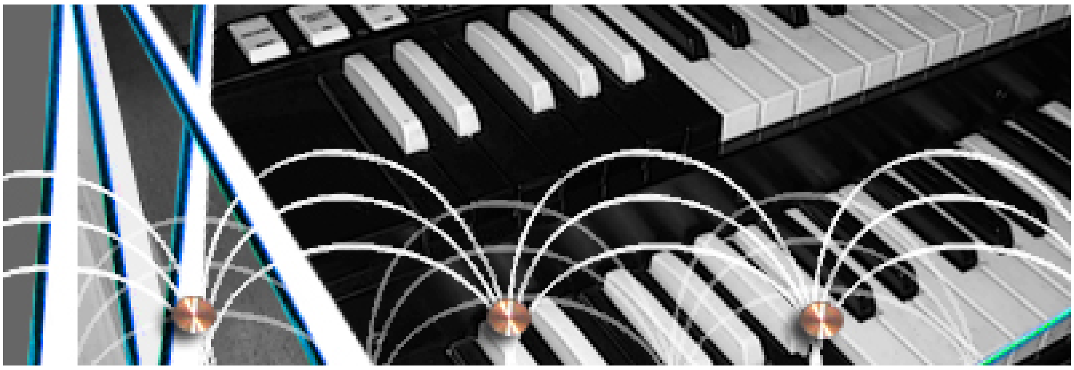
Radio Activity: Articulating the Theremin, Ondes Martenot and Hammond Organ

By Owen Chapman



Introduction

The **Ondes Martenot** was introduced in 1928 by cellist and pedagogue Maurice Martenot (1898-1980). His initial design used Audion tubes (patented by Lee deForest in 1906) to create two supersonic radio signals transmitted at frequencies very close, but not identical in terms of Hertz?producing a resultant beat frequency within the audible realm. Martenot's invention allowed one to change the frequency of one radio wave in the pair it emitted?affecting the audible pitch produced. The first version had the player pull or release a ring on a wire in order to slide freely between different pitches. Later versions saw this mechanism extended horizontally over a fake keyboard, allowing one to select specific "notes." Real keys came a short time later.

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Timbre Examples?The Ondes Martenot
Ondes Martenot Player (Ondiste): Suzanne Binet-Audet
Recordist: Owen Chapman
Date of Recording: June 28th, 2009
Location: Hotel2tango recording studios, Montreal Canada.

1. High Swoops

2. Low Staccato Sounds

3. High Trills

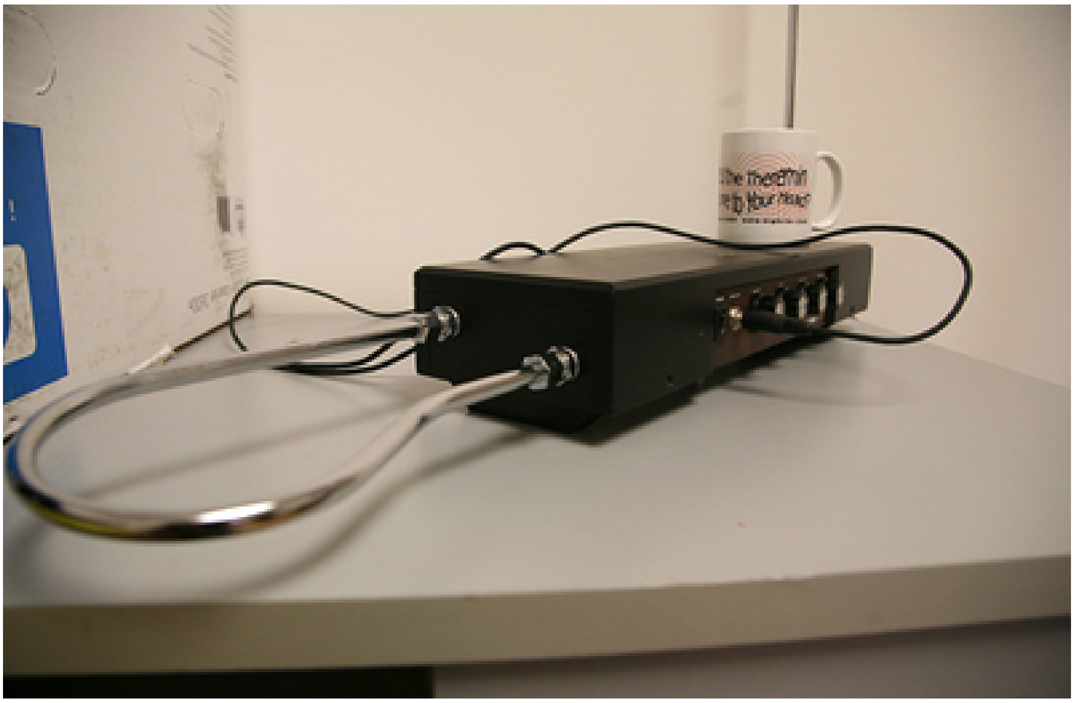
4. Single Low Note (Cello?)

