

# The Road to 1296 MHz WAS

By

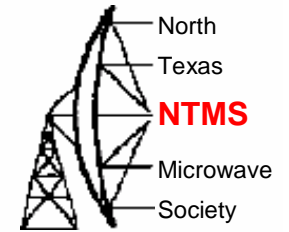
Al Ward W5LUA

&

Paul Perryman WA5WCP

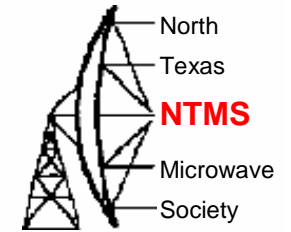
WA5WCP Paul Perryman, W5LUA Al Ward, K5GW Gerald Williamson

# Outline



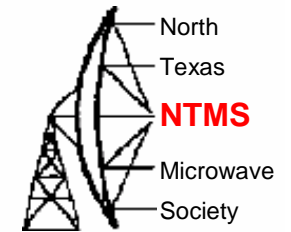
- Introduction and Motivation
- Technical Description
- What is Involved in Setup and Operation
- Places Visited / Stations Worked
- Conclusion and Future Plans

# Why has it taken so long?



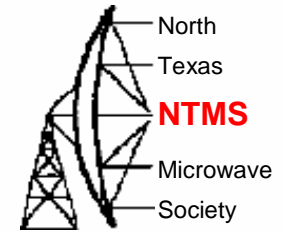
- 2M WAS first occurred in 1976 by K0MQS and many others have followed
- 432 MHz WAS was achieved by W0YZS in 1979 and several followed
- 222 MHz WAS was achieved in 1984 by W0VB and several followed at the same time but it was not possible without WB0TEM/W0SD going on multiple expeditions to both the east coast and the west coast and W0VB taking a trip to Hawaii.
- This all occurred between 1976 and 1984. Here it is over 20 years later and no new WAS's on the higher bands. So when would the next major VHF band be conquered? Presently very little EME activity on 902 but on 1296 MHz, it is a different story. There is a lot of EME activity but there are quite a few states that are not active on 1296 EME – namely 9 including Hawaii
- So what would it take????

# Along came Paul



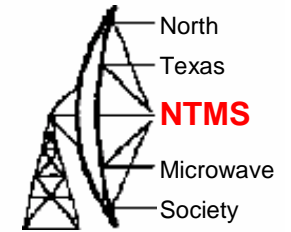
- I have known Paul ever since about 1975 when Paul came over to my house to listen to WA6LET via the moon on 432 MHz.
- I always thought Paul to be a little unique in that he likes to blow stuff up with CO<sub>2</sub> LASERS – he sounded adventuresome
- So one day Gerald K5GW, Paul and I were at Dickey's BBQ and we started talking about "what ifs" and Paul's eyes started to light up about this EME stuff
- Paul is not new to EME as he had built a 2M EME array back in 1975 when he was a grad student at what used to be called North Texas State University in Denton.
- Well we got Paul hooked.....

# Some Obstacles



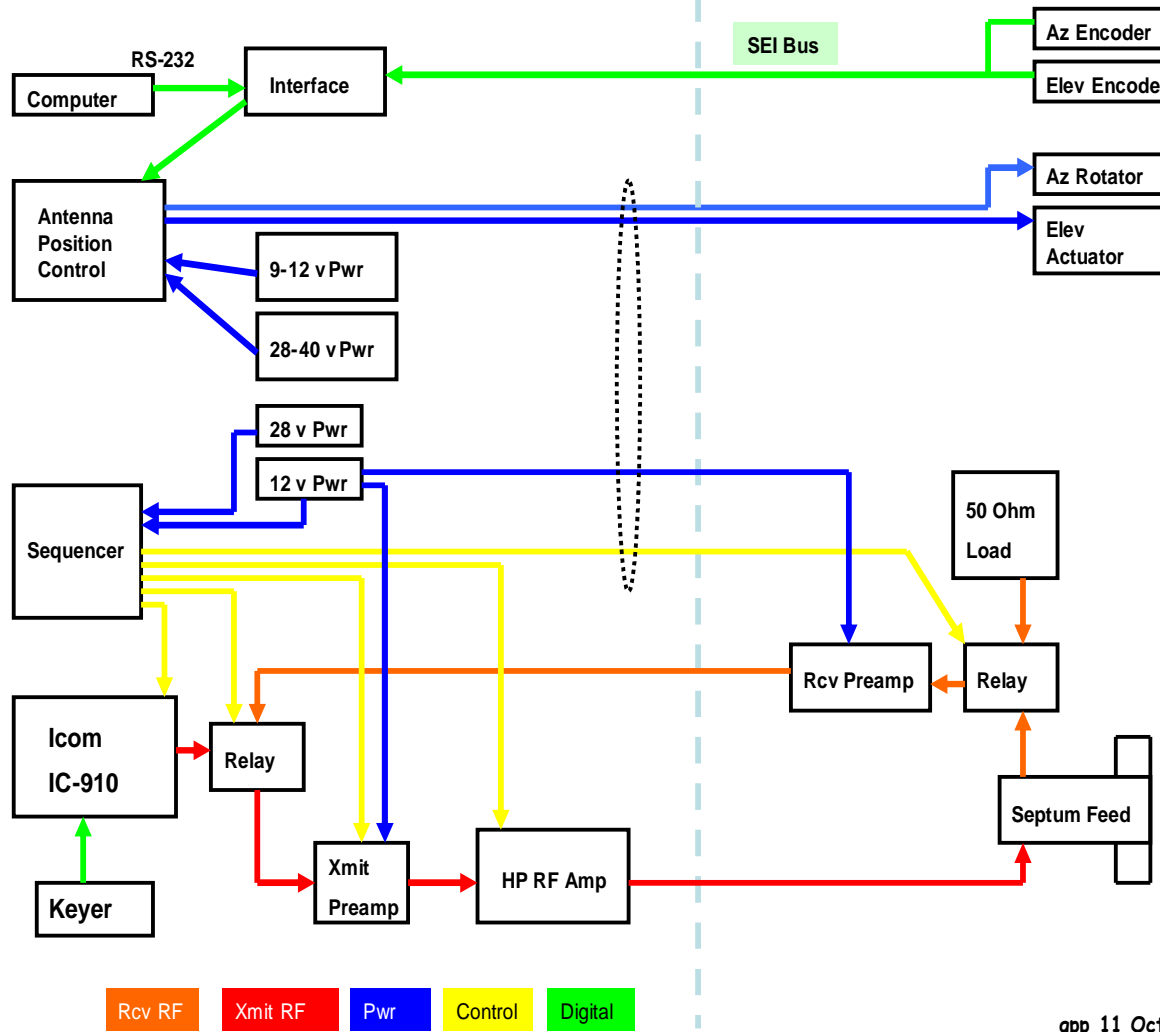
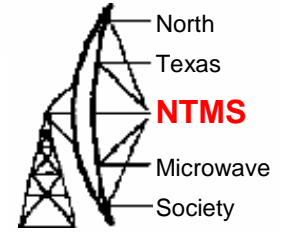
- Activate 3 to 4 states in a 2 week period of northern declination
- Avoid new moon
- Allow time for travel to the locations and between locations
- No allowance for down time
- Work within Paul's work schedule
- Potentially dozens of people to work on 1296 MHz – could this take some time?
- The needed states are over a 1000 miles away on both coasts!

