July 2014

President's Trophy Air Race – Gariep Dam Airstrip 29th May 2014

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

Editing by Christopher ZS2AAW

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 15th of July, 7:30 pm
Jacqui Crozier from the NMMU will speak on an "Overview of PV module shading and defect identification using Electroluminescence"

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

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	
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 Winter QRP Sprint
26 - 27 July	RSGB Islands on the air(IOTA)contest
3 August	SARL HF Phone contest
9 August	SARL YL Sprint (Women's Day)
16 August	Trans-Baviaans MTB Race Lighthouse weekend
17 August	SARL HF Digital contest
31 August	SARL HF CW contest
4 October	RTA Port Elizabeth

Solar tracking project (following the June talk…)

Mechanical tracking systems are available to reposition a variety of devices including radio telescopes, antennae, and even television satellite dishes. **Nathan D. Williams & Nicholas P. Truncale** These systems are large and often unaffordable for the small project developer. We are team members of a collaboration including two universities and a non-profit sustainable energy entity whose goal is to develop and commercialize a new solar energy collection device.

This article will describe the new patent pending device called the Reflective Solar Tracker (RST) and will showcase the control systems function. The control systems' main hardware component is the Raspberry Pi, whose primary algorithm uses astronomical data to reposition the RST and collect voltage data for power and energy calculations.
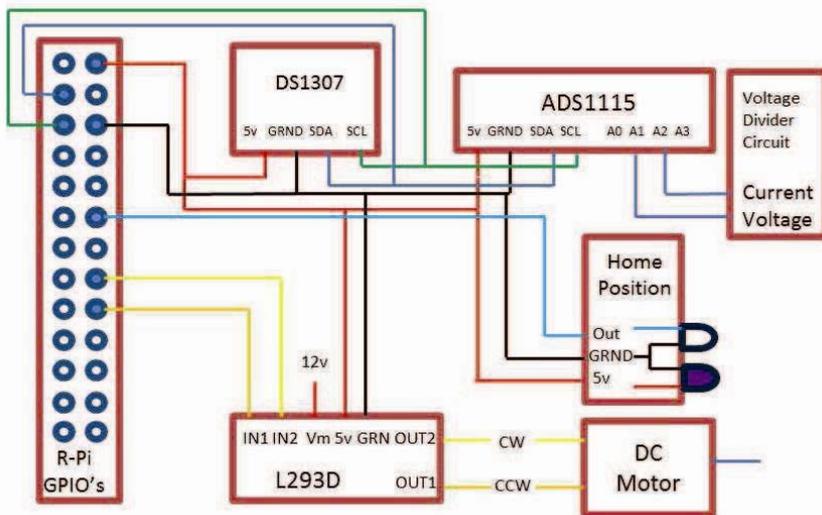
The Reflective Solar Tracker

This device utilises both reflected sunlight via Mylar panels and a rotating base platform to increase the energy density impinging on commercially available solar panels. The extra sunlight from reflection saturates the individual crystalline solar cells while the rotating base ensures the saturation takes place for a longer portion of the day compared to conventional stationary installations. The repositioning on the base platform is accomplished using a gear and worm screw turned by a low power DC motor controlled by the Raspberry Pi. The following describes the components for controlling a bi-directional DC motor, collecting voltage and current data from a solar panel installation, and the algorithm using astronomical data to guarantee the RST is always sun facing.

Hardware Description

The hardware architecture for the Raspberry Pi control system functions with the use of products from http://www.adafruit.com specifically the 081307 Real Time Clock, ADS1115 16-Bit ADC, L293D H-Bridge IC, IR home-position sensor, and a 5200mAh power bank. The Real Time Clock is used to ensure the program executes daily at the proper time in case of power failure. To minimise the chance of failure, the Raspberry Pi is powered by a power bank, which is simultaneously being charged by a 5V 1A power adapter. The motor is directly controlled by an H-Bridge that is interfaced with the Raspberry Pi GPIO pins. In addition to the H-Bridge for motor control, an IR home-position sensor is used to ensure the motor is returned to the proper location at the end of every cycle. The hardware architecture also includes an Analog-to-Digital converter that allows us to collect the solar panel output voltage data throughout the day. We also collect the voltage across a 1Ω power resistor giving us the current. The connections of all of these components can be viewed in the provided block circuit diagram.

