QSX - PE

June 2014

Beavan ZS2RL's waterpoint at the Nanaga MTB Race - 10th May 2014

This Newsletter is published by the Port Elizabeth Amateur Radio Society
P.O. Box 10402, LINTON GRANGE, 6015

Editing by Eric ZS2ECH

QSX-PE - Newsletter for the discerning Radio Ham

**Download QSX-PE from www.zs2pe.co.za/Newsletter/Newsletter.htm
or www.commco.co.za/pears.htm**

PEARS Monthly Meeting

Tuesday 17th of June, 7:30 pm

Chris Gertsch from PiA Solar will do a presentation on Solar Tracking Methods

at the Italian Sporting Club, Charlo, 17 Harold Road.

Why not wear a name badge with your call sign to the meeting so that everyone can get to know each other.

WRINKLY RAVERS

The regular monthly lunchtime meetings of the Wrinklies take place every first Thursday of the month at '[Beyond Beans]' in Newton Park. You will only be excused if you have a "more" important appointment, or you do not have any wrinkles. Come join the folks for some tremendous company and fun, whether you have wrinkles or not.

SEE YOU THERE!!!!!

DIARY OF EVENTS	
29 – 31 May	2014 President's Trophy Air Race (at Gariep Dam)
7 – 8 June	IARU Region 1 CW Field day
8 June	ZS4 Sprint
14 – 15 June	International Museums on the Air Weekend
17 June	World QRP Day
17 June	PEARS monthly meeting at the Italian Sporting Club
19 – 23 June	SARL Top Band QSO Party
21 – 22 June	International Museums on the Air Weekend
11 – 12 July	VW Rally
12 – 13 July	IARU HF World Championship
15 July	PEARS monthly meeting at the Italian Sporting Club
19 July	SARL QRP Contest

Congratulations to the following who received awards at the PEARS AGM held on the 17th May 2014:

- Tony ZR2TX — PEARS Amateur of the Year
- Theunis ZS2EC — Merit Cup
- Gerrit ZS2XD — DX Trophy
- Andrew ZS2G — Hamnet Shield

Also congratulations to the following who wrote and passed the RAE held on the 15th of May:

- Higgs, David Graydon John — ZS2DH
- Moolman, Quintus — ZS2KU
- Ras, Hugo Jacobus — ZS2HR

****

This is my last QSX as Editor. I would like to thank all the regular contributors for QSX, unfortunately there are too few. Please support the next editor because without the support of the club there cannot be a club newsletter.

Also many thanks to Isolda ZS2IW for her patient typing and proof-reading.

Eric ZS2ECH

Jeffreys Bay Wind Farm

The info here was copied from http://jeffreysbaywindfarm.co.za/ Please visit this site for more info.

Project Description

Located between Jeffreys Bay and Humansdorp in the Eastern Cape, the Jeffreys Bay Wind Farm site spans 3700 hectares. The site's optimal wind conditions, relatively flat topography, minimal environmental constraints and its close proximity to the 132kV Eskom grid line, make it an ideal wind energy resource.

Arising from the South African Government's Renewable Energy Independent Power Producer Procurement Programme (REIPPP), Jeffreys Bay Wind Farm signed a 20-year Power Purchase Agreement with Eskom as well as an Implementation Agreement with the Department of Energy.

Currently under construction and expected to be completed mid-2014, the wind farm will supply 460 000 MWh per year, enough clean, renewable electrical energy to meet the needs of 100 000 average South African households. The project will effectively reduce annual carbon emissions by 420 000 tonnes and lifetime carbon emissions by 8 400 000.

The project received full Environmental Authorisation from the Department of Environmental Affairs in 2011 and has many environmental benefits such as reduced carbon emissions and water saving.

Why is wind a feasible renewable energy option in South Africa?

Large parts of South Africa's coastal land, as well as various areas inland, have an economically viable source of wind energy. Furthermore, the scale and maturity of the global wind industry have made it a cost-competitive energy option, compared not just to other renewable technologies but also many fuel-based technologies.

Also with significant local content, these technologies can also raise the employment intensity of the electricity generation sector.

How many wind turbines will be sited at Jeffreys Bay Wind Farm?

