WATTS

01 - 2007
Year 77+1m

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.zs6pta.org.za e-mail: zs6pta@qsl.net

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

ZR6FD logo

Drukwerk printing ZS6BAQ
Papier / paper Errol ZR6VDR

Alf ZS6ABA ontvang HF en VHF konstruksie trofeë

(somewhat shaky photo by Craig ZS6RH)

In this issue

In hierdie uitgawe

Next Meeting

3 Jan. 2007

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
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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
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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 Dec. 2006

Welcome: Johan ZS6JHB declared the meeting open and welcomed all who attended.

Welcome: Almero ZS6LDP declared the meeting open and welcomed all who attended .
Attendance: The meeting was attended by 20 members and 2 visitors .
Apologies : Apologies were received from Sander ZS6SSW, Ed ZS6UT, Doreen ZR6DDB, Pine ZS6OB and Louis ZS6LVW.
Personal Matters/Lief en leed: Jac ZS6QA moet n heupvervangings operasie ondergaan. Baie geluk weereens aan Pieter ZS6PVW en Magda ZS6MVW met hul dogter se puik skool prestasies .

Minutes of previous meeting: The minutes of the previous meeting were approved . Proposed by Richard ZS6UK and seconded by Alf ZS6ABA .

Matters arising from previous minutes: There was some confusion regarding the bring & braai at PMC . Some members thought that the club meeting was scheduled to be held at PMC which was not the case .

Awards :
Only one person entered for the HF Constructors Trophy and the UHF / VHF Constructors Trophy .
Congratulations to Alf ZS6ABA who was declared the winner and scooped up both trophies .

Raffle : Two bottles of wine donated by Johan ZS6JHB were won by Hans ZS6KR and Richard ZS6UK .
General : Andre ZS6BRC proposed that we should have regular competitons for HF and UHF/VHF during the year .
Almero ZS6LDP reminded the meeting that Joe Noci will be the guest speaker at our next meeting .

Next meeting : 3 January 2007 .
Closing: The meeting closed at 21:00
ZS6JHB

Editorial

Luckily there is little space here for my ramblings as I have already gone into relaxed mode. I wish all members a joyous "festive" season. May you get done what you need to get done but do not forget to spend quality time with your loved ones and again experience the true meaning of Christmas..

Redaksioneel

Gelukkig is hier min plek oor vir my gebasel omdat ek alreeds in ontspanne luim verkeer. Ek wens all lede 'n prettige "feestyd" toe. Mag julle gedoen kry wat gedoen moet word maar moenie vergeet om kwaliteit-tyd met u geliefdes te geniet nie en ook die ware betekenis van kersfees weer te ervaar.

Birthdays Jan
Verjaarsdae

02 Alf ZS6ABA
03 Stan ZS6SDZ
04 Mike ZS6AFG
05 PierreZS6PJH
08 Darren ZR6TY son of Selma and Joe ZS6TB
11 Braam ZR6EM
12 Ivan ZS6AUT
14 Gert ZS6ZB
18 Mary, sw of Bill ZS6KO
20 Errol ZR6VDR

Anniversaries Jan
Herdenkings

03 Margriet en Tobie ZS6ZX ( )
05 Louise en Almero ZS6LDP (16)
07 Doreen ZR6DDB en Johan ZS6JHB (29)
20 Helga en Hans-Peter ZS6AJS (46)

20 Theresa, dogter van Margriet en Tobie ZS6ZX
25 Margriet, lv van Tobie ZS6ZX
31 Elize, lv van Pieter ZR6AHT

Meegevoel | Condolences

Met Tjerk ZS6P en familie wat hulle vader/grootvader verloor het op 2 Desember 2006
To Vlasta, sw of Ivan ZS6CCW who has recently lost her father.

Sick Parade | Krukkelys

Mary, sw of Bill ZS6KO is recovering well after her back operation

New Members | Nuwe lede

Welkom aan Chris Bothma ZS6LOG. Chris is ook tweede in bevel van HAMNET.

