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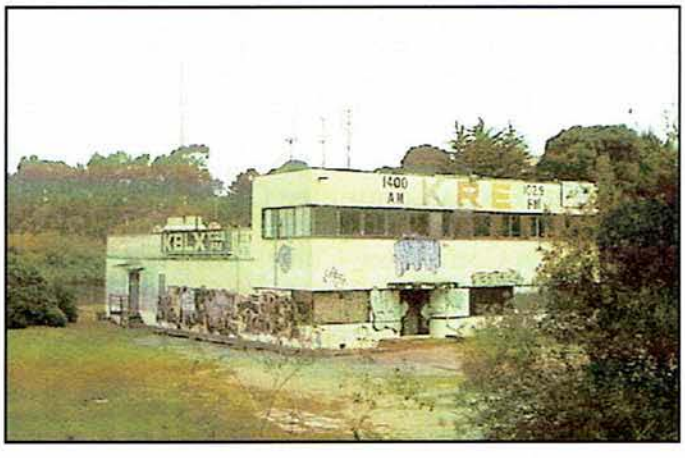
CALIFORNIA HISTORICAL RADIO SOCIETY

KRE .... Then and Now!



FOR THE RESTORATION AND PRESERVATION OF EARLY RADIO

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The California Historical Radio Society, (CHRS), is a non-profit educational corporation chartered in the State of California. CHRS was formed in 1974 to promote the restoration and preservation of early radio and broadcasting. Our goal is to provide the opportunity to exchange ideas and information on the history of radio, particularly in the West, with emphasis on collecting, preserving, and displaying early equipment, literature, and programs,

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THE GIANT 2008 CHRS EVENT SCHEDULE

July 5th - Saturday, 10 AM, Berkeley,
601 Ashby Ave. - "LIVE! at KRE 2008" - Giant CHRS fund raising event.

July 19th - Saturday, 9 AM -
3rd Saturday work day at KRE

July 27th -
4th Sunday work day at KRE

August 2nd, Saturday, 9 AM -
Los Altos Hills. Foothill College, Lot "4". SWAP-MEET & AUCTION.

August 16th - Saturday, 9 AM -
3rd Saturday work day at KRE

August 24th - Sunday, 9 AM -
4th Sunday work day at KRE

September 6th, Saturday, 9 AM -
Berkeley, CA - KRE Building, 601 Ashby Ave. RADIO ACTIVITY DAY / RADIO CLINIC and DEMO or SPECIAL PRESENTATION

September 20th - Saturday, 9 AM -
3rd Saturday work day at KRE

September 28th - Sunday, 9 AM -
4th Sunday work day at KRE

October 4th, Saturday, 9 AM -
Modesto, CA - CHRS Central Valley Chapter Swap Meet at the Modesto Radio Museum, KMPH, 1192 Norwegian Ave.

October 18th - Saturday,
9 AM - 3rd Saturday work day at KRE

October 26th, Sunday, 9 AM -
4th Sunday work day at KRE

November 1st, Saturday, 9 AM –
Berkeley, CA - KRE Building, 601 Ashby Ave. SWAP-MEET / SPECIAL PRESENTATION - SELL for Free at KRE

November 15th - Saturday, 9 AM -
3rd Saturday work day at KRE

November 23rd, Sunday, 9 AM -
4th Sunday work day at KRE

December 6th , Saturday, 12 PM -
Berkeley. CHRS/KRE Building. GENERAL MEMBERSHIP MEETING & HOLIDAY SOCIAL - GUEST SPEAKER

December 20th - Saturday, 9 AM -
3rd Saturday work day at KRE

History of the Victor Phonograph
by Paul C. Edie

The Victor Talking Machine Company was founded by Eldridge Johnson in 1901, and quickly became a major player in the rapidly growing phonograph market. Johnson had been active in the phonograph business as a motor supplier for several years prior, and had learned a great deal about the emerging home entertainment market. At the turn of the century, all phonographs used a large external horn to "amplify" the playback sound. While this system worked quite effectively, the stark horn tended to dominate the average parlor, and many people felt that this created an unsightly appearance. In addition, the horn was quite prone to being bumped or damaged Johnson (and his growing staff) made several improvements to the phonograph in those early years, including a tapered tonearm, improved soundboxes and quieter, more stable running spring motors. The phonograph market grew significantly in those early years, and due to a creative and well-funded advertising campaign, Victor's sales steadily grew. Johnson arranged to have renown opera stars and musicians endorse his products, which spurred additional sales at a cost of almost 50% of the company's total operating budget. However, increased competition from other companies and continued objections to the huge horn limited Victor's market. In addition, business was continually threatened due to the the massive numbers of lawsuits filed by competitors, which became a constant battle for all phonograph companies in the first decade of the 20th Century. Victor won most suits and was able to survive (with very expensive legal representation). Around 1905, Victor began to experiment with a novel idea to make the phonograph more acceptable and convenient. The horn was folded downward into a large floor standing cabinet, so that the horn opening was below the turntable. Two doors were used to cover the opening. This concept had an added advantage in that the doors acted as a crude but effective "volume control"; when they were open, the sound was loud, when they were closed, the volume was reduced.

This idea was quickly patented, and the copyrighted name "Victrola" was given to this new invention. The term Victrola thus applies ONLY to internal horn phonographs made by the Victor Talking Machine Company, and is not a generic term for all old phonographs. The first internal horn phonograph, initially designated as The Victor-Victrola, was marketed in 1906. Since Victor did not have sufficient manufacturing facilities to produce the large cabinet, the Pooley Furniture Company was contracted as a cabinet supplier. The machine was intended for sale for wealthy customers, as the initial sale price was a lofty $200 (the most expensive Victor with an external horn sold for $100). In spite of the price, the machine sold briskly, and Victor knew it had an immediate success on its hands.The earliest Victrolas were designated by a "VTLA" (an abbreviation for Victrola) identification on the dataplate, although they were soon marketed as "Victrola the Sixteenth" or VV-XVI. Victor also experimented with marketing a more deluxe model, designated "Victrola the Twentieth" (VV-XX), which sold for $300, with gold plated trim on the cabinet. Only a few hundred of these models were produced before being discontinued due to the high cost. Production of the XVI model ramped-up quickly, and the VTLA identification was superseded by "VV-XVI" on the dataplate in early 1908. At about the same time Victor rapidly expanded its cabinet manufacturing operations, and the services of Pooley were no longer required. Victor added different finish choices, including oak, walnut, and even custom painted versions.

By the middle of 1909, approximately 15,000 Victrolas had been sold, and Johnson decided to capitalize on his success by introducing a lower priced model. Thus, in 1909, the tabletop Victrola XII was introduced, selling for $125. This first attempt to make a low-price compact Victrola was not successful, as the horn opening was too small for adequate volume in a large room. In 1910, two new tabletop models replaced the XII, the Victrola X ($75.00) and Victrola XI ($100.00). These tabletop models had much better performance than the XII, and began to sell quite well, even though the price was still prohibitive for many Americans. A smaller version of the VV-XVI was also introduced, named Victrola the Fourteenth or VV-XIV ($150.00)In 1911, with an eye on the average family's budget, Victor introduced several new low-priced models, the VV-IV, VV-VI, VV-VIII and VV-IX, with prices ranging from an astounding $15.00 up to $50.00.

This series of new low priced machines was a smashing success, and Victrola production rose from several thousand per year in 1906, to approximately 250,000 per year by 1913. While the Victrola model lineup remained relatively unchanged through World War I, several deluxe models were introduced in the mid-to-late 'teens, including the VV-XVIII ($300.00) and the VV-XVII ($250.00). By 1917, Victor was making well over a half million Victrolas per year. The VV-XI floor model was the most popular of all, selling over 850,000 copies during its production run (1910-1921). For the wealthy customer, Victrolas were also available in a variety of custom designs, with hand painted images, exotic wood, and Japanese lacquer finishes. This machines were produced in low quantities, and are highly desirable today.

In 1913, the first electric motor option became available on the Victrola XVI, eliminating the need for cranking after every few records were played. Victrolas with electric motors were called "Electrolas". This option didn't really catch-on until well into the 1920's, as electrical power was not yet readily available, and the added cost of the motor was prohibitive for most buyers.

Due to national defense needs, production decreased during WWI. Victor transitioned production to biplane wings and other war materials. When the war was over, the demand remained strong, but Victor found that it had a lot of new competition from small upstart companies, who often made cheaper (and usually inferior) phonographs. Thus, by late 1919, sales started to wane. Victor redesigned most of its lineup in the early 1920's with scores of new models, including some horizontal console styles such as the VV-210 ($100.00) and the VV-300 ($250.00). These Victrolas sold well for a short while, but the increasing popularity of the newly developed home radios began to take their toll on the phonograph market. Radio offered endless variety, better sound quality, and best of all, the consumer didn't need to purchase records. By 1923, Victor offered a few phonographs (with an "S" prefix before the model identification) that would allow an aftermarket radio to be installed in the cabinet alongside the turntable (using the Victrola's horn as a "speaker"), but this did little to improve sales. By late 1924, the bottom literally fell out of the phonograph business, and Victor had to make some major improvements in order to survive. Some documents indicate that literally hundreds of thousands of unsold Victrolas were sitting in warehouses by early 1925. In order to move this stock, a huge "half-price" sale was held during the summer of 1925, wherein every unsold Victrola would be offered at half the usual list price. Both dealers and the company "ate" the losses. The sale was a success, but the valuation of Victrolas (including the

market value of the entire company) took a serious tumble. Dealers who had sold an elegant VV-125 to a customer for $275 in 1924 would now offer the same customer only around $25 for the same machine in trade for a newer one less than one year later (and today we think that computers depreciate too fast!!). Obviously, this created some bad press for the company and dealers.