# Motivation and Technical Description of the Portable EME Station



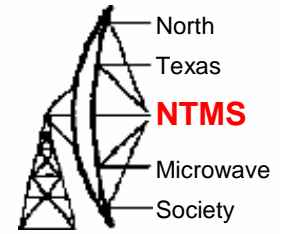
- 1296 MHz Worked All States Was Within Reach of a Few Stations
- The Realization of a EME Capable Portable Station Seemed Challenging but Possible
- K5GW, W5LUA, and WA5WCP Started Construction in the Spring of 2005
- The First Version of the Station was:
  - 10 Ft C-Band Dish With Septum Feed (12 ft and VE4MA feed in NW)
  - Icom IC-910 with W7CNK / WD5AGO LNAs
  - 250 W High Power Amplifier
  - Sequencer, Computer Tracking, Keyer
  - 2304 MHz Station Added: Feed, Dem XVTR, 140 W Xmit Amplifier
- WA5WCP Made Numerous CW Contacts during the Summer and Fall of 2005 Proving Portable Operation is Possible With this Station
- The Strategy was to Put the Four Needed New England States on first, Single Expeditions to Hawaii, and the Western Four Needed States Last
- Part One of this talk Will Describe The NE USA Expedition, and Part II is the Western USA Expedition (ND was also a single state Expedition as well as KOYW activating Hawaii)

# WA5WCP EME Mobile System Interconnect



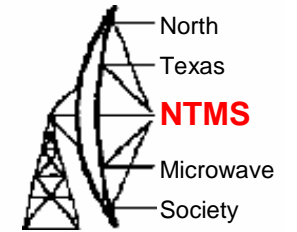
gpp 11 Oct 2005

# At Midlothian EME Contest 2005



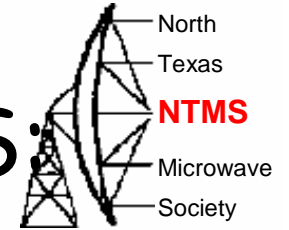
Note the old truck!





# WA5WCP Portable EME Operation: Summer 2006

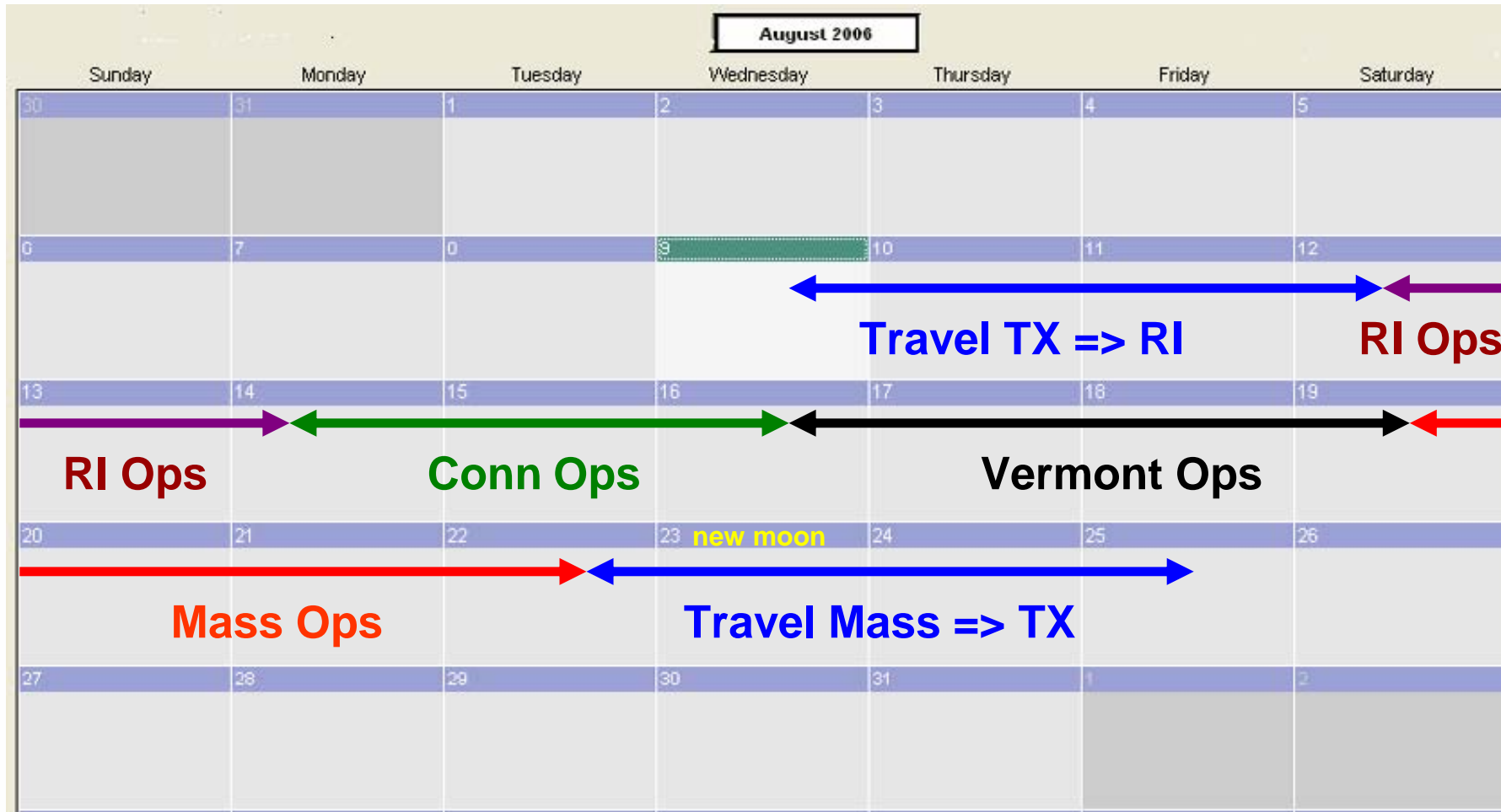
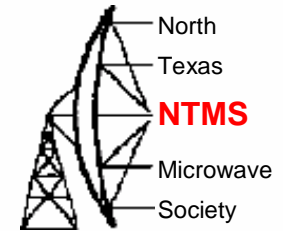
# Part I: Summer of 2006 NE US:



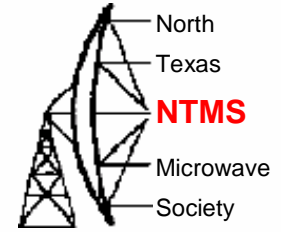
- W1JJ - "Mick" Mc Manus: Warwick, RI
- K7BV - Dennis Motschenbacher :  
Colchester, CT ( as W1AW)
- N1UR - ED Sawyer, Barre, VT
- NC1I - Frank Potts, Southwick, Mass