5. Lonesome Melody (High Pitch)

6. Lower Sounds (First Example)

7. Lower Sounds (Second Example)

The **Theremin** also creates its sound through the use of "heterodyning" radio waves. It was invented by Leon Theremin (1896-1993) around 1919 and is still in commercial production today by the Moog Audio corporation, although with transistors in the place of Audion tubes. The Theremin is played by moving one's hands around two radio antennas to control the pitch and volume of its sound. No keyboard interface was developed. It is much harder to play melodies with the Theremin than the Ondes Martenot. Its popular renown, however, is much greater.



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Timbre Examples?The Theremin
"Somewhere Over the Rainbow", and Theremin Improv with Beat
Theremin Player and Recordist: Owen Chapman
Date of Recording: Feb 23rd, 2009
Location: Home Studio, Montreal Canada.

These recordings warrant a small bit of explanation. "Somewhere Over the

Rainbow" is offered in all humility, as a demonstration of how difficult it is to play the Theremin well on its own. Sliding between each note is hard to avoid, and I think this example provides ample evidence for the "drunken mouse playing a mini (and very loud) trombone" metaphor I employ in my paper.

The second example ("Theremin Improv with Beat") demonstrates what can be done by a poor Thereminist who passes the signal through delay and ring-modulator effects pedals, playing over-top of a simple drum beat. Much less painful on the ears!

The last example is 60+ seconds of Clara Rockmore playing a song called "Water Boy" (composed by Avery Robinson) on the Theremin. The excerpt is from Clara Rockmore's Lost Theremin Album, published by Bridge Records, Inc. in 2006. Rockmore is accompanied by her sister Nadia Reisenberg on the piano, and is playing an "antique" Theremin built for her by the inventor himself in the 1920s. The track was recorded in 1975, produced and engineered by Robert Moog and Michael Colina. Rockmore is widely hailed as the world's greatest Thereminist, even after her death in 1998 at the age of 88.

The sound of the **Hammond Organ** is also widely recognized by Western listeners due to its use in many different genres of music since it was patented in 1935. Laurens Hammond (1895-1973) developed a "tone-wheel" system for sound generation that borrowed heavily from Thaddeus Cahill's design for his earlier Telharmonium (which was protected by three partial patents between 1897-1936). Hammond's system used vacuum tubes for amplification, but not for sound generation. These tone-wheel organs were built up to 1974, when they were replaced by transistorized models.

