WATTS 2018-06

Year 88 + 06m

Monthly Newsletter of the Pretoria Amateur Radio Club
Maandelikse Nuusbrief van die Pretoria Amateur Radio Klub

PARC, PO Box 73696, Lynnwood Ridge 0040, RSA
http://www.parc.org.za zs6pta@zs6pta.org.za

Bulletins : 145.725 MHz : Sundays from 08h45 / Sondae vanaf 08h45
Relays: 1.840, 3.700, 7.066, 10.135, 14.235, 51.400, 438.825, 1297 MHz and Echolink. Activated frequencies are announced prior to bulletins
Swopshop : 2m and 7.066 MHz live on-air after bulletins
Bulletin repeats on Mondays / herhalings op Maandae : 2m 19h45

Tydens 'n onlangse toekenningsgeleentheid van SA Motorsport (SAM) het Johan de Bruyn ZS6JHB die toekenning ontvang vir die No1 Tydrenbeampte vir 2017. Irene ZS6IEA en Pieter ZS6PAM Myburgh het beide die toekking ontvang vir die No2 Tydrenbeamptes vir 2017. Pretoria Amateur Radioklub wens hiermee vir Johan, Irene en Pieter geluk met hierdie besondere prestasies.

In This Issue / In Hierdie Uitgawe

Club Meetings / Klub Vergaderings

Club Committee Meeting :

The next Committee Meeting will be on Wednesday, the 6th of June from 18h00 at the Waterlab Offices.

Next PARC Fleamarket / Volgende PARK Vlooimark

Saturday the 21st of July from 10h00 at POMC
Saterdag die 21ste Julie vanaf 10h00 by POMC
To book a table, please do contact: / Om 'n tafel te bespreek, kontak gerus:
Alméro Du Pisani ZS6LDP at 083-938-8955 or almero.dupisani@up.ac.za

Member's Birthdays June 2018 / Lede Verjaarsdae – Junie 2018

07 Chris Oosthuyse ZS6OC
22 Richard Peer ZS6UK
26 Pieter Stronkhorst ZS6PSR
27 Emil Bohma ZS6EGB

Member's Spouses June 2018 / Lede Gades Junie 2018

01 Fiona, Gade van Etienne Naude ZS6EFN

Anniversaries June / Herdenkings – Junie

24 Marita en Roy Alexander ZS6MI

Member's Birthdays July 2018 / Lede Verjaarsdae – Julie 2018

06 Helen Newton ZR6HN
13 Pieter Human ZS6PA
17 Jan (Pine) Pienaar ZS6OB
19 Theo Bresler ZS6TVB
20 Roy Newton ZS6XN
26 Frank Schneider ZS6GE
29 Lian McAllister ZS5IE

Member's Spouses July 2018 / Lede Gades Julie 2018

01 Avida, Gade van Theo Bresler ZS6TVB
12 Sharmaine, gade van Louis de Wet ZS6SK
17 Lyn, Gade van Andre van Tonder ZS6BRC (Erelid)
17 Judy, Spouse of David Botha ZS6O
22 Ria, Spouse of Pete Smith-Curren ZS6PJ

Anniversaries July / Herdenkings – Julie

06 Elsa en Fritz Sutherland ZS6SF

PARC Bulletins / PARK Bulletins

PARC Bulletins are presented on Sunday mornings at approximately 08h45, after the SARL Bulletins in English and Afrikaans, from 08h15. The Bulletin Presenters for the following two months are presented below. Please do contact the applicable presenter beforehand if you wish to make a contribution to the Bulletin. PARC Bulletins are broadcast on the 2 meter repeater on 145.725 MHz, and 70 cm on 438.025 MHz. Relays are done on 7.060 MHz by Hans Kappetijn ZS6KR and on Echolink by Johan Lehman ZS6JPL. A re-broadcast of the Bulletin is done the following Monday evening at 19h45 by Hans ZS6KR.

PARK Bulletins word op Sondag oggende aangebied om 08h45, na die SARL Bulletins in Engels en Afrikaans, vanaf 08h15. The Bulletin aanbieders vir die volgende twee maande word onder aangedui. Kontak gerus die toepaslike Bulletin leser indien u 'n bydrae tot die Bulletin wil maak. PARK Bulletins word uitgesaai op die 2 meter Herhaler op 145.725 MHz, en 70cm op 438.205 MHz. Herleidings word gedoen op 7.060 MHz deur Hans Kappetijn ZS6KR, en op Echolink deur Johan Lehman ZS6JPL. 'n Heruitsending van die Bulletin geskied die opvolgende Maandag aand om 19h45 wat behartig word deur Hans ZS6KR.

PARC Bulletin Presenters : April – May 2018			
Date	**Presenter**	**Date**	**Presenter**
06 May 2018	Etienne Naude ZS6EFN	24 June 2018	Louis de Wet ZS6SK
13 May 2018	Alméro DuPisani ZS6LDP	01 July 2018	Etienne Naude ZS6EFN
20 May 2018	Johan de Bruyn ZS6JHB	08 July 2018	Alméro DuPisani ZS6LDP
27 May 2018	Louis de Wet ZS6SK	15 July 2018	Johan de Bruyn ZS6JHB
03 June 2018	Etienne Naude ZS6EFN	22 July 2018	Etienne Naude ZS6EFN
10 June 2018	Alméro DuPisani ZS6LDP	29 July 2018	Alméro DuPisani ZS6LDP
17 June 2018	Johan de Bruyn ZS6JHB	05 August 2018	Johan de Bruyn ZS6JHB

