



ZR6FD logo

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# WATTS

03 - 2007

Year 77+3m

Monthly newsletter of the Pretoria Amateur Radio Club  
Maandelikse nuusbrieff van die Pretoria Amateur Radio Klub.



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Bulletins :145,725MHz 08:45 Sundays / Sondae

Relays : 1840, 3700, 7066, 10135, 14200 kHz, 51,4 and 438,825 MHz

Activated frequencies are announced prior to bulletins

Swapshop: Live on-air after bulletin 2m and 40m

Bulletin repeats | herhalings : Mondays 19:45 on 145,725 MHz

## Down to Earth II – Af Aarde Toe II

Johan ZS6JPL voltooi sy installasie – nog fotos bl.3



### In this issue

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- Member news

7 Feb

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Notules  
Ledenuus

Tegnies  
Bladsy tien

### Next Meeting 7 Ma. 2007

Time: 19:30 for 20:00  
PARC Clubhouse  
South Campus  
University of Pretoria  
SE cnr University and  
Lynnwood roads.

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	Doreen de Bruyn	ZR6DDB		012-803-7385	

## Minutes of the monthly club meeting of the Pretoria Amateur Radio Club held at the South Campus of the University of Pretoria on 7 Feb. 2007

**Welcome/Verwelkoming.** Almero ZS6LDP declared the meeting open and welcomed all present.

**Attendance/Bywoning.** The meeting was attended by 18 members and 2 visitors, Pete Smith ZS6PJ and Brendan Smith ZR6BM.

**Apologies/Verskonings.** Malcolm Newton ZR6OLM, Helen Newton, Edwin Peer ZR6ESP, Hilary Peer ZR6HAP, Bill ZS6KO, Doreen ZR6DDB, Chris ZS6BGH.

**Personal Matters / Lief en Leed.** Suzette, junior van Pieter ZS6PVW en Magda ZS6MVW is terug by die huis na 'n suksesvolle rugoperasie.

Jac ZS6QA back home. Jac had a hip replacement.

**Matters arising from previous minutes/Sake voortspruitend uit vorige notule.** None / Geen.

**Approval of previous minutes/Goedkeuring van vorige notule.** The minutes of the previous meeting as published in Watts were approved. Proposed by Mike ZS6AFG and seconded by Willie ZR6WGR.

### Club Activities/ Klub Bedrywighede:

#### Rallies/Tydrenne. Johan ZS6JHB .

Next rally – Belfast Rally on 24th February 2007. Members who is providing communication on the event is Tony Crowder ZS6CRO, Johann de Beer ZR6YV, Pierre Holtzhausen ZS6PJH and Johan de Bruyn ZS6JHB.

There is a possibility that the Ellis Ras Rally may be moved to a date later in the year.

**Foxhunts/Jakkalsjag . Richard ZS6UK.** The next Foxhunt will be on 17 February. Start is at the Botanical Gardens in Silverton. Starting time 14.00

**Social/Sosiaa. Johan ZS6JHB.** Bring en braai na afloop van die Jakkalsjag aan huis van Johan ZS6JHB en Doreen ZR6DDB.

**Hamnet . Johan ZS6JHB.** Hamnet vergadering 19.00 Maandag 19 Februarie 2007 by PARK klubhuis. Almal is welkom by die vergadering.

**Financial Report / Finansies. Richard ZS6UK.** Finances in order.

**Technical / Tegnies . Craig ZS6RH.** Craig gave a lengthy report on the current repeater status and what they still aim to achieve in the next month or two.

**Fleamarket / Vlooiemark . Almero ZS6LDP.** 31 Maart 2007 by Pretoria Amateur Radio Klub se gronde .

### General / Algemeen

**a) Field Day competition** – Ivan ZS6CCW to investigate a new site for competition use.

**b) Upgrading – ZR to ZS (Rally members)** - Johan ZS6JHB – still available to set up dates for evaluation from ZR to ZS. It is not always possible to phone members who want to upgrade, Please phone or send e-mail.

**Presentation / Aanbieding .** Thank you Hans ZS6KR for your presentation .

**Next meeting / Volgende vergadering.** 7 th March 2007 .Starting time 20.00 .

**Closure / Sluiting.** The meeting closed at 21.45.

**Editorial** A big thank you is in order to *Craig ZS6RH and every one involved* at the Moreletta repeater site. Also Nico ZR6VT who so generously donated hardware. The results have been impressive. Keep up the good work!

**Redaksioneel** 'n Groot dankie is verskuldig aan *Craig ZS6RH en almal betrokke* by die Moreletta perseel. Ook aan Nico ZR6VT met sy milde donasies. Die resultate was indrukwekkend. Hou so aan!

## Exothermic welding – Cu-Cu bonding



Hardware: Bottom and (inverted) top block, clamp, magic powder and circular tin disc. Note: block is specific for bar and wire size.



