W5HN

North Texas NTMS Microwave Society

NTMS Meeting

February 4, 2017

St Barnabas Church Richardson

2017 Meeting Dates

North Texas NTMS Microwave Society

- March 4
  ARC Hamfest

Irving

- April 1
- May 6

Providence

- June 3

- July 1

- August 5
- September 2
- October 7
- November 4
- December 2

» **03/11/2017 | HamEXPO**
» **03/18/2017 | Swapfest Georgetown Tx**
» **03/24/2017 |**
Texas State Convention (Greater Houston Hamfest)

» **05/19/2017 | 2017 Dayton Hamvention**

» **06/09/2017 | Ham-Com,Inc**

» CSvhfs.org – July 27 2017 – Albuquerque NM

Other Business

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- We have contract with church which includes liability responsibility
- Purchased ARRL Insurance for Clubs
- Moved Web Page to new host – Bluehost.com
  - Bob Gormley is doing a great job of making changes and updates on the web.
- Update Constitution to support obtaining a 501 C3 status with the IRS.
- Feedpoint Articles and Progress

Presentations

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- Review of interesting publications
- Show and Tell on your projects
- Discuss old test equipment
- Review of HP Ap Notes or Bulletins
- Review of recent Band activity
- Review of EME activity
- Beacon Status – Reports – Upgrades
- Group Projects

ARRL Contest

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- 10-12 June VHF
- 5-6 Aug **222 MHz and Up Distance Contest**
- 19-20 Aug **10 GHz & Up – Round 1**
- 9-10 Aug **EME - 2.3 GHz & Up**
- 9-11 **September VHF**
- 16-17 Sep **10 GHz & Up - Round 2**
- 7-8 Oct **EME - 50 to 1296 MHz**
- 4-5 Nov **EME - 50 to 1296 MHz**

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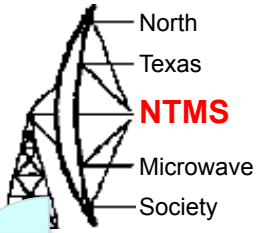
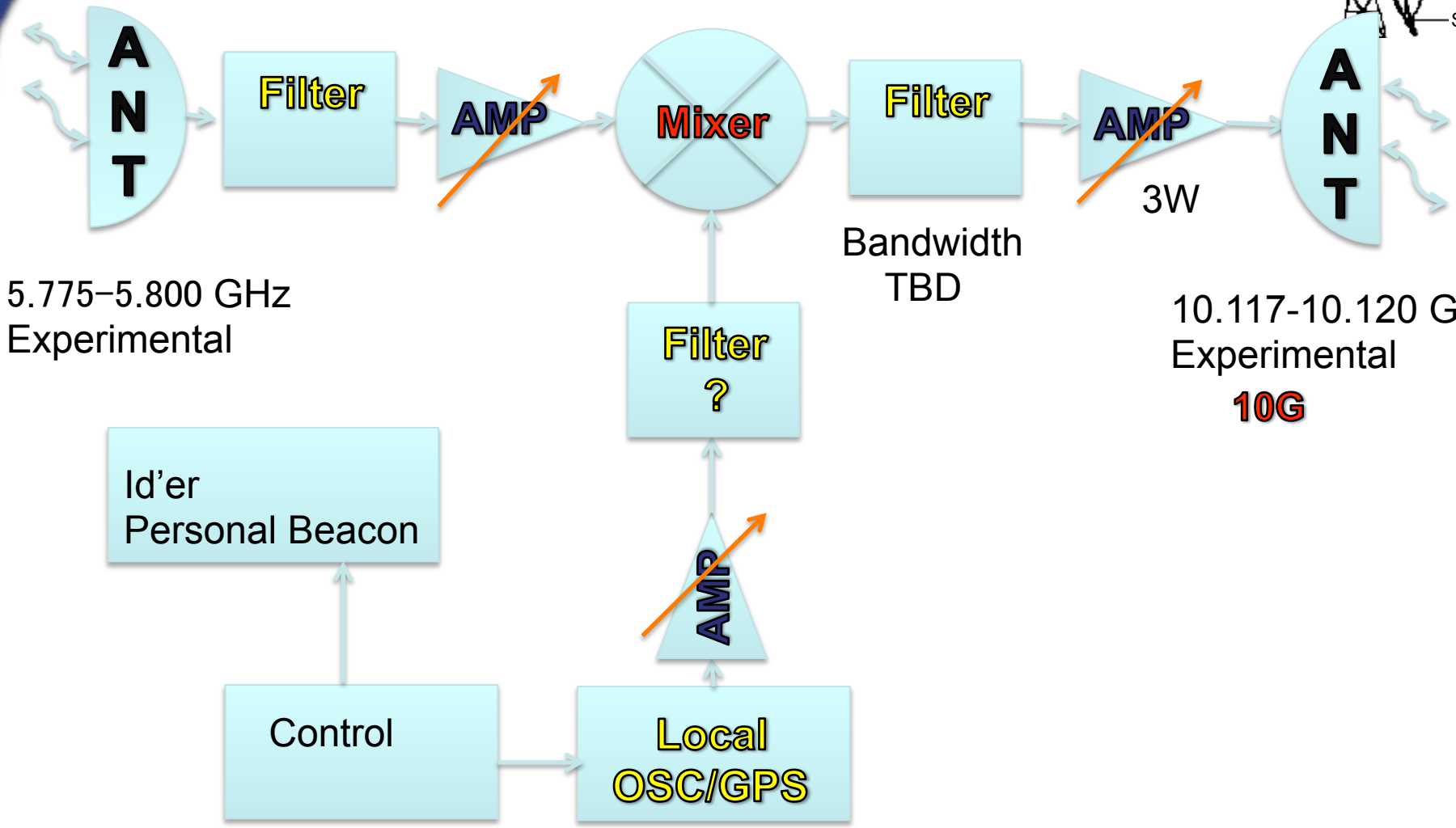
Crossband Linear Transponder CTL