Please do contact Etienne Naude ZS6EFN for more information or any Bulletin arrangements

PARC SUBS : PARK LEDEGELD : FROM / VANAF : 30-06-2018

Bank	First National Bank	Ordinary Members / Gewone Lede : R160 Spouses / Pensioners : R60	**Your call sign must appear as statement text!**
Branch Code	25 20 45		
Account No	546 000 426 73		

Please remit your subs in time to our Treasurer, or pay per transfer into the PARC account
Betaal asb. u ledegelde betyds aan ons Tesourier, of betaal per oorplasing in die PARC rekening

Please Note : If your Club fees are not paid up to date, birthday details cannot be displayed in Watts

PARC Committee Members Contact Details / Komiteelede Kontakbesonderhede : 2017 - 2018

Elected Members	Name	Callsign	Email Adress	Tel No	Mobile No
Chairman, Web co-ordination	Graham Reid	ZS6GJR	greid@wol.co.za	012-667-2720	083-701-0511
Vice Chairman, Treasurer & Rallies	Johan de Bruyn	ZS6JHB	zs6jhb@gmail.com	012-803-9418	079-333-4107
RAE Training, Bulletins & SARL Liaison	Etienne Naude	ZS6EFN	etienne@afrigrid.com	012-661-6745	082-553-0542
Club Secretary	Irene Myburgh	ZS6IEA	Irene@srsa.gov.za	012-304-5109	082-462-6001
Social & Contests	Whitey Joubert	ZS6JJJ	zs6jjj@gmail.com	012-993-2267	072-120-4516
Watts Newsletter & RAE Assistance	Louis de Wet	ZS6SK	louis.zs6sk@gmail.com	012-349-1044	072-140-9893
Youth Development & Competitions	Nic Louw	ZS6NWL	nic.louw@telkomsa.net		083-596-1026
RAE Training & Technical	John Minter	ZS6LED	john.minter.za@gmail.com	012-349-0019	083-291-5422

Co-Opted Members	Name	Callsign	Email Adress	Tel No	Mobile No
Fleamarkets	Alméro DuPisani	ZS6LDP	almero.dupisani@up.ac.za	012-420-3779	083-938-8955
Auditor	Tony Crowder	ZS6CRO	tcrowder@telkomsa.net	011-672-3311	

Contests and Diary of Events – June 2018 / Kompetisies en Dagboek van Gebeure – Junie 2018 (UTC Times)	
01 - 03	Ham Radio 2018 : Friedrichshafen Germany
02 - 03	10-10 International Open Season PSK Contest : 00h00 – 24h00
02 - 03	IARU Region 1 Field Day, CW : 15h00 – 14h59
02 - 03	RSGB National Field Day : 15h00 – 15h00
04	RSGB 80m Club Championship, Data : 19h00 – 20h30
13	RSGB 80m Club Championship, CW : 19h00 – 20h30
16 - 17	All Asian DX Contest, CW : 00h00 – 24h00
16 - 17	Ukranian DX Classic RTTY Contest : 12h00 – 11h59
23 - 24	His Majesty King of Spain Contest, SSB : 12h00 – 12h00
23 - 24	ARRL Field Day : 18h00 – 21h00
21 - 25	**SARL Top Band QSO Geselligheid**
28	RSGB 80m Club Championship, SSB : 19h00 – 20h30
30	International Asteroid Day
Contests and Diary of Events – July 2018 / Kompetisies en Dagboek van Gebeure – Julie 2018 (UTC Times)	
01	**Start of SARL Financial Year: Membership payments are due**
01	**ZS5 Sprint**
01	RAC Canada Day Contest : 00h00 – 23h59
07	**SARL Newbie QSO party**
14 - 15	IARU HF World Championship : 12h00 – 12h00
21	**Winter QRP Contest**
21	Jakarta DX Contest : 10h00 – 22h00
21	**PARC Flea Market at POMC from 10h00**
21 - 22	CQ Worldwide VHF Contest : 18h00 – 21h00
22	**ZS2 Sprint**
28 - 29	RSGB Islands on the Air (IOTA) Contest : 12h00 – 12h00

More information can be obtained from the SARL website, as well as the WA7BNM contest calendar at the following website: http://hornucopia.com

Visit https://asteroidday.org/ for more information on World Asteroid Day

CQ Hou Koers : Voortrekker Monument

Saterdagoggend die 12de Mei het meer as ‘n duisend Voortrekker ouers en jong Voortrekkers by die Voortrekker Monument byeengekom vir ‘n heerlike dag van interssante aanbiedings vir die kinders wat gewissel het vanaf masjeer, kosmaak, en natuurlik Amateur Radio! ‘n Groepie van ongeveer 20 kinders is deur die Klas B sillabus van die Amateur Radio kursus geneem wat uit radio regulasies, radio teorie en ‘n praktiese sessie bestaan het. Die kursus is aangebied deur Nick Louw ZS6NWL, Pieter Fourie ZS6CN en Louis de Wet ZS6SK. Pieter het ‘n veld radiostasie opgestel met 2m en 40m radios. Die kinders het tydens die praktiese sessie die geleentheid gehad om met Oom Pieter te gesels en hul vernuf as toekomstige Radio Amateurs te toets.