The top block is clamped on and the tin disc is inserted first. Powder is added on top. A "fuse" powder leads fire into the block.



Firmly closed with the fuse powder showing. Light the powder and POOF - enormous heat amalgamates the tin and copper. See p1.

### Skindernuus

**Johan ZS6JPL** wat al die bostaande werk by sy stasie gedoen het, het toe ook vir homself 'n ICOM 756 ProIII gaan koop. Sover as ons kennis strek, is hy die 5e klublid wat so 'n radio nou besit. Lekker speel!

**Jean ZS6ARA** is weer baie ingenome met sy Kenwood TS2000 *limited edition* model. Geluk Jean, en ook baie DX.

**Doppies ZS6BAQ** spandeer baie vrye tyd aan elektroniese projekte en apparaat. Hy dreig ook om sy hok te herstruktureer om dit beter te kan bedryf. Ons wag in spanning vir nog fotos.

**Tim ZS6TIM** het nou feitlik al sy radio toerusting verkoop. Hy trek binnekort na 'n kleiner woning en sal weer van voor af begin as hy daar is. So ken ons mos vir Tim. Hi. Hopelik sal ons dan ook meer van Tim-Se-Vrou ZR6TSV te hore kry.

## Birthdays

## March Verjaarsdae



01 Elsa, dogter van Elmarie ZR6AXF en Johan ZS6JPL  
01 Albert, seun van Elmarie Zr6AXF en Johan ZS6JPL  
04 Johnny ZS6BAJ  
05 Martha Louisa, lv van Attie ZS6REY  
09 Helga, sw of Hans-Peter ZS6AJS  
10 Gary ZR6GK  
11 Kaye, daughter of Heila and Melvyn ZS5MF  
12 Rite, sw of Vitor ZS6VG  
16 Jeanne ZR6GPC, sw of Sander ZS6SSW  
17 Gerda, sw of Roger ZS6RJ  
21 Frances ZR6AUT

Maart

## Anniversaries Herdenkings

13 Bernice en Pieter ZR6KSA (3)  
16 Marilise en Pierre ZS6PJH (11)

21 Martie, lv van "JB" ZR6YV  
22 Julian ZS6AOU  
22 Ivan ZS6CCW  
25 Doreen ZR6DDB, lv van Johan ZS6JHB  
27 Colin, son of Bernie ZS6ANU  
30 Joey ZS6BBL, lv van Jan ZS6BBK

## Sick Parade | Krukkelys

- Suizette, dogter van Pieter ZS6PVW en Magda ZS6MVW vorder goed nahaar rugoperasie.
- Jack ZS6QA has returned home from Huis Herfsblaar where he recuperated from his hip operation.
- Bernie ZS6ANU in Nelspruit is apparently back in the saddle.
- Bertha, lv van Hans ZS6KR was 'n maand in die hospitaal met longinfeksie.
- Jan ZS2LJ herstel van 'n enkelbreuk en sy lv van 'n galblaasoperasie.
- Lorraine, sw of Stan ZS6SDZ had gastric problems investigated.

## New Members | Nuwe lede

Welkom aan **Lourens ZS6KRT**  
and welcome to **Peter ZS6PJ** and to **Mark ZR6BM**

## Diary | Dagboek (UTC times)

**Ma** 03 ARRL Int. DX SSB Contest 0000-2400  
04 DARC Digital Contest 1100-1700  
10-11 RSGB C'wealth Contest 1000-1000  
13-14 Commonwealth "BERU" CW Contest 12-1200  
17-18 Russian DX Contest 1200-1200  
24-25 CQWW WPX Contest SSB 2359-2400  
**31 PARC Fleamarket**  
**Apr** **04 PARC Club Meeting**  
**14 SARL AGM**

### DX Tips:

Know and practice the Grey Line.  
Know how to work split  
Keep away from personal, political and religious comment  
LISTEN before calling – get the op's pattern of operation first  
Let the last station complete the QSO – do not chip in.

### Pile-ups/DXpeditions

Adhere to the operating pattern quietly and respectfully  
Note how the operator ends his QSO's – then call  
Do not call on his frequency – note what split he is listening  
Do not enquire what his callsign is – LISTEN patiently  
Do not duplicate - or waste time commenting on any issue.

## Snippets | Brokkies

**Is your callsign somewhere on your radio?** Johan ZR6JO had his stolen goods returned as a result of the Police being able to ID his callsign. Although one should always have a list of serial numbers of what-have-you in the house, this led to an almost effortless happy end.

