Bouw van de K2 #05618

Bringing the fun of building back to Ham Radio.

Agenda

- 08:00 Presentatie
- 09:00 Pauze
- 09:05 Demonstratie

Voorstellen….

- Koert Wilmink
  - NL8315 1981
  - PD0OFS 1983
  - PE1KRF 1984
  - PA3HCH 1996
  - PA1KW 2003

K2 #05618

Waarom zelfbouw?

- Leer effect
- Fun
- Therapie ☺
- Prijs kwaliteits verhouding

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De K2 Transceiver

- **Eigenschappen:**

  Erg leuk om mee te werken…!

  – Zeer goede ontvanger
  (3rd Order dyn range= 99dB; IP2 = +77dBm;
  Blocking Dynamic Range = 133db; Low Phase Noise)

  – Bijna geen bedrading; modulair opgebouwd

  – Geen SMD; normale componenten.

  – Weinig stroom gebruik ideaal voor mobiel gebruik maar ook zeer goed als basis station te gebruiken met de KPA100.

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De K2 Transceiver

- 160-10 meters; PLL synthesized
- CW en SSB/CW (SSB upgrade)
- Down conversion to low IF (4.915MHz)
  - Best trade-off of cost / complexity
  - IF derived AGC, Variable B/W CW crystal filter
- 10W PEP (100W optie)

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De K2 Transceiver

- CW Full Break-in; Diode Switched TX/RX
- Memory Keyer met Iambic A & B *(9 memories)*
- ‘”smart” CW signal scanning
- 120ma Low Current RX Mode
- Built in Test: Freq. Counter, Volt/Amp Meters
- Self Calibration Firmware

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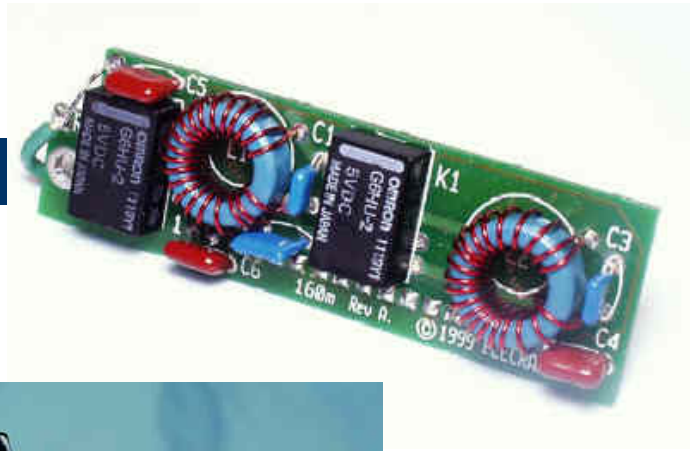
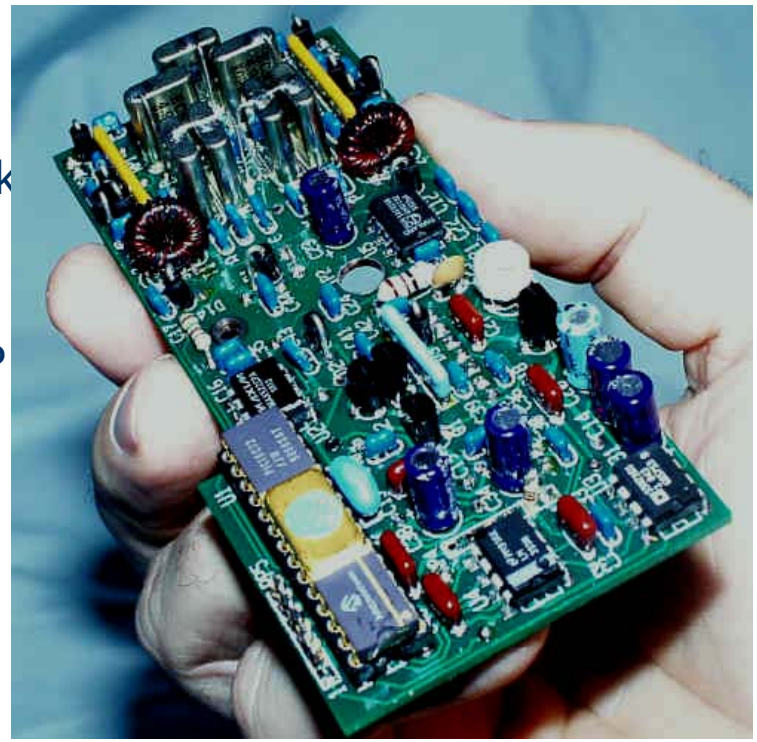
K2 opties



- SSB *(7 pole SSB filter; speech compressor)*
- Interne Auto Tuner
- 160M / 2nd RX Antenna
- Audio Filter/Real Time Clock
- Noise Blanker
- Internal 2.9 AH Battery DSP
- Externe Auto Tuner
- Transverters



K2 Receiver Performance Comparisons

Microsoft Excel Worksheet

Note: Source ARRL

MDS = Minimum Discernible Signal (3db increase above noise floor). Larger negative numbers are generally better, but too much sensitivity can reduce strong signal dynamic range and Ip3. Pre-Amp On MDS numbers of -134dBm or more ar`e more than adequate for most HF band operating, since band noise is typically above this number. *(Lower frequencies need less MDS (more +number) due to an increase in atmospheric noise.)*

BDR = Blocking Dynamic Range This test shows when the receiver's sensitivity begins to drop in the presence of strong near by signals. (Desense). A Pre-Amp OFF BDR of greater than 120dBm is good. Greater than 130dBm is considered excellent.

IMDDR3 = 2 tone 3rd order Two tone IMD Dynamic Range. This test shows how the RX performs in the presence of multiple strong nearby signals in relation to its sensitivity (MDS). Higher is better. Pre-Amp Off IMDDR3 numbers of +95dBm or more are considered excellent.

Ip3 = 2 tone 3rd order Intercept Point. This test also shows how the RX performs in the presence of multiple strong nearby signals. Higher is better. Pre-Amp OFF IP3 numbers of +15dBm are good, and +20dBm or more is excellent. *Note: Low RX sensitivity can also artificially increase the measured Ip3.*

Ip2 = 2 tone (8.020MHz, 6.000MHz) 2nd order Intercept Point This test shows how the RX performs in the presence of multiple strong out of band signals (such as broadcast signals on 6Mhz and 8Mhz creating birdies at 14Mhz). Higher is better. A Pre-Amp OFF IP2 of +55dBm is OK, and +70dBm or more is considered excellent.