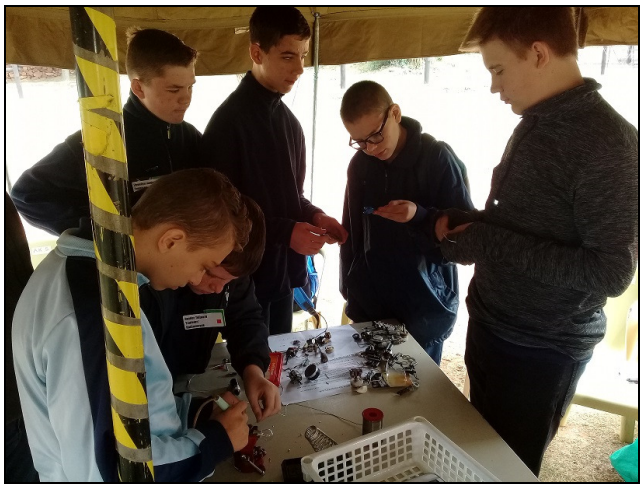
Kampterrein teen die Pretoria oggend agtergrond

Die PARK “lesinglokaal” vir CQ Hou Koers kursus

Pieter Fourie ZS6CN se antennas teen die agtergrond van die Voortrekker Monument en sy stasie

Sersant Majoor leer die jongelinge masjeer

Nick ZS6NWL neem presensie by die CQ Klasgroep

Dit was ‘n gewoel werskaf met die koppel van weerstande in series en parallel


Van die jong manne was goed bedrewe met soldeerkuns en het werkende stroombane gebou

Pieter Fourie ZS6CN en De Jager Burger ZS6ZO by Pieter se veldstasie

Bo: Nadat die teorie gedeelte van die dag afgehandel is, het ons die soldeerbout en multimeters uigehaal, en lekker begin rondkrap in twee bokse vol draad, asook gewone- en verstelbare weerstande. Die jongklomp het vining verskillende kombinasies weerstande in series en parallel gekonnekteer en die weerstand bepaal. Ook is klein stroombane gebou met 12V lampe en verstelbare weerstande.

Links: Pieter Fourie ZS6CN het ‘n veldstasie opgerig ingerig vir 2m en 40m. Die jong CQ Hou Koers studente kon die geleentheid kry om op HF te QSO met die RAE studente wat besig was met hul HF asessering by die QTH van Vincent ZS6BTY bygestaan deur Pierre ZS6PJH en Etienne ZS6EFN. Na die HF sessie afgehandel is, kon die student op 2m QSO’s hou vanaf Louis ZS6SK se mobiele stasie wat hy in die PARK tent opgerig het. Die jong voornemende Radio Amateurs het hul eie tydelike roepseine uitgedink vir die geleentheid, en het op simpleks lae krag op 145.500 MHz met Pieter gesels.

The woes of powerline communications : Hans van de Groenendaal ZS6AKV

Once heralded as the answer to broadband communication, the introduction of communication over powerlines had a rocky start with fierce opposition from radio spectrum user as it was seen as a generator of excessive interference of the radio spectrum particular on frequencies between 1 and 30 MHz and in some instances stretching into the VHF region of the RF spectrum.

Narrowband powerline communications began soon after electrical power supply became widespread. Wikipedia estimates that it was first introduced in 1922 when the first carrier frequency systems began to operate over high-tension lines with frequencies of 15 to 500 kHz for telemetry purposes. Consumer products such as baby alarms became available around 1940.

At the dawn of the internet and the need for fast connectivity, companies realized that Powerline Communication could become an inexpensive way of providing broadband communication. There was a big move to it in the USA where is was branded as Broad Band Powerline (BPL). Elsewhere in the world it became known as Powerline Communication (PLC) and Powerline Telecommunication (PLT). The academic world tried to differentiate between PLC as the carrier for internet and PLT as a telemetry system for powerlines, smart metering and similar remote control system for the electricity network.

BPL/PLC/PLT works by transmitting high frequency data signals through the same power cable network used for carrying electricity power to household users. Such signals cannot pass through a transformer. This requires devices that the voice and data signals must be combined with the low-voltage supply current in the local transformer stations to bridge the last mile. In the house, "indoor devices" are used to filter out the voice and data signals and to feed them to the various applications (e.g. PC/Internet, telephone, etc.)

The technology was once lauded by national governments, the European Union (EU), and even the Organization for Economic Cooperation and Development (OECD), given its apparent ease of deployment and negligible environmental impact. But after numerous global trials of the technology access BPL initiatives petered out. Telecommunications companies and Internet service providers failed to prove that it could deliver the reach and bandwidth required to formulate a cost-effective customer proposition for the consumer broadband market.

PLC trials have been widespread, from the UK and most European countries to the US, Australia, Egypt, Ghana, India, Indonesia, Malaysia, the Philippines, Saudi Arabia and South Africa. Despite all these initiatives, all the trials appear to have resulted in power companies and/or Internet service providers deciding that the technology is not viable as a means of delivering broadband Internet access. This is because of two technological challenges that have impeded progress: limited reach, and low bandwidth which do not come close to matching ADSL, Wi-Fi, and even 3G mobile broadband services available at the time.

Many projects were ended abruptly. Scottish Power, for example, was reported to be trialing 200Mb/s access BPL connections to around 1,000 homes in Liverpool in 2011, partnering with local house builder Plus Dane Homes to overlay broadband provision on the back of a broader smart grid initiative designed to connect smart meters in domestic premises. The two companies are now focusing solely on the smart-meter part of the arrangement.

The same pattern of stalled or discontinued trials has become evident across the world as major providers have either limited their BPL deployments to low-bandwidth connected equipment via smart grids, or ceased BPL operations altogether. One of the world's most ambitious BPL companies, International Broadband Electric Communications (IBEC) in the US, ceased trading in January 2012, encouraging its existing customers to pursue other options for their Internet service as soon as possible.

