# WATTS

12 - 2006
Year 76+12m

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


## Vlooimark -11 Nov.- Fleamarket

**binne-aansig met Johan ZS6JPL, Pieter ZR6AHT en Pierre ZS6PJH sigbaar in foto. Alle beskikbare handelaar-spasie was vol en 'n groot aantal besoekers het aankope gedoen.**


## In this issue



## In hierdie uitgawe



## Next Meeting

**6 Dec. 2006**
Time: 11:00

PMC Clubhouse,
Keuning str W
Silverton

# 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 1 Nov. 2006

**Welcome:** Johan ZS6JHB declared the meeting open and welcomed all who attended.
**Attendance:** The meeting was attendend by 17 members and 1 visitor, Vlasta sw of Ivan ZS6CCW.
**Apologies :** Apologies were received for Joe ZS6TB, Almero ZS6LDP, Hal ZS6WB, Pine ZS6OB, Nico ZR6VT and Don ZS6AQS .
**Personal Matters/Lief en leed:** Joe ZS6TB's pharmacy was robbed for the 3rd time. Solly ZS6SV underwent a triple bypass.
**Minutes of previous meeting:** The minutes of the previous meeting as published in Watts were approved . Proposed by Alf ZS6AB and seconded by Vitor ZS6VG.
**Matters arising from previous minutes:** None.

**Club Activities:**

**Rallies :** Johan ZS6JHB – Rally season has come to a end. Last event was the Toyota Dealer 400 off-road in Lydenburg. The mobile repeater was set up on Long Tom Pass and communications were excellent. Johan thanked everybody for their service during the year.
**Social:** Bring and braai – Sunday 12 November 2006 at PMC. Starting time 11:00.
**DF Hunt:** Richard ZS6UK – Next Foxhunt to be announced. Johan ZS6JHB was the fox on the two previous hunts and the hunters were unable to find him.
**Fleamarket:** Almero ZS6LDP - Next Fleamarket – 11 th November 2006 at premises of Pretoria Amateur Radio Club from 08:00. Tables available from Almero at R25.00 per table. Refreshments will be available – van Wyk family – hamburgers, Richard ZS6UK and Molly ZR6MOL – cold drinks.
**Financial Report.** – Richard ZR6CK reported on the club's finances.
**Technical:** Pine ZS6OB - Not available - Monday evenings from 20h00 on 145,725. Discuss technical issues.
**Club bulletin:** Repeat of bulletin on Monday evenings from 19:45
**Ham Dairy:** NOVEMBER.

| | |
|---|---|
| 05 – National Maritime Day. | 18-19 - SARL Field Day Contest 2nd leg. |
| 11 – Armistice Day. | 25-26 – CQWW CW DX Contest |
| 12 – Remembrance Sunday | 27 - Closing day for Field Day logs |
| 16 – RAE. | 30 – Closing date for nominations for council nominations and motions SARL AGM 2007 |

**General :** SARL HF Field day – Johan ZS6JHB – 3 stands available at Roodeplaat Dam from Friday 17 th November. Special rates for day visitors. Everybody welcome.
**Next meeting :** 6 December 2006.

# Editorial

The past year has been a busy one especially for our Rally Members and our Technical Team concerned with our repeater system. Thank you, you have shown true ham spirit in promoting public relations and improving our infrastructure. We wish all our members a pleasant festive season and happy holidays.

# Redaksioneel

Die afgelope jaar was besig, veral vir ons Tydren Span en ons Tegniese Span betrokke met ons herhaler stelsel. Dankie, julle het 'n ware Amateur-gees laat blyk deur om openbare betrekkinge en ons infrastruktuur te verbeter. 'n Aangename feestyd en vakansie word almal toegewens.

