



QSOX PE



**THIS NEWSLETTER IS PUBLISHED BY THE
PORT ELIZABETH AMATEUR RADIO SOCIETY**

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SEPTEMBER 2003

MONTHLY GENERAL MEETING

The monthly general meeting of the PORT ELIZABETH AMATEUR RADIO SOCIETY will be held on Thursday, 18 September 2003 at **the St Hugh's Church Hall, Newton Park**, starting at 20:00 (8 pm).

Viv Moore ZS2VM will give a talk on simple receivers, including the direct conversion receiver whose details appear in this issue. Please bring your QSX along.

We didn't see much of the *bring and buy* last month, but a table will be provided. Bring your stuff along.

Tea, coffee and biscuits will naturally be provided!

Wrinkly Ravers

The October Rave will be held on the 2nd of the month. Isn't it strange how close that seems to Christmas?

Get there around 12:00.

We had 11 members plus Judy & ZS2BWB Ken's daughter Marion from Pretoria at the September rave, at which everyone enjoyed her or himself.

NEWS from the SARL


We have heard from Graham Hartlett ZS6GJH, the President of the SARL, that the proposed radio regulations that were submitted some three years ago have been returned to them unsigned.

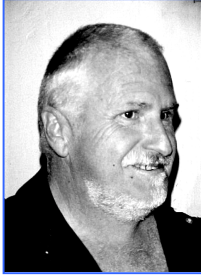
ICASA says that (presumably) they should have first published the regulations for comment by all concerned before submitting them to the Minister. Although one tends to think of the *general* public, it is most likely the comments from other amateurs who are not members of the League that are sought after because they were not informed of the details of the proposed amendments.

The Minister also expects to be informed of all relevant matters pertaining to the matter under discussion. Because of the recomm-

endations from the recent WRC03 meeting, where the reference especially to Morse code was dealt with, it will probably be necessary for the League to have a new bash at the Regulations and submit them again to ICASA. This will probably be a good idea, since some of the previous proposals seemed unnecessary.

ICASA has queried the SARL's representation of amateur radio operators. The SARL needs to be suitably representative if it is going to have any influence in the direction taken by ICASA. Once again, this means members. If the SARL does not represent the majority, ICASA will be less likely to listen.

Do the right thing: Join the SARL. It's up to you to make the difference. 



from *The* *Chairman*

One has only to say the word “SARL” on the air, and you can be assured of a lively debate.

Earlier this month, an informal debate amongst a few of us locals on the 650 town repeater got the ball rolling. We all seem to have pretty strong and divergent views as to why a) our hobby is not attracting enough new-comers and b) why the SARL is in such a precarious financial position.

The one aspect that really needs addressing is just what we consider to be the definitive definition of a radio amateur. Once we know who we are, what we aspire to become and how we would like those outside the hobby to view us, we can go about the task of targeting new members to the ranks of our fascinating hobby. To plot a course successfully, the destination has to be known.

From my perspective, having been licensed since the mid 1970’s, becoming a ham was a milestone to be cherished. Passing the then RAE was an achievement – and an amateur operators certificate was a passport to a little recognition in the technical world. I secured several jobs, early on in my working career, thanks to being a radio ham. Regrettably, the dumbing-down of the RAE, in an effort to attract newcomers to our hobby, has diluted the value of being a ham. Statistically, it also seems apparent that it has not attracted too many “stayers” to the hobby.

Radio amateurs are people who are totally fascinated by communications. Most followed a path from being short wave listeners, to becoming CB operators, and then ham radio. They are not necessarily highly technical, but they are generally very inquisitive – learning in the process of satisfying their enquiring nature. They are also very passionate about their hobby. The great thing about our hobby is that you can leave it alone for a while, and years later, when opportunity permits, take on where you left-off, and play catch-up.

At our next meeting, I would like to address these perceptions, and gain your observations. Let’s bring amateur radio back to it’s former glory – and turn the tables, let’s get outsiders contacting us to join our fraternity, not the other way around!

73

Rory, ZS2BL

Electricity

Have you ever given some thought to our reliance on electricity?

I think I am safe in saying that the per capita usage of electricity in North America is higher than here, and that being technologically the most advanced area in the world, who would have even considered the possibility of a major power failure there?

Yet, during August they experienced a power failure which affected a huge area of North Eastern United States and Southern Canada, including major cities such as New York, Chicago, Detroit and Toronto.

As a senior investigating official stated, "This blackout should not have occurred." But it did, and could just as well occur here.

With the existing electrical supply system and the high prevalence of copper wire theft, for instance, it is not such an unlikely event.

Just imagine that you were without electricity for several days. What would you do?

73,

**AI ZS2U,
Provincial Director
Hamnet/ECARES**

Solution – Problems of Transmitter Tones

Referring to last month's problem: ZS1 could not have heard both ZS2 and ZS3 as "smooth" because he would then have known that his transmission was rough. Similarly, ZS2 could not have heard both ZS1 and ZS3 as smooth because he would also have known his to be rough.

ZS3 would have noted that both ZS1 and ZS2 had a smooth tone, which would immediately show his as rough.

JOKE

Two guys are moving about in a supermarket when their carts collide. One says to the other, "Excuse me, but I'm looking for my wife."

"What a coincidence, so am I, and I'm getting a little desperate."

"Well, maybe I can help you. What does your wife look like?"

"She's tall, with dark hair, long legs, firm boobs, and tight buns. What's your wife look like?"

"Never mind, let's look for yours."

FOR \$ALE ★ WANTED ★ SWOP

FOR SALE

* Icom 721 (commercial version of 725) with handbook and microphone – R3000
— Phil Kauffmann-Sorensen ZS2NP, tel. 043 726 1689 or 072 724 4923

GPS Guide for Idiots (like me....)

(During one of our technical chats which follows the repeat of the Sunday bulletin on Monday evening, the question was asked "How does GPS work?". The internet was consulted, and here follows a simplified synopsis of the whole complicated and very cunning business. ZS2RL)

1. Overview

There are about 24 satellites (SVs – space vehicles) in various orbits around the earth. Each SV has a highly accurate atomic clock on board, all the clocks being exactly synchronised. At frequent intervals each SV transmits its ID and precise position in space – each transmission being time-tagged.