The project will comprise 60 wind turbines – model Siemens SWT 2.3 MW. These turbines were selected based on the technology's quality and compatibility with the local wind regime and its proven track record of over 5170 units installed worldwide as of October 2012.

How big are the wind turbines?

The height and weight statistics of the wind turbines are:

- a hub height of 80 meters
- a blade length of 49,5 meters
- a rotor diameter of 101 metres
- the rotor weighs 60 tones
- the nacelle weighs 82 tones
- the tubular steel tower weighs 162 tones

How do wind turbines operate?

Wind turbines are sophisticated machines with computer controls.

- A typical operating sequence is as follows:
- when the wind speed reaches around 4 metres per second, the turbine blades will spin up to operating speed, usually around 14 to 29 rpm (varies by turbine model), and start generating electricity
- as the wind speed increases, the generator output increases
- when the wind speed increases to the rated wind speed (usually around 12-13 metres per second), the generator will output its nameplate-rated capacity (i.e. a 2.3MW turbine would now output 2.3MW)
- as the wind speed continues to increase, the generator output will remain at the rated capacity (i.e. 2.3MW) until the wind reaches the cut-out speed (usually around 25 metres per second)
- at this wind speed, the turbine will deploy its tip-brakes and then apply its disk brake, stopping the blades in a few revolutions
- it will then rotate itself 90 degrees out of the wind and park itself
- if the wind speed drops to a level below the cut-out speed for a sufficient length of time, the turbine will point itself back into the wind, release the brake, and resume power production.

How to Specify RF and Microwave Filters

Copied from: http://www.anatechelectronics.com/

LC or Lumped-Element Filters

LC filters are lumped-element (also called lumped-component) types that can be specified in low-pass, bandpass, bandstop, high-pass, or diplexer configurations and are available for frequencies ranging from below 100 kHz to slightly above 3 GHz (Figure 1). The resonators in an LC filter consist of inductors and capacitors in either series or parallel resonant circuits. They range in size from about 0.5 in. at high frequencies to 26 in. at low frequencies, their size being dictated by the size of their capacitors, inductors, and power handling.

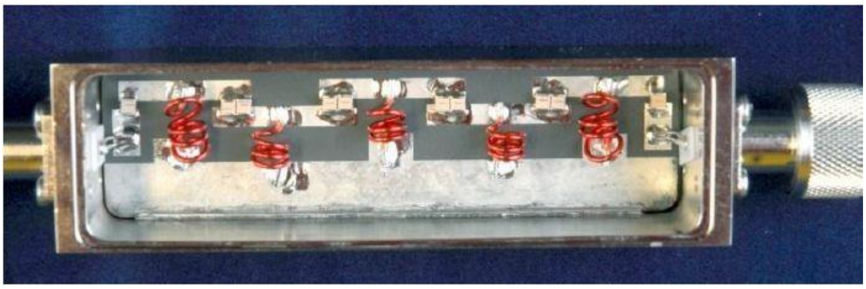


Figure 1 - A typical LC filter

Figure 2 – A cavity filter and smaller LC filter

LC filters have a variety of advantages, the benefits of which vary depending on the application for which they are being considered. They are a good choice, for example, at frequencies between 500 MHz and 1 GHz, because their size remains reasonable compared to other filter types, and they are the best choice for very low frequencies, where cavity filters would be too large and they can achieve high performance.

For example, an LC filter with a center frequency of 500 MHz would typically be one third the size of a cavity filter (Figure 2). They can be made to provide the widest range of filter responses, including Chebyshev, elliptical, Bessel, Butterworth, constant-impedance, and constant group delay, and deliver a steep transition from passband to the rejection points. It is also relatively easy to shift the center frequency of LC filters, since this is achieved by changing the inductance of the coil and requires no machining.

LC filters are also very versatile from a mechanical standpoint, and can support many types of connectors in various combinations, as well as drop-in, printed circuit board, and surface mounting.

Many case styles can be accommodated to meet the needs of specific physical environments as well. They inherently have low insertion loss and can handle RF power levels as high as 500 W, and in special cases even more.

However, LC filters cannot achieve extremely narrow bandwidths because of the coupling between elements, and a Q factor limitation. In addition, at frequencies above about 2 GHz, the inductors and capacitors become very small and impractical to fabricate.

