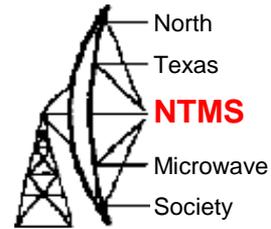


Welcome to The North Texas Microwave Society Cowtown Jan 21, 2023

- **WA5VJB – Kent Britain**
 - Microwave are easy
- **KM5PO – Jim McMasters**
 - NTMS & Equipment/Antennas/Activity
- **Question and Answer**

The North Texas Microwave Society was formed in 1986



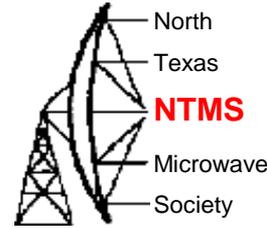
**Dedicated to Promoting Activity, the
State of the Art in Equipment Design,
and
the Exchange of Ideas and Technology
for the Amateur Bands Above 902 MHz**



**President – Jim McMasters KM5PO
Vice President – Scott Armstrong AA5AM
Secretary – Eric Haskell AG5XV
Treasurer - Wes Atchison WA5TKU
Web – Jim McMasters KM5PO**



NTMS Groups.io



Groups.io Your Groups Find or Create a Group

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- New Poll
- Chats
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- Photos
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- Wiki

NTMS@groups.io / Topics

Topics # Hashtags Filter

Drying Out Hardline? 2
 I'm seeking information from the collective wisdom of the group. I have several pieces of LDF6 & LDF7 hardline that show signs o
 By Robin Midgett · Jan 19 ·

Programming Kenwood Radios
 George Byrkit, K9TRV who has been involved with TAPR and other ham groups ask me to pass this along: If you have a Kenwoo
 By Bob Stricklin[N5BRG] · Jan 19 ·

FW: [microwave] Fw: [10GHz-Up] Large W2IMU dual-mode feedhorns for the higher micrwave bands 🔗
 Hello NTMS Paul W1GHZ has been busy working on W2IMU feeds for the upper bands. 73 Al From: microwave@SLAMS.groups
 By Al Ward · Jan 18 ·

Cowtown Speaker Program
 Fyi, https://m.facebook.com/story.php?story_fbid=pfbid0t6HQmyXjXyoVMmtPgE1Vv1QvRQhiagbKnFNvii6RMWqDy4UeUvqWqD
 By wa5jat/Jim Hudson · Jan 18 ·

uW Micrommeet 2023 🔗
 A Zoomed Microwave Event Kent From: Maximo EA1DDO - M0HAO - HK1H <ea1ddo@...> To: UKMicrowaves@groups.io <ukmi
 By KENT BRITAIN · Jan 18 ·

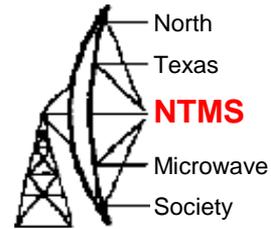
EMI Chamber
 Sort of an update! On Tuesday, January 17, 2023 at 06:20:29 PM CST, KENT BRITAIN <wa5vjb@...> wrote: Got some testing I N
 By KENT BRITAIN · Jan 17 ·

EMI Chamber
 Got some testing I did to do with some lads in the greater Plano area. Anyone know of an EMI chamber for sale, or one we can us
 By KENT BRITAIN · Jan 17 ·

ARRL 10 GHz and up contest results
 NTMS- Results from last year's 10 GHz and up contest are published in the February 2023 issue of QST. Displayed prominently o
 By Jim McMasters · Jan 17 ·

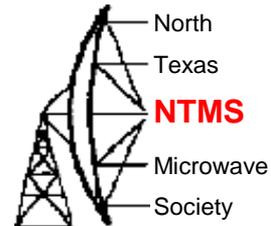
Lunch at Cowtown Hamfest 2 🔗

Calling Frequencies for Weak Signal Work on CW and SSB and EME



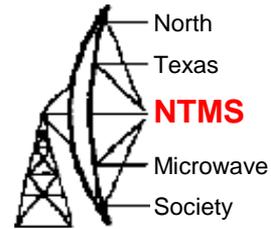
Band	Weak Signal Calling Frequency
• 902-928 MHz	902.1 MHz (902.0 to 902.150 used for EME)
• 1240-1300 MHz	1296.1 MHz (1296.0 to 1296.2 used for EME)
• 2300-2310 MHz	2304.1 MHz (2304.0 to 2304.2 used for EME)
• 2390-2450 MHz	2400.1 MHz (used only for EME to work Japan)
• 3400-3450 MHz	3400.1 MHz (3400.0 to 3400.150 used for EME)
• 5650-5925 MHz	5760.1 MHz (5760.0 to 5760.2 used for EME)
• 10.0-10.5 GHz	10368.1 MHz (10368.0 to 10368.2 used for EME)
• 24.0-24.25 GHz	24192.1 MHz (24048.0 to 24048.2 used for EME)
• 47.0-47.2 GHz	47088.1 MHz (47088.0 to 47088.2 used for EME)
• 76 - 81.0 GHz	78192.1 MHz and 76032.1 MHz (up to .200 EME)
• 122.25 - 123 GHz	
• 134 - 141 GHz	
• 241-250 GHz	
• All above 275 GHz	

NTMS Activities



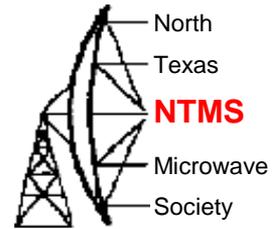
- Regular meetings with informal “bull and swap” session followed by technical presentations
- Noise figure and network analyzer test sessions at meetings or at members houses
- Antenna range for measuring antenna gain
- Equipment Construction
- Contesting
- Social events
- Sponsor Microwave Update conference

2023 NTMS Calendar



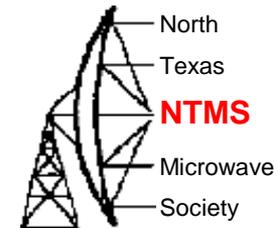
- Feb 4 - In person NTMS meeting & simultaneous Zoom
Cozby Library – Coppell Texas
- ~ March – winter NTMS activity event
- April 15 – Ham EXPO Spring 2023 -- The Belton Hamfest,
Belton Texas
- April 14/15 – Microwave update, Windsor Connecticut
- May 6 - In person NTMS meeting & Zoom
- ~ May 20 – spring NTMS activity event
- June – ARRL VHF, Field Day
- July 1 – In person NTMS meeting & Zoom
- August – 10 GHz & up contest
- September – 10 GHz & up contest, ARRL VHF
- October – EME contest, Social gathering
- November – EME contest
- December 2 – In person NTMS meeting & Zoom

Weekly Lunches



- East Side - Tuesday 11:30AM
Texas SmokeHouse BBQ
800 E. Arapaho Rd, Suite #101
Richardson, TX 75081