IBEC had scored a deal with IBM to install BPL networks on power lines operated by seven US regional electricity suppliers, aiming the service at 200,000 - 340,000 rural homes in Alabama, Maryland, Pennsylvania, Texas, Virginia and Wisconsin – although it remains unclear how many customers were actually connected by the time the company ceased operations.

Australia too saw regional and national electricity providers such as Aurora Energy, Energy Australia, Essential Energy, and the Woomera Consortium, trial access BPL at various times between 2004 and 2007; but no active access BPL deployments appear to remain in the country.

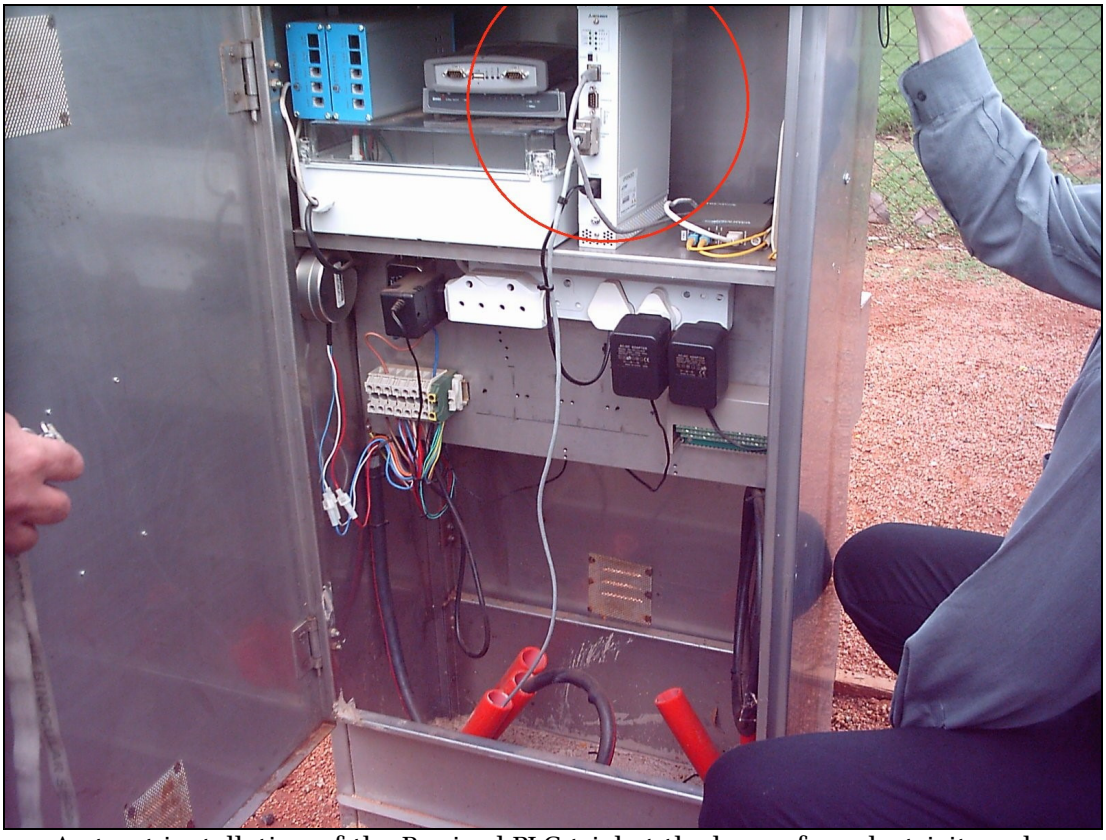
The failure to properly define clear international standards for BPL technology also probably played its part in its demise. Because they used unlicensed frequencies and voltages which varied from one country to another, early standardization initiatives were fragmented, and it was generally up to individual power companies to decide how they implemented their transmission facilities, leaving the possibility of problematic interconnection.

Reports of wide spread interference in the radio frequency spectrum emerged in many publications. In the July 2004 edition of Elektron, the forerunner of EngineerIT in an article on PLC it was reported that "*There is a worldwide concern about the introduction of power line communication because of its radio interference potential. There are many documented cases that show that interference caused by PLC systems render radio reception unusable. Some manufacturers claim that they have solved that problem and have produced newer designs that produce lower levels of interference. The Tshwane Metro is trialing (in Rooiwal) such a newer system that according to their spokesperson looks promising.*"

Once interference studies were carried the Rooiwal trial was abruptly stopped.

PLC was heavily debated in SABS TC 73 committee on EMC which led to the publication of draft PLC regulations by ICASA on the 7th of February 2008 (Government Gazette 30752) It resulted in a large number of comments, proposals for amendment and objections. The regulations were never finalized and remain a draft till today.

PLC never took off as a broadband access technology. Is it totally dead? No, the technology is used in devices like home-plug used in homes and small offices to use the mains wiring to extend WiFi systems. It is a standard of the HomePlug Alliance that was established in 2000. The latest version of HomePlug is AV2 that uses OFDM over the frequency range of 2 MHz to 86 MHz on the ac line. Using modulation to 4096QAM it can achieve a raw data rate to 1 Gb/s or 500 Mb/s considering overheads. This is useful for transporting HD video around the home.



A street installation of the Rooiwal PLC trial at the base of an electricity pole.

This paper was published in the March 2018 Edition of the EngineerIT Journal (p42-43). Thank you very much to Hans van de Groenendaal ZS6AKV for a copy of his paper.