- Our **Moreletta 145,725 repeater** performance will be further enhanced with diversity reception from Waverley Kop and Keevy Kop linked by UHF to the main Moreletta site. The aim is to improve accessibility from all topological locations with hand-helds and mobiles. TX coverage will be improved by employing a 100W amplifier permanently.
- **Pine ZS6OB** het bedank as komiteelid vanweë persoonlike verpligtinge.
- **HAMNET bulletins** are also on 3760kHz 19:00 Monday evenings.
- **Louie ZS6LVW** is emigrating – ask for his list of ham equipment on offer.
- **Chantel, dogter van "JB" ZR6YV en Martie** het op 3 Februarie in die huwelik getree.
- **Melanie, daughter of Ed ZS6UT** was engaged to Michael at Victoria Falls on 4 Feb. Wedding bells will ring on 15 Sept.
- Remember to support the **SARL Youth Net** by reporting in or make a contribution every Thursday 6pm. **Craig ZS6RH** will be the new host on 3650, 7082, 14240 kHz as well as 145,725MHz, 438,775 MHz and Echolink.
- PARC participated in the first leg of the **SARL HF Field Day** at Roodeplaat Dam with 4 operators: **Sander ZS6SSW**, **Pierre ZS6PJH**, **Craig ZS6RH**, and **Richard ZS6UK**.  
**Ivan ZS6CCW** gave it a personal shot from a game farm at Modimolle (Nylstroom) but experienced much bad weather.

**PARC Website** <http://www.zs6pta.org.za> and contact [zs6pta@zs6pta.org.za](mailto:zs6pta@zs6pta.org.za)

New electronic contact addresses have been established direct to PARC functionaries that are independent of their personal addresses and will thus have perpetual validity. In future please direct all official PARC correspondence to the following:  
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[technical@zs6pta.org.za](mailto:technical@zs6pta.org.za) More such addresses may be created in future.



## Long Term HF Propagation Prediction for March. 2007

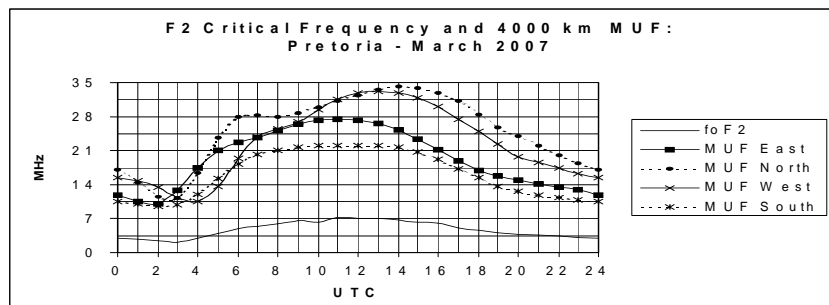
Vince ZS6BTY

### DX Operating

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

### Local Operating

The F2 critical frequency (foF2) is the maximum frequency that will reflect when you transmit straight up. E-layer reflection is not shown.



## Pretorians – do you remember

(Excerpt from *A Man Called Intrepid – The Secret War 1939-1945*)

### **Jack Nissen's Hi-Fi / Electronics shop first in Bureau Lane and later opposite the Technical College in Church street?**

He settled in South Africa after an illustrious stint in the British military during WWII. Originally Jack Nissenthal was the son of a Jewish tailor, escaped from Poland, and was temporarily attached as a sergeant to an irregular force to raid and note the level of technology in a German radar station above Dieppe harbour, specifically searching for the German equivalent to the British cavity magnetron. A bombing diversion on site gave him and Rose, the British radar inventor, a chance to remove instruments in the control hut and cutting the land lines. This forced the Germans to use radio once the radar was back in operation and data was then be monitored and compared with that of the British radar. This would then give further insight into the progress of German research. All this happened simultaneously with Canadian troops entering Dieppe and various commandos carrying out raids. Jack and the "Baker Street" team escaped in a fast motor-torpedo boat to England.

None involved were awarded any medals nor was their work disclosed after the war. Nissenthal was advised to change his name and settled in South Africa where he initially ran an electronics company in Johannesburg.

## From *Dataweek 7 Feb 2007*

- Kids in the US are becoming increasingly tech-savvy. While downloading games is the most prevalent activity, 25% watch downloaded movies, music videos or on-line video streaming within the ages 2-14. One in 10 of age 7 downloads digital content in some form, increasing to 22% at age 10 and 50% at age 14.
- The British are following traditional Egyptian rituals and enclosing 21<sup>st</sup> century treasures, including mobile phones, jewellery and photos in the coffin when a loved one passes away. According to a survey, most people would like to be buried with their mobile phone for fear of being buried alive and keeping their phone content private.