Image originally uploaded on Flickr by rockmixer

Timbre Examples?The Hammond Organ
Title: Supabad Stanley
Composer: Donna Grantis
Performers: Vanessa Rodrigues Soul Project (Vanessa Rodrigues - organ, Donna Grantis - guitar, Jean-Pierre Levesque - drums)
Album: Vanessa Rodrigues Soul Project - February 2005
http://www.vanessarodrigues.com

The goal of this paper is to point out the family resemblances between these three historically significant instruments and especially their mutual incorporation of oscillating vacuum tubes and electric amplification?technologies strongly associated with radio in the early part of the 20th century. I also sound-off on the limitations of narratives of technological "progress" in understanding the histories of different electronic musical instruments and in particular the notion of the "democratizing" power of new devices. Contrary to the usual determinism that sees sound technologies as responsible for innovation in sound manipulation practices, I emphasize how the socio-cultural environments into which "new" technologies are introduced dramatically affect what they end up being used to "do". Sound technologies, as such, are always negotiations?both during their invention as well after they are introduced to a public. The rhetoric of unlimited sound synthesis as the ultimate goal of electronic musical instrument design is also questioned.

Electronic Sound Technology and the Concept of *Synthesis*

> When we compare music with the other arts, and particularly with other fields of human endeavor, we find tradition enthroned instead of progress. The graphic arts have evolved photography and moving pictures, even in color, and television. The drama has availed itself of every conceivable device to intensify the arts of make-believe. Communication has made tremendously great strides, by telegraph, telephone, and radio. Transportation, likewise, has tremendously accelerated the pace of human movement, with steamships, railroads, automobiles, and airplanes. Illumination today is very far ahead of the oil lamp of the dark ages. Agriculture and industry leave no stone unturned to press improved machinery into service. But what of music? In this age of progress in every conceivable field, music and musicians still use the traditional implements and machines of hundreds of years ago. (Miessner, 1936, paragraphs 2-3)

Benjamin Miessner, an influential member of the North American electronic musical instrument design community in the 30s and 40s, goes on in this paper (published in the *Proceedings of the Institute of Radio Engineers*) to describe contemporary classical instruments such as the violin and piano, emphasizing certain ?crude' details such as the use of strings, guts and elaborate pulley systems, pipes for organs or the hammer and drums "of the aborigines." These instruments are said to "have reached the limit of their development," as evidenced by the fixedness of their design over hundreds of years. Instrumentalists fetishize this tradition, valuing older instruments over newer ones. All of this, it is suggested, seems particularly curious in light of the fact that the four decades previous to 1936 had seen major advances in electrical mechanisms for sound generation, as opposed to the veritable stasis of "mechanicoacoustic, or pneumaticoacoustic" methods (i.e., vibrating strings, reeds, pipes, etc.). (Miessner 1936, opening paragraphs) This stage-setting is used to launch Miessner's history of the development of electronic musical instruments up to 1935 along with detailed descriptions of "the most important." (Miessner 1936, opening abstract) While the Theremin and Hammond Organ are described by Miessner, the Ondes Martenot is not. This is still a common omission in the english literature on the history of electronic sound. Miessner's own contribution, the Miessner Electronic Organ, built on "mechanicoelectric" principles (i.e., electronic sound signals produced by vibrating, wind-blown reeds and magnetic pick-ups), is covered extensively.

What is superior about electrical methods over traditional instrument design? For Miessner, it is the possibility of *synthesis* or the creation of *any* sound.

> The ideal instrument is one which can make any sound, known, unknown, or conceivable; to do this we must provide a generator for periodic vibrations embracing the whole audio spectrum of frequencies. We must be able to select from this generator at will any desired single frequency, or many single frequencies simultaneously, whether harmonically or inharmonically related, or whether in narrow or wide continuous bands. We must further be able to emit these frequencies in any desired sound amplitudes and envelope shapes, even though, in a given sound, all the components require different shapes of envelope. We must be able to control the emission of these sounds by some suitable playing technique and apparatus.
>
> With such an apparatus we shall be able to synthesize any possible sound, continuous, damped, transient, musical or nonmusical, for we have all the elements of sound, and means for putting together any desired combination of these elements in any desired time-amplitude relationship. Looking ahead ten or twenty years we are now at work on such an instrument. (Miessner, 1936, final 2 paragraphs)

Why should electricity provide the key to the perfect instrument? Why is the ability to "synthesize any possible sound" the goal? Miessner does not answer these questions, assuming simply that his audience accepts these premises. However, the histories of the Theremin, Ondes Martenot and Hammond Organ provide case studies that strongly suggest unlimited sound synthesis as more of a near universally adopted *rhetorical* device used in marketing new electronic instruments than a realized/realizable possibility.