## Birthdays Des
## Verjaarsdae

02 Antoinette ZS6D, sw of Danny ZS6AW
04 Wynand, seun van Wynand ZS6ARF
05 Hanlie, dogter van Susan en Freddie ZS6JC
06 Sylvia, lv van Tjerk ZS6P
07 Hansie ZS6AIK
08 Hans ZS6KR
08 Magda ZS6MVW, sw van Pieter ZS6PVW
10 Arland ZR6KWV, son of Heila and Melvyn ZS5MF
15 Almero ZS6LDP
17 Dominic, seun van Adele en Hans ZS6HVG
21 Retha, sw of Roy ZS6XN
22 Johan ZR6JO
22 Steven, son of Mary and Bill ZS6KO
23 Niel ZR6AUK, son of Marieta and Roy ZS6MI
25 Annemarie, sw of Bernie ZS6ANU
25 Chrissy ZS6JX, sw of Dave ZS6JW
28 Allan ZS6AVC, son of Frances ZR6AUT
29 Ricky, son of Rita and Vitor ZS6VT
30 Rika, sw of Errol ZR6VDR
31 Henk ZS6CS

## Dec Anniversaries
## Herdenkings

01 Elize en Pieter ZR6AHT (22)
11 Petro en Gert ZS6ZB ( )
12 Mary and Bill ZS6KO (55)
17 Leanne and Allan ZS6AVC (12)
22 Rita and Vitor ZS6VG
29 Molly ZR6MOL and Richard ZS6UK (30)

# A Blessed Christmas

It is difficult at the time of writing to realize that the Festive Season is soon upon us. The January issue of Watts will probably appear after Christmas. **The Management Team of PARC will now take the opportunity to wish you and your loved ones a Blessed Christmas and Happy New Year.** May there be new inspiration for the future through the Message and real meaning of Christmas for all. We also wish our Jewish members a happy **Chanukah.**

# 'n Geseënde Kersfees

Dit is moeilik om nou ten tye van hierdie skrywe te besef te dat die Feesgety alreeds baie naby is. Die Januarie uitgawe van WATTS sal waarskynlik eers na Kersfees verskyn. **Die Bestuurspan van PARK wil nou van hierdie geleentheid gebruik maak om u en u geliefdes 'n geseënde Kersfees en Gelukkige Nuwe Jaar toe te wens.** Mag daar nuwe inspirasie vir die toekoms deur die Boodskap en ware betekenis van Kersfees vir u almal wees.

## Snippets | Brokkies

- **This 10-page issue of WATTS is only 650k in .pdf**

**Geluk Suzette!** **Suzette, die jongste dogter van Pieter ZS6PVW en Magda ZS6MVW het by haar skool se prysuitdeling die kalklig gehad. Sy het die volgende toekennings ontvang (en sluit dan ook haar laerskool loopbaan met die hoogtepunt af)**

**Tien sertifikate vir:**
**Besondere prestasie in Afrikaans, Engels, Wiskunde, Natuurwetenskap, Tegnologie, Geskiedenis, Bedryfsekonomie, Kuns en Kultuur, Lewens-oriëntering en Algemene Voortrefklike Prestasie.**

**Ontvang ook sertifikate vir:**
**Onderhoofmeisie, CSV – Leier, TOP 10.**

**Ontvang Trofeë vir die volgende:**
**Beste Leerder in Graad 7, Beste Akademiese Prestasie in graad vir 5 jaar, Trofee vir Onderhoofmeisie.**

**Ontvang Trofeë vir die Beste Akademiese Prestasie in Graad 7 vir Afrikaans, Engels, Wiskunde, Natuur-wetenskap, Tegnologie, Geskiedenis, Bedryfsekonomie. Sy het ook 11 Medaljes ontvang vir bogenoemde.**

## Snippets (cont'd) | Brokkies (vervolg)

- For several weeks Nico ZR6VT and Craig ZS6RH have relayed the Youth Net to our repeaters and HF on Thursdays 18:00. Listen to the excellent effort of Youth Net and report in afterwards to show your support. Dit sal waardeer word as van ons lede kan luister en rapporte gee om ondersteuning te toon. Die bronuitsending is op 3650kHz met:
  40m herleiding op 7066kHz
  20m herleiding op 14235kHz
  2m herleiding op 145.725MHz
  70cm herleiding op 438.825 MHz
- On Sunday mornings Nico and Craig also relay HQ and Club bulletins on 438.825, 51.4 and 14.235MHz.
- Stan ZS6SDZ has changed his HF set to a Kenwood TS570S – enjoy it Stan.
- **Have you designed constructed anything during this year? At our December meeting the HF and VHF Constructors' Trophies will be up for grabs. Bring your hardware along for others to see. How about going for the Desert Island Trophy? The best yarn gets the plaque.**
- At roughly this time 10 years ago we opted for Club status and became the PARC; ex PTA Branch of the SARL.
- Hal ZS6WB has just worked DXCC country #40 on 2m EME
- The Toyota-Tzaneen rally held in October was successfully assisted by many PARC members. It was rough and tough for many participants and only 15 drivers finished out of 56 starters. The pictures below were submitted to WATTS:

**It's not all hard work. Craig ZS6RH (rear) and two other marshals in relaxed mode.**

**Below: Jan Habig.** **Right: Serge Damseaux (winner)**

## New Members | Nuwe lede

We welcome Ivo Chladek ZS6AXT and also Trevor Mooi who yet has to get a call sign. May your association be a pleasant one.

## PARC Diary | Dagboek

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Dec** | 09-10 | PEARS HF QSO Party | 15 | Russian 160m Contest | 16-17 | Croatian CW Contest |
| | 09-10 | ARRL 10m Contest | 16 | Day of Reconciliation | 16-17 | Intern. Naval Contest |
| | 15 | NARC closed | 16 | OK DX RTTY Contest | 25-26 | Xmas Day – Day of Goodwill |

## Sick Parade | Krukkelys

- Padlangs gehoor dat Hubert ZS6HVM kortliks in die hospitaal was.
- Suzette, dogter van Pieter ZS6PVW en Magda ZS6MVW sal Januarie 'n operasie ondergaan.
- Sollie ZS6SV het 'n driedubbele hartomlyning ondergaan – sterkte ou Sollie.
- Bernie ZS6ANU recently suffered a light stroke but aparently recovered well.
- Jac ZS6QA went in on 21 Nov. for a hip replacement.

# Long Term HF Propagation Prediction for Dec. 2006

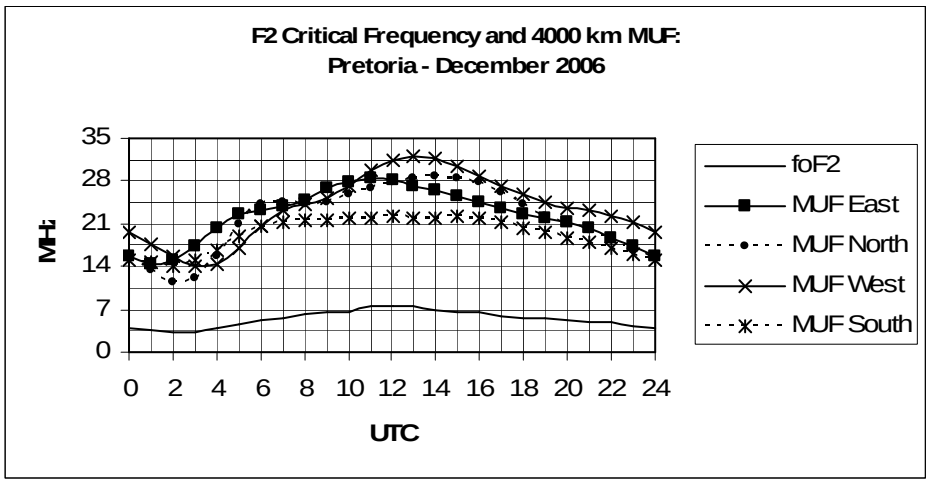
**Vince ZS6BTY**

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.