Their power handling ability is defined by the physical characteristics of their elements and is thus somewhat limited. Although they can be made with up to 14 sections, their insertion loss increases significantly when many sections are needed, and they can be complex when steep rejection skirts are required. Finally, the labor-intensive nature of LC filters makes them comparatively expensive.

Ceramic Filters

Ceramic filters (Figure 3) use quarter-wavelength resonators as their main tuning elements, are best suited for frequencies between 400 MHz and 6 GHz, and can be fabricated in bandpass or bandstop configurations. The most prevalent type is the bandpass.

Their size depends on the dielectric constant of the ceramic resonator, which in most cases ranges between 30 and 90. The lower the dielectric constant, the larger the resonator and the better the temperature coefficient, and vise versa.

Ceramic filters can be made from discrete ceramic resonators or as a monoblock in which the resonators are made from a single piece of ceramic. Their advantages include good insertion loss, low cost, comparatively small size, and the ability to be mass produced cost-effectively in large numbers.

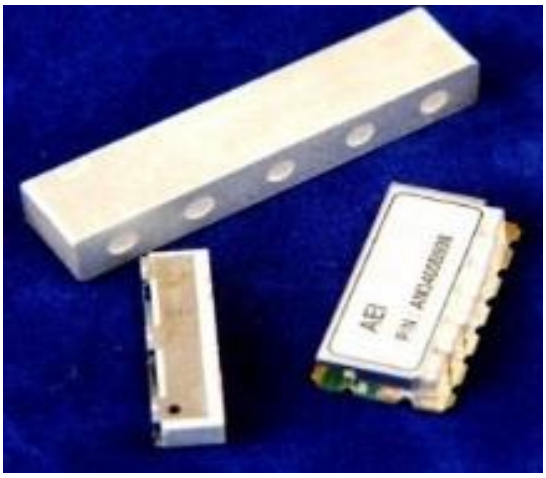


Figure 3 – A group of ceramic filters

However, ceramic filters can be designed for a relatively narrow range of frequencies, can handle RF input power of only 5 W, and have the potential for temperature instability when constructed with ceramics having high dielectric constants. In addition, their construction allows them to be suitable only for surface mounting, and they require a considerable amount of care during assembly to ensure good adhesion to ground. It is also very difficult to modify or shift the frequency of ceramic filters once they are tuned.

Cavity Filters

This extremely common type of filter is usable at frequencies between 20 MHz and 30 GHz or even higher, and can be specified in bandpass and notch configurations. It consists of a quarter-wavelength resonator typically machined from aluminum and usually in an air dielectric, the result being very large compared with ceramic filters, for example, as shown in Figure 4.

The advantages of cavity filters include high power handling ability with the norm being about 500 W, low insertion loss, very high performance, and the ability to be manufactured in medium to large quantities although at relatively high cost. On the downside, they are comparatively large (Figure 5), cannot be used at very low frequencies, and generally can only be supplied in a connectorized module.

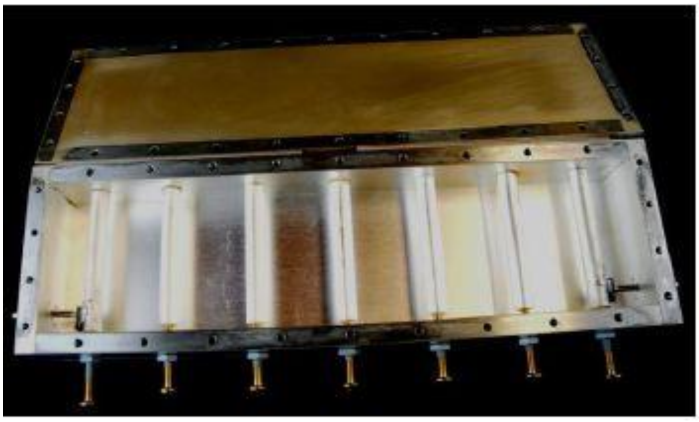


Figure 4 – Inside a cavity filter

Figure 5 – Size comparison between cavity and ceramic filters

A coupled resonator structure is employed when narrow bandwidth is required. Moderate bandwidths are accomplished with a combline structure, and when wider bandwidths require an interdigital type configuration. Recent advances in cavity filter design allow them to achieve extremely high performance, with a transition from passband to stopband as low as 1 MHz in a filter centered at 800 MHz, for example.

