WATTS

10 - 2006
Year 76+10m

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

PARC, PO Box 73696 Lynnwood Ridge 0040, RSA

web http://www.qsl.net/zs6pta

Bulletins : 145,725MHz 08:45 Sundays / Sondae
Relays : 1840, 3700, 7066, 10135, 14,200 MHz (Seasonal)
Swapshop : After bulletin 2m and 40m (also on-line)
Bulletin repeats : Mondays 19:45 on 145,725 MHz only

ZR6FD logo

Drukwerk printing ZS6BAQ

Papier / paper Errol ZR6VDR

Down to Earth – Af Aarde toe

'n model aard-installasie deur Johan ZS6JPL – nog fotos op bl. 3

In this issue — in hierdie uitgawe

Next Meeting
4 Oct. 2006
Time: 19:30 for 20:00
PARC Clubhouse,
South Campus,
University of Pretoria.
SE cnr University and
Lynnwood roads.

PARC Management team / Bestuurspan Aug 2006- Aug 2007:

Committee members					
Chairman, SARL liason, Fleamarkets	Alméro Dupisani	ZS6LDP	almero.dupisani@up.ac.za	012-567-3722	082-908-3359
Vice Chairman, Secretary Rallies, Social, Hamnet	Johan de Bruyn	ZS6JHB	johandbr@absa.co.za	012-803-7385	082-492-3689
Treasurer, Database, DF hunts	Richard Peer	ZS6UK	zs6uk@peer.co.za	012-333-0612	082-651-6556
Public relations	Craig Symington	ZS6RH	craigsym@global.co.za	012-997-4504	083-259-3233
Repeaters, Technical	Pine Pienaar	ZS6OB	janpienaar@ananzi.co.za	012-345-1801	082-447-7823

Co-opted / Geko-opteer:					
Repeaters, technical	Johan Lehmann	ZS6JPL	jlehmann@csir.co.za	012-804-6173	083-300-8677
	Hans Gurtel	ZR6HVG	adele123@absamail.co.za	082-940-0623	082-940-0623
	Pieter Human	ZR6AHT	humanp@telkom.co.za	012-800-2888	082-565-6081
Repeater Maintenance (70cm)	Willie du Plessis	ZS6AEA	hesterdup@webmail.co.za	012-565-5555	083-653-2101
Auditor	Position open				
Newsletter/Kits	Hans Kappetijn	ZS6KR	zs6kr@wbs.co.za /arrl.net	012-333-2612	072-204-3991
Asset control	Andre v Tonder	ZS6BRC	andreh.vtonder@absamail.co.za	361-3292	082-467-0287
Tydrenne/Rallies	Johann de Beer	ZR6YV		011-918-1060	082-857-1561
Klubfasiliteite, vlooimark	Willie Greyling	ZR6WGR	willie@up.ac.za		082-940-2490
Webmaster	Edwin peer	ZR6ESP	zr6esp@peer.co.za	012-333-0612	
Hamnet, projects	Roy Newton	ZS6XN	newtonr@telkomsa.net	012-547-0280	
Morse testing	Position open				
Historian/Awards	Tjerk Lammers	ZS6P	zs6p@iafrica.com	012-809-0006	
Public Relations	Jaco Lubbe	ZR6JLL			082-494-1959
	Thobile Koni	ZS6TKO	toko40@mweb.co.za		082-493-2483
Tea	Molly Peer	ZR6MOL	molly@peer.co.za	012-333-0612	
	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 6 Sept 2006

Welcome: Almero ZS6LDP declared the meeting open and welcomed all who attended.
Attendance: 19 members and 1 visitor. Apologies were received from Hal ZS6WB, Edwin ZR6ESP, Hillary ZR6HAP, Nico ZR6VT, Helen Newton, Doreen ZR6DDB, Bill ZS6KO and Malcolm Newton ZR6OLM.
Personal Matters / Lief en leed: Bertha, lv van Hans ZS6KR, weer in die hospitaal.
Matters arising from previous minutes: None.
Minutes of previous meeting: The minutes of the previous meeting were approved. Proposed by Willie ZR6WGR and seconded by Vitor ZS6VG .