Tracking and data collecting algorithm

The primary algorithm, executed by a daily cron job, retrieves a local sun azimuth table containing the sun's position in degrees relative to the eastern direction for the installation's geographic location in the current month. The hardware allows the motor to turn the base platform in both the clockwise (CW) and counter clockwise (CCW) directions. Beginning at 6.00am, the algorithm calculates the starting direction in reference to East and moves the base platform CW or CCW to this position. Throughout the rest of the day, the motor is turned on for a specific interval every half hour and moves the base platform CW, in the direction of the sun's trajectory, to the next sun facing position.
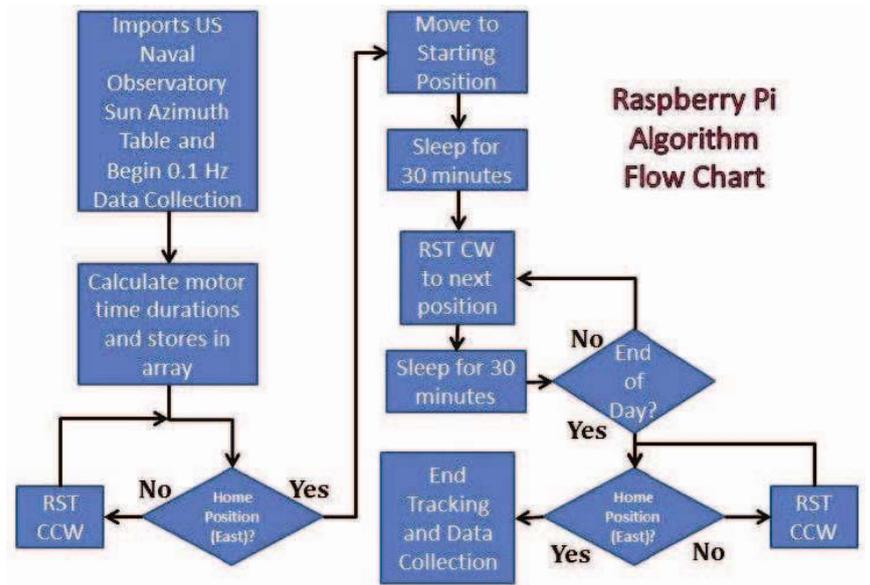
The following snippets of code, which utilise the NumPy library, include the readDayData( ) function that calculates the specific time durations from the imported sun azimuth tables. The durations are stored in the motor_time[ ] array. Once the algorithm reaches the end of the imported file, the RST rotates CCW back to the home position so it is facing east the next day. For our data logging function, we used some of the code from the Adafruit ADS1x15 class combined with the Python threading class. The method itself is written as a thread that is kicked off in the main method. Once executed, the thread will open a new text file titled with the current date. Inside the file, the thread will log and timestamp data from inputs A1 and A2 every 10 seconds (0.1 Hz) until the daily tracking function ends and the thread stops.

```python
import time, subprocess, threading, datetime, logging
import RPi.GPIO as GPIO
import numpy as np
from Adafruit_ADS1x15 import ADS1x15

# GPIO setup would go here

#Returns the 3 letter month abbreviation of current month
def getMonth():
    temp = subprocess.Popen(["date"], stdout=subprocess.PIPE)
    date_string = temp.communicate()[0]
    t1, month, t2= date_string.split(' ',2)
    return month
month_str = getMonth()
    filepath = '/home/pi/RST/Months/' + month_str + '.txt'
    rawData = np.loadtxt(filepath, dtype=(str, float), usecols=(0,2))
    motor_const = 0.462 # Units of deg/sec based upon speed of motor

    angle_deg = np.zeros((len(rawData),1), dtype=(float))
    motor_dir = np.zeros((len(rawData),1), dtype=(int))
    motor_time = np.zeros((len(rawData),1), dtype=(int))
    def readDayData():
        z = 0
        while(z < len(rawData)):
            loop_time[z,0] = int(convTimeSec(rawData[z,0]))
            if(z == 0):
                if(float(rawData[z,1]) <= 90):
                    angle_deg[z,0] = 90 - float(rawData[z,1])
                    motor_dir[z,0] = -1
                    motor_time[z,0] = angle_deg[z,0]/motor_const
```

```
                else:
                        angle_deg[z,0] = float(rawData[z,1]) - 90
                        motor_dir[z,0] = 1
                        motor_time[z,0] = angle_deg[z,0]/motor_const
                else:
                        angle_deg[z,0] = float(rawData[z,1]) - float(rawData[z-1,1])
                        motor_dir[z,0] = 1
                        motor_time[z,0] = angle_deg[z,0]/motor_const
                z+=1

#Returns RST to home position
def returnHome():
    if(GPIO.input(homeSensor) == 0):
        logging.info(timestamp() + ': Returning to home position.')
        GPIO.output(hbEnable, 1)
        GPIO.output(motorLED, 1)
        GPIO.output(motorCCW, 1)
        print "Returning home."
        ...

class DataLoggingThread(threading.Thread):
    def __init__(self, threadID, stop_data_log, delay):
        super(DataLoggingThread, self).__init__(self)
        self.threadID = threadID
        self.delay = delay

    def run(self):
        ADS1015 = 0x00
        adc = ADS1x15(ic=ADS1015)
        logging.info(timestamp() + ': Running data logging thread.')
        while not stop_data_log.isSet():
            file = open('/home/pi/RST/Data/' + today + '.txt','a')
            voltage = adc.readADCSingleEnded(1, 4096, 250) / 1000
            file.write(timestamp() + '\t' + str(voltage))
            current = adc.readADCSingleEnded(2, 4096, 250)/ 1000
            file.write('\t' + str(current) + '\n')
            file.close()
            time.sleep(self.delay)
        logging.info(timestamp() + ': Exiting data logging thread.')
```