The receiver (the size of a cell-phone!) incorporates a reasonably accurate clock, which it frequently synchronises with the clocks on the SVs – this effectively eliminates potential errors due to the receiver's imperfect clock. Upon receiving a transmission from a SV, the receiver can easily calculate the time taken by the signal to reach it, this being the difference between the transmission's time-tag and the time of receipt. The receiver can then calculate how far it was from the SV at the time of transmission.

The transmission also contains the SV's precise position in space at the time of transmission. By monitoring signals from three or more SVs, the receiver can therefore accurately compute its position in space by triangulation and relatively simple mathematics, since it knows the location of each signal source and its distance from each. Simple! Yeah

2. The Satellites (SVs) and Their Orbits

The nominal GPS Operational Constellation consists of 24 SVs that orbit the earth in 12 hours. There are often more than 24 operational SVs as new ones are launched to replace older SVs. An SV weighs around 900 kg, and the transmitter power is in the region of 40 W.

The SV orbits are about 17 500 km above the earth, and repeat almost the same ground track (as the earth turns beneath them) once each day. The orbit altitude is such that the SVs repeat the same track and configuration over any point

approximately each 24 hours (4 minutes earlier each day). There are six orbital planes (with nominally four SVs in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane. This constellation provides the user with between five and eight SVs visible from any point on the earth.

Each SV carries around four atomic clocks, which use the oscillation of caesium and rubidium atoms to keep very accurate time, accurate to +/- one second over more than 30,000 years. All satellites in the system are synchronised at exactly the same time and must be kept within 176 nanoseconds of UTC, plus accumulated jump seconds. An error of a mere 1/1000th of a second would trash the GPS fix by a factor of 288 km or so. Obviously, very accurate clocks are required.

3. GPS Satellite Signals

SVs transmit on two frequencies: L1 (1575.42 MHz) and L2 (1227.60 MHz). L1 carries the information used for the Standard Positioning Service (SPS) (i.e. civilian use), and L2 is used by the Precise Positioning Service (PPS) (mainly military use) to measure the ionospheric delay for greater accuracy. The specified accuracy of SPS is 100 m horizontal, 156 m vertical and a time accuracy of 340 nS; in practice, figures better than this are achieved.

For the sake of simplicity we shall ignore the military applications, and only consider the L1 signal.

Three binary codes shift the L1 carrier phase.

- The C/A Code (Coarse Acquisition) modulates the L1 carrier phase. The C/A code is a repeating 1 MHz Pseudo Random Noise (PRN) Code. This noise-like code modulates the L1 carrier signal, "spreading" the spectrum over a 1

MHz bandwidth. The C/A code repeats every 1023 bits (one millisecond). There is a different C/A code PRN for each SV. GPS satellites are often identified by their PRN number, the unique identifier for each pseudo-random-noise code. The C/A code that modulates the L1 carrier is the basis for the civil SPS.

- The Navigation Message also modulates the L1-C/A code signal. The Navigation Message is a 50 Hz signal consisting of data bits that describe the GPS satellite orbits, clock corrections, and other system parameters.

The two main components of the Navigation Message are the almanac and the ephemeris data.

- The almanac describes the position of all the satellites in space in general terms, with sufficient accuracy and detail for the receiver to locate them. The almanac is broadcast by all the SVs.
- The ephemeris data describes the exact orbit and position of a specific SV, and is broadcast by that SV only. As it circles the earth, each satellite is subject to several major influences which cause its orbit to be less than perfectly circular. The major influence is the earth's equatorial bulge, but solar wind and other effects also take a toll. The GPS orbital perturbations are defined by 16 constants and these are updated and uploaded at least once a day (maybe more often) along with clock correction data. The satellite then rebroadcasts this and your receiver decodes it as ephemeris data. The ephemeris tells the receiver *exactly* where the satellite is in space so, when the receiver calculates distance, it'll know *exactly* where the source of the signal is; each SV broadcasts its own ephemeris data

The GPS Navigation Message consists of time-tagged data bits marking the time of transmission of each subframe at the time

they are transmitted by the SV. A data bit frame consists of 1500 bits divided into five 300-bit subframes. A data frame is transmitted every thirty seconds (one frame (= 1500 bits) in 30 secs gives a baud rate of 50 – slow!). Three six-second subframes contain orbital and clock data. SV Clock corrections are sent in subframe one and precise SV orbital data sets (ephemeris data parameters) for the transmitting SV are sent in subframes two and three. Subframes four and five are used to transmit different pages of system data. An entire set of twenty-five frames (125 subframes) makes up the complete Navigation Message that is sent over a 12.5 minute period.

Ephemeris data parameters describe SV orbits for short sections of the satellite orbits. Normally, a receiver gathers new ephemeris data each hour, but can use old data for up to four hours without much error. The ephemeris parameters are used with an algorithm that computes the SV position for any time within the period of the orbit described by the ephemeris parameter set.

Almanacs are approximate orbital data parameters for all SVs. The ten-parameter almanacs describe SV orbits over extended periods of time (useful for months in some cases) and a set for all SVs is sent by each SV over a period of 12.5 minutes (at least). Signal acquisition time on receiver start-up can be significantly aided by the availability of current almanacs. The approximate orbital data is used to preset the receiver with the approximate position and carrier Doppler frequency (the frequency shift caused by the rate of change in range to the moving SV) of each SV in the constellation.

Each complete SV data set includes an ionospheric model that is used in the receiver to approximate the phase delay through the ionosphere at any location and time.

Each SV sends the amount by which GPS Time (i.e. the SV's own clock) is offset from Universal Coordinated Time. This correction can be used by the receiver to set UTC to within 100 ns. Other system parameters and flags are sent that characterize details of the system.

Continued next month

MOTIVATIONAL MESSAGE TO NEW HAMS

(Continued from last month)

Is it fear of failure which has kept so many older people away from computers and digital electronics? So what's been keeping you from getting involved in amateur radio- and electronic pioneering. It's certainly not the expense or shortage of time, which you yourself can regulate.

By scrounging around, expenses can be minimized to such a extent that will enable you to achieve your ultimate goal.