In November, 1925, Victor introduced the "Orthophonic" Victrola, which utilized the latest sound reproducing technology offering far superior reproduction. The old style Victrolas sounded anemic compared to these products. Dramatic improvements were made in the design of the horns and the soundboxes, in part based on signal transmission theory developed during World War I. This was achieved without the use of electronics, but rather though sophisticated acoustic designs. The tinny Victrola sound was now replaced with a rich tone that was superior to all but the best radios.

In addition, phonograph records were for the first time being recorded electrically, which also improved the sound quality. Selling for as little as $50.00 (and for more than $300.00), these machines were an immediate success, and quickly brought profitability back to Victor.

The rapid expansion of the radio market caused a quick decline in the price of electron tubes and components, and by the late 1920's, the combination electronic radio-phonograph was becoming quite popular. These machines could now use the radio's amplifier for reproducing records, and the need for the horn was replaced by the small paper-cone speaker. Fidelity was also much improved. Some models even had sophisticated record changers, which would allow a complete symphony to be played without having to stop and manually change records. Victor entered into an agreement with RCA for the use of RCA's electronics in Victor's products, and produced a number of radio-phono combination sets which were quite successful. By the late 20's, Victor's founder, Eldridge Johnson, now a millionaire, was growing weary of the business, so he decided to retire. In 1929, RCA purchased The Victor Talking Machine Company, and the new company was called "RCA Victor". By this time, the popularity of the acoustic phonograph was quickly diminishing in favor of the louder and more flexible electronic combination systems, and only cheap portables and children's phonographs continued to utilize acoustic reproduction. In October 1929, the onset of The Depression literally killed the sales of all non-essential commodities, and not until the late 1930's did RCA Victor again experience significant sales of phonographs.

Basics of the Acoustic Phonograph

All Victor machines of the acoustic era were based on the Berliner flat disc design. The discs revolved at 78 RPM and used the lateral (side-to-side) cut method. Some other manufacturers, including Edison, used cylinders or discs with a vertical cut wherein the needle moved up and down to reproduce the acoustic signal (see Figure 1). Only the lateral cut medium will be discussed in these articles. As the needle tracks the grooves, vibration is mechanically coupled into the soundbox, which consists of a thin diaphragm of mica or (later) aluminum. The diaphragm vibrates and provides a large surface area to vibrate the air molecules into the hollow tonearm. Thus, mechanical energy is converted into acoustical energy. The air molecule vibration is routed through the tonearm and into the horn, which directs the soundwaves into the listening environment A hand-wound, spring-powered motor was utilized to spin the turntable on most Victor machines. Depending on model (and price), from one to four spiral-wound springs were used in the motor. A simple mechanical governor provided a stable drive system. Electric motors became an option on Victrolas around 1913, but the more common spring drive was used in most models through the 1920's. It wasn't until around 1928 that electrically powered phonograph motors became very commonplace. Even many of the early radio-phono combination sets of the mid-1920's used a spring-wound motor, with batteries providing DC power for the radio's electronics. Early phonographs used an external horn. External-horn Victors varied considerably in design detail in early years, evolving in sophistication as more was learned about effective transfer of vibro-acoustic energy from the disc to the surrounding room. The earliest designs had an integral horn and soundbox structure. In these models, the horn's neck was attached directly to the soundbox housing, and the entire horn assembly moved along with the needle as the record was played (some of the horn's weight was supported at a pivot point, allowing the soundbox/horn assembly to follow the record grooves)Thus, the record groove had to pull along the mass of the entire system (needle, soundbox and some of the horn's weight).

CHRS Endowment Fund

Some of you have asked about how to leave estate sized donations to CHRS. The CHRS Endowment Fund is a fund that can only be used to make money to insure the long term success of CHRS. If you want to include CHRS as a beneficiary in your will, here is information from our hard working General Counsel Emeritus, Bart Lee. What is most important is that if you want to leave your radio collection to CHRS then you must also will enough money to CHRS to maintain it.

1. Outright Bequest:

I give to the California Historical Radio Society of San Francisco and Berkeley, California, (CHRS, P. O. Box 31659, San Francisco, CA 94131) the sum of $ . . . . . and/or the following real and/or personal property: [describe property].

2. Memorial Designation:

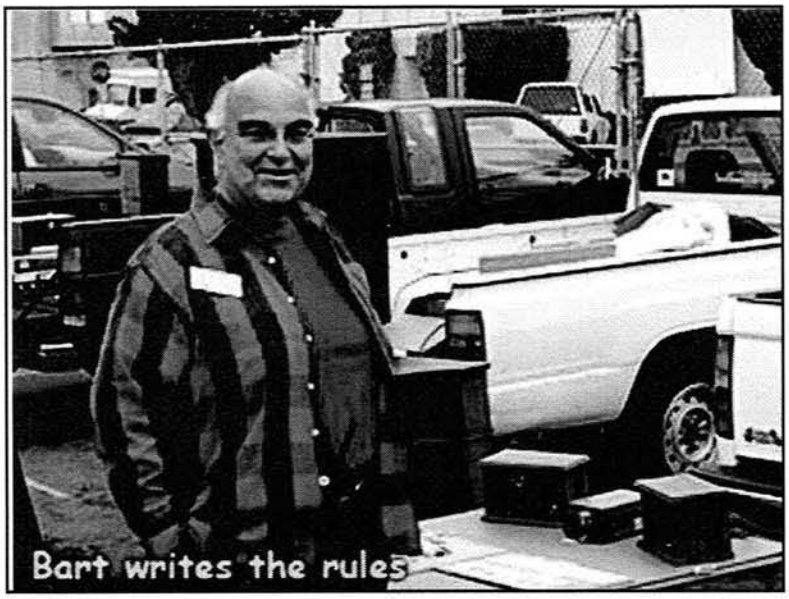
I give to the California Historical Radio Society of San Francisco and Berkeley, California, (CHRS, P. O Box 31659, San Francisco, CA 94131) the sum of $ . . . . . [or .....% of my estate] [or describe real and/or personal property] to establish a permanent fund to be known as the: . . . . . Endowment Fund on the records of the said Society.

3. Residuary Bequest:

I give to the California Historical Radio Society of San Francisco and Berkeley, California, (CHRS, P. O. Box 31659, San Francisco, CA 94131) the sum of $ . . . . . [or .....% (percentage)] of the residue of my estate.

4. Gift to be added to the endowment (unrestricted gift):

I give $ . . . . . [or . . . . % of my estate] [or describe real and or personal property] to the California Historical Radio Society of San Francisco and Berkeley, California, CHRS, P. O. Box 31659, San Francisco, CA 94131) to be held and administered as part of the endowment of the said Society with distributions of income and/or principal to be made as the governing Board of Directors of the said Society shall from time to time determine.