# A Guide To Metric Time - Or Decimalized Time

"A TOUS LES TEMPS; A TOUS LES PEUPLES"  
"FOR ALL TIME; FOR ALL PEOPLES"

A treatise by Lyle Zapato 14-12-2002. (shortened version - no response to email request to publish)

**Metric Time (MT)** is an attempt to create a decimalized time system for our modern base-10 using world. The use of different number systems in different cultures (such as the Babylonians from whom our base-60 time system originated and Mayans who had base-20,) and the difficulty that we as decimal users have in using their systems (most of us can't just start doing addition in base-20 without having to keep track with paper and pencil,) raises all sorts of intriguing questions about how we think about numbers. Would we be able to do math at all if we didn't have a language or written system to aid us? It seems that the main problem we have in using other base systems is that those of us who have grown up in a decimal using culture *think* in decimal. It's just perverse for us to be using base-60 for telling time. NOTE: The time system that you are used to (24hr/day) will be referred to here as **Anglo-Babylonian Time (ABT)**. The reason for the Babylonian part was mentioned above. The Anglo is there because the system in its current form has been associated with the British (Greenwich and all that.)

**Basic Description.** A Metric or Decimalized Time system is, like ABT, based on the solar day (i.e. one revolution of the Earth). This day is then divided into units of tenths, hundredths, thousands, etc. that are used to keep and tell time. NOTE: Although we are defining Metric Time here based on the rotation period of the Earth, that doesn't mean that we couldn't redefine it based on something more stable (such as the radioactive decay rate of some atom,) as has been done with ABT. Most proposed day-based decimalized time systems are basically the same in that one tenth of a day is one tenth of a day for all of them. However there are differences between systems, these mainly being the unit names, display format and how locality and universality are handled.

**Units.** There are and have been a number of units and formats proposed. The most popular unit system is the one instituted in France during the Revolution along with the Metric System. This system uses hours, minutes, and seconds like ABT but redefines their lengths: (Note: The metric second here will be referred to as an "MT second" to avoid confusion with the official SI second which is equal to the ABT second.) The main attraction of this is that seconds and minutes are fairly close to their ABT counterparts, allowing people to continue to use expressions like "I'll be done in a few seconds" or "any minute now!" and have them mean the same thing. There are, however, two major drawbacks.

French Revolutionary Metric Time	
Amount	Description
10 metric hours	in a day
100 metric minutes	in a metric hour
100 metric seconds	in a metric minute
10 days	in a metric week (called a <i>dekade</i> )

One is that using unit names that are the same as the ABT units could lead to confusion where precision is more important. This is especially problematic with the metric hour which is almost two and a half times the length of the ABT hour. This could be solved by always saying "metric hours" and "ABT hours", but this would quickly grow tiresome. The second drawback is that, while metric minutes and MT seconds are as convenient as their ABT counterparts, the metric hour is a bit ungainly. Blocking out the day in ABT hours is manageable, but a tenth of a day is too long a period to be useful for higher resolution mapping of the day on the scale of appointments, TV show times and such (although it would still have value as a low resolution day-overview).

The obvious solution to the latter problem is to pick a base-ten fraction that gives a more reasonable length of time and promote its use as the basic building block of the day, much as ABT hours and half-hours are used. It will be the unit that time is normally expressed in, except in technical situations. A hundredth of a day (let's call it a **centiday** here for brevity) is the logical choice for this unit as it is 14.4 ABT minutes. For example: a TV sitcom is 2 centidays long and a typical class session lasts 4 centidays.

**Names.** The first problem with the French system leads us to the question of what -- if not hours, minutes and seconds -- we should name our units. Here we have some options. There is a tradition in science of naming units after researchers who made important discoveries in the related field. For instance, the unit of absolute temperature is the **kelvin**, named in honor of Lord Kelvin who came up with the concept of absolute temperature. This methodology could apply to Metric Time too. One person has suggested that a hundredth of a day be called a **fleming** in honor of Sir Sanford Fleming, Canadian inventor of standard time zones. While there is precedent for a naming scheme like this, there are all sorts of politics involved in who exactly the unit would be named after (would Quebecers approve of telling time in flemings?). And although scientists are used to this sort of meritocracy of names, the general populace would probably find any person's name to be too provincial for a much used unit of time.

Another method would be to come up with more neutral words specifically for each useful division of the day, much as we currently have with hours, minutes and seconds. For instance: Jonathan Jay's Global Network Time uses **cycles, grands, beats and ticks** for a hundredth, thousandth, etc. of a day. Swatch's Internet Time uses **.beat** for a thousandth of a day.

Since we are using decimalized time, we can take advantage of the Metric System's set of standard prefixes. This will allow us to only have to name one base unit -- be it a cycle or a MT second or whatever -- and then be able to express a time in a unit scaled for specific usage. For example, if a fleming is a hundredth of a day, then a **millifleming** is a hundred-thousandth or an MT second. It's easier to say "two milliflemings" than "zero point zero zero two flemings".

**The Metric Time Unit** Although a tenth of a day is a convenient unit for scheduling purposes, it is a rather arbitrary one as the base unit for naming purposes. The most natural base unit is a day. Therefore *propose that the base Metric Time unit be called a **day** in English and that it be equal to one mean solar day.* This should, however, be considered a temporary name for the present purpose of explaining decimalized time in English. Users of other languages can replace it with their word for day, such as *diá*, etc.