The Most Common Power Meter Mistake : J. Kovatch : RF Test Engineer

At least 50% of all power meter users make this mistake. It has happened to you. You measured an RF power level and later someone said, "…but I measured the power and got a different number." Who was right? Measuring RF power appears easy. Modern wattmeters and power meters are simple to use, and can provide digital measurement data to several decimal places in dBm or watts. But if they are so accurate, why is it so difficult to make good measurements? If you are making the most common mistake, correcting for it will dramatically improve your measurement accuracy.

For the most common power meter application, measuring the level of power in a signal, many users tend to forget that a power meter is *not* measuring what you want to know- the power level of the signal. Instead, it is measuring the total power over the entire bandwidth of the sensor, which for measurement purposes is practically infinite!

Power meters versus Wattmeters

Most people recognize that a calibrated power meter is a superior measurement instrument compared to a wattmeter. But what is the difference between a wattmeter and a power meter? Generally, a wattmeter is similar to a power meter in that they both measure broadband power, but unless you are correcting the power meter for frequency, you are using it as a wattmeter. The perceived plug-and-go measurement ability of power meters is one of the misconceptions that endear power meters to users. This paper describes how to account for frequency in your power meter measurements, making them as accurate as possible.

Correction factors, what are they?

Power meter sensors that do not employ electronic calibration come with a graph or tabular data showing the calibration factor and correction factors by frequency. Most users will take the reference Calibration Factor (CF) in percent and use it to calibration the power meter at the calibration reference frequency, for instance at 50 MHz. But what are all the other numbers for? They are correction factors, similar to the reference CF, and indicate the response of the sensor to power as measured at those frequencies across the entire measurement range of the sensor. The numbers are usually a percent of the full scale response, and can vary from 80% or so to 100%. Let's say your sensor reference CF is 100% (not uncommon) and the CF of the frequency at which your signal of interest occupies is 95%. If you, like many users, carefully perform a calibration, and then plug the sensor to the signal port and make your measurement, it is still in error by at least 5%, or about 0.2 dB. Since power sensors are available with correction factors as low as 90%, your measured power can be in error by as much as 10% without taking other known uncertainties into consideration. Assuming the power to be measured is within the sensor range, the signal-to-noise ratio is acceptable, and the VSWR of the measurement port is acceptable, then the most important correction you can make to improve the error is to account for the frequency of measurement.

First, remember that measurement accuracy at higher power levels makes a much bigger difference than those made at low power. At -20 dBm, a 0.2 dB error is only about 0.5 uW, but at +55 dBm the error is over 15 Watts!

Correcting for the test frequency

When you are using a power sensor with a correction table by frequency *you must enter the percent correction* as shown on the sensor for the frequency being measured. If you are using a power sensor with electronic calibration data you must still enter a frequency to allow the meter to make the correction. The main advantage of the electronic calibration sensors is you don't have to interpolate the correction percentage by frequency from the data table or graph. When you enter frequency, the meter will apply the correction, but *you must input frequency*. CF Uncertainty is still a factor when using power sensors, even when correction for frequency is applied. CF Uncertainty increases with frequency from about 1% to 3%, depending on the frequency range, but failing to apply the correct CF to the measurement compounds the error.

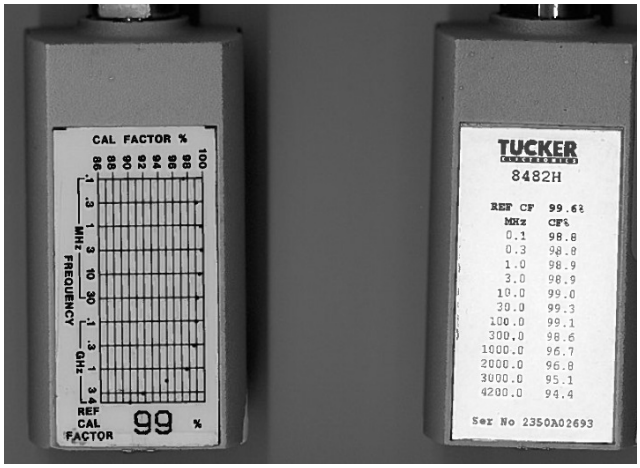


Figure 1 Power sensors with Cal Factor (CF) data

CF as low as 90% is shown. For frequencies not enumerated, use straight-line interpolation of adjacent data. If your measurement frequency is *not* enumerated or between data provided, you are using the wrong sensor.

Measurement system slope and offsets

Applying corrections by frequency to power measurements goes beyond simply correcting the sensor. If the RF power level to be measured is not connected directly to the power meter head, whether the RF path is just an attenuator or an entire test bench setup, you must account for the "slope" of the RF path to correct your measurement. A common method uses a measurement "Offset" to add the attenuation of the path loss the power measurement displayed. Unfortunately, a single offset is frequently used, as the meter may only retain a single value. The Offset value *must be changed for each measurement frequency* that has a different loss. Some e-cal power meters allow you to input a table of offsets that will be interpolated by the meter. This is a great feature, but will occur only *when you input the measurement frequency*. High quality attenuators will come with calibration data, or measure the slope with a network analyzer for reference.