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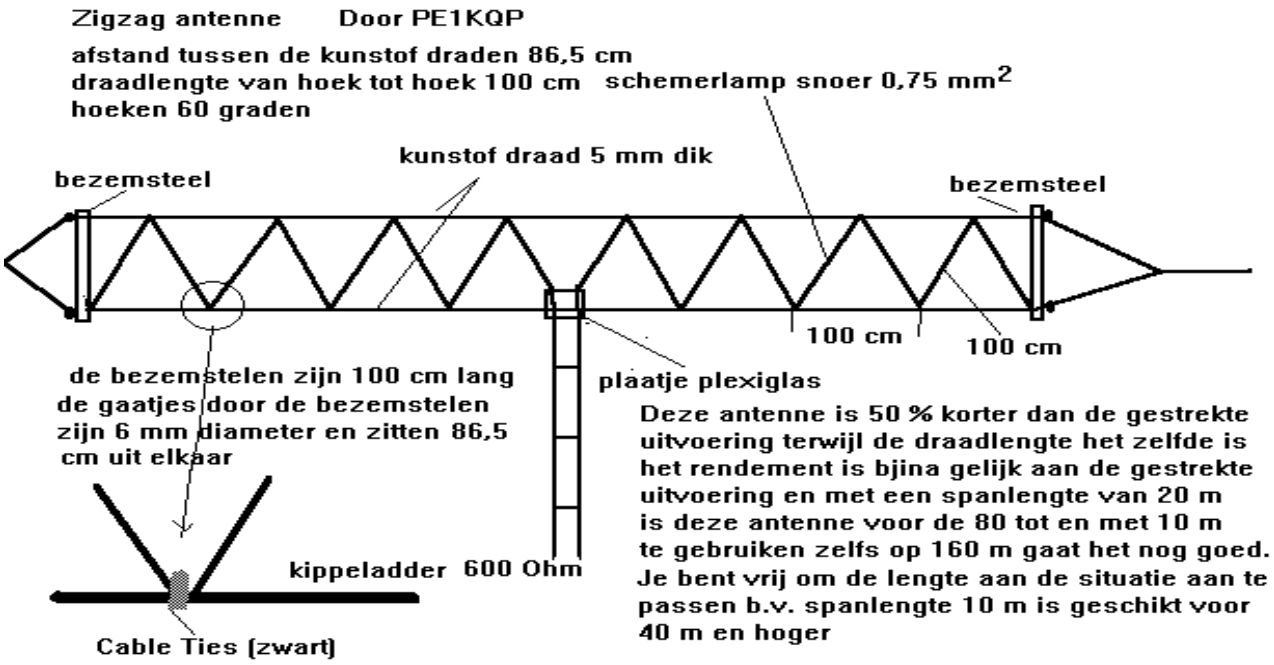

## SARL Field Day 18-19 Nov - it was the ideal contest weekend to catch all types of colds and flu..

**Ivan ZS6CCW made a mean Czechoslovak 'potjiekos' on Saturday evening and that got everyone motivated to stay..**

**ZS6CCW antenna erected at Roodeplaat Dam and Jaco ZR6JLL, one of our multi-ops, with Johan ZR6JHB logging**

**Molly ZR6MOL, Marieza en Marelese van Pierre ZS6PJH**

**Dit was die algemene vorm van die slaapgeriewe!**

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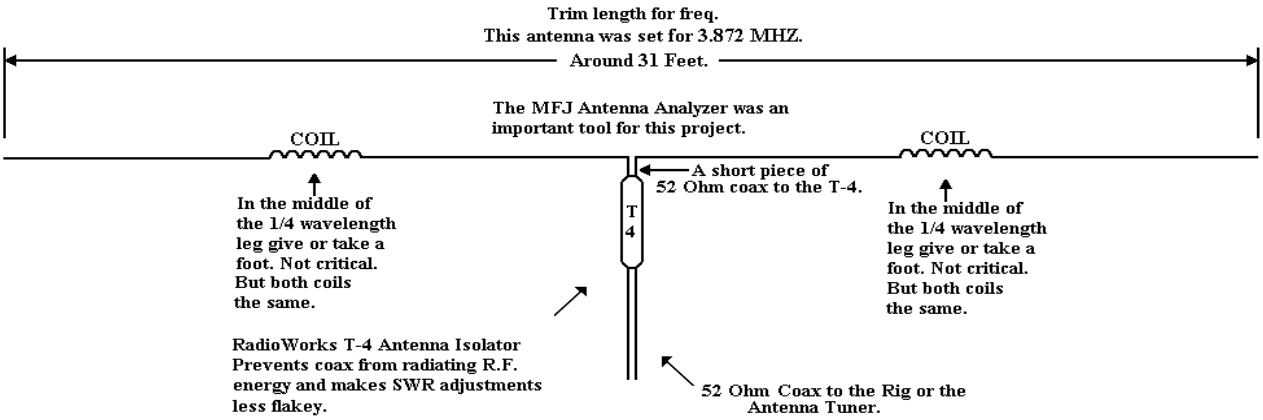
COIL parameters: Coil forms are PVC pipes, 3-1/2 inch in diameter and 8 inches long. The coil is wound 7 Inches long. Use stainless steel hardware with wing nuts to secure to the antenna wires. 42 turns of #14 Solid Tinned Copper were used. A 100 foot spool will supply you for two coils. 6 turns per inch. I used some old nylon lacing cord to help me control the spacing. Wrapped coils first and then spread them evenly by wrapping the lacing cord between the windings from one end to the next. Put down two layers of lacing cord. You may have other ideas like drilling pairs of holes here and there and using tie wraps to spot secure the wire. These coils were based on a design by WB2CLN, Tom. The ARRL Antenna Software for mobile center loaded verticals can be useful (MOBILE.EXE).

