

## LIMINAL TRANSMISSION OBSERVATIONS

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The *Liminal Transmission* broadcast experiment carried out on WGXC 90.7FM, August 30th 2012 from 1 am to 3am was intent on discovering the limitations, if any, of the FM band's ability to reproduce frequencies that fall outside of the suggested frequency range. My preliminary research led me to believe that the FM band was able to reproduce frequencies between 30Hz and 15kHz. I was under the impression that frequencies that fall outside of this range could not be transmitted, and if they were, the result would be perceived moments of silence by the listener. What I have concluded from this experiment is that the frequency response range is undoubtedly related to an optimal range that the FM dial can reproduce with a certain degree of audio fidelity.

Frequencies in the lower end seemed to saturate the signal and prevent other sounds from being transmitted. For example when transmitting frequencies in the lower end of the spectrum, the large shape of the soundwave seemed to saturate the centre frequency, leaving little to no room for other frequencies or signals to pierce through. When I attempted to speak simultaneously with the low frequencies (listen to 29-30HZ at about 26minutes into the audio file) - my voice was rendered indecipherable, as if the frequency was modulating the sound of voice.<sup>1</sup> I am fairly certain that once the signal dipped below 34 Hz, the sound emitting from the radio in the studio was a mixture of noise and mechanical vibration of the speaker cone. It was only at 0 Hz that the radio ceased to emit any sound at all. At the other end of the frequency spectrum, I was able to perceive sounds emanating from the radio receiver up until and including 17kHz, after which I could no longer hear anything, which could be attributed to hearing loss, due to a variety of factors such as age, work environment, exposure to high sound pressure levels etc...)

*Liminal Transmission* was a 2 hour-long live radio program, where I broadcast frequencies from 40 Hz down to 0Hz and then 15kHz up to 20kHz using a tone generator which, unfortunately contained a significant amount of high frequency noise in its signal. I also played sound art and music compositions that contain frequencies in the lower and upper frequency ranges to gage the quality of transmission of these works. I set up 2 radio receivers tuned to WGXC 90.7FM. One of the receivers was in the studio, and the other in the hallway on the ground floor of free103point9's Wavefarm study centre, which houses WGXC's Acra, NY studio. I set up microphones and recorders in front of each of these receivers to document the audio output.

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<sup>1</sup> I experienced this same phenomenon while delivering a reading over a sound-bed that I had created for a composition called *Auroral Sounds for Unto K. Laine*: <http://andrea-janecornell.com/track/auroral-sounds-for-unto-k-laine>. While reading the text, my voice sounded like it was cutting in and out - as if the VLF sound was interfering with the sound of my voice

The final audio document of *Liminal Transmission* is a mix between the sound as recorded through a computer (before transmission occurs), and the sound as amplified through the two different receivers (one of these receivers contains an audible clicking glitch). The sound heard on the final recording of *Liminal Transmission* are a mix between the 2 radio receivers and a pre transmission digital audio file recorded live to the main studio computer. During the frequency test segments the sound is that recorded through either of the two radios. The computer mix only comes in during the speaking parts for clarity, and during the diffusion of the compositions for comparison of sound quality.

In terms of the audio fidelity of the compositions played during the transmission - it sounded as though the sound coming through the radio in studio was not as robust or clear when dealing with the lower end of the spectrum. In the high end of the frequency spectrum, it seemed like the sound was also a little thin, these observations are based solely on the subjective act of listening and comparing the sound coming through the radio, and the sound coming from my headphones.

The process of editing the final audio document together has raised several questions relating to sound as heard through the physiognomy of the auditory apparatus, and sound as mediated through the recording process. Both recordings of the transmission made through the radios contained a serious amount of distortion during the speaking segments. This distortion was not present/ audible through the radio I was using monitoring the transmission in the studio. I am uncertain about where this distortion comes from. I can only presume that it may be related to the sample rate and recording format (one radio recording was mono, mp3 128kbps (in studio), the other radio recording was stereo, wav. 44100kHz 16bit (radio on the ground floor)), however it seems like I am missing something to clarify where the distortion comes from, as there is no evidence of peaks in the digital files. After aligning the 3 separate audio files, I realized that they would become out of phase with one another, I had not realized that digital audio would do this (in the same manner as tape, for example) and wonder if this too is related to different sample rates and recording devices.

### **Playlist of tracks used during the transmission experiment:**

(artist - album - title of track - record label - year released - length of excerpt/length of track)

#### **Opening Track:**

- Else Marie Pade - Lyd og lys (Sound and Light)(1960) - Et Glasperlespil - Dacapo Records, 2001 - Length of excerpt: 4:55 /4:55.

#### **Low F(c) Compositions:**

- Autechre - Quaristice - Paralel Suns - Quaristice - Warp Records, 2008 - Length of excerpt: 3:03 /3:03.
- Lamonte Young& Marian Zazeela - The Black Record- 23 VIII 64 2:50:45-3:11 AM The Volga Delta- Edition X, 1969: Length of excerpt: 3:44 /20:10.

- Atheus (Serge Collin) - Soundscapes and Drones - Drone 37Hz - Ghost Sounds 2009 - Length of excerpt: 2:27/8:10.
- Khampagar Monastery, Tashi Jong Community, Himachal Pradesh, India- Tibetan Buddhism - The Ritual Orchestra and Chants - Mahakala Sadhana: dag-kye - Nonesuch, 1973 - Length of excerpt 3:15 /26:00.
- Skinwell(Christian Corvellec and Martin Dumais) - Tunnels - untitled 3 - . Angle Recs, 2009 - Length of excerpt :4:11/4:11.
- Toshiya Tsunoda - Low Frequency Observed at Maguichi Bay - Hibari Music, 2007- length of excerpt: 2:31/11:12.
- Toshiya Tsunoda - Low Frequency Observed at Maguichi Bay - IV- Hibari Music, 2007 - Length of excerpt 1:52 /13:10.
- Eliane Radigue - Adnos - Adnos I - Table of the Elements, 2002(composed between 73-81) - Length of excerpt: 14:25 / h11.

### **High F(c) Compositions**

- Alvin Lucier - Bird and Person Dying - Bird and Person Dying - Cramps Records, 1975 - Length of excerpt: 3:14 /23:41
- Ryoji Ikeda - See you at Regis Debray - Staring Writing Cooking Sleeping - Syntax, 2008 - Length of excerpt: 4:54/48:26
- Florian Hecker - Acid in the Style of David Tudor - Ten - Editions Mego, 2009 - Length of excerpt: 4:30/4:30
- Qkcofse - Radar Defense Network - Molecular Detournement Égregore suRRism - Phonoethics, 2010 - Length of excerpt: 0:51/0:51
- Toshimaru Nakamura and John Butcher - Dusted Machinery - Knead - Monotype, 2012 - Length of excerpt: 2:27/10:21
- Eliane Radigue - Transamorem Transamortem - Important Records, 2012 (composed in 1973) - Length of excerpt: : 6:07/67minutes