.

It is good design practice to use a frequency resolution of less than 30 kHz/turn of the VFO knob, but a compromise is required for the sake of simplicity and low cost. An additional fine-tune knob is implemented to help with the tuning.

The inductor used for the oscillator is a bought out, moulded choke. Although the temperature stability is not as good as some more exotic solutions (toroides, home brew coils, etc), it is still adequate for this application and helps to simplify construction. The moulded choke has the same shape as a ¼ Watt resistor and is nearly as readily available.

Audio Pre-amplifier

A readily available, low noise operational amplifier (IC2, TL071) is used to terminate the balanced outputs of the '602 mixer. The output impedance of 1.5 kΩ per output of the '602 is used in conjunction with the 22 kΩ feedback resistors in a differential configuration to obtain a voltage gain of nearly 24 dB. The coupling capacitors' (C4 and C10, 330 nF) value was chosen to implement a simple 330 Hz high-pass filter with the 1.5kΩ output impedance of the '602. ($F=1/(2\pi RC)$)

The 2.2 nF capacitors in parallel with the 22 kΩ feedback resistors implement a simple 3.3 kHz low-pass filter, giving some selectivity to the

stadium and to reduce wide band noise.

Audio Amplifier

The very common LM386N audio amplifier IC is used. Note that the -3 suffix is the preferred component if a National version of this IC is used due to the higher operating voltage specification. The LM386N-1 is intended for a 6 V supply and may have a negative effect on the reliability of the circuit when run from a 9 V battery.

The input to the audio amplifier is via the 10 kΩ potentiometer (P1) implemented as the volume control. The 10 uF (C11) capacitor between pins 1 and 8 defines a gain of 200x for the '386. With the gain of the previous stages included the total gain of the receiver is adequate to drive a small loudspeaker ($\geq 8\Omega$) to useful levels.

The 10 Ω / 10 nF (R2, C13) combination at the output of the amplifier protects it against RF interference and breakthrough from transmitters in the vicinity. It also ensures that the output is properly terminated for all frequencies.

Construction

Take proper anti-static protection measures before commencing construction of the receiver. It is highly recommended that the receiver is built in stages and that construction of the next stage commences only after successful completion of the previous stage.

It is best to start with the audio amplifier. After completion simply touching the input pin can easily test this stage. A hum should be heard on the

(Continued on page 13)

(Direct Conversion Receiver from page 12)

loudspeaker. Alternatively the output of a CD player or computer audio card can be connected to the volume control to confirm correct functionality of the audio amplifier. (The 9 V battery as well as the polarity protection diode (D2) must be connected/fitted before commencing any tests.)

Next is the 5 V power supply including the voltage regulator (IC4, 78L05) and the applicable decoupling capacitors. Confirm the 5 V-output level with the aid of a multi-meter.

The audio pre-amplifier is next in line. After completion the hum level on the loudspeaker should be little bit louder when touching the inputs of IC2 (TL071).

Only the NE/SA602 and components needed for the RF stage (including the loop antenna) now remains. Once completed a 40m Ham band receiver can be used to listen to the oscillator signal.

If a receiver is not available of-the-air signals must be used. During night-time there are many strong AM broadcasts just above the amateur band.

Alignment

Tune the receiver to the high frequency limit. Adjust the frequency trimming capacitor until the signals of the strong AM broadcast stations are heard (during night-time). Adjusting the trimming capacitor must be done with a nonconductive screwdriver, etc. This ensures that the 40m Amateur band is within the tuning range of the receiver.

Tune the receiver to more-or-less the centre of the band (7.050 MHz). Once again use a non-conductive

screwdriver to adjust the antenna trimming capacitor (CV1) for maximum signal (or noise). Care must be taken to ensure that the antenna is optimally tuned, as the tuning is relatively sharp.

Operating

Switch the receiver on and adjust the volume control until noise can be heard on the loudspeaker. Adjust the frequency control until a signal is heard. Adjust the frequency control slowly while the station is transmitting (if listening to speech). Final tuning is done with the "Fine" knob until the audio is clear.

It is important to only adjust the fine-tuning when the signal is on the air. The tuning is relatively coarse and it is easy to tune away from the signal. Due to the fact that the receiver operates on the Double Sideband, suppressed carrier principle it is sometimes necessary to tune "through" a signal to get to the right sideband. It sounds much more difficult than what it is and after a few seconds practising the receiver becomes a joy to operate.

Most of the frequency drift happens in the first ten minutes after switching on. After that the stability is adequate to listen to the SARL bulletin for example.

It is also possible to connect the receiver to a computer sound card. There are many programs available on the Internet to demodulate Morse, RTTY, Slowscan TV, etc. It is also possible to display the received audio spectrum and to experiment with Software Defined Radio (SDR), to name just a few applications.

(Continued on page 14)

(Direct Conversion Receiver from page 13)

The receiver is eminently suitable for receiving signals from Southern Africa, i.e. local signals. It is also possible to receive some of the stronger DX signals after sundown. Not bad for such a simple and compact receiver! There is also the satisfaction of operating equipment that you've built yourself and also upgrade your licence in the process.

Kits

I'm busy putting a few kits together to make it easier for interested people to upgrade their licenses. The kit in-

cludes everything needed to build the receiver (professionally manufactured PC-board, components, knobs, connectors, engraved and drilled box, etc). Only exclusion is the dowel stick needed for the antenna as this item is not suitable for mailing. It can however be easily obtained from most hardware stores. The total cost of the kit is R350 (excluding postage).

Note from the editor: The circuit diagram is available on the web site of the SA Amateur Radio Development Trust. It is too big to reproduce here.

