

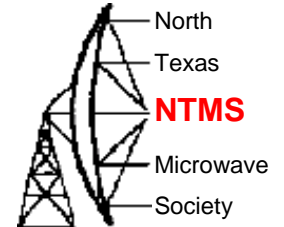
More Backyard Microwave EME

Dave Robinson
WW2R,G4FRE

Dallas , TX
2010

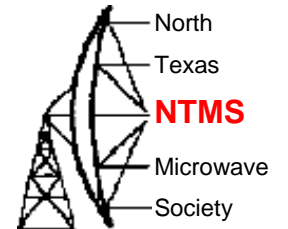


EME History



- First Introduced to EME on 432 by G3YGF/G3WDG
- 1985 Persuaded by DL9KR to work him as G4FRE on 432 after meeting him at Weinheim (JO01)
- 1999 worked 21 initials as WG3I from NJ (FN21)
- 2004 Worked 6 on 432 from 3B9C (MH64)





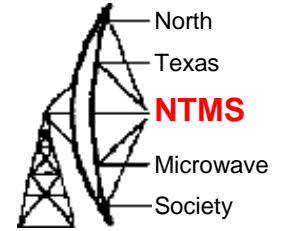
Then I moved to the USA

Had been Inspired for a long time by the KD5RO article in MUD Proceedings 1989 “Microwave EME using a Ten Foot TVRO antenna”

Searched for a dish for a long, long time with no success, then one day N5PYK announced he was moving to College Station for further education....

Initial results covered in Florence. This presentation covers improvements/failures/successes since that time

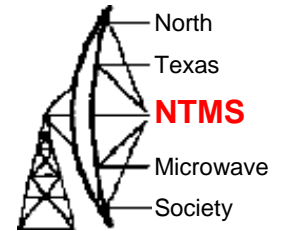
W5HN



33cm

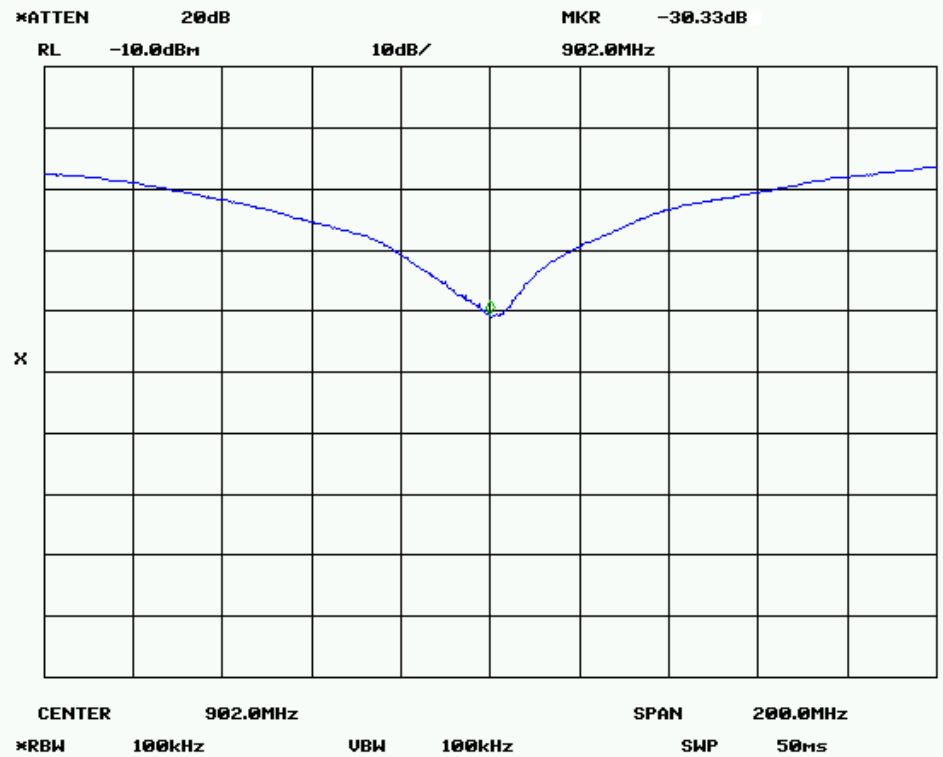
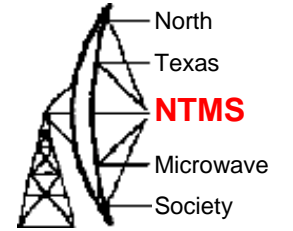
902MHz