Club Activities / Klub Bedrywighede

Rallies /Tydrenne : Johan ZS6JHB – Volgende tydren – 21/22 Oktober 2006 - Tzaneen Tydren – tydren gaan oor 14 sneltrajekte beslis word in die Tzaneen omgewing. – lede wat kan help met kommunikasie moet Johan ZS6JHB skakel by 0824923689.
Social / Sosiaal : Johan ZS6JHB – Next social - Bring & braai at home of Richard ZS6UK and Molly ZR6MOL.
DF Hunt / Jakkalsjag : Richard ZS6UK – DF hunt 16 September 2006 .Starting time 14.00 at Botanical Gardens.
Financial report / Finansies : Richard ZS6UK – reported on finances of club.
Fleamarket / Vlooimark : Almero ZS6LDP – Next fleamarket - 11 th November 2006 at premises of PARC.
Ham Dairy / Dagboek : September : 10 – Spring QRP Sprint. 11 – Closing date HF CW contest logs. 16 – World Ozone Day. 15/17 – SARL VHF/UHF Contest . 22 – Inland & Coastal Schools close. 23/24 – SAC SSB CW WW DX RTTY. 24 – Heritage Day. 25 – Public Holiday. 30 – Last day for SARL subscriptions.
Technical / Tegnies : Pine ZS6OB – Repeater – looking at other sites. Tegniese praatjie op Maandag aande na die heruitsending van die klub bulletin.
General / Algemeen. Echolink – Chris ZS6FCS – PARC repeater open for echolink users 24 hours per day.
Next meeting / Volgende vergadering : 4 th October 2006.
Presentation / Aanbieding : Thanks to Roy Newton ZS6XN - 12 volt distribution.

Editorial

Your Editor (and probably yourselves) is valiantly trying to fit amateur radio activities into his daily schedules and constantly loosing out against earning a living and personal responsibilities. If you can close the door on these at 5pm every day, you are lucky and set your mind to other things. For most of us life has become an entanglement with the technological advances of the last few decades and multiplexing these with a personal life is quite an art. Failure to do this successfully can end in dementia or divorce!
To get the maximum out of this hobby in available time means you need an efficient set-up. This means properly installed and reliably powered equipment, fixed cabling and no temporary arrangements that need temporary incompatible connections that waste time and are a risk to the equipment. This especially applies to mobile operating. Spend some time and money on these aspects and you can then push buttons and turn knobs that will always respond.

Redaksioneel

U redakteur (en waarskynlik ook jouself) probeer dapper om rado-amateur aktiwiteite in sy daaglikse skedules in te pas en verloor gedurig teen verdienste- en persoonlike verantwoordelikhede. As jy jou deur om 5nm daarvoor kan toemaak, is jy gelukkig en kan jou aandag elders bestee word. Vir die meeste van ons is die lewe verstrengel met tegnologiese vooruitgange van die laaste paar dekades en om dit te multipleks met 'n persoonlike lewe is nogal 'n kuns. As jy dit die nie suksesvol kan doen nie, kan dit eindig in dementia of 'n egskeiding!
Om die majksimum uit die stokpedtjie te kan haal in beskikbare tyd, beteken dat jy 'n doeltreffende opstelling nodig het. Dit beteken behoorlik geinstalleerde en gevoede apparaat, vaste bekabeling en geen tydelike opstellings wat tydelike en onversoenbare verbindings het wat tyd mors en 'n risiko vir die apparaat is. Dit geld veral vir mobiele bedryf. Bestee 'n bietjie tyd en geld aan die aspekte en dan kan jy knoppe druk en draai wat altyd sal reageer.

Shack revamp – ZS6JPL style. Johan doen nuwe be-aarding en kragverspreiding

Koper aardstroke rondom die hok

"Power Pole" paneel vir 12V verspreiding

Kragnet verspreiding met Klas 2 beskerming

Battery stelsel met stroombrekekers op beide + en -

Atmospheric broadcasting **From New Scientist http://www.newscientist.com/blog/invention/**

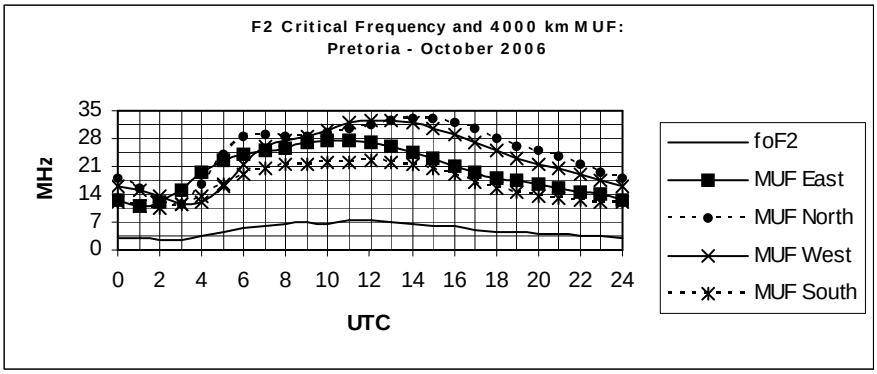
The layer of the atmosphere known as the ionosphere, at an altitude of 50 kilometres, is already used as a radio reflector, bouncing low frequency radio signals from one side of the world to the other. Researchers at Samsung in Korea are now working on a way to turn the ionosphere into an antenna. A patent application filed by the company reveals plans to direct higher frequencies radio signals at about 1 GHz at the ionosphere to alter its behaviour. It describes using a UHF radio signal, of a few hundred MHz, and a carrier signal of around 1 GHz. The mix would be amplified and focused by a dish into a spot beam that hits the underside of the ionosphere. The idea is for the GHz carrier signal to be absorbed by the atmosphere and for the UHF one to alter the temperature of ionospheric electrons. This should create an alternating current within the ionosphere that can be modulated at a particular frequency. The target spot should then work as an antenna, radiating the UHF tens of km back down to Earth. Samsung sees the system as a cheap way to broadcast signals, or communicate over long distances, without needing to launch expensive satellites.