Metricized Day	
Name	Definition
deciday (dd)	= 1/10 day (Metric hour)
centiday (cd)	= 1/100 day
milliday (md)	= 1/1000 day (Metric minute)
microday ( $\mu$ d)	= 1/1000000 day (Metric decisecond)

Using metric prefixes on **day** we get: The 'day' word may be omitted for brevity in situations where it is understood that you are referring to time. This gives us the following informal or slang names:

	Informal Names
<b>Formal</b>	<b>Informal</b>
deciday = deci or dez	
centiday = centi or cent	
milliday = milli or mil	
microday = micro or mic (pronounced "mike") or moo (the symbol for micro is $\mu$ )	
quintoday (qd) = $1/100000$ day (MT second)	informal = quint

### The MT Second And SI Second

We now come to some problems. You may have noticed that there was no equivalent to a MT second listed above. Since there is no current metric prefix for  $10^{-5}$  we can't state a MT second using the unit day (except as  $10 \mu\text{d}$ ). Also there is the existence of the SI second, which is the official unit of time of the International System of Units (aka the Metric System or SI). Here are some options:

**1. Create a  $10^{-5}$  prefix.** float the idea of a **quinto (q)** for  $10^{-5}$  and a matching **Quotta (Q)** for  $10^5$ ? With this we get the following:

**2. Redefine the SI second to be equal to  $10^{-5}$  day.** The SI

second is defined as the period of time that it takes a specific number of cesium isotope radiation emissions to occur such that it is as close to a mean ABT second ( $1/86400$  day) as feasible given the variance of the earth's rotation. To redefine the SI second to be equal to a MT second would mean redefining it to be equal to whatever number of cesium-133 emissions are close to  $10^{-5}$  mean day given variation. There are two problems with this option. First is that there could be confusion over having the same name for two different time periods as was mentioned above for hours and minutes. Second is that the rules of the SI are that there is one base unit for each base quantity. By introducing the day as a base unit and keeping the second, we will have two base units of the quantity time. How much of a problem this is depends on how strictly you wish to adhere to the SI rules.

**3. Create a new name for  $10^{-5}$  day.** Perhaps named for a researcher? This would solve the first of the previous problems but not the second.

**4. Keep the SI second.** Since the SI second isn't really defined as  $1/86400$  of a day but instead an arbitrary number of cesium isotope decays, we can't really fault it for being Babylonian. The SI second is already used as a decimalized unit in science and engineering, so why not use the SI second as the time unit for technical purposes and the SI day as the unit for clock keeping and day-to-day use (timing boiled eggs and such). This also introduces a dual unit system though, and one where conversion is harder.

**5. Adopt the day as the official SI time unit** Let seconds go the way of scruples and stones. Expect to hear scientists and engineers use **femtodays** a lot. A day will need to be more precisely defined as mentioned above.

**Clock Format:** Metric Time should be written as a single decimal number expressed in whatever scaled unit is needed. For normal timekeeping, such as on your watch, *that unit should be the centiday and it should be labeled with UMT or LMT depending on whether you are expressing the universal or metric time* in places that it should be written depends on need. One decimal place would give you the rough equivalent of an ABT display to the minute, three to the ABT second:

**Non-Clock Formats:** When using Metric Time for more general measuring purposes (like meters, liters, etc.) numbers may be rounded up and leading and trailing zeros truncated (keeping in mind the rules regarding significant digits when dealing with more technical situations).  
Examples of Metric Time in use:

"The half-life of Bromine-75 is 6.75 cd"  
"Cook the frozen entrée in the microwave oven for 5.5 md on high"  
"Otto ran the 5k in 1.276 cd"

**Day format:** Using a non-scaled day as a unit can have advantages when writing dates and times together (i.e. time stamps) as the day and time can be written as a single decimal number. For example:

2001-01-01.50000 LMT

is noon at the International Date Line (IDL), to greater than a second, on the 1st of January, 2001. The above would also be equal to:

2001-01-02.00000 LMT

at the prime meridian (00:00:00 midnight GMT), however localized date formats should be avoided.

Because the context in the above examples is clear, we don't have to specify that the last number is in day units. However, if you were to write this without the year and month you would need to state the unit to avoid confusion:

01.50000 d UMT

**Julian Day.** The Julian Day chronology system begins its days on the IDL (or rather at GMT - 12 hours). The reason for this is that Julian days are used mostly by astronomers, most astronomy (at least prior to the Hubble telescope) is done at night, and the people who created the system were European: It's just more convenient to have your night's observations all happen on the same day. The reason I bring this up here is that the Julian day system uses a decimal number to express the time of the day, so the decimal part of a Julian date is the same as UMT expressed in days.

