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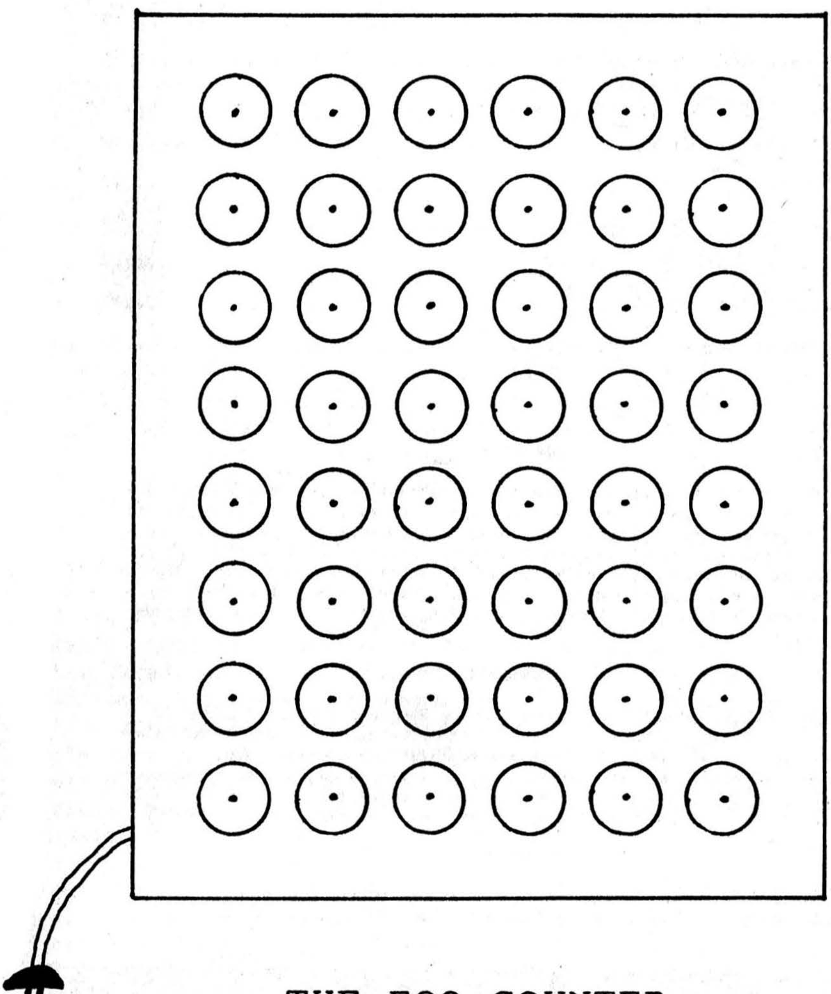

THE FOO COUNTER

CALIFORNIA HISTORICAL RADIO SOCIETY

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THE SOCIETY

The California Historical Radio Society is a non-profit corporation chartered in 1974 to promote the preservation of early radio equipment and radio broadcasting. CHRS provides a medium for members to exchange information on the history of radio with emphasis on areas such as collecting, cataloging and restoration of equipment, literature, and programs. Regular swap meets are scheduled four times a year. For further information, write the California Historical Radio Society, P.O. Box 1147, Mountain View, CA 94042-1147.

THE JOURNAL

The official Journal of the California Historical Radio Society is published six times a year and is furnished free to all members. Articles for the Journal are solicited from all members. Appropriate subjects include information on early radio equipment, personalities, or broadcasts, restoration hints, photographs, ads, etc. Material for the Journal should be submitted to the Editor, Herb Brams, 2427 Durant #4, Berkeley, CA 94704.

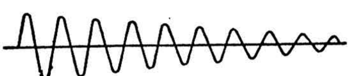
MEMBERSHIP

Membership correspondence should be addressed to the Treasurer, John Eckland, 969 Addison Ave., Palo Alto, CA 94301.

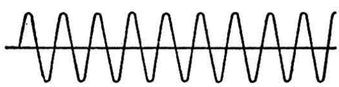
EARLY TRANSMITTERS

In 1892 Sir William Crookes suggested that it might be possible to communicate over distances by electromagnetic waves. The earliest transmitters were spark transmitters. These used the sudden release of energy of an electrical discharge into an antenna system to produce high frequency electrical oscillations in the system, causing the antenna to emit radio waves. The process was like striking a bell with a hammer to make the bell ring. The electrical discharges were generated by applying a high voltage across two closely-spaced electrodes, causing sparking to occur. The high voltages applied to the electrodes were usually alternating currents. These could be generated by using an interrupter (buzzer) to break up direct current from a battery. The interrupted current was then stepped up by an induction coil (transformer) to produce the high voltage alternating current supply. Alternately, an AC generator could be used to supply the high voltages.

The signals emitted by the antenna consisted of groups of damped waves: the waves were strongest immediately after each discharge and then died away slowly between the discharges.



DAMPED



UNDAMPED OR CONTINUOUS

The waves were, therefore, amplitude-modulated, the amplitude varying at the rate of sparking. The frequency of the waves was determined by the antenna system. Being modulated, the signals could be heard in receiver earphones, and the sparking rate was often adjusted to several thousand times a second to maximize the audibility of the signal.

The spark gap system had several important drawbacks. The initial discharges heated and ionized the air between the gap. This lowered its resistance so that electrical oscillations of the antenna system also caused sparking to occur. As a result, the energy stored in the antenna circuit was rapidly dissipated, greatly decreasing the efficiency of operation. In addition, the sparking produced a relatively broad wave, consisting of many different frequencies. This often caused interference with other transmitters. The sparking also converted oxygen and nitrogen in the air into nitrous acid which deteriorated the electrodes. In addition, the spark system made considerable noise.

The quenched spark gap, introduced by Telefunken in 1906, was an improved form of the simple spark gap. The spark was forced to jump across a series of closely-spaced metal discs that were cooled by a fan. The metal discs prevented the gap from remaining conductive after the initial spark had passed.