Phase Noise = value read from ARRL test graph at +10 kHz from the carrier. Numbers are for the worst case band. Larger negative numbers are better. Bad phase noise contributes to poor RX Blocking Dynamic Range (desense from nearby signals.) Good values are -120 dBc or better at +10 kHz. See the actual ARRL phase noise plots in each review for details of other spurious phase noise components.

K2 Prijzen

- K2 HF Transceiver (CW)…. $599.00
- SSB Option …….. $ 99.00
- 160M / 2nd RX Ant. ……. $ 39.00
- KPA100 100W & Serial IO.. $389.00
- KDSP2…….. $229.00

HTTP://WWW.ELECRAFT.COM

K2 Prijzen

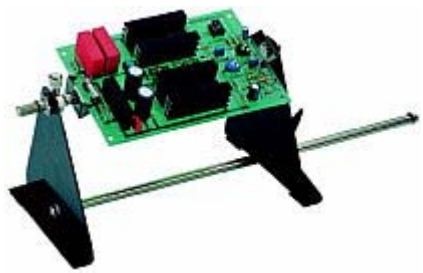
- K2 HF Transceiver (CW)…. $599.00
- SSB Option …….. $ 99.00
- Dayton Special (Discount) $ 50.00 -
- Transport…… $ 60.00 **$708,00**
  - Euro’s € 553,00
  - Recht bij invoer € 19,87
  - BTW bij Invoer € 108,49
  - Inklaringskosten €15,00 **€696,36**

K2 Prijzen

- KPA100 & Serial I/O…… $389.00
- 160M /2nd RX Antenna…... $ 39.00
- Transport…… $ 30.84 **$458,84**
  - Euro's € 356,67
  - Recht bij invoer € 10,44
  - BTW bij Invoer € 68,10
  - Inklaringskosten €16,75 **€451,96**

Gereedschap

- Platbek tangetje
- Knip tangetje
- Pincet
- Schuifmaat
- Soldeerbout
  - Tin!!! Niet alle type geschikt.
    - Zie Elecraft Website
- Loupe 8x
- Printplaat montage houder

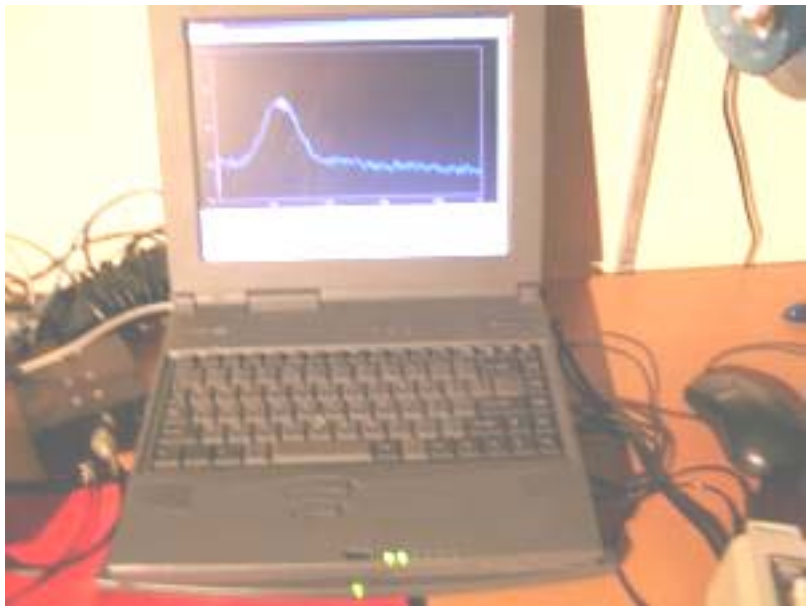


Meetapparatuur

- Universeelmeter
- LC Meter
- Frequentieteller
- Voeding

Meetapparatuur (2)

- Spectrogram (afregelen if filters)
- Computer met geluidskaart

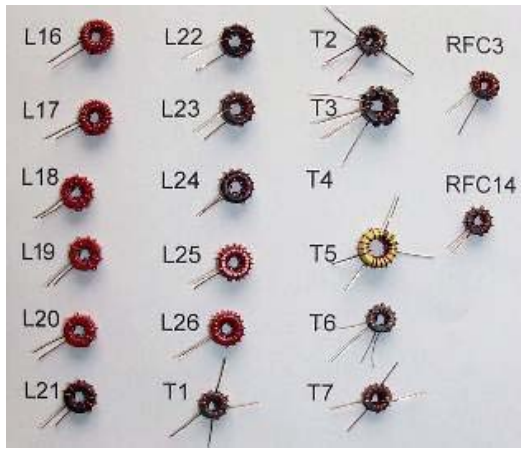


Electro Static Discharge (ESD)

- Door potentiaal verschil ontstaat ontlading
- Gevolg: mogelijk defecte componenten

De bouw

- Front panel
  - Schakelaars, Microfoon en koptelefoon plug; LCD display en S-meter bar graph
- Control board
  - main microcomputer, voltage regulators, AGC circuit en audio amplifier
- RF Board
  - synthesizer, receiver en transmitter circuits
- Enorm veel C's en R's (150 elk)
- Wikkelen spoelen (19)
- 60 uur