North Texas Beacons



North Texas Microwave Society area Beacon Status updated October 30, 2022

Freq (MHz)	Call	Grid	Power	Antenna	Height above Ground	Status		Stabilization	Freq Reference	Keying
50.073	W5HN/B	EM13sj	.5 W	Halo	180 ft	OFF THE AIR (1)	HB	Crystal	12.51825 MHz	on/off
144.280.2	W5HN/B	EM13sj	1.5 W	Halo	180 ft	ON THE AIR	HB	Crystal	12.0233 MHz	on/off
222.060	AA5C/B	EM13se	8 W	Folded Dipole	53 ft	ON THE AIR	HB	PLL	10 MHz	on/off
432.370	N5PYK/B	DM93bm	50 W	Yagi towards DFW	70 ft	ON THE AIR		XCVR		on/off
432.380	W5HN/B	EM13kf	.8 W	Halo	280 ft	ON THE AIR	HB	ADF4351	10 MHz OCXO	on/off
903.050	W5HN/B	EM13kf	9 W	Alford Slot	280 ft	ON THE AIR	HB	N5AC PLL	10 MHz OCXO	on/off
1296.375	W5HN/B	EM13kf	3 W	Alford Slot	280 ft	ON THE AIR	HB	N5AC PLL	10 MHz OCXO	on/off
2304.366	W5HN/B	EM13kf	4 W	Alford Slot	280 ft	ON THE AIR	HB	Crystal		FSK
3456.380	W5HN/B	EM13kf	250 mW	Alford Slot	280 ft	OFF THE AIR	DB6NT	Crystal X 27	128.014 MHz	FSK
3400.380	W5HN/B	EM13kf	250 mW	Alford Slot	280 ft	BEING UPGRADED (2)	DB6NT	ADF4351	125.94 MHz	on/off
5760.364	W5HN/B	EM13kf	158 mW	Alford Slot	280 ft	ON THE AIR	DB6NT	Crystal X 48	120.0079 MHz	FSK
10368.368	W5HN/B	EM13kf	2.5 W	Alford Slot	280 ft	ON THE AIR	DB6NT	Crystal X 96	108.00395 MHz	FSK
24192.300	AA5C/B	EM13sf	500 mW	16-slot WR42	75 ft	ON THE AIR	HB	Crystal	112.0015 MHz	on/off
24192.380	W5HN/B	EM13kf		10 slot Alford	280 ft	Under Construction (3)	HB	ZL PLL		on/off
47088.300	W5HN/B	?				Under Construction				

Notes

- (1) Waiting for a tower climb to put antenna back up at 60ft
- (2) Working on cleaning up spurs
- (3) ETA 2023

Actual 10 digit grid squares

EN13sj = EM13sj91mr

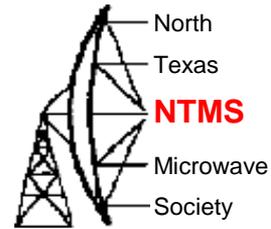
EM13se = EM13se55vi

DM93bm = DM93bm46su

EM13kf = EM13kf45pb

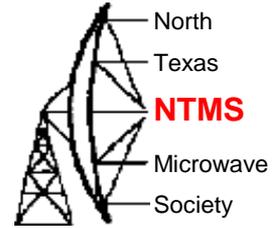
EM13sf= EM13sf89tb

NTMS Sunday Night NET

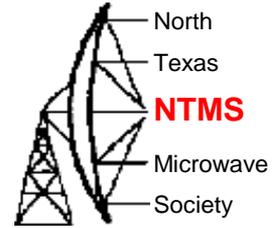


- Local to DFW gathering on 144.260 MHz USB starting at 8PM
- Generally run by Ross K5ZSJ from the Carrollton area
- Very informal

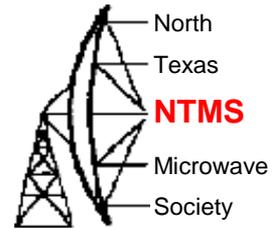
Meeting and Tune-up Party at N5BRG's QTH



Previous gathering Testing - Show and Tell - Build



10 GHz Antenna Range



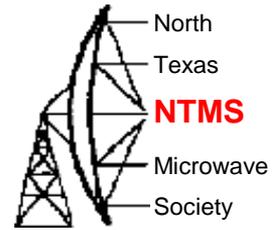
**St. Barnabas Church
parking lot antenna range.**

Kent, WA5VJB and Jim, WA5JAT

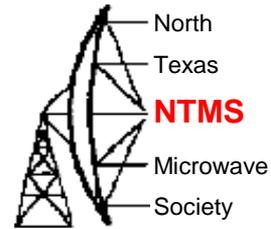


Jim, KOMHC and Jim, WA5JAT

Previous gathering Testing - Show and Tell - Build

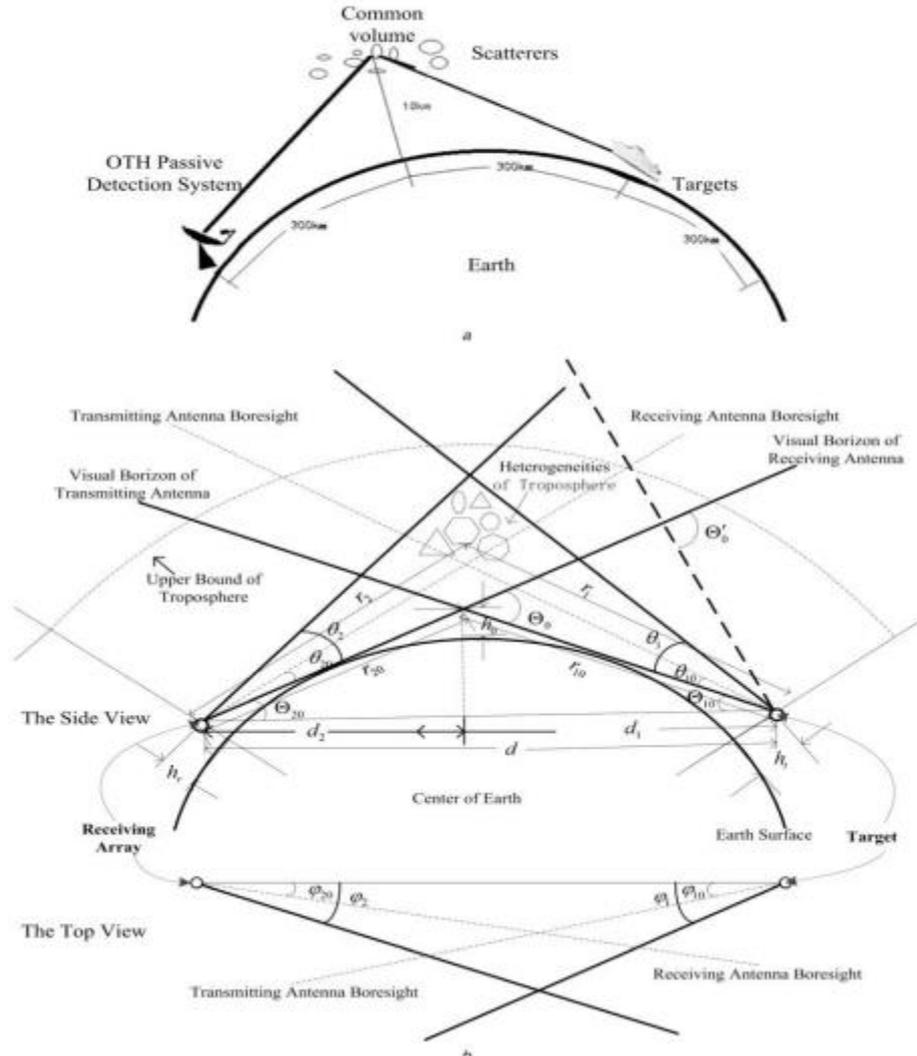


Microwave Propagation



- Terrestrial weak signal CW/SSB/WSJT modes – work up to 1000 miles plus under the right tropospheric conditions
- Rain & Snow Scatter CW/FM – work hundreds of miles
- EME (Earth – Moon - Earth) CW/SSB/WSJT Modes

Common volume!