(SARL/HMO Beacon from page 9)

Micro Controller

Seven different combinations of oscillator and uP were tried in practice. Arrangements that included using the uP oscillator and its auxiliary oscillators as the main oscillator source. All but one is having noise severe disadvantages. Finally a separate oscillator and driver from the uP gave the best advantages, and thus this left the uP to take care of the final amplifier control, time standard, synchronization, and sending the CW message.

The 16F627 was chosen first for its PWM ability thus allowing the final to be driven at different phase angles providing a digitally controlled class C amplifier

In addition, the interrupt controller proved ideal together with the LP mode and low cost.

Oscillator & Driver

The driver was the most important consideration, the oscillator could be any type, but must produce a square

wave. The additional harmonics of the square wave output could be easily suppressed by integration but the final amplifier conditions were vital to produce a clean signal.

It was considered advantageous to control the conducting angle of the final amplifier, by doing this the efficiency and the total harmonic output could be reduced better than a sinusoidal oscillator and analogue techniques. The HCT132 was considered ideal as it matched the uP job of controlling the final amplifier and in addition provided a small SMD footprint that led to a RF clean layout.

Final Amplifier

The final amplifier power of 40 mW was decided by practical tests and observation. This was mainly of the 7025 kHz George Beacon. The power of 40 mW was chosen so that the greatest change in propagation could be detected.

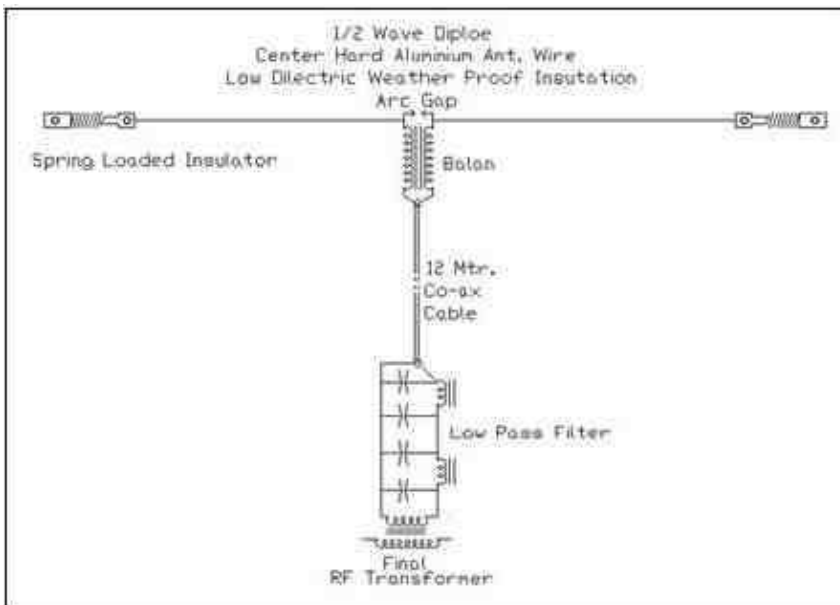
A higher power pushed most receivers AGC and masked the prevail-

(Continued on page 15)

(SARL/HMO Beacon from page 14)

ing conditions.

The task of having transmitters on the air continually led to it being mandatory to use the lowest power possible and the shortest time needed for the task. It was decided very early on that the final amplifier should produce 6 dB more than the required output thus providing the low



pass filter with many design advantages. The power loss after 160 mW was a small price to pay for the pending harmonic attenuation. The 2N2219a is an old transistor and a well-proven thoroughbred.

The above arrangement made it possible to provide full power with a SWR of 1.6 and an ability to withstand infinite SWR both open and short circuit.

Antenna

It was decided to supply the antenna with the beacon to control the lightning protection mechanism. The antenna is a half wave dipole connected by a XL 300 ohm Balun to 50-ohm coax cable.

The balun provides enough isolation to effect complete independence of the groundside radiator and the detuning effects of the antenna when mounted low to near by objects.

The most important job of the balun is to provide a high impedance function to lightning discharge. The choke effect together with the capacitance of the coax cable, leads to high

a voltage rise across the arc gap at the centre connection of the dipole thus discharging a lot of the total energy.

The resulting wave front now travels down the outer of the coax but reflects at the bottom back to the antenna system. For this reason, the output transformer and LPF are isolated from ground. The resulting transients are thus not imposed on the transmitter ground being contained as much as the coupling allows to the antenna system, which can handle them more easily.

The CW Message

The beacons transmit CW at around 8 words per minutes and will use the following message format: The example given here is for ZS6SRL

DE ZS6SRL BCN(spc) LOC KG33WV (followed by message), this will be followed by the tuning signal consisting of long dashes corresponding to the call sign division.

For example, if the beacon is lo-

(Continued on page 18)

lohi



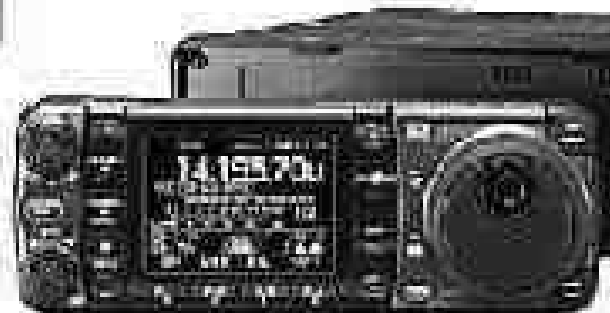
lohi NES10-2 Noise Eliminating Speaker
Incorporates Digital Signal Processing to
remove unwanted noise and interference
Fully adaptive noise cancelling
Noise cancellation 9-35dB
4-65dB tone reduction
8 user selectable noise cancelling levels