Initial Equipment 33cm

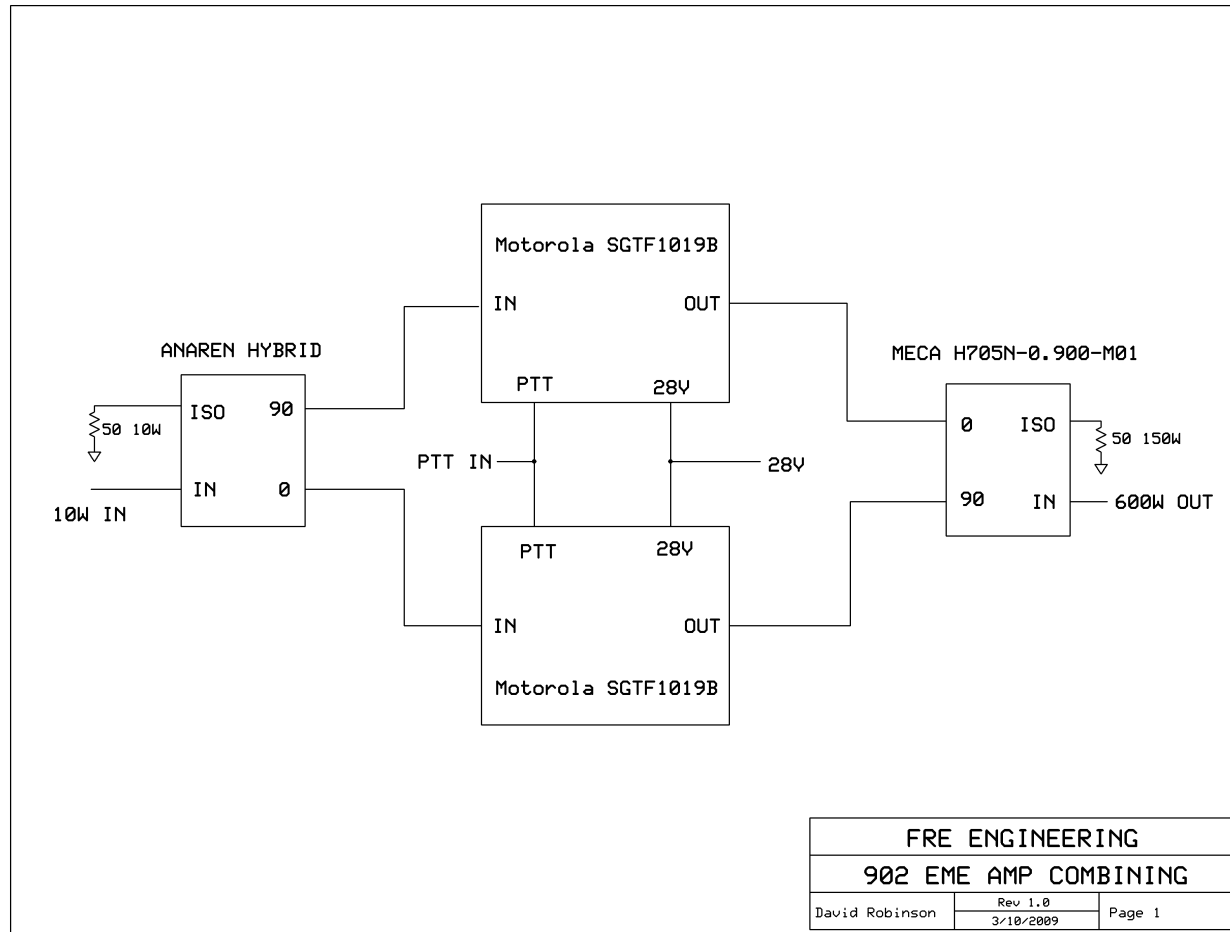
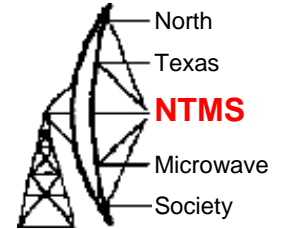


- Don Hilliard 1/1988 Linear feed
- G0MRF Preamp. 0.4dB NF
- Eimac CV850 cavity 400W?
- 15' LDF5 TX feeder
- Homebrew Xverter
- FT847

33cm Feed



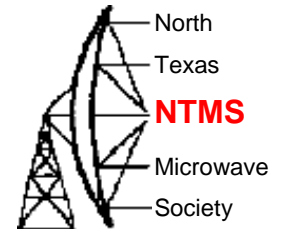
33cm PA



Eimac cavity
300w output and
drifted

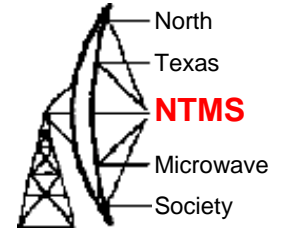
Found some
surplus 300W
motorola cellular
amps for \$60 on
ebay

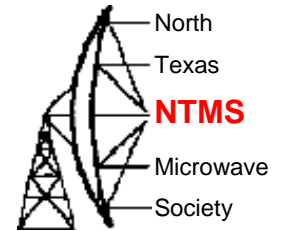
33cm PA



10W input 650W output. 28V

902MHz Dish Feed View





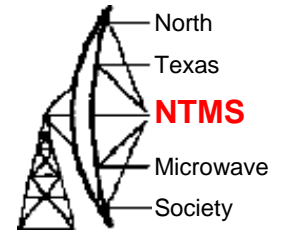
Results for 902MHz

DATE	CALL	STATE	GRID	DXCC#	COMMENTS
7-Mar-09	W5LUA	TX	EM13	1	

Also heard K8EB

902MHz QSO with local needs careful planning.
Hard to separate direct and moon produced signals as Doppler max is around 1kHz. Choose just risen moon and use good cw filter