Bandwidth and Noise

Due to the high bandwidth of a power sensor, when using a power meter to measure power in a signal, the signal-to-noise ratio is important. Remember that Noise Power = KTB, and for a sensor BW of 26 GHz, B > 100 dB! Noise power can dominate the total power measured when signals fall as low -50 dBm or so. Adding a post-amplifier will not help the signal-to-noise, as the noise will be amplified as well as the signal. In this situation a filter is wanted, ideally a band-pass filter at the frequency of interest. Lacking a band-pass filter, a high- or low-pass filter (or both) can help. Check the ON/OFF power level of the system noise without the signal to see if the noise power is a factor in your measurement. When making measurements of signals at higher power levels it is important to be aware of strong harmonics or other spurious signals that may contribute too much to the total power measured. Check the signal with a spectrum analyzer to make sure. In this case, again, filters need to be used to subtract that power before the sensor can see it. At lower power levels a good spectrum analyzer (SA) may make a better measurement than a broadband power meter, as the SA will employ detection and filters that exclude the noise power.

VSWR can make a difference

Another practical power meter measurement correction that you can easily make is to assure yourself that the measurement uncertainty created by VSWR is minimized. When measuring with a sensor on an unknown port, you can make a quick check with a 6 dB pad to see if the measurement improves. Adding 6dB of loss increases the return loss by 12 dB, and will improve poor VSWR by a substantial amount, allowing a better measurement. The easiest way to do that is to use the power meter "Relative" measurement feature to "zero" the displayed power level, then add the pad and see if the level changes by 6 dB. As long as the signal level is still in the sensor range, if it changes more than the pad value the VSWR is adversely affecting the measurement, and you should use the pad. It might need more attenuation than 6 dB. In any case, *you must enter the percent correction* as shown on the attenuator for the frequency being measured or *you must input the measurement frequency*. To reduce the measurement uncertainty of a relative measurement, try to keep the power applied to the sensor at the low end of the power range. The relative uncertainty can be as high as 6% at the high end, and as low as 1% at the low end. Many factors contribute to making a successful power measurement- using the correct type of detector for your signal of interest, making allowances for gating and various forms of modulation, and more. But if you can avoid the biggest mistake and remember when you use a power meter that you are making a broadband measurement, not just measuring a discrete signal, you are on the way to getting better and more consistent results.

Thank you very much to Hans Kappetijn ZS6KR for submitting a copy of this paper to Watts

AMSAT SA Symposium : Innovation Hub : 19 May 2018

The 2018 AMSAT SA Space Symposium was again held at the Innovation Hub on the 19th of May. As usual, the program was filled with very interesting presentations of an extremely high standard. The event was opened by Hans van de Groenendaal ZS6AKV, President of AMSAT SA, which presented a very though provoking and interesting talk entitled "*Why is the RF Noise Floor of concern for Satellite operators*?" This was followed by a range of topics listed on the next page, ranging from the proposed launching of the Es'Hail-2 satellite, analog to digital converters and linear transponders. The event was well attended, and a number of PARC Members such as Fritz Sutherland, ZS6SF, Fritz Sutherland Jr. ZS6FSJ and Thobile Koni ZS6KO enjoyed the day.

Nico van Rensburg ZS6QL, SARL President, Chairing Session 2, with Hannes Coetzee ZS6BZP ready

Pretoria Club Members: Left: Fritz ZS6FSJ and Fritz ZS6SF. Right: Thobile Kone, ZS6KO

The following papers were presented by the speakers:

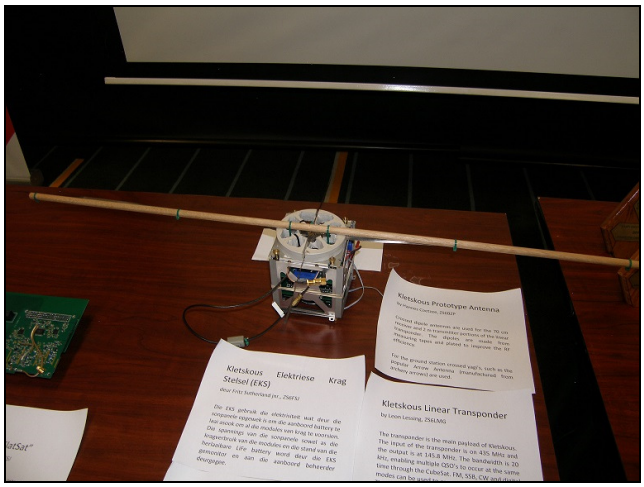
Hannes Coetzee ZS6BZP: *Es'Hail-2: An Updated Look at Amateur Radio's First Geostationary Satellite.*
Alex Artieda ZS6EME: *Introducing the UAADC4, a universal analogue to digital converter specially designed to work with SDR IQ mixers*
Hannes Coetzee ZS6BZP: *A BACAR-ready 10GHz beacon to exercise your Es'hail-2 receiver*
Deon Coetzee ZR6DE: *FunCube and it's data and hidden secrets*
Anton Janovsky ZR6AIC: *How to build a linear transponder with a Raspberry Pi, RTL Dongle and a Hack RF module using GENU radio*
Nico van Rensburg ZS6QL: *A mission and Quality Assurance perspective on Radio Amateur CubeSats*
Christo Kriek ZR6JLK: *BACAR Quo Vadis, the next five years*

Progress Reports on KLETSKOUS and it's next generation transponder:

Frik Wolff ZS6FZ: *Stabilization and Solar Panels*
Fritz Sutherland ZS6FSJ: *Electronic Power System*
Leon Lessing ZS6LMG: *New Generation Transponder*

A number of papers presented at the AMSAT SA Space Symposium can be downloaded from http://www.amsatsa.org.za/Space%20Symp2018.htm. **If you did not attend the space symposium,** you are free to download the papers but AMSAT SA requests you to make a donation to AMSAT SA. Our bank is ABSA, Branch code 632 005 ; Account number 40 8982 6281. Please send an EFT advice to admin@amsatsa.org.za so we can acknowledge receipt.