There's bound to be at least one radio amateur in your area who is an active pioneer and "time-finder". Speak to him and get him to teach you. Once you've gotten going you can read more and then start talking with the experts in the field.

This is where PEARS and QSX back issue collection will be priceless to you. The next thing you know you'll be an expert and working on ways to take the newer developments and apply them to amateur radio communications.

A lot of moans and groans from radio amateurs were heard when the world wide web was established. The attitude should have been: "Anything they can do on the Internet we (radio amateurs) should be able to do on our frequencies".

It's we hams who should have been doing this pioneering. We dropped the ball 30 years ago, but instead of pointing fingers, we now can at least apply technologies developed for other systems to amateur radio. Yes, if you want to, you can become an expert and pioneer on analog and digital electronics. I mean **you**, so stop looking around furtively.

The only things we fear in life are those we don't understand, if you think

about it. Once we understand things we may respect them and be careful, but we'll no longer be afraid. I respect High Voltage, but I'm not the slightest bit afraid of it. So I'm careful when I'm working with high voltage. It is only our ignorance which makes us afraid, and that's completely self-inflicted.

Some radio amateurs have been missing out on tons of fun in homebrewing amateur radio equipment. Fear? It certainly isn't because it costs a lot of money, so it's got to be a shortage of time or laziness. (Hi! Hi!)

Oh, you are too busy? Shure, I believe you. Well, I would, except that I notice that somehow we do manage to spend time on the things we really want to, so we're not talking lack of time, which is a very lame excuse, we're talking motivation and the will to build your physical and mental skills.

And, via amateur radio, you will be able to get to be an expert in fields which are in serious demand right now, and will be even more in the future.

Ray Croc, the man behind McDonald's, once wrote the following about success: "It doesn't take brains – there are too many brilliant scientists who can't afford a new car. It doesn't take education – look at the number of impoverished college professors. All it really takes is perseverance and you can have just about anything you desire".

You do have to back up your dream with plenty of hard work, Nothing is free that's worthwhile.

Health, wealth, happiness, and endless fun with amateur radio are all waiting, but not for the unmotivated. It's your decision. You can build skills and knowledge, or you can waste hours of the day numbing your mind with think-free TV garbage and other meaningless activities.

It is your deal, so pick up the cards and let's see what your future holds. 🎲

**MINUTES OF THE MONTHLY MEETING OF THE PORT ELIZABETH
AMATEUR RADIO SOCIETY HELD AT St HUGH'S CHURCH HALL, NEWTON
PARK, PORT ELIZABETH ON 21 AUGUST 2003.**

Welcome

Rory welcomed all who braved the cold weather!

Present & Apologies

As noted in the attendance register. In addition ZS2ACP, ZS2VM, ZR2GIB

Minutes of the previous meeting

Proposed ZR2H, Seconded ZS2RT

Matters arising

None

Correspondence

In:

Two licences ICASA says we haven't paid – WEFAX and another. Clive has faxed proof to local office
Electricity a/c at Slipper is still not completely sorted out, although an account for R45 was received and has been paid. R372 outstanding on the letter will be queried.

One digital contest log.

Some rally claims

Out: None

Finance

All is sound financially. Clive gave a report to the meeting.

Rally claims to R968 paid so far

Does the club pay the SARL membership fees? Meeting agreed to pay the fees.

No update on the PEARS member numbers that have not renewed.

Meeting agreed to spend R1700 approx on Governorskop refurbishment material – thanks to ZR2NT for the assistance with this work.

Social

Chairman thanked Ashley for the

recent social event at his QTH.

He then proposed a Christmas get together at the same venue in late November. Possibly combine the monthly meeting with this venture. Third Saturday in November proposed.

Special Events

VW Rally feedback. Beavan gave an account in QSX. Field operators were commendable. Scorers are poor – they do not bother to contact our time keepers. Kings Beach had no starting times when ZS2MC operated.

Repeaters

Chris gave a run down on latest developments. Work party to Governorskop this Saturday

General

Feedback on club members vs SARL members. 2002/3 we had more than half local members as SARL members. Apparently on a national basis, only 17 Eastern Cape hams have renewed. The chairman pleaded for support if possible. Comments from the floor varied.

ZR2NT asked about the interested party in his area – the chap has joined as a member.

He then also asked about a small technical section on the local weekly bulletins. The bulletin time was then a question. Meeting suggested Monday evenings.

Beavan offered to record and do the rebroadcast of the local bulletin.

Trial run this coming weekend, rebro on Monday evening 20h00.

The meeting closed at 20h35. 📺

DIRECT CONVERSION RECEIVER

adapted from an article in Sprat by Ernst Olivier, F5LVG

Viv Moore, ZS2VM, will give a talk on simple receivers at the September meeting of PEARS. Bring this article with you.

Direct conversion receivers often suffer from AM breakthrough. Integrated circuits as a TDA7000 minimise this problem, but it still exists.

Recently I bought all back issues of SPRAT and I discovered a very simple design: DC77 from PA0GBY (nr. 30, Spring 82), a 3-band direct conversion RX from Martyn Lindars (nr. 35, Summer 83) and IMP from GOEBQ (nr. 53, Winter 87/88).

All the authors claimed that these small receivers, with only two diodes for the mixer, were insensitive to AM signals. Incredible.

However, I tried this kind of receiver and the results are exceptional. Reception of 40 metres is always possible, even in the evening. Try to build it – you will be surprised.

T1 is an RF amplifier. L1 removes FM broadcast and C1 medium wave broadcast.

On 3,5 MHz, L1C1 is tuned in the centre of the band. RA has to be adjusted to remove AM signals.

The Colpitts oscillator is very stable, despite its varicap tuning.

P1 is the RF gain and P3 the audio gain.

If you want to improve this receiver, add a parallel resonant circuit inductively coupled to P1 and capacitively coupled to T1.

The receiver is built on a 15x20 cm board with glue and pad method.

Components

R1: 2,2 k Ω (7 and 14 MHz); R1: 10k Ω (3,5 MHz); R2: 100 Ω ; R3: 100 Ω ; R4: 1 k Ω ; R5: 1 M Ω ; R6: 4.7 k Ω ;


R7: 100 Ω ; R8: 10 Ω ; R9: 4,7 k Ω ; R10: 220 Ω ; R11: 1,5 k Ω ; R12: 100 Ω (14 MHz); R12: 220 Ω (7 and 3,5 MHz); R13: 470 Ω ; R14: 22 k Ω ; R15: 560 Ω .