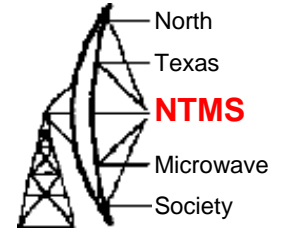
W5HN



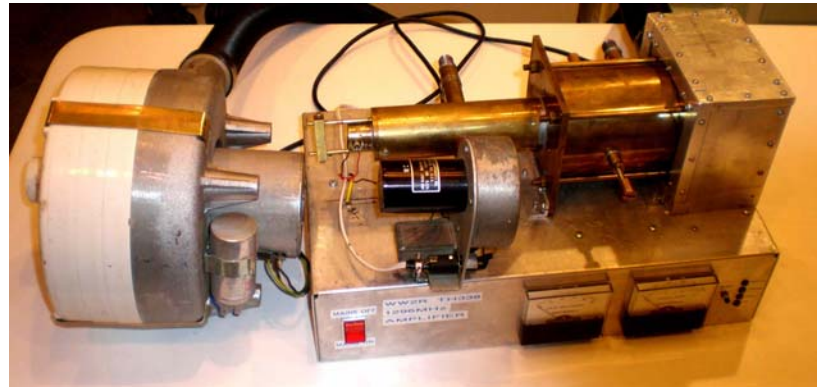
23cm

1296MHz

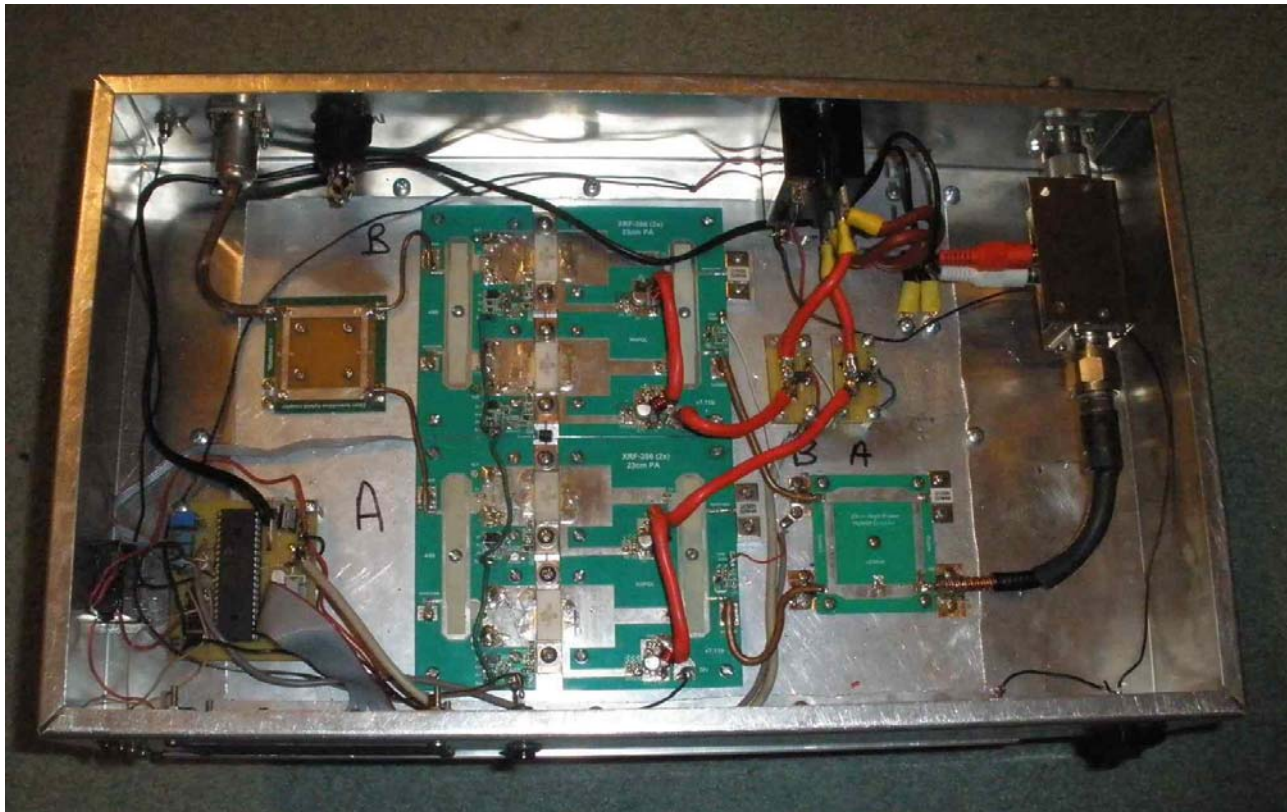
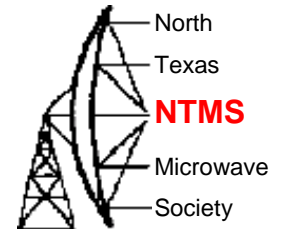
Equipment Changes 23cm



- New G4DDK Preamp. 0.2dB NF
- TH328 Amplifier
- IF: Elecraft K3+ Internal 2m xverter+SDRIQ Panadaptor

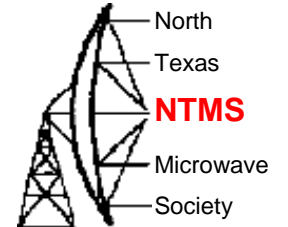


Solidstate 1296 Amp



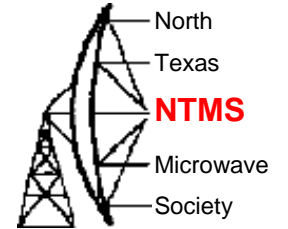
4 x XRF286SC. 22W Input 400W Output.
PIC monitoring/protection/LCD display

Results so far: 1296MHz CW



8N1EME AD6IW AL7RT CT3/DL1YMK DF3RU DL0SHF DL1YMK
 DL1YMK/CX DL4MEA ES5PC ES6RQ F2TU F5FEN F6CGJ F6KHM
 G3LQR G3LTF G4CCH G4DZU GW3XYW HB0/DF1SR HB9BBD HB9HAL
 HB9Q HB9SV IK2MMB IK3COJ IQ4DF IW2FZR IZ1BPN JA6AHB JA6CZD
 JR4ZZS K0YW K1JT K1RQG K2DH K2UYH K3JNZ/0 K4QI K5GW K5JL
 K5PJR K5SO K8EB K9SLQ KH7X KL6M LA8LF LA9NEA LX1DB LZ2US
 MI/DL1YMK N0OY N2IQ N2UO N9JIM NA4N NY2Z OE5JFL OE9ERC
 OH0/DL1YMK OH2DG OK1CA OK1DFC OK1KIR ON7UN OZ4MM OZ6OL
 PA0SSB PA3CSG PI9CAM RA3AQ RU3ACE RW1AW RW3BP SD3F
 SK0UX SK6OSO SM2CEW SM3AKW SM3LBN SM4DHN SM6CKU
 SM6FHZ SP6JLW SV1BTR SV1OE SV3AAF TF/DL1YMK VA7MM
 VE3KRP VE6TA VK3UM W2DRZ W2UHI W4OP W5LUA W6YX W7BBM
 WA5WCP WA5WCP/ID WA5WCP/UT WA5WCP/WY WA6PY WB2BYP
 ZS6AXT

291 Qs 106 Inits 5 Cont 34 DXCC 83 Grids 21 States

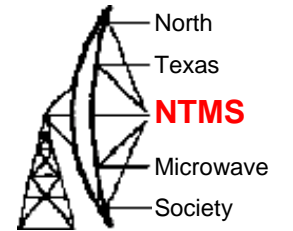


Results so far: 1296MHz JT65C

ES5PC ES6RQ G4CBW G4CCH G4DDK
G4DZU GW3XYW K2UYH K7XQ K8EB
N9JIM OE9ERC OH2DG OK1DFC OK1KIR
PA0BAT PA3DZL PA3FXB PI9CAM PY2BS
R2/DL1YMK RD3DA RW3BP SM5LE
UR5LX VA7MM VE7BBG VK7MO W3HMS
W5LUA

45 QSOS 30 Initials 15 DXCC 26 Grids 4 States

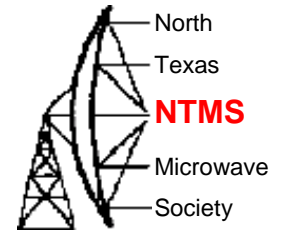
W5HN



13cm

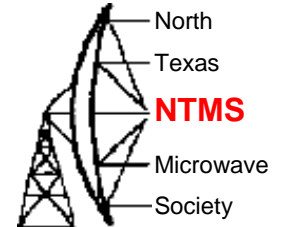
2301/2304/2320/2424MHz

Equipment 13cm



- G4DDK ATF36077 preamp 0.33dB NF
- Spectrian Amplifier mounted at dish (200W max). 28V operation.
- Homemade VE4MA Superfeed using copper tube mailed by PA3CSG.
- DB6NT Xverter For 2301/2304/2320. Dual IF Outputs.
- FT847 IF (141/144/160MHz)
- For 2424MHz RX (JA band) use ADC7133 Satellite down converter to FT847 IF at 168MHz