Rainscatter



WQ0P-N00Y contact 10
GHz 91 miles

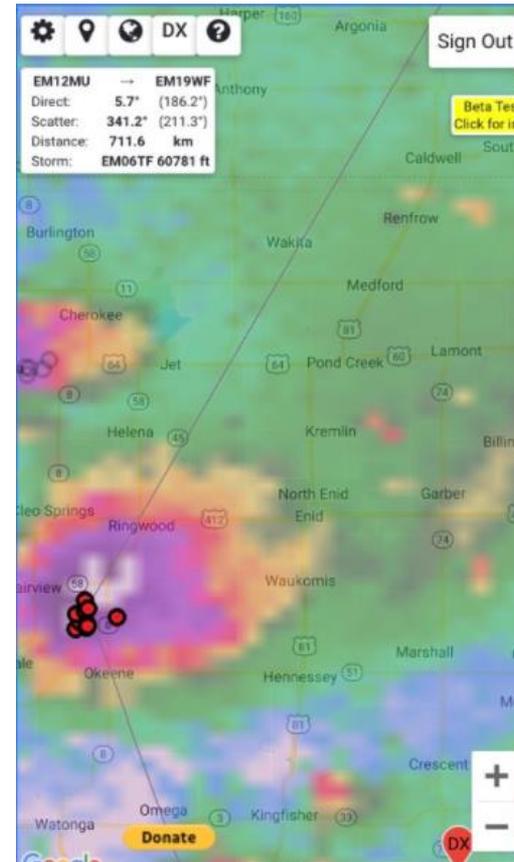
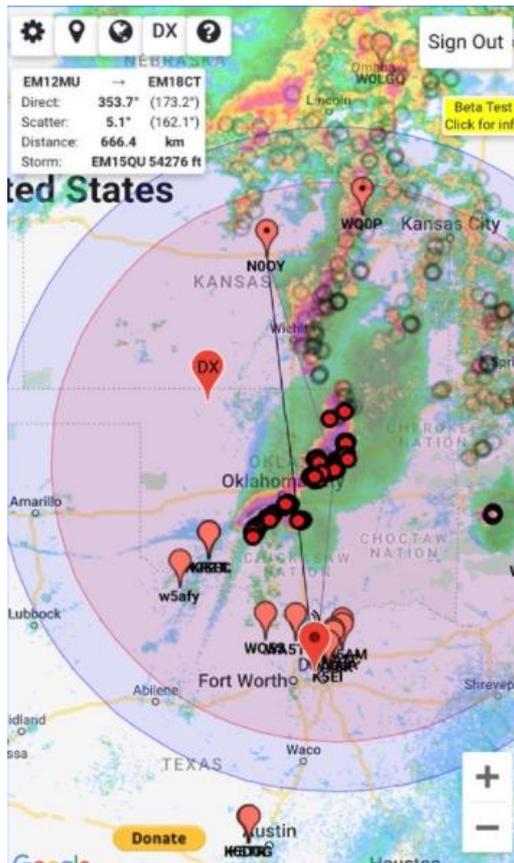
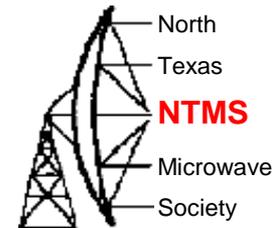
<https://youtu.be/60LiQkfdz5o>



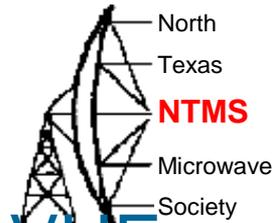
WQ0P-KM5PO **FM voice contact** 10 GHz
442 miles – 711.6 km.

<https://youtu.be/uBHhppoH9w>

Rainscatter tools

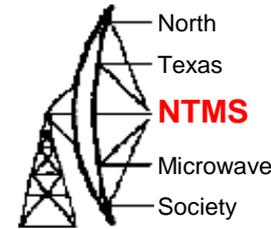


Getting on Microwave



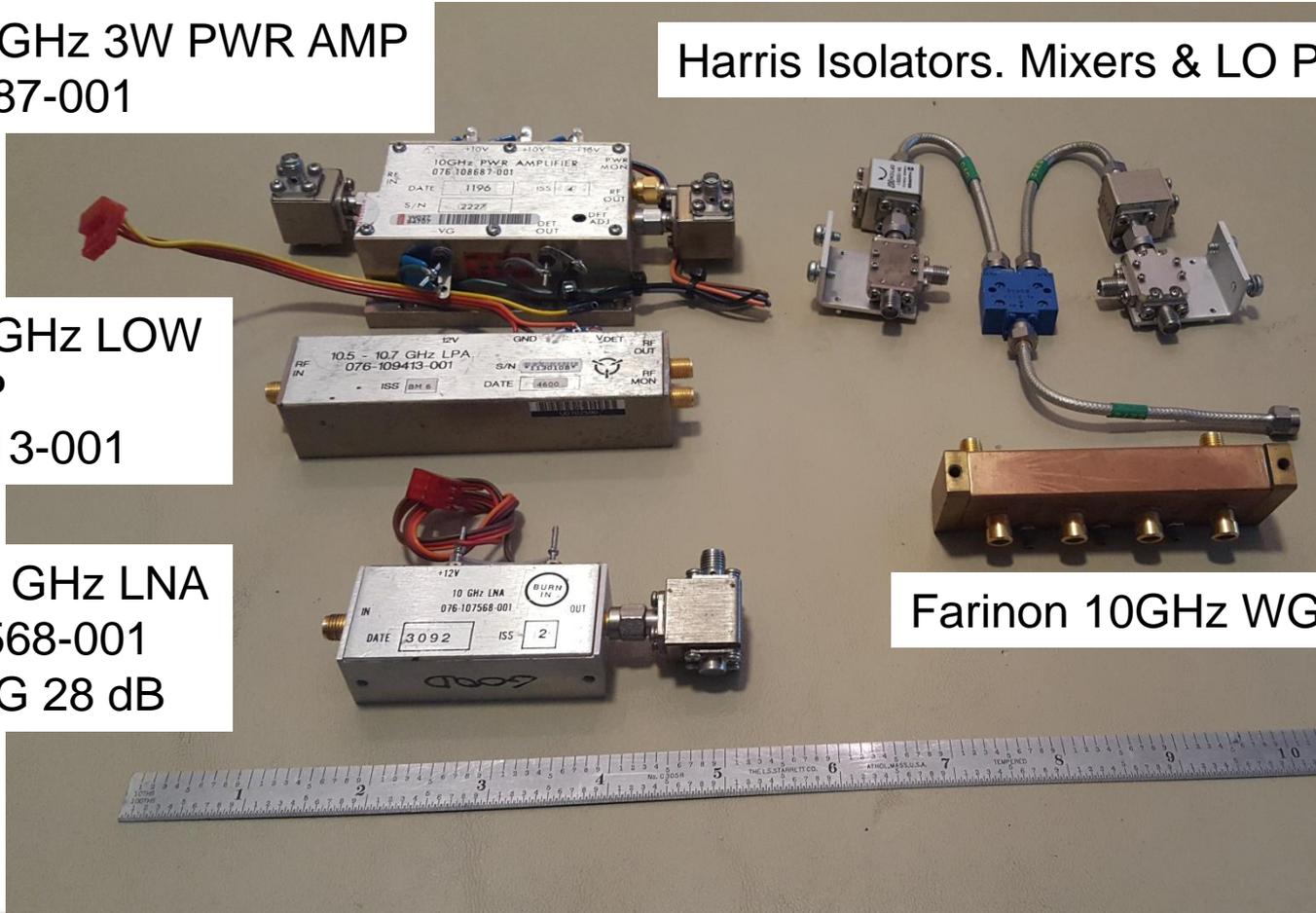
- Conventional method is to use your favorite VHF Multiband SSB-CW Transceiver and connect to a Transverter.
- A transverter uses a local oscillator and mixers to upconvert from an IF like 2m to an RF frequency like 10368 MHz on transmit and the reciprocal on receive.
- As an example an LO of 10224 MHz can be used to mix with 144 MHz to achieve 10368 MHz
- Now to build or buy?