Reflective Solar Tracking in the field

Using the collected voltage and current data from the solar panels, we multiply the values together to get the power output of the panels. Integrating these power values in kilowatts over the total amount of hours of sunlight gives you the total energy output in kilowatt-hours (kWh) of your installation. Our initial study compared the RST energy output versus a conventional stationary non-reflective installation. The plot alongside shows the power and energy comparison on a perfectly sunny day.
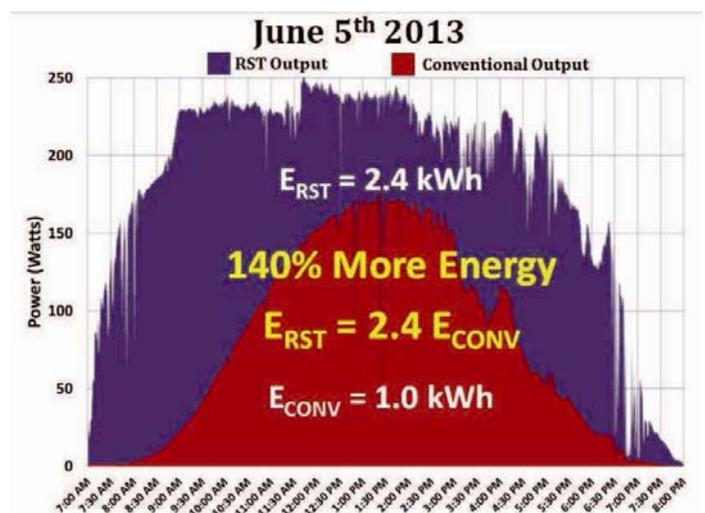
We recently sent two RST's to two locations in Uganda where one will be used to power an electric water pump at a rural parish school as a science experiment where the students will collect data with the Raspberry Pi as a project and send us the files for our study. We also gave a keynote presentation at the 2013 Energy Path conference about the RST and the Raspberry Pi control system. Anyone with questions regarding the control system or projhect may contact us at any time. Nathan.williams2@scranton.edu, Micholas.truncale@scranton.edu