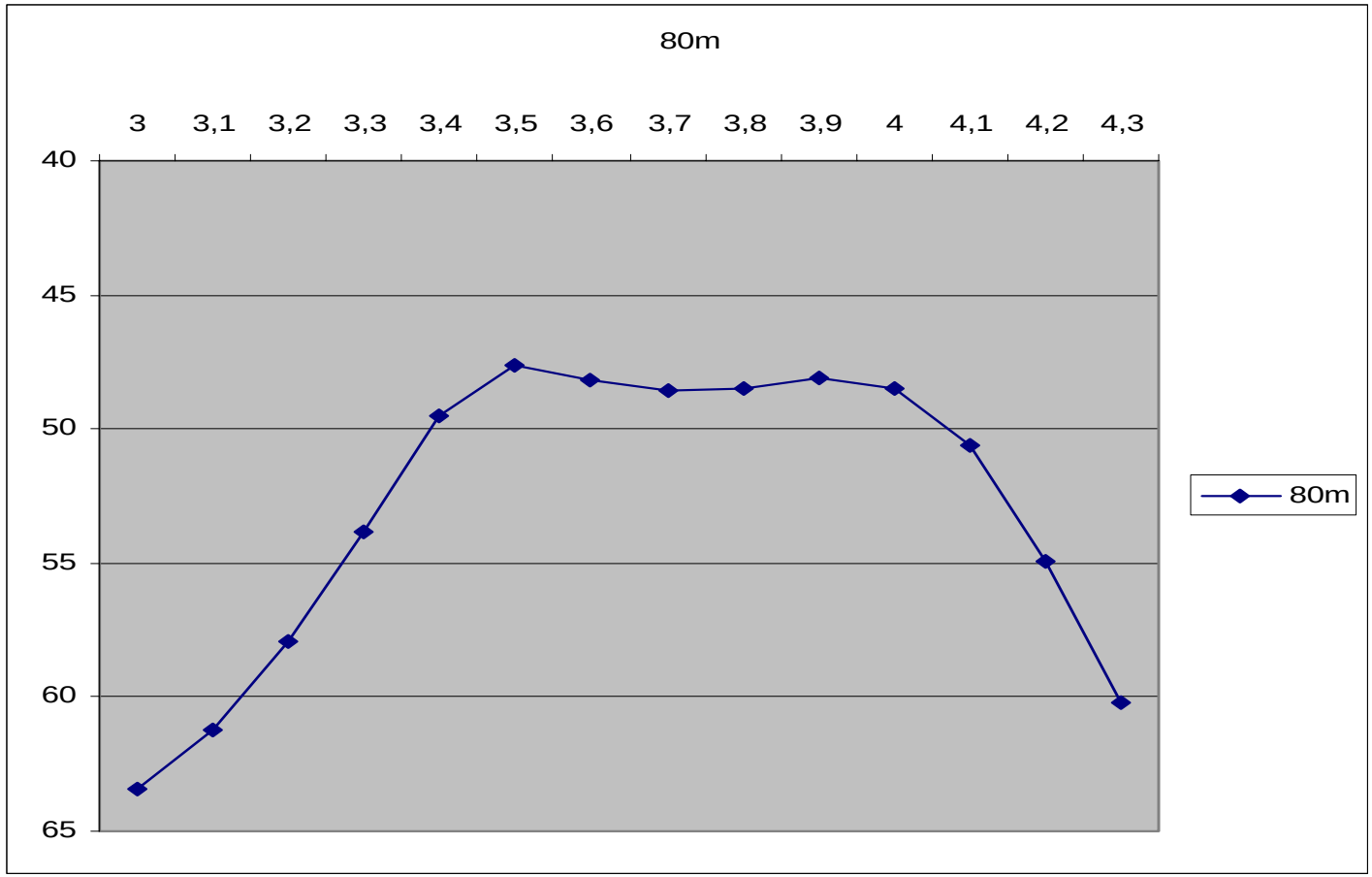
RF Filter meet opstelling

- Signaal Generator
- Spectrum Analyser
- Microsoft Excel ☺

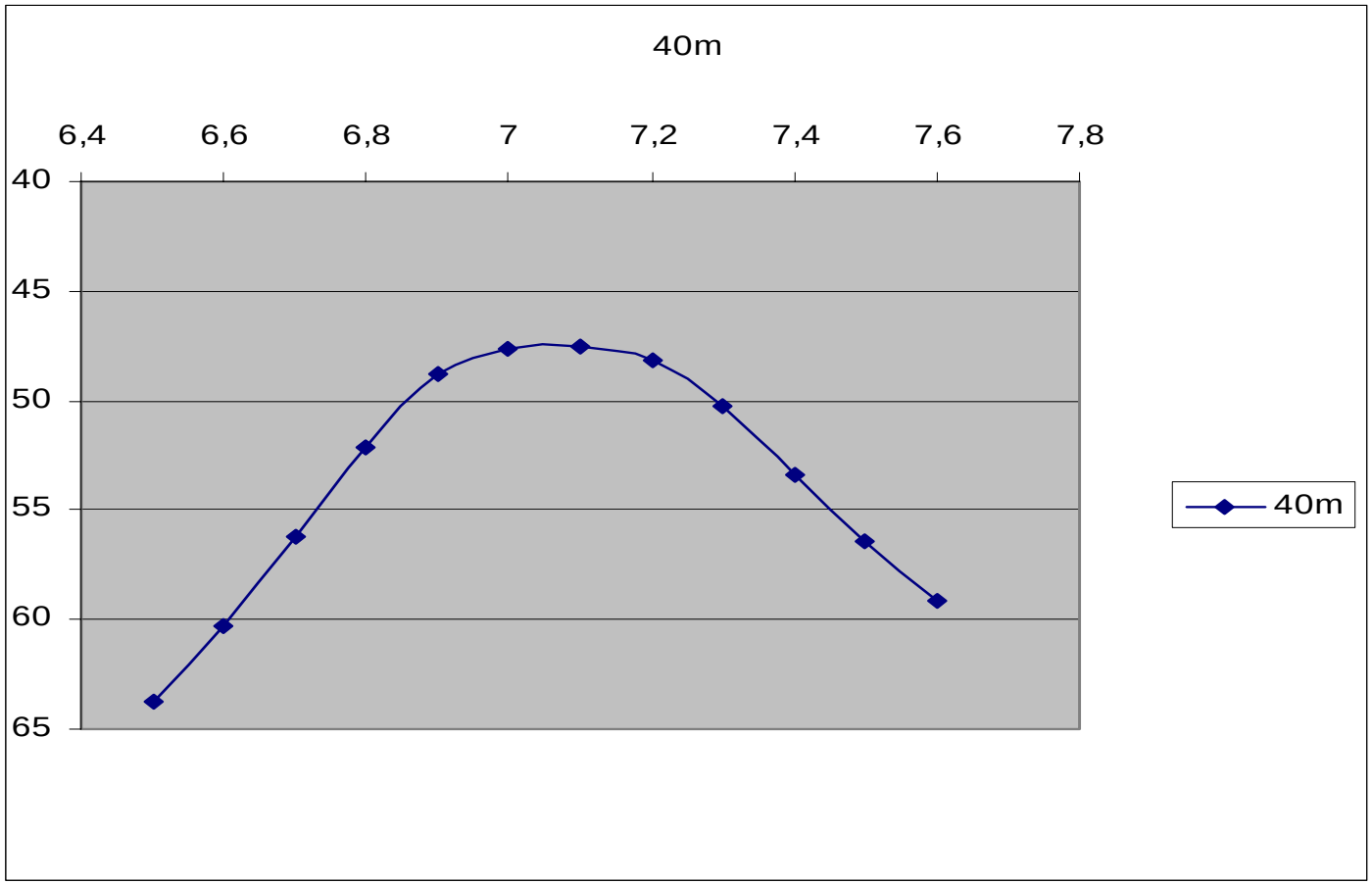
Controle van standaard afregeling in Manual

  - Standaard afregelen is maximaal signaal en maximaal vermogen.