Various 10 GHz surplus items that could be used to build a transverter



Harris 10 GHz 3W PWR AMP
076-108687-001

Harris Isolators. Mixers & LO Pwr Divider

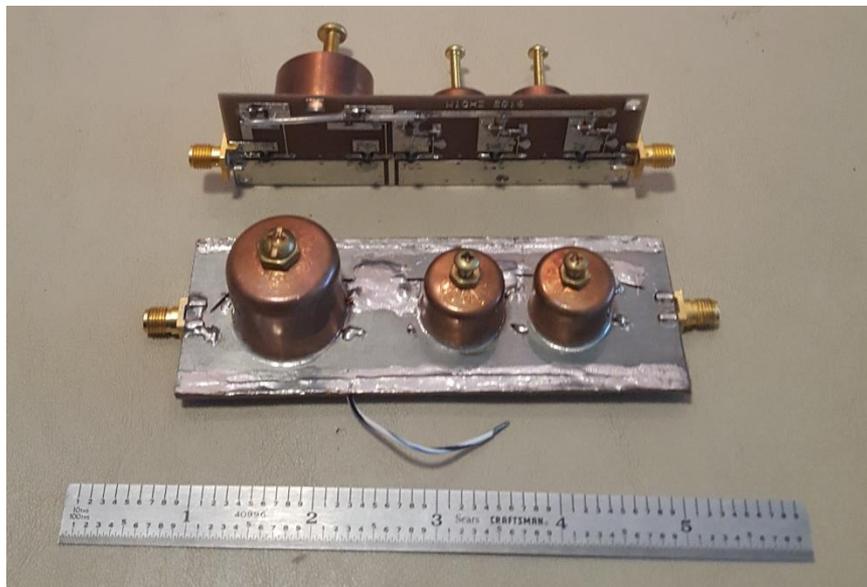


Harris 10 GHz LOW PWR AMP
076-109413-001

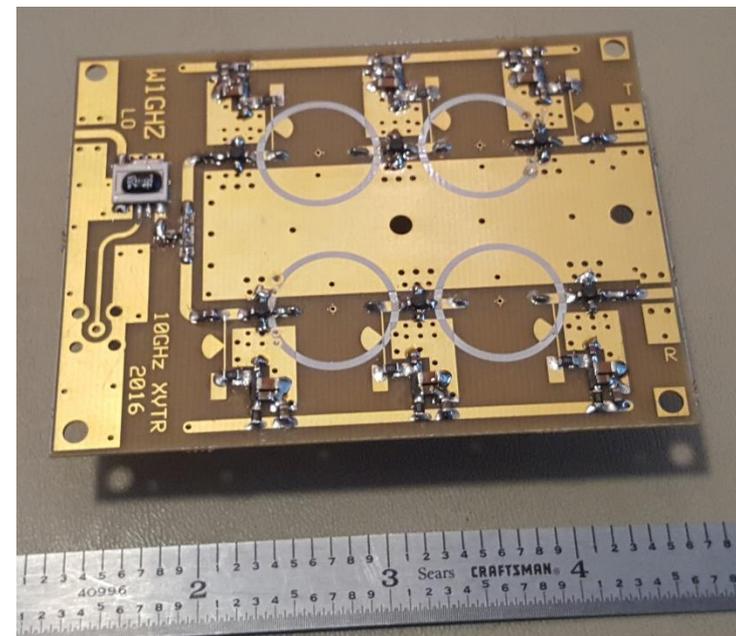
Harris 10 GHz LNA
076-107568-001
NF 2dB, G 28 dB

Farinon 10GHz WG Filter

Paul Wade makes numerous circuit boards for many microwave projects.
Here are 2 PCBs for 10 GHz