Top Left: Hannes Coetzee ZS6BZP demonstrating a receiver for the Es'hail-2 X-band downlink.
Below Left & Right: Close-up photographs of the Kletskous prototype spaceframe

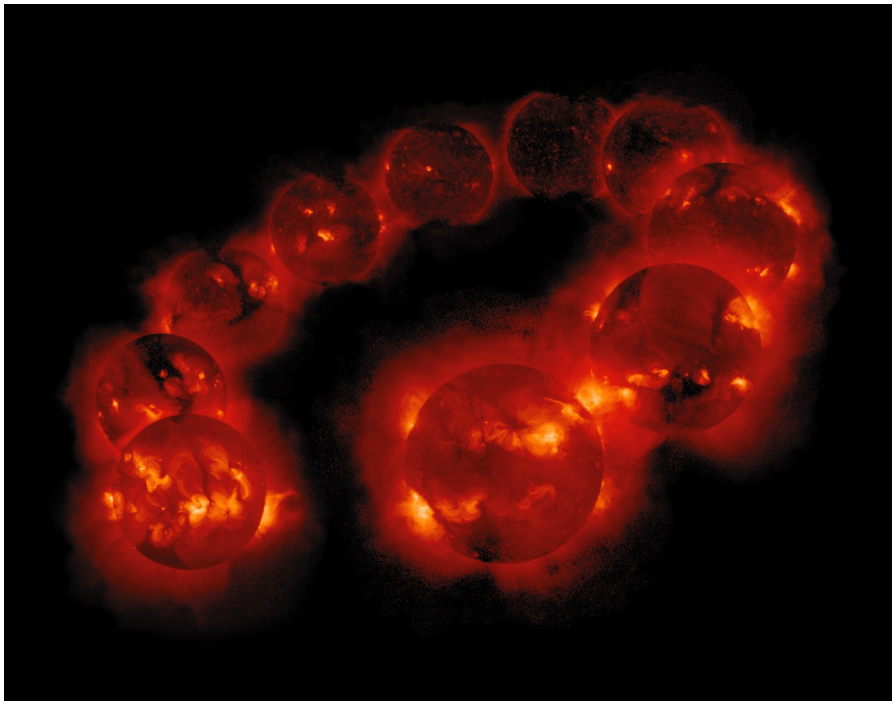


A variety of nice prizes, which included antennas, power amps, tuners and Raspberry Pi kits, supplied by Sam's Ham Shack, Avnet, RF Design and RS, were handed out to attendants in a lucky draw.

Solar activity drop to affect Shortwave Communication : Hans van de Groenendaal ZS6AKV

Over the past few years there have been mutterings about another solar Maunder Minimum which could serious affect shortwave communication. While many solar scientist did at the time not support the notion they now agree that the world can expect an extended solar minimum period. This is bad news for radio amateurs but good news for satellite operators who prefer a stable solar environment with no or low solar flare activity from the Sun.

The Maunder Minimum, also known as a prolonged sunspot minimum, occurred for almost 70 years from 1645 till about 1715. During this low solar activity period, Europe also experienced lower than average temperatures. This finding set scientists into another direction of research. Is there a connection between the level of solar activity and earth's climate? Was the lower temperature due to the absence of solar activity? This right now is a controversial subject. And it was truly a factor, is it being masked by the climate change.



Montage of solar images taken between August 1991 and September 2001. Credit: *Yohkoh/ISAS/Lockheed-Martin/NAOJ/U. Tokyo/NASA*

In 2015 Prof Valentina Zharkova, Professor in Mathematics at Northumbria University in the UK, dropped a bombshell at the National Astronomy Meeting in Llandudno when she presented a new model to forecast the length and intensity of the Sun's solar cycles. The new model is producing unprecedentedly accurate predictions of irregularities within the Sun's 11-year heartbeat.

The model draws on dynamo effects in two layers of the Sun, one close to the surface and one deep within its convection zone. Predictions from the new model suggest that solar activity will fall by 60 per cent during the 2030's to conditions last seen during the 'mini ice age' that began in 1645.

Ean Retief ZS1PR, a Cape Town Radio Amateur who has studied radio propagation for many years said that while Scientist have generally accepted that a solar cycle is 11 years in duration, every cycle is a little different. Up to now none of the models have fully explained these fluctuations. Many solar physicists have put the cause of variations in solar cycles down to a dynamo caused by convection of fluid deep within the Sun. Prof Zharkova and her colleagues have found that adding a second dynamo, close to the surface, completes the picture with surprising accuracy.

At the 2015 conference Prof Zharkova said: “we found magnetic wave components appearing in pairs, originating in two different layers in the Sun’s interior. They both have a frequency of approximately 11 years, although this frequency is slightly different, and they are offset in time. Over the cycle, the waves fluctuate between the northern and southern hemispheres of the Sun. Combining both waves together and comparing to real data for the current solar cycle, we found that our predictions showed an accuracy of 97%.”

Zharkova and her colleagues derived their model using a technique called ‘principal component analyses of the magnetic field observations from the Wilcox Solar Observatory in California. They examined three solar cycles-worth of magnetic field activity, covering the period from 1976-2008. In addition, they compared their predictions to average sunspot numbers, another strong marker of solar activity. All the predictions and observations were closely matched.