Surface Acoustic Wave (SAW) Filters

Compared to “traditional” filter types, which are typically hand-made devices, SAW filters are made using a photolithographic process.

They vary in size from being extremely small with a very low profile (2 x 2 x 2 mm), to about 25 x 12 x 2 mm (size also depends on the number of sections and required performance), and can be manufactured in very large quantities at low cost (Figures 6 and 7).This has led to their becoming a staple in virtually every portable wireless-enabled device. They are made from piezoelectric crystal and employ multiple conductors that are calculated to resonate at a specific frequency.

The signal propagates from one conductor to the other, and depending on the number of electrodes and the distance between them, the filter will achieve a specified bandwidth and level of performance.SAW filters are limited to bandpass and duplexer configurations at frequencies from 30 MHz to about 3 GHz, and can achieve very narrow bandwidths, with very low group delay variation.

That said, their overall performance, especially insertion loss, is inferior to other types of filters, they can handle only very low-power levels, and like all “wafer-scale” devices, their characteristics cannot be changed after fabrication.

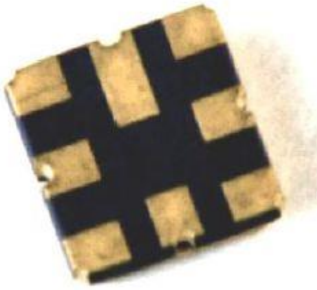


Figure 6 – SAW filter(2 x 2 x 2 mm)

Figure 7 – SAW filter compared to ceramic filter

Crystal Filters

Crystal filters consist of crystal resonators, each one made from a single piezoelectric resonance material (Figure 8). They provide a precisely-defined fixed center frequency and achieve extremely high Q factors (in the tens of thousands), which allows them to achieve extremely narrow bandwidths of only a few kilohertz.

Crystal filters are typically employed in intermediate frequency (IF) stages of receivers (70 and 140 MHz), and can be specified at frequencies from about 300 kHz to about 225 MHz. They are usually available in bandpass or notch configurations and in Chebyshev or Butterworth topologies.

Crystal filters are primarily used for single-band applications such as a receiver operating at one frequency, which the filter passes while rejecting all others with high precision. They also inherently have high temperature stability. However, crystal filters can handle power levels of only about 10 W, are very difficult to tune, are typically expensive, and exhibit relatively high insertion loss.

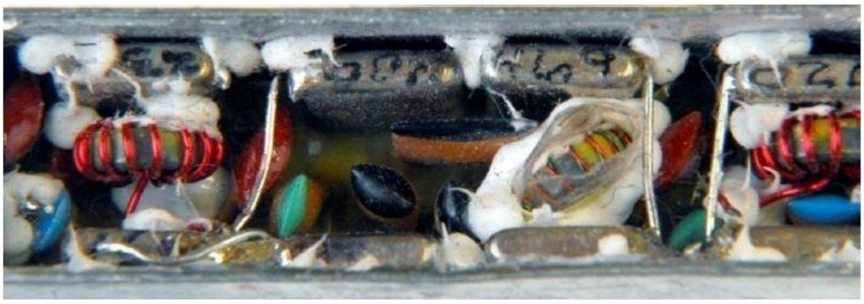


Figure 8 – Inside a crystal filter

Helical Filters

Helical filters are lumped-element types that can be made to operate at frequencies between 45 MHz and 3 GHz and are limited to the bandpass configuration (Figure 9). They consist of a series of cavities that are magnetically coupled, each cavity consisting of a coil soldered to ground on one side and a tuning capacitor on the other (Figure 10). The length of the unfurled coil is equal to one-quarter wavelength at the filter's center frequency.

Their advantage over LC filters is in their bandwidth versus insertion loss. They also have much higher Q than conventional lumped-element types, produce comparatively little stray coupling, and are easy to adjust. When compared to a SAW filter, for example, they offer much lower insertion loss and lower impedance. Their simple design enables smaller quantities to be produced economically with fast delivery.