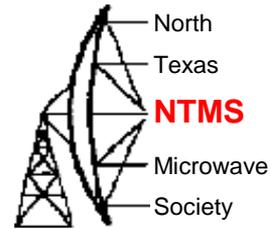


X9 Multiplier
 $F_{in}=1136 \text{ MHz}$ $F_{out}=10224 \text{ MHz}$

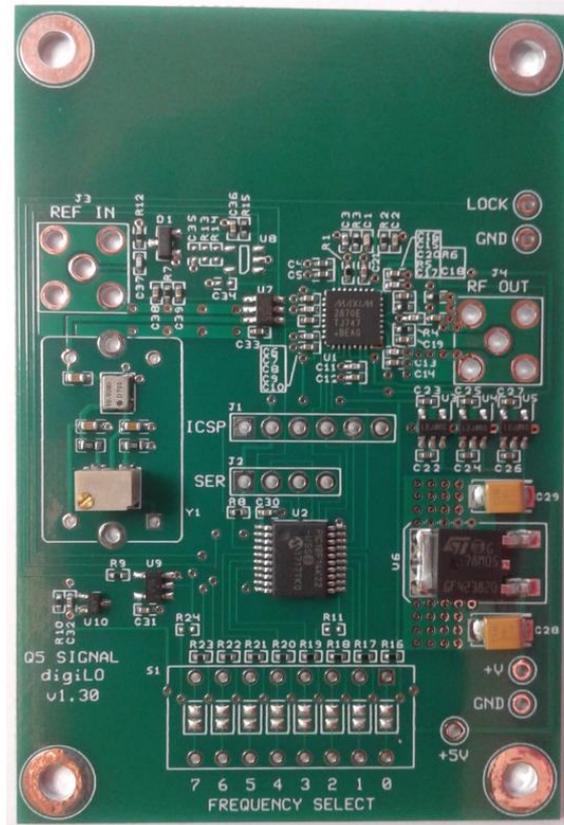


10 GHz Transverter 10368 MHz to 144 MHz
 LO in = 10224 MHz

Local Oscillator Units

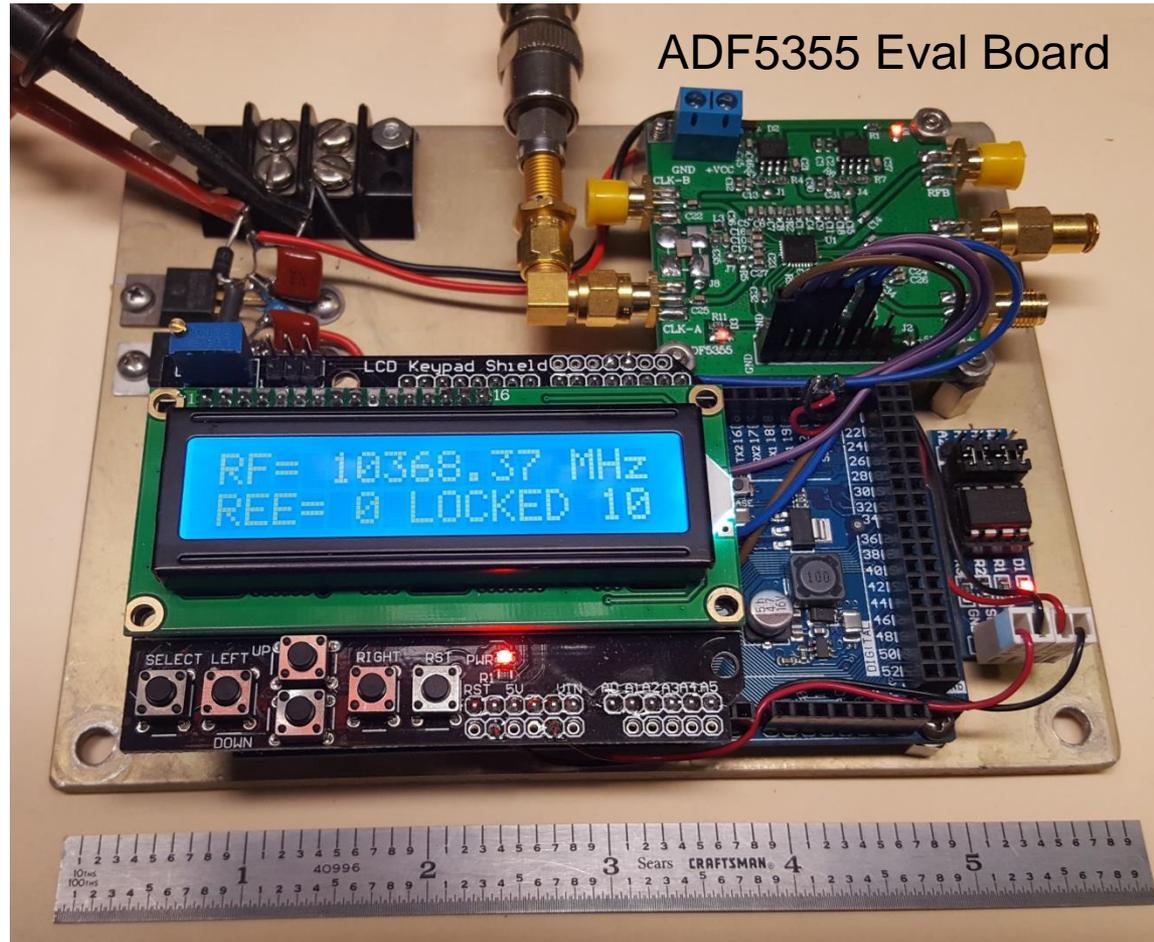
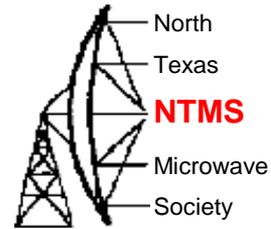


DEMI/Q5Signal
DigiLO PLL
23.5MHz -
6GHz
Internal Ref or
External 10 MHz
Ref



ADF5355 PLL Synthesizer

54 MHz to 13.6 GHz



Presentation on
www.ntms.org

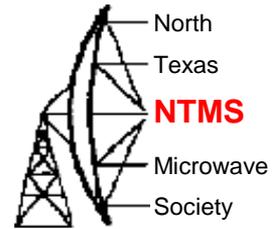
- Knowledge Base
- At the meetings
- September 2017

“ADF-4351 and ADF5355
 Update by Greg McIntire
 AA5C

Arduino Due & LCD
 Shield & EEPROM Board

Built by W5LUA

Most Popular Commercial XVTRs



DB6NT



<https://shop.kuhne-electronic.com/kuhne/en/shop/>

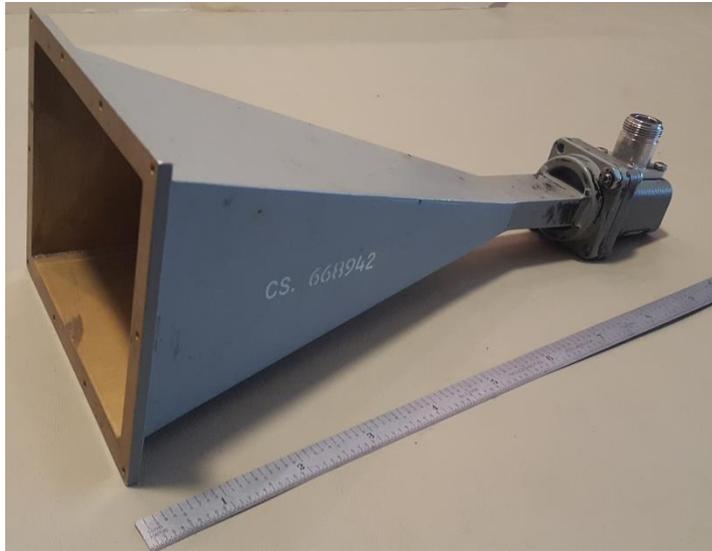
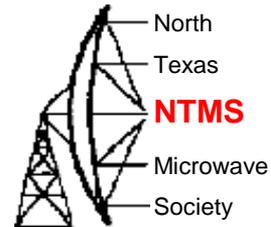
DEMI



<https://www.downeastmicrowave.com/>

Others as well...

Antenna options for 10 GHz



4.3" X 2.3" Horn
 $G = 20$ dBi
 3dB Beamwidth ~ 17 deg

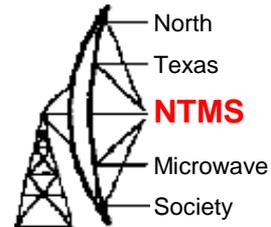


8" Offset Fed Dish
 $G = 25$ dBi
 3dB Beamwidth ~ 9 deg



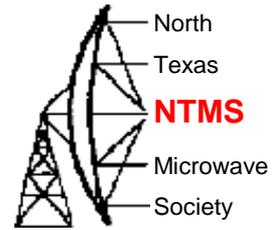
18" Offset Fed Dish
 $G = 32$ dBi
 3dB Beamwidth ~ 4.3 deg

Roving on 10 GHz



- The major event for the NTMS is to participate in the ARRL 10 GHz and Up Contest in both August and September
- Some stations operate from home and a number of stations are rovers.
- The object of the contest is to work as many stations in as many 6 digit grid squares as possible. Rovers are required to move at least 16km (10 miles) before a station is reworked. Every contact has a distance multiplier in km. The sum of the distance multiplier plus 100 points for each unique call sign provides the total score.
- See Feb 2023 QST for results. Full report will be at <http://contests.arrl.org>