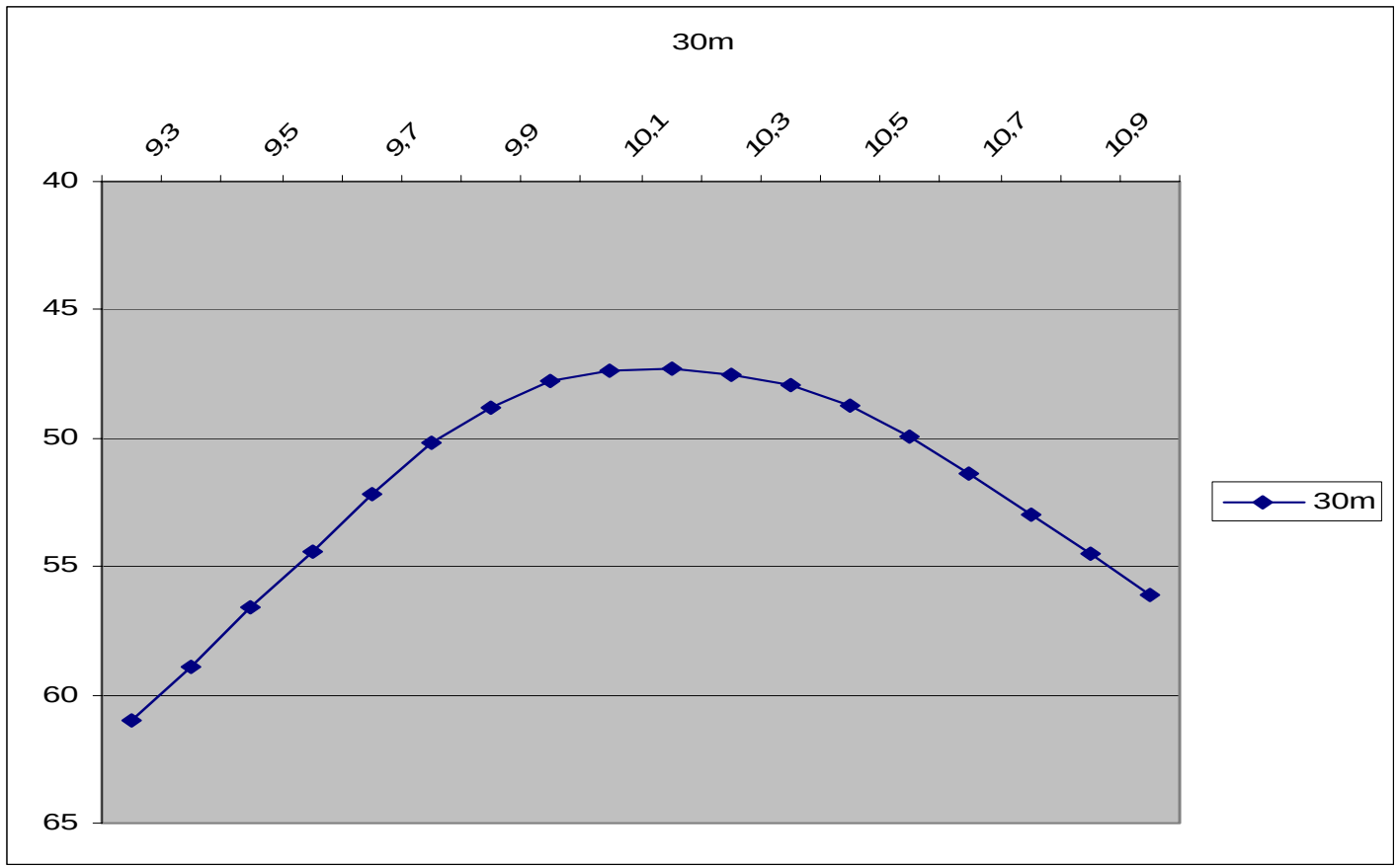
RF Filter meeting 80m



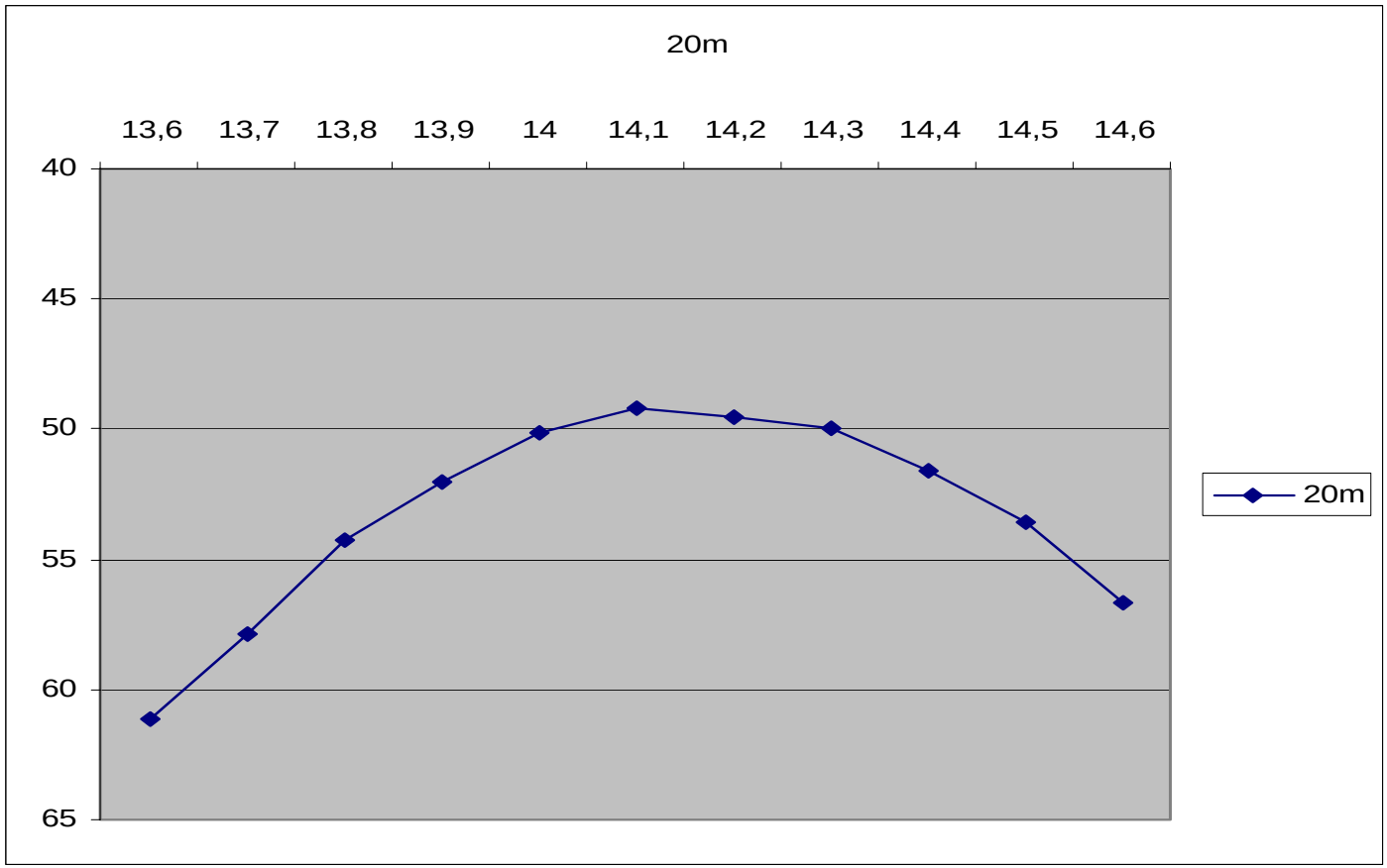
RF Filter meeting 40m



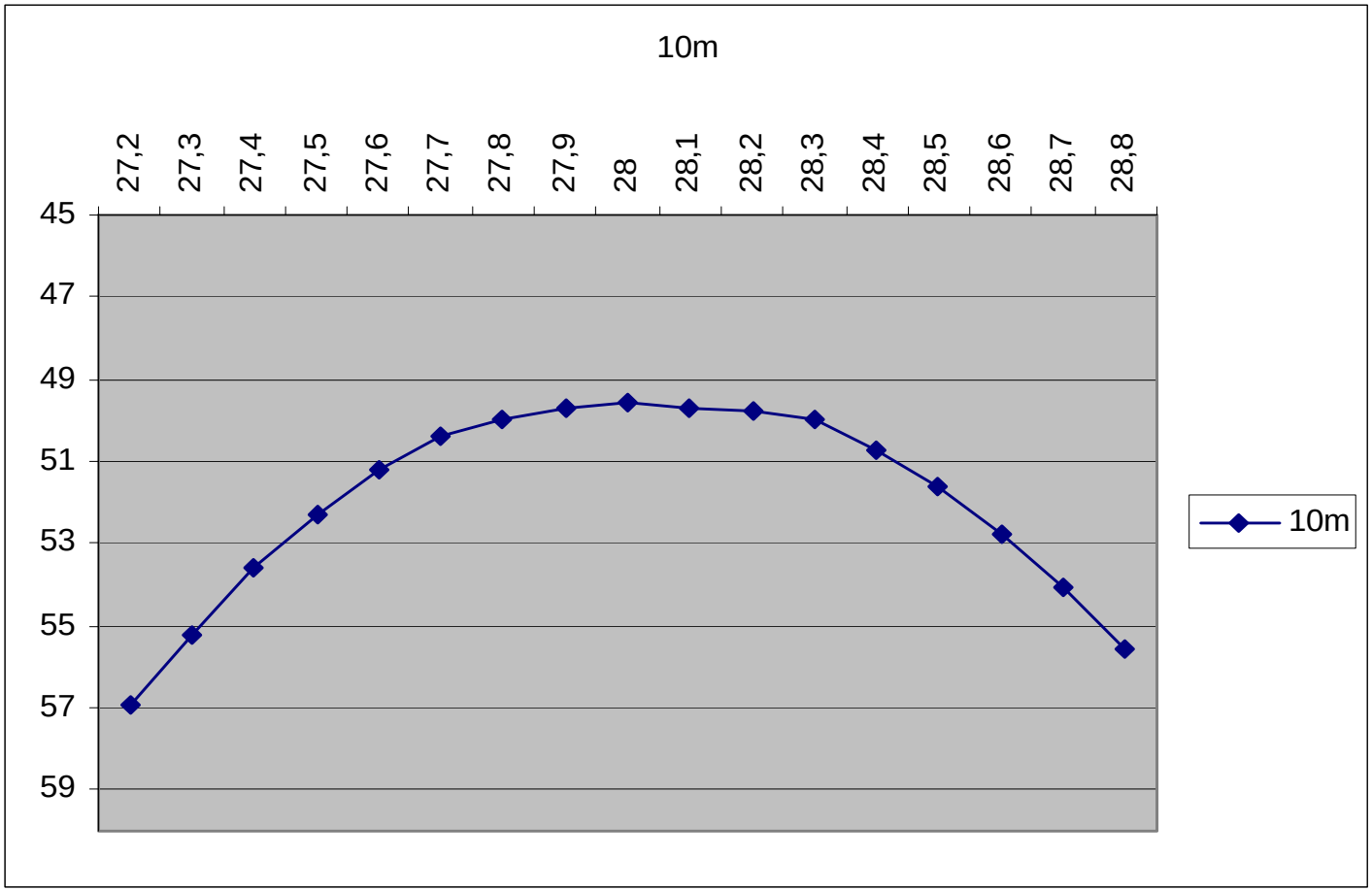