MFJ259B SWR/RF Analyzer
Read SWR and Impedance 1.8-170MHz
Determine Velocity Factor, coax cable loss in dB,
length of coax and distance to short
Built-in frequency counter
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Icom IC-7000 HF/VHF/UHF Mobile Transceiver
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RIT
VFO A/B
Digital IF
S/R/SWR Meter
50 Watts 2M, 35 Watts 440
All band Multimode
CW Receive Reverse
Memory Keyer
503 Alpha
Preamp
1 Hz Dis
Twin PE
100 Wa
Manual
Remova
Mini Sp
2.5" Co

9 Carnation Street,
Gallo Manor

Tel: +27 (11)802-2976 o

Fax: +27 (11)804-4847 f

Mobile: +27 (82)974-8248

Email: radioacc@telkomsa.net

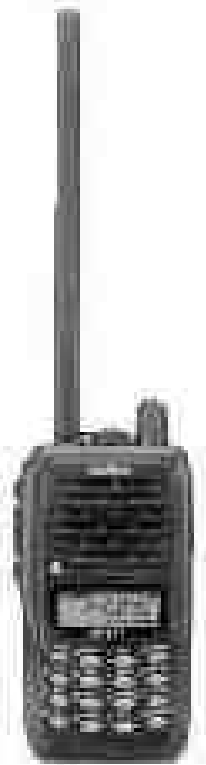
Website: www.radioacc.co.za

s & Data Modems

CESSORIES CK88/18657/23

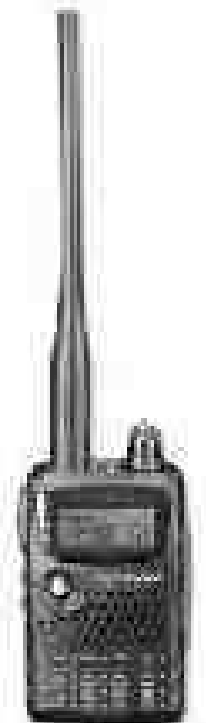


Alinco DJ-V17 VHF Handheld Transceiver
 New, two-touch repeater access
 High grade waterproof materials (submersible:
 1m/3ft. for 30 min.)
 Rugged polycarbonate body resists dirt, dust and
 moisture
 Highly visible backlit alphanumeric display
 Direct frequency input through illuminated keypad
 200 Memories and one call channel
 VFO, Memory and Scan modes



KENWOOD

Kenwood TH-F7E Dual Band Handheld
 Transceiver
 Simultaneous 2 frequency RX, even on the same
 band
 0.1-1300MHz high-frequency range RX (Sub B
 band)
 FM/FM-W/FM-N/AM plus SSB/CW receive
 7.4V 1550mAh lithium-ion battery for 5W output
 and extended operation
 1200/9600bps packet function (ext. TNC)



Receiver:
 10 memories
 Attenuator
 Display
 T
 HF+6M
 Notch
 Head
 Spectrum Scope
 TFT



PO Box 691,
 Gallo Manor
 2052 Rep. of South Africa

(SARL/HMO Beacon from page 15)

cated in division 6 the beacon will transmit 6 long dashes. Next will be the s-meter signal consisting of 4 dots. The s-meter signal varies with power from 40 mW to 5 mW in four steps. This is to ease reporting by students on receivers not fitted with an "S" meter. If they hear 4 dots, it is 59 If they hear 2 dots it is 52 etc.



The Beacon project is an evolving project

and during the testing of the initial six, some of the sequence timing problems have been resolved. John Wil-

son gives frequent updates on the project, which are posted, on www.sarl.org.za and on the HMO website (link from SARL web). Click on beacon and involved in the construc-

JOTA from Mafikeng

Eddie Leighton, ZS6BNE

Eddie gives his impression of the JOTA activities from the Scene at Mafikeng. Evan, ZS6EVD and John, ZR6ANG had arranged the event.

When I walked into the hall at SCENE yesterday morning [21 Oct], I was welcomed with the sight of young Scouts hovering around the amateur radio station set up in a 'Corner'. Evan, ZS6EVD manning his TS-130S with a long wire and tuner, John, ZR6ANG manning his laptop and wireless connection (quite a few meters away, mind you!) to the Scene's ADSL router in the office.

mounted inside) and I manned the TS-130S, giving the Scouts a chance to say their name and ask a question. I was amazed at the questions the Scouts and Guides had on their cell-phones, like "What can you swallow that can swallow you?" Answer, "Water". This is where I was impressed! They were asking questions via radio and getting answers from someone "they did not know." Evan knew most of the children by name and their personalities! When he told

Evan went out to my car (Icom 706

(Continued on page 19)

(Continued from page 18)

them over the radio who he was and where he was, the kids rushed out to look for him.

The Guides, Scouts and Evan,ZS6EVD



Technology was brought to SCENE this weekend too.

Evan's dad, Noel, VK6DAV in Australia, spoke to us via Echo-link and Skype video communications were also used. This really impressed all of us. I had the opportunity to meet Evan's dad "in person!" I was amazed!



Evan, I want to thank you for the fantastic job you did in organising, not only the Mafikeng Scout's 100-year celebrations but this year's JOTA as well. You and John were there when called for duty and I must apologise that I could not be there for longer than a few hours on Sunday.

From front to back: John, ZR6ANG, Evan, ZS6EVD and Theo - manager SCENE with some Scouts and Guides

Evan, I can see you and John made an impact on these young children's lives and that through ham radio. Be assured they will remember these times forever!



Well done guys!!!!!!

On the screen, Noel, VK6DAV, John manning the controls, a Scout holding the microphone and Evan holding the video camera.