As a result, oscillations in the antenna circuit could go on swinging without being loaded down by secondary sparking. This increased the efficiency with which energy was turned into the production of radio waves. The waves were stronger and died away less quickly (less damped), making them carry further. There was also less production of unwanted frequencies, resulting in less interference. By varying the number of discs, the quality of the signal could be varied to obtain a clear musical tone that was easy for the receiver to copy. The quenched gap also made relatively little noise.

The rotary spark gap consisted of a circular series of electrodes rotated rapidly by a series of fixed ones. As each of the two types of electrodes came close together, a discharge occurred, and then the electrodes moved rapidly apart. This gave a brief spark like that of the quenched spark gap. The rotating electrodes cooled themselves and swept away the ionized gases that formed as a result of the discharges, reducing the tendency toward secondary sparking. This increased the efficiency of operation and the signal had a purer waveform. The rotary spark gap gave a signal that had a high clear note that was quite pleasant to the ear and was easily heard through interference. The gap could be adjusted to a synchronous relation with the alternating current of the high voltage power circuit. This gave more efficient operation with less wear on the electrodes and a clearer tone to the signal.

The improvement in spark transmitters was based on eliminating the formation of arcs (secondary sparking) which lowered efficiency by short-circuiting oscillations of the antenna system. However, the arc itself could be used to generate radio waves. An arc is formed when a spark jumping the gap between two closely-spaced electrodes connected to a high voltage power supply ionizes the air between the electrodes, forming a conductive path between them. Current then flows through this path, heating the air in the space between the electrodes, maintaining ionization. The intense heat maintains the conductivity of the path and current continues to flow by this means, forming an arc.

Around 1908, Valdemar Poulsen developed the arc transmitter, based on a discovery made by Duddell in 1900. Duddell had found that if a condenser and inductor were shunted around a direct-current arc, the arc would produce a musical note. From this it was called the "singing arc." The system of the arc, condenser, and inductance coil acted as an oscillator, generating high-frequency alternating currents. Poulsen adapted the Duddell singing arc to generate radio waves by putting suitable values of inductance and capacitance across the arc. Frequencies up to 250 KHz could be generated. In 1911 an American engineer, Cyril F. Elwell, formed the Poulsen Wireless Telephone and Telegraph Company which constructed many stations using arc transmitters.

The waves produced by the arc transmitter were constant in amplitude (continuous or undamped waves), rather than being damped like those of the spark transmitters. This type of wave had important advantages, as we shall see. Arc transmitters were capable of faster response in telegraphy than spark transmitters and emitted a purer wave so that two transmitters on slightly different frequencies could transmit without interfering with each other.

High frequency alternators were also used as transmitters. Alternators are devices that generate alternating electric currents. Alternator-type transmitters were developed around 1906 by Fessenden from designs originated by E. F. Alexanderson. They produced high-power alternating currents at high frequencies (up to 250 KHz). Like the arc transmitter, the alternator generated waves of constant amplitude (continuous waves).

Continuous waves had many advantages in transmission over damped waves and so the trend in transmitter development was from the production of damped waves to the production of continuous (undamped) waves. As we have seen, damped waves varied in amplitude, the waves being strongest immediately after each spark discharge and then dying away between the discharges. Undamped or continuous waves were constant in amplitude. The plain spark gap system produced waves that were highly damped, the quenched gap and rotary spark gap systems produced waves that were more moderately damped, and the arc and alternator transmitters produced continuous waves.

Damped waves were relatively easy to generate, and being modulated, they could be heard in earphones using only simple detectors. They were, however, inefficient in the use of power for their production. Being modulated, they occupied a relatively broad bandwidth, often causing interference with other signals.

Undamped waves, being unmodulated, occupied a narrower bandwidth, reducing interference. Being of constant amplitude, they were more penetrating than damped waves, which decreased in amplitude. Undamped waves were also more efficient in the use of power for their production. However, since they were unmodulated, continuous waves could not be heard in earphones, and so they required more complicated detectors for reception. Continuous waves could be interrupted or varied at the transmitter to modulate them, but this reduced the efficiency of operation. With the gradual improvement in detectors, however, reception of continuous waves became less of a problem. An advantage offered by continuous waves was that the pitch of the signals was under the control of the operator at the receiving station, rather than at the transmitter, so that he could adjust the signals for best reception. Probably the most important feature of continuous wave transmitters (arcs and alternators) was that, unlike damped wave transmitters, they were capable of transmitting voice as well as telegraphic signals.

The advantages of continuous waves outweighed the disadvantages, and with the development of continuous-wave vacuum tube oscillators and transmitters around 1913, which were much simpler and more efficient than previous transmitter types, the fate of undamped waves was sealed.

Detection of continuous waves. Continuous waves were unmodulated and so could not be heard directly in receiver earphones. They required special methods of detection. One method was to use a motor-driven device at the receiver to interrupt the signal at a high frequency. Such a chopped signal was audible in the earphones. Another method was to put a variable capacitor with motor-driven rotating plates in parallel with the main tuning condenser. This would periodically tune the circuit in and out of resonance with the incoming signal, making the signal audible in the earphones. The most effective way to detect continuous wave signals, however, was by heterodyning. The basis of this idea appears to have been discovered and first applied by Fessenden in 1905. Heterodyning depends on the production of new frequencies when two signals are mixed and passed through a non-linear circuit. A low-power high-frequency oscillator (arc, alternator, or vacuum tube type) was coupled to the receiver and tuned to a frequency about 1,000 Hz different from that of the signal being received. The two signals combined and produced an audio tone that could be heard in the earphones. This method of detection offered the advantage that the audio tone could be controlled by the operator by varying the tuning of the oscillator. It could be adjusted to produce a tone most pleasing to the operator or one heard most effectively through interference. For reception of weak signals the tone could be adjusted to the resonant frequency of the receiver earphones, giving an especially loud response. The heterodyne method of continuous wave detection was the most effective one and has remained the method of choice right up to modern times.