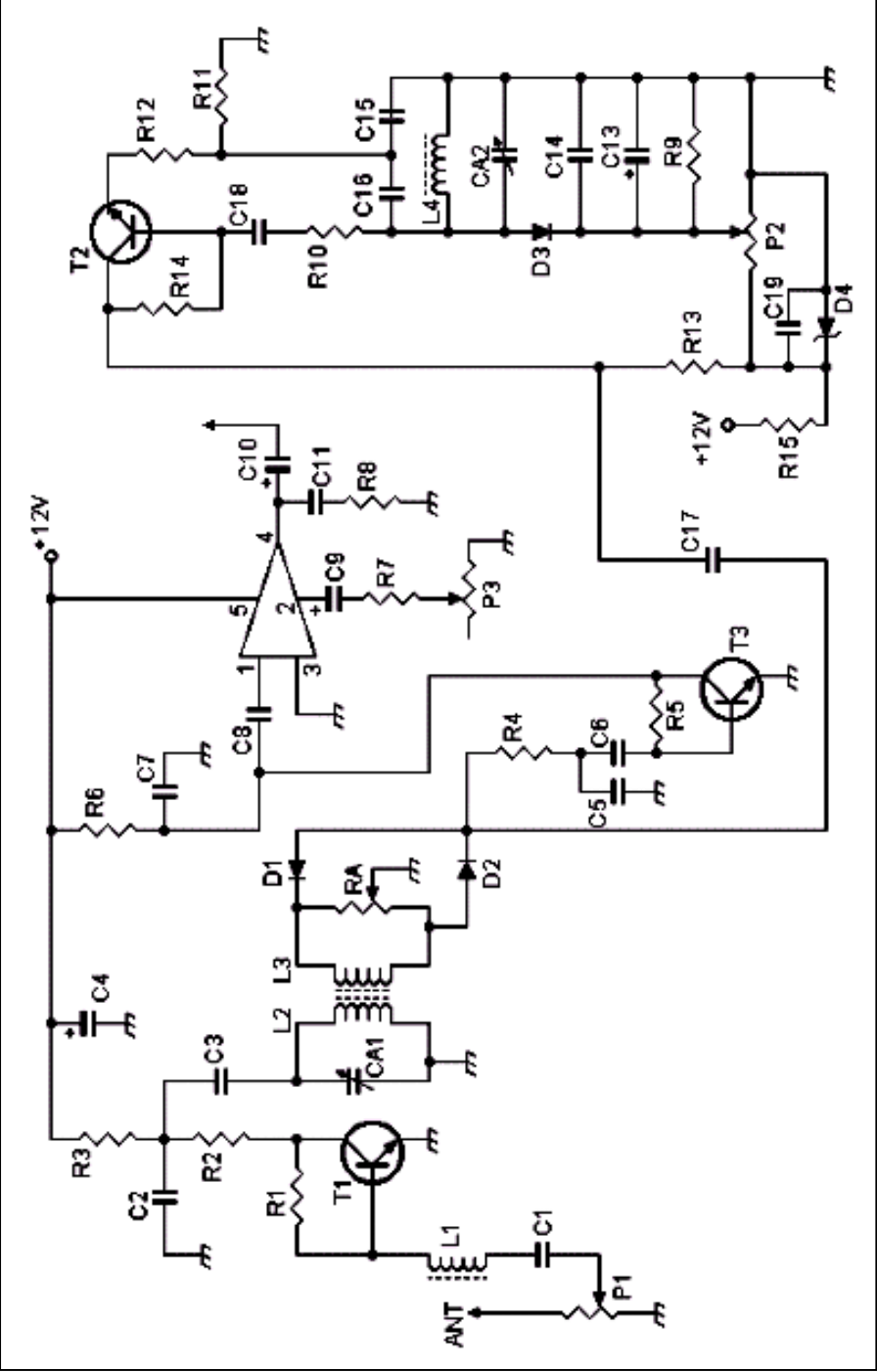
P1: 1 k Ω ; P2: 20 k Ω 10 turns; P3: 4,7 k Ω

C1: 22 pF (7 and 14 MHz); C1: 40 pF adjustable (3,5 MHz); C2: 100 pF; C3: 10 pF; C4: 220 μ F; C5: 47 nF; C6: 47 μ F; C7: 22 nF; C8: 22 μ F; C9: 4,7 μ F; C10: 100 μ F; C11: 100 nF; C13: 10 μ F; C14: 47 nF; C15: 680 pF styroflex or NPO; C16: 680 pF styroflex or NPO; C17: 220 pF; C18: 100 pF; C19: 100nF; CA1: 90 pF adjustable; CA2: 90 pF adjustable. (Note – C12 has been removed!)

T1: BFR91A; T2: BFR91A; T3: BC549C; IC1: TDA2003.

D1: 1N4148; D2: 1N4148; D3: 2x1N4007 (14 MHz); D3: 1x1N4007 (7 MHz); D3: 1 zener 6,8V, 1W (3,5 MHz); D4: 6V zener.

L1: 1 μ H (7 and 14 MHz); L1: 100 μ H (3,5 MHz); L2: 4,7 μ H (14 MHz); L2: 22 μ H (7 MHz); L2: 47 μ H (3,5 MHz); L3: 4,7 μ H (14 MHz); L3: 22 μ H (7 MHz); L3: 47 μ H (3,5 MHz); L1, L2, L3: miniature coils (L2 stuck to L3); L4: 4 turns (14 MHz), 12 turns (7 MHz), 22 turns (3,5 MHz) 8 mm diameter. 



Direct Conversion Receiver Circuit

RS232 COMMUNICATION

by Neil Thomas ZR2NT

RS232 communication has been the most common method used to interface modems, plotters and printers to a computer. I have also used the RS232 protocol to interface some PIC projects to a computer, e.g. DTMF decoder, stepper motor controller and an alarm decoder. I therefore decided to share some of the information I have learned in the process.