3DA0WW, Swaziland CQ WW DX SSB 2007

Donovan van Loggerenberg, ZS2DL

At the time of being invited to fiers, all protected by Dune Star and join the 3DA0WW team, I Ice filters. All the equipment was was tasked with the article. sponsored by African DX Safaris. So here it is.

After the initial fears of being question about all the radio equipment in our vehicles at the border post, we arrived at our destination, Hawane, Swaziland and without any delays started erecting the antennas. We were most fortunate that the main tower is a permanent fixture at the Hawane Resort being a 30-metre lattice one. At our disposal on this tower was an A4S from Cushcraft for 14, 21 and 28 MHz, below that an A3WS for the WARC bands and below that a 4 Square for 7 MHz. A second portable tower was erected also at around 20 metres. With a second A4S and a 4 square for 3.5 MHz. A further distance away, we managed to erect a vertical antenna, which we could also use on 3.5 MHz if needed, but it would also be our only antenna for 1.8 MHz. There was also a Receive loop put up to help us copy during periods of severe static. I think the hardest part of the job was the rolling out of a 100 radials below all the various antenna structures, some 8 kilometres worth of walking and as later transpired another 8 kilometres to roll them up again!

The station itself was erected in no time with a network of laptop computers and 2 x FT1000's as well as the trusty Alpha 78 and TL922 ampli-



Donovan, ZS2DI and Daniel, ZS6JR

Band	QSOs	Points	Country	Zone
1,8	4	8	4	4
3,5	81	215	23	16
7	547	1607	71	30
14	864	2521	101	28
21	2138	6354	110	29
28	1028	3046	78	16
Total	4662	13751	387	123
Score		7 013 010		

The big disappointment up to the contest was the weather and we got soaked every time something needed to be done on the antenna site.

The operators for the contest were Donovan, ZS2DL, Rhy, ZS6DXB and Daniel, ZS6JR. We were also joined

(Continued on page 22)

Sukses met HF-Kompetisies

Jan Botha, ZS4JAN

Om te kompeteer d.m.v. radiokommunikasie is dieselfde soos met enige ander sportsoort; om vas te stel wie die beste is tydens die geleentheid. Hoe meer tyd en energie jy insit, hoe beter sal die eindresultaat wees soos met enige sportsoort.

Wat is die mikpunt om voor te streef?

- Jy wil No 1 wees in die wêreld (WRTC);
- Jy wil graag No 1 wees in 'n spesifieke kompetisie (CQ WW);
- Jy jag 'n trofee (die SARL het baie van hulle);
- Jy jag sertifikate (WAZS en DXCC).

Voordat ons kyk na 'n tipiese kompetisiesitasie is daar 'n paar ander baie belangrike punte om te onthou!

✓ Kry 'n DX- / kompetisiekalender in die hande. Die kalender het die meeste geleenthede van die jaar daarop en jy kan jou tuisbeplanning daarvolgens doen. (Die SARL het so 'n kalender en die nuusblad HF Hapopenings per e-pos).

✓ Kry 'n afskrif van die kompetisiereëls voordat jy begin. Met die reëls kan jy strategies jou kompetisie beplan.

✓ Die posadres vir jou logstaat is belangrik. Logstate wat in Cabrilloformaat elektronies gepos word, word bevestig met 'n volgnommer as bewys tydens internasionale kompetisies (contest Robot).

✓ Indien jy van die lokale poswese gebruik maak is dit 'n goeie idee om die brief dubbel te pos. Die een brief

Jan, ZS4JAN discusses the requirements of success HF Contesting. In this article he looks at why do we take part in contests - what do we want to achieve, preparation for a contest - the before, during and after and what basic equipment you should have to participate. Jan summarises by saying know the rules, the band conditions, the capability of your equipment and yourself and some luck. And practice, practice and practice!

met normale slakkepos en die tweede brief met "fast mail". Sodoende kan jy seker wees, die logstate sal by die bestemming aankom.

Kompetisiesitasies hoef nie groot en duur te wees soos ons in die meeste van die radiotydskrifte sien nie. Begin klein en doen ondervinding op in die lokale SARL-kompetisies. Daar is ongeveer 23 SARL-kompetisies plus klubkompetisies in die jaar om jou te help om ondervinding op te doen.

Met geen kompetisie-ondervinding kan iets soos die CQ WW dalk net jou moed breek om in die toekoms deel te neem. Ek wil 'n baie belangrike punt deel:

➤ 'n Kompetisie strek nie net van die begintyd tot die eindtyd nie ! (15:00 – 18:00).

➤ Jy moet dae voor die tyd al die bandkondisies ontleed en daarvolgens strategiese beplanning doen, en jou reëls leer.

➤ Na die aksie agter die mikrofoon of sleutel moet die logstate gekontroleer word, punte word verwerk en die log word dan gepos.

➤ Die kompetisie is eers verby sodra

(Na bladsy 22)

(Sukses met HF vanaf bladsy 21)

die sperdatum verstreke is wat die logstate in moes wees. Die kwaliteit van jou logstaat het ook 'n invloed op die eindtelling, (duplikaatroepseine, verkeerde inskrywings).

Wat benodig ek in my kompetisiestasio?

'n **Elektroniese log** is 'n handige middel en kan oneindige funksies in jou stasio hanteer. 'n Basiese rekenaar soos 'n 486 of Pentium 1 sal die DOS-programme met gemak kan hanteer (bv. TRlog, CT). Windows-gebaseerde programme sluit in N1MM, Winlog32 as 'n basiese program.

Kompetisies gaan oor spoed en effektiwiteit m.a.w. jy soek jou hande op die sleutelbord van die rekenaar. Die radiotoerusting is opgestel links en regs van jou.

Die **horlosie** en datum op die rekenaar is akkuraat gestel om jou kontakte reg te log, en om te weet wanneer die kompetisie begin en eindig.