10 ft dish

# Calendar of Activities

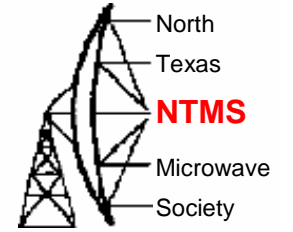


# WA5WCP Mobile 5,4,3,2,1

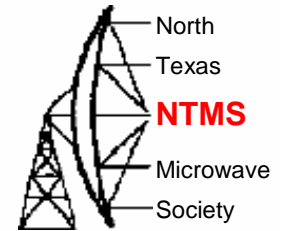




# WA5WCP Mobile 5,4,3,2,1



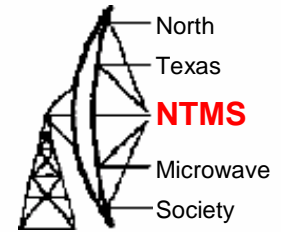
# Rhode Island: Here is Mick W1JJ



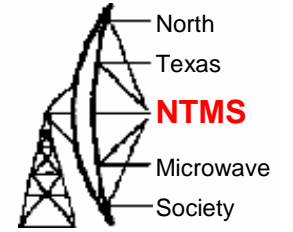
What a Great Host: Especially helping with the flat tires.



# WA5WCP / 1 @ W1JJ RI

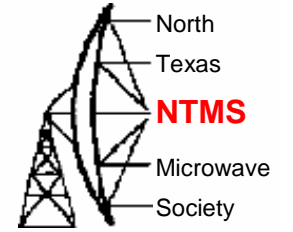


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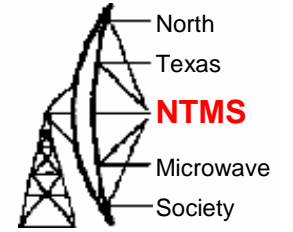




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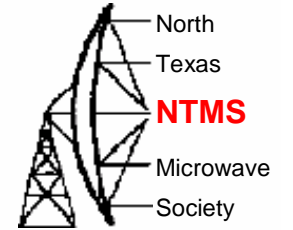


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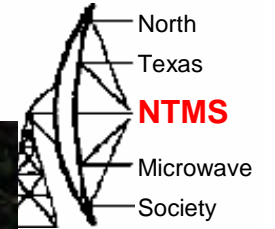




# WA5WCP / 1 @ W1JJ RI

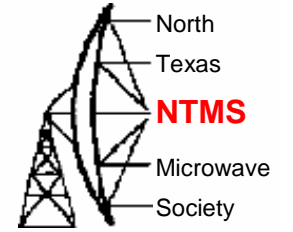


# Ready for QSO's at W1JJ

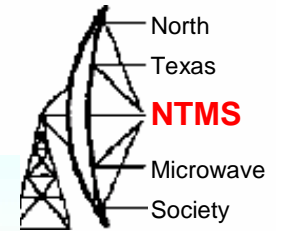




# WA5WCP / 1 @ W1JJ RI

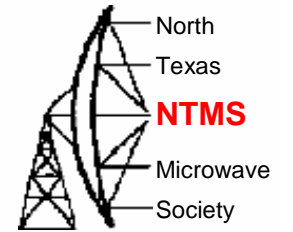


# Conn at K7BV/1 Dennis': as W1AW/1



Dennis and His Wife Were Very Gracious (and even forgave the ruts I left behind).

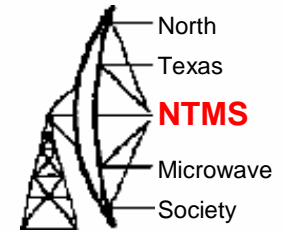
# Conn at K7BV/1 Dennis':



Ready for QSO's as W1AW/1: What a Great Experience!



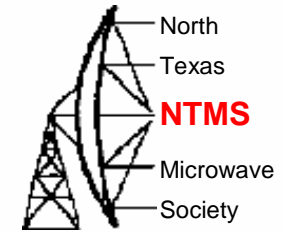
# Vermont At N1UR Ed's:



Shot from Above: Here is Ed's Dream Location  
(I'm that little spot in the middle)



# Vermont At N1UR Ed's:



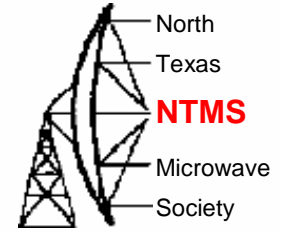
Ed: N1UR



Bob: W1QF

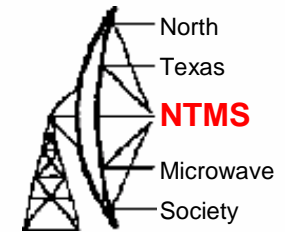
What a spectacular location for Portable Operation, and Ed, Bob, and Company were excellent hosts.

# WA5WCP/1 @ N1UR VT



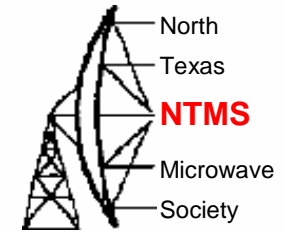


# At NC1I : Mass



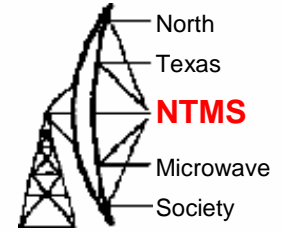
Frank NC1I has a very impressive home QTH ... he and the family put up with the mess in the back yard, provided a great home cooked meal, and a very much appreciated hot shower.

# At NC1I : Mass



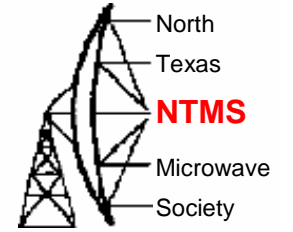
Here you can see we are ready for Portable ops, in the shadow of Frank's amazing HF and 70cm EME antennas.