Looking ahead to the next two solar cycles, the model predicts that the pair of waves become increasingly offset during Cycle 25, which peaks in 2022. During Cycle 26, which covers the decade from 2030-2040, the two waves will become exactly out of synch and this will cause a significant reduction in solar activity.

In cycle 26, the two waves exactly mirror each other – peaking at the same time but in opposite hemispheres of the Sun. Their interaction will be disruptive, or they will nearly cancel each other. Zharkova predicts that this will lead to the properties of a ‘Maunder minimum’. Effectively, when the waves are approximately in phase, they can show strong interaction, or resonance, and there is strong solar activity. When they are out of phase, we have solar minimums. “When there is full phase separation, we have the conditions last seen during the Maunder minimum, 370 years ago”’ she said.

Some of the UK newspaper misinterpreted the findings and lead with scary headlines like “Earth heading for 'mini ice age' within 15 years (The Telegraph 11 July 2015). “Is a mini ICE AGE on the way? Scientists warn the sun will 'go to sleep' in 2030 and could cause temperatures to plummet” (Daily Mail 10 July 2015).

“While many scientists were sceptic of the findings that during cycle 26 solar activity will drop by 60%, they are today not so sure about their skepticism. Many scientists now agree that the next few solar cycles will be lower than the current cycle 25”, Retief said.

“Radio Amateurs and shortwave enthusiast should not despair even when the next two solar cycles are predicted to be much lower there will still be HF communication be it that the Maximum Useable Frequencies (MUF) will be lower” Retief said.

The ionosphere is not just formed by solar activity but cosmic rays also ionize the ionosphere. These high energy rays originate from sources throughout our galaxy and the universe such as rotating neutron stars, supernovae, radio galaxies, quasars and black holes. This means there will always be propagation of high frequency signals although the frequencies may be lower. Commercial users of the High Frequency bands and shortwave broadcasters will select frequencies which are below the predicted MUF to ensure that they have a stable circuit but there will be many times when HF propagation occurs above the MUF. This provides opportunities for radio amateurs to explore unusual short lived propagation conditions. This is what Amateur Radio is all about, explore the unusual. “My advice is use the MUF predictions as a guide and then step up to the next higher frequency band”’ Retief said.

The MUF is determined by ionospheric sounding, a technique that provides real-time data on high-frequency ionospheric-dependent radio propagation, using a basic system consisting of a synchronized transmitter and receiver. The time delay between transmission and reception is translated into effective ionospheric layer altitude. Various organizations offer propagation forecasts. In South Africa the information is available from www.spaceweather.sansa.org.za.

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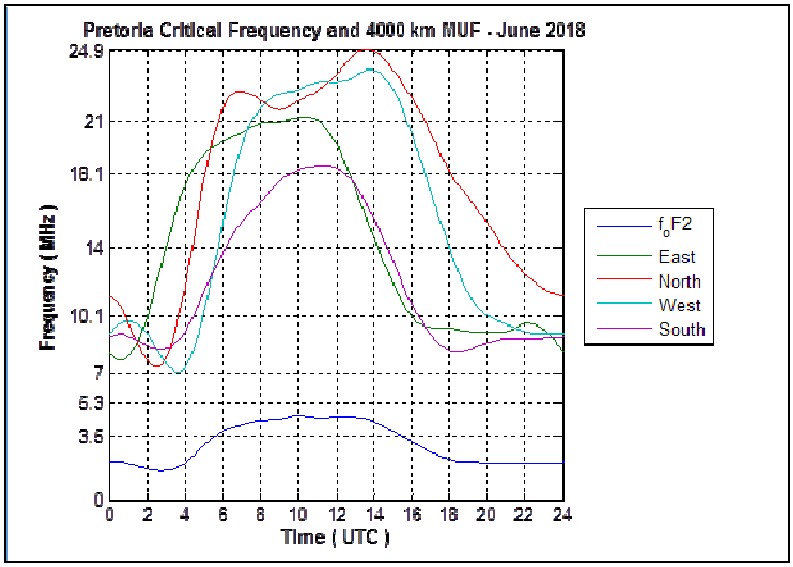
2018 Tydren Kalender / 2018 Rally Calendar

Met die 2018 tydren seisoen wat voorlê, kan ons weer uitsien na 'n besige program met baie radio-aktiwiteit tussen die aksie, stof en geraas! Die Tydren Kalender is voorsien deur Johan de Bruyn, wat tydren aktiwiteite koordineer. Indien u belangstel om deel te wees van tydren radio-diens, kontak gerus vir Johan by 079-333-4107 of zs6jhb@gmail.com. Die datums van die Nasionale- en Streekstydrenne word onder aangedui.

With the 2018 rally season approaching, we can again look forward to a busy program loaded with radio-activity in-between the action, dust and noise! The Rally Calendar was provided by Johan de Bruyn, who is the coordinator of rally activities. If you are interested in becoming part of rally radio-service, feel free to contact to contact Johan at 079-333-4107 or zs6jhb@gmail.com. The dates of the National- and Regional rallies are presented below.



Long Term HF Propagation for June 2018

DX Operating

The graph shows the 4000 km maximum useable frequency (MUF) to the East, North, West and South from Pretoria for the first hop using the F2 layer.

Local Operating

The F2 critical frequency (foF2) is the maximum F-layer frequency for short range communications.

For worldwide propagation see:
http://www.parc.org.za/index.php?page=propagation

Courtesy Vincent ZS6BTY

Honoring Amateur Radio and Radio Amateurs on Postage Stamps and First Day Covers. More in the next issue of Watts