..and some past experiences with atmospheric behaviour:
The Luxemburg effect was caused by the interaction between the EM wave radiation of the powerful transmitters of Radio Luxemburg and its caused modulations of the gas molecules in some Heaviside layers. It induced cross-modulation-like phenomena in many parts of the central European continent and Britain. It appeared that severe cross-modulation occurred when Luxemburg transmitted on long wave. It affected reception on medium waves though not every area was equally being interfered.

Long Term HF Propagation Prediction for Oct. 2006 **Vince ZS6BTY**

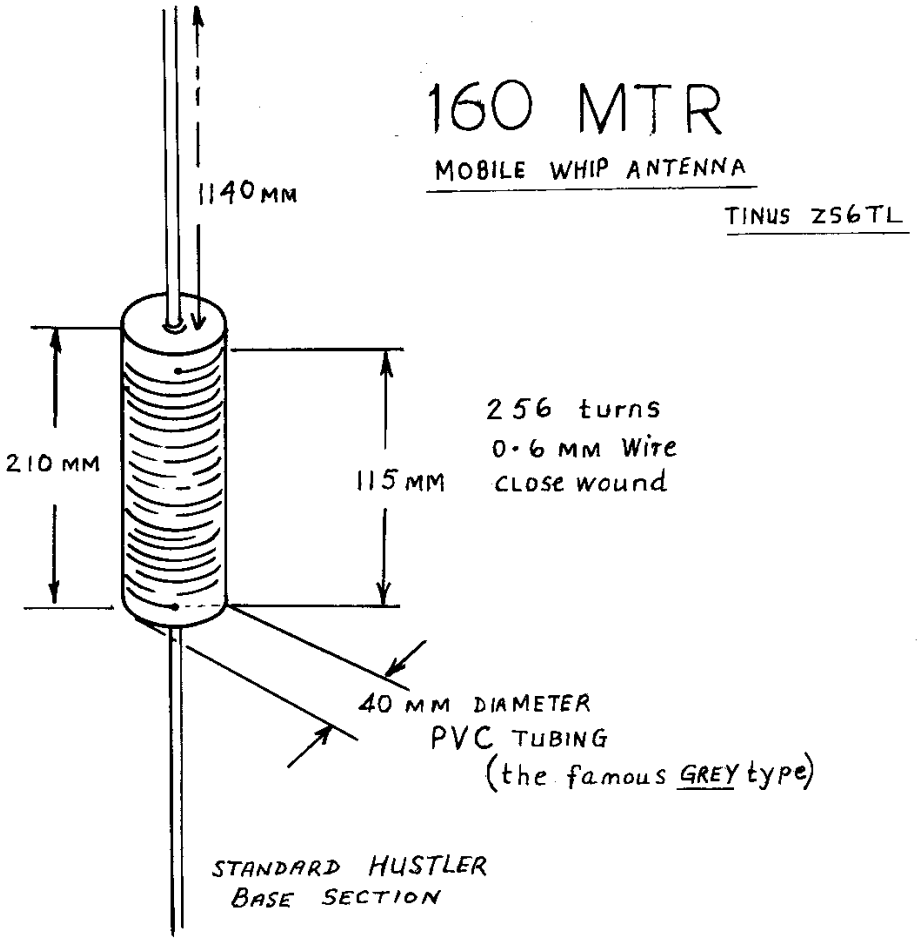
DX Operating
The graph shows the 4000 km maximum useable frequency (MUF) to the East, North, West and South from Pretoria for the first hop using the F2 layer.

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.