The factors determining the size of a helical filter include frequency and bandwidth. Narrow bandwidths require larger structures to achieve higher resonator Q, and filter size decreases as frequency increases. Their limitations include RF power handling ability of only 5 W, and a relatively narrow frequency range of 45 MHz to 3 GHz.

Figure 9 - Helical filters

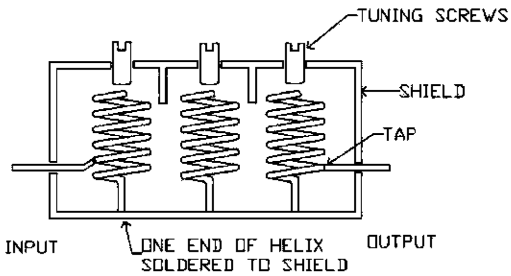
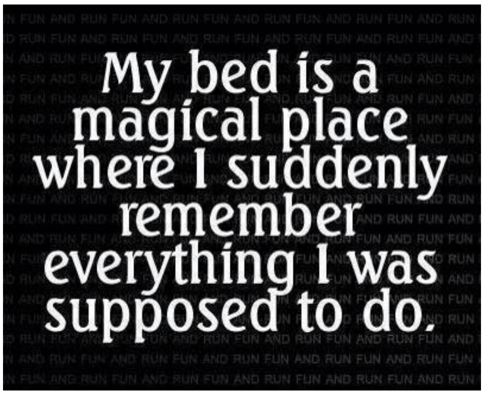


Figure - 10 Helical filter structure



Filter Characteristics in a Nutshell

Filter type	Advantages	Disadvantages
LC (lumped element)	- Reasonable size at intermediate frequencies (500 MHz to 1 GHz) - Supports many topologies - Steep transition from passband to rejection - Connectorized, PC mount, surface mount, drop-in configurations - Multiple case styles - Reasonable insertion loss - Power handling acceptable for most needs - Relatively easy to shift frequencies	- Cannot achieve narrow bandwidths - Elements become impractical to fabricate at high frequencies - Limited power handling - Bulky at low frequencies - Lossy when large number of sections must be used - Moderate to high cost
Ceramic	- Small size - Reasonable insertion loss - Low cost - Good choice for low-power applications - Suited for mass production	- Relatively high low-frequency limit - Maximum operating frequency of 6 GHz - Low power only (5 W) - Difficult to modify once tuned - Surface-mounting only - Can be unstable over temperature if high-dielectric-constant ceramics are used - Requires care during installation
Cavity	- Handle very high RF power levels - Very high performance - Low insertion loss - Medium to high-volume production	- Large and expensive - Mass producible – but at high cost - Mostly connectorized - Relatively high low-frequency limit
Surface Acoustic Wave (SAW)	- Extremely small (2 x 2 x 2 mm) - Very low in cost - Suited for high-volume production - Can achieve very narrow bandwidths	- Limited frequency range - Extremely low power handling ability - High insertion loss - Low to moderate overall performance - Cannot be modified after fabrication
Crystal	- Suitable for single-band applications - Extremely high Q - Can achieve extremely narrow bandwidths - Can achieve extremely sharp skirts - Temperature stable (considering their narrow achievable bandwidth)	- Low power handling - Very difficult to tune - High to very high cost - High insertion loss
Helical	- Better bandwidth vs. insertion loss than LC type - Very high Q - Easy to adjust - Low insertion loss	- Limited to bandpass configuration - Low power handling - Limited operating frequency range

Antennas Made of Ice?

Copied from: http://wnep.com/2014/01/16/antennas-made-of-ice/

These pictures show what appears to be radio antennas on the roof of a truck on an icy morning recently in Danville. However these are not antennas but rather strange-looking ice formations called ice spikes.