WA5YWC (sk) in 2019 ARRL 10GHz Contest



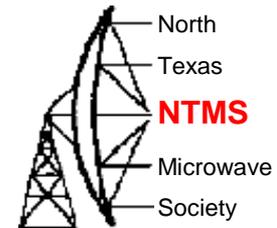
Operating position in cab of truck

2 ft prime focus dish in bed of truck

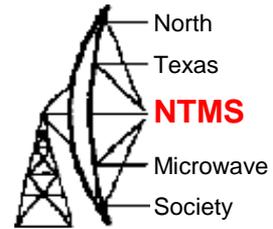


November 21, 1944 – October 21, 2018

K8ZR/R 24 GHz EM24tq Sept 16, 2017



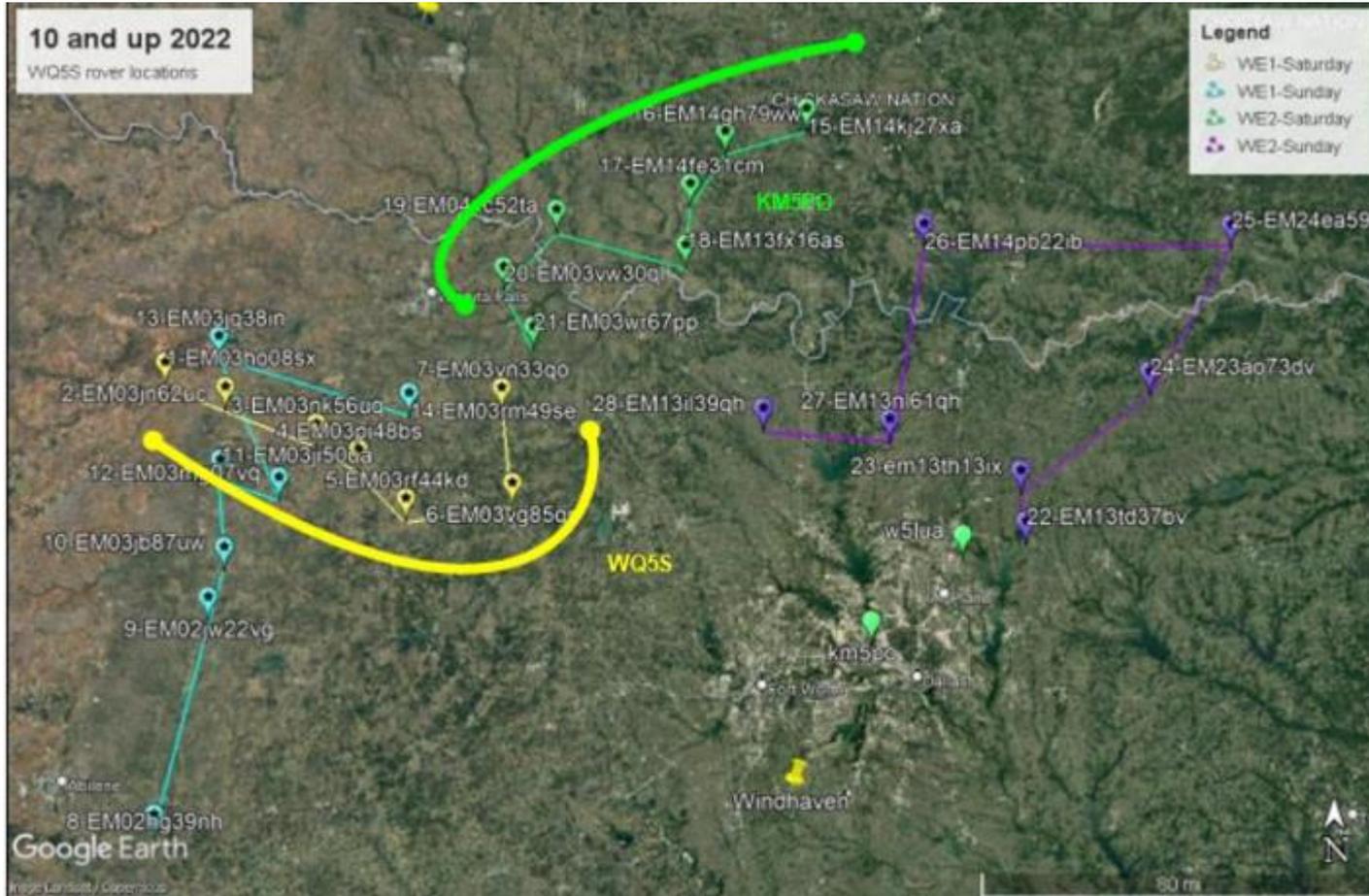
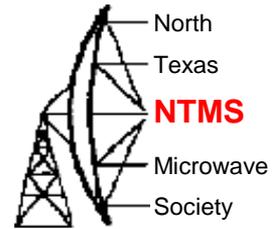
NTMS 10 GHz and up contest results 2022



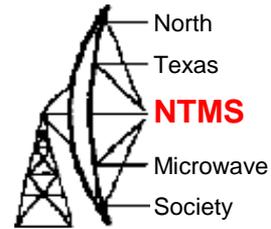
10 GHz	
Call	Score
WB5ZDP	12,835
W5VY/R	6,116
K5LLL	2,558
WA5TKU	2,467

10 GHz and up	
Call	Score
WQ5S/R	25,532
W5LUA	13,516
AA5C	12,026
AA5AM	9,802
KM5PO/R	9,295

WQ5S/KI5EMN/KM5PO 2022



WQ5S/R 10 GHz and up contest results

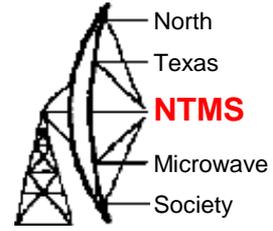


10 Ghz-147 QSOs
1000 - Points for Unique Calls
24251 - DX points
25251 – 10 GHz points

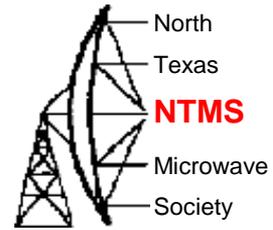
24 GHz- 10 QSOs
300 - Points for Unique Calls
347 – DX points
647 – 24 GHz Points
Total Score submitted 25,898!

WQ5S 10/24 GHz Rover 2022

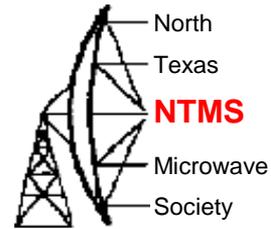
10 GHz and up contest



WQ5S working rainscatter 2022 10 GHz & up contest

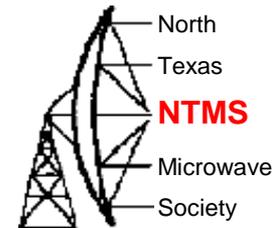


Initial AA5AM 10 GHz Success



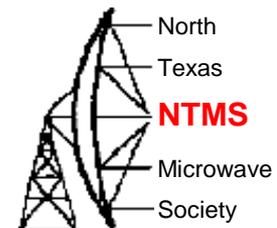
Double Balanced Mixer and 8 inch
offset fed dish
W5LUA worked at 13 miles
Scott also heard W5RLG at 68 miles
And N5WCO at 56 miles
Scott has since improved his station
to a larger dish plus 1watt PA and
LNA