ZS6PTA

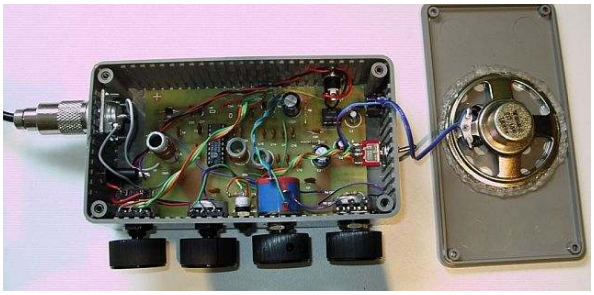
1930-2006



Published in WATTS Nov 1982

UPGRADING ZR>ZS - some options

ZS1I Electronic Projects offers a 40/80 METER ZR TO ZS HF RECEIVER kit at R320.00 excluding P&P. For more info and photos visit the SARL web pages under Homebrew Forum. Johan Terblanche 044-693-3136 zs1i@mweb.co.za



ZS6BZP Hannes Coetzee bied 'n 20/40m send-ontvanger aan teen R1000, wat alle komponente, pc-borde, knoppe, kassie, konnektors, draad, ens insluit. Daar is ook 'n bou-instruksie handleiding met heelwat fotos. Tel 012-653-3797 hcoetzee@ewation.co.za

Upgrading with Morse Code: QRV Technology (Hans ZS6KR) has done a new production run of the popular Morse Mate decoder. Model Mk4 decodes from any key(er) either as a desktop practice unit with built-in buzzer or keying to a radio. No PC required. Also reads from radio audio output. Large LCD display. Ideal learning aid and shack accessory. R499 ready-built. 012-333-2612 zs6kr@wbs.co.za

Birthdays Oct
Verjaarsdae

02 Hans-Peter ZR6AJS
02 Andre ZS6BRC
03 Poppie ZS6BCP lv van Hansie ZS6AIK
03 Celeste, dogter van Bernice en Pieter ZR6KSA
06 Danny ZS6AW
09 Ed ZS6UT
10 Harry ZS6AMP
10 Roy ZS6MI
11 Kevin, son of Tim ZS6TIM
13 Bill ZS6KO
14 Iza ZR6IZA
14 Gary, son of Joe ZS6TB
16 Vasti, dogter van Hennie ZR6HEN
16 Hennie ZR6HWM, seun van Hansie ZS6AIK
20 Corlene, dogter van Hansie ZS6AIK
20 Martinho ZS6BQP
21 Jan ZS6BBK
21 Louise, lv van Almero ZS6LDP
22 Marieza, dogter van Marelise en Pierre ZS6PJH
26 Rae, sw of Mike ZS6AFG
26 Callie ZS6BRY, seun van Freddie ZS6JC
26 Ken ZS6NB
27 Craig ZS6RH
28 Tracy, daughter of Graham ZR6GJR
28 Carl ZS6NCC
29 Pierre, seun van Marelise en Pierre ZS6PJH
30 Viv ZS6BZS
30 Andre ZS6GCA
31 Jessica, daughter of Anne and Jac ZS6QA

Anniversaries Okt
Herdenkings

03 Poppie ZS6BCP lv van Hansie ZS6AIK (44)
07 Moffie en Bokkie ZR6CL (34)
13 Susan en Freddie ZS6JC (?)
17 Elmarie ZR6AXF en Johan ZS6JPL (14)

PLEASE NOTE || LET WEL
Next month only paid-up members will receive WATTS.
Volgende maand sal slegs opbetaalde lede WATTS ontvang.

Subscriptions were due June 30.
Ledegelde was vanaf 30 Junie verskuldig.

Stel asb. u status vas by Richard ZS6UK 012-3330612
Please verify your status with Richard ZS6UK

Sick Parade | Krukkelys

Bertha, lv van Hans ZS6KR het 'n heupvervanging ondergaan

PARC Diary | Dagboek

Oct	01	RSGB 21/28MHz Contest 07:00-19:00 UTC
	02	Schools open / VHF contest logs deadline
	04	**PARC Club meeting**
	05	SARL 80m QSO Party 17:00-20:00 UTC
	07-08	Oceana Phone DX Contest 08:00-08:00
	12	Closing date Nov. RAE
	13-14	CQ Hou Koers | 14-15 Jamboree on the Air
	14-15	Oceana CW DX Contest 08:00-08:00
	20	Closing date for 80m QSO party logs
	21-22	Worked all Germany Contest 15:00-1459 UTC
	28-29	CQWW Phone Contest 00:00-24:00 UTC