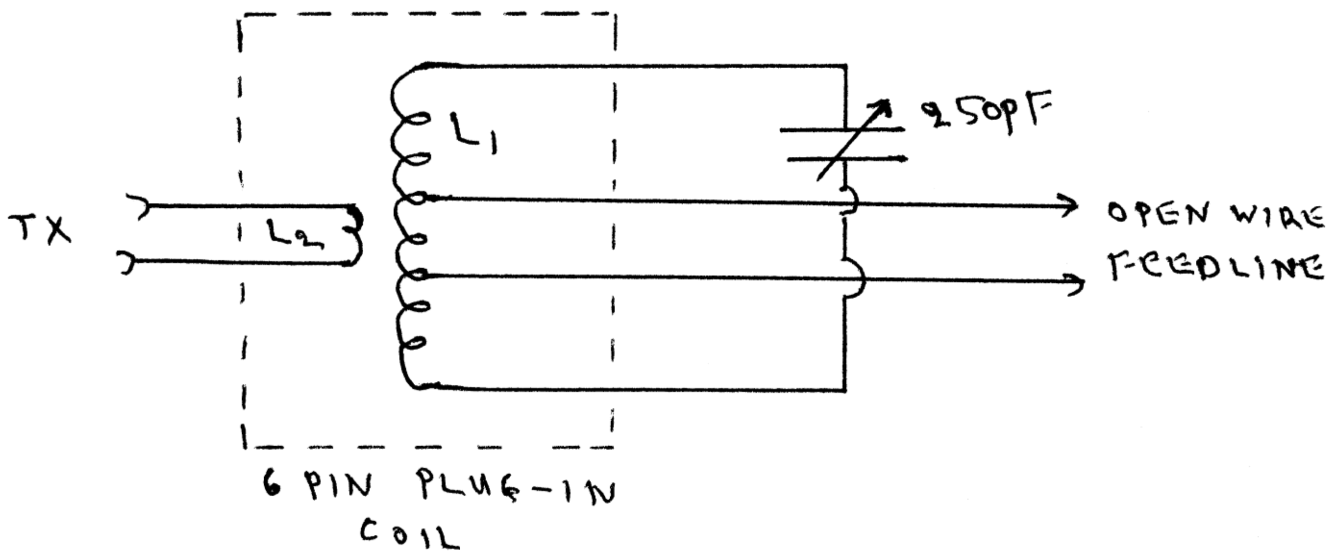
I've also seen these spikes pictured on ice in a backyard bird bath and on ice cubes in a tray. Ice spikes can form when water freezes inside an enclosure.The water first starts to freeze around the edges and spreads inward until just a small hole or opening is left on the surface.
Since ice expands when it freezes the remaining water is forced up through the opening eventually forming a tube or ice straw. As the water is forced upward it freezes around the rim of the tube and this adds to it's length making the spike grow. The tube will continue to grow until either all the water freezes or until the tube freezes shut forming a solid spike of ice.

It's possible that a light wind may have caused the spikes to grow at an angle making them look like radio antennas. How strange!

ANTENNAS AND TRANSMATCHES – PART 5
BY AL AKERS – ZS2U

The variable capacitor has a 0 – 100 dial on it. The coils are air-wound so that L2 can be moved into L1 to various extents to vary the coupling. The feedline is tapped close to the centre of L1 and equidistant from the centre. Tune to resonance and check SWR. It is likely to be high. Vary the coupling between L1 and L2 and resonate again. Repeat till the lowest SWR is obtained. If it is still high, move feedline taps a turn each side and repeat the adjustment. Repeat the whole procedure till a low SWR is obtained. The coupling between L1 and L2 is quite critical, so it is advisable to use some epoxy resin to prevent a shifting of the coupling during handling. Note the dial setting for this coil and band. This matching is a tedious business, but the reward is that when you want to operate on a band, simply plug in the coil for that band and set the capacitor dial to the recorded value and you are away.

Representative inductance values for L, in transmatch is 4 µH for 40 m, 2 µH for 20 m and 1 µH for 10 m.



$$\text{Coil inductance } L = \frac{A^2N^2}{38(A+3B)}\ \mu\text{H}$$

Where:
A = coil diameter in cm
N = Number of turns
B = Length of winding in cm
L2 will be about 5 turns for 40 m, 4 turns for 20 m and 3 turns for 10 m.