The Electronics Industry Association recommended the RS232C standard. The specified voltages are +3V to +15V as high level and -3V to -15V as low level. You can therefore NOT interface your computer COM port directly to a PIC or any other logic device without the appropriate level shifting circuitry.

The late Colin ZS2CR introduced me to the MAX232 IC and I have used them extensively. It is ideal for the purpose of converting the +12V to 0V and -12V to +5V as well as the other way from +5V to -12V and 0V to +12V. Note that the

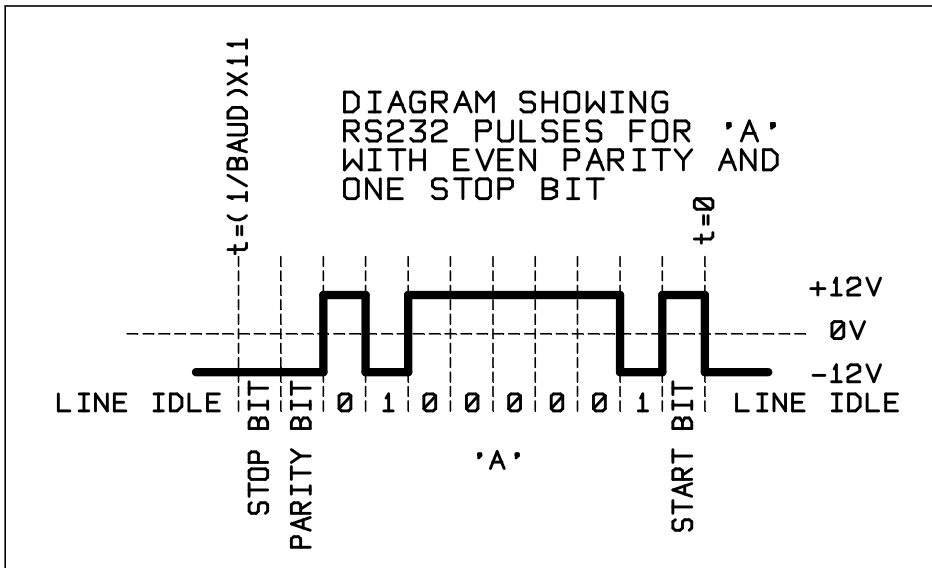
voltage levels can be as low as $\pm 3V$.

The most common settings available to the computer user are: baud, number of data bits (usually 8), number of stop bits (usually 1) and parity (even, odd or none).

BAUD: According to the 1998 ARRL handbook it is *a unit of signalling speed equal to the number of discrete conditions or events per second*. Therefore irrespective of the number of data bits, stop bits or parity, the width of every pulse is equal to the reciprocal of the Baud setting, i.e. 9600 baud gives a pulse width of $1/9600 \cong 104\mu$ seconds.

START BIT: This is not a setting available to the user but a positive voltage level signifying the arrival of data. Note that the transmission line idles at the negative voltage level.

DATA BITS: The number of high and low level pulses that make up the information being transmitted. There are



usually 8 bits, although 7 bits also form part of the RS232 specification. The 8 bits are referred to as a **byte**.

PARITY: Is a form of error checking. If parity check is done an additional pulse is added to the transmission after 8 data bits. If even parity is used, the parity bit will make the number of '1' s amongst the 8 data bits even. For example, if the data byte is the ASCII character 'A' represented as 8 data bits as follows '0100001', for even parity the parity bit will be a 0 as the number of 1 s are even.

If odd parity was used, the parity bit would be a 1 to make the number of 1s odd. If no parity is used, there will not be a parity bit and therefore one less pulse to send/receive.

STOP BIT: If more than one character or data byte is sent, the receiving unit must know when the next transmission starts. Therefore by specifying the number of stop bits, the receiver has a predetermined time (one pulse width in the case of one stop bit) before the **start bit** of the next **byte** can appear.

With the above information it is now possible to interface your projects to your computer using the transmit and receive pins without *'handshaking'*. To use handshaking in half duplex mode the **RTS** (request to send) and **CTS** (clear to send) pins on the COM port are used. The voltage levels as discussed for the data pulses also apply to the other COM port pins. The handshaking pins are however not pulsed but kept high or low as and when required.

I can hear the sceptics saying: 'Why RS232 and not USB or are you not re-inventing the wheel!'

My answer is: 'No, I am not reinventing the wheel, merely learning more about it – and yes, I plan looking into interfacing a PIC via USB but the RS232 interface allows me to communicate with the oldest 80286

DOS based computer as well as my latest Windows 2000 based AMD 2400+ (2GHz) machine. It is more than I can say for many other interfaces/software I have come across.

Most serial port cables that are supplied with the normal modems used for Internet access are 'straight through' cables, i.e. pin 1 on one end is also pin one on the other end and this applies to all the pins. The change over from TD to RD is done in the modem.

If you do want to connect one computer to another such a cable cannot be used. The TD pin from computer (A) must go to the RD pin on computer (B) and vice versa. Similar requirements apply to the handshaking pins.

I recommend that for your home brew projects you use the straight through cable, as that is common practice.

The following table gives the pin numbers for the 9 pin serial port on a computer.

| PIN | DESCRIPTION | ABR | IN/OUT |
|-----|---------------------|-----|--------|
| 1 | Data carrier detect | DCD | In |
| 2 | Receive data | RD | In |
| 3 | Transmit data | TD | Out |
| 4 | Data terminal ready | DTR | Out |
| 5 | Signal ground | | |
| 6 | Data set ready | DSR | In |
| 7 | Request to send | RTS | Out |
| 8 | Clear to send | CTS | In |
| 9 | Ring indicator | RI | In |

For more info join us on Monday and Thursday evenings during the technical chat on the East Cape repeater system.

Remember ...

HOME BREW
is best !! 

RADIO AMATEURS and LIGHTNING

from JOHAN TERBLANCHE ZS1I

With spring approaching and our attention turning towards fixing wires and guy wires after and before all the storms, we need to consider one of our most feared summertime events. No, I am not talking about gardening, or one of the many projects that the XYL's want us to do, I am talking about *lightning protection*.