RF Filter meeting 30m



RF Filter meeting 20m

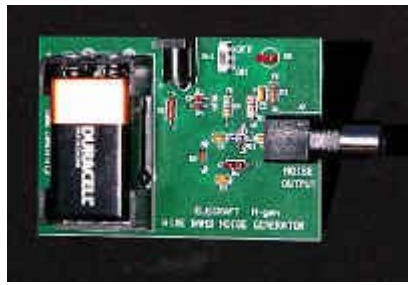


RF Filter meeting 10m



MF Filter afregelen

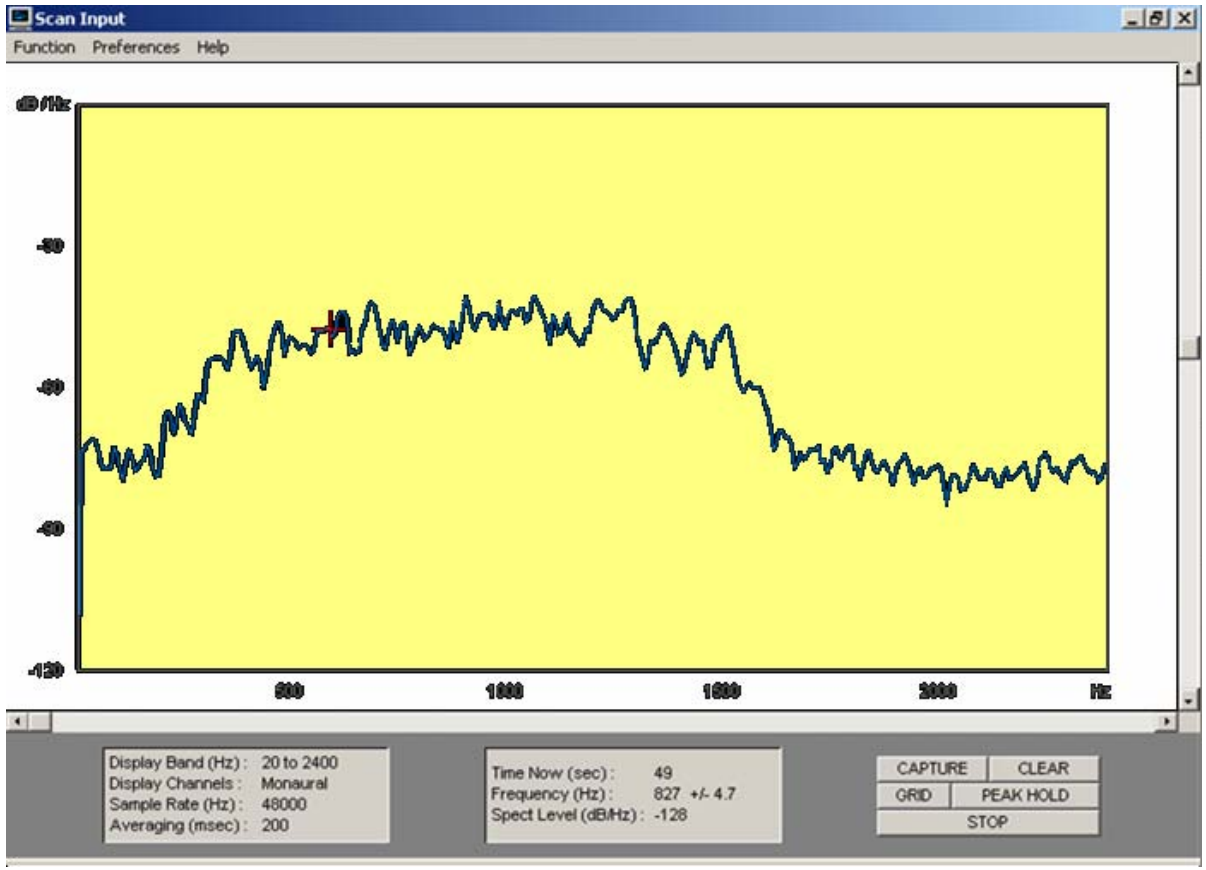
- Spectrogram
- Dual channel audio spectrum Analyzer
- Ruis van Antenne
  - Beter is om een ruisbron te gebruiken