'n **Kopstel** wat die oorfone met

mikrofoon insluit is 'n wenner. Die radio se PTT word geaktiveer d.m.v. 'n **voetskakelaar**. Die rekenaarskerm is reg voor jou op 'n gemaklike hoogte. Jou radio is skuins van jou om jou hand toegang te gee tot beheerfunksies. Dit is die basiese uitleg van die binnekant van 'n kompetisiestasio.

'n Gemaklike **stoel** sal help om op die kompetisie te konsentreer i.p.v. die sitvlak.

Drink genoeg koeldrank/water om jou stembande en liggaam te help teen uitputting. As jy iets wil eet, moet dit maklik verteerbaar wees en nie vetterig nie. Vermy gaskoeldrank, alkohol en aartappelskyfies (chips). Dit laat jou liggaam ongemaklik voel en klink nie goed in die luidspreker van die ander stasio nie.

Om sukses in kompetisies te behaal moet jy **OEFEN, OEFEN, OEFEN**, jou reëls en bandkondisies ken, die vermoë van jou stasio en jouself verstaan; en laastens geluk hê.

In die volgende uitgawe sal ek meer konsentreer op hardeware vir jou kompetisiestasio.

(3DA0WW from page 20)

by Dave, ZS6AVM who was tasked with getting 18 MHz going. Something he succeeded in doing to the tune of 500 QSOs even though on a very casual basis, he operated under the call of 3DA0VM. He found it to be quite exciting and promised to be back next year but now wants to be part of the contest team...Hi. Before the contest, I was let loose on CW and RTTY just to get the ball rolling and managed around 450 QSOs on RTTY and around 200 on CW. These two modes really got the planet talk-

ing with rather large pileups and may be something to look into for separate trips in the future to this beautiful Mountain country that is the Kingdom of Swaziland.

There was a little time to sight see as well and we managed to pay the local glass blowing factory a visit.

The weekend of the contest was greeted by really bad band conditions, but nevertheless pileups of large proportions ensued anyway, with our main activity being 28, 21, 14 and 7 MHz weighing in with in excess

(Continued on page 23)

(3DA0WW from page 22)

of a 1 000 QSOs each. We managed to accrue some 4 800 QSOs and 7,000,000 points for contest weekend and thanks to the fantastic Heil Headsets the Static and noise was bearable.

One thing to also note is that Emil, LZ3HI from QSL Print in Bulgaria not only sponsored the QSL cards for the trip but also has agreed to act as QSL Manager for the CQ WW DX SSB 2007 and for future contest activations of 3DA0WW.

QSLing has become a bit of an issue to Rhy, ZS6DXB who is struggling to cope with the demand. WHAT was annoying during contest is when someone stops your run to ask you about the status of their QSL request from last year. So hopefully

our arrangement with Emil will prevent this from happening in the future.

With that, the curtain came down on our mini DXpedition for 2007, and all the radials had to be rolled up again.

Great fun was had by all and a discussion started about going some place even more sort after for a longer period of time, so...watch this space. I will be active during CQ WW CW with my home call of ZS2DL but cannot begin to expect the kind of pileups as we had in Swaziland.

Until next year, 3DA0WW saying thanks es 73's

QSL via LZ3HI. Emil Stoikov, LZ3HI, PO Box 8, 6000 Stara Zagora, Bulgaria. QSL via the Bureau or direct

ZS9X Contest Station

Early in 2006, some discussion took place in Bloemfontein about setting up a contest club and station to participate in various international contests. A suitable venue was available with a number of antennas already on the terrain. The site was originally a HF Telecommunication Station used by the South African National Defence Force (SANDF), but with developments in technology, has given way to modern technology such as satellite telecommunications. It is located on a hill about 20 km west of the city of Bloemfontein overlooking a military training area and the facility has its own accommodation facilities.

The Bloemfontein Defence Amateur Radio Club was established and the call sign ZS9X was allocated by

ICASA. The station was founded and developed by the following four Bloemfontein radio amateurs:

John, ZS4S - the commander of the Regional Signal Unit in the Free State; Barney, ZS4U - an attack helicopter pilot with the South African Air Force; Bernie, ZS4TX - a reserve force officer with the SA Army and owner of a telecommunications company in Bloemfontein and Dennis, ZS4BS - a sergeant major employed at the Simulation Centre, School of Armour.

ZS9X has three aims, namely:
A - Participation in DX competitions (all modes) as a single or as a multi operator operation; B - Development of amateur radio amongst the youth; and C - A station that can be utilised

(Continued on page 31)

Determine True North with high precision

John Fielding ZS5JF

Introduction

Radio amateurs need to align their azimuth rotators to point in the correct direction. Although this seems to be a simple exercise when dealing with very large antennas and short wavelengths in the microwave bands the errors can become significant. To put the problem into perspective let us look at two examples.

Example 1

A 144 MHz Yagi array consists of 4 long boom antennas. The predicted half-power beamwidth is approx 20° in the azimuth plane. Therefore a pointing inaccuracy of less than half the beamwidth is tolerable. This means the rotator only needs to be accurate to $\pm 10^\circ$.

Example 2

A parabolic antenna for 1.3 GHz for EME operation of 5 m diameter has a half-power beam width of approx 4° . Therefore the maximum error we can tolerate is half this value, or about $\pm 2^\circ$ maximum pointing inaccuracy.

Traditional Methods

The most common method of aligning an azimuth rotator is the magnetic compass. However, this can introduce large errors. Anyone who has used a compass is aware that being close to metal objects causes an error in the reading. It is for this reason that magnetic compasses on air-

craft and ships have compensating magnets to null out any induced error from the metal in the vessel.

