Southeastern Antique Radio Society

Newsletter
www.sarsradio.com

Summer 2017

Presidents Message

JIM POWEL

Greetings Fellow Members and Guests, summer is here and the heat is on. Our spring swap meet is now history. We had wonderful weather and thank you to The Golden Corral.

New signs are in the works for the next swap meet. It's been brought to our attention that "SARS RADIO SWAP MEET" did not convey a clear message. The new signs will read "ANTIQUE RADIO SWAP MEET" in hopes this will bring more traffic and attention to our hobby. Hopefully the results will be evident with our fall swap meet, which by the way is Saturday October 14th also at The Golden Corral.

The Jim R. Miller Park buildings will be torn down in October to make way for new construction in 2018. We have a new facility for the February 17th winter meet. It will be held at The American Legion Post 201 in Alpharetta. Details will be posted on our website.

I am especially grateful for the 2 club members who spearheaded this find, "Kudos" to Roger Willy and Sam Mashburn.

The monthly meeting attendance remains steady, there's always room for more. Most months in addition to our usual business and our show and tell, there is a presentation that relates to the hobby. If you can make it I know you will enjoy the evening.

In conclusion, I would also like to pass along an "Attaboy" to our webmaster, Jim DelPrincipe for keeping our site up and going.

> *"We have a new facility for the February 17th winter meet."*

Join SARS Now:

Go to our Website at www.sarsradio.com for complete information on how to:

- Become a member
- Have fun at monthly dinner meeting
- Attend triannual swap meets for great deals – buy, sell, trade

In This Newsletter

- Our prolific Jim DelPrincipe once again shares interesting and unique information, this time discussing wavelength and frequency history.

Transition from Wavelength to Frequency

Jim DelPrincipe

Question: What is the story behind the reason for moving from wavelength to frequency on our radio dials?

When radio began, the point at which it operated was expressed in terms of wavelength. Most radio dials were not yet calibrated as evidenced by the scales from zero to one hundred. Owners of these early sets were directed to keep a log of stations, entering the dial setting necessary to tune in their favorite programs. Starting with a one dial radio, listeners eventually had to tune in three dials for most TRF sets, a tedious affair at best.

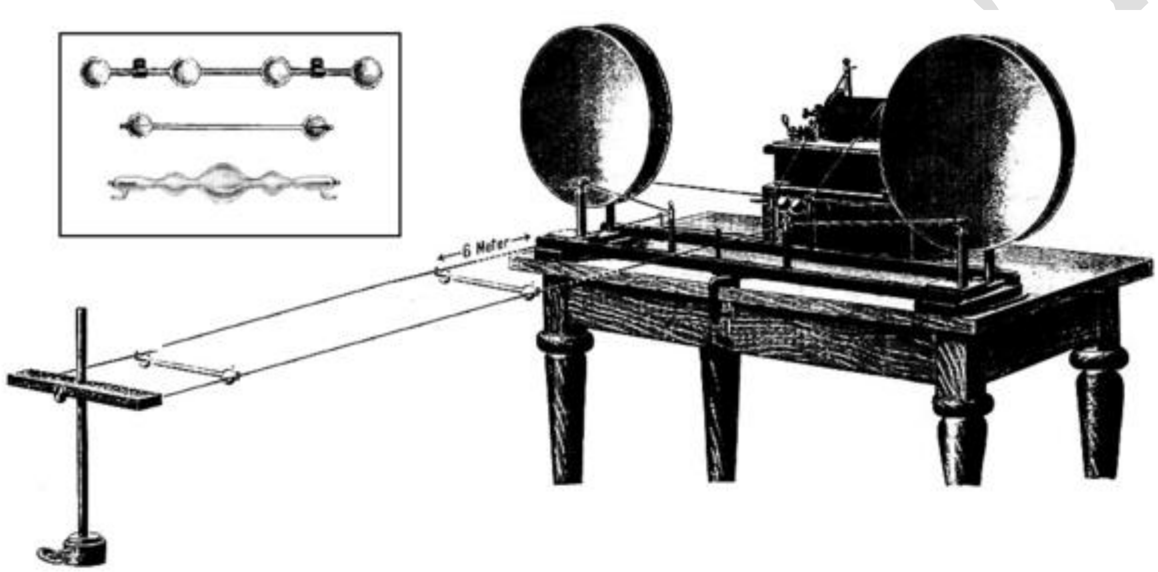
Later, the dials were calibrated in wavelength. This was especially true of European receiving sets. Why were these specified in wave length and not Kilocycles or Megacycles? Two thoughts come to mind. The early researchers were already familiar with the concept of wavelength from work in optics. These students of "Natural Philosophy" as they were known, often did research in many areas of interest. From optics, their work carried over to this new phenomenon of electromagnetic waves. It isn't until the latter part of the 19^{th} century that they would be known as a physicist.

Another reason is the ease of measurement. It would have been almost impossible for them to count frequency of waves in the thousands of cycles that were sometimes employed. Hertz first equipment was in the one meter region. (and we think VHF is a new invention).