References: From Spark to Satellite, by Stanley Leinwoll, Charles Scribner's, 1979.
Radio Theory and Operating, by Mary T. Loomis, 1925.
Radio Encyclopedia, by Sidney Gernsback, 1927.
CHRS Journal, May-June 1984, July-August 1984.

HISTORY OF BROADCASTING

Until the early 1900's radio transmission consisted of keyed telegraphic signals in Morse code. Attempts to transmit the human voice were usually unsuccessful since the spark transmitters, in use at this time, were not suited to the transmission of speech. Signals generated by sparks were not continuous but were continuously interrupted, resulting in poor intelligibility.

In the early 1900's Fessenden tried voice transmission using a rotary spark gap, which produced sparks at a high frequency. Results with the rotary gap were better than with the older fixed spark but were still not quite good enough. Fessenden realized that the only way of transmitting good-quality voice signals was by using continuous waves. He decided to use a high-frequency alternator (a device that generates alternating current) to generate continuous waves. Under his direction a 50 KHz 1000W alternator was built and delivered to him in 1906. Preliminary tests were successful; voice transmissions with the alternator were of good quality. With this alternator Fessenden made the first radio-telephone broadcast in history, on Dec. 24, 1906. The broadcast started with a general call to all stations "CQ" in Morse code. Operators sprang to attention at wireless stations along the Atlantic coast and aboard ships within a radius of a few hundred miles. Then, to their astonishment, they heard the strains of Handel's Largo coming over the air, followed by a solo on the violin by Fessenden himself.

During the next few years other broadcasts of speech and music were made. In 1909 Charles Herrold ran regular half-hour daily broadcasts from the West Coast, using an arc transmitter. In 1916 Lee de Forest carried on regular broadcasts from his High Bridge station in New York City. These early broadcasts were primarily designed as tests of equipment and were aimed at radio operators and technicians. Indeed, at this time there was no use for radios by the general public.

During World War I Westinghouse undertook extensive research into the development of radio-telephone equipment using vacuum tubes. Dr. Frank Conrad, in charge of the program, constructed a small telephone transmitter and received a license for a station on Aug. 1, 1916, with the call letters 8XK. However, in 1917, the United States entered the war and the station was shut down. In October 1919 the ban on amateur radio was lifted and Dr. Conrad resumed operation.

During his tests of radio-telephone equipment, Dr. Conrad soon became bored with the burden of speaking into the microphone. Seeking a way to free himself, he placed the microphone in front of a phonograph and played records over the air instead. To his great surprise, Conrad was deluged with mail. Amateurs from around the country wrote telling of their pleasure with these broadcasts and requested that he play specific records. Requests became so heavy that Conrad decided that he would "broadcast" (his term) records for two-hour periods every Wednesday and Saturday evenings. Before long, Conrad had depleted his supply of records. An enterprising local enterpreneur offered to make a steady supply of records available to him if he mentioned the store on the air. Conrad agreed. By September 1920 interest in the broadcasts had become so widespread that a Pittsburg department store, the Joseph Horne company, advertised in the local paper, calling attention to Dr. Conrad's programs and informing the public that the store was selling radio receiver (crystal sets) that could tune in the broadcasts.

Westinghouse followed the activities of Dr. Conrad with interest, realizing the commercial possibilities of broadcasting to the public. Westinghouse itself applied for a license to broadcast, and on Oct. 27, 1920 it received a license for their station with the call letters KDKA. Then began two weeks of feverish activity, for it was decided that the inaugural program would carry the November presidential election returns. The broadcast occurred Nov. 2, 1920 and went perfectly. This was the first broadcast by a <u>commercial</u> radio station. Carried to the general public, it created a sensation! Within a year, three other Westinghouse stations were on the air and demand for receivers grew so rapidly that it could not be met. One of the greatest booms in American industrial history was underway.

In 1922 General Electric, Westinghouse, and RCA became the major manufacturers of receivers, but because of the great demand, many other manufacturers entered the field. By 1924 several hundred companies were producing receivers. Most of these receivers were crystal sets or small regenerative sets. Later, tuned radio frequency receivers were introduced, and then neutrodyne types, introduced in 1923. In 1924 RCA introduced the superheterodyne which, by 1930, gradually replaced all other types.

With the proliferation of radio stations, it was inevitable that several stations would be connected together to carry the same program simultaneously, forming a network. In January 1923 the first hookup of two stations was accomplished, when programs carried by station WEAF in New York were fed by telephone line to station WNAC in Boston. In 1924 twenty-two stations were hooked up coast-to-coast to carry a speech by President Coolidge during the presidential campaign.

In 1926 the National Broadcasting Company (NBC) was formed, consisting of twenty-four stations in twenty-one cities. Stations around the country pressed NBC for affiliation and in 1927 a second NBC network was formed. The two networks were designated "Red" and "Blue" because these were the colors used by NBC in mapping the locations of the transmitters in the networks.

Also in 1927, a third network, the Columbia Broadcasting System (CBS) was formed. In 1934 the Mutual Broadcasting System was formed. This basic four-network framework continued until 1943 when the FCC ordered NBC to divest itself of one of its networks. NBC sold the Blue network, which became the American Broadcasting Company (ABC). Regional networks, serving particular areas of the country, have been formed from time to time and have been successful on a smaller scale.

INCREASING EARPHONE SENSITIVITY

In the old days, the sensitivity of earphones to the fixed tones of telegraphic signals could be increased by making the earphone resonant to those frequencies. This was accomplished by putting a capacitor of about 0.1 mfd across the earphone terminals. The parallel combination of capacitor and earphone windings acted as a resonant tuned circuit, giving a peak in response to those frequencies.