13cm Results

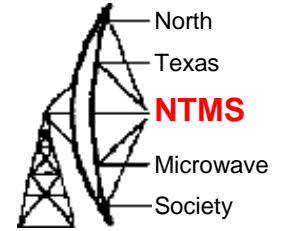


DL1YMK DL1YMK/CX DL4MEA ES5PC F2TU
G3LQR G3LTF G4CCH G4DDK HB9Q HB9SV
IW2FZR K2UYH K5GW K7XQ KL6M LA8LF
LX1DB MI/DL1YMK OE9ERC OH0/DL1YMK
OH2DG OK1CA OK1DFC OK1KIR OZ4MM
PA3CSG R2/DL1YMK RW1AW SD3F SM2CEW
SP6OPN SV1BTR TF/DL1YMK VE6TA VK3NX
VK4AFL VK7MO W5LUA WA6PY WD5AGO

90 QSOS 40 INITIALS 36 Grids 26 DXCC 5 States

+ VK7MO, W5LUA, G4CCH on JT65C

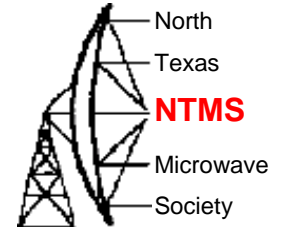
W5HN



9cm

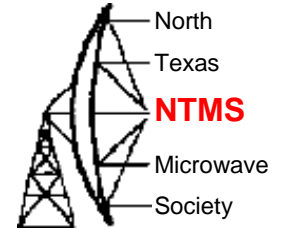
3400MHz

Original Equipment 9cm



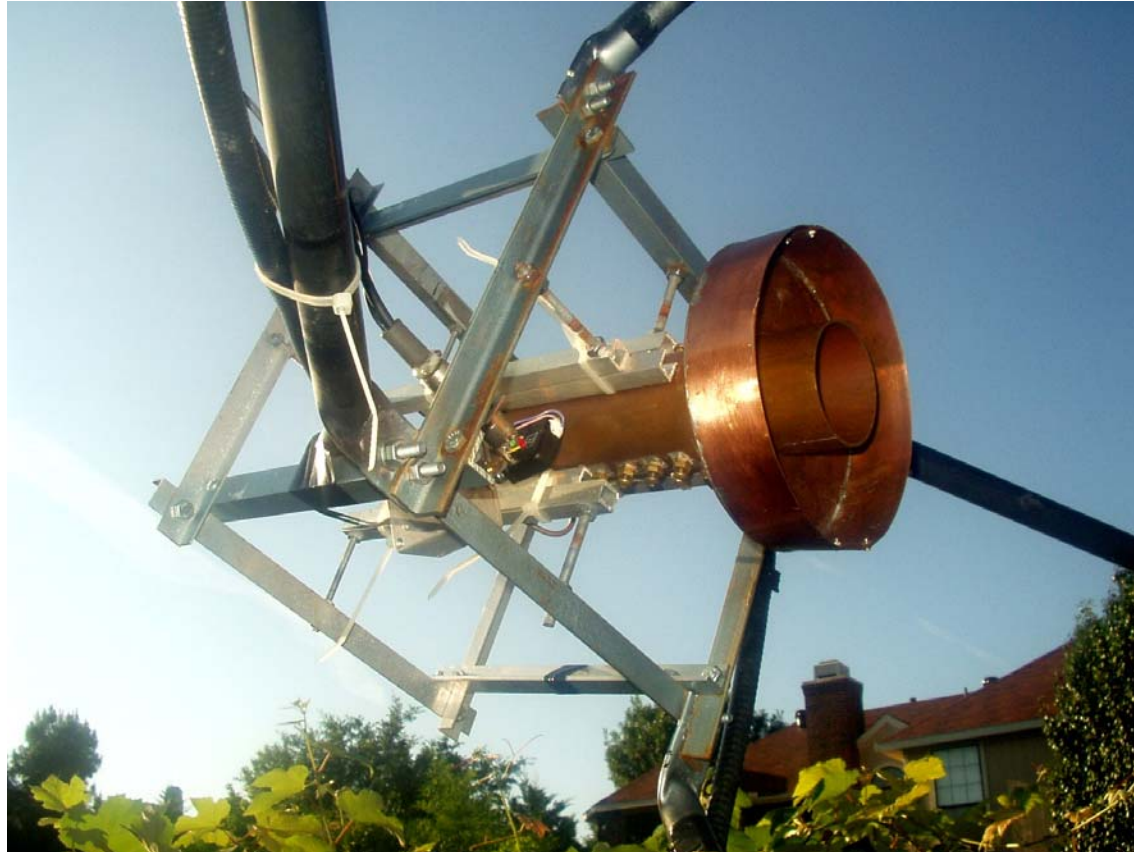
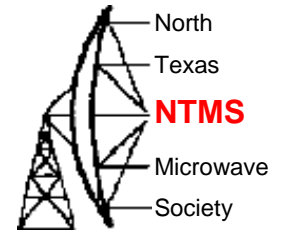
- Homemade Scaled 23cm VE4MA using 2.5" copper tube
- Homemade 3400MHz GPS Locked transverter
- DEMI preamp 0.65dB/13dB
- 40W Toshiba Amp at dish

Current Equipment 9cm



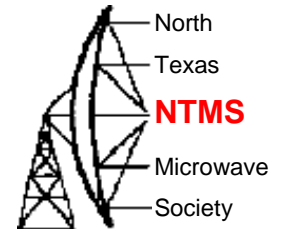
- WD5AGO made septum feed
- Homemade 3400MHz GPS Locked transverter
- DJ9BV preamp 0.75dB/33dB
- Dual Toshiba PA: 100W
- Changed feed mount
- Can remote monitor PA