# WA5WCP/1 @ NC1I Mass

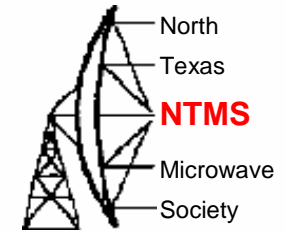




# WA5WCP/1 @ NC1I Mass 2304 MHz Feed



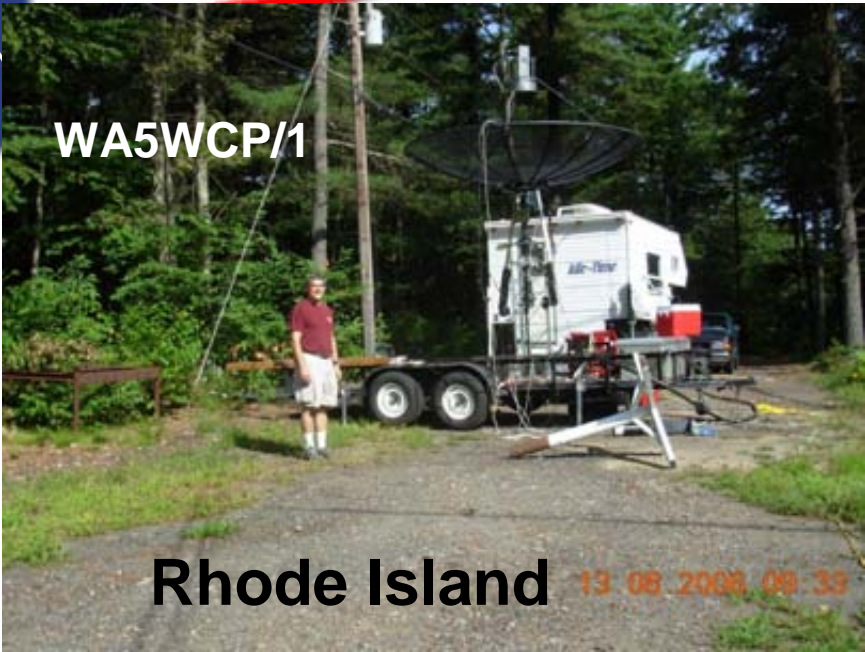
# WA5WCP/1 Four States on 1296 MHz EME in 16 Days Aug 2006



- On 1296 MHz: 111 Contacts : 34 Stations, 13 Countries, 10 US States
- 1296 MHz: 16 Stations From all four locations
- 2304 MHz: 8 Contacts from Mass
- DF3RU, DJ9YW, DL1YMK, F2TU, G3LTF, G4CCH, HB9BBD, HB9Q, HB9SV, KOYW, K2UYH, K5GW, K5JL, K9SLQ, KL6M, LX1DB, N2IQ, OE9ERC, OH2DG, OK1CA, OK1DFC, OK1KIR, OZ4MM, OZ6OL, PA3CSG, SM2CEW, SM4DHN, SM6CKU, VE6TA, W2UHI, W5LUA, W7BBM, WA6PY



W5HI



Rhode Island 13.08.2006 09:33



Connecticut 08.16.2006 06:10



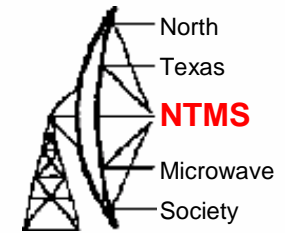
Vermont 17.08.2006 16:59



Massachusetts 21.08.2006 15:31

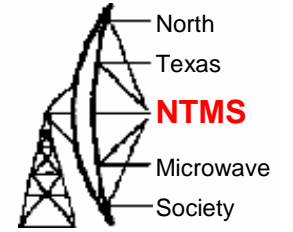
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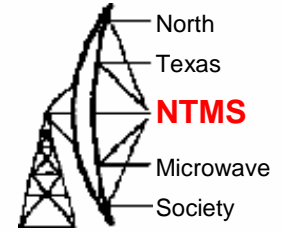


# K0YW / KH7X Portable EME Operation in Hawaii on 1296 MHz and 2304 MHz April 2007

# The dish to be used at KH7X



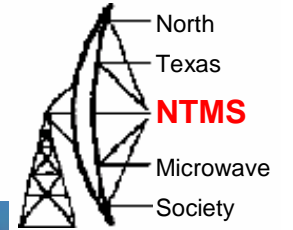
# K0YW and KH6YY at KH7X



Bruce Clark

Alex Benton

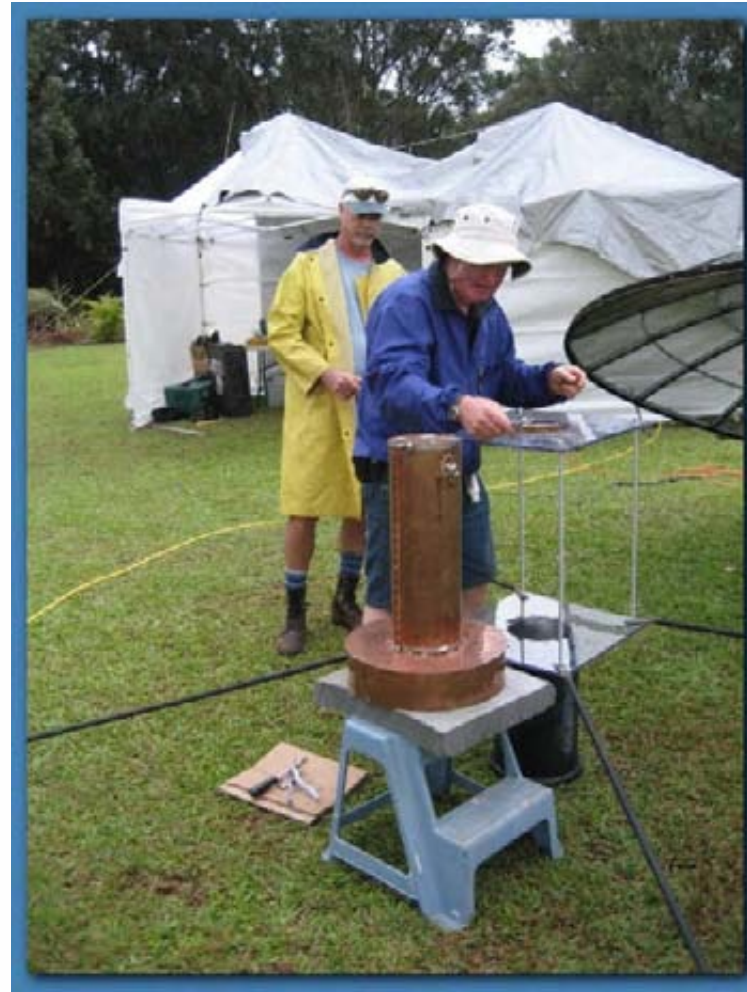
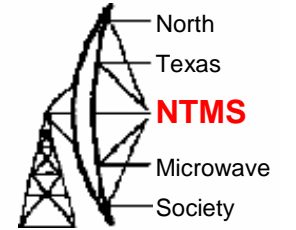
# KH7X Crew

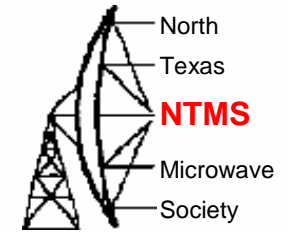


KH6ND Mike   KH7U Kimo   K0YW Bruce   Jim AA6GS   Bev AH6NF



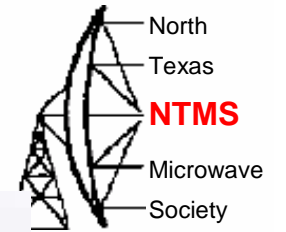
# KH7X On 1296 & 2304 MHz EME





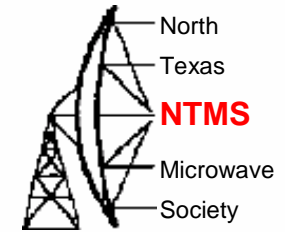
# VE4MA / K0ALL EME Operation from North Dakota August 2007

# K0ALL North Dakota Aug 4 & 5 2007



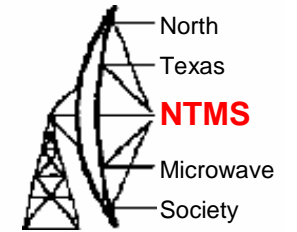
Special thanks to VE4MA and K0ALL

# K0ALL North Dakota



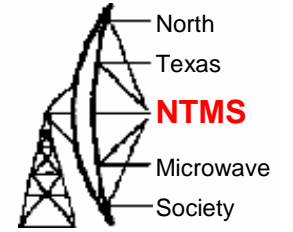
Manual AZ-EL on a 10ft solid dish with VE4MA feed and a single 2C39 generating 100 watts output. First weekend netted several QSOs including K5JL, K2UYH, K0YW, VE6TA, W5LUA, WA6PY. Ron and Barry went on to work many others the following two months including several Europeans.