Snippets | Brokkies

- **Danny ZS6AW** had some maintenance done on his antenna some months ago. Not for the light hearted! This photo tells all.
- **Hal ZS6WB** has moved QTH to a Weavind Park flat and is not yet fully operational.
- **Bill ZS6KO** and Mary were in the Kruger Park for a holiday. Bill managed to report into our bulletins on HF.
- **Doppies ZS6BAQ en Estie ZR6STB** gaan vakansie hou in Namibia in Oktober. Sy IC-7000 gaan saam.
- **Willem ZS6WAB** in Polekwane has put up a beacon on 144,800 MHz. Feedback will be appreciated.
- **The Tzaneen Rally** takes place 21-22 October. Contact Johan ZS6JHB if you can assist.
- **Hans ZS6KR** took 4th place in the recent SARL HF contest. Club support was poor except for Tjerk ZS6P and Ed ZS6UT who sent in logs.
- **PARC** took 2nd place overall after the Bloemfontein ARC.
- **IRLP i**s now active on our 2m repeater courtesy Johan ZS6JPL. 2m Node **8719**. 70cm node still **8427**. **At our next club meeting on 4 Oct. Johan ZS6JPL and Chris ZS6FCS will inform members on both IRLP and Echolink working.**
- **Conrad ZR6CON**, from what we hear, is busy constructing his own VHF/UHF antennas and apparently keen on satellites.
- **SARL HF Field Day.** Second leg Coming up 18-19 November. Start diarizing and get equipment ready.
- **Hamnet bulletins** are now on Thursdays 8pm.
- **The last foxhunt** on 16 Sept. was a no-go for the hunters. Johan ZS6JHB was the fox and could not be found. He has kept his location secret for a next time. Why not join in?
- **Malcolm ZR6OLM (17)** achieved his wings in a Jabiru aircraft ZU-JOS solo flight. More info next month.

Timekeeping – Q and oscillator stability

Extract from WW 1987 by ZS6KR

We are all by now pretty used to the terms "atomic time" and "caesium standards/clocks" etc. which which are state-of-the-art technologies to which all timekeeping and oscilators can be referenced. A gentleman by the name of DA Bateman at the Royal Aircraft Establishment, Farnborough, England jumped into a late-80's debate on the origiins of "Q" and proved it also applied to horology as wel as electronic circuits.

Accuracy in an oscillatory system is due to variable behaviour as a result of small changes in phase angle and inversely proportional to Q. Thus, the higher the Q, the lesser effect the phase variance will have - at least in the short term.

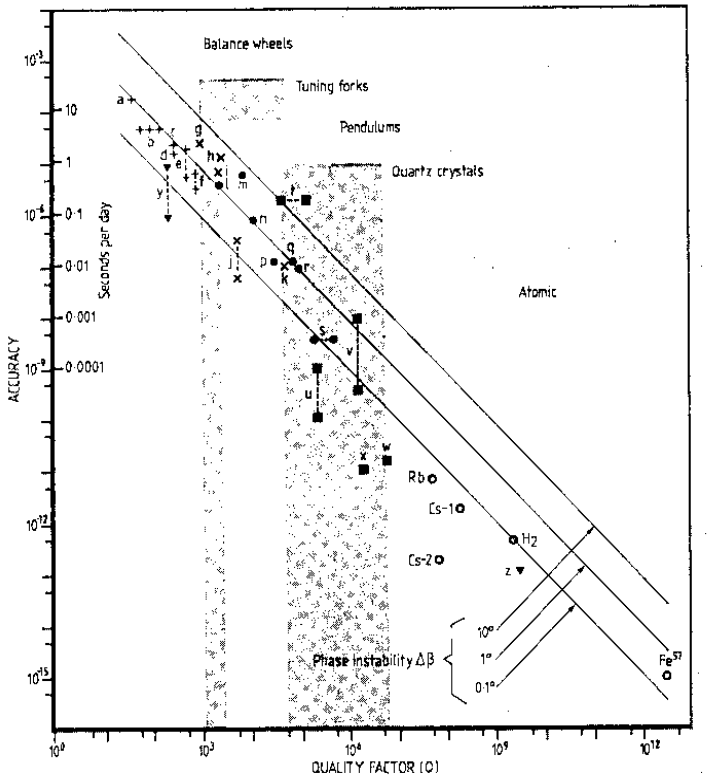
For clocks, long term behaviour also has a link to Q. Bateman surveyed many well-known clocks and calculated Q factors for their technologies as shown in the table and graphs below. He also built a pendulum clock with photo-electric control that was accurate to 70mS per day.

His hunt for the origins of "Q" ended with the earliest publication known by a KS Johnson in 1924. Further references showed that "Q" became established in the early 1930's and was used extensively by Terman's "Electronic Engineering" first published in 1932.

An interesting find was the factor 4,53. When N=the number of periods for the amplitude of a decaying oscillation to decay by half, then Q=4,53xN.