Lightning is the visible discharge of atmospheric electricity that occurs when a region of the atmosphere acquires an electrical charge (or potential difference) sufficient to overcome the resistance of the air. Lightning can occur anytime of the year when atmospheric conditions become unstable.

Lightning occurs because charge-separation processes, that produce an electric dipole structure in a cloud, generate regions of net charge.

The charges within a thunderstorm are distributed between a large net-positive charge in the upper region of the cloud and large net-negative charge in the lower region, and a small net-positive charge in the lowest part of the cloud. Charges reside on water drops, ice particles, or both.

If the surrounding air has a net charge, an air discharge from the cloud may occur.

Cloud-to-ground lightning is initiated by the neutralization of the small net-positive charge in the lowest region of the cloud. A cloud-to-ground flash comprises at least two strokes: a leader stroke and a return stroke. A leader stroke carrying a negative charge

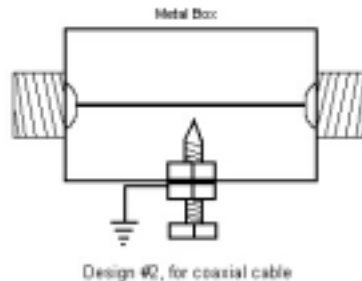
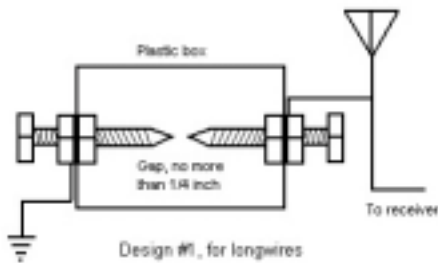
passes from cloud to ground.

The leader stroke is not very bright and is often stepped and has many branches extending out from the main channel. As it nears the ground, it induces an opposite charge, concentrated at the point to be struck, and a return stroke carrying a positive charge from ground to cloud is generated through the channel.

The two strokes generally meet about 50 m above the ground. At this point, the cloud is short-circuited to the ground and a highly luminous return stroke of high current passes through the channel to the cloud. (Hopefully this one missed your tower and radio's or maybe your safety precautions can withstand such a strike)

A normal lightning strike involves a potential difference between cloud and ground of several hundred million volts, with peak currents on the order of 20,000 amps. Temperatures in the channel are in the order of 50,000 F.

The entire process is very fast: the leader stroke reaches the juncture point of the ground in about 20 milliseconds, and the return stroke reaches the cloud in about 70 microseconds.



No, I am not going to try to write the perfect article on how to make you, your home, your family, and your ham shack with radios safe from lightning. For starters I am not an expert but hopefully I can point you in the right direction.

This month QSX features two homebrew lightning arrestors as a project and a possible start to lightning protection and safety. The WEB has several good sites to visit.

A good place to start is the National Lightning Safety Institute, an independ-

ent non-profit consulting, education and research organization –

<http://www.lightningsafety.com/>

See also: <http://www.lightning.org/>

<http://www.ccrane.com/lightningprotection.asp>

<http://wwwk9wk.com/litenin.html>

Well, off you go. I hope this information will help guide you to getting yourself, your family, and your shack protected from lightning this summer. ☺

HAM RADIO

by Al Akers ZS2U

When you look at the current amateur situation you see a number of people writing the RAE; most who pass then come on two metres. They are quite active till the novelty wears off, then little or nothing is heard from them. Some get involved with computers and this keeps them active.

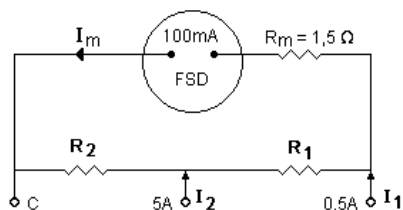
Why is this? Well, when they get their licence they come on the air with a piece of sophisticated bought equipment, but what have they learnt about radio? How to operate the equipment yes, but little or nothing about the technical side.

As far as results are concerned, they have pretty well started at the top, so where do they go now? In the days when I got my licence, equipment was scarce and expensive. While some hams bought new receivers, others used army surplus or domestic receivers suitably doctored. There were even those who built their own.

Virtually all amateurs built their own transmitters or used army surplus equipment. Antennas were very largely homebrew. Thus amateurs got to know something about basics and the technical side. There was always something to learn, it was ongoing. I still remember the first SSB transmitter in Port Elizabeth was one built by Roy Ehman in 1951, and a bit later Bob Dersley also built one. It took the hams some getting used to, to tune in SSB after being familiar only with CW and AM.

In those days you had to pass a morse test to come on the air and then on CW only for the first year. I feel that any ham worth his salt today should make the effort to learn more about the basics and build equipment. Also, improve their operating abilities by trying to make long distance simplex contacts on VHF and working DX on HF. There is so much more satisfaction in making contacts with equipment you have built yourself than with commercial equipment.

In the hope that I will get at least some hams motivated, I plan to pose some technical problems for them to solve. The first one is an ammeter to measure two



current ranges, as shown in the figure.

R_m is the internal resistance of the meter which has a full scale deflection of 100 mA. C is the common terminal and of course the other two terminals are for the two different current ranges.

Calculate the values of R_1 and R_2 . ☺

Pearstalk

(Some of these items from SARL bulletins and ZS4BS Dennis Green's HF Newsletter)

OUTING TO ZR2AG's QTH

There must have been about 50 people at the QTH of Janet and Ashley Goosen ZR2AG on 16 August. The weather was beautiful – no rain! – and we had a glorious time.

There was initially a bit of uncertainty about the braai though, because the drums and grids were to have been brought along by Ewalt and Henry. A sigh of relief as they eventually came up the drive with all the goodies in their car.

Alan ZS2R and Henry ZR2HPD quickly got the essential bits out to make one of the three fires



There was even a waiter, in the form of ZR2H Cyril, as the photo alongside shows – although he quickly discarded his towel in order to do justice to his own food.

After lunch we had a look at the Longmore repeater, which was in the back of Trevor's kombi. Someone then

reported that Ashley was playing the organ and we ended up in the lounge listening to the music from an accomplished organist.



As we were about to break up we were invited to share some of the beautiful trifles that Janet had made for us. (Here she is, next to Ashley and their grandchild).