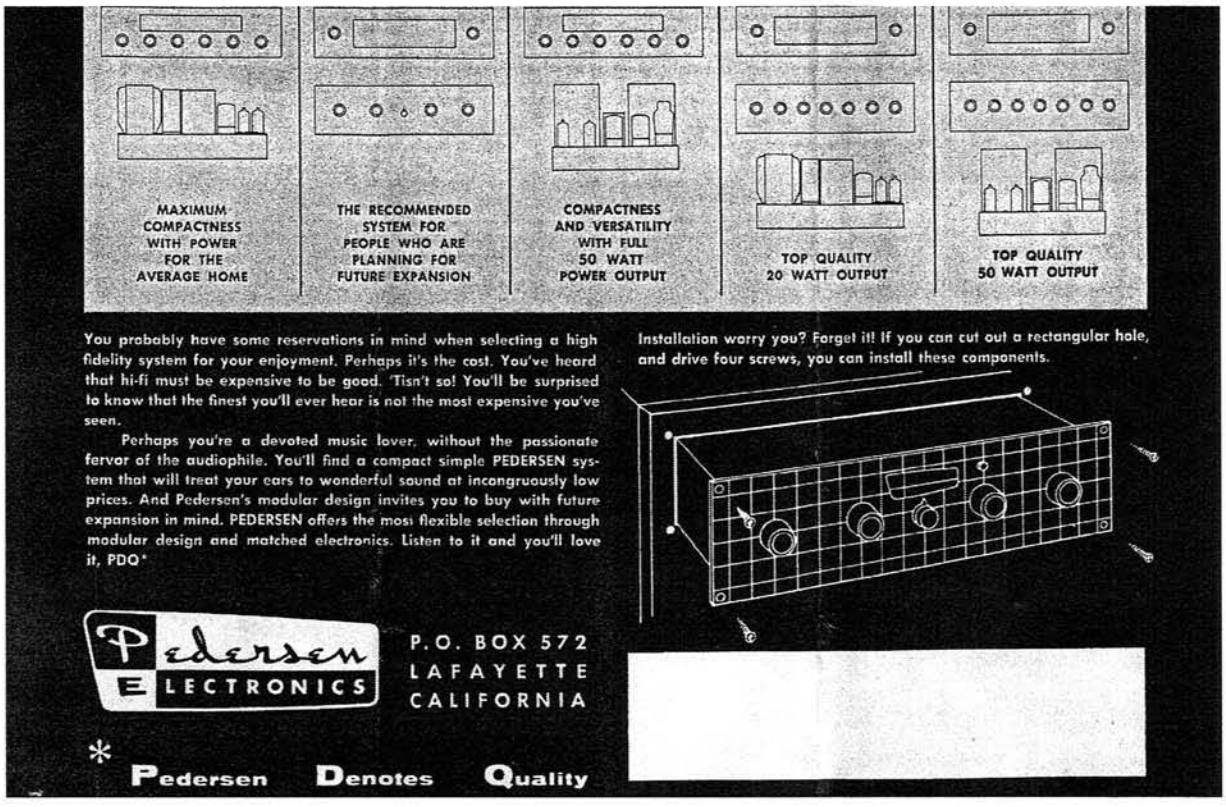


Some Local History - The Pedersen Electronics Company

by John Eckland

When Sven Pedersen graduated from high school in the mid thirties. he had a fascination with electronics and was earning a living repairing radios during the middle of the depression. Progressing through the later thirties, he developed an interest in the construction of custom radio and record playing systems. Income from those pursuits was sporadic, so via the Danish American organization he was eventually able to obtain a full time job working for Shell Development Lab's in Emeryville, California. While working for Shell, Sven - or Rudy as he preferred to be addressed, met Dr. Ernest Lawrence of the yet to be Lawrence Livermore Lab's. he also met his future wife, Sheila, a U.C. Berkeley grad who also worked at Shell Development.

After marrying Sheila, Rudy became an instructor of radar at a school in San Francisco, California, during the outset of WW2. He was later stationed at Camp Murphy, in Florida near West Palm Beach. Sheila stayed nearby at West Palm Beach also. Next Rudy was transferred to Fort Monmouth, New Jersey to teach radar but soon felt his abilities were severely under - utilized. Sheila went out to address his apparent state of limbo by corralling a colonel, who was walking through the hallway at the administration center indicating to him that her husband was in need of a change to a position more comeasurate with his abilities, that was more challenging. Amazingly the Colonel put Rudy in the right direction indicating that he was in the process of forming an advanced radar group of experts at Bendix Corporation, in Maryland. Rudy jumped at the challenge and after studying the existing Radar setup at Bendix, found that much of the circuitry was outdated and needed revision, which he proceed to undertake with this group. After the radar group updated the circuitry, the next project was to write an operation manual for the system and to review same for accuracy. A state of the art Radar system was prepared for shipment to the pacific theater and the Bendix Radar group headed off to Honolulu in preparation for the installation of said equipment, but the equipment never arrived! The Bendix guys instead spent much of their time on the beach at Waikiki and the Honolulu Municipal Golf Course waiting for the equipment that never arrived.

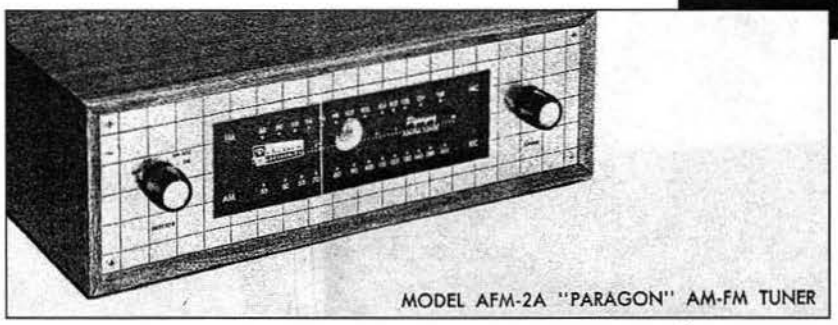


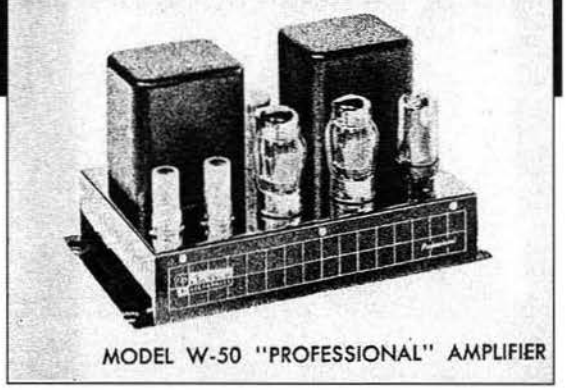
Then came word of the dropping of the atomic bomb on Hiroshima and Nagasaki, and after an extended stay, they were sent home. After the war, Sheila encouraged Rudy to pursue an electrical engineering degree at Cal Berkeley, and he graduated with top honors in the late forties. While going to Berkeley, he built Hi-Fi amplifiers on the back porch of their cottage in Lafayette for students and professors. Dr. Lawrence gave Rudy his first contract building regulated power supplies for the lab. Rudy was also the "water boy" for Lawrence's Cyclotron!
Rudy befriended Alexander M. Poniatoff, the founder of Ampex Corporation in Redwood City, California. Alexand Harold Lindsay as well as other Ampex notables would come over for dinner on many occasions at the Pedersens home in Lafayette.

Alex gave Rudy a contract to build 30 watt amplifiers, using push - pull 807's for use in Ampex theater sound installations. The transformers in these amps were mainly supplied by the General Transformer Company of Chicago. Rudy also made high end under the Pedersen logo starting in the early fifties with the W-15 Williamson model using KT-66's in the output stage. A deluxe full featured preamp was made to compliment the W-15 that sported a copper finished faceplate. The preamp was a PRT-1 model. A small building was constructed to facilitate manufacture of audio equipment in Lafayette. The small plant featured a paint shop and a silk screening room. More Hi-Fi amps were to come. The W-30 which used a pair of 5881's in the output stage, and the W-50, which used a pair of 6550's in its output stage. Both amps use the Williamson front end. The W-50 power amp had a variable damping factor control as well as a thirty second time delay relay, for the application of B-plus, to extend the life of the electrolytic capacitors.

Pedersen Electronics in the mid fifties came out with a full line of modular HiFi equipment starting with the model AFM-2A Paragon AM-FM tuner, model AFM-6A Pageant AM-FM tuner preamp, model PRT-1B/LC Prelude control preamp, a model PCP-20 Tri_amp 20 watt integrated amplifier, a model W-20 Parade, W-30 and W-50 Professional basic amplifiers. This final lineup of Pedersen equipment was styled by San Francisco designer W.W. Fitzgerald. All power amps use circuitry adapted from the Williamson design. The W-50 has the addition of the damping factor control to it's Williamson circuitry. The FM tuners use a Cascade RF stage, a low noise triode mixer, two IFs, two limiters and a discriminator. The preamp used triodes throughout (5 - 12AX7s). The chassis are mostly copper plated.

They are usually painted with an instrument grey automotive enamel with the exception of the W-50, which had a mostly chromium chassis.\The first Ampex stereo consoles used a Fisher 80 AM-FM tuner in 1956. All later Ampex consoles used the Pedersen tuners employing a shock mounted template containing the tuning condensers and IF coils etc. floating on soft rubber grommets. Simplified versions of these templates were supplied to Hoffman Electronics in Los Angeles, for the use in their Hi-Fi consoles. Pedersen made some of the small amplifiers used in the Ampex speaker-amps to accompany various models of tape decks such as the PR-10, and the F-44 to name two.


MODEL AFM-2A "PARAGON" AM-FM TUNER


MODEL W-50 "PROFESSIONAL" AMPLIFIER

Reflections: Marconi and Ionosphere Propagation, and a Plea for Timely Experiments

By Bart Lee,
KV6LEE, xWPE2DLT, CHRS, AWA

Marconi sent three dots, the letter "S", across the Atlantic by wireless in December, 1901. Or did he?

As I reported to the Poldhu Amateur Radio Club in December, 2001, in 1999 I had checked the sunspot numbers for December 1901 and discovered (for the first time as far as I know) that that number was exactly zero.

As I wrote for 13 Antique Wireless Association Review (2000), this means the absorption frequency would be at its lowest and Marconi could well have benefitted from onospheric propagation, or "skip" at his primary frequency of 833 khz, from Poldhu to St. John's, Newfoundland.

There are several reports of current transatlantic AM broadcast reception on similar paths. Marconi told the IRE in the 1920s that he took a low pass filter out of the circuit, but no more in known about this. The kite movements detuned his receiver, so he altered it, presumably broadening the tuning. But Poldhu was still at 833+- khz, and recent work suggests that the Poldhu fan antenna would not have transmitted at much higher a frequency, and would have most strongly radiated at about a 45 degree angle into the sky. The fly in this ointment is that propagation models do not permit Marconi to get across, or the AM skip either for that matter. Marconi didn't trust experts, and the models may not be as good as one would hope.

Was there D-layer absorption that would prevent Marconi's signals from reaching the F-layer and skipping across the pond? The models say so, but they are, as far as I can determine, based on today's understanding of the chemistry of the ionosphere.

The amount of Nitrous Oxide (NO) at D-layer altitude determines the thickness of that layer. The models say it is too thick today for Marconi to have gotten through it that afternoon and thus through to Newfoundland in 1901. But that was then and this is now.