POINT ON GRAPH	CLOCK OR OSCILLATOR	Q (Loaded)	ERROR
	Balance wheels		
a	Cheap alarm clock, pin pallets	40	15s/d
b	Compensated, good quality jewelled lever	100	4s/d
c	Torsional ring "pendulum" (Atmos clock)	330	2s/d
d	Hamilton chronometer	330	1.7s/d (marine specification)
e	Mercer chronometer	560	0.5–1.7s/d
f	Randall constant force escapement prototypes 1978,1979	700	0.29 - 0.45s/d
	Tuning forks		
g	Junghans Resonic (300Hz)	1000	2s/d*
h	Omega Megasonic (720Hz)	2500	1s/d*
i	Bulova 2181 (360Hz)	2000	0.5s/d
j	NPL standard, 1934 (1000Hz)	5000	5×10^{-6} (hourly) 3×10^{-6} (weekly)
k	Laboratory standard, USA 1932 (480Hz)	52000	10^{-7}
	Pendulums		
l	Synchronome	3400	2s/week
m	Big Ben	6600	0.5s/d
n	Bateman regulator, photo-electric amplitude control	12700	0.07s/d
p	Gravity survey, transportable double pendulums, low pressure (Gulf Oil)	35000	10^{-7}
q	Gravity survey ("Cambridge pendulums")	90000	10^{-7}
r	Shortt, low pressure, 30mm Hg	106000	0.008s/d
s	Fedchenko, low pressure, 4mm Hg	200000–500000	0.0003s/d
	Quartz crystals		
t	Wristwatch, flexure mode, NT cut	50000–150000	5s/month*
u	Square plate, GT cut (laboratory)	200000	10^{-10} (1 minute) 10^{-11} (½ hours)
v	Essen ring	10550000	4×10^{-11} (1 hour) 10^{-9} (1 week)
w	Marconi F3160 laboratory standard, lenticular AT cut	6090000	1.5×10^{-11} (1 sec.)
x	Hewlett Packard 10543A laboratory standard	2000000	10^{-11} (1 sec.)
	Atomic		
Cs–1	Caesium beam, NPL2 1972	1.8×10^{8}	2×10^{-12}
Cs–2	Caesium beam, NPL3 1977	5.7×10^{7}	2×10^{-13}
H_2	Hydrogen maser	2×10^{9}	5×10^{-13}
Rb	Rubidium cell, commercial (Efratom)	5×10^{7}	2×10^{-11}
Fe^{57}	Radio-active iron, Mossbauer resonance effect	3×10^{12}	10^{-15}
	Electronic		
y	High stability tuned inductor and capacitor	700	10^{-9} (1 hour) 10^{-8} (1 day)
z	Superconducting cavity resonator	3×10^{9}	1.2×10^{-11} (10 sec.)

* Commercial specifications



The Ceasium 133 atom oscillates in a vacuum at 9,192,631,770 Hz

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FEEDTHROUGH CAPACITORS

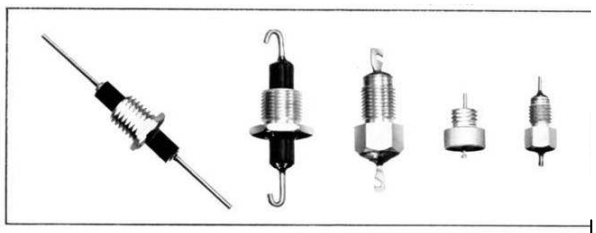
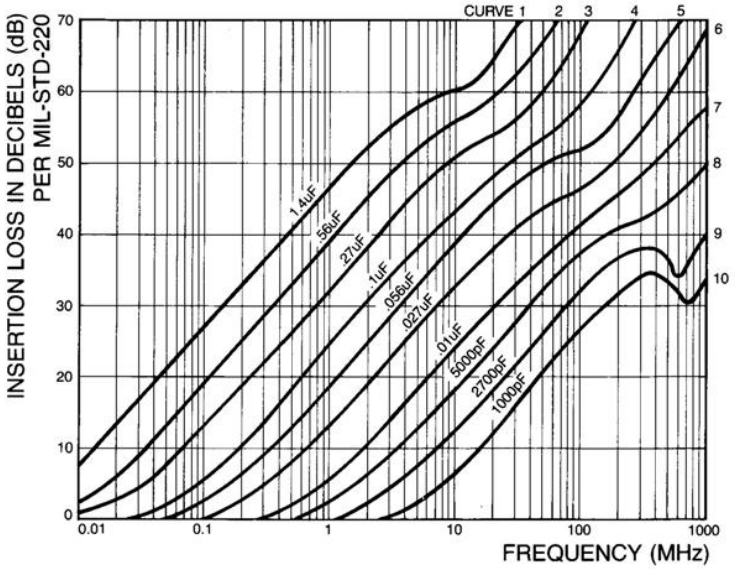


FIG 1 — FEED-THROUGH CAPACITORS — TYPICAL INSERTION LOSS



Wise move?