## Shortened 80m Antenna

By means of inductive loading - (devised by Rick, K1WRYH)

When I started out with this idea, I used 40 Meter Hamsticks for the coils. When I heard W4DOG, Larry, charging full blast on 3.933, I had to adjust the SWR from 3.872 with the antenna tuner. He hardly heard me and I had to give my call a number of times for him to get it. When I changed the coils, and heard him charging in the next time, he said I was 20db over S9. This antenna works well!



# SOLDERING TIPS FOR LEAD-FREE SOLDERING

**Information supplied by Weller. Extract from *Quantum* Sept. 2006**

***A soldering tip has two major tasks. The first is to transfer thermal energy at lowest possible loss, and the second is to spread the solder on the joint in combination with flux. Due to physical considerations, the tip wears down sooner or later. The major tasks should thus be performed in a way to improve tip life, in order to reduce costs.***

Soldering is based on the ability of different metals to dissolve or diffuse into each other and to cause an electrical connection at lowest resistance and good mechanical fixing. Flux is used to dissolve the metal-oxygen layers on the surface of different metals being connected, and so improves joining of the metals.

To improve thermal conductivity, a soldering tip consists of a Copper core. Silver would be better, but is much more expensive. The wettability of copper with solder tin is extremely good, which means the solubility of copper in solder tin is extremely high, causing the tip to wear down quickly. The tip must be wettable to properly carry the heat and the tin to the soldering joint. Iron is also wettable with tin, but the solubility is far less.

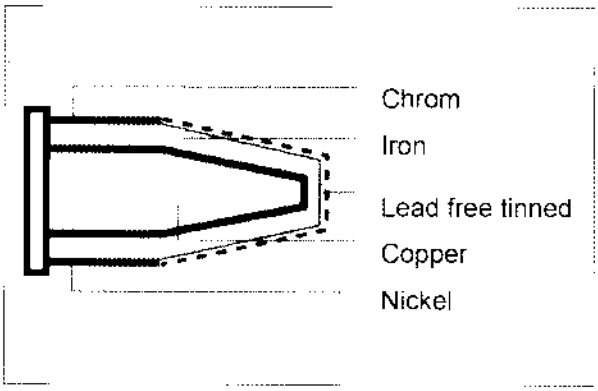



*Figure 1: Soldering tip for lead-free soldering*

Unfortunately iron has a very low thermal conductivity that adversely affects the thermal flow. The thicker the iron layer, the lower the heat transfer from the tip towards the soldering joint. The thinner the iron layer, the shorter the lifetime of the tip, due to the solubility of iron in tin. Using materials that are not soluble in tin cause a non-wettable tip and bad solder results.

## Heating a soldering tip to high temperatures.

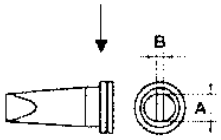
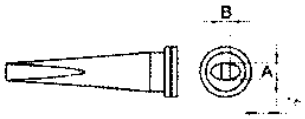
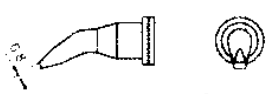
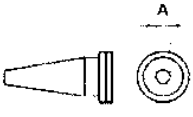
The solubility of iron (with tin) increases with rising tip temperature. Thus the mechanical resistance of the tip's iron layer will also be reduced. When soldering, the tip is somehow always touching some part of the component and is in contact with the aggressive tin. With lead free soldering, the content of tin in the solder is increased by 35%, which results in 35% more aggressiveness of the solder towards the iron layer, simply causing tip life reduction.