So what equipment was employed to measure these new ether waves? One you may have seen is the absorption wavemeter. It is, in its most basic form, a coil and capacitor connected to a lamp. When the coil is brought near a source of radio energy, some of that energy is coupled to the coil. Tuning the capacitor will bring the coil and capacitor into resonance and the energy in the circuit will rise to the point where the lamp will light. A set of tuning charts will show the user just what wavelength this corresponds to. Wavemeters could be purchased or made.

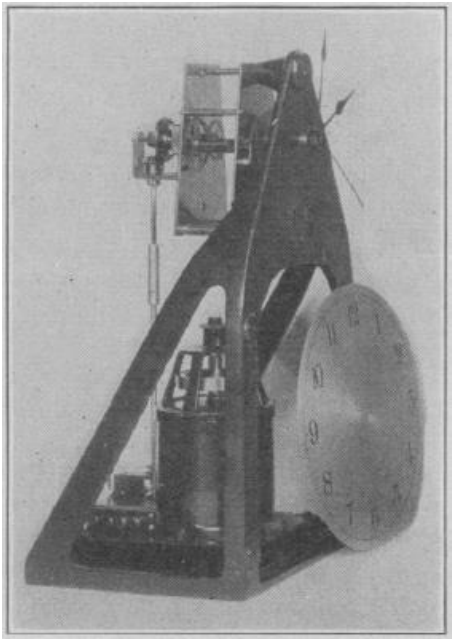
Examples of early wavemeters - These are sometimes still used today.

Another device is the Lecher wire, invented by Ernst Lecher around 1888. Waves generated by a transmitter travel down a set of parallel wires which are short circuited at the far end. The waves reflect back and form a standing wave on the line. Voltage will go to zero at half wave intervals on the line and this can be shown by Geissler tubes which will light or extinguish as they are slid along the wires. The measured distance between nodes is one-half wavelength. Geissler tubes are a gas filled glass tube which glow when exposed to a voltage including RF energy. This works well at high frequencies but can you imagine trying to measure a 600 meter wave?



The example above shows a spark transmitter on the right connected to a set of Lecher wires. Geissler tubes, shown upper left in the image, are suspended across the wires.

At some point, technology advanced to the point where frequency of a wave could be measured with reasonable accuracy. This meant that our dials could now be calibrated in cycles per second and for our radios, this was in Kilocycles (thousands of cycles per second) or Megacycles (millions of cycles per second).



Synchronous motor with Clock

Early determination of frequency involved a comparison to a reference standard that could generate a stable sinusoidal waveform at a known frequency that remained accurate over a period of time. Two methods were employed for this. The first one utilized a tuning fork at 100 cycles per second in a regenerative vacuum tube circuit. The tuning fork set the fundamental frequency and the vacuum tubes kept it in motion and were used to provide harmonics, integer multiples of the fundamental frequency, to be used to compare to a unit under test. The actual frequency could be determined using a clock that was driven by a synchronous motor, fed from this frequency standard. The time of the clock could be compared to the sidereal day (24 hours of Earth's rotation) as determined by astronomical observations.

Another, even more accurate means was the use of a quartz crystal resonator at a high frequency, for example 50 Kilocycles per second. This would also be used to power a synchronous motor driving a clock for determining actual frequency.

So, how was frequency first measured in the field or on a bench? Hewlett Packard was a leader in this new technology. They first produced a frequency meter which read out frequency on an analog meter.

The HP 500A Frequency Meter

The HP 500B Frequency Meter

Two examples of early HP frequency meters:

Later, Nixie tubes produced the first "digital" readout:

HP 523C Frequency Counter

But what about the switch in specifying how a station is defined; wavelength or frequency?

This was done by a regulatory agency, the ITU. The name has changed over the many years of its existence but it has been responsible for communications standards since 1865. Yep, the International Telegraph Union was there in the days of wired telegraph to ensure the various nations systems could 'talk' to each other.

The ITU was founded in Paris in **1865** as the International Telegraph Union. It took its present name, International Telecommunications Union, in 1932, and in 1947 became a specialized agency of the United Nations**.**

Several conferences were held to discuss this issue of wavelength versus frequency and among them:

1932: Madrid ITU Radio conference – The groundwork was laid.

1938 Cairo Radio Regulations expressly stated that frequency was the preferred way of expressing spectrum management matters.
They stated: *"Waves will be first denoted by their frequency in kilocycles per second (kc/s), or in megacycles per second (Mc/s). Following this the approximate length in metres will be shown in brackets. In these Regulations, the approximate value of the wave-length in metres is the quotient obtained by dividing the number 300,000 by the frequency in kilocycles per second"*
1947: Atlantic City Regulations – abandoned the "Wavelength concept" in spectrum management altogether. This drove the final nail in the issue of wavelength versus frequency.

Many of our radios from the 30's or 40's, some with very colorful dials, have bands expressed in wavelength; for example the 41 meter band or the 49 meter band, all have the frequencies in Kilocycles or Megacycles thanks to the ITU.