From: Hans Gurtel (H) [mailto:GURTELHV@telkom.co.za]
Sent: 25 August 2006 10:04 AM
To: sosairrescueafrica@internationalsos.com
Subject: HF radio frequency
Answered as follows:
Emergency frequencies are in general a thing of the past. They only apply in countries with local police or mbulance frequencies are used. We use satellite communication and normal aviation channels.

LET'S GO COMPLEX (part VI) — Hans ZS6KR

11. WAVE MOTION IN TRANSMISSION LINES

The (phase) velocity with which a single frequency propagates through a transmission line is quite logically:

$$Vp = \frac{\text{angular velocity of wave in radians/sec}}{\text{phase constant in radians/meter}}$$

$$= \frac{2\pi.f}{\beta} = \frac{w}{\beta} \text{ meters per second} \quad \ldots\ldots\ldots [25]$$

For summed or modulated waves the phase velocity of the envelope is the velocity with which the energy is propagated. This is a different velocity to that of any of the component waves and known as the group velocity:

$$Vg = \frac{\text{difference in frequency}}{\text{difference in phase}} = \frac{\delta f}{\delta \beta} \quad \ldots\ldots\ldots [26]$$

For distortionless propagation of complex waves the amplitude of all frequency components must remain the same and all components must undergo the same delay in time. Else we get frequency distortion and delay distortion. This is not only true for networks but also true for long distance HF skip conditions through the atmosphere where these phenomenae are often noticable on speech modulation.

12. RELATIONSHIPS TO PHYSICAL LINE CONSTANTS

There are useful relationships which tie the parameters discussed in sections 10 + 11 to actual line inductance, capacitance and physical dimensions.
Imagine again our T section(s). The series arms will be an inductance L and the shunt arm a capacitance C.
If the frequency is reasonably high, the inductive reactance of the series arm will be much higher than the ohmic resistance and we can virtually ignore R.
Under these conditions we can define a line with a good dielectric as lossless and the simplified parameters (ϵ=1 in air, c=speed of light) apply:

$$\Phi = j\beta \quad \ldots\ldots\ldots [27]$$
$$Zo = \sqrt{L/C} \quad \ldots\ldots\ldots [28]$$
$$Vp = c \quad \ldots\ldots\ldots [29]$$
$$\beta = w/Vp \quad \ldots\ldots\ldots [30]$$
wavelength $\lambda = c/f \quad \ldots\ldots\ldots [31]$

} divide by $\sqrt{\epsilon}$ if not in air

L and C can be derived from physical dimensions:

$$L = 0{,}2 \cdot \lg(d2/d1) \ \mu H/m \quad \ldots\ldots\ldots [32]$$
$$C = 55{,}6\epsilon / \lg(d2/d1) \ pF/m \quad \ldots\ldots\ldots [33]$$
$$Zo = 60/\sqrt{\epsilon} \cdot \lg(d2/d1) \ \Omega \quad \ldots\ldots\ldots [34]$$

} coax

Though beyond the scope of this series, the analyses in sections 9 and 10 also yield that the line impedance of a lossless line at any point y backwards from any termination Zr is

$$Zin = Zo \frac{Zr + jZo.\tan\beta y}{Zo + jZr.\tan\beta y} \quad \ldots\ldots\ldots [35]$$

thus $Zsc = jZo.\tan\beta y \quad \ldots\ldots\ldots [36]$
thus $Zoc = -jZo.\cot\beta y \quad \ldots\ldots\ldots [37]$

PRACTICAL EXAMPLES

12.1 We want to make a capacitor of 100pF with a piece of 52Ω coax. The operating frequency is 145,725 MHz and the manufacturer specifies the dielectric permittivity ϵ=2,13

100pF has a reactance of $-j1/2\pi fC = -j10{,}92\ \Omega$
Using a piece of open-circuited coax then

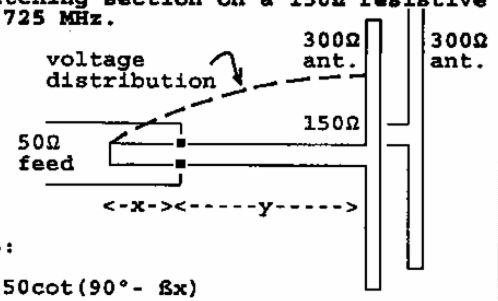
from [41] $-j52.\cot\beta y = -j10{,}92$
$\cot\beta y = 0{,}21$
$\beta y = 78{,}14°$
$= 1{,}364$ rad

From [34]-[36] $\frac{2\pi.\sqrt{\epsilon}}{\lambda}.y = 1{,}364$ rad

Thus $y = \frac{1{,}364\lambda}{2\pi.\sqrt{\epsilon}} = 306$mm ——>

12.2 We want to find the position of attachment for a 50Ω feedline to a ¼-wave matching section on a 150Ω resistive antenna system for 145,725 MHz.