President's Trophy Air Race, Gariep Dam – 29-30 May 2014

Beavan Gwilt, ZS2RL

PTAR as seen through the eyes of ZS2RL & ZS2RT

We hit the road at 06h00 on the morning of Thursday 29 May, our four vehicles (ZS2NT, ZR2CRS, ZS2AAW, ZS2RL) rendezvousing just beyond Uitenhage. The first stop was at Jansenville, at the Noorsveldt Padkafee for breakfast. The satisfied gang can be seen below -

We met up with Daniel ZS4DL and family at Colesberg, and our convoy then followed him to collect the PTAR marker gazebos at the Gariep airfield. Thereafter we left for our respective turning points for the Friday – Clive and myself heading for Steynsburg, where we overnighted in a chalet at the Redefin Caravan Park. Our hosts – Mike and Lucy Pentz - really made us feel welcome.

Up at sparrow the next morning to be at the TP just outside the dorpie by 0700. VHF comms to Aliwal or Cradock were non-existent, so up went the 80/40m dipole. We were joined there by Gary ZS2GRL and some of his farmer friends, who came to help with the spotting – and we sure needed it! Spotting ain't that easy. Apart from having to rotate your torso through 180 degrees while keeping the binoculars focused on an object crossing your field of view at something like 200 kph plus, the greatest challenge was to spot the number. No thought seems to have been given to the legibility of the numbers: they were randomly placed on the aircraft (engine cowling, anywhere on the fuselage our tail) so in the first instance you didn't know where to start looking, and in a few notable cases the numbers were cunningly camouflaged against the background: black numerals against a dark-red fuselage, or against a black/white chequered tailplane, and one enterprising fellow actually superimposed them on the aircraft's ZS callsign emblazoned on the side – visually, a confusing mess.

After the last aircraft on Friday, we set of for a guest farm (New Holme) between Hanover and Colesburg. Saturday's TP was to be on New Holme's private airfield. The owner of New Holme, Mr PC Ferreira, sponsored our accommodation for the Friday evening, including meals. Staying there was sheer luxury. The pic below shows Clive enjoying the braai we were given for Friday's evening meal.

Up at 0600 on Saturday morning to grab a bite of breakfast before setting out, and it was COLD – a layer of ice (not frost) on the bakkie's windscreen. Comms was a piece of cake, with a full-house UHF signal from

Colesburg. A few of the neighbouring farmers joined us at the TP, and one daredevil entertained us by doing tricks and wheelies on his quad bike (and also enveloping us in a dust cloud!).

Finally, a return journey back to Gariep to return the gazebos. There we popped into 'Control' to say hello to the patient souls who manned the JOC – Lionel, ZS2DD, a well-experienced HF mobile and base station operator, Trevor, ZS2AE and son Christopher, ZS2AAW. Their challenges on the days concerned included an unreliable mains supply reticulated through multiple tandem extension leads from a diesel generator, plenty of local QRM from 3G modems and wifi links, and a somewhat cramped operating space. But playing to their advantage was the availability of a permanent VHF folded dipole with PL259 connector ready to plug into the dualband rig, which performed as well as the X50 antenna, into the local repeater network. So the X-50 was later packed away and only the HF antennas remained aloft for the full event duration.

On the way back to PE we had decided to overnight at the Redefin CVP in Steynsburg, and there we were joined by Colin, Ted, Jimmy, Patrick, Andrew and Mandy. Our host, Mike Pentz, made an indoor room with built-in braai available to us (it was too blerrie cold outside!), and to use a hackneyed phrase "a fine time was had by all".