PARC Diary | Dagboek (UTC)

Jan	06-07	EuCW 160m Contest	20:00-23:00 and 04:00-07:00
	13-14	Hunting Lions in the Air	00:00-24:00
	19-21	PEARS National VHF/UHF contest	
	27-28	CQWW 160m Contest	00:00-23:59
Feb	16	Closing date for Tinus Lange Techl Excellence Award	
	10-11	CQWW RTTY Contest	00:00-24:00
	10-11	Dutch PACC Contest	12:00-12:00
	10-11	RSGB 1st 1.8MHz contest CW	21:00-01:00

Snippets | Brokkies

- **Hal ZS6WB** recently mentioned to have made over 140 EME contacts to different stations.
- **PARC made 3rd position** amongst Club results of the 2006 SARL 2-part HF Field Day. Overall 4th on combined results.
- **Johnny ZS6BAJ** is putting in a concerted effort to be on the air despite the sw complaining about lack of attention! He lives in Dorandia and a guyed vertical multi-band vertical antenna should be on top when you read this. →
- **ZU9PTA** is the license of our 10m repeater yet to be put up. This repeater needs the TX and RX sites to be 4-5 km apart and **Johan ZS6JPL** is now on the prowl for a suitable second site away from an already secured site east of Waverley.
- **Jean ZS6ARA** has almost completed rebuilding his shack and is devoting special attention to earthing.
- **Joe ZS6JGN** will be at our next 3 January club meeting with various of his home-brew projects including a fully synthesized HF tranceiver, a wattmeter that measures as low as 1mW with very wide range and more. Joe is relocating to Namibia and this is your last chance to see these excellent projects. Come and see them at our next meeting!
- **Alf ZS6ABA** het sy send-onvanger en kragbron projekte by ons Desember vergadering getoon en die werking daarvan verduidelik. Hy het die konstruksie-trofeë vir 2006 hiermee verower. Foto op volgende bladsy wys hoe lyk die hardeware.

Alf ZS6ABA wys sy konstruksie projekte

Recent upgrade of antennas at our repeater site.
Craig ZS6RH (white helmet) and Johan ZS6JPL fitting a dipole stack according to an analysis done by Vince ZS6BTY.

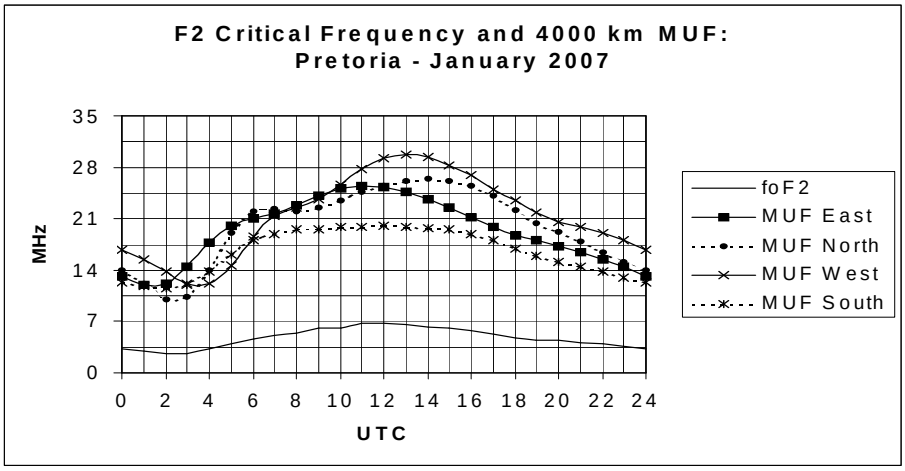
Long Term HF Propagation Prediction for Jan. 2007

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.