The feedline sees two branches in parallel. The left branch is a shorted line and the right branch an open line terminated with 150Ω. If x+y is made a ¼-wave (514mm long or 90°) then the reactance in each case is:

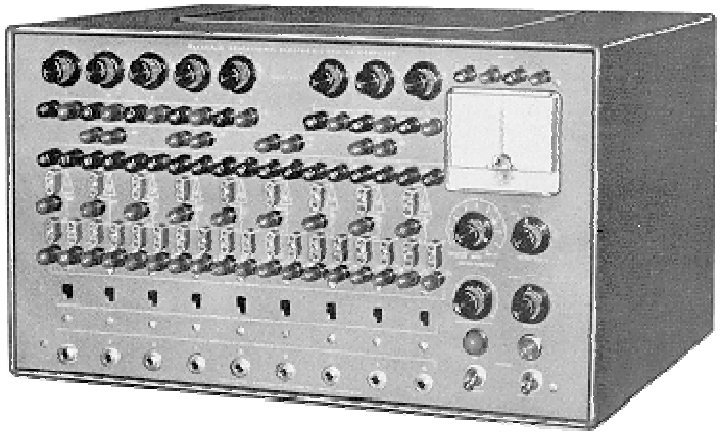


$$Xoc = -50\cot\beta y = -50\cot(90° - \beta x)$$
ie: $Xoc = -50\tan(\beta x)$
and $Xsc = 50\tan(\beta x)$

which shows that the reactances are equal and opposite independent of x indicating parallel resonance in the 90° matching section. The attachment point can be found by noting that the voltage distribution is sinusoidal as shown. Using simple proportionality

$$\frac{x \text{ mm}}{514\text{mm}} = \frac{\arcsin(50/150)}{90°} = \frac{19{,}47°}{90°}$$ and thus x=111mm ——>

EC-1 Educational (1960) Analog Computer



The Heathkit model EC-1 Educational Analog Computer puts advanced engineering techniques within the reach of everyone and still remains the lowest cost analog computer of its quality on the market today. Used widely in industry and in educational institutions, the Heathkit EC-1 is capable of solving a multitude of complex mechanical and mathematical problems with swift electronic accuracy. Many industrial concerns are using this versatile computer to train computer operators and engineers in setting up computer problems. Schools and colleges find the EC-1 ideal for teaching physics, engineering and mathematics. In addition, the basic principles of analog computer application can easily be obtained from using the instrument and computer design knowledge is also enhanced by familiarity with the EC-1 circuitry.

The Heathkit Educational Analog Computer is completely self-contained and contains nine DC operational amplifiers with provision for balancing without removing problem setup. It also features three initial condition power supplies, five coefficient potentiometers, four sets of relay contacts, an electronically regulated power supply and a built-in repetitive oscillator for automatic operation. The complete EC-1 kit also contains an assortment of precision resistors, capacitors, special silicon diodes and patch cords for setting up scores of complex computer problems easily and accurately. All components of the EC-1 computer are mounted on plugs for convenient and rapid insertion in problem-board sockets. All markings and symbols are standard computer type. The problem results are read directly from the meter supplied with the kit, and provision is also made for measuring results with an external read-out device such as the Heathkit DC oscilloscopes.

Don't Mess With Grandma!

An elderly Florida lady did her shopping and, upon returning to her car, found four males in the act of leaving with her vehicle. She dropped her shopping bags and drew her handgun, proceeding to scream at the top her voice," I have a gun, and I know how to use it! Get out of the car..!!"

The four men didn't wait for a second invitation. They got out and ran like mad. The lady, somewhat shaken, then proceeded to load her bags into the back of the car and got into driver's seat. She was so shaken that she could not get her key into the ignition. She tried and tried, and then it dawned on her why.

A few minutes later, she found her own car parked four or five spaces farther down. She loaded her bags into the car and drove to the police station .

The sergeant to whom she told the story couldn't stop laughing. He pointed to the other end of the counter, where four pale men were reporting a car jacking by a mad, elderly woman described as white, less than five feet tall, glasses, curly white hair, and carrying a large handgun.

If you're going to have a Senior Moment, make it a memorable one!

Some clever rearangements: ASTRONOMER > MOON STARER , MORSE CODE > HERE COME DOTS
ELEVEN PLUS TWO > TWELVE PLUS ONE , DESPERATION > A ROPE ENDS IT,
and the best one : MOTHER IN LAW > WOMAN HITLER