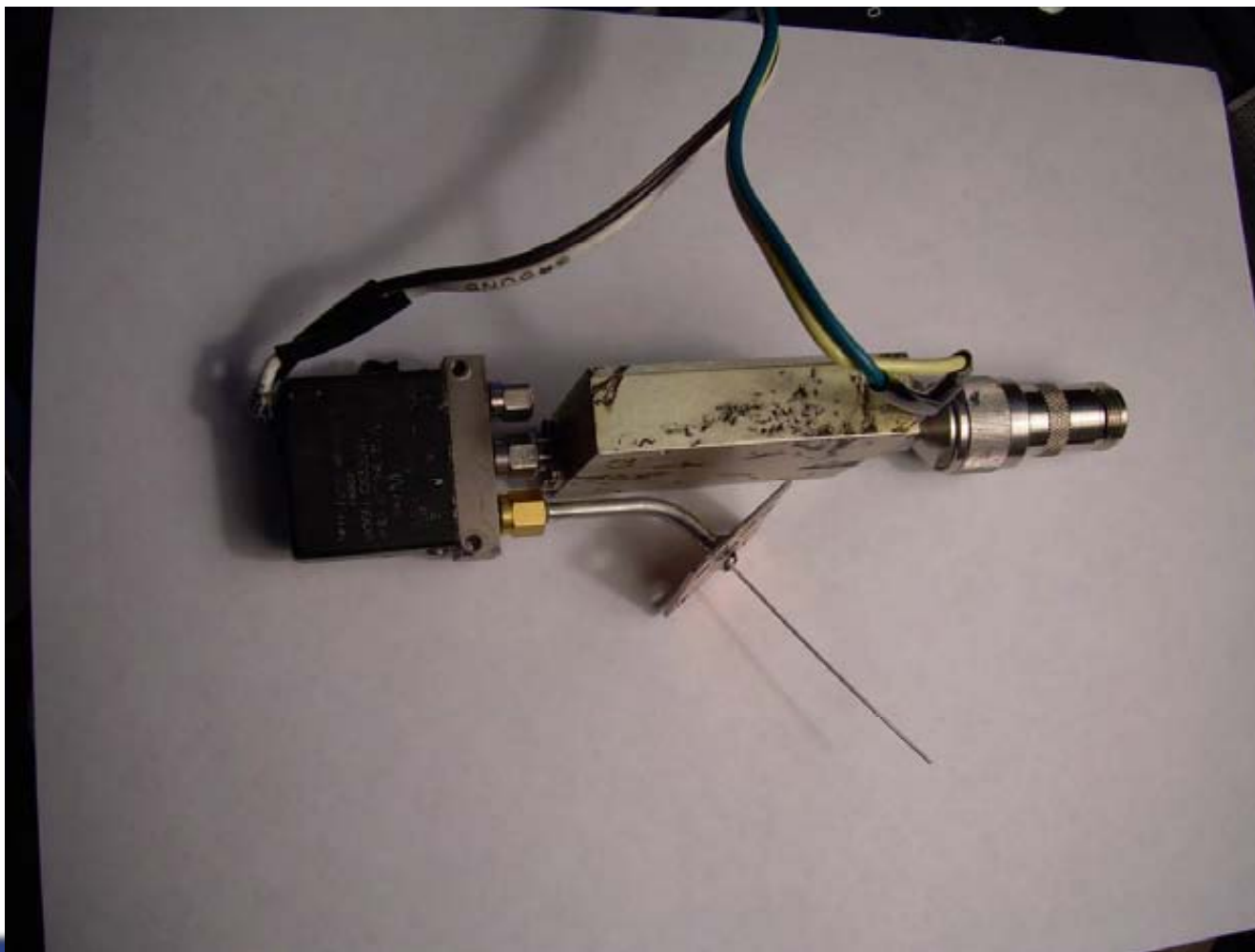
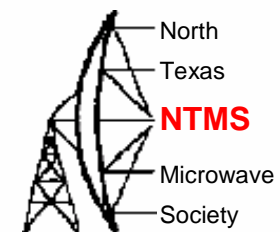


# WA5WCP Portable EME Operation: Summer 2007

# Meanwhile back at the ranch in Texas

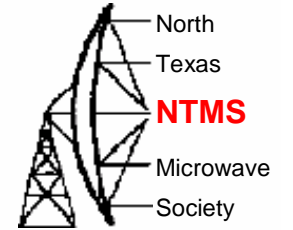


# A better transition between the feed and the LNA

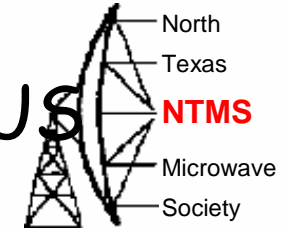




# Late night hours at WA5WCP



## Part II: Summer 2007 EME Portable NW US

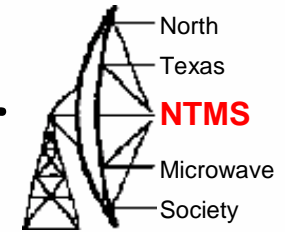


Wyoming – Discussions with Rev WS7W and Chris WY7UPR netted us a location at the Rock Springs Airport hosted by Judy and Gary Valentine N7RUG & N7OQP

Utah – Discussions with Pat K7LNP, Clint KA7OEI, and Mel Parks steered us to Dave WA7GIE who works for the city of Toole, Utah at an expense paid campground

Idaho – First talked to Jeff W7ID then Al WA7GSK in Boise but then K5GW had a customer come into his store by the name of Dee Larsen, KD7DL, Idaho Falls, Idaho who offered his driveway for the setup!

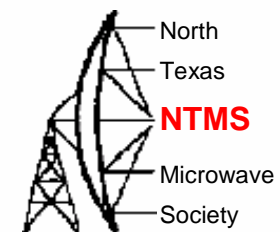
# Wyoming At Rock Springs Airport



Set up on top of the Plateau Ready for Moon Rise : An amazingly Quiet location. A little amp trouble.