VARIOMETERS

Variometers were early tuning devices. They were variable inductors, consisting of two coils of wire connected in series. One coil was stationary while the other could be rotated within the first. Depending on the orientation of the movable coil, the electromagnetic field around the coil either aided or opposed that of the fixed coil, increasing or decreasing the total inductance.

LODGE DISC DETECTOR

The Lodge disc detector consisted of a rotating thin steel disc with its edge just touching a pool of mercury with a film of oil floating on it. When a signal passed through the circuit, the mercury adhered to the disc. At the end of the signal the contact was immediately broken by the revolving of the disc and the oil re-insulated the disc. Using this type of detector, code signals could be recorded with great precision on a Morse tape. The disc detector was an imperfect-contact type detector like the coherer.

LONG WAVE BROADCAST RADIO

by Ed Fistor

Early radio communications systems were developed primarily for the maritime industry for the obvious reason that instant communications promoted safety of life at sea. The only other users were amateur radio operators who communicated with each other and radio experimenters. A proliferation of ship and coastal stations mushroomed along the European coastal regions to service the growing volume of marine traffic. All these stations gravitated to the high end of the known spectrum. . . . 1000 KHz because of the shorter antennas required for efficient radiation and the fundamental requirement for short-range communication. The calling and distress frequency was chosen to be 600 meters (500 KHz).

Early experimenters of speech or music transmission by radio believed that establishment of a public broadcasting system was feasible. Since the longer wavelengths provided better signals at greater distances, the broadcast services set up shop on these longer wavelengths to take advantage of the longer range and to reach a larger group of listeners. The European Long Wave Broadcast Band was thus established from 1,000 to 2,000 meters (150 to 300 KHz). No other region in the world set up any broadcast services in this band because in the 1910-1915 era most other nations had neither the know-how nor, in many cases, the finances to set up such a service.

These long wave stations were monsters. The transmitter powers ranged from a few thousand watts for those in local or domestic service to half a million watts for international stations. This service, incidentally, was established long before KDKA made their famous broadcast in 1921. These long wave signals could be heard all over Europe, the north Atlantic, and the eastern seaboard of the United States. I remember many a cold winter evening in Michigan when the locals came pounding in. Stations were logged from London (400 KW), Sweden (600 KW), Poland (500 KW), Luxemburg (500 KW), and more. All this received on a TRF regenerative receiver, and a 150-foot antenna.

The antenna structures were necessarily large. A quarter-wave antenna at 2000 meters is 500 meters, or 1640 feet, or a third of a mile. Towers were 200 to 300 feet high, strung with wires running every which way. The antennas were basically top-loaded verticals, current fed. A mass of underground radials was required to dissipate the thousands of amperes of antenna current.

My impressions of the programming was that the rest of the world did not see Americans as we saw ourselves. Their programs were oriented to higher intellectual levels than ours. There was more recognition of worldly events, politics and literature.

There was more symphonic music and less jazz. It was there that I first learned of Hitler and followed his antics, which eventually got me involved in World War II.

Many of these stations were destroyed in the war, many migrated to the standard broadcast band, but a few are still around. Anybody heard one lately?

The Editor would be delighted to receive articles, stories, anecdotes, notes, ads, tid-bits of information, photographs, personal reminiscences, etc. from CHRS members for publication in the Journal. Nothing is too small for consideration. So let's hear from you.

SWAP MEETS

Why do we charge admission to our swap meets? Your membership fees cover the costs of the Journal only. In this way members do not pay for meets they cannot attend. The swap meets represent an additional service made available to buyers and sellers and should be paid for as such. The cost of renting space is usually $150-250 per meet. Paying admission to the meets is the same as paying for a newspaper in order to look at the classified ad section or paying admission to a flea market to look for old radios. We are only trying to distribute our charges fairly.

THE FRIENDLY B.E.A.R.

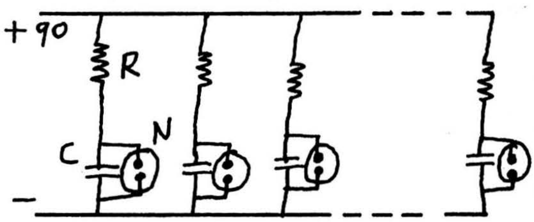
The July-August CHRS Journal carried an article that stated that it is a violation of California state law for anyone not licensed by the State Bureau of Electronic and Appliance Repair to charge for the repair of any electronic device. This presumably includes old radios. Jerry Talbott, President of the Northwest Vintage Radio Society writes that Oregon state law provides an exception: "Nothing in ORS shall prohibit--any person from servicing only consumer electronic entertainment equipment manufactured prior to 1957" (Consumer Electronic Entertainment Equipment Service, article 702.020). Do other states have similar provisions for unlicensed repair of older electronic equipment?

THE FOO COUNTER

by H. Brams

A long time ago, when I was just a boy, I saw a man with a small metal box that had an array of flashing neon lights on the front. Each lamp flashed individually and independently of its neighbor, forming no particular pattern like that of a traffic warning device or sign. I asked the man what the device was and he replied, "It's a Foo counter. It counts Foos." Naturally, I asked him what a Foo was, and he smiled and said, "That's a good question. The Foo is a very mysterious thing. You can't see them, feel them, or even smell them, but they're all around. And this little box can count them. Every time a light on this box flashes, it indicates the presence of a Foo." Being a smart young lad, I realized that I might get a better idea of what these mysterious Foos were like if I knew how the device worked. So I asked the man and he explained.

The Foo counter consists of an array of 25 or more neon bulb flashers (relaxation oscillators) mounted on a flat surface of a box, about 1" apart.



R = 22 megohms, ½w

C = 0.1 mfd, 100v

N = NE-2 neon bulb

When the voltage is applied, each capacitor begins to charge up. The capacitors charge slowly since the flow of current is limited by the resistor. When the voltage across the capacitor reaches about 65 volts, the gas in the neon bulb ionizes, and the bulb flashes and conducts current, discharging the capacitor. The bulb then goes out and the charging process starts all over again. The bulb flash about once per second, the rate of flashing being determined by the voltage and the values of the resistors and capacitors.