Not only that but the exact location causes the true North indication to vary. The residual metallic ores below the surface of the ground can cause large deviations in the indicated reading. The magnetic dip angle also varies on an annual basis and depends on the position in the country.

The writer only needed about an hour of experimenting to realise that a magnetic compass was useless on his property. Two compasses were used, one a World War 1 type issued to British army troops and the other a modern Silva compass which is standard NATO issue to the armed forces. These are both high-grade instruments. Moving around in the front garden showed variations of up to 30° for as little as 50 m movement. This is because the QTH is situated on top a mountain with metallic ores in the substrata. Forget about taking a compass reading from on top of a tower amongst the antennas, the result will be wildly out!

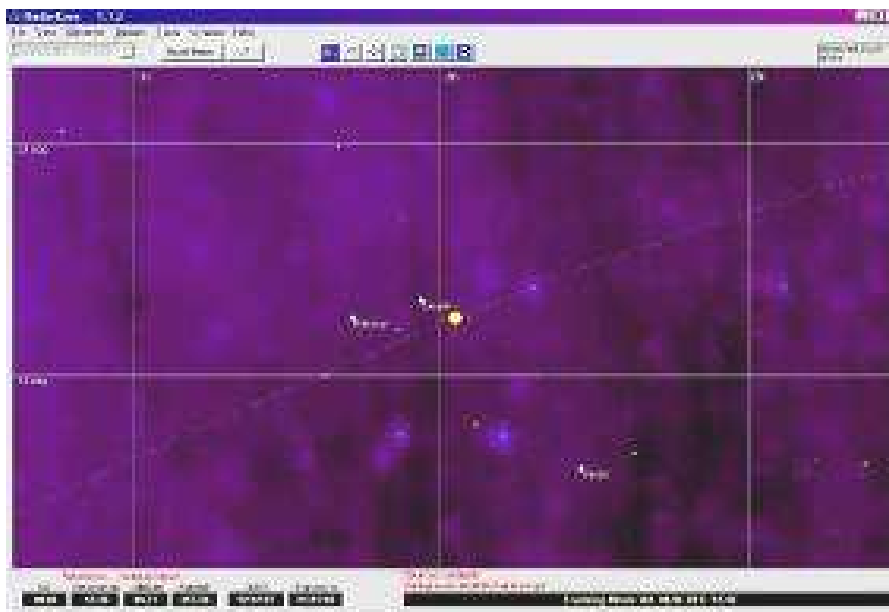
However, there is a simple and accurate method of determining True North as opposed to magnetic North. True North is what we require and magnetic North needs to be calculated back from the magnetic dip angle in your part of the country. In many cases this is not known to any degree of accuracy.

(Continued on page 25)

(Determine True North from page 24)

The Sundial Method

Most amateurs are familiar with the old fashioned means to telling time, the Sundial. We can use its properties to accurately determine True North with a little help from modern computer software. The writer obtained results within $\pm 0.25^\circ$ with nothing more than a stick and a piece of chalk!



Picture 1. Radio Eyes screen dump of Sun tracking

Before we can use this we need a certain type of computer software that will determine the position of the Sun. There are numerous software packages available, the writer uses two, Instant-Track for satellite tracking available from AMSAT and Radio-Eyes from Radio-Sky, Hawaii, which is a sophisticated radio astronomy software suite. These are freely available and low cost. You also need two other pieces of information, your position and the exact time to within a minute of error. Your position can be read off a map to within an insignificant error or by using a GPS unit to within 20m or better accuracy. Actually as long as you can determine your position to within 50 km it is quite accurate enough. If your position is not known to say 100 km error it makes as little as 0.125° error. If you consider that the Sun is 150 million kilometres away from us then an error

of 100 km in position is tiny.

Sundial Method

Find a suitable straight stick or piece of tubing about 1m in length and hammer it into the ground so the stick is truly vertical. The writer used a corner of the back garden close to a concrete path so the shadow from the piece of aluminium tube cast the shadow onto the concrete. A piece of chalk was used to mark the shadows cast. (See picture below)

With the software running and tracking the Sun the azimuth and elevation the Sun appears at is displayed. The Earth rotates one full revolution in 24 hours (actually it is 23h 59m 4s but the difference it makes is so small it is academic). So in every hour the Sun appears to move 15° in azimuth. Hence 5° is covered in 20 minutes and 0.25° for every minute.

Starting a little before noon, say

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11:00 local time, make a chalk line at the corresponding time and write the number of degrees next to the line. When the software shows the Sun is crossing your meridian at noon it will be exactly due North of your location and will show a value of 0° in azimuth. This mark is the zero point or True North. If time permits continue marking the shadow every 5° to give some extra datum points. In the writers case transit of the local meridian occurred at 34s after noon because it was the beginning of spring (mid August).



Picture 2 Recording shadows

Many amateurs use the rising and setting Sun to establish East or West. But this is only exactly correct on two days of the year, the equinoxes. In winter in South Africa the Sun rises north of east and in summer south of east. The same applies to the setting Sun, in winter it is also north of west and in summer south of west. The difference between summer and winter is about 30° , so it is a significant error.

A Permanent Method

If you fancy you can make a permanent Sundial to allow more accurate recording. For this you will need a piece of chipboard about 300mm square and on this is taped a sheet of A4 paper. With a drawing compass scribe a circle about 200 mm diameter (A4 paper is 210 mm wide) and in the centre drill a small hole and knock

in a short length of steel rod or welding rod to form the vertical stick.