Has Miessner's suggestion that limitless sound synthesis technology is invent-able and something that society "must" have come to fruition? Yes, according to at least one noted contemporary sample-based artist:

> After all, it's all just data. Map one metaphor onto the other, remix, and press play. The sampling machine can handle any sound, and any expression. You just have to find the right edit points in the sound envelope?it's that structure thing come back as downloadable shareware for the informationally perplexed. (Miller 2008, p. 6)

Such determinist statements are commonplace within too many histories of electronic sound technology to fully retort here, but the audience and date of Miessner's intervention make it stand out?namely, North American radio "engineers" and hobbyists, 1936. What becomes quickly apparent when researching the relationship between the history of electronic musical instrument design and radio is the necessity to create strong interconnections between inventing, refining, performing, teaching and marketing "new" technologies if they are to be adopted as widespread *practices* or *"mindsets"* (to borrow from Franklin, 1992). One way in which this happens is through articulating a new technology with others that are already known. Radio stood out in this regard for Martenot and Theremin as did the church pipe organ and home piano for Hammond.

Another way to craft socio-cultural links for new electronic musical instruments and/or sound recording technologies in general has been to suggest that "the new" not only provides unheard sonic possibilities, it can easily be used to duplicate the sounds of traditional instruments, thus effectively allowing for the production and manipulation of "any sound". This argument has, for instance, been a long standing element of the debates over the ethics of sampling practices such as those found in hip hop and related genres that borrow recorded musical material in the production of new tracks. Knowing what a Theremin sounds like, it's hard to imagine that its inventor professed to many that soon there would be entire orchestras using different versions of his electronic instrument (Glinsky 2000, p. 87). Laurens Hammond was also fairly notorious with this sort of claim, promoting his instrument as "music's most glorious voice" and even winning a court battle in 1935 for the right to call his invention an "organ", thus assuring strong competition with church pipe organ manufacturers (documented in Høsteland 2008).

The Radio Corporation of America (RCA) made a fortune in the '20s,

> serving as a distributor of transmitters, receivers and radio components. The company had no manufacturing plant of its own and acted only as a sales agent for the General Electric company and the Westinghouse Electric and Manufacturing company. In 1929, RCA

> purchased the Victor Talking Machine Company, a leading phonograph manufacturer: Victor had been faltering with competition from the radio industry, and by absorbing the firm and its plant in Camden, New Jersey, RCA hoped to enter the production market. (Glinsky 2000, p. 93)

Very soon after acquiring Victor, the first commercial attempt to market the Theremin became RCA's next step in their plan to corner the home radio and gramophone markets. Executives from the newly dubbed RCA Victor approached Theremin upon his arrival to New York city to promote his instrument (in February 1928). The RCA Theremin was pretty much a failure in terms of business success?the first run of 500 instruments had many quality control problems, were extremely difficult to play and were introduced to the buying public at the start of the Great Depression. It was the only production run. Theremin, a charismatic promoter of his invention, had originally assured a vast market for the RCA Victor Theremin. In his prospectus for his Theremin Corporation, written in 1928 and presented to RCA Victor, he states: "On the basis of an assumed sale of 10 000 instruments per year...the gross profits to the corporation would amount to $500 000....The assumed figure of 10 000 instruments per year...is exceedingly low" (Glinsky 2000, p. 91). Theremin maintained this point of view by citing U.S. Department of Commerce records for 1925 and 1927 that documented $170 million in annual sales of domestic musical instruments (mostly pianos) and $360 million in radio and radio parts in the U.S..