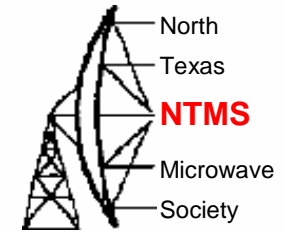


# Toole, Utah



WC7X Jim and WA7GIE Dave help with antenna assembly

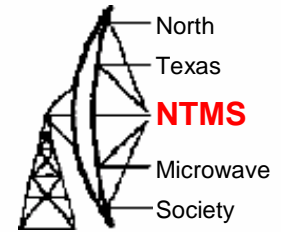
# Toole, Utah



Mason watches as Charles W7OTO, Dave WA7GIE, Andy KD7DBB (Mason's Dad), and Jim WC7X work in the antenna



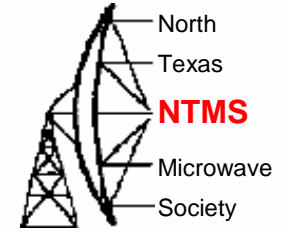
# Toole, Utah



WI7P - Randy Looks Over the Mount Design

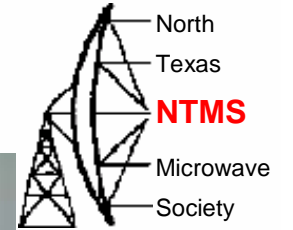


# Toole, Utah



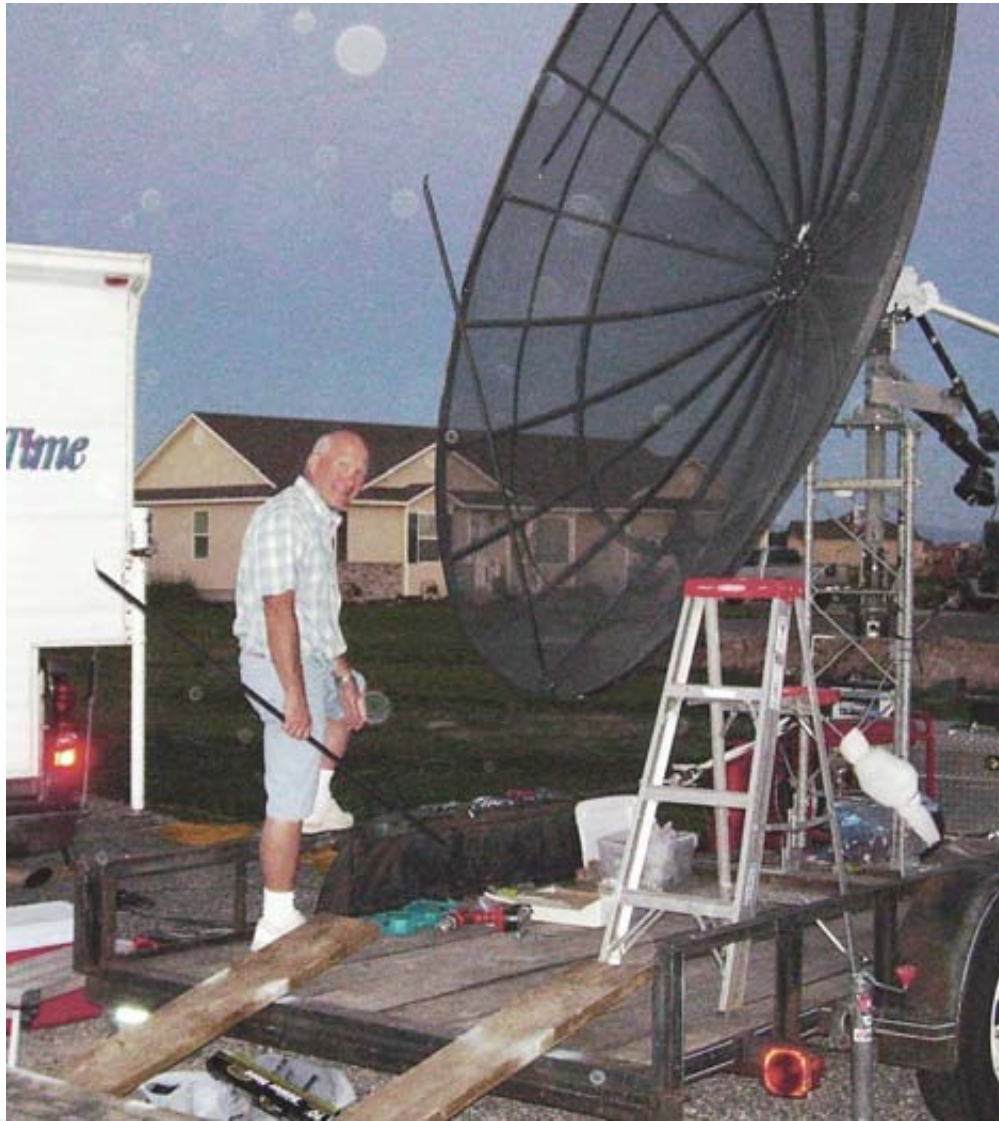
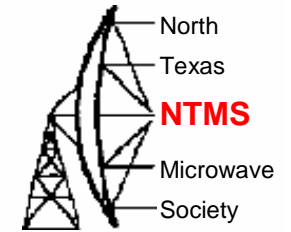
Now some EME QSO's with the *Great Salt Lake* in the background.

# At Idaho Falls, Idaho



Home QTH of Dee KD7DL

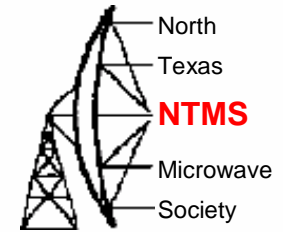
# At Idaho Falls, Idaho



KD7DL helping with the set up: Dee and his wife were great hosts. I got home cooked meals and even hand delivered chocolate cookies!

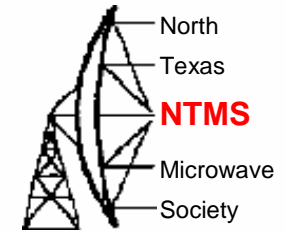


## Summary of Ops in NW USA



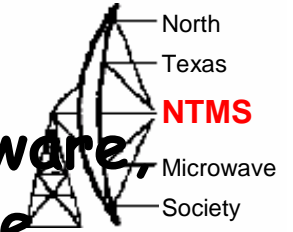
- On 1296 MHz: 77 Contacts : 33 Stations, 15 Countries, 12 US States
- 1296 MHz: 14 Stations From All Four Locations
- 2304 MHz: 10 Contacts with 7 stations
- DF3RU, DJ9YW, DL4MEA, ES5PC, F2TU, G4CCH, JA4BLC, K1RQG, K2UYH, K5JL, K5SO, K9SLQ, KL6M, LA9NEA, N0OY, N2UO, OE9ERC, OK1CA, OK1DFC, OK1KIR, OZ4MM, OZ6OL, PA3CSG, RW1RW, SM2CEW, SM2AKW, VE6TA, VK3UM, W2DRZ, W5LUA, W7BBM, WA6PY, WW2R