Because of slight differences in the characteristics of the bulbs, resistors, and capacitors, each bulb flashes at a slightly different rate. Although initially the bulbs flash together, they soon get out of step and flash independently of each other in a random way. But now a curious thing happens. By chance, a group of bulbs will flash so as to form a particular pattern. For example, bulb #1 will flash, followed immediately by bulb #2, then #3, 4, 5 --- etc., making a comet-like streak over the face of the box. Or, a single bulb will flash, followed by the bulbs immediately around it, and then the bulbs around these, and so on, giving an explosion effect.

Sometimes, a particular figure, like that of a face, will suddenly be formed. There are millions of patterns possible and each can occur by chance. The sudden appearance of a pattern is exciting and pleasing, something like fireworks exploding in the sky. Each pattern will flash a few times and then disintegrate into random, meaningless flashing.

I watched the man's Foo counter for a while, fascinated by the patterns that appeared, and then suddenly I realized that I had to hurry off to school. I never did see that man again so I never had the chance to find out what a Foo is. Does anyone out there in Radioland know?

BOOK REVIEW

The Early Days of Wheeler and Hazeltine Corporation - Profiles in Radio and Electronics, by Harold Alden Wheeler. Hazeltine Corporation, Commack, N.Y. 11725 (1982) 432 pp.

Harold A. Wheeler has written a fascinating and very detailed account of his life and of the growth of the Hazeltine Corporation where he worked. Much of the book is devoted to a thorough account of the technological development of equipment and circuits such as TRF, neutrodyne, and superheterodyne receivers, diode detection and automatic volume control (AVC), mixers and converters, antennas, television, FM, and test equipment. The theory, operation, and limitations of such equipment is analyzed in detail. Wheeler also gives a thorough account of the fight to obtain and protect patents for his inventions, shedding much light on the intensely competitive nature of the electronics industry and on the unsavory practices and questionable litigation that characterized it. Wheeler's presentation is extraordinarily well documented with specific names, places, and dates, giving us a firm historical understanding of events as they happened. The reader will find this book to be a goldmine of information on the radio industry of the 1920's-1940's.

EARLY DAYS OF FM, TAPE RECORDING

An interesting series of articles on the early days of FM and magnetic tape recording are appearing in the July, August, and September issues of Audio magazine. The book Man of High Fidelity: Edwin Howard Armstrong, by Lawrence Lessing (publ. by Bantam) is available for $1.00 each from the Armstrong Foundation, 1342A S.W. Mudd Building, Columbia University, New York, N.Y. 10027.

LUNCH WITH GROUCHO

by Jerry Perchesky

It was a typical Beverly Hills afternoon in May of 1976, when, at the appointed hour of 12:50 p.m., I drove up to Groucho Marx's home. A maid answered the door and Jim, Groucho's secretary (and an old friend), guided me into the entrance way. I noted a large hat rack with all of the many hats I had seen Groucho wear in films and on stage. I was given a quick tour of the home and noted the walls filled with large photos of the Marx Brothers and their parents.

Within minutes, we entered the dining area and Jim said: "Here he comes." Coming towards us was this frail, aging veteran of show business, slowly pacing his way. Groucho stuck his hand out and greeted me amicably, and we sat down. Immediately, we were served a fruit salad, and Groucho asked: "What did you bring me?" I gave him some rare tapes of World War II performance shows he appeared in, and put in front of him a browned VARIETY newspaper from World War I. "I'm not interested in the past" he commented, "only the future." But, as he turned the pages and saw an article on the Marx Brothers concerning their military service, he said "All lies. I played with this act in Hoboken in 1917. . . . lousy act." Another ad for a prominent act of their day caught his eye. "I played around with this guy's wife while he played on stage. And he never knew about it." "Groucho," I asked, "do you mind if I tape some of our conversation?" He was cutting into a lamp chop, and it seemed to me, waiting for answer, that more than a few minutes went by. Then he finally looked me right in the eye and said "WHAT conversation?" "Well, " I answered, "ONE of us is talking at least!" He smiled that famous Groucho grin of his (and I secretly TURNED ON my tape recorder). I could see he was frail of body, but the old Groucho was still there. We traded questions and answers, but I don't believe I ever got a straight answer to ANY question, just subtle quips. He was sharp-edged mentally, but in body, a frail old, old man. But what memories that mind held. After we finished eating, Groucho got up from his chair, stuck out his hand and said, "It was a great pleasure talking to you. I never met anyone more informative about our business." I looked him right in the eye, still clutching his hand and said, "Groucho, I've had some wonderful interviews, but THIS WASN'T ONE OF THEM!" He smiled again, turned away and walked to his den (where I was told he spent most of his hours reading and watching television). Jim took me into his library, where I borrowed every bit of tape and recording material I could find to take home and copy. Also, I was given a 1934 original Marx Brothers radio script (which Groucho later autographed for me). Groucho called to Jim, and a few minutes later Jim returned and said, "Groucho liked you, and would welcome another visit later." I was flattered. But that visit never came about because the Great One passed on less than a year later. I had returned his jabs with a right cross, and he had respected me for it. I had met a legend and dueled him to a virtual tie. And that was my lunch with Groucho.

GILFILLAN

The August 1984 issue of the Southern California Antique Radio Society Gazette (SCARS) has a fine article that should be of special interest to West Coast members. It covers the Gilfillan Company, a major West Coast manufacturer of radios and radio parts from the 1920's to the 1940's.

The company started in 1912 as a smelting and refining company and in 1915 began producing automative ignition components. In 1922 it expanded into radios and radio parts. Gilfillan was a flexible and technologically innovative company, producing an extensive and very diverse line of products.