http://www.visualizationsoftware.com/gram.html

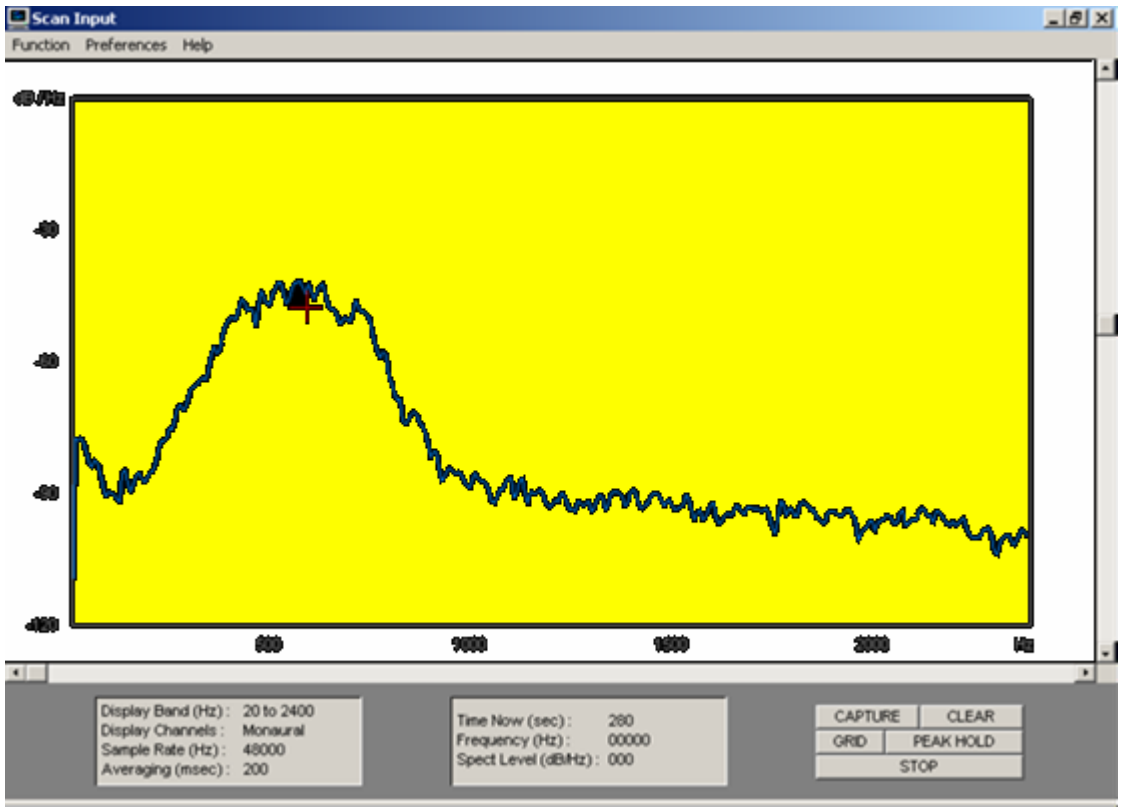
MF Filter 1500Hz

Schaal 120-90-60-30 dB



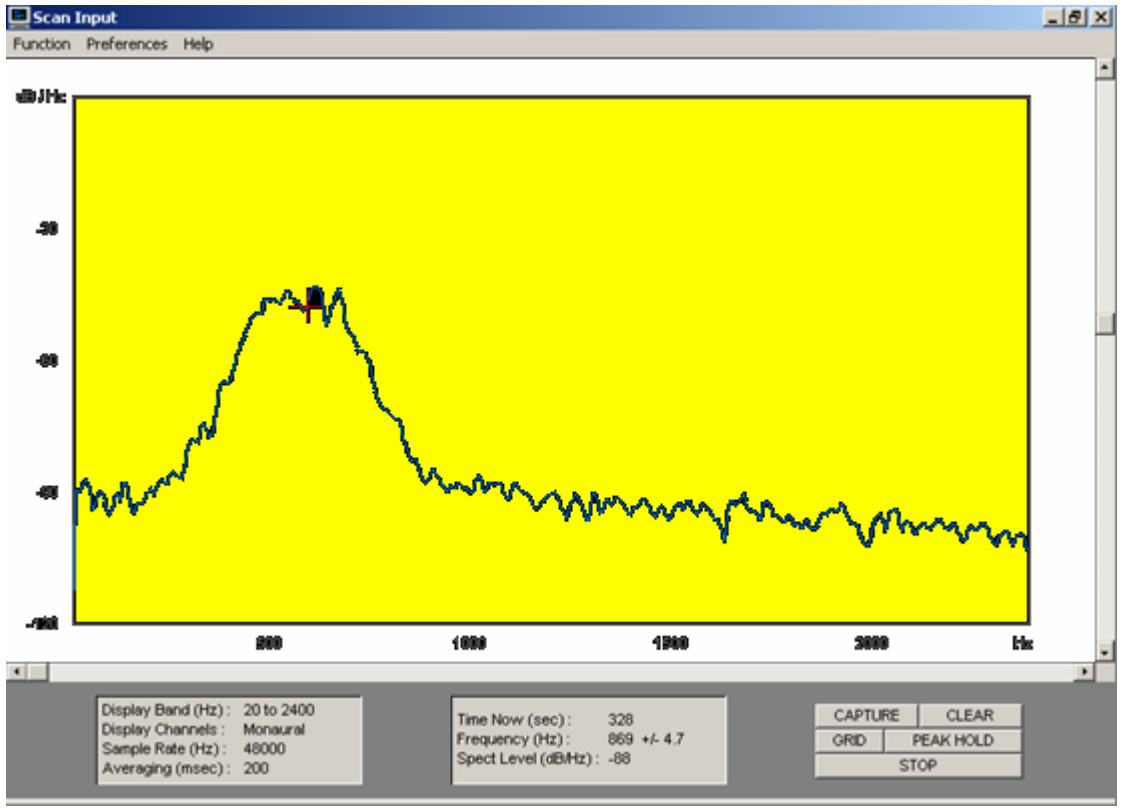
MF Filter 700 Hz

Schaal 120-90-60-30 dB



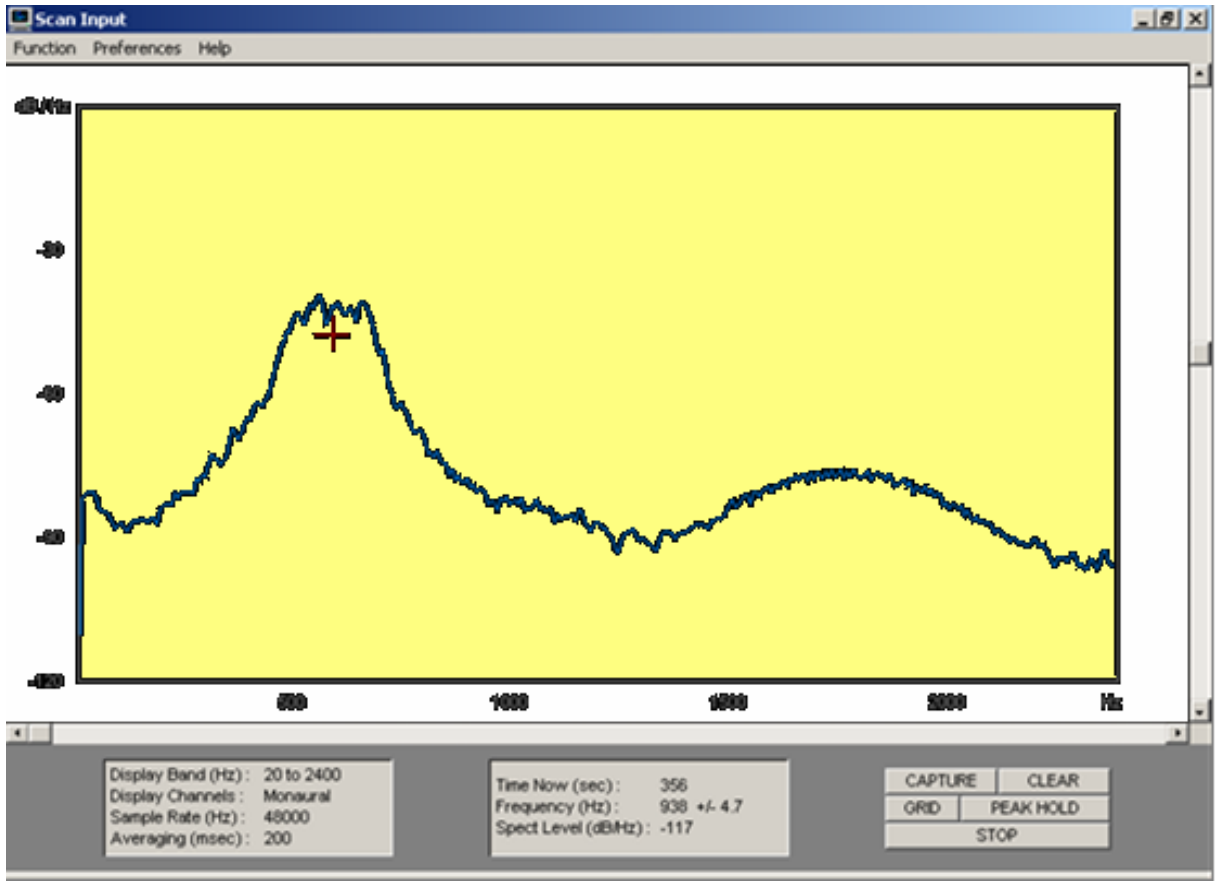
MF Filter 400Hz

Schaal 120-90-60-30 dB



MF Filter 200Hz

Schaal 120-90-60-30 dB



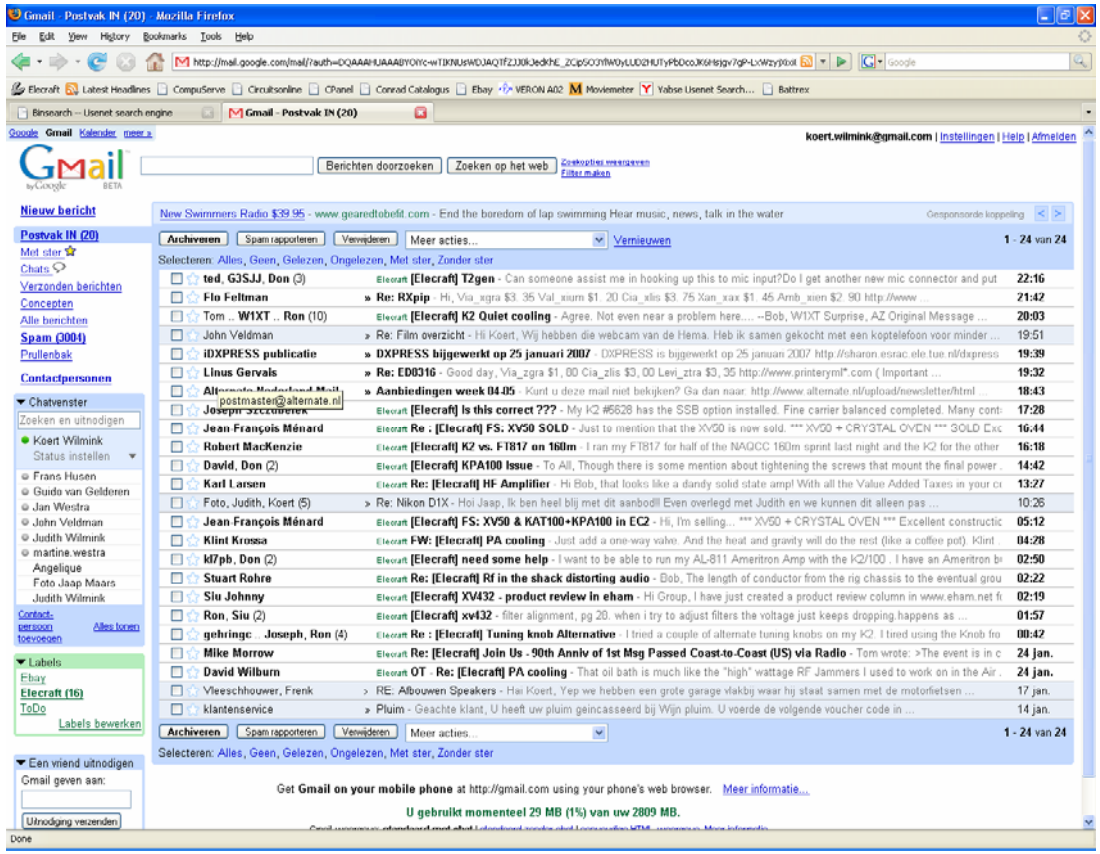
S meter afregelen

- 50 microVolt signaal = S9

Waarden in punten "S"	Decametrische banden (HF)		Banden 144 MHz en >	
	dBm 50W	spanning/50W	dBm 50W	spanning/50W
1	- 121	0,2 µV	- 141	0,02 µV
2	- 115	0,4 µV	- 135	0,04 µV
3	- 109	0,8 µV	- 129	0,08 µV
4	- 103	1,6 µV	- 123	0,16 µV