"Touching" Radiophonic Sound

Martenot (1898-1980) came up with the idea for his "musical waves" (also known as the "Martenot" and "les Ondes") while working as a wireless telegraph operator during the First World War (according to Laurendeau (1990)?the only book on the inventor and his instrument). Once again, when two radio waves are transmitted at frequencies very close, but not identical in terms of Hertz, another wave can be produced within the audible realm?this effect is called "heterodyning". This is how wireless radio transmissions were made audible for Morse code purposes. Martenot's invention allowed one to control the frequency of one of these waves, thus affecting the resulting pitch produced in the audible realm.

Martenot's initial 1928 version had the player pull or release a wire attached to the finger by a ring in order to slide freely between different frequencies. In order to control the volume, attack and over-all sound envelope of the notes, Martenot attached a special touch-sensitive switch to his device, the "touche d'expression". This controlled the flow of electricity through the system, affecting the shape of the resulting "ondes musicales" at the same time. Later versions retained this control feature, but saw the wire and ring extended horizontally over a fake keyboard, allowing one to control pitch by placing one's finger through the ring and then moving over various "notes." Martenot eventually hard-wired the keys to produce a predictable series of pitches corresponding to the Western chromatic scale. However, the wire and ring, or "la bague" as it is called, were retained for purposes of glissandi, vibrato and other expressive techniques. One could also, following Laurendeau, describe this feature of the Martenot as permitting "une certaine virtuosité, comparable à celle d'un chanteur" (Laurendeau 1990, p. 80), whereas the keyboard allows for a different type of virtuosity featuring the use of scales and arpeggios (although not chords, as the Martenot is a monophonic instrument that only plays one note at a time?like the Theremin but unlike the Hammond Organ, which is polyphonic). The keyboard is also sensitive to horizontal vibrations, which cause slight pitch variations, not unlike the technique of using vibrato on a cello.

These three features of the Martenot?the touch control, the keyboard and the system's evolution throughout the inventor's lifetime distinguish it, importantly, from the Theremin?to which it is often compared. The latter was invented in 1919 and is still in commercial production today by the Moog Audio corporation. Each Ondes Martenot still in existence, on the other hand, has been hand crafted by Martenot himself and none have been built since his death in 1980. The Theremin is controlled by moving one's hands around two radio antennas to produce sound. The proximity or distance of one's hands in relation to these antennas control this sound's pitch and volume, respectively. This sound is created through heterodyning radio waves. Theremin, like Martenot, also came up with the idea for his musical instrument while working as a military radio operator during the First World War, but in Russia as opposed to France (see Glinsky 2000, as well as Anna Friz's contribution to the current volume). It is clear that Martenot knew about Theremin's invention, as it was demonstrated throughout Europe almost 10 years prior to the popular introduction of the Ondes (1928). Just how much Martenot was influenced by Theremin's instrument is a matter of some dispute. He was certainly motivated by Theremin's success (as documented in Laurendeau 1990), but to describe the Martenot as a simple cousin to the Theremin is to ignore its many differences (improvements?) in terms of playability and sound colouration.

The "touche d'expression" is perhaps the most notable feature in terms of this difference. Like the first version of the Martenot, glissandi between many different notes is easily possible even for the untrained player of the Theremin. However, the ability to reliably repeat specific notes upon command is a skill mastered by very few. With the Hammond Organ, pressing keys on the keyboard turns notes on or off, at specific frequencies (i.e., pitches), but without any dynamic variation (i.e., no individual volume control of each note depending on hard one presses a key). The Martenot's combined keyboard and touche d'expression, however, offer some very refined possibilities. As Jeanne Loriod (one of the world's most famous ondistes and teachers of the instrument) says in *Technique de L'Onde electronique: type Martenot, Volume 1: Le Clavier*:

> It should be noted that tactile sensitivity needs to be developed to the point where a distinct consciousness is active in each finger; this is the sensitivity and tactile autonomy required by the precision of the gradation key ["touche d'expression"]. This key, unlike other musical instruments where the performer is dealing with concrete objects (hammers and strings for instance), enables life and shape to be given to the unreal sonorous matter produced by the transistors, then amplified by the speaker. At this point the individual's artistic sense and acquired knowledge come together. (Loriod 1987, p. 129)

Another way to describe the "touche d'expression" is as a simple, yet intuitive and highly sensitive mechanism for *articulating* the notes played on the Ondes. The most consistent problem that people experience trying the Theremin is sounding individual notes one at a time without sliding between each in terms of pitch, creating an effect not unlike a drunken mouse playing a mini (and very loud) trombone. Well articulated notes require lightening fast precision with the volume and pitch antennae of the Theremin. This is much more easily accomplished on the Ondes Martenot, but still requires some practice with the "touche d'expression" to get right at first. Lightening fast precision, once obtained, allows for many more possibilities of articulation with the Martenot than the Theremin (which is notoriously sluggish, especially the RCA models). The Hammond Organ, of course, does not suffer from any articulation issues, beyond the fact that each key produces an audible "click" when depressed; each tone selected comes on at full volume as soon as the switch controlled by the key is opened (i.e., once pushed). This "key click" was considered a serious defect by Hammond throughout the years that he manufactured his organ, although many enthusiasts see it as part of the instrument's signature sound. The only way to control the sound envelope on a Hammond organ is through a foot pedal (named the "expression pedal", interestingly) which controls the overall volume of the device, much like the volume knob on a home radio (a simple potentiometer?unlike the Martenot's "touche d'expression"?a complicated pressure-based sensor?see Caroline Martel's contribution to the current volume for further details).

There are further technical similarities/differences worth dusting off at this point. The Ondes and Theremin both use heterodyning radio waves to create their initial sound signal. The Hammond organ features "tone-wheels", discussed below. None of these instruments are considered "synthesizers" by contemporary standards. The principal reason for this is that the original sound created (either by tubes or tone-wheels) and then modulated by the instrument's settings is outside the control of the player. With a modern "synth", any number of starting points are possible through sound-banks. If "sampling" technology is built into the synth, then any recorded sound can be introduced into the hardware before sound modulations are programmed. This fits the suggested parameters of the putatively "perfect" electronic instrument as outlined by Miessner above, but has this led to synthesizers or samplers in every home, easily recreating all sounds ever heard before (or not heard)?

Hammond was not a musician himself, unlike Martenot and Theremin, who were both accomplished cellists. Hammond's skill, it seems, was in finding and then expanding unique market niches. His first large-scale business venture was a series of clocks that used electromagnets to create smooth and reliable rotation of the minute and second hands out of the slightly inconsistent a/c power that flowed through the grid of many North American cities in the 1920s and 30s. This "synchronous motor" became the heart of the musical instrument he designed initially as a lower cost and significantly more portable competitor to the church pipe organ (Vail 2002, p. 13). Hammond also paid close attention to the patents for electrical and electro-mechanical instruments that were popping up all over France and North America at the turn of the last century. Once the church pipe organ industry proved too small to handle Hammond's capitalist appetite, he starting marketing his instrument towards the affluent, middle class American home (an early Model A Hammond Organ cost easily as much or more than a new car in 1938 at approximately $1300 USD), capitalizing on the perception that electronic instruments can democratize music.

> **You needn't remember a note of music.** Thousands of people who have never had any previous musical training have learned to play simple pieces on the Hammond Organ in less than a month. (Hammond Organ Ad - "To the girl who never finished her music lessons," *Saturday Evening Post*, Sept. 23rd, 1950, p.106?emphasis in original).