In all probability, automotive and industrial processes for the last century of progress have filled the D-layer with NO that just wasn't there in 1901. It also has to be true that the present ambient RF noise level has to be orders of magnitude higher now than it was in 1901, which is presumably an element in the model's predictions. Yet even today AM signals at high Northern latitudes get across, NO or no NO. Some say that Marconi did hear three clicks, repetitively, but it wasn't Poldhu. One theory is that it was electrical machinery. This is hard to test because that machinery is in all probability long gone and its EMF-emitting characteristics cannot now be determined. But Marconi would have heard such noises all the stronger in his English experiments, there being a lot more electrical machinery in England at the time than in Newfoundland and environs.

He (and Kemp) presumably would have recognized it for what it was. The second theory is more interesting, and testable as well. Some say Marconi heard the clicks for sure (as did Kemp) but they were lightning-generated.Newfoundland is due North of the Amazon basin, home to most of the world's lightning storms. (This theory somewhat inconsistently presumes a North to South ionospheric propagation for lightning static longer than the East to West of Poldhu to St. John's, so the zero sunspot number is still in play. The data from the National Bureau of Standards in the 1930s, however, suggests Northern latitude propagation is differentially improved when the ionosphere quiets). Be this as it may, if lightning static sounded like three repetitive clicks in 1901 it should sound the same a century later, so it can be recorded now and analyzed. I have proposed that the Poldhu Amateur Radio Club put a 160 meter beacon of maximum legal power on the air in November 2006 through February 2007, because that will likely be the next sunspot minimum. GB2GM can transmit the standard marker of the Morse letter V, which has the advantage of being ST, and this itself will include Marconi's S of three dots.

I propose that it transmit in CW but also as SSB audio hash, 200 hz to 2,500 hz. This will simulate a spark signal, albeit with a very narrow "decrement" as they used to say (or "bandwidth" in today's understanding).

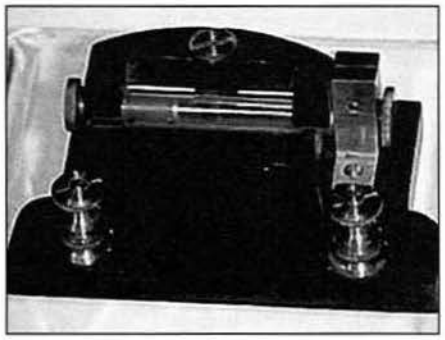
Reflections, (continued)

The first test is simply: can this be heard in Newfoundland. Next, what is the minimum receiver and antenna required; will this require a beverage antenna and modern digital signal processing, or will a sharply tuned crystal set suffice with a tuned vertical? T Marconi's mercury oxide "Italian Navy" (or more likely Chandra Bose) detector was a sensitive semi-conductor playing into a high impedance earphone to sensitive ears.

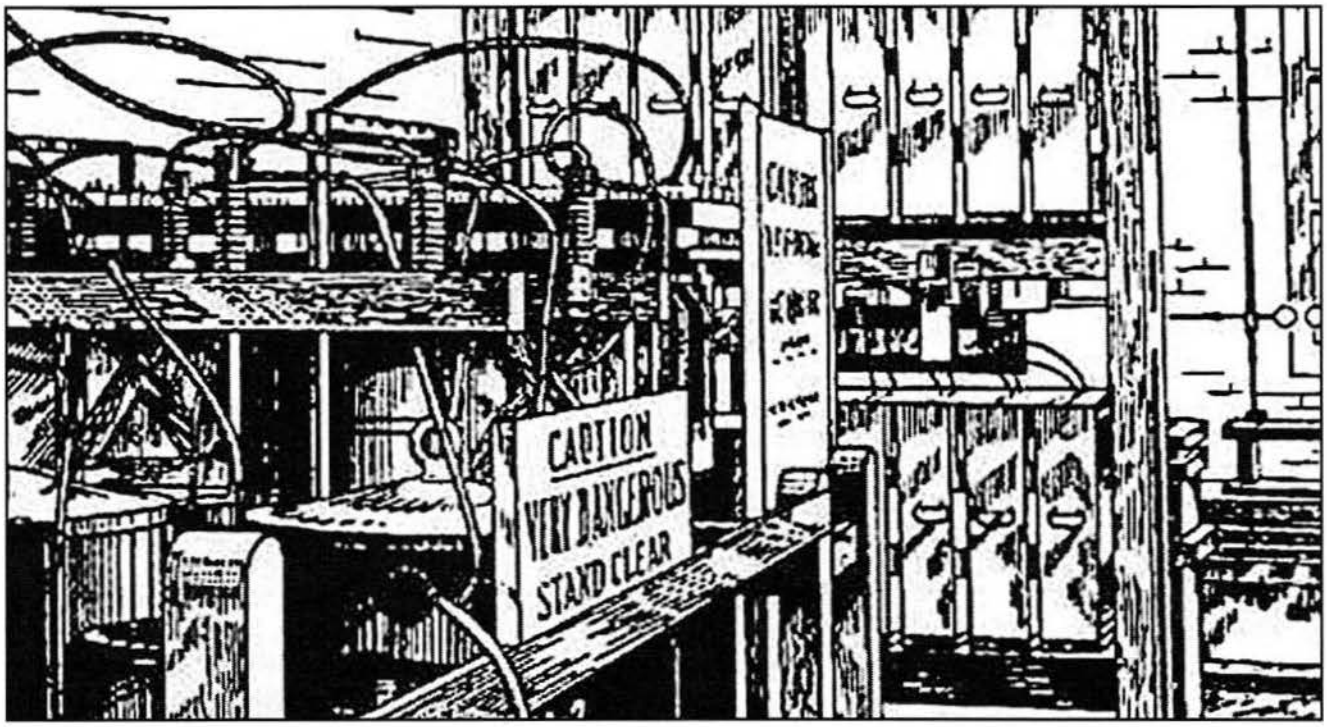
Marconi in Newfoundland did not employ an insensitive coherer and inker combination, but even that worked for 700 daylight miles aboard ship in early 1902, and for almost 2,000 miles at night. To my mind this fully documented success clinches the ionospheric propagation hypothesis for December 1901 as well. The ionospheric pond above was likely a whole lot quieter in 1901-'02 than the Atlantic "pond" on which he sailed that winter.

The second test relates to the lightning theory. A beverage antenna in Newfoundland pointing to the center of the Amazon lightning zone ought to hear that noise on 800+- khz (and 160 meters). Recordings of that noise, when analyzed, should show nothing but random patterns. But sensitive ears can listen for three-click patterns, as were Marconi and Kemp in 1901. It's a subjective test to be sure, but worthwhile. It must, however, also be remembered that Marconi and Kemp knew what their Poldu transmitter sounded like. Each spark transmitter has a distinctive audio pattern determined by the frequency of the spark generation. For example, a later 500 hz quenched spark gap sounds a 1000 hz audio note and 50 or 60 hz mains powered spark gaps sound as 100 or 120 hz "thumps", with rotary spark gaps somewhere in the middle, the principle of which would have been known to Marconi.

These two experiments can provide a empirical basis for acceptance of Marconi's 1901 claim, and lay to rest an alternate theory. Continuing cooperation between Canadian and British amateur radio operators can thus play a part in verification of one of the most interesting events in the history of our technology.



Marcon s Bose/Solari Mercury Detector of 1901



The History of the Sargent-Rayment Company

by Will Rayment

The following is an interview with Will Raymond and captured by Bill Wray

Steve Kushman: You may recall, we talked about the fact that Will Rayment contacted us from his reading the article in the Oakland Tribune about the planned radio Museum at the old KRE facilities. For those of you who do not know Will, this is Will Rayment, and his family owned and operated the Sargent Rayment Radio Company of Oakland during part of the time of it's existence, from 1927-1961. Will is here to give us a presentation about his family's company, and historical significance of it, and its products. So let's give a hand for Will Rayment.

WR: You want me to wear that little dude? (referring to the lapel microphone) All right. As Steve said, I read the article last month in the Oakland Tribune concerning your museum plans for the old KRE station.

Steve, you mentioned that you called the KRE lake, as the Radio Pond. In the days before WW2, and shortly thereafter, it was always referred to as Lake Limburger. I don't know how many of you can remember that smell. (laughter) But boy, did that place smell bad.

Anyhow, back to the SR history lesson. What I'm going to do is cover from 1927 to Dec of 1961, and that's a lot of years. I know you don't have that much time to sit here and listen to me cover that much history.. I'm just going to take a few years and tell you what significantly happened at that time in the company's history. Then I'll turn it over to a question and answer session and let you guys have at me. I'll do my best to answer whatever questions come my way.

OK, here then is a very brief history of the **Sargent-Rayment Company** and my family's involvement. In 1926 there was a company across the street from the Oakland Tribune Tower that was manufacturing special radio receivers. I have been unable to find its name. The president was **Ed Sargent** and the vice-president was my father, **Lyndon C. Rayment**. In 1927 they put a company name on it, Sargent-Rayment Company. The specialty receivers they had been assembling and selling had already gained recognition all over the country as being a real hot item. It was known as the SR7, or Sargent-Rayment 7.