K5TRA's Attic 10 GHz Antenna

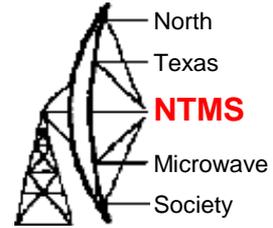


W5LUA worked K5TRA on 10 GHz at a distance of over 200 miles

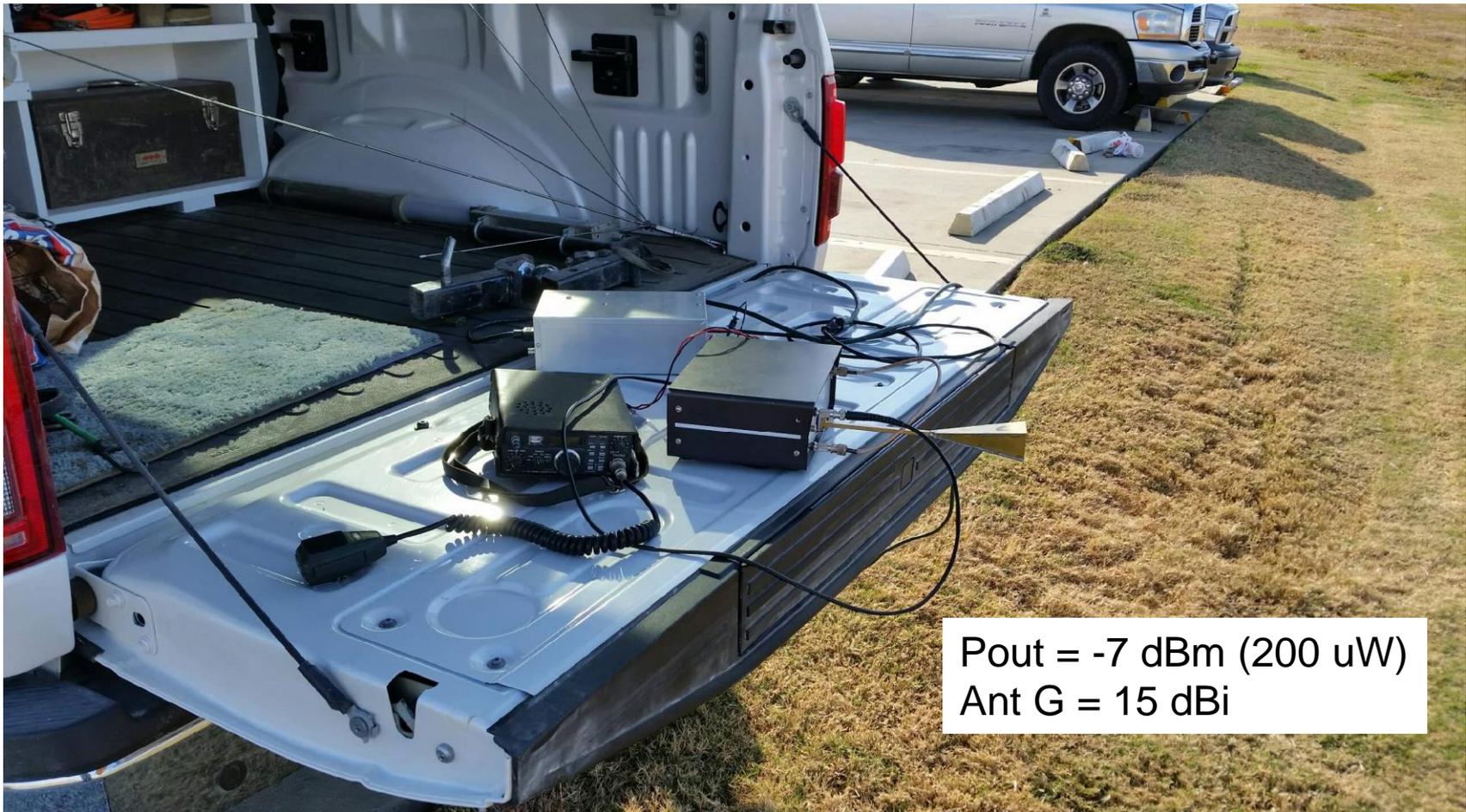
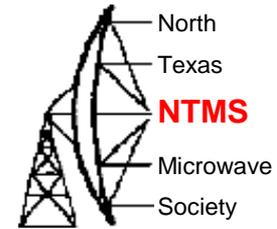
Flyswatter at W5LUA



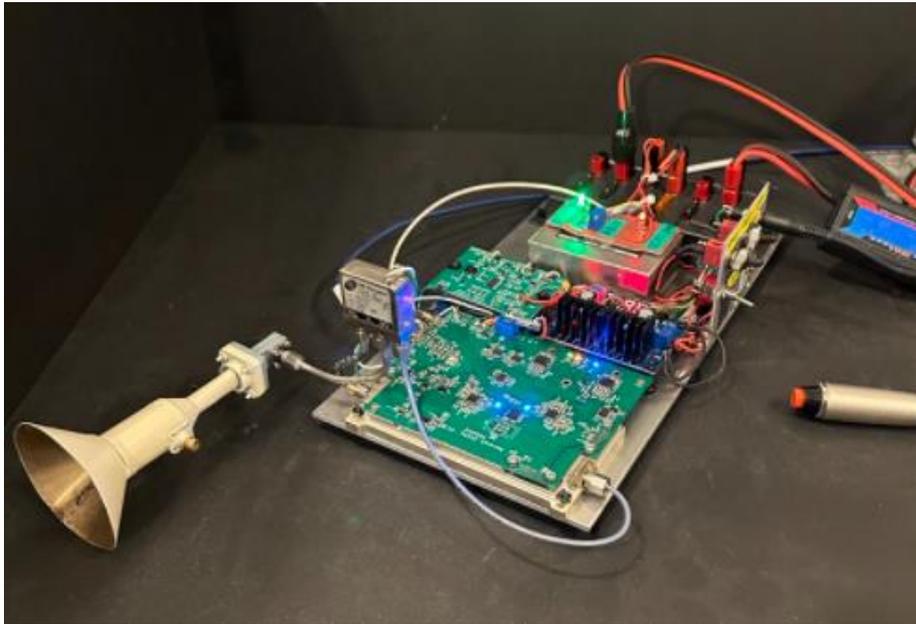
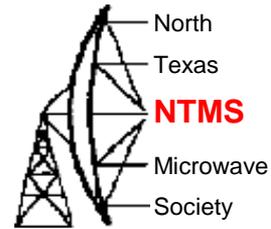
Lower table with 47 GHz XVTR



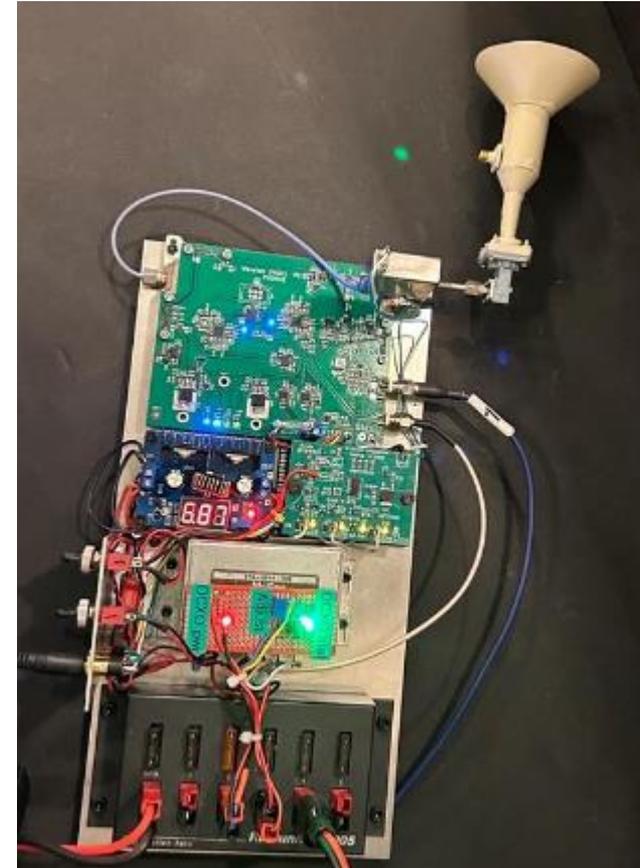
AA5AM/R Beacon Rig at 47088.1 MHz



24 GHz system Jan '23 – Wavelab module & add-on board

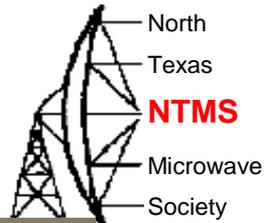


NTMS group buy of 20 PCB boards manufactured in China.