Straw Man Proposal

2/4/17

Repeater/Linear Transponder





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Frequency Allocation

Input

5.77 GHx

Output

10.185 GHz

5.77/3=1.923
5.77/9=0.641
5.77/27=.214

LO
7.9775 GHz

Emission Types

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- CW
- SSB
- Digital
  - JT65
  - Experimental

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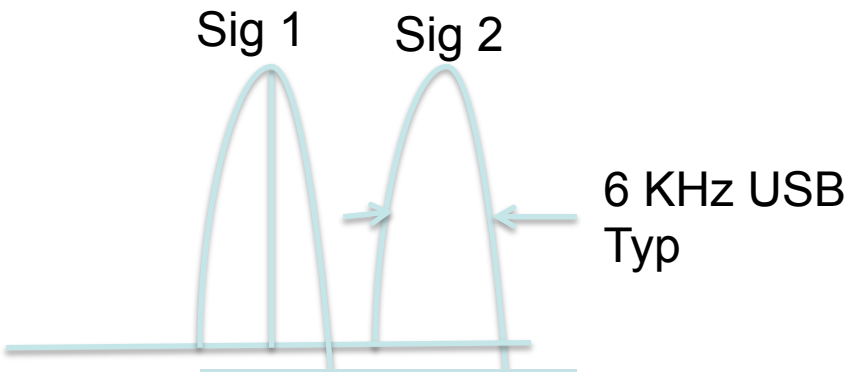
Bandwidth Filter Selection



Bandwidth
100KHz
200KHz
500KHz

FCC Rules and Reg

- Not clear about allowable bandwidth of a transmission in 10 GHz band.
- Emission Type may not fit any of the current definitions well. We want W9W! Rules allow it but we may need to get an STA.
- Rules do not clear state the power requirements of station ID.

Operation

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- My thought is to keep it simple – KISS
- There is no base band required!
- White noise will be present on output signal.
- We could add a input power monitor with a threshold to squelch the transmitter. Then only ID when system is operational. (Not KISS).

Controller

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- Arduino – Pic – Intel – Other
- Robust program with fault recovery
- Method to manually reset controller
- Include a watchdog timer with reset
- Provide some telemetry – (Not KISS)
- Keep Power needs low

Concept

- Novel concept that pushes the state of the art in amateur radio.
- Not fully covered in FCC rules - pushes the law.
- Provides a ground based system that emulates an AMSAT project.
- Facilitates more microwave activity.
- Challenging for the group.

Call to Action

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- Identify target location
- Study FCC rules more and make recommendations.
- Controller design – Program - and implementation
- 5 GHz receiver – Mixer – 10G Xmit
- ID system
- Preventive Failure Mode Analysis PFMA
- Enclosure
- Power Supply – Requirements –Build
- LO with GPS system

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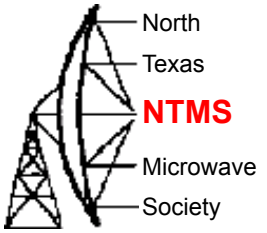
FCC Freq:

5 cm	5.650-5.850	5.650-5.925	5.650-5.850	(a), (b), (e), (r)
3 cm	10.0-10.5	10.0-10.5	10.0-10.5	(a), (b), (k)

ARRL Band Plan:



5 Centimeters (5650.0-5925.0 MHz)

Frequency Range	Emission Bandwidth	Functional Use
5650.0-5670.0		Amateur Satellite; Up-Link Only
5650.0-5675.0	0.05 - 1.0 MHz	Experimental
5675.0-5750.0	>= 1.0 MHz	Analog & Digital; paired with 5850-5925 MHz (Note 2
5750.0-5756.0	>= 25 kHz and <1 MHz	Analog & Digital; paired with 5820-5826
5756.0-5759.0	<= 50 kHz	Analog & Digital; paired with 5826-5829 MHz
5759.0-5760.0	< 6 kHz	SSB, CW, Digital Weak-Signal
5760.0–5760.1	< 3kHz	EME
5760.1-5760.3	< 6 KHz	SSB, CW, Digital Weak-Signal (Note 1)
5760.3-5760.4	< 3 KHz	Beacons
5760.4-5761.0	< 6 KHz	SSB, CW, Digital Weak-Signal
5761.0–5775.0	<=50 kHz	Experimental
5775.0–5800.0	>=100 kHz	Experimental
5800.0-5820.0		Experimental
5820.0-5826.0	>=25 kHz and <1 MHz	Analog & Digital; paired with 5750-5756
5826.0-5829.0	<=50 kHz	Analog & Digital; paired with 5756-5759 MHz
5829.0-5850.0	0.05-1.0 MHz	Experimental
5830.0-5850.0		Amateur Satellite; Down-Link Only
5850.0-5925.0	>=1.0 MHz	Analog & Digital; paired with 5675-5750 MHz (Note 2

Note 1: 5760.1 is the National Weak-Signal Calling Frequency

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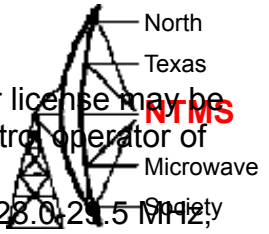
3 Centimeters (10000.000-10500.000 MHz)

Frequency Range	Emission Bandwidth	Functional Use
10000.00 - 10050.000		Experimental
10050.000-10100.000	<=100 kHz	Analog & Digital; paired with 10300-10350
10100.000-10115.000	>=25 kHz and <1 MHz	Analog & Digital; paired with 10350-10365
10115.000-10117.000	<=50 kHz	Analog & Digital; paired with 10365-10367
10117.000-10120.000		Experimental
10120.000-10125.000	<=50 kHz	Analog & Digital; paired with 10370-10375
10125.000-10200.000	>=1 MHz	Analog & Digital; paired with 10375-10450 (Note 2)
10200.000-10300.000		Wideband Gunnplexers
10300.000-10350.000	<=100 kHz	Analog & Digital; paired with 10050-10100
10350.000-10365.000	>=25 kHz and <1 MHz	Analog & Digital; paired with 10100-10115
10365.000-10367.000	<=50 kHz	Analog & Digital; paired with 10115-10117
10367.000-10368.300	6 kHz or less	SSB, CW, Digital Weak-Signal & NBFM (Note 1
10368.300-10368.400	6 kHz or less	Beacons
10368.400-10370.000	6 kHz or less	SSB, CW, Digital Weak-Signal & NBFM
10370.000-10375.000	<=50 kHz	Analog & Digital; paired with 10120-10125
10375.000-10450.000	>=1 MHz	Analog & Digital; paired with 10125-10200 (Note 2)
10450.000-10500.000		Space, Earth & Telecommand Stations

Note 1: 10368.100 is the National Weak-Signal Calling Frequency



§97.205 Repeater station.

(a) Any amateur station licensed to a holder of a Technician, General, Advanced or Amateur Extra Class operator license may be a repeater. A holder of a Technician, General, Advanced or Amateur Extra Class operator license may be the control operator of a repeater, subject to the privileges of the class of operator license held.

(b) A repeater may receive and retransmit only on the 10 m and shorter wavelength frequency bands except the 28.0-29.5 MHz, 50.0-51.0 MHz, 144.0-144.5 MHz, 145.5-146.0 MHz, 222.00-222.15 MHz, 431.0-433.0 Mhz, and 435.0-438.0 Mhz segments.

(c) Where the transmissions of a repeater cause harmful interference to another repeater, the two station licensees are equally and fully responsible for resolving the interference unless the operation of one station is recommended by a frequency coordinator and the operation of the other station is not. In that case, the licensee of the non-coordinated repeater has primary responsibility to resolve the interference.

(d) A repeater may be automatically controlled.

(e) Ancillary functions of a repeater that are available to users on the input channel are not considered remotely controlled functions of the station. Limiting the use of a repeater to only certain user stations is permissible.