Before I go any further, I'm gonna just touch base on this magazine here. Radio World was its name and its date is December 8, 1928. If you were a radio distributor, you subscribed to it. If you were a radio dealer you subscribed. If you were a radio repair-whatever, this was the leading magazine of the day. I don't know why they put the Sargent-Rayment name up here on its cover, but inside it's just covered with ads. I don't know it you can see them all. Every one of them is Sargent-Rayment 7 ads from all the distributors all over the country. The heading on many of the ads read ..."the peer of all receivers", "demonstrates superior overall quality", "the greatest achievement in radio". I won't go any further on that part, but inside, in the center section, is the first of two articles. This is all about the Sargent-Rayment 7. The schematic is shown. It's a TRF (tuned radio frequency) circuit as you can see, with some improvements to it.. I'm gonna read just the first two sentences of the part one article. "I've tried all DX receivers which have come to my notice," writes O.D.Brown, a Connecticut man, "but the **Sargent-Rayment 7** is the only receiver which I have found that will pull in KFI Los Angeles (laughter) from Connecticut with ample loud speaker volume at any time, night or day, summer or winter." What a testimonial! I wonder if truth in advertising was in vogue in those days? OK. (people talking to each other).

Audience: Summer or winter?

WR: Summer or winter, that's right. So it's a pretty good article.

Then in the following month there was another. But this is the December 8th , 1928 issue. Now I hope you did notice that date ... 1928. They are getting orders from all over the United States. And SR is buying all the component parts necessary to assemble these SR7's.

Sargent-Rayment Company (Continued)

Then within a couple of months, along came the 1929 stock market crash. As my dad put it, he says the phone just rang off the hook. Every distributor cancelled their orders. In the meantime, SR had already received all these unpaid for component parts. The Rayment family came very, very close to going into bankruptcy at that juncture. My dad did sell out his interest in the company to Ed Sargent , and Ed Sargent changed the name of the company to the EM Sargent Company., which was sort of a flop, but everybody said it was great. Most all of the first radios were TRFs, then they went into super heterodyne, and as you mentioned earlier. During the war, the EM Sargent Company manufactured radio direction finders, and also five-band crystal controlled air force receivers for the Navy. Now, the EM Sargent Company manufactured from 1930 till the end of World War II all kinds of receivers, almost anything you could imagine. Crystal sets, Marine radios, and HAM radios. infradyneIn the summer of 1942 I worked in their sheet metal shop at age 15. Then the war ended. 1947 came along, and Ed Sargent found himself in very bad financial condition. He loved to play the ponies all the time. He was a very bad gambler, and lost a small fortune. He had about (this is what my dad told me) about five bookies looking for him, and in those days those guys were pretty bad. So Ed sold the Sargent Rayment company to my dad, and got completely out. He committed suicide about 6 months later. Now this is where I come into the picture. I'll give you a little background on myself. In early 1943 you'll recall we were right in the middle of World War II. At my dad's suggestion I quit high school at age 16 and went over to Central Trade School in Oakland. They had a crash program going for much needed Marine radio operators. The Merchant Marine Maritime Law states, ships can not sail unless they have a FCC Licensed Radio Operator on board. Well, no radio operators were available. They just couldn't train them fast enough. The shipyards were turning out ships so fast there were loaded ships out in the harbor that couldn't sail because they couldn't get radio and other licensed people fast enough. So anyhow, I took my FCC test and passed. I was the first to pass in my class. I went over to the union hall with my license. Boom, they had me on a Tanker like that, and at age 17 I was down in the South Pacific doing refueling duty. On my second ship I was Chief Radio operator, and to the best of my knowledge, I was the youngest Chief Radio Officer in the Merchant Marine.

Audience; Were you the only Radio Operator on the ship?

WR: Oh no. On my first ship we had to steal two Navy men to fill the three eight hour watches. We registered them in the Navy Armed Guard, but they could copy code, so they could do a watch. Supposedly there has to be three radio operators on board. Yeah, unless, and this happened to me on my third ship. They could only give me one operator due to the shortage. That meant we had to do 24 hour duty ... four on, four off, four on, four off, four on seven days a week. Bad duty. After the war I passed my FCC first class radio telephone license. That's different than a telegraph license, and I wanted to be in the radio industry, but not go to sea. I applied for a job at KRE and other small bay area stations and got thrown out. You gotta have time and experience on your license before they'll hire you in the large metropolitan areas. So the only way you get time is, you go down through the valley and get a job there for $1.25 an hour. And you are the announcer, you are the engineer, you're the disk jockey, you take care of the High School football and baseball games and Sunday morning church remote. And you also get the broom out and do the sweep up. So I landed a job at KPRL Paso Robles, California ... the heart of the almond empire. Great duty for a young single man, I will have to say that. OK, now it's 1947. I had just turned 21 My dad called one day and said I need your help to get the Sargent Rayment Company going again. So I resigned my job there at KPRL , and went to work at the Sargent Rayment Company. My dad thought it best if he made me president of the company because he had had so many problems with his heart. We came out with our first line of hi fi products in 1949, and they were doing just fairly well. They consisted of an AM TRF Tuner and 10and 15 watt tone control amplifiers. That was the SR6AM and the SR10 and SR16A Amps. The SR6FM tuner followed about 6 months later. In 1950 we introduced the SR28FAM followed by the SR51.... Both were AM-FM tuners with tone controls. Sales were picking up. But then in 1951 the company experienced its second setback. My father had a fatal heart attack. Here I am, stuck with the company now, way over my head with responsibility.

But in 1952 I was blessed with some real good fortune. I landed a government contract to make those five band crystal controlled Air Force receivers. And our hi fi stuff was beginning to catch on. We got a top rating in CONSUMERS RESEARCH FOR THE SR51 in 1953. They split the top rating with Radio Craftsman and us. They gave Sargent Rayment the top AM rating. Nobody on the market could touch our AM performance. The only "Ding" they gave me on the FM was they said we didn't use the Armstrong detector, but instead we were using the Hazeltine Ratio detector. We were the only manufacturer not using the Armstrong. Scott, Fisher, Radio Craftsman all were.

But within five years of that time all of them switched over to the ratio detector. So I felt vindicated. In 1953 I designed and put into production 5 new hi fi products. The SR58, SR68, tuners, SR38 tone control, SR88 and SR98 15 watt and 25 watt amplifiers.We received great write-ups in AUDIO and HI-FI magazines. Orders were coming in good. en we experienced set back number three. there. Late 1953, our best time for sales, the company burned down. I mean, we had a peach of a fire. It completely took out the production area at 212 9th Street in Oakland. The only thing I was able to come away with was the sheet metal shop and the test facilities in the screen room. We moved out to 1401 Middle Harbor Road and set up business Let's see now ... Lost in the fire was the new hi fi products. Also we were making

SR 68 Tuner production at 212 9th Street, Oakland, CA

400 wireless radios for the LA Biltmore Hotel, a little five channel wireless thing that people could tune in to music or Hotel news t burnt those all out and it took the better part of my insurance money from the fire to square them away. We made our Hotel delivery on time.

We were back in production now, out at Middle Harbor Road. Then we had serious set back number 4. I contracted Polio. All my life God has blessed me. And this was a big blessing. I came down with the non-paralyzing polio. None the less, it took too long to recuperate from that, and I had too little money at the time to really keep the business going. So I sold the business to Donner Scientific. You may have heard of them. Later on they were merged and became Systron Donner. The manager was a real shrewd, shrewd man, OK. Anyhow, I sold the company to Donner Scientific and we manufactured their wave analyzers and oscillators. Even a teaching Computer for Colleges. It had over 100 12AT7's in it. One Hot Momma. We put them all on our production line, but at the same time hi fi is going pretty good for us too. We introduced the SR707 and SR808 AM-FM PROFESSIONAL tone control on one chassis. Again we got great write-ups from the trade magazines. I had a nice personal contract with Donner for running the place. But then 1955 rolled around and they decided they were going to nullify my yearly bonus. Their management found a loophole and cut me out of that. So, I resigned from the Sargent Rayment Company and at the same time offered to buy the name ... Sargent Rayment . I bought the name. and they changed the old SR company name to Eldorado Electronics. I got the sheet metal facilities and the engineering instruments and moved out to 4926 East 12th St., Oakland. That's where I started putting back together the SR company. I'm getting older and wiser. I'm now 29 years old and I had already learned the hard way ... it takes money to make money. And I didn't have any. So I started putting together a group of backers and financial people. I got one that will knock your socks off. You'll probably recognize some of their names. I'm only going to mention four people right now, but we had some others that are good ones too. The top four recognized investors were Dr. Louis Alvarez, father of the A Bomb, head of the UC Radiation Lab, and Nobel Prize winner. General Anderson ... we all know him. Heller of the famous Washington Heller Report, and Ken Eldridge, the patent holder of the magnetic ink, and a manager over at Stanford research.

I put together some pretty good people, but I lost control stockwise by doing so. But at that time I thought it's well worth it. I got a five star group of people backing me, and I couldn't help but feel we're on our way up again.

That's when I introduced what

4926 East 12th Street, Oakland, CA

we call the Cantilever Control hi-fi line. I dug this SR200 out of my basement the other day. Its been sitting under my house for 22 years. It's one of the 3 new products we introduced in 1956 .