On Sunday morning we departed Redefin at different times. Clive and I stopped at the Daggaboer Padkafee between Cradock and Cookhouse for brunch. Upon leaving there, we soon found ourselves stationary at a 'stop-go'. And an amazing coincidence: the next vehicle to pull up behind us was Colin (ZR2CRS) and company.

Proudly, PEARS delivered the goods. There was one small hiccup, where some markers were allegedly in the incorrect position, but that was found to be due to the TP positions having been slightly changed at the last minute, and the info not being passed on to PEARS – the pilots and the PEARS choir were singing different versions of the same hymn. Full credit is due to Colin ZR2CRS for having done an excellent job in organising our side of things.

Next year's PTAR is to be at Bloemfontein, and for 2016 Polokwane was mentioned. Volunteers please to queue up outside the Italian club……

Summits On The Air (SOTA) Eastern Cape

Andrew Gray, ZS2G

Up to now none of the Eastern Cape summits have been successfully activated since the implementation of SOTA in 2003.   This with leaves the EC lagging behind most of the other regions of the country.

There are 16 registered Summits in the Eastern Cape.

Code	Name	Alt(m)	Points
ZS/EC-001	Ben Macdhui	3001	10
ZS/EC-002	Kompasberg	2503	8
ZS/EC-003	Hangklip	2086	6
ZS/EC-004	Gaika's Kop	1963	4
ZS/EC-005	Hogsback	1937	4
ZS/EC-006	Cockscomb	1758	4
ZS/EC-007	Smutsberg	1757	4
ZS/EC-008	Peak Formosa	1676	4
ZS/EC-009	Perdeberg	1651	4
ZS/EC-010	Menziesberg	1645	4
ZS/EC-011	Bloukop	1623	4
ZS/EC-012	Tor Doone	1565	4
ZS/EC-013	Thumb Peak	1425	2
ZS/EC-014	Witelskop	1251	2
ZS/EC-015	Strydomsberg	1180	2
ZS/EC-016	Lady's Slipper	607	1

SOTA website at : http://www.sota.org.uk

Operating Summits on the Air from the Cockscomb Mountain.

When Mandy , ZS2AV, who is a member of the Voetsak Hiking Club heard that the club was going on a weekend outing up the Cockscomb Mountain , she jokingly asked me if we should go along. Of course what radio ham wouldn't jump at the idea of being able to play radio from a high mountain top? The problem was that the hike was only 6 days away from when Mandy phoned, and yours truly hadn't walked up any sort of hill in the previous few   months. The next four evenings, Monday to Thursday, were each spent walking about 7 kms around the neighbourhood to increase my level of fitness.

On the first day of the hike, Saturday 28 June, it soon became clear to me that I was still unfit and that my backpack was too heavy for what we were doing. Somehow we managed to grin and bear it and 6 hours later we were at the overnight cave high up in the mountains. Altogether we were fourteen people on the hike who spent the night in the cave. It was quite a festive evening around the camp fire, although yours truly went to bed somewhat early.

On the Sunday morning ten people from the group left for the Cockscomb peak and four people had decided to stay at the cave. It took about two hours of climbing to reach the summit and we were there by 10h15. We set up the radio, which was an Icom handheld on 145.500 MHz. The antenna was a Comet CHL 25 end fed half wave mounted on a broom handle with a homebrew mounting bracket and a short length of co-ax.   The stations that we worked in PE were Tony ZR2TX , Colin ZR2CRS , Beavan ZS2RL , Al ZS2U and Dave ZS2DH who was operating portable from the Lady's Slipper peak. Ted , ZS2TED , put in a booming signal from Jeffery's Bay. We were lucky to have one "dx" contact with Abe ZS1ZS in Mossel Bay. Barry ZS2NF from Uniondale was listening out for us by operating portable from some high ground , but unfortunately we didn't make any contact. Thank you to all the stations who gave us contacts and also to Barry, ZS2NF, who tried so hard.