# Solid State relays

## The Benefits of Solid State Relays

Figure 1 is a basic modem schematic incorporating an electro-mechanical relay. Because such relays inherently cause contact bounce upon contact closure, R1

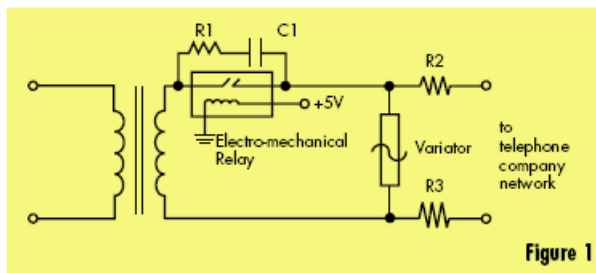


Figure 1

and C1 debouncing circuitry is required. Additionally, there are two fusible resistors, R2 and R3, in series with the tip and ring lines that are required for this circuitry to pass the FCC Part 68 lightning surge test. Without these resistors the relay would almost certainly be destroyed due to contact welding during such a surge.

In Figure 2, the electro-mechanical relay is replaced with our HSR412L solid state relay. R1 and C1 debouncing circuitry is

no longer needed, because there are no physical contacts with solid state switching, making it bounce-free.

Additionally, R2 and R3 fusible resistors are no longer required because the HSR412L includes active, current-limiting circuitry. More important than the space and cost savings is the fact that should one

or both of the fusible resistors open in a power surge, the modem would fail to operate until it was repaired.

Replacing an electro-mechanical relay with a solid state relay reduces component count, thereby reducing cost and saving space.

Furthermore, selecting a solid state relay with active, current-limiting circuitry increases reliability, reduces the possibility of costly repair or replacement, and further reduces component count.

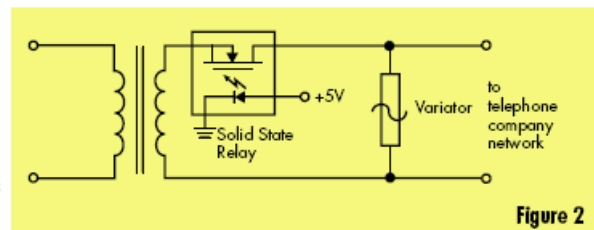
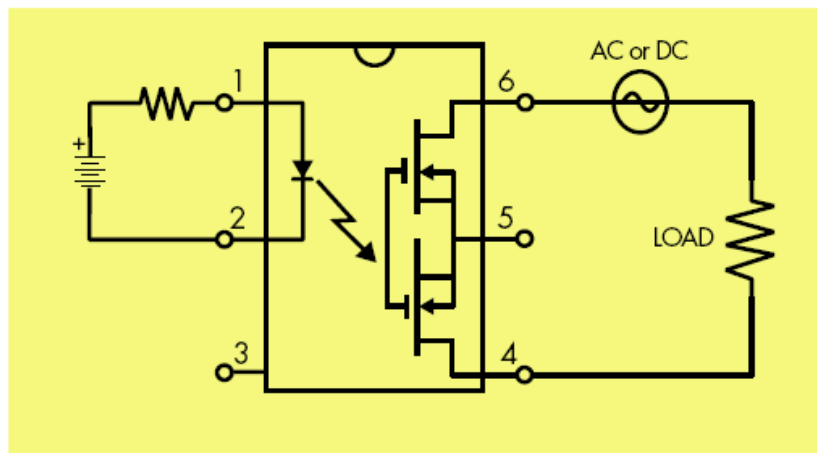


Figure 2

## Serial Dual Relay Connection

The dual MOSFET configuration allows multiple connection options for optimizing output resistance and current parameters to meet your specific application requirements.

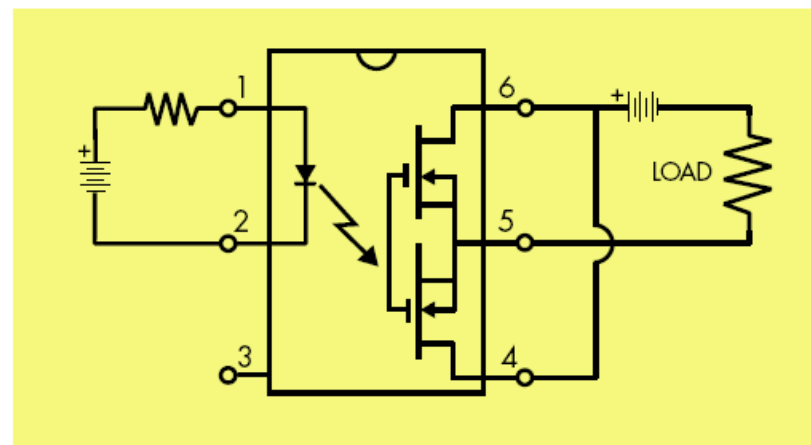
Connection of both MOSFETs in serial for ac or dc operation provides the lowest (best) active current limit for the HSR312L and HSR412L.