I was still President of Sargent Rayment of course, and what we discovered after introducing the line was ... It was a dud. The product numbers were, The SR100 AM-FM tuner. SR200 professional tone control and 20 watt amp. And the SR300 combination AM FM tuner , tone control and 20 watt Amp. SR200.
An absolute bomb, and all my fault. at the Sargent Rayment products. It was a wrong thing to do for that particular time in the market place. We immediately changed over and made the 3 new products also available with flat cabinet, mountable faces. The technical design was good. I'm just going to go briefly into a couple of outstanding features found in this
The people that were buying hi fi

1401 Middle Harbor Rd, Oakland, CA

in those days wanted high technology, but they didn't want a trend setting thing of beauty. They wanted something that looked like an instrument. They wanted the flat fronts on it. They didn't want to make a fashion statement, and that's where I made another mistake. I did the advertising having beautiful women looking

No other pre amp, amplifier has ever equaled our variable scratch and rumble filters. Rumble was a 3 ganged pot exclusive feature by SR that delivered a variable notch from 19 cycles to 122 cycles, 40 DB, and only 5 cycles wide each side of center. The scratch filter was an 18 DB per octave cut off . The best our competitors could offer was 6 DB. we put a number of real good new products on the market. I will just give you the model number, a SR 1000, SR380, SR2000, SR1717, SR5100, SR534, SR570, SR8000, SR2051, and some small stuff like the SR202 Reverbatron unit.

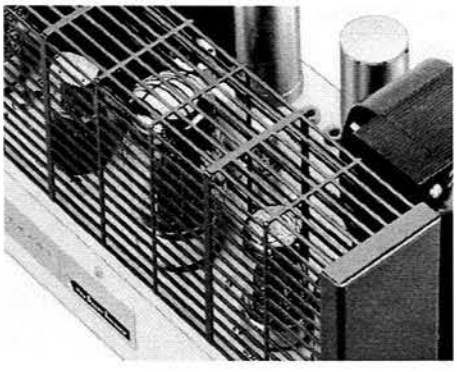
OK, 1959, we are going good, but suddenly I've got a problem. All of my blue ribbon stock holders were absolutely shocked when the major devise that lured them to buying Sargent Rayment stock in the first place was turned down by the FCDA That's Federal Civil Defense Administration. Two of my stock holders I didn't mention earlier were a pair of Physicists from the U C Rad Lab,. Don Cone and Dave Garbalono. They held a patent on the absolute best little radiation detector out there for civil defense use. A go, no go type of device. We called it GARD... Gamma Atomic Radiation Detector. Now remember, this was during that cold war time when either you or your kids were being told at school, Now Children ... when you hear the siren go off you climb under your desk and put your head ... you know where.

Audience: Did you use a three section variable capacitor?

That's right. That's exactly what I used along with 3 sets of triodes

Bill Wray: Did you have a design engineer doing all this work?

WR: It was all done by me. I designed everything from 1952 forward till I left the company in December of 1960. OK, I'm going to skip a few years here. We're gonna jump all the way up to 1959. And that was supposed to prevent you from being blown up by a Russian Nuclear Bomb. So the idea of everyone wanting to have one of these inexpensive life saving devices was real good And having the two of them as stock holders, giving us the exclusive rights in manufacturing was of prime importance to my investors. And so the SR Company completed its design and tooled up for its manufacture. I was only involved in the design of the external shell. With proto type in hand I went back to Battlecreek Michigan where the FCDA was located. I made my pitch on this wonderful little device. They liked the product. It looked real good, but they said "We won't test it or approve it unless you will give us permission to let any manufacturer in the United States manufacture it without paying Sargent Rayment



a royalty. I couldn't believe my ears. Were they kidding? Geez, this is un-American (laughter). of Rockefeller Center in New York. Now Atlas is a big company. This is Floyd Odlam, and you may have heard of him.

They owned a lot of big companies like RKO and General Dynamics. They owned dozens of smaller ones like Sky Data and Oakland Engine Overhaul. These are all aviation oriented companies. I'm still acting President of SR, and we are cooking right along with our new owners. I've got a new overseer who takes up a desk in my office. One day I get a bean counter out from New York. He tells me we are going to quadruple sales next year. I say that's fine, that's possible, but I want to see a cash - flow sheet before I'm going to sign off on the expenditures it will take. He said OK, and in about a week he brought one in. I called it a lie sheet. I said you can't do it ... you have no additional money coming. That's when I was told right to my face, that I don't know anything about business and I'm very, very naive in the ways of the business world. He acknowledged that I have been running the company now for 10 years, but I don't know what's going on when it comes to finance.
No way! This is just not the way business is done in these United States. So I Said No. I would not give them that permission. Within 6 or so months the FCDA went ahead and approved the Bendix unit. Now their device was a little dosimeter. Let me tell you what our unit's advantages were over theirs. Our unit required no batteries: theirs of course did. No charger. It had infinite shelf life. Worked in light or in darkness, and was half the price of the Bendix unit. Nobody in the world could convince me that something didn't take place underneath the table, and we got bombed out of contention. Anyway, at that juncture my backers said ..."well, this thing we went into the company for went down the tube. Now we can make some capital gain." So they decided to sell the SR Company, and they did. They sold it to Sky Data, a subsidiary of Atlas Corporation He went on to say, just because the invoices say that you have to pay them in 30 days, that doesn't mean you have to. (Laughter) You can go for 3 months without paying. And that's where we're gonna get our money. And that 3 months goes for radio advertising, it goes for trade magazine advertising, all of them, you don't have to pay any of that stuff in less than three months they declared chapter eleven bankruptcy.

WR: So now, Questions and answers, if you have any.
Bill Wray; Weren't you telling me at some point there was somebody in the company who left the company and went to form Remler
WR: No, not to form Remler, but to work for Remler. That was my Father. Yeah, there was Elmer ... something. I think Remler got its name by spelling Elmer's name backwards and adding the R. Then there was Harry Green and Ernie Danielson. That was in 1932.
Audience: Are any of those 1927-28 TRF sets in your basement?
WR: You know what we did back in 1958? We sent out press releases and ran ads in the hi fi magazines stating that the first man that could come up with an SR7 would get his selection of a complete set of a Sargent Rayment tuner and amplifier. We had three people that came in pretty fast. This guy in the picture was first. He lived in Milwaukee and he won the hi fi equipment and that's a picture of him and his SR7. But to answer you ... no I don't have one in my basement.
I felt I had too many business friends out there to be involved in this crazy plan. So I guess I can say that that was the sixth and final serious set back of the Sargent Rayment Company. I have been told that in that last year after I was gone, they hired a new OK, I could see the hand writing on the wall . This baby is going down the tube if this is the way they are going to finance their growth. they went ... which I had predicted would happen. design engineer
Audience; What year is that again?
WR: That would have been December of 1961
So I resigned two weeks later, after that cash-flow presentation, and I became the Executive Vice President over at Fisher Berkley Corp. Eleven months and 13 days later, Sargent Rayment Company went into bankruptcy. The sad part is we were making money
Audience: I've read in some places about the SR7 sometimes referred to as the Super 7. Was that a different model or was that the same model?
WR: I would think if it carried the number 7 that it was the same model. But maybe it had a different cabinet.
. I was only one year old then. (laughter)
WR: It was widely accepted, even outside the hi fi sector. The new 3-D movie theaters from SF to NY used them, and many of the Disney-Land rides and displays used them.

Audience: And in all those experiences you had making this and that, at any time did you ever consider making a television set?

WR: No

Audience: Everyone else did.

WR: Yeah, you're right. Yeah, Mad Man Muntz. "WE Got Em!

Audience: They all sold, and I fixed every one of them.

WR: Oh! (laughter) Obviously they must have all stopped working.

WR: Yeah, it was the SR98 or SR98B.

Audience: I've come across those from time to time.

WR: He did a variety of things. He went out and formed the Victory Rayment Company manufacturing speakers and microphones and amplifiers, strictly for public address type of stuff. Then he was manufacturing Diathermy equipment. Then he went over to Remler.

Then he weathered sold the company the first time to Ed Sargent, what did your father do from that period of time till when you became president? He went over and designed the Voycall intercom at Lake Manufacturing.

Then he went back and joined Ed Sargent. I think it was 37 or 38, and they were designing HAM and Marine radios.

Audience: It was a very good amplifier... like the 70 watter.

WR: Yeah, that was the SR570 I believe. It used KT 88's capable of 100 watts out. But I chose to only drive them to 70 watts to insure long life.

Audience: I'm just curious. Did you manufacture the output transformers on site at SR?

Audience: How big a staff did you max out at? I mean, how big was the company in number of Employees?

WR: Not big. I would say 36 to 40 ladies on the production line, 8 to 10 guys in the sheet metal, Shipping, and test facilities.

Audience: I have one in my collection.

WR: You don't have one of the SR7s in your collection, do you?

Audience: Yeah.

WR: You do! Fantastic. Yeah.

Audience: But it says Super 7 and I was wondering if you recall that?

WR: Yeah, I might even read my own literature here and see if that's (laughter) correct.

Audience: How many of them do you think were made?

WR: I have no idea. That was strictly with Ed and my dad

I only had 3 girls in the office, so we weren't' very big

Bill Wray: You had Ladies as assemblers?

WR: Oh, the Ladies? Yeah, they were great. I had a whole string of them cranking these things out.

Bill Wray: Technical staff, were you the Chief Engineer?

WR: Yeah. I did all the engineering from 1952 to December of 1960 when I left. During the remaining 12 months before the company went belly-up, they did hire at least one engineer

Bill Wray: And did you have any other engineers?

WR: No, I had techs that did the alignment work and trouble shooting and things like that. Jim Pierce my good right arm, did my mechanical layouts, coordinating with the sheet metal department on all my designs.

Bill Wray: Are you yourself a graduate engineer?