9cm Original mount



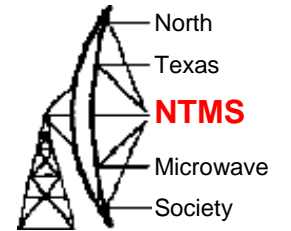
Scaled VE4MA 1296MHz feed

New feed mount



For 9cm I just have to bolt the plate on the 4 dish arms. Much quicker to mount and feed much stabler than the previous cage arrangement

9cm PA Housing

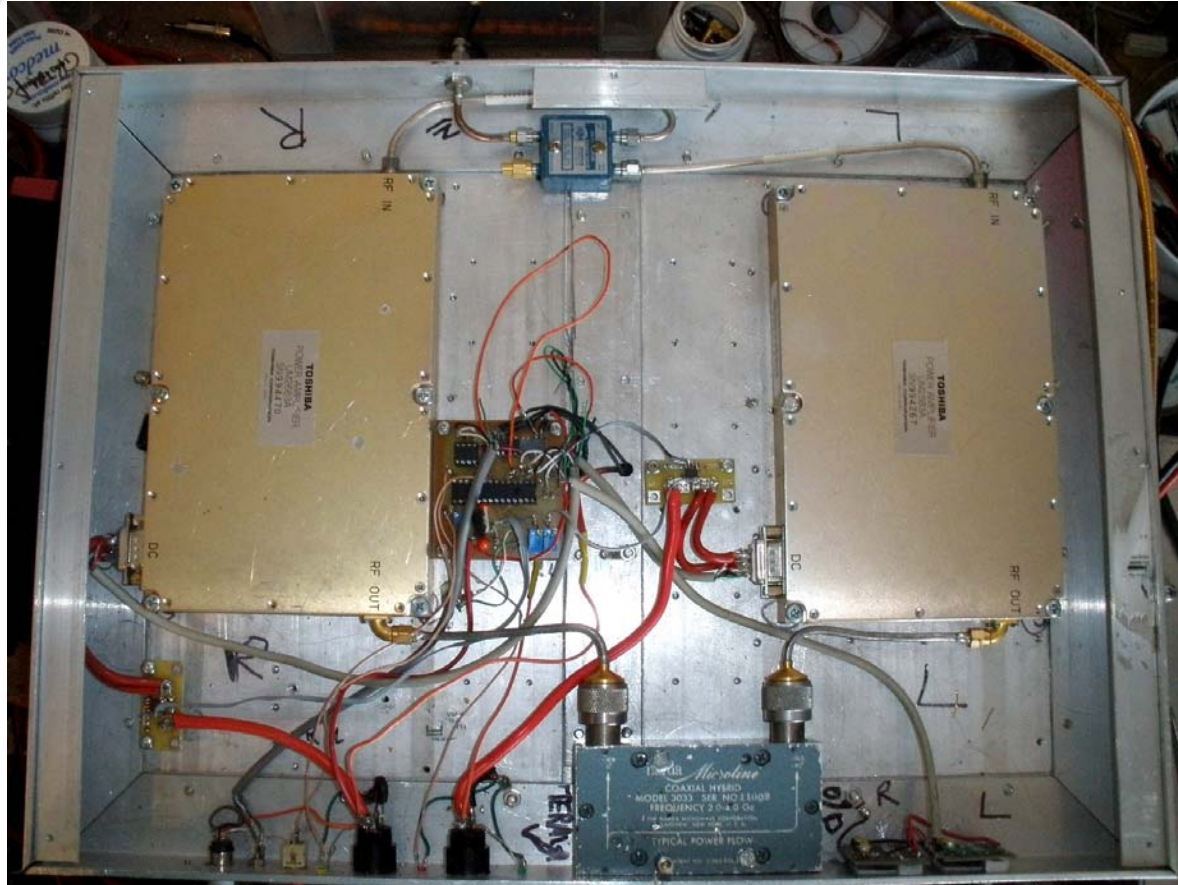
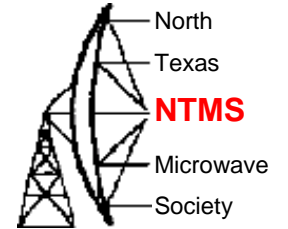


Dubus Apr 2010



Aug 2010 A/W

100W PA



Input combiner: Anaren 10016-3

Output combiner: Narda 3033

Amps: 2 x Toshiba UM2683A

Input 15mW

Output 100W @ 3400MHz

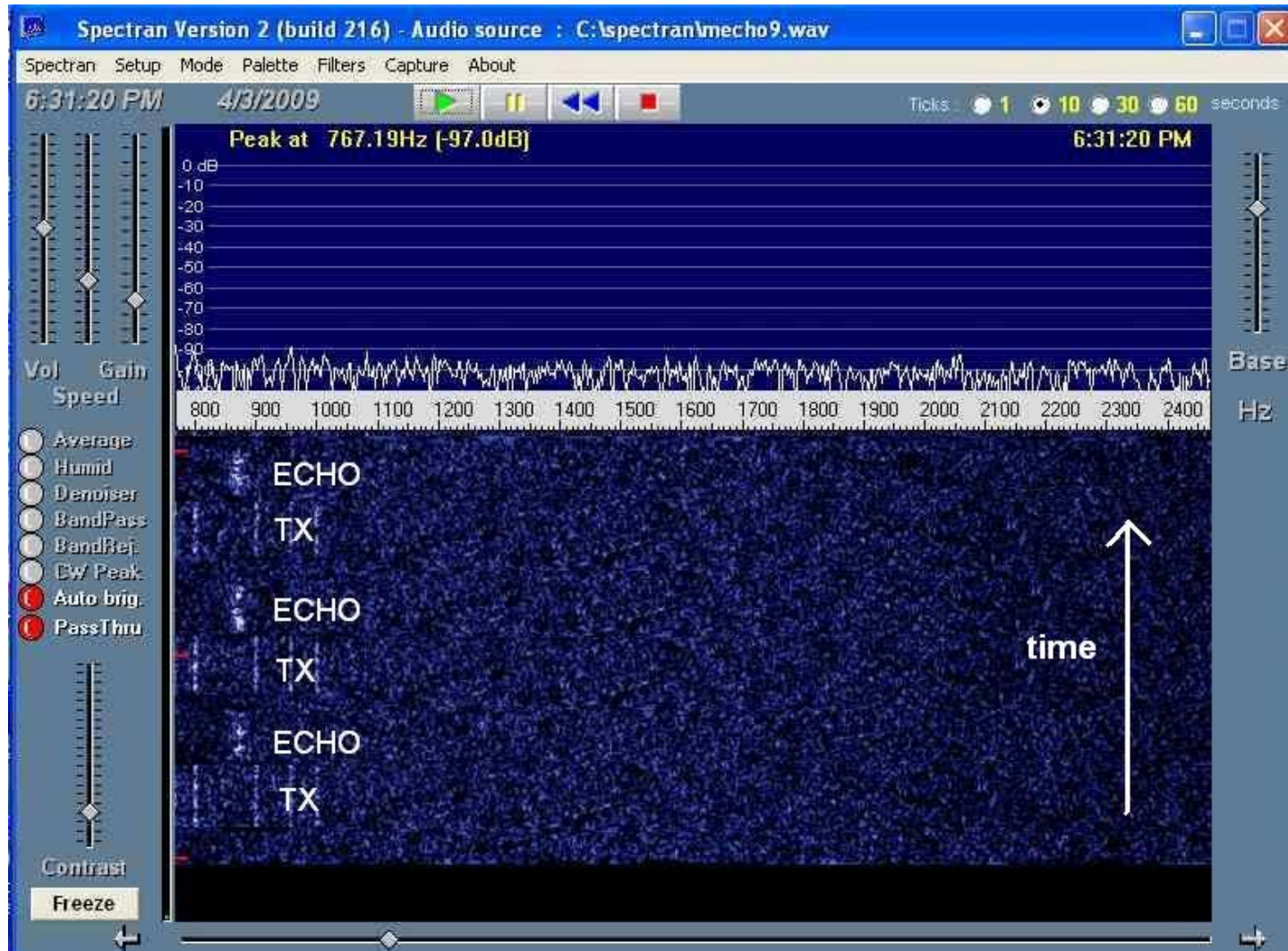
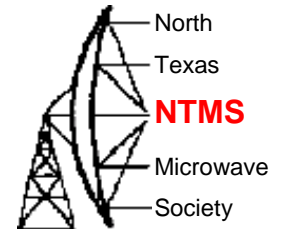
Power Supply: 2 x 13.8V @17A