Align the straight edge of one side of the base to a known datum point, say the wall of your house, and arrange some way so that the sundial cannot move. Commence as before and make pencil marks on the perimeter and the degrees of azimuth. When finished remove the central stick and with a ruler draw straight lines from the circle through the center point to the opposite side of the circle perimeter. You only need about 90° of shadow marks and the opposite quadrant can be found from the reciprocal lines and a protractor can be used to fill in the missing angles.

To determine a direction, start at the circle perimeter from the desired angle on the circle and follow the line through the centre of the circle, this line points in the desired direction.

Couldn't be simpler!

The Future of Space in Support of Mankind

Katlego Zabala, Sekano-Ntoane Secondary School

Space as a whole has been and still is quite a mystery to mankind. It was for this very reason that the human mind began to enquire about this celestial wonder. This has led to many pioneering feats being achieved. Even to this day, the world works towards complete knowledge of our universe in its entirety.

A man once said that it is the mark of an instructed mind to be satisfied with the degree of precision that a subject offers. Then again my question is - was it an instructed mind that discovered that the earth is spherical? Or was it an instructed mind that led man to the moon? I think not!

I believe that if one wants to discover the limits, one must go beyond the impossible.

I believe that the future of space is favourable to mankind and all life on earth. To mention but a few, space colonisation is one possibility that could save humankind. Presently the earth is undergoing a process of deterioration and we need an emergency home. One way this can be achieved is if further research can be conducted to find the logistics and dynamics of this new home.

Another possibility is that of power generation that does not require any fossil fuel but a non-stop supply of solar energy. This kind of solar energy would not be affected by bad weather

Katlego is the winner of the SA Amsat essay writing competition.

conditions because instead of the normal solar panels on earth, there would be a large (i.e. big enough to supply the whole planet with electricity) panel positioned close enough to the sun for a continuous power supply. In order for the energy to reach the earth there would be a laser that would send the energy rays to different power stations in every continent. This would mean that the use of coal power stations would diminish and the result would be decreased air pollution.

With further research on the planets in our solar system, different minerals that could be of use to all humanity, industrially and medically could be found. Different breakthroughs could emerge as a result of the discovery these minerals. Diseases such as HIV/AIDS, Influenza and other terminal diseases could be cured. Life on earth could take a turn for the better. The earth would no longer be the main source of minerals and fossil fuels, but we would be able to preserve it as much as we possibly could.

One benefit that the society of science would consider to be the most prized would be the fact that we as humankind will have conquered the unknown.

(Continued on page 31)



Radio Scouting

by Dave Gemmell, ZS6AAW
and the Broomstick Warriors

50th JOTA 2007

Many thanks to Evan, ZS6EVD and John, ZR6ANG, for the fantastic job you chaps did in organizing ZS100MAF from Mafikeng for the Scout movement's 100 year celebrations and ZS50MAF the 50th JOTA event.

The station was set up at SCENE, the Scout HQ and camping grounds just outside the town. I was welcomed with the sight of young scout children hovering around the amateur radio station set up in a "Corner"

Evan used his TS-130s with a long wire and tuner, while John operated Echolink using his laptop and wireless connection (quite a few meters away, mind you!) to the SCENE's ADSL router in the office.

At one stage Evan used the Icom IC-706 mounted in Eddie's car and while Eddie manned the TS-130S in the hall, giving the scouts a chance to say their name and ask a question. They were asking questions via radio getting answers from someone "they did not know." Evan knew most of the children by name and their personalities! When he told them over the radio who he was and where he was, the kids rushed out to look for him.

The latest technology was brought to SCENE that weekend as Evan's dad, Noel, VK6DAV in Australia, spoke to all present via Echolink and Skype Video communications! This really impressed the assembled gang

as everyone had the opportunity to meet Evan's dad "in person"!

The whole event made a big impact on these young children's lives and that through ham radio. Be assured they will remember these times forever!

Well done chaps and many thanks!!!!!!

Single Operator JOTI Stations

Were there any SINGLE scout or guide stations for JOTI?

I would like to include some news from this type of station. So please, please, let me know before Christmas Day, the very, very latest!!! Any guide or scout plus brownies or cubs could have taken part in JOTI, even if they worked from their own homes! No special licenses or permission is required either. The only criteria, really, is that the person taking part should be a bone-fide member of the Scout or Guide Movements.

This also applies to JOTA with the difference that the Radio Station be controlled by a properly licensed radio amateur who could actually be a guide or a scout. Ham licenses, as you know, have been obtained by many young people who have passed the necessary exams and requirements.

International JOTA/JOTI Report

This column was written on 21 No-

(Continued on page 29)

(Radio Scouting from page 28)

vember 2007 with JOTA 50 now just a happy memory with only the National Report to be compiled! No one, apart from Eddie, has submitted a report.

Even if you only read this column during the first week in December there is still time to send me a short report of the happenings at your JOTA-JOTI station. The dead-line was actually November 30th but a few days won't delay my report. This National report for SA must reach the World JOTA HQ before 31 December 2007, but I still have to put it together!

Maurice for sending this report, which happens to be the first I have received for the 50th anniversary of JOTA.

Apologies

Due to various and quiet valid reasons I could not take part or do as much for this year's JOTA as I would have "liked to"....

So please forgive me if I didn't answer your request or advise you as I should have. Even my planned visit to Mafikeng was also cancelled at the last minute for the same reasons.)

First SA 50th JOTA Contribution

The Hibiscus ARC, ZS5HAC operated a JOTA station at the Southcity Christian Academy, Ramsgate on Saturday 21 October. Due the prevailing radio conditions not many contacts were made but the ones made were enjoyable. The QSOs included ZS6VOL, ZS6KO, ZS4PB, ZS6SET, ZS2ABV and ZS6BIK.