In 1924 Gilfillan became one of the original fourteen members of the Independent Radio Manufacturers, Inc., a consortium formed to fight the monopoly RCA held on radio circuit patents. This group explored alternative designs and became a major factor in the development and introduction of the neutrodyne receiver in 1924. A big boost came in 1927 when RCA gave Gilfillan exclusive territorial rights to RCA patents.

From 1929-1933 the West Coast was a hot-bed of radio manufacturing. There were at least fifty-two radio assemblers in the Los Angeles area alone. The West Coast and in particular Gilfillan was instrumental in introducing and popularizing compact table radios in 1929-1930. Although Gilfillan made and sold its own name-brand sets, they did a large business making chassis and complete sets for dozens of other companies in the 1930's. Gilfillan made chassis and sets for Breting, Herbert H. Horn (Tiffany Tone), Jackson Bell, Kemper, Mission Bell, Packard Bell, Patterson, Peter Pan, Remler, Rola, Troy, Western Air Patrol, and many others. One uniquely-styled product that appeared in the 1934-1935 period were mirrored glass table radios. Gilfillan was an early manufacturers of TV's, producing sets as early as 1939. Gilfillan had two manufacturing plants on the West Coast. The primary plant was in Los Angeles and the other was in San Francisco.

Gilfillan continued making radios, phonographs, wire recorders, and televisions until 1948 when it decided to drop its consumer product line. The company was sold to ITT in 1963 and exists today as ITT Gilfillan, a producer of command and control systems and air traffic control systems. It has been estimated that Gilfillan sold more than 1,500,000 radios between 1924 and WWII.

SCARS

The Southern California Antique Radio Society (SCARS) invites you to join their club. A quality Gazette, issued quarterly, has in-depth articles on many topics. Free ads and a roster of members is available to all members. Write: Ed Sheldon, Sec., 656 Gravilla Pl, La Jolla, CA 92037.

"A" BATTERY ELIMINATOR

by Henry Meyer

The power supply described below provides a means for eliminating the bulky 6v "A" battery for those who would like to operate their old battery radios that use 01A-type tubes. The supply will provide 4.9-6.2v DC (adjustable) at 1.75 amps and slightly less than 6v DC at up to 2 amps. The voltages are regulated and well-filtered.

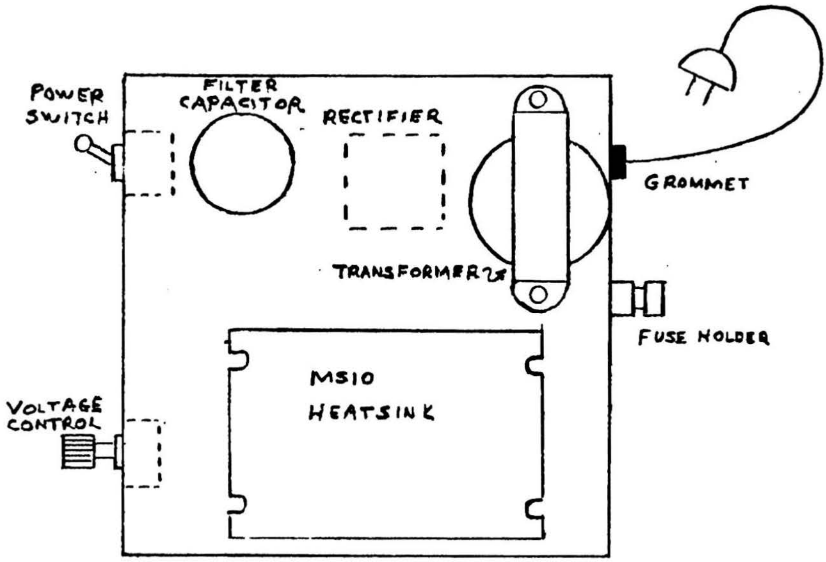
The transformer should provide 12.6v at 3 amps or more. I used one available at Radio Shack, #273-1511. The rectifier is a 6 amp 100v bridge with 50 amp surge capability. The filter capacitor can be any unit over 3000 mfd at 20v DC. The .01 mfd capacitor in the output bypasses RF currents, reducing hum problems.

The heart of the unit is the regulator. I used a National Semiconductor LM309K device. This is a 5v, 1.5 amp regulator which, when used as shown, can provide a variable voltage up to about 8v DC depending on components. Other devices that can be used include the LM323K (5v, 3 amp) regulator, and the LM317K (1.5 amp), LM350K (3 amp), and LM338K (5 amp) adjustable regulators. These devices are short-circuit proof and have thermal sensing to provide automatic shutdown if the device overheats. This gives a real margin of indestructibility and provides a good reliable "A" supply.

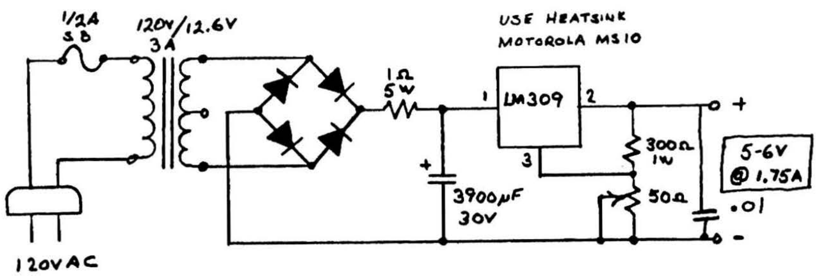
The output current capacity is determined by the efficiency of the heatsink. With the Motorola MS-10 sink, up to 2 amps can be provided without thermal shutdown. Since 01A tubes consume 5v at 0.25 amps, this is sufficient for sets with up to eight 01A tubes.

The performance of this supply has been quite satisfactory. An old Algonquin RF-5 radio that had sat around for many years after its previous owner had passed away is again filling the house with low-fidelity sound. Also, two Atwater Kents have come out of retirement and must now work for a living.