# Lessons Learned : Portable EME



- **Scouting Locations is Critical to Success ( UHF and Up operators have unique requirements: “Clear Horizon”)**
- **Consider Ground Stability**
- **Being Level for Operating Position is a good thing**
- **Breakdown/ Pack – Move – Setup in One Day is Very Challenging**
- **Calibration is Not Super Critical, but A Minimal Level of Attention is a Necessity for 10 ft Dish at 1296MHz**
- **Scheduling vs. Random Contacts Method needs More Consideration**
- **Operation of Two Bands : 1296 MHz and 2304 MHz  
=> Most Likely Needs More than 2 Moon Rises**
- **To Work 10 ft Dish Stations, More Aperture / More Power Needed**

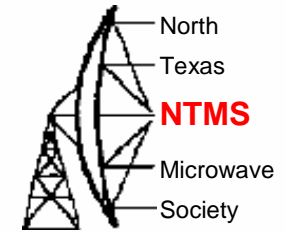
# Big Thanks to: The Folks that made this possible with Hardware, Software, and Encouragement / Tolerance



- W5LUA - Al
  - K5GW - Gerald
  - K1RQG - Joe... Scheduling
  - WD5AGO - Tommy
  - W1JJ, K7BV, N1UR, NC1I, W1QF, Judy and Gary Valentine, WA7GIE, AG7A, W7OTO, KD7DBB, WC7X, WI7P, KD7DL, and families / friends
  - K5JL - Jay, KOYW- Bruce and the Hawaii group, KOALL - Ron, VE4MA - Barry, N5AC - Steve, WB5AFY - Dan, WB5NNE - John, KD5SXH - Millie, KD5YKV - John Andrew
  - Cathey Lou & Emily
- And Erik for maintaining the 16ft trailer

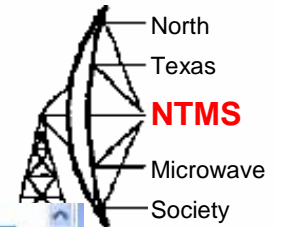


# Scheduling and Coordination



- Time scheduling by K1RQG, the 432 and Above EME Net Control (14345 kHz) was paramount in maximizing QSO success
- Announcements in the “432 MHz and Above Newsletter” by K2UYH
- Daily Updates on “Moon” and “Moon-Net” because nothing goes according to plan, right?

# [www.arrl.org](http://www.arrl.org) Sept 8, 2007



**ARRL** The national association for AMATEUR RADIO

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## Amateur Radio News

[Current News](#)
[RSS](#) [What's This?](#)

**Al Ward, W5LUA, Makes 1296 MHz WAS #1** (Sep 8, 2007) -- Al Ward, W5LUA, of Allen, Texas, is the first person ever to achieve the ARRL's Worked All States (WAS) on 1296 MHz, making him 1296 MHz WAS #1. Ward first started on his pursuit January 25, 1977, with his first 1296 MHz contact with Leroy May, W5HN (SK). His 30 year quest ended just this week, with confirmed contacts with Wyoming, Utah and Idaho, giving Ward his last three needed states, thanks to Paul Perryman's, WA5WCP, [EME DXpedition](#). "I couldn't have done this without Paul," Ward said. "Also, thanks to Ron Roche, K0ALL, and Barry Malowanchuk, VE4MA, in North Dakota for number 47 in August. Without them, it just wouldn't have been possible." After collecting his 50th QSL card, Ward drove from his home in Texas to Little Rock, Arkansas so ARRL President Joel Harrison, W5ZN, could verify his cards and complete his WAS paperwork. "Verifying QSL cards from 30 years of activity brought back a lot of memories of several stations active on 1296, many who are Silent Keys now," Harrison said.

**ARRL North Texas Section**

**The Diamond Terrace at ARRL**

The Diamond Terrace at ARRL, honoring radio amateurs and their friends  
[Donate to place a brick](#)

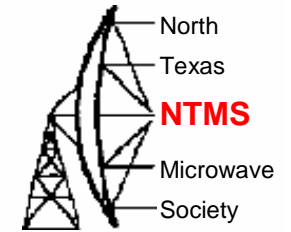
**This month in...**

QST-NCJ QEX-

**Current Feature Articles**

- [Sep 07 Surfin': DCC at BDL](#)
- [Sep 01 It Seems to Us: When All Else Fails... Amateur Radio](#)

# EME on the Microwave Bands

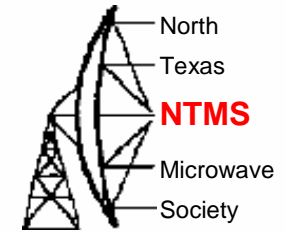


<b>Band</b>	<b>Frequency Range</b>	<b>Weak signal work in NA</b>
<b>33 cm</b>	<b>902 to 928 MHz</b>	<b>902 MHz</b>
<b>23 cm</b>	<b>1240 to 1300 MHz</b>	<b>1296 MHz</b>
<b>13 cm</b>	<b>2300 to 2310 MHz</b>	<b>2304 MHz</b>
	<b>2390 to 2450 MHz</b>	
<b>9 cm</b>	<b>3300 to 3500 MHz</b>	<b>3456 MHz (3400 MHz used for EME)</b>
<b>6 cm</b>	<b>5650 to 5925 MHz</b>	<b>5760 MHz</b>
<b>3 cm</b>	<b>10000 to 10500 MHz</b>	<b>10368 MHz</b>
<b>1.25cm</b>	<b>24000 to 24250 MHz</b>	<b>24192 MHz (24048 MHz used for EME)</b>
<b>.6 cm</b>	<b>47000 to 47200 MHz</b>	<b>47088 MHz</b>
<b>.35 cm</b>	<b>77000 to 81000 MHz</b>	<b>allocation changing</b>

**Not all countries have same allocation as us.....**



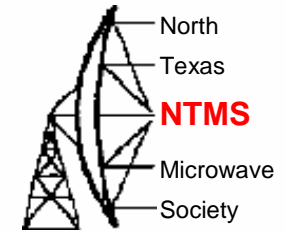
# 5 Meter Dish at W5LUA



**Used for  
EME on  
902 MHz  
1296 MHz  
2304 MHz  
3456 MHz  
5760 MHz  
10368 MHz**

May use on 222  
and 432 MHz  
Also considered  
use as a 2.5M  
offset fed dish for  
24 GHz