Sunday Bulletins

PEARS provides a local reading of the SARL national bulletins in Afrikaans at 08h15 and English at 08h30. The club bulletins are transmitted immediately after the SARL English bulletin, i.e. at about 08:45 on 7098 kHz as well as the 2m linked network that provides coverage from Butterworth to George and up to the Free State and their environs. PEARS 7098kHz transceiver facilities are also remotely linked as needed.

A recorded rebroadcast of the society bulletin takes place on the Eastern Cape Linked Repeater Network every Monday night at 20h00, courtesy of Ewalt, ZS2EHB.

Bulletin Roster

6 July	Clive	ZS2RT
13 July	Tony	ZR2TX
20 July	Chris	ZS2AAW
27 July	Theunis	ZS2EC
3 August	Chris	ZS2AAW
10 August	Nick	ZS2NT
17 August	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 – July

05 Nico Oelofse ZS4N
07 Jim van Loggerenberg ZS2LR
08 Ronel du Plessis XYL of Basie ZR2BA
10 Mitch Rundle ZS2DK
11 Marius Rautenbach ZS2JR
12 Sandra Bowden XYL of Neville ZS2N
13 Cyril Hislop ZS2EJ
16 Hendrina Pearson XYL of George ZS2E
20 Marelyn Villiers XYL of Ettienne
20 Sally Jacobs XYL of Donald ZS2BW
22 Beavan Gwilt ZS2RL
24 Ingrid Maré XYL of Jan
28 Yakov Loock ZS2YCL
29 Leslie Jansen ZS2LES
29 Des Pettit ZS2ABU

ANNIVERSARIES – July

01 Gerrit & Laetitia Rautenbach ZS2XD
02 Donald & Sally Jacobs ZS2BW
06 Freddy & Joy Leibach ZR2FM
07 Barry & Colleen Nugent ZS2NF
10 George & Hendrina Pearson ZS2E
15 Martin & Margret Ras ZS2MR

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 on 70.200 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.

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ZS2AAW, ZS2VS & family go "WiFi mobile"

Visible on a recent trip to Div 6 (Rustenburg), this 3G GSM magmount antenna on ZS2VS's mobile gives away the secret of keeping teenage travelers happy – "WiFi Mobile!!"

Using a 3G router with prepaid SIM card, Dad ZS2AAW kept his travelers happy (including mother-in-law), since there were 5 cell phones and three iPads onboard which did not have GSM connectivity. "A week in Div 6 cost me 3GB data, but the peace and quiet was well worth the costs ☺". Powered from the accessory socket using a modified car cellphone charger (SMPS) to deliver 5V, the wifi signal was even usable from inside the B&B accommodation with the mobile parked outside…

Your Society's Committee for 2014-2015

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
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QSX Distribution, Contests, Awards, ZS2PE	Theunis Potgieter ZS2EC	082 766 8830	zs2ec[at]vodamail.co.za
Technical/repeaters, WiFi	Chris Scarr ZS2AAW	082 925 6367	christopher[at]peham.co.za
CO-OPTED POSTS			
RAE Examination Admin.	*Vacant*	-	-
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	*Vacant*	-	-

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 145,050/650	**Town UHF** 431,050/438,650	**Uitenhage** 145,075/675	**Longmore** 145,025/625	**IRLP** available on this subnet

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 (link only)** 438,750 / 438,675
Colesberg 431,075/438,675	**Kareedouw** 145,125/725	**Plett** 145,175/775	**Brenton** 145,075/675

Packet network:			
ZS0NTP-2 Packet Node Lady's Slipper 144,800 1200bd 439,850 9600bd 434,800 1200bd APRS	**ZS0NTP BBS** Lady's Slipper On all node frequencies	**ZS0GHT-2 Packet Node** Grahamstown 144,800 1200bd 434,800 1200bd 439,850 9600bd (to LS)	**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.**

Disclaimer.

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