Everyone left on a happy note, and it was not surprising that those at the August meeting decided, with Ashley's

approval, to hold the Christmas get-together at the same place!

WHAT DO YOU WANT TO HEAR?

The Monday evening bulletin relays and following chats on two metres have been attended well. Among the items dealt with are the global positioning system, about which we will start a story next month.

Other items discussed were how the pressure sensitive monitors work and how a computer program knows when the "gun" is correctly aimed at the screen.

What we really want to know is just what do you want to hear on these talks. Give us your ideas, and the chaps concerned will see what they can come up with.

REPEATERS

The Governorskop repeater was looked at after last month's meeting – the repeater was spurious, the link to Cradock was noisy and the link to EL needed attention.

The packet digi had died, and it was planned to convert it to a 24v computer.

The Mount Kemp to Governorskop link was re-established by ZS2JM, although the link antenna feeder needs changing at the Governorskop end.

Longmore temporary repeater was removed once more – thanks to Glen ZR2GV for arranging for a copy of the key.

Our 6m link for Lady's Slipper was being built up again. A work party would be established to refurbish the site when the weather warms up.

EXTENSION OF CLOSING DATE FOR RENEWALS

Due to the rather extraordinary situation this year regarding the delayed dispatch of invoices and in view of non-receipt of invoices by some, it has been decided to extend the cut off date for the payment of SARL subscriptions to the 31st October 2003.

It has also been brought to our attention that various members have not received renewal notices yet. At this stage we are not

sure if it's a postage problem or not. We are looking into it.

Please feel free to call the SARL office on 011 675 2393 if you have not yet received your renewal notice.

NEW PREFIXES FROM THE NETHERLANDS

From 4 August one could hear new prefixes on all bands from The Netherlands. Jan Jaap PG7V says that all prefixes from PA - PH can now be used and the choice of prefix and suffix is free.

PD is novice (2m/70cm), PE and PH is VHF and higher.

SARL FINANCIAL STATUS

Graham Hartlett ZS6GJH, the President of the SARL, reported to SARL News that, as a result of the continued commitment of our members and the tight cost management program implemented, the SARL no longer has an overdraft; we are in the black.

We will endeavour to maintain this status going forward but will need your help, so do the right thing, pay your subs.

Graham extends a special word of thanks to all the paid up members for their ongoing support. He reports that membership continues to grow at a steady rate, thanks to all those who have paid their fees.

For those of you who have not gotten around to it, there is still time. Your support is appreciated. Remember, it's your hobby, ensure its future.

SPECIAL EVENT STATION

Special event station GB5FI was on the air from Flatholm Island from 22 to 27 August. Marconi used the island when he demonstrated to the British Post Office his theory that radio waves would travel across water.

He made the link via radio from Lavernock Point in South Wales to the island on Thursday 13 May 1897.

Members of the Barry Amateur Radio Society erected a monument on the island and make an annual visit to operate GB5FI.

The island counts as EU-124 for the

RSGB Islands on the Air awards programme. You can QSL via GW0ANA direct via the call book address or via the Bureau.

SARL TOP BAND CERTIFICATE

The Top Band Certificate is sponsored by the SARL and its aim is to encourage more 160m QSOs with Southern African countries.

South African stations must submit proof of having contacted at least six different Southern African call areas, of which five must be in the Republic of South Africa; the sixth contact can be from 3DA, 7P or A2.

All contacts after 1 January 1960 are valid for this award and contacts must be established in the range of 1 800 to 2 000 kHz. ZS amateurs can transmit between 1 810 and 1 850 kHz.

Endorsements for single modes can be requested.

South African applicants should send QSL cards, a list of contact details and a handling and postage charge of R 10,00. This award is free to members of the South African Radio League.

Your application should be addressed to The Awards Manager, South African Radio League, PO Box 1721, Strubensvallei, 1735 and e-mail enquiries can be directed to zs6p@iafrica.com.

Of the 27 certificates issued until February 2003 only five have gone to South African stations.

ZS6DDG/P OPERATIONS

After his recent stay at Richards Bay (KG61) Derek has been home in Johannesburg during September for a well-earned rest.

From mid-October until early December he will be back on the road with stays scheduled in Durban (KG50), Phalaborwa (KG56), Mozambique (KG77) and Simons Town (JF95). During these trips he plans to be active on both 50 and 144 MHz all-modes including the JT44 and FSK441 digital modes.

Of particular interest will be the week in Mozambique in mid-November as the location well north of Maputo will be a good

meteor scatter distance from South Africa and Namibia for both 50 and 144 MHz, and MS contacts using FSK441 should be a distinct possibility for anyone with a reasonably well-equipped digital station.

For operators in the Johannesburg area this will probably be your best opportunity to work C9 on 144 MHz and for those who have not yet worked C9 on 50 MHz the contact should be relatively easy using FSK441.

2003 SARL VHF/UHF CONTEST

The second leg of the SARL VHF/UHF Contest will be on the air from 12:00 SAST on Saturday 20 September until 12:00 SAST on Sunday 21 September. This gives you about three weeks to get your plans sorted out for this weekend.

Activity will be found on 6, 4 and 2-metres, also on 70 and 23 centimetres.


The rules for the contest can be downloaded from the SARL website at www.sarl.org.za and a copy of SARLVU, the logging programme written by Nico ZS4NS.

WEEKEND WSJT DIGITAL OPERATION

Weekend operations using WSJT will continue on Saturday and Sunday mornings from 0330 utc until 0600 utc and primary calling frequencies will be 50.245 and 144.245 MHz. The FSK441 mode is used primarily for meteor scatter work and JT44 for long-distance tropo work.

If you aren't already equipped for WSJT we urge you to try it and you will be amazed what your VHF station is capable of. With 100 watts on 144 MHz and a small Yagi fixed on the horizon you will be able to make contacts in North America by reflecting your signals off the moon.

VHF long-distance contacts are one of the great challenges of amateur radio. Many of our newer amateur operators have never had the opportunity to discover what their station is capable of and the ease of working repeaters has removed most of the thrill of making that rare long distance contact.

We need to use our entire VHF/UHF frequencies, not just the repeaters. As they say, use it or lose it. 