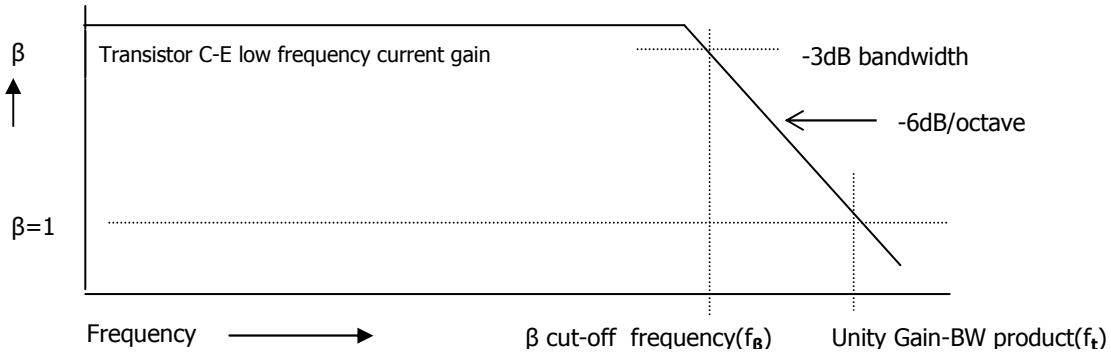


League Asks FCC to Postpone, Modify Part of 75-Meter Band Change

NEWINGTON, CT, Dec 11, 2006 -- In separate petitions today, the ARRL asked the FCC to postpone the change in allocation for 3600 to 3635 kHz while it considers a request to maintain the status quo in the segment.
The so-called "omnibus" Report and Order (R&O) in WT Docket 04-140, which included moving the lower edge of the Amateur Extra 75-meter phone band to 3600 kHz, is set to go into effect Friday, December 15.
The League wants the Commission to rectify the "unintended consequence" of the expansion by moving the dividing line between the narrowband and wideband segments of 80/75 meters to 3635 kHz. This would keep 3600 to 3635 kHz available to General and higher licensees for RTTY, data and CW and open to Novice and Tech Plus licensees for CW. The requested change also would maintain access to the automatically controlled digital subband, 3620 to 3635 kHz. In a Petition for Reconsideration, the League emphasized that it was not seeking reconsideration of the entire 75-meter phone band expansion.
To justify its far greater-than-requested expansion, the League asserted, the FCC relied on the flawed logic of a handful of commenters who specifically asked for a 3600 to 4000 kHz phone band. Some commenters had made the case during the proceeding that the "CW subband" is vastly underutilized while space for SSB is at a premium.

What is a Transistor's Gain-Bandwidth Product? (From ZS6KR's archives)

In the early days of transistor manufacture, instrumentation to verify parameters was expensive and even boycotted due to political sanctions at the time. I was tasked to devise something to measure transistor AC characteristics so that random samples could be measured after production.
In those days when IC's were just in their infancy, an immense amount of publications concerning transistor manufacture and characterization was already available. All based on physics and electronic theory, this task was an exercise in applying theory into practice.
What was required was AC current gain (β) and the GBW product at which frequency the gain drops to unity.
The latter is used as benchmark data in all datasheets and is a *product of the -3dB response and the AC gain*.
Generally it is assumed that the AC gain remains constant until the cut-off point is reached.
Hence if the GBW product is known the theoretical gain at any frequency beyond it can be mentally calculated.
The theory and analysis of a common-emitter amplifier is simple and can be found in every academic textbook. The frequency response of a single stage with resistive source, load and bias elements as shown in the graph below:



Two values, β and the –3dB bandwidth, must be determined in order to calculate the GBW product.
What we need to do is to feed a signal into the transistor and measure the AC gain β at a specific collector voltage and current both at a low- and high frequency.
Since the high frequency can be in the MHz region, the jig design should be designed for 50 ohm input- and output impedances. A signal generator, oscilloscope and DC supply were readily available.
Since the low frequency current gain can be 100 or more, a test jig with a 100:1 in-out ratio can show β directly on an osciloscope provided 100mV is used as input.
The test jig circuit is thus as shown:

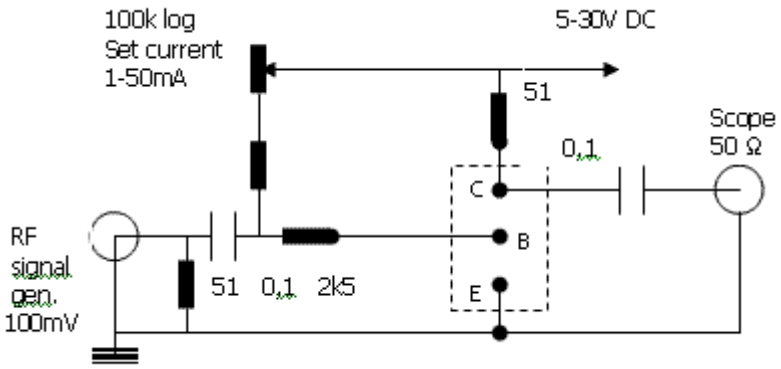
Vout/Vin = β.Zout/Zin thus **Vout= β (mV)**

In this circuit the transistor Zout=25Ω
Zin ≈2500Ω

This jig must be built with short connections, BNC sockets and a suitable plug-in socket for the Device Under Test (DUT)

The oscilloscope can be made 50Ω by using a coaxial feed-thru termination on its input socket.