5	- 97	3,15 µV	- 117	0,315 µV
6	- 91	6,3 µV	- 111	0,63 µV
7	- 85	12,5 µV	- 105	1,25 µV
8	- 79	25 µV	- 99	2,5 µV
9	- 73	50 µV	- 93	5 µV

Ondersteuning

- Website
- Email Reflector
- Elecraft

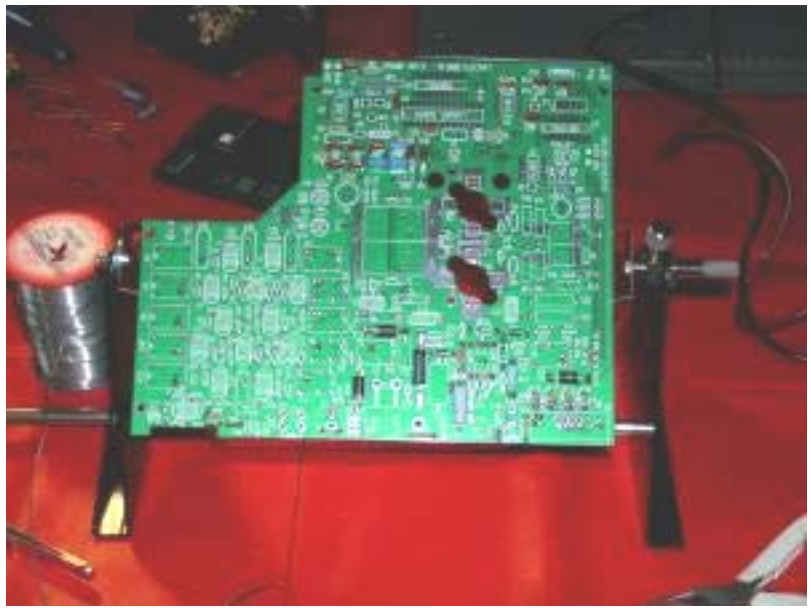


Lessons Learned

- 5 x kijken voor een IC vast te solderen.
- 80 procent van de fouten zit hem in verkeerd geplaatste componenten en slechte soldeer verbindingen.
- Neem je tijd. Haastige spoed is zeker met de K2 niet goed.
- Om te leren is het beter dat je een aantal fouten maakt.
- Resultaat is prachtig!
  - PACC; ARRL DX CW

Vervolg…….

- KPA100
- 160M



- DSP?

Demonstratie….

Vragen ?

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