(f) [Reserved]

(g) The control operator of a repeater that retransmits inadvertently communications that violate the rules in this part is not accountable for the violative communications.

(h) The provisions of this paragraph do not apply to repeaters that transmit on the 1.2 cm or shorter wavelength bands. Before establishing a repeater within 16 km (10 miles) of the Arecibo Observatory or before changing the transmitting frequency, transmitter power, antenna height or directivity of an existing repeater, the station licensee must give written notification thereof to the Interference Office, Arecibo Observatory, HC3 Box 53995, Arecibo, Puerto Rico 00612, in writing or electronically, of the technical parameters of the proposal. Licensees who choose to transmit information electronically should e-mail to: *prcz@naic.edu.*

(1) The notification shall state the geographical coordinates of the antenna (NAD-83 datum), antenna height above mean sea level (AMSL), antenna center of radiation above ground level (AGL), antenna directivity and gain, proposed frequency and FCC Rule Part, type of emission, effective radiated power, and whether the proposed use is itinerant. Licensees may wish to consult interference guidelines provided by Cornell University.

(2) If an objection to the proposed operation is received by the FCC from the Arecibo Observatory, Arecibo, Puerto Rico, within 20 days from the date of notification, the FCC will consider all aspects of the problem and take whatever action is deemed appropriate. The licensee will be required to make reasonable efforts in order to resolve or mitigate any potential interference problem with the Arecibo Observatory.

[54 FR 25857, June 20, 1989, as amended at 55 FR 4613, Feb. 9, 1990; 56 FR 32517, July 17, 1991; 58 FR 64385, Dec. 7, 1993; 59 FR 18975, Apr. 21, 1994; 62 FR 55536, Oct. 27, 1997; 63 FR 41205, Aug. 3, 1998; 63 FR 68980, Dec. 14, 1998; 69 FR 24997, May 5, 2004; 70 FR 31374, June 1, 2005]

Emissions

(a) No amateur station transmission shall occupy more bandwidth than necessary for the information rate and emission type being transmitted, in accordance with good amateur practice.

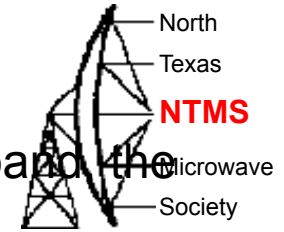
§97.305 Authorized emission types.

5 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
3 cm	Entire band	MCW, phone, image, RTTY, data, SS, test	(7), (8), and (12).

(7) A RTTY, data or multiplexed emission using a specified digital code listed in §97.309(a) of this part or an unspecified digital code under the limitations listed in §97.309(b) of this part may be transmitted.

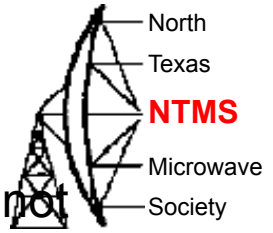
(8) A RTTY or data emission having designators with A, B, C, D, E, F, G, H, J or R as the first symbol; 1, 2, 7, 9 or X as the second symbol; and D or W as the third symbol is also authorized.

(12) Emission F8E may be transmitted.



(d) Amateur stations transmitting in the 430-450 MHz segment, the 23 cm band, the 3.3-3.4 GHz segment, the 5.65-5.85 GHz segment, the 13 cm band, or the 24.05-24.25 GHz segment, must not cause harmful interference to, and must accept interference from, stations authorized by other nations in the radiolocation service.

(f) Amateur stations transmitting in the following segments must not cause harmful interference to radio astronomy stations: 3.332-3.339 GHz, 3.3458-3.3525 GHz, 76-77.5 GHz, 78-81 GHz, 136-141 GHz, 241-248 GHz, 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz, or 926-945 GHz. In addition, amateur stations transmitting in the following segments must not cause harmful interference to stations in the Earth exploration-satellite service (passive) or the space research service (passive): 275-277 GHz, 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz, or 951-956 GHz.



(r) *In the 5 cm band:*
(1) Amateur stations transmitting in the 5.650-5.725 GHz segment must not cause harmful interference to, and must accept interference from, stations authorized by other nations in the mobile except aeronautical mobile service.
(2) Amateur stations transmitting in the 5.850-5.925 GHz segment must not cause harmful interference to, and must accept interference from, stations authorized by the FCC and other nations in the fixed-satellite (Earth-to-space) and mobile services and also stations authorized by other nations in the fixed service. In the United States, the use of mobile service is restricted to Dedicated Short Range Communications operating in the Intelligent Transportation System.

(13) A data emission using an unspecified digital code under the limitations listed in §97.309(b) also may be transmitted. The authorized bandwidth is 100 kHz.