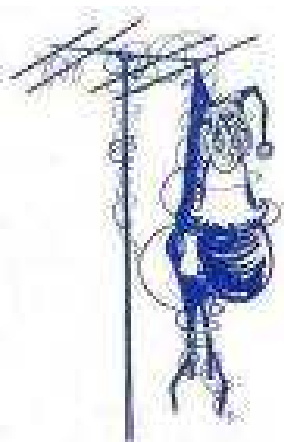
Maurice Dobson, ZS5BCA taught the scouts about radio procedure and amateur call signs. Many thanks to

Need for (CW) Education???

During a recent visit to my QTH, my 6 year old grandson, Robert saw a morse key of mine and asked if it was a "mouse trap"!!! By the way, he does have one of his own, but his Dad has it safely stored away. For the time being, that is!!!

Wishing you all the best for the Christmas season and a prosperous 2008.

73 Dave, ZS6AAW



Museum News

by Dave Gemmell and
The Old Timers

ZS6NOM

On the 24th and 25th of November, Leon Lessing, ZR6ANA organ-

ised an amateur station ZS6NOM on behalf of the Battle Group South as part of it's exhibit at the Military mu-

seum in Johannesburg. He setup the whole station single-handed.

He set up a 1980's long-range patrol camp and operated the radios. Fortunately the rain which delayed the erection of antennas didn't dampen Leon's enthusiasm. He actually slept

(Continued on page 30)

(Museum News from page 29)

over at the museum on Saturday night! The equipment used was two B25s and a FT-101 ZD.

Unfortunately, this same precipitation was the cause of the relatively low number of contacts made on all bands, 18 to be exact, 80m = 2, 40m = 13, 20m = 2, and 15m = 1. I wonder if these figures "mean anything" regarding propagation conditions or "normal ham usage" over the weekend.

Interestingly enough Leon has had a 160 m (1840 kHz) contact with Denny, ZR6ZIP on 07 November 2007. Has anyone else used the 160 m band recently???

There were German, Afrika Korps, British, American and South African air-force equipment exhibits as well. One visitor to this station served in the Afrika Corps of the German army. He received an Iron cross first class for destroying three tanks with a PAK40 anti tank cannon. A cannon similar to the one used is on display at the war museum.

ZS1MUS and ZS6MUS

These stations are still going strong but we wish that the propagation conditions between the two were just as strong.

A recent visitor to Swartkop Museum Wireless Room was OM Richard Tismore, ZS5TF. Over the past few years, he has been busy with the restoration of a T1154 transmitter and a R1155 receiver. He is still looking for a matching power, which was, used

with this combination TX & RX. He is also looking for a "bath tub" morse key and the antenna switch type-J which goes with this arrangement. It is not the usual type of antenna change-over but also connected the DF (direction finding) loop to the receiver when necessary. An important feature was to prevent accidentally transmitting into the loop while the R1155 receiver was being used for DF purposes.

Jericho

No, not in 4XA but the TV story about a small town near Denver (USA). The story is about how the small town folk handle the situation when this nearby city is hit by a nuclear bomb.

The part that interested me was an ex-policeman who tunes in on a ham band and can read the Morse. This scene was shown when the ex-cop at the controls of an FT101-F (I am sure it was not an FT101-E). The annoying part is that when I heard the CW I dashed to the TV set, pen and paper in hand only to have the scene change as I started to write!

I wonder if the Hamnet chaps took a few notes about this programme. Hi Hi!!

Radio Scouting and Museum News items can be sent to Dave at PO Box 77, Irene, 0062, telephone and fax 012 667 2153 and e-mail davegemmell@bmknet.co.za

(The Future of Space from page 27)

It is again this knowledge of the unknown that will spark curiosity in the minds of scientists around the world so that they go even further in getting to know the universe and what it holds.

The only thing standing between man and the benefits held by space is time. In time all will be achieved, it is merely up to us to decide upon whether we continue patiently in the endeavour to become the pioneers of the universe.

This can also be within our grasp if children are encouraged to have a rooted interest in astronomy and if they are allowed to let their young minds run free in order to invent, innovate and discover.

The Great Albert Einstein once said, "Logic can take you from A to B, but imagination can take you anywhere." It is from this great mind that we should know that science would have not come about if it were not for the "crazy ideas of the ancient civilizations."

(ZS9X from page 23)

by visiting national and international radio amateurs.

The station has an impressive antenna system comprising:

Three Log Periodic antennas covering 3 - 30 MHz fixed in North West, North and North Easterly directions for use mainly on 80 m and 40 m. Each Log P has 30 elements and occupies about an acre of ground.

One Optibeam OB17/4 up at a height of 20 m, rotatable, covering 40 to 10 m.

Two Optibeam OB16 fixed in a north-east and north-west direction.

One five element 10 m monobander up at a height of 30 m fixed north.

One HF Discone antenna mounted on a 40 m mast covering 1,5 – 30 MHz which will be used mainly on 160 m.

Two shunt loaded towers for use on 80 and 160 m are also in use. Inverted V antennas for 80 and 160 metres

A six element 15 m monobander on a 15 m boom was mounted at a height of 20 m fixed north, but after an altercation with a Hadida in early 2007 and wind damage, it was removed. The Battle Creek was also taken down after sustaining wind damage in October 2007.

The equipment used at ZS9X is a mixture of Yaesu and Icom transceivers with valve type amplifiers.

The Bloemfontein Defence ARC, ZS9X, has participated in the 2006 CQ WW DX Phone and CW contests [13 million points and 26th Contest club in the world], the 2007 CQ WPX Phone Contest and the 2007 CQ WW DX phone and CW contests. The claimed scores are 7,1 million points for the phone contest and 6,6 million points for the CW contest.

The QSL manager is K3PD and the ZS9X logs are uploaded to Logbook of the World.

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