Project described in article at www.ntms.org under "@ The Meetings" then under "December 2022" and then "2022 KM5PO Wavelab 23 GHz"

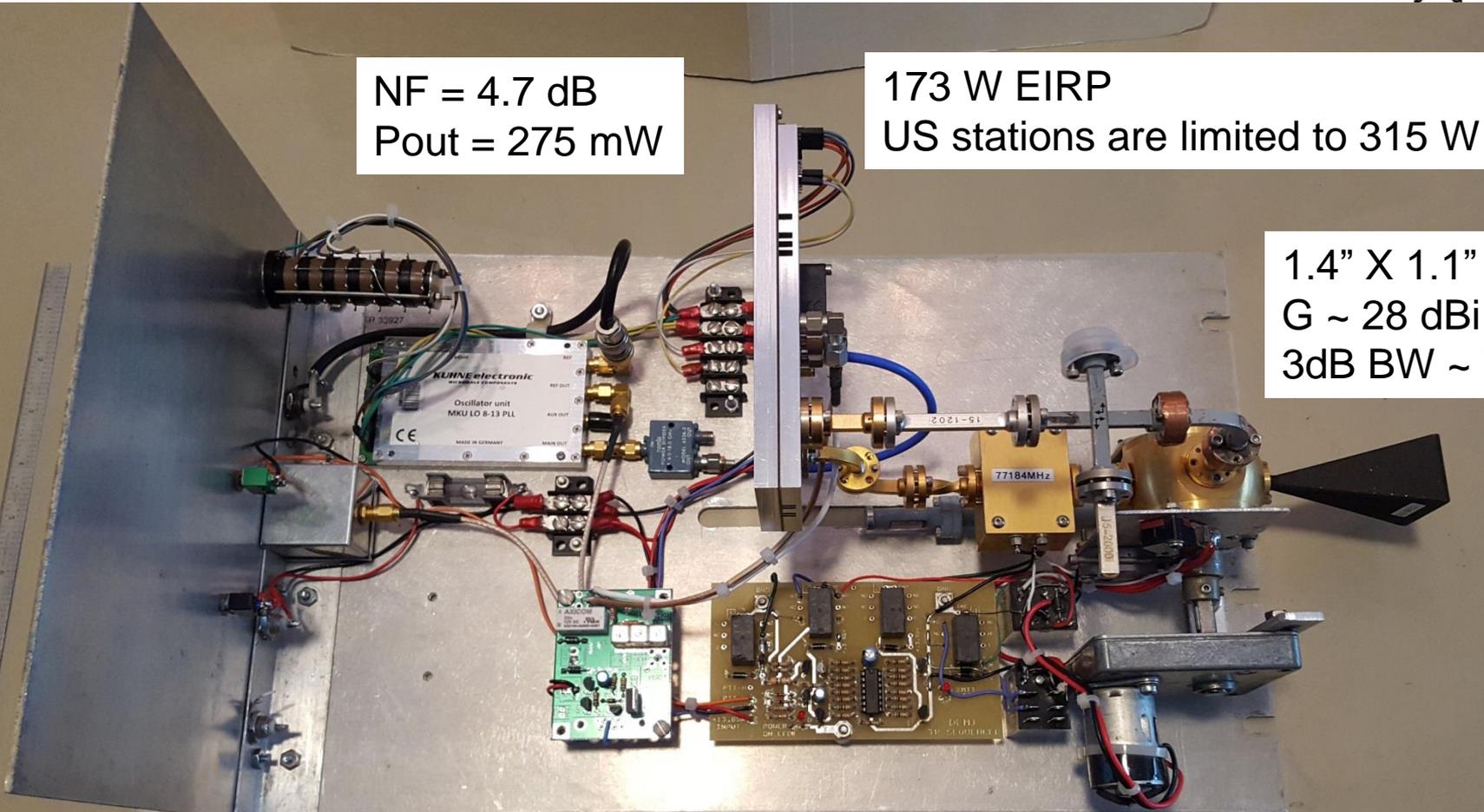
W5LUA 76 GHz Transverter using DB6NT MKU 76 G2 Transverter & WA1MBA LNA



NF = 4.7 dB
Pout = 275 mW

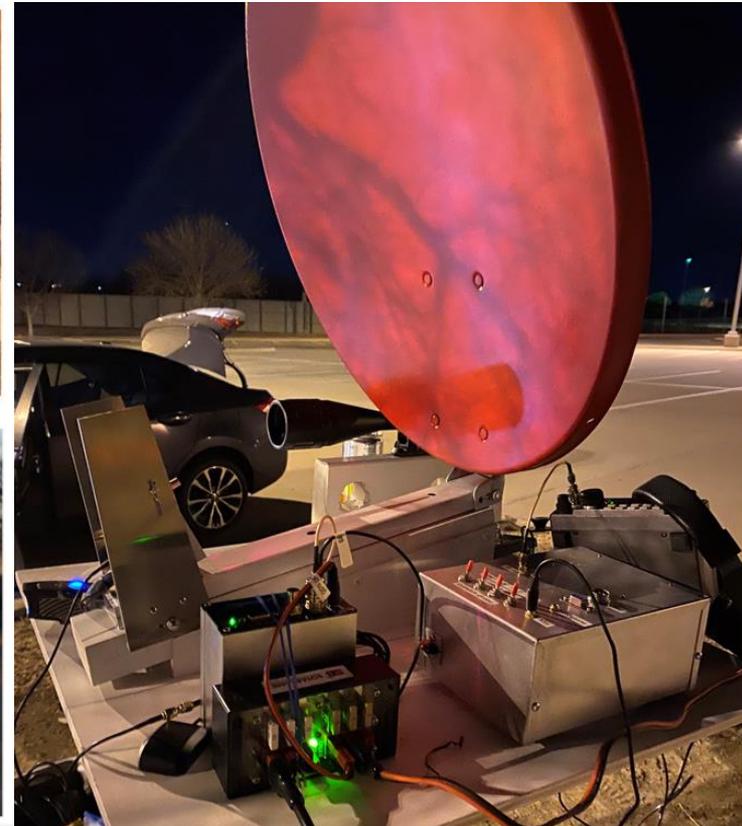
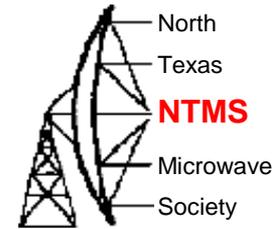
173 W EIRP
US stations are limited to 315 W EIRP

1.4" X 1.1" Horn
G ~ 28 dBi
3dB BW ~ 7 deg



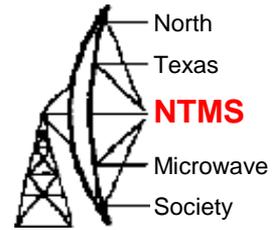
Transverter described in article at www.ntms.org under "Knowledge Base" then under "Tech Library" and then "Millimeter Wave"

122 GHz from Cedar Hill to Alvarado – 17 km



Strong signals – ½ milliwatt & conical horn & Chapparral feed/2 foot dish

Questions?



- Thank you for attending