Please click on the image for an enlarged view.

This claim around the democratizing power of a new musical technology is a commonly used rhetorical trope. It was repeatedly employed by Martenot and Theremin (see Glinsky 2000, Laurendeau 1990). For contemporary examples, one could look at any of Apple's promotional material for its "Garage Band" and/or "Itunes" applications, along with its Ipod/Iphone hardware for contemporary examples. For a more heart-warming version of this rhetoric in situ, see David Byrne, discussing his new musical instrument/installation "Playing the Building".

The Telharmonic Connection

Thaddeus Cahill invented the Telharmonium around 1897. The last patent for the instrument expired in 1936 (Vail 2002, p. 36). Huge spinning cylinders were set up in front of large electro-magnets. These cylinders were inscribed with regular patterns of ridges which, when spun in front of the magnets, created regular, periodic fluctuations in the electric circuit?fluctuations that could be turned into sound. However, these signals had to be very strong as *Speakers* and *amplifiers* had yet to be invented. Telephone receivers were used. The instrument was huge. Cahill elected to "broadcast" the Telharmonium's signals through New York city's telephone system. Telharmonic Hall was set up to receive the instrument. When transported from the inventor's studio in Holyoke Mass., it took up 30 railroad cars. (see Miessner 1936 and also http://120years.net/machines/telharmonium/index.html) The sound of the instrument was piped to subscribers via their home phones. Non-subscribers started complaining, however, when Telharmonium melodies began invading their telephone conversations as circuits were regularly overloaded. Cahill's business ventures with the Telharmonium ended in 1914 (Lodder 2008 p. 8).

Mark Vail claims that Hammond took the idea for his organ from Cahill's designs (Vail 2002, p. 36). Cahill's patents for his instrument did expire right around the time that Hammond released his first organ, the Model A (1935). In a conversation this past summer with David Kean, director of the Calgary-based Audities Foundation (see the introduction to the current volume for more information on Kean's work), I was surprised to learn that Vail had apparently heard this "fact" from Kean, who had offered it as conjecture, asking the former to mention this when preparing his book (which Vail failed to do). When I countered that the Telharmonium patents had expired at the same time that the Hammond Organ was released, that the design similarities seemed exceedingly clear, Kean responded,

> It's interesting?you just need a modulation source for whatever the current is, or whatever the magnetic field is that you're modulating. That's all you're looking for. And that's what a tone-wheel does.
>
> The big lesson with Hammond was, well there's two, but the first one is that Henry Ford and their relationship changed forever the way musical instruments were built. Henry Ford is building model Ts or whatever model was out in 1937. He's building them on an assembly line with little old ladies doing one thing all day long. This part goes here... But they got built correctly, and efficiently and cheaply. And he taught him [Hammond] everything he knew about that. Mass assembly, Hammond learnt those lessons. [...] So he builds these things in the 1000s. There are Hammond organs littering the landscape all over the world. It's just unbelievable. Because they are built so well. It's such a simple technology. (David Kean, July 21st 2008?personal interview)

Hammond replaced the Telharmonium's monster tone-wheels with small, dollar-coin sized ridged disks. The tiny frequencies these produce when spun at a constant speed in front of electro-magnetic pick-ups are amplified by vacuum tube circuits?circuits first invented and explored in the field of *radio*, in order to dramatically increase transmission strength and reception capabilities (to global proportions). These advances from one field were then combined with another?the Fordist production model?in the construction of a strong and successful legacy for the Hammond Organ?a legacy that persist today, as the instruments themselves were built to last. Hammond then took his efficient and cheaply built device, and marketed it ruthlessly, releasing new, improved models every few years and strong-arming organ dealers to carry only his products, if they wanted to represent the Hammond name. The impacts were far reaching?with Hammond organs "littering the landscape all over the world".