To those celebrating special days (21.9 to 18.10) we say

Have a Happy Day...



... on your birthdays

September

- 22 André Mulder ZS2AJ
- 26 Garth Laaks ZS2HB
- 27 Norman Dowler ZS2XF
- 27 Johan Terblanche ZS1I
- 27 Ewalt Bouwer ZS2EHB
- 28 Glen Cummings ZR2GV

October

- 5 André Roets ZR2AR
- 6 Colin Ashwell ZS2AO
- 6 Barry Griggs, XYL of ZS2ABK
- 8 Vanessa Scarr ZR2VM
- 8 Raphey Schauder ZS2SP
- 9 Ewan Mathieson ZS1EM
- 9 Pamela Koen, XYL of ZR1JAC
- 10 Anne Dowler, XYL of ZS2XF
- 12 Bert von Rahden ZS6LP
- 12 Neil Thomas ZR2NT
- 13 Santie Greyling, XYL of ZS2ACG
- 15 Morag Maynard, XYL of ZS2RE
- 16 Greg Maynard ZS2RE

... on your anniversaries

September

- 22 Anne ZR2ABC & Vic Olivier ZS2SZ
- 26 Ellen & Chris du Plessis ZS6BST
- 28 Marjorie & Dudley Forsyth ZS2AW



October

- 1 Deidré & Tony Allen
- 3 Susanna & Mike Bosch ZS2FM
- 3 Maria & Anthony Marran ZR2AI
- 4 Carin & Mark Hugo ZR2M
- 6 Judy & Ken Tremeer ZS2BWB
- 9 Kay & Fred Strutt ZS2JS
- 10 Joan & Bill Browne ZS2BY

10 Anne & Terence van der Linden
ZR2VDL

Congratulations

... on passing your Morse, Paul van der Merwe ZR2PJ, of Graaff Reinet. We look forward to chatting to you on HF in the near future.



Other news ...

New Members: Paul van der Merwe, ZR2PJ, soon to be a full ZS, which is good because being stuck in Graaff Reinet with VHF only could be a problem.

Broken Bones! Ewalt Bouwer ZS2EHBs son recently had a motorcycle prang and bust his leg, yet had no other injuries whatsoever!

Going Places: Allan Bowles ZS2BO is heading for Botswana for a couple of weeks' holiday.

Visiting: Mike Bentley ZS2IC was in town for a few days and saw AI ZS2U.

Mugged! While in Belgium recently, Keith Laaks ZS6TW was mugged and, although he fought back, he lost a top digital movie camera and tape of the USA and Europe. Who says it only happens here? 🗿

Your Society's Committee

| | | | |
|-------------------------------------|---------------------|--------------|-----------------------------|
| Chairman, Awards..... | Rory Norton ZS2BL | 585-9330 | rory@commco.co.za |
| Vice Chair, | Chris Scarr ZS2AAW | 368-1344 | cvscarr@intekom.co.za |
| Secretary, repeaters, packet, | Chris Scarr ZS2AAW | 368-1344 | cvscarr@intekom.co.za |
| Treasurer; Assets Control..... | Clive Fife ZS2RT | 367-3203 | cfife@absamail.co.za |
| Social, Refreshments, | Bill Hodges ZS2ABZ | 581-2580 | whodges@absamail.co.za |
| Special Events | Ewalt Bouwer ZS2EHB | 933-3482 | ewalt.b@freemail.absa.co.za |
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| Internet Website (ex com) | Barry Murrell ZR2DX | 083 717 9210 | zr6dxb@qsl.net |
| Technical Classes (ex com) ... | Al Akers ZS2U | 360-2983 | |

PEARS' VHF/UHF & Other Services

REPEATERS

| | | |
|-------------------|-------------------|---------------------|
| Town VHF | # 145,050/650 | |
| Town UHF | # 431,050/438,650 | Knysna |
| Cockscomb | 145,000/600 | Lady's Slipper..... |
| Colesberg | * 431,075/438,675 | Noupoort..... |
| Cradock | * 145,050/650 | Uitenhage..... |
| Grahamstown | * 145,150/750 | |

* These form the PEARS long-range 2-metre repeater system, also linked to which are East London 145,775 MHz, George 145,700, Danabaai 145,600, Stilbaai 145,750, Butterworth 145,725, King Williams Town 145,625 and Umtata (438,725 duplex). It is further extendable to Cape Town via the WCRWG system. # These can also be linked as required.

OTHER SERVICES

| | |
|---|---------|
| Packet Bulletin Board (ZSØNTP) | 144,625 |
| Packet Rose Switch ZSØGHT-3,046101 (144,675 in/out) or 046102 (UHF out to BBS)..... | 144,675 |
| 2m Beacon (ZS2VHF CW ID, FSK) (horizontally polarized, 160W ERP) | 144,415 |
| 6m Beacon (ZS2SIX CW ID) (horizontally polarized, 25W ERP) | 50,005 |
| 6m Simplex Link with Lady's Slipper 2m Repeater (vertically polarized) | 51,400 |
| Wefax Relay (Meteosat)..... | 145,350 |

Sunday Bulletins

PEARS bulletins are transmitted on Sundays immediately after the SARL English transmission, i.e. at about 08:45, on 7098 kHz as well as the 2 metre linked network that provides coverage from East London to George as well as Cradock and environs. PEARS' 7098 or 3640 kHz transceive facilities are also remotely linked as needed. In addition, the SARL's 40m operations on 7082 or 7066 kHz or Hamnet's 7070 kHz can be remotely patched to the 2m network, in receive-only mode or with full transceive capability for interactive events.

| Date | Prepare and Read on 2m Repeater Link |
|---------|--------------------------------------|
| 14 Sept | ZS2ABZ |
| 21 | ZS2BL |
| 28 | ZS2EHB |
| 5 Oct | ZS2AAW |
| 12 | ZS2RT |
| 19 | ZR2AG |

| DIARY DATES |
|---|
| <u>SEPTEMBER</u> |
| 12 RAE final entry date |
| 18 PEARS general meeting; bring and buy |
| 20/21 SARL VHF/UHF contest |
| <u>OCTOBER</u> |
| 2 Wrinkly Rave |

* We like being your Society *