Standard tips now have an average iron layer of 200µm depending on the geometrical form. The new LF tips carry an optimized layer of twice as much iron. More iron would cause lower heat transfer and obstruct the soldering process. Influence of the temperature on the lifetime of the tip can be seen in *Figure 1*.

A general recommendation is using a tip as large as possible (See *Table 1*) and, if necessary, to improve the process by a thinner solder-wire. For lead free solder the adjusted soldering temperature at the station should be in the range of 340 – 360°C, depending on the geometry of the tip. For further improvement of tip life, suitable stands should be used. **Q**

**For more information please contact Testerion (Pty) Ltd.**

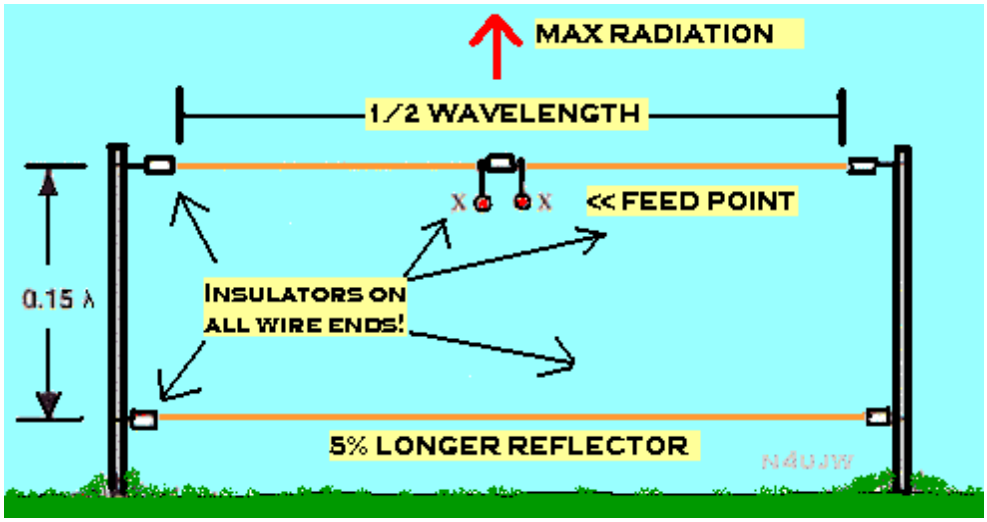
**Vangeli Glyptos (011) 704 3020**

| Description | LF-Tip mark | Width A | Thickn. B | Model | Order No. |
|---|---|---|---|---|---|
| Chisel tip |  | 1,6 mm | 0,7 mm | LT ALF | 005 44 470 00 |
| | | 2,4 mm | 0,8 mm | LT BLF | 005 44 446 00 |
| | | 3,2 mm | 0,8 mm | LT CLF | 005 44 447 00 |
| | | 4,6 mm | 0,8 mm | LT DLF | 005 44 448 00 |
| Long chisel tip |  | 2,0 mm | 1,0 mm | LT LLF | 005 44 476 00 |
| | | 3,2 mm | 1,2 mm | LT MLF | 005 44 477 00 |
| Chisel bent |  | 1,6 mm | - | LT AXLF | 005 44 480 00 |
| | | 3,2 mm | - | LT MXLF | 005 44 469 00 |
| Round tip |  | 0,6 mm | - | LT TLF | 005 44 428 00 |
| | | 0,8 mm | - | LT OLF | 005 44 481 00 |
| | | 1,6 mm | - | LT ASLF | 005 44 471 00 |
| | | 3,2 mm | - | LT CSLF | 005 44 474 00 |

**Some lead-free tips from the Weller LT range**

# THE CLOUD WARMER NVIS BEAM

**AIM FOR THE CLOUDS .....FOR BETTER "LOCAL" SIGNALS!**
**AN NVIS STYLE ANTENNA FOR BETTER "LOCAL" AREA COVERAGE ON HF**




**THERE IS NOTHING SPECIAL ABOUT THIS ANTENNA CONSTRUCTION OTHER THAN THE ADDED REFLECTOR AT THE BASE OF THE DIRECTOR (DIPOLE)!**
**THIS IS NOT A DX ANTENNA!**