## Parallel Dual Relay Connection

The dual MOSFET configuration allows multiple connection options for optimizing output resistance and current parameters to meet your specific application requirements.

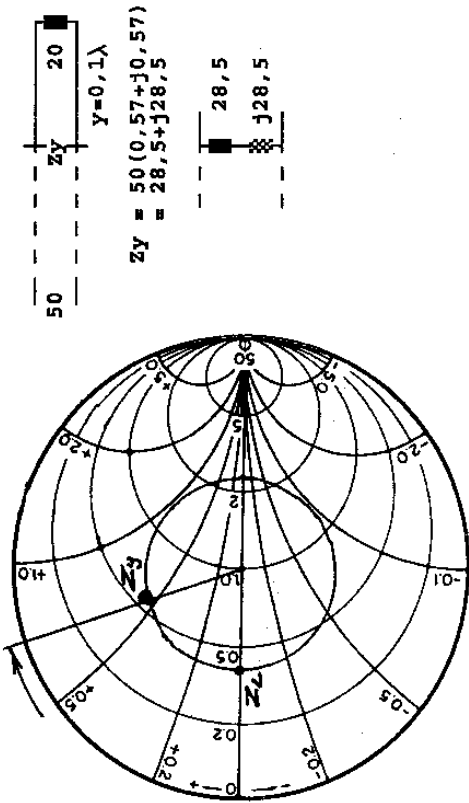
Connection of both MOSFETs in parallel for dc operation allows for the lowest maximum on-state resistance and the highest maximum load current.



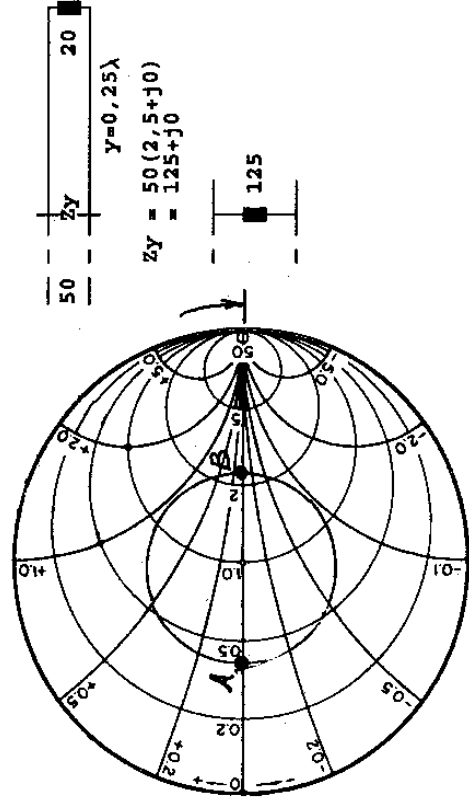


LET'S GO COMPLEX (part XI) final Hans ZS6KR

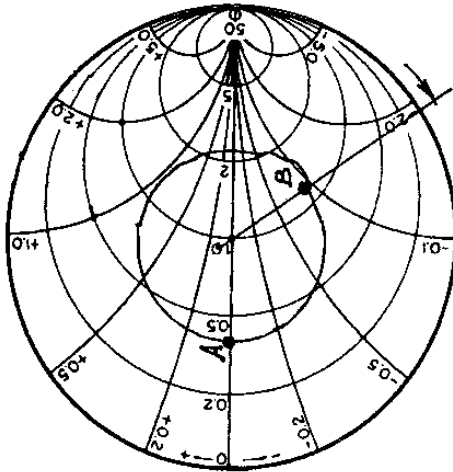
The last example is illustrated below. The illustrations are done with skeleton charts so as to preserve clarity. Use your copies of the full chart to verify values found.



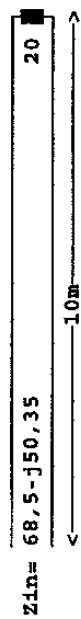
Eg2. Now determine the impedance one quarter wave back from the load by moving along the SWR circle from A to B in a clockwise direction. At B will be the required impedance.



Eg3. If the coax is 10m long at 145MHz we can even look as far back as the transmitter and deduce the feedpoint impedance. First we calculate the free space wavelength:  $\lambda = 300/145 = 2,069m$ . Then multiply by the velocity factor of 66% to obtain the cable length per wavelength = 1,365m. The 10m cable is thus  $10/1,365 = 7,326$  wavelengths long.