**External Dual LTC5534 fwd/rev
power monitor**

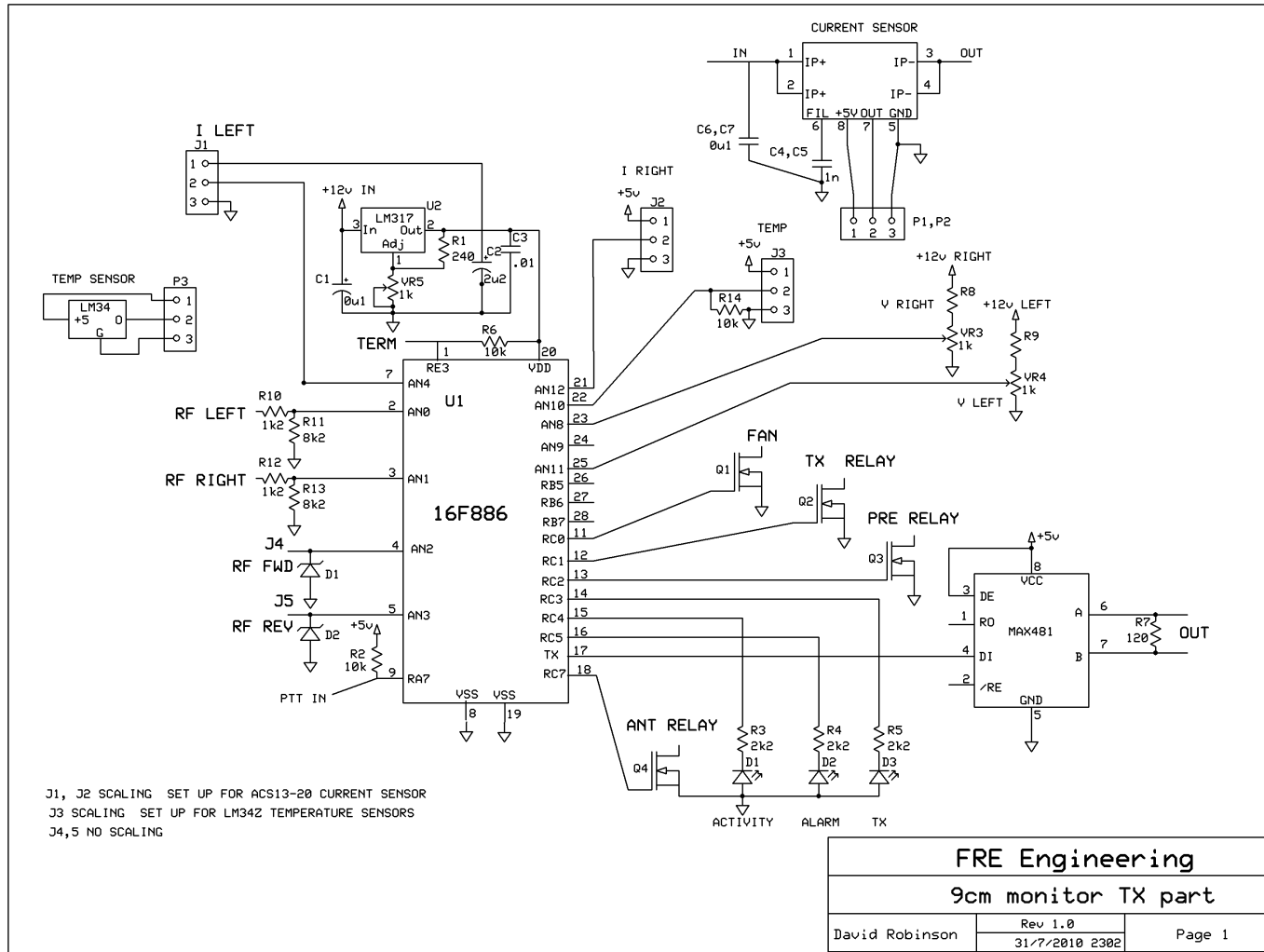
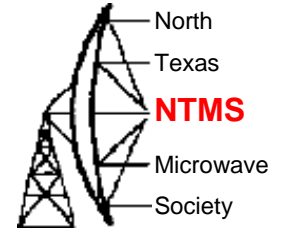
**Extra 3dB definitely worth the
effort**