In practice the following procedure is then used:



1. Set the generator to 100mV p-p
2. Adjust the DC supply (collector) voltage to specification and adjust the collector DC current to specification
3. Set the generator to approximately 20k-40kHz
4. Read the low-frequency AC current gain β as the exact vertical p-p deflection on the oscilloscope
5. Now adjust the oscilloscope for 7 divisions p-p vertical deflection
6. Increase frequency until the deflection reduces to 5 divisions (=0,707x =-3dB) to obtain f_{β}= common-emitter BW
7. Multiply β x f_{β} to get f_t = the Gain Bandwidth product. (This can be several hundred MHz)

This is also a useful and easy-to-do project for amateur use.
Typical figures for an f_t=1GHz transistor would be β=50 and thus the input frequency required to measure f_{β}, is 20MHz.

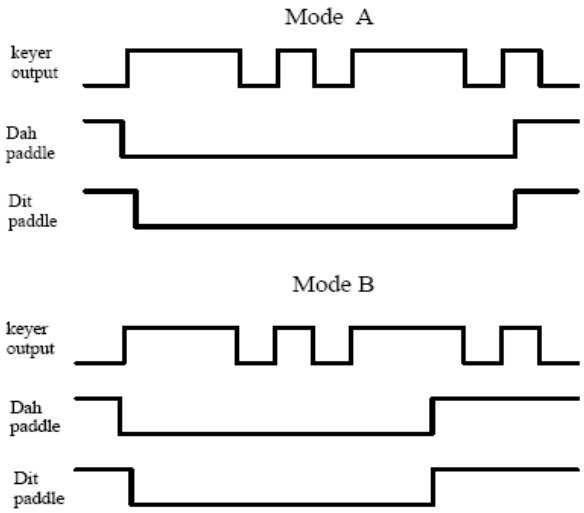
Iambic keyer mode A and B explained

by Chuck Olson, WB9KZY

Mode A and B refer to the way that a Morse code keyer handles iambic (squeeze) keying so first, let's define iambic keyer operation. An iambic keyer will send an alternating sequence of dits and dahs as long as both the dit and dah switches are depressed or squeezed. You may remember the singsong rhythm of iambic pentameter from English class:

```
                I  NE    ver   SAW   a  PUR   ple   COW
short    long  short    long  short    long  short    long
      di    dah   di    dah   di    dah   di    dah
```

Iambic operation is useful for sending characters that have alternating patterns such as a period or the letter C. An iambic keyer is normally used with a dual lever paddle. It consists of two separately actuated switches. I am right handed and use my thumb for the dits and index finger for the dahs. You can also use a single lever paddle with an
iambic keyer but you won't be able to take advantage of the iambic properties of the keyer. Single lever keying is sometimes called slap keying since you can only depress either the dit (slap to the right) or dah (slap to the left) switch – you can't depress both at the same time. Finally, some folks "slap" a dual lever paddle - this is OK, too!