Radio waves are electromagnetic waves similar to those that can be sent to speakers from home stereo amplifiers via speaker wire, only cycling at much higher frequencies (about 30 KHz to 3 GHz as opposed to 20Hz to 20KHz for audio systems). Vacuum tube (or transistorized) circuits feeding-back on themselves can produce very fast oscillations in electrical currents from the audible range to the radiophonic. Once such a *carrier* signal is produced, it can be modulated through combining it with a source signal from within the audible range (in a method reminiscent of the heterodyning radio waves employed in the Theremin and Ondes Martenot). The resulting information-rich radio signal produced can either be AM (amplitude modulated) or FM (frequency modulated). Translating a radio signal back into sound waves requires a receiver that effectively subtracts the carrier signal from the transmission, resulting in an electromagnetic wave that speakers can turn into sound (i.e., vibrating air molecules). Before this final stage, however, the low-level electromagnetic signal received through radio must be *amplified* before being sent to a speaker woofer or tweeter. Sending out a radio signal over the airwaves also requires a great deal of amplification if one wants to reach a large audience - typically from 1-20 watts for pirate or amateur radio, and anywhere from 50 000 to 100 000 watts for commercial radio. To quote Canadian electronic musical instrument designer Hugh Lecaine,

> Amplifiers and oscillators made possible by the vacuum tube completely revolutionized the world of electrical-acoustic devices. Cahill's tons of electrical generators which looked like a large power plant became the compact electronic organs of today [1966]. (Young 1989, 36)

Lecaine, like Kean, considered the Telharmonium to be the ancestor of the Hammond organ?a "miniaturization" of the giant telephone-based instrument (as does Miessner in the 1936 article quoted above). The Hammond Organ applied "radio" technology in order to amplify its oscillating tones. In an interesting twist, Hammond Organs were used for a period in the 1940s as a means of sending different tones over the wires of Western Union (Vail 2002, p. 10). Hammond and his engineers (especially John Hannert) worked also on vacuum-tube-only organs, employing heterodyning radio waves?designing a series of unsuccessful instruments (including the Novachord, Solovox and Extravoice) before developing a "hit" with the Chord Organ?produced between 1950-1970 and marketed as "new, easy to play, inexhaustible, exciting...and best of all...worthwhile!" (from a 1950s Hammond advertisement).

Conclusions

Understanding the impacts of influential musical practices (such as sound synthesis, radio engineering and electronic instrument design) can only happen when the technologies employed or built-upon are recognized as indeterminate fields of possibility. Musical instruments, once designed and built, are only brought into culture through their sonification?through being played, heard, treasured, activated, defended and articulated. Theremin and Hammond each had their own strategies for bringing people to play their devices, appealing to inner desires to make music on the part of millions of North Americans untrained to play "classical" instruments, not to mention the magic of waving music from the "ether". Theremin's first name for his invention was the "etherphone", drawing on the fascination with all things "ether" that existed at the time. For at least one later inventor, the trick was to keep knocking on the doors of big business....

> [I]n 1938, Benjamin Miessner, a noted pioneer in radio engineering and electronic musical instruments, wrote to George H. Clark asking if RCA might be interested in his electric pianos. Miessner admitted: "I know and RCA knows that they made a mistake with their Theremin venture. That mistake has caused them to have doubts about all electronic music instruments....But the past few years have proven very decisively that electronic organs and small instruments have a very strong appeal, backed up by fine sales records." (Glinsky 2000, p. 138 - Miessner quote from a letter to Clark dated March 10, 1938 from the George H. Clark Collection, National Museum of American History, Division of Electricity and Modern Physics, Smithsonian Institution, Washington, D.C.)

It helped sell instruments, but more importantly it provided a consistent and highly active network of practices out of which a host of remarkable sounds, technologies, players and composers emerged. The impact of these socio-musical articulations is still being felt in a great variety of design and performance environments. Radio Activity was in the air. It still is, in more ways than could ever have been imagined.

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Biography

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