# AZ EL Mount for 5 Meter Dish

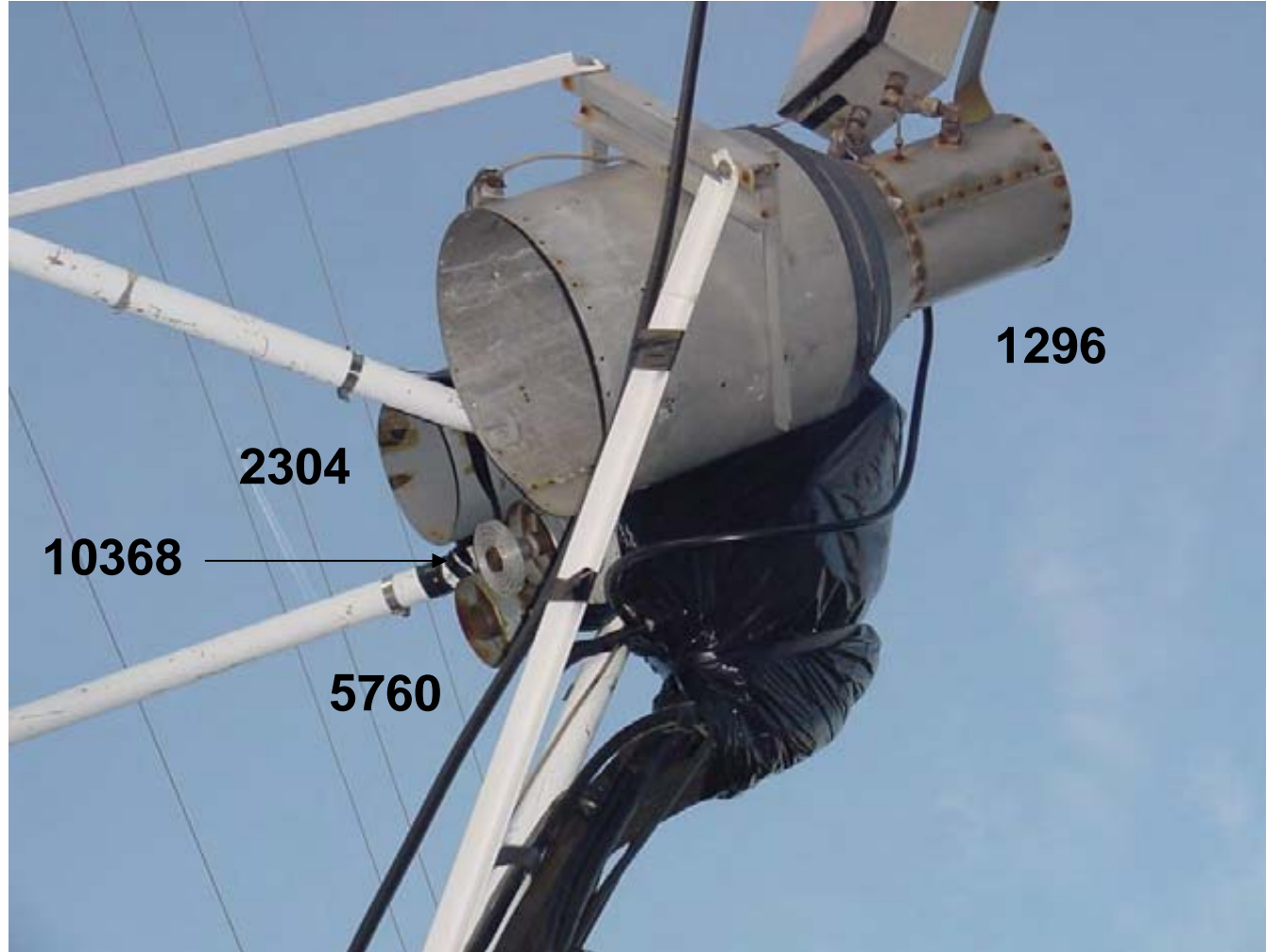
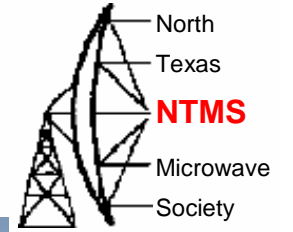


Hydraulics for elevation drive

Prop pitch rotor for azimuth drive

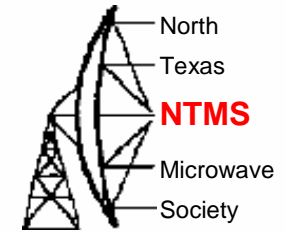
US Digital Absolute Encoders for readout and K5GW tracking program

# Multi-Band Feed System



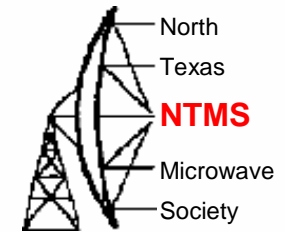


# EME Net



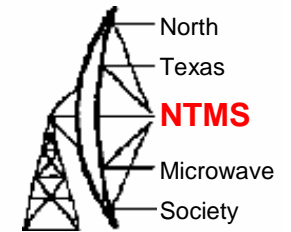
- Meets Saturday and Sunday Mornings at 9AM Central time on 14.345 MHz – NET Control is K1RQG – Excellent for scheduling new stations and expeditions
- Also available via the internet courtesy of K0TAR <http://taring.org/>
- Weekly NET notes also available from K1RQG by emailing Joe at [k1rqq@aol.com](mailto:k1rqq@aol.com)
- Also informal activity during the week on 14.345 MHz starting at 9AM Central and 3846 kHz every evening

# 432 MHz and Above EME Newsletter



- Edited and distributed monthly by Al Katz, K2UYH since 1972 – send reports to [a.katz@ieee.org](mailto:a.katz@ieee.org)
- Available from Rein W6/PA0ZN via the internet at <http://www.nitehawk.com/rasmit/em70cm.html>
- Available from Warren Butler [wbutler@comcast.net](mailto:wbutler@comcast.net) in .pdf format

# International EME Conference

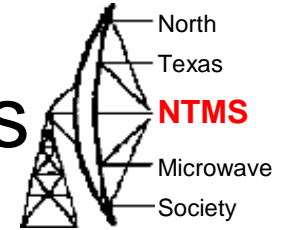


- DF6NA and his group sponsored the 2006 Int'l EME Conference in Wuerzburg, Germany in August. 140 amateurs from all over the world were in attendance
- The 2008 Int'l EME Conference will be held in Florence, Italy

<http://www.ari-crt.it/eme2008/>



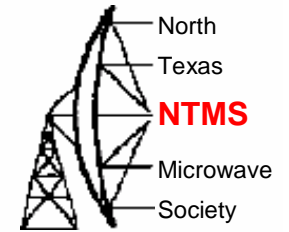
# EME Reflectors, Chat Room & Loggers



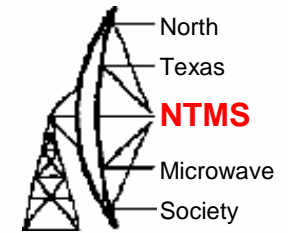
- Moon-Net - <http://www.nlsa.com/nets/moon-net-help.html>
- Moon - <http://www.moonbounce.info/mailman/listinfo/moon>
- ON4KST CW/JT65/Microwave Chat Room - <http://www.on4kst.com/chat/start.php>
- HB9Q Loggers - <http://hb9q.ch/joomla/index.php>



# Websites for more Information



- NTMS – <http://www.ntms.org/>
- WW2R - <http://www.g4fre.com/radio.htm>
- VE1ALQ - <http://www.ve1alq.com/>
- F1EHN - <http://www.f1ehn.org/>
- W2DRZ -  
<http://www.w2drz.ramcoinc.com/index.htm>
- W1GHZ – <http://www.w1ghz.org/>



We hope you enjoyed your lunch and  
our presentation

73

Al Ward W5LUA

[w5lua@sbcglobal.net](mailto:w5lua@sbcglobal.net)

Paul Perryman WA5WCP

[wa5wcp@hotmail.com](mailto:wa5wcp@hotmail.com)