Answer to April's ammeter problem	**Answer to May's hexagon problem**
$R_2 = \frac{I_1 \times I_m \times R_m}{I_2(I_1 - I_m)}$ $R_1 = \frac{R_2(I_2 - I_1)}{I_1}$	$\text{Area } A = 1.5 \times \sqrt{3} \times L^2$

Sunday Bulletins

PEARS bulletins are transmitted on Sundays immediately after the SARL English transmission, i.e. at about 08:30 on 7098 kHz as well as the 2 metre linked network that provides from Butterworth to George and up to the Free State and their environs. PEARS 7098 or 3640 kHz transceiver facilities are also remotely linked as needed. In addition, the SARL's 40 m operations on 7082 or 7066 kHz or Hamnet's 7070 kHz can be remotely patched to the 2 m network in receive only mode or with full transceive capability for interactive events.

A recorded rebroadcast of the bulletin takes place on the Eastern Cape Linked Repeater Network every Monday night at 20h00 courtesy of various volunteers who rotate this duty.

The bulletin readers are always looking for something to announce. If you have something to contribute, please forward it to the next reader.

Bulletin Roster

25 May	Clive	ZS2RT
1 June	Johannes	ZS2JO
8 June	Tony	ZR2TX
15 June	Theunis	ZS2EC
22 June	Chris	ZS2AAW
29 June	nick	ZS2NT
6 July	Clive	ZS2RT

The bulletin readers are always looking for something to announce. If you have something to contribute, please forward it to the next reader.

CONGRATULATIONS

BIRTHDAYS – June

02 Vanessa XYL of Glen Cummings ZS2GV
03 Tim Joubert ZS2X
06 Linton Rohl ZS2ICE
09 Gus Winter ZS2MC
10 Ken Victor ZS2OC
18 Ingrid XYL of Dawid Petzer ZS1PC
19 Neville Bowden ZS2N
21 Fredrick Leibach ZR2FM
25 Terry Flanagan ZS2ABB
29 Dennis Hibberd ZU2KF
30 John Ashworth ZS2GB

ANNIVERSARIES – June

10 Gwen and Dennis Hibberd ZU2KF
16 Peggy and Viv Moore ZS2VM
26 Rosemary ZR2MCR and Rob Mac Geoghegan ZS2ROB
30 Marelyn and Ettienne Villiers

If you are a member and your birthday or anniversary details are omitted or incorrect, please notify Clive ZS2RT (or any committee member) to update our records.

Four Metre Net

On Monday evenings at 19h00 there is a four metre net at 70.2 MHz FM - antennas are horizontally polarized. This net serves a dual purpose: It will get amateurs together to discuss various aspects of the hobby; and it will also provide signals for stations further afield to listen out for and hopefully, when there are openings, to make contact with net members. You are welcome to join in. 73, Al ZS2U

Basie ZR2BA is now the repair agent in PE for the **GHD hair straightener** and carries a wide range of spares. Contact detail: Basie du Plessis, 082 888 2118.

TROPO VHF/UHF DISTANCE RECORDS IN RSA & WORLD

Band	R.S.A.		World	
50 MHz	ZS2BE / ZS8MI	1758 km	ZS2BE / ZS8MI	1758 km
70 MHz	ZS2ACP / ZS6NK	1181 km	ON4KHG / OY9JO	1430 km
144 MHz	ZS2ACP / FR5DN	3247 km	KH6HME / W1LP	4754 km
432 MHz	ZS2GK / FR5DN	2875 km	KH6HME / XE2/N6XQ	4150 km
1,3 GHz	ZS6ASO / ZS6BNT	422 km	KH6HME / XE2/N6XQ	4150 km
2,3 GHz	ZS6ASO / ZS6BNT	198 km	KH6HME / N6CA	3982 km
5,7 GHz	ZS6AXT / ZS6JON	151 km	D44TXV / CT7/F1PYR	2993 km
10 GHz	ZS6AXT / ZS6JON	199 km	D44TXV / CT7/F1PYR	2993 km
24 GHz	ZS6AXT / ZS6JON	56,2 km	DL7QY / F6DKW	581 km
47 GHz	ZS6AOU / ZS6BMS	21,2 km	W6QI / AD6FP	343 km
76 GHz	No Record		DL2AM / DL2GWZ	228 km
134 GHz	No Record		WA1ZMS / W4WWQ	114 km
241 GHz	No Record		WA1ZMS / W4WWQ	114 km