**Recent experimentation by Pat Lambert, W0IPL and others conclude the distance from the antenna and the ground can be lowered considerably with much better results:**
**"While 1/8th wave works reasonably well, better coverage is obtained if the antenna is mounted at about 1/20th wavelength above ground. A second advantage of lowering the antenna to near 1/20th wavelength is a lowering of the background noise level. At a recent S.E.T. communication on 75 Meters was started with a dipole at approximately 30 feet. We found communication with some of the other participants to be difficult. A second 1//2 wave dipole was built and mounted at 8 feet off of the ground. The background noise level went from S7 to S3 and back when we switched back the antennas, plus communications with stations in the twenty-five and over mile range were greatly enhanced."**

## About NVIS antennas.

### HF NVIS COMMUNICATIONS (Edited from U.S.Military training documents)

NVIS propagation is simply sky wave propagation that uses antennas with high-angle radiation and low operating frequencies. Just as the proper selection of antennas can increase the reliability of a long-range circuit, short-range communications also require proper antenna selection. NVIS propagation is one more weapon in the communicator's arsenal.
NVIS propagation uses high take-off angle (60° to 90°) antennas to radiate the signal almost straight up. The signal is then reflected from the ionosphere and returns to Earth in a circular pattern all around the transmitter. Because of the near-vertical radiation angle, there is no skip zone. Communications are continuous out to several hundred miles from the transmitter.

The nearly vertical angle of radiation also means that lower frequencies must be used. Generally, NVIS propagation uses frequencies up to 8 MHz. The steep up and down propagation of the signal gives the operator the ability to communicate over nearby ridge lines, mountains, and dense vegetation. A valley location may give the operator terrain shielding from hostile intercept and also protect the circuit from ground wave and long-range sky wave interference. Antennas used for NVIS propagation need good high take-off angle radiation with very little ground wave radiation.

**EXPERIMENT! EXPERIMENT! EXPERIMENT!**

## LET'S GO COMPLEX (part VIII)

Hans ZS6KR

### 14 ROUNDING OFF THE THEORY

For completeness and further insight as to what really takes place when a lossless line is mismatched with non resonant antennas or complex loads, we can expand equation [39] as folows:

$$\Gamma = \frac{Vr\text{-}.e^{-j\beta y}}{Vr\text{+}.e^{+j\beta y}} = \frac{Vr\text{-}\ \angle -\beta y}{Vr\text{+}\ \angle +\beta y}$$

Specifically at any voltage maximum the phase angles for the incident and reflected waves must be the same but not necessarily the amplitudes.
The above can thus further be reduced to:

$$\Gamma\angle\sigma = \frac{Vr\text{-}}{Vr\text{+}}\ \angle -2\beta y$$

If the above angle is equated to the angle σr found from equation [40] then the distance y from the termination Zr will be the position of the FIRST voltage maximum from Zr.

$$\text{Thus y to first maximum} = \frac{\sigma r(\text{deg})}{2\beta(\text{deg/m})} = \frac{\sigma r.\lambda}{720^\circ} \quad \ldots\ [43]$$

EXAMPLE
A 50Ω line is terminated in an antenna of 20Ω radiation resistance and 20Ω inductive reactance (Zr=20+j20).
Calculate the SWR and the position of the first maximum and minimum from the load.

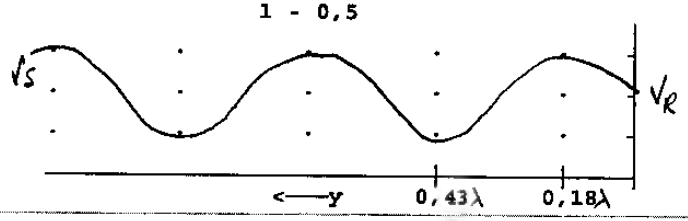
$$\text{from [40]} \qquad \Gamma r = \frac{20+j20-50}{20+j20+50} = \frac{-3+j2}{7+j2} = -0{,}32+j0{,}38$$

$$|\Gamma r| = 0{,}5\angle 130^\circ$$

$$\text{from [43]} \qquad y = \frac{130.\lambda}{720} = 0{,}18\lambda \longrightarrow$$