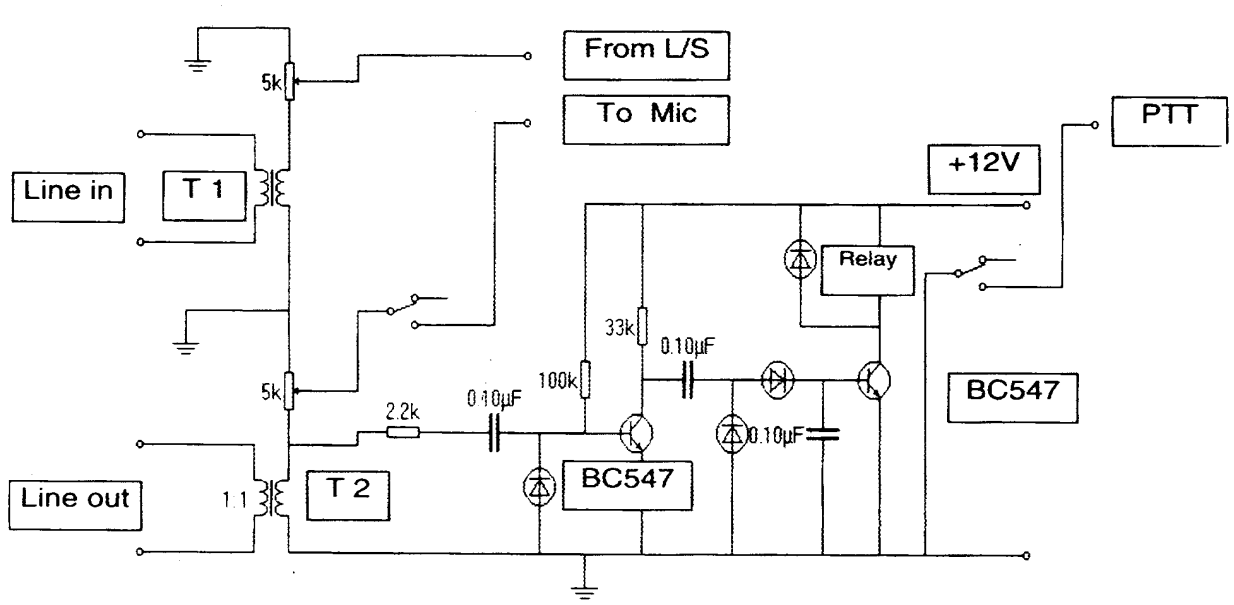


The difference between mode A and B lies in what the keyer does when both paddles are released. The mode A keyer completes the element being sent when the paddles are released. The mode B keyer sends an additional element opposite to the one being sent when the paddles are released. The original Curtis chip is mode A - the WB4VVF Accu-keyer is mode B. You can tell the basic difference between the modes with the letter C. In mode A you could squeeze both paddles (dah before dit) and you would let go of both after hearing the last dit. With mode B, you start the same BUT let go of both paddles after hearing the second *dah*. The diagrams show sending a C with mode A and B:

This only affects letters and characters like C, PERIOD or AR, unfortunately the most commonly sent sequence in ham radio is CQ, so you can usually tell right away if an op has the mode set correctly when operating an unfamiliar keyer. I use mode B - the mode you end up with just depends on which type of keyer you used when learning to send - I learned using an Accu-keyer.
I hope this discussion has made the differences between mode A and B a little clearer.

Digital Mode interface – no serial ports required.

Tone keyer designed by ZS6ABU. Published in Radio ZS Dec 2002. Signal diodes are Ge.



LET'S GO COMPLEX (part IX) Hans ZS6KR

17. APPLYING THE THEORY

Hopefully you have kept all instalments of this series. The theory has been given at the most elementary level possible. Transmission lines, coaxial or otherwise, are now proven complex circuit devices with special behaviour when (not) terminated in their characteristic impedance.

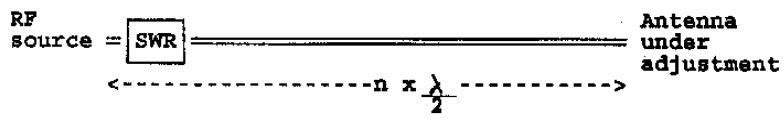
Yes, you say, we know all that; that's why we use an SWR meter to match my antenna to the rig. When the SWR = 1:1 then the rig and myself are happy.

THE AUTHOR WILL NOW PUT IT TO YOU THAT YOU CAN BE WAY OUT IF YOU MEASURE BETWEEN THE RIG AND THE FEEDER CABLE WHILE ADJUSTING THE ANTENNA FOR A MATCH.
The measurement is only correct between the cable end and the antenna base for the purposes of antenna adjustments. In many cases this is impractical as it needs two persons to operate equipment in two locations.

There is a way round this problem to do the job correctly all on your own when taking into consideration some of the facts and figures derived from the theory concerning half-wave transmission lines.

From Table 2 and aforegoing derivations we see that a half wave section 'repeats' the load with a phase inversion and a full wave section 'repeats' the load exactly as it is. This of course also applies to multiples of half- or full wave sections.

Voila, if we can make our feeder a multiple of preferably an even number of half-waves we see an exact replica at the feed end of what is happening at the load end.