WR: I'm a high school drop out at age 16 and never ever got a diploma. As mentioned earlier, I did pass all FCC Telegraph and Telephone tests.

Bill Wray: Your father, did he do all the designs of the original sets?

WR: Yes. And he taught me a lot. He did all the design till 1951 when he passed away

Bill Wray; Was your father a graduate Engineer?

WR: No, he was not a graduate engineer. He started his electronic life as a radio operator, going to sea in 1916. When the USA became involved in World War I, he joined the Navy as a Chief Radio operator. After the War he worked at Mare Island repairing all electronic equipment for the Navy. Then he joined with Ed Sargent and the Sargent Rayment Co. was formed in 1927.

Bill Wray: So you designed the ratio detector?

WR: No, no, that's a Hazeltine patent and we paid them a royalty for every radio we sold. I don't know how many of you know the difference between a ratio detector and an Armstrong detector.

Bill Wray: We have an expert in them right over there.

WR: No, no, that's a Hazeltine patent and we paid them a royalty or every radio we sold. I don't know how many of you know the difference between a ratio detector and an Armstrong detector. I won't get technical, but only say the ratio detector does a better job of noise elimination between stations.

The following article first appeared in the San Francisco Chronicle, April 9, 2006 and is reprinted with permission from the author.

"RADIO WAVES", by Ben Fong-Torres - A RADIO MUSEUM GROWS IN BERKELEY

Steve Kushman works in television, as a video editor at KGO, but his heart is in radio. His home in Noe Valley houses some 1,500 old radio sets, nearly 100 vintage microphones and who knows what else. But that's not enough. And so, as president of the California Historical Radio Society, Kushman, 53, is overseeing the creation of a radio museum, at the site of the old KRE studios in Berkeley. There, he gets to look at two floors of rooms -- 4,600 square feet in all -- filled with radios, from tabletop "cathedral" models to those consoles that used to grace living rooms all over the country; with equipment and parts ranging from tubes to horn speakers to old "rip 'n' read" teletype machines. There are control boards and Ampex tape recorders from the '50s. One room is jammed with old radio magazines, which belonged to Jim Maxwell, a pioneer amateur radio operator whose ham radio gear -- and station (W6CF) -- are being kept alive in the KRE building.

It's all stuff from long ago, before radio leapt into the digital age, but Kushman and his 360 fellow CHRS members hope that by creating the Bay Area's first radio museum, they can pass radio history -- and the inner, technical workings of the medium -- on to future generations.

The society started in 1974 mainly as a way for radio collectors to get together for swap meets, where they could buy, sell and trade radio sets and collectible microphones. They could also exchange tips on getting antique radios repaired.

Kushman grew up loving radio and wanting to work in the business, but after college, his first broadcasting job offer came from a TV station, the old KEMO (Channel 20), and in 1976, he joined KGO. He began collecting radios and, from John Wentzel at the Aladdin Radio repair shop, learned about the CHRS.

Local radio people have been trying to create a museum for decades. The National Academy of Television Arts & Sciences is exploring sites for a broadcast museum. Broadcast Legends, a social group, keeps radio's golden age alive through programs and newsletters. David Jackson, creator of www.bayarearadio.org, hopes to work with the other radio groups to form a local radio hall of fame. Jackson said that, after a recent column in this space about his site, visits increased from an average of 1,000 a day to more than 5,500.

The Bay Area loves radio.

As Kushman put it, "This area is so rich with broadcasting history and legendary broadcasters. At every turn, somebody is stepping forward."

That's how the CHRS found its home. In 2002, a friend of Kushman's introduced him to a fellow radio freak in Noe Valley, Jaime Arbona, whose company had dealings with Inner City Broadcasting Corp. ICBC owns KBLX ("The Quiet Storm" at 102.9 FM), which used to be KRE-FM. The company also operates KVTO (1400 AM), which used to be KRE-AM, a station dating back to 1922. As KBLX grew, ICB found the studios, built on the Berkeley wetlands in 1937, no longer suitable for its operations, and moved the station to San Francisco in 1993. The studios had received a moment of fame in 1973, when George Lucas, directing "American Graffiti," used them for several scenes with Wolfman Jack, but had been abandoned, except for a studio for KVTO, an Asian language station, along with transmitters and antenna towers serving KVTO and KEAR-AM.

When Arbona told Kushman that the KRE studios had largely been vacant for nine years, Kushman contacted Harvey Stone, president and GM of Inner City's three local stations (ICBC also owns KVVN, an Asian language station in San Jose). Stone invited Kushman to write up a proposal.

CHRS promised to restore the building and its original studios, make all necessary repairs, keep up the property and operate an educational radio museum, including a classroom, a repair shop and a library, all for CHRS members and outside visitors and groups by invitation. Classes would be offered in radio history, troubleshooting and repairs, and amateur radio operations. members and others began donating radio sets, equipment and libraries. Once the news spread that CHRS had a home, members and others began donating radio sets, equipment and libraries. Volunteers have gone to the site on a regular basis to clean, paint, make repairs and organize the various rooms.

Over lunch, Kushman said, Stone virtually handed over the keys. "He said, 'You have the building for 10 years, rent free. Just don't impinge on KVTO's signal. Otherwise, you can do anything you want.' The office was just going to waste," Stone told me. "It'd be a problem selling it with a 400-foot tower on the property. I'm an old radio guy, and I love what the group is doing, and what they wanted to do there." Once the news spread that CHRS had a home

As Kushman leads a tour, showing where a classroom will be and telling about how visitors can get audio memories in any form ("from 78 rpm records to cassettes" converted into CDs), it's clear that CHRS has done an impressive job -- but also that there's a lot of hard work ahead. To create a large gallery, which could serve as the home of a Bay Area radio hall of fame, walls need to be moved. To re-create a radio studio circa the '40s but with updated equipment so that, say, the Broadcast Legends could do a live show over KVTO on Saturday nights, control rooms will need rewiring. The CHRS charges its members modest annual dues of $25. Where will the money come from? "We get money from within," says Kushman, who notes that 20 members have ponied up $1,000 or more each for the group's museum fund. But won't the labor required to renovate and rebuild the facilities require a lot more? Kushman almost laughs. "Nah!" he says. "All the equipment's donated, and most of the work consists of taking stuff away. We have electricians and technicians, all volunteers."

CHRS (www.californiahistoricalradio.com) does need more funds to complete the renovations, get the museum operating and acquire additional storage space, but he's optimistic that local radio lovers -- and companies -- will come through. The Bay Area, after all, appreciates radio history.

As Kushman puts it: "Without history, there wouldn't be now, for God's sake!"

SOLDERING

by Bill Gerrey, Rehabilitation Engineer,
Rehabilitation Engineering Research Center

Author's Note: Much of this paper is directly taken from my writings in "The Smith-Kettlewell Technical File" in a series of articles, "Soldering" (spanning issues from 1980 through 1987).}

Soldering is not Welding; It's not Gluing:

Imagine being asked to join two sugar cubes -- stick them together so as never to come apart. Three possible ways are:

You could glue (or cement) them together. However, they would no longer be a unit of sugar; you would have introduced a foreign substance which would appear as flakes in the coffee.

You could "weld" them, holding them in tongs over a hot flame until sugar actually reached its melting point, then mashing them together. The molten sugar would be very hot indeed.

But the easiest way is to "wet" the adjoining faces with a solvent, then let their molecules mingle as the solvent distributes itself. What's a good solvent for sugar? Water! Dampen one face of each cube and hold them together until they become one unit -- all sugar (with a few water molecules distributed throughout).

This third method is closely analogous to soldering. Solder is a solvent; at "alloying temperature" metal of each work piece goes into solution with the molten solder, and when the "joint" cools, there is a continuous metallic path, on the molecular level, between the items. Alloying is the key.

Alloys of Solder:

The "solder" which we are likely to encounter is an alloy of tin and lead. In times past (mostly for reasons of cost), solder of half tin and half lead (50/50) was common. Now, however, "60/40" solder (containing 60% tin - and 40% lead) is the standard. Widely varying combinations of tin and lead, and even alloys of other metals, have their applications.

One notable example is tin-lead solder with a small amount of silver added. This is often advertised as "low-temperature" solder; the introduction of silver indeed lowers the melting point. But this alloy is of interest to instrument manufacturers for a reason different from its melting point. Where component terminals are plated with silver; solder containing silver will not leach the silver away from the terminals, which solder of only tin and lead would happily dissolve away. There is a combination of 63% tin and 37% lead (the so-called "eutectic alloy") which has the lowest melting point of any tin-lead mixture. This is unique, in that there is an abrupt change between liquefied and solid states. Above the "eutectic temperature", it is liquid; below this, it is solid.

As lead is added (above 37%), the melting point becomes less defined, and there appears to be a "plastic phase" in transitions from solid to liquid and back again. As solder rich in lead cools from being liquefied, lead-heavy crystals precipitate in "dendrites" (branch-like structures); eutectic liquid is trapped in a gauze of these dendrites until its temperature drops to the eutectic temperature, whereupon the solder, whatever its tin-lead constituency, becomes completely solid. An alloy of 10/90 (10% tin and 90% lead) has been used in metal work -- such as auto body repair -- whose plastic phase allows it to be shaped by a trowel before it becomes fully solid. Even with that slight increase in percentage of lead, standard 60/40 solder exhibits a plastic phase for a short time before it solidifies.