(From CHRS Journal Vol. II, No. 1, Fall, 1976)
AWA Old Timer's Bulletin, Sept. 1984)



Solid State A Eliminator Supply Layout on 7" by 7" Chassis



Schematic Diagram of Solid State A Supply

SPEAKER REPAIR

Neal's Speakers and Stereo, 1748 Fulton Ave., Sacramento, CA 95825 (916) 486-9372.

O-RINGS

The R.W. Scott Co. which had been my supplier of O-rings for Zenith drive belts, rubber drive wheels, etc. is out of business. However, another company has a good selection of rings: East Bay O-Ring, 1451 Fifth St., Berkeley, CA 94710 (415) 526-5858. Ask for Janet Goree.

MOTOR BRUSHES

Do you use motor-driven tools that have replaceable electrical brushes? Periodically check that the screw-in caps holding the brushes are not becoming loose by vibration. A friend of mine unexpectedly lost the use of his heat gun when a cap and brush suddenly flew off and were lost forever. The brushes are spring-loaded and will propel themselves to the Great Beyond with the greatest of ease.

RESTRINGING WIRE DIAL CORD

Many early AC radios of the late 1920's used wire dial cord to drive the dial and tuning condenser from the tuning knob. A typical arrangement is this (Sparton 931): the cord goes from the front grooved wind-up gear to one side of the drum dial, goes around the dial about one-half turn, then goes across the dial to the other side. It then goes around the other side of the dial one-half to one turn, and then passes down to another grooved wind-up gear at the rear of the tuning shaft. The wire is difficult to string because it is so springy. Try this. Prevent the tuning knob shaft from turning easily by putting a piece of sandpaper between the jaws of a wrench and tightening the wrench on the shaft. Wind the cord fully on the front take-up gear. Loosen the screws on the rear take-up gear so that it turns freely. String the cord carefully, loosening the wrench just enough so that the cord can be unwound from the front take-up gear but not so much that the shaft slips too easily. Applying pieces of tape to hold the cord in place may help. Wind up the cord on the rear take-up gear by turning the gear, then turn the gear until the cord is tight. Tighten the screws. If the cord has a tendency to jump off the dial or take-up gears, apply tension to the cord by connecting a spring between the dial drum and the crossover point of the cord on the drum.

TESTING CAPACITORS

Capacitors are important components of electronic equipment. They consist of two metallic conductors (usually foil) separated by an insulator. They allow signals (alternating currents or variations in DC voltages) to pass through them, thereby transferring such signals from one part of the circuit to another. However, because of the insulation between the plates, any constant voltage on one side of the capacitor is prevented from reaching the other side.

Capacitors are tested to determine if the insulation between the plates is still good. A voltage is applied and any flow of current through the capacitor is determined. If there is a flow, the capacitor is considered "leaky" and should be discarded. Capacitors are also tested for their capacitance. An alternating-current signal is applied and the amount of signal that is transferred across the capacitor is determined. This gives a measure of its capacitance. If the capacitance is much less than its indicated value, the capacitor is considered "open" and should be discarded.

Electrolytic capacitors are a special case. They have a polarity and must be connected so that the positive end is connected to the point in the circuit that has a more positive voltage than that of the connection to the negative end. For the leakage test, an electrolytic capacitor is connected to the tester so that this polarity is observed. Electrolytics normally allow some current to flow through them and still be good, but if an excessive amount flows, the capacitor is considered leaky and should be discarded. Electrolytic capacitors should also be tested for their power factor. This is an internal impedance, preventing the capacitance from acting effectively in passing signals. If the power factor is greater than about 15, the capacitor should be discarded.

A variety of capacitor testers are available. Many older units which were often assembled from kits (Heathkit, Eico, Knight, Precision, etc.) are entirely adequate. They can often be found at swap meets, flea markets, garage sales, etc. at reasonable prices ($5-25). They have a large round printed dial marked in several ranges to indicate capacitance and a Magic Eye tube to indicate capacitance and leakage. Be sure to replace the capacitors in them with new units before use. I myself use a Heathkit Condenser Checker, model C-3. The directions for using them are all about the same and are given below for those who do not have an instruction manual. Capacitors already in sets do not have to be removed for testing. Simply disconnect one end from its associated components.

DIRECTIONS

Paper and Mica Capacitors: Place capacitor across Cap. terminals or use connecting leads.

Capacity Measurement- Set selector knobs at Cap. Test (at appropriate range) and Paper and Mica positions. Turn dial for maximum eye opening. Read value.

Leakage Measurement- Set selector knob at Leakage Test at appropriate voltage. Turn knob to Leakage position. Eye will close then open fully if capacitor is good. With small capacitors the eye will open quickly. With large ones the eye may take several seconds to open.

Note: for small capacitors and mica capacitors, put the negative or ground lead on the end that was left connected in the circuit and the positive lead on the disconnected side. With the leads reversed one often gets erroneous values of capacitance and leakage.

Electrolytic Capacitors: Place capacitor across Cap. terminals, positive end to positive or center terminal.

Capacity Measurement- Set selector knobs at Cap. Test (at appropriate range) and Electrolytic positions. Turn dial for maximum eye opening. Read value. Without moving dial, adjust Power Factor knob for maximum eye opening. Read value.

Leakage Measurement- Set selector knob at Leakage Test at appropriate voltage. Turn knob to Leakage position. Eye will close then open fully if capacitor is good.

In my experience capacitors in old sets are almost always leaky and should be replaced. I usually don't bother to test them but go ahead and replace them routinely.

Converting capacitor values: The basic unit of capacitance is the farad. However, most capacitors are measured in microfarads (mfd) which are millionths of a farad, and in micro-microfarads (mmfd) which are millionths of a microfarad. Micro-microfarads are also known as picofarads (pfd).

To convert a value given in microfarads to micro-microfarads multiply by a million (move decimal point six places to the right).

0.000110 mfd = 110 mmfd
0.001 mfd = 1,000 mmfd
0.01 mfd = 10,000 mmfd

To convert a value given in micro-microfarads to microfarads divide by a million (move decimal point six places to the left).