Once the antenna is adjusted satisfactorily ie: it is now truly 50 ohms resistive, THEN THE LENGTH OF LINE BECOMES IRRELEVANT AS EVEN AN INFINITE LINE TERMINATED IN Zo WILL STILL SHOW Zo AT ITS FEEDPOINT.

In practical terms this means that you can tackle your antenna adjustments in two ways:

a) Make up a longish length of multiple half-wavelength cable for the frequency of interest and mount the antenna under test on a temporary support.
Connect all your measuring equipment on the feed side and finalize the antenna.
Then add the antenna to whatever systems you operate.

b) Alternatively ensure that the feedline to your mast is an exact multiple of half waves at the frequency of interest. Measurements down in the shack will now correctly indicate antenna behaviour.

How do we make up (multiple) half-wavelength cables? You can do this pretty accurately by first calculating the free-space wavelength of the frequency of interest. 145,000 MHz for the 2m band is a good choice as the various repeaters listen between 144,725 and 145,175. Thus a single ½ wavelength in free space is = ½.300/145 = 1035mm. Multiply this with the velocity factor of the cable (typically 65%) to get 673mm.

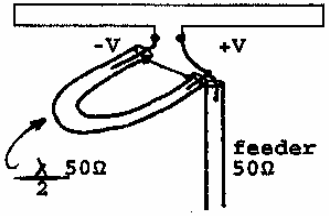
Alternatively if you own an MFJ 259 it can be done in a very illustrative way. Put a PL259 connector on one end of the cable and screw it onto the MFJ. Make up a shot-circuited female termination for a PL259. Cut the cable a bit longer than the number of ½ wavelengths you need. Strip the end and short the screen to the inner wire. Tune the MFJ around 145,000 MHz and check where the resistance meter dips to zero (yes, it sees the true load value at the feed end). As the cable was cut too long the frequency will be too low. Now up the frequency by shortening the end in cm steps (less when near freq) until you are about 200KHz too low.
Now put on a PL259 and screw it onto the shorted female you made.
The result should be very near 145,000 MHz for R = zero or a very low minimum. Note that any R reading larger than zero indicates cable loss and has nothing to do with the resonance condition that you are interested in.
At lower frequencies such as HF the lengths are of course larger and not any more critical to the nearest few mm.

Now physically measuring the cable length (PL259's pins half way) enables you to establish the true velocity factor of the cable you have used:

$$\text{Vel. factor} = \frac{\text{your total length in mm}}{\text{no of ½waves . 1035mm}} \times 100\%$$

2. A second practical example involves the elimination of TVI by 2m transmissions.
Adding a ¼wave shorted stub or a ¼wave open stub (see section 16) in parallel with the TV RF socket will place an effective short-circuit at the TV socket for say 145,000 MHz with sufficient bandwidth to cover most repeater input frequencies.

3. A third example is a low-cost 1:4 balun for use with a folded dipole (300Ω).
The end of the normal feeder connects to a ½wave section of similar cable as shown.
Due to the inverted but equal signal at -V, the dipole is thus fed in a balanced way.



After explaining to a student through various lessons and examples that:

$$\lim_{x \to 8} \frac{1}{x-8} = \infty$$

I tried to check if she really understood that, so I gave her a different example. This was the result:

$$\lim_{x \to 5} \frac{1}{x-5} = \text{in}$$

From the middle ages:

Houses had thatched roofs-thick straw-piled high, with no wood underneath. It was the only place for animals to get warm, so all the cats and other small animals (mice, bugs) lived in the roof When it rained it became slippery and sometimes the animals would slip and fall off the roof.
Hence the saying . It's raining cats and dogs.

There was nothing to stop things from falling into the house.. This posed a real problem in the bedroom where bugs and other droppings could mess up your nice clean bed. Hence, a bed with big posts and a sheet hung over the top afforded some protection. That's how canopy beds came into existence.

In England the local folks started running out of places to bury people. So they would dig up coffins and would take the bones to a bone-house, and reuse the grave. When reopening these coffins, 1 out of 25 coffins were found to have scratch marks on the inside and they realized they had been burying people alive. So they would tie a string on the wrist of the corpse, lead it through the offin and up through the ground and tie it to a bell. Someone would have to sit out in the graveyard all night (the graveyard shift.) to listen for the bell; thus, someone could be, 'saved by the bell' or was considered a 'dead ringer'..