Beware Noisy Lambda Power Supplies

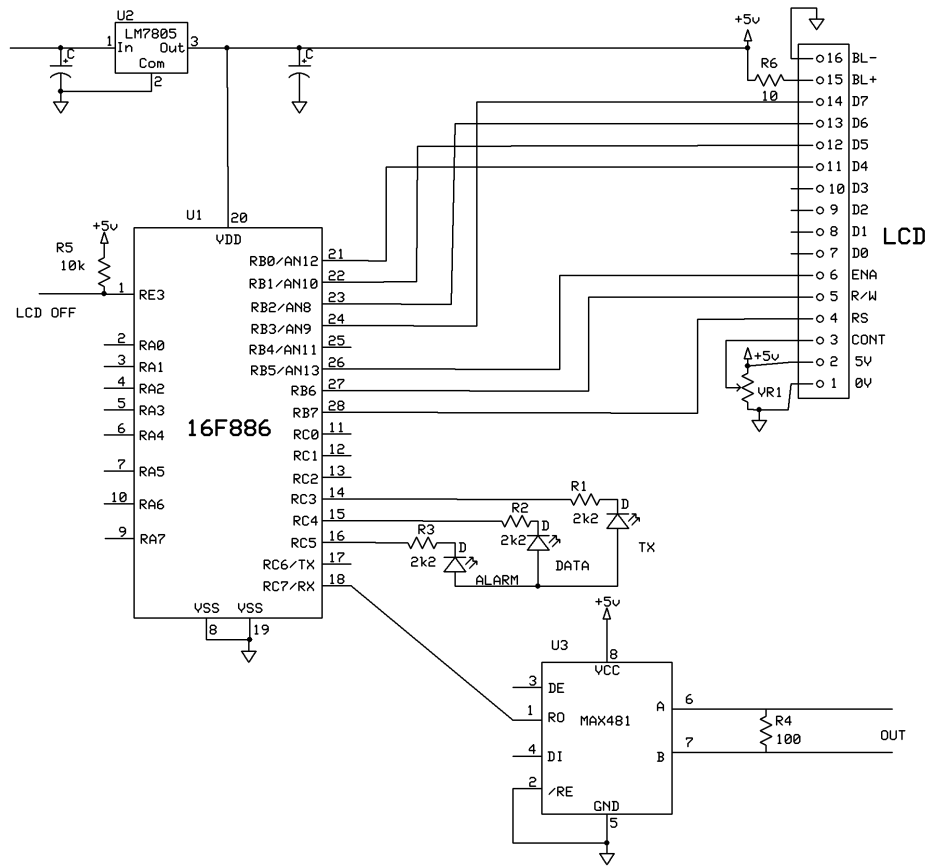
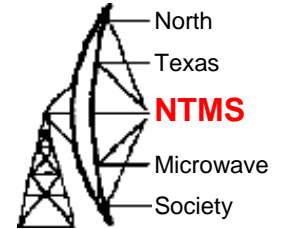
9cm echos



PIC Controller PA End

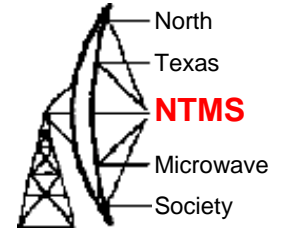


PIC Controller Shack End

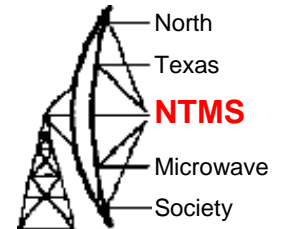


FRE Engineering		
9cm Monitor RX end		
David Robinson	Rev 1.3 18-APR-2010	Page 1

PA Monitoring



Results so far:3400MHz

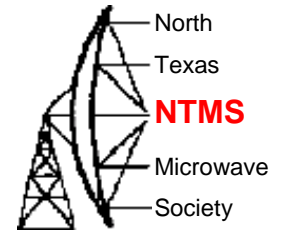


G3LTF LX1DB W5LUA OK1CA MI/DL1YMK K5GW
OK1KIR PA0BAT OE9ERC VE6TA VE4MA
DL4MEA DF9QX OZ6OL DL1YMK K2UYH WA6PY
WD5AGO VK3NX ES5PC

26 Qs 20 Inits 3 Cont 12 DXCC 18 Grids 4 States

Plus W5LUA on JT65C (doppler seriously challenged the software)

W5HN

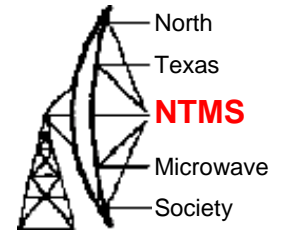


6cm

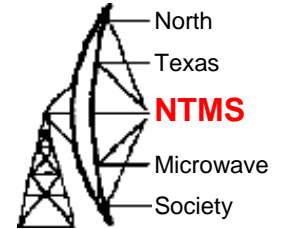
5760MHz

Equipment 6cm

- Homemade GPS locked Xverter
- DB6NT Preamp (0.8dB NF)
- Western Electric (Varian Canada)
KS22469L1 TWT 25W
- 14' flexible waveguide (20W at feed).
- WD5AGO Septum feed

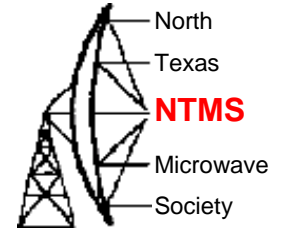


5760MHz Feed



WD5AGO Septum feed. Plumbing fitting allows position adjustment

5760 Transverter



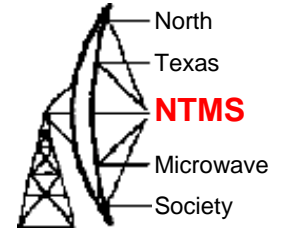
L.O. : G4HUP 117MHz GPS locked source+DB6NT multiplier

TX: SMA mixer + Collins surplus filter +MSC surplus amp (100mW)

RX: SMA mixer + Collins filter +W5LUA 2 stage preamp (0.9db nf)

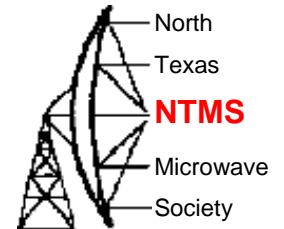
10MHz Osc for standalone operation. DEMI IF switch