7,000 mmfd = 0.007 mfd
250 mmfd = 0.00025 mfd
50 mmfd = 0.00005 mfd

Capacitor values are best expressed with the fewest number of zeros, e.g., 50 mmfd rather than 0.00005 mfd, 0.001 mfd rather than 1,000 mmfd, and 0.05 mfd rather than 50,000 mmfd.

Capacitors whose values range up to about 0.001 mfd are usually mica or disc capacitors, those with values of about 0.001 to 1.0 mfd are usually tubular capacitors, and those with values greater than 1.0 mfd are usually electrolytic.

ADVERTISEMENTS

four tubes, table model with speaker, $13. Packard Bell, five tubes, AC table model, $13. Sparton model 25/26, ten tubes, plays, no speaker, $35. Midwest, 14 tubes, no speaker, $35. Bosch model 66AC, with power supply, speaker, turntable, original owner's manual,knobs, and escutcheon, $60. Pilot Super Wasp converter model 40672, $15. RCA model D22-1, upper chassis, recapped, plays well, original knobs, $45. Wanted: 9P6 power supply for a Majestic model 90. John E. Wentzel, 1609 Irving, San Francisco, CA 94122 (415) 731-1920.

Wanted: 15 v filament Arcturus tubes for Sonora A-30: four RF types RA-1 and two audio types SO-1. Tim Passadore, 345 Fulton St. #19, San Francisco, CA 94102.

For Sale: Garrard model 301 turntable with base, Gray arm, $90. 1935 Zenith table model radio with small round dial, chrome grill. Chrome needs replating, cabinet needs minor repair, knobs missing, $65. Two Zenith floor models with big round black dials that light up in colors, 1936 vintage, shadow meter tuning indicator, needs some wood repair, $60 and $140. Steve Franaszek, 2007 Haste St. Apt. 9, Berkeley, CA 94704 (415) 841-9323.

For Sale: Dyna stereo 70 tube power amp and matching preamp, ex. cond., $175. Wanted: Atwater Kent model 84 cathedral radio, and any information on Jesse French radios or the company. Steve Duffert, 1142 Los Palos Ct., Pittsburg, CA 94565.

For Sale: Several wood console and table model radios. No shipping. Doug Bennett, 1674 Plymouth St., Mountain View, CA 94043 (415) 968-1346.

For Sale: RCA-Victor table radio, no model number, works fine. Pat Levy, 185 El Pinar, La Selva Beach, CA 95076.

For Sale: RCA-Victor battery-operated portable radio, model 54B1, ex. cond. Millard Hoyle, 1521 Cienega Rd., Hollister, CA 95023 (408) 637-5566.

Wanted: Old-style type 45 and 80 tubes. Hiroshi Ishii, 15531 Corinne Dr., Los Gatos, CA 95030 (408) 356-6213 eves.

For Sale: Hallicrafters S-20R communication receiver, exc. cond. $150/offer. Wanted: Jensen Q series pedestal horn tweeter, Garrard RC-1 record changers, and anything pertaining to E.H. Scott and McMurdo-Silver equipment. John Eckland, 969 Addison Ave., Palo Alto, CA 94301.

For Sale: Miscellaneous clock radios of the 1950's-1960's, $5 each. Zenith AM-FM stereo radio, $30. GE personal portable TV $5. Columbus gumball machine, $175. Wanted: colored celluloid radios. Bob Crockett, 1520 Willow Rd., #202, Palo Alto, CA 94304.

For Sale: Fairchild studio turntable model 750, needs a belt, $30. Scott 121-B and 121-C mono preamps, no case, $40 and $50 plus shipping. Norm Berge, 969 Addison Ave., Palo Alto, CA 94301.

For Sale: Various battery and early AC radios and speakers. George Patterson (415) 326-7935. No shipping.

For Sale: Rare early electric Edison radio, $300. 1928 Zenith "English" radio cabinet, fair cond. $50 FOB my doorstep. Ken Zander, PO Box 2652, Sunnyvale, CA 94087.

Wanted: Old Blaupunkt and Becker car radios. Charles Siegfried, 659 Cherry St., Santa Rosa, CA 95404.

Wanted: Old tube-type Marantz or McIntosh amplifiers, old Tannoy (English) loudspeakers, Victor Orthophonic Credenza and any orthophonic reproducers, old Western Electric equipment and tubes, old broadcast or receiving tubes with early-style envelope bulbs. Please call if you have any of the above, or send card with phone number. I will reply. David Yo, Box 832, Monterey Park, CA 91754 (818) 576-2642.

For Sale: Three old radios, Philco, Howard, Airline. Tom (408) 926-8936.

For Sale: 1940 Zenith radio-phono with pushbutton tuning. Make offer. Ralph Weston, Box 2413, Carmel, CA 93921.

For Sale: Heathkit capacitor testers, restored, work well, model C-3, $25. Chassis model 30 and speaker for 1930 model Silver radio (Silver-Marshall), $10. 1936 GE tombstone radio model E-81, good condition but a patch of water damage on top, $25. Wanted: grid dip meter for under $20, 6T5 Magic Eye Tubes. Herb Brams, 2427 Durant #4, Berkeley, CA 94704 (415) 841-5396.

★★★★★★★★★

Ads should contain information on condition, vintage, model numbers, and price, and telephone numbers should contain the area code. Ads should be sent to the Editor, Herb Brams, within three weeks after you have received your previous Journal.

★★★★★

The editor would welcome articles or other information on crystal sets and early (1920's) superheterodyne receivers.

★★★★★★★★★★★★★★

OREGON SWAP MEET

The Northwest Vintage Radio Society will hold a swap meet Saturday, Oct. 13 at the Buena Vista Club House at 16th and Jackson St., Oregon City, Ore. (south of Portland). For information, call Jerry Talbott 649-6717.

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