Your Society's Committee for 2015/2015

Chairman	Nicholas Thompson ZS2NT	082 490 0824	Nick.peham[at]gmail.com
Vice Chairman, Technical/repeaters	Glen Cummings ZS2GV	082 411 2743	glenvanessa[at]gmail.com
Secretary, Functions organising	Patsy Kruger ZS2PTY		patsy[at]peham.co.za
Treasurer	Clive Fife ZS2RT	041 367 3203	clive[at]peham.co.za
Public Relations	Johannes Geldenhuys ZS2JO	082 320 3032	Johannes[at]s4.co.za
Events, Rally organising	Tony Allen ZR2TX	082 956 2920	tony.zr2tx[at]gmail.com
QSX Distribution, Contests, Awards, ZS2PE	Theunis Potgieter ZS2EC	082 766 8830	zs2ec@vodamail.co.za
Technical/repeaters, WiFi	Chris Scarr ZS2AAW	082 925 6367	christopher[at]peham.co.za
CO-OPTED POSTS			
RAE Examination Admin.	Donovan ZS2DL	082 852 4885	zs2dl[at]hamradio.co.za
Assessors	Rory ZS2BL Chris ZS2AAW Donovan ZS2DL Bill ZS2ABZ	072 026 8909 082 925 6367 082 852 4885 041 581 2580	rory[at]commco.co.za christopher[at]peham.co.za zs2dl[at]hamradio.co.za zs2abz[at]isat.co.za
Hamnet scoring	Al ZS2U	041 360 2983	al[at]peham.co.za
Contest Committee	Theunis ZS2EC	082 766 8830	contest[at]peham.co.za
PEARS VHF/UHF Contest	Mike ZS2FM	084 612 9600	mikecbosch[at]gmail.com
Meetings catering	Bill Hodges ZS2ABZ	O41 581 2580	zs2abz[at]isat.co.za
QSX Editor			

Replace [at] with @ when you want to send an email (this is done to try to prevent spamming).

PEARS' VHF/UHF, Packet & Other Services

Local Repeaters: These repeaters form a separate sub-net in the PE - Uitenhage - Despatch area.

Town VHF	Town UHF	Uitenhage	Tygerhoek	Longmore
145,050/650	431,050/438,650	145,075/675	145,000/600	145,025/625

Cape Linked System Repeaters:

These form the PEARS long-range 2-metre repeater system, in conjunction with the Border, Southern Cape and WCRWG systems. See www.zs2pe.co.za/Repeaters/repeaters.htm for more details.

Lady's Slipper 145,100/700	**Grahamstown** 145,150/750	**Cradock** 145,050/650	**Noupoort** 438,750 / 438,675
Colesberg 431,075/438,675	**Kareedouw** 145,127/725	**Plett** 145,175/775	**Brenton** 145,075/675

Packet network:

ZS0NTP-2 Packet Node Lady's Slipper 10,151 LSB 300bd APRS 144,800 1200bd 438,275 1200bd (FWD) 434,875 9600bd 434,800 1200bd APRS Cape Linked System	**ZS0NTP BBS** Lady's Slipper On all node frequencies	**ZS0GHT-2 Packet Node** Grahamstown 144,800 1200bd 434,800 1200bd (FWD) 439,850 9600bd	**ZS0CDK-2 Digi** Cradock 144,800 1200bd
	ZS0KDJ APRS Digi Mount Road 434,800 1200bd	**ZS0KDB APRS Digi** Longmore 434,800 1200bd	**ZS2ABZ-4** WMR918 WX Station 144,625 1200bd

VHF Beacon: 50,007 MHz FSK – ZS2X, 25 Watts into 2 element Yagi beaming north.

Banking details *(for subs & donations)*: NEDBANK SAVINGS ACCOUNT No. 221 252 7594, Bank code 121217, A/C name: Port Elizabeth Amateur Radio Society. Please use call signs as a reference.

QSX-PE - *Newsletter for the discerning Radio Ham*

TO:

IF NOT DELIVERED
RETURN TO

Port Elizabeth Amateur Radio Society
PO Box 10402
LINTON GRANGE
6015

AMATEUR RADIO is the hobby for RADIO EXPERIMENTERS and those who like to fiddle with ELECTRONICS, COMMUNICATIONS or COMPUTERS