5760 PA



Western Electric KS22469L1 TWT

6cm Results

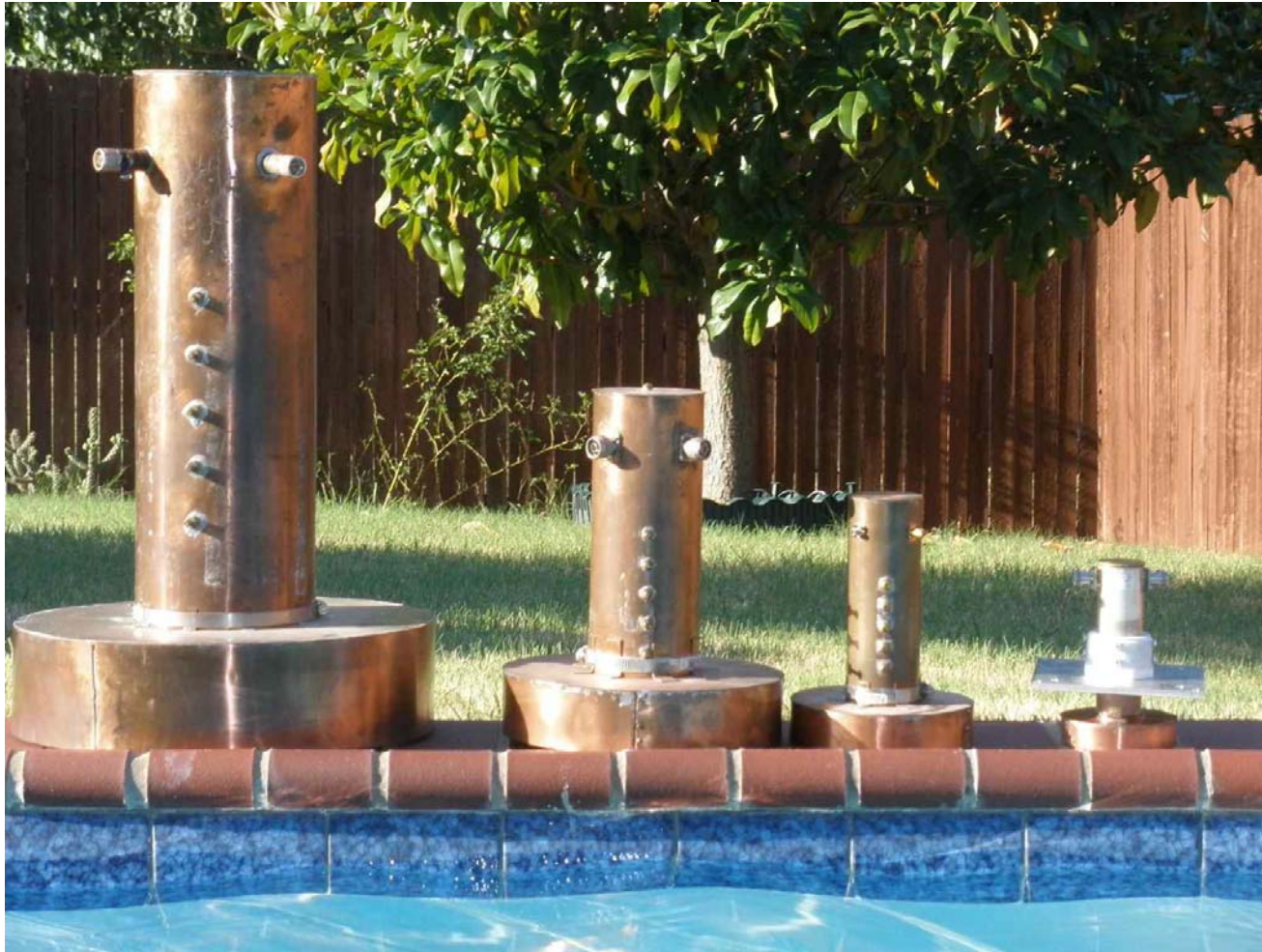
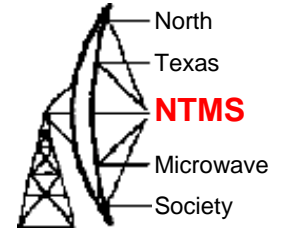


2010 DUBUS contest: Low declination made tracking hard. Heard OK1KIR, F2TU, VE4MA, SV3AAF, W5LUA. Was heard by F2TU but not enough to complete

2010 A/W contest: Moon/Sun separation 2 degrees. Ant beamwidth 1.2 degrees. Result: only heard sun noise!

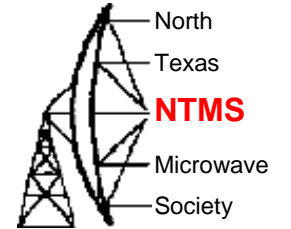
Optimised Sun noise 9dB at $sf=57$. 3dB lower than predicted but 3GHz dish mesh/profile not perfect for 5760MHz. Need solid offset dish!

Quadruplets!



Left to right 1296MHz 2304MHz 3400MHz 5760MHz

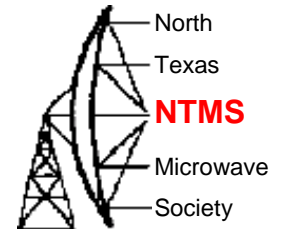
What Next...Other Bands?



Looking for an offset dish for 5/10G

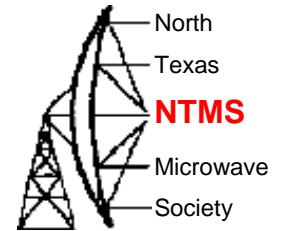
1420.40575 MHz

Acknowledgements



- To G4DDK, K5GW, W5LUA, PA3CSG, K1RQG for advice and assistance
- To my wife Meg, N2NQI (M0FRE), for encouraging me to decorate the backyard with the oversize garden ornament
- Finally to N5PYK for moving and donating the dish

More information



- 902MHz: <http://g4fre.com/902eme.htm>
- 23cm: <http://g4fre.com/1296eme.htm>
- 23cm PA: <http://g4fre.com/350w1296pa.htm>
- 13cm: http://g4fre.com/13cm_eme.htm
- 9cm: <http://g4fre.com/3400eme.htm>
- 9cm: <http://g4fre.com/3400eme.htm>
- 6cm: <http://g4fre.com/6cmeme.htm>