In the diagram we again locate the load at A and (clockwise) move  $7,326\lambda$  "towards generator". This is done by an imaginary 'round and round' 14 times to simulate the  $7\lambda$  and then stopping at  $0,326\lambda$ . Now draw a line from the centre to that point on the periphery and the impedance is then seen at point B  $Z_{in} = 50(1,17 - j1,07) = 58,5 - j50,35$



SUMMARY AND CONCLUSION

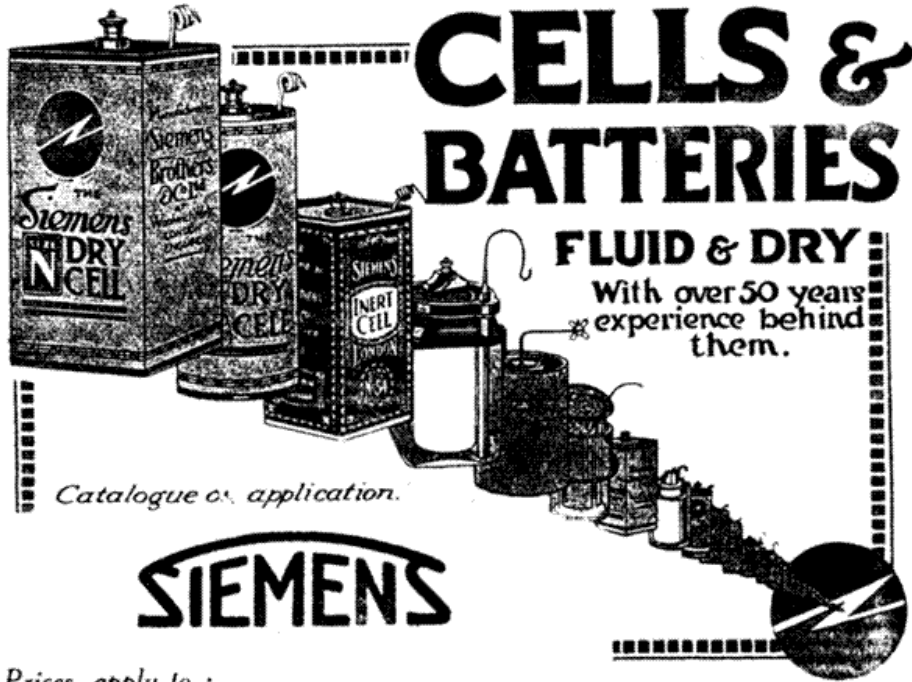
This concludes the series. There still is much that can be expanded on but the main purpose was to create an awareness and understanding of passive networks and their analysis. A Smith chart reduces the mathematics to simple calculator operations and provides an excellent overview of circuit or line behaviour. All circuits in this series were so chosen so as to be associated with basic Radio Amateur practice. Your hobby is very much based on all circuits discussed. You may wish to be able to pursue it with better understanding. If you wish to take the subject further, consult some of the excellent references below:

- Literature
1. Communication Engineering Everitt and Anner McGraw-Hill
  2. RF Circuit Design Bowick C SAMS
  3. Antenna Impedance Matching Caron WN ARRL
  4. How to use the Smith Chart Fisk R Ham Radio 3-78
  5. Electronic Applications of the Smith Chart in Waveguide, Circuit and Component Analysis. Smith PH McGraw-Hill

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**Blondie's solution to:**

$$\frac{1}{n} \sin x = ?$$

~~$$\frac{1}{n} \sin x =$$~~

$$six = 6$$

### Workplace logic

Adapt your workplace behaviour according to mathematical guidelines:  
What Makes 100%? What does it mean to give MORE than 100%? Ever wonder about those people who say they are giving more than 100%? How about achieving 103%? Here's a little mathematical formula that might help you answer these questions:  
If: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z is represented as:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26.

Then:

**H-A-R-D-W-O-R-K = 8+1+18+4+23+15+18+11 = 98%**

and

**K-N-O-W-L-E-D-G-E = 11+14+15+23+12+5+4+7+5 = 96%**

But,

**A-T-T-I-T-U-D-E = 1+20+20+9+20+21+4+5 = 100%**

and ,

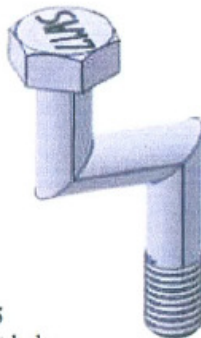
**B-U-L-L-S-H-I-T = 2+21+12+12+19+8+9+20 = 103%**

AND, look how far ass kissing will take you.

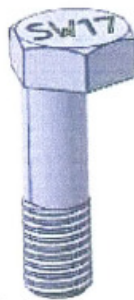
**A-S-S-K-I-S-S-I-N-G = 1+19+19+11+9+19+19+9+14+7 = 127%**

So, one can conclude with mathematical certainty that While Hard work and Knowledge will get you close, and Attitude will get you there, it's the Bullshit and Ass kissing that will put you over the top!

### Special fasteners for engineers



**DIN 875**  
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**DIN 876**  
for one-sided lack of  
space for fastener head



**DIN 877**  
for too large  
sunk holes