The first minimum is 0,25λ further back at y = 0,43λ ——>

$$\text{from [42]} \qquad VSWR = \frac{1 + 0{,}5}{1 - 0{,}5} = 3 \longrightarrow$$

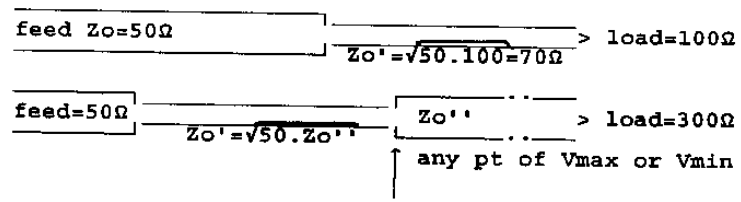



### 15 QUARTER WAVE TRANSFORMERS

In section 13.1 it was shown that over ¼ wavelength the phase changes 90° and an impedance transformation takes place according to Zo.SWR <—> Zo/SWR (high <—> low).

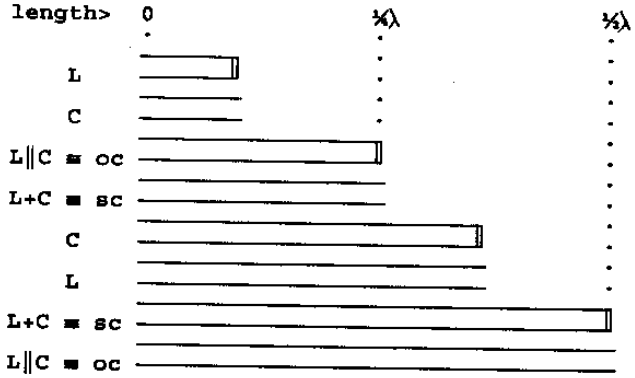
From [35] (with ßy = 90°) $Zin = \frac{Zo.Zo}{Zr}$ or, impedance of the ¼-wave section is $Zo' = \sqrt{Zin.Zr}$ ..... [43]

Some useful applications are shown below. These methods are of course frequency sensitive.



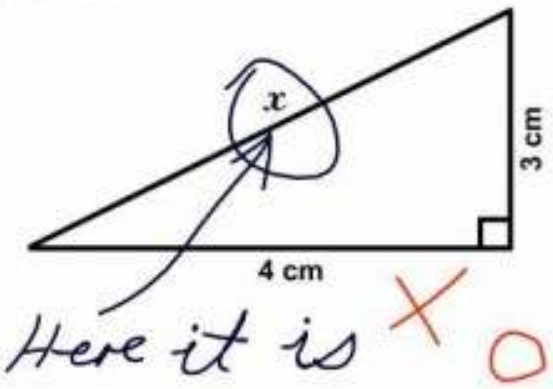

### 16. OPEN AND SHORTED LINES ( STUBS )

In equations [36]-[37] we can take the angle ßy from 0° to 180° and find that short lines can act like inductors or capacitors and, as we know, as resonant circuits.
Without going into the actual derivations, all possible cases are illustrated below:




Stubs that exhibit L or C can be placed at a strategic point on a mismatched feedline where the impedance happens to be Zo±jX. A stub with the opposite jX then cancels the reactance and makes the line purely resistive at that point; effecting a perfect match to the source.

**3. Find x.**




## MY ROTARY BEAM

My rotary beam is a scream,
I built it strong and high from the ground,
The birds they use it for a merry-go-round,
That's my rotary beam.

Oh, my rotary beam is a scream,
It swings in the air just like an old sack,
I get 10 DB off the front, and 40 off the back,
That's my rotary beam.

Oh, my rotary beam is a scream,
I call CQ Siam, what do I get? Some local Ham,
On my rotary beam.

J. WALTER ASHTON, W8PHJ.

**From the middle ages:**
Lead cups were used to drink ale or whisky. The combination would sometimes knock them out for a couple of days. Someone walking along the road would take them for dead and prepare them for burial. They were laid out on the kitchen table for a couple of days and the family would gather around and eat and drink and wait and see if they would wake up. Hence the custom of holding a wake.
People with money had plates made of pewter. Food with high acid content caused some of the lead to leach onto the food, causing lead poisoning death This happened most often with tomatoes, so for the next 400 years or so, tomatoes were considered poisonous.