One good reason not to use 63/37 "eutectic solder" for hand work is that it abruptly changes state from liquid to solid, and given any disturbance (such as hand tremor), a joint may break at the very instant the solder solidifies. "wetting",

SOLDERING (Continued)

Alloying with Work Pieces: Just melting of the solder is not all that is required. For the metallic bond to be made, a temperature must be reached at which the total mix of metals can go into solution -- an alloy of tin, lead, and copper, or whatever metal the work pieces contain. This critical temperature is called the "alloying temperature", and it is higher than the melting point of the solder.

Wetting:
When the desired solution of molten metals occurs -- when an alloy with work pieces is formed -- this is called "wetting". A connection where "wetting" has not occurred is called "a cold solder joint"; the temperature of one or more component of the work has not been brought to alloying temperature. "Wetting" is what you look for in judging the merit of a solder connection. A beautiful dome perched atop a solder joint means that solder has melted, but has been contained by its own surface tension, not having "wet" other metals. Where wetting has occurred, the solder will have conformed to the shape of items in the joint. In other words, the contour of the assembly will still be apparent, and the solder will "feather down" at its boundaries, not leaving an "edge" in many cases.

Solder is not glue! Though it may appear to be stuck in place, it makes very poor mechanical connections; proper soldering forms connections on the molecular level. "Wetting", to form a continuous alloy, is the key.

Heating Methods:
Heating the work so that soldering can take place can be done in a number of ways. For example, a technique called "resistance soldering" uses tongs to deliver high electric current through the work, thus getting it hot. Factory assemblies of electronics use baths of molten solder which can make all connections on a circuit board at once.
The tool most used for hand work is a "soldering iron". When a soldering iron of sufficient size is used, the transfer of heat to the desired area can be very efficient. The metal used in the soldering iron is critical. If properly chosen, metal from its tip will be dissolved into the work as well; some of your soldering iron is part of every connection you make. "Gee, why not make soldering tips out of some inert material -- ceramic, maybe -- so that they are not eroded away by the soldering process?" Transfer of heat from the iron to the work is made very very efficient when the iron is molecularly involved in the process. Involving the soldering tip in the alloy is worth promoting, not to be discouraged.

Flux:
Oxidation is the bane of solderers; it prevents metals from coming together to form an alloy. What's more, oxides form with gusto as metals are heated. Even if you were to try soldering in an oxygen-free atmosphere, tarnish already present on electrically active metals would prevent alloying. Chemical agents called "flux" have been developed to strip oxides off the surfaces in the nick of time to permit soldering. Mostly, these are "reducing agents", compounds which, themselves love to combine with oxygen. However, some stainless steel can even be soldered using the right flux; this flux attacks the surface of the metal to free up some of the iron for alloying. Chemical compositions of flux are being improved all the time; a wide variety is available. Flux, as a liquid or a paste, may be applied prior to heating the work. For convenience, however, solder in the form of a hollow wire ("flux-core solder") contains flux which gets delivered automatically as the solder is applied.

The proper choice of flux depends on what you are soldering. Halide salts make very aggressive, very good, fluxes, but their residues are corrosive and should be washed away with distilled water. (In the popular vernacular, all fluxes with corrosive properties are called "acid flux".)

For electronics work, a compromise flux, rosin dissolved in alcohol, has been the standard; it is not very aggressive (a disadvantage during soldering), but its residue is inert. Improved rosin "activated" flux is common; at first, this is good, but it deteriorates if the temperature gets too high.

SOLDERING (Continued)

Selecting Solder for Hand Work on Electronics:

The magic words in ordering solder for electronics work are: "rosin-core solder". An English company, Ersin, makes a product called "multicore solder"; the wire has a star-shaped hollow in which the flux is stored. Critics maintain that the quantity of flux is excessive; beyond this, since isolated capillaries are not separately loaded with the flux, voids in the flux (the bane of manufacturers of flux-core solder) can still occur. My lab uses Kester and Ersin rosin-core solder interchangeably. Since the flux in flux-core solder is not fully liquid, it crumbles instead of being flexible. The solder surrounding it is ductile; the tin-lead alloy stretches easily. Therefore, voids in the flux can inadvertently be created if the solder is mishandled. Idly pindling it around a pencil, or stretching it by pulling off a piece, causes voids in the core of flux. Once solder starts to look mistreated, discard it and get fresh solder from the spool. Many wire sizes of solder are available. Some technicians keep a selection around to cover different sizes of connection points. In my lab, we mostly build projects with chips whose terminals are placed at 1/10th-inch centers; we stock only 22-gauge rosin-core solder -- about 0.03 inches in diameter. Where heavy terminals and coaxial connectors are to be soldered, we just fold the 22-gauge solder two or three times to simulate a thicker wire. (,the Ersin diameters are slightly different, not using the American Wire Gauge system, but the 22-gauge English size is close.)

Properties of Soldering Irons:

No matter what configuration a soldering iron has, it must be able to transfer heat efficiently; it must quickly, as quickly as possible, heat the work pieces beyond alloying temperature -- above 600 dg. F. Choosing from available power ratings, you should consider that if an iron is too small (under 30 watts is often too small), energy taken from it by work pieces may require prolonged contact to bring the connection to alloying temperature. During this extended time, heat is being conducted to components, which can be damaged. Thus, an iron can rarely be "too big" (unless it is too physically large); it can often be too small for efficient heating.

Heating systems of soldering irons come in three types:

1. The oldest is a resistive heating element, rated as to its power consumption, which remains hot as long as it is plugged in. While in its rest stand, the barrel of its heating element is designed to dissipate this rated power; at rest, it may reach 1000 dg. F. (This high temperature is not a disadvantage, since the user judges temperature of the connection from "wetting" by the solder.)

2. More modern (and, much more expensive) irons have some means of maintaining a constant tip temperature. As the tip cools from transferring heat to the work, high power is sustained -- or power is increased -- so as to assure that the system has sufficient energy to get the job done in a hurry. Recommended temperatures range from 650 to 850 dg. F.

3. The third type includes fast-heating fast-cooling kinds of soldering guns and cordless irons. These deliver high current to a "tip" of comparatively low mass (which may be a loop of wire); when a finger switch is pressed, they heat up quickly. These cannot survive being left on while not in contact with work pieces; their tips are not designed to dissipate power in free air.

Two problems can arise in using this class of iron.

1 The only limit to the temperature is the heat capacity of the work and/or the user's ability to remove and de-energize the tool before damage is done; without careful monitoring, the flux can be charred, and work pieces can become so oxidized as to no longer be solderable.

2 The small tips may not be able to transfer heat to the connection in time to prevent long-term absorption, thus accumulating enough energy to damage components.

Soldering tips are critical; they should be chosen for their ability to efficiently transfer heat to the work.

Two features of soldering tips determine this:

1 Geometry of the tip determines its conductivity. Thermal conductivity through its length goes up with the cross-sectional area; a long-thin tip only conducts one-fourth as well as a tip of twice the diameter

SOLDERING (Continued)

Maximizing the contact area with the work enhances heat transfer; tips with flat faces (pyramid-shaped or "screwdriver" tips) can impart more energy to the work than a conical tip can do.

2 The surface of the tip must be metallically active enough to alloy with the solder. "Tinning the tip" refers to the initial procedure of generously applying fresh flux-core solder to the active area of the tip; the resultant coat of solder protects the tip from oxidizing, and assists in alloying. Pure copper was used in years past, but those tips needed frequent redressing to keep them in good order. Some manufacturers advertise that their tips are "pretinned"; but periodically applying your own solder, especially at first, is still a good idea. The new ferrous-metal-clad tips (clad with some variety of steel and containing a copper core for reasons of thermal conductivity) are wonderfully durable, as long as you judiciously keep them coated with solder. A soldering iron cannot transfer heat efficiently unless its tip is cleaned before using. The right tool for this is a wet sponge -- one designed for this purpose, not a dish-washing sponge. Sponges either come with irons, or are available from, soldering equipment dealers. Because a coating of solder protects the tip from oxidizing, it should never be cleaned by the sponge without getting fresh flux-core solder immediately afterward. In other words, wipe the tip just before soldering a connection; never wipe the tip before returning the iron to its rest stand, where the tip will then be susceptible to oxidation without its protective coat of solder.

The Act of Soldering -- The Ideal Situation:

Solder is not glue; it is not"filler" either. Solder is a liquid solvent, and each work piece is a "wick". In order for a complete metallic path to be established, all pieces of the work must be in contact. For example, if a wire lead is to connect to a terminal of some sort, the wire should be wrapped just a bit more than one-quarter turn around the terminal. Where possible, arrange things so there is a little tension at the connection so as to assure this necessary contact. Moreover, all items of the connection must reach alloying temperature (usually above 550 dg.F), those pieces which are firmly touching will be likely to heat up together. As you bring the iron from its rest stand to the work, wipe it on the wet cleaning sponge. On the way back to the stand, bypass the sponge; let the iron keep any solder that it comes away with. With the initial coming together, place the solder at -- or very near -- the point of contact by the iron. The principle is to first establish the "metallic path" from the iron to items of the connection. Next, attempt to feed solder to components at the joint, avoiding the site at the iron. When components are hot enough, solder will dissolve into them; it will appear to be drawn into the heated joint. When enough solder has been applied to be involved with every item of the joint. Twist or slide the iron off the connection and bring it straight back to rest. "Hopping" off the connection -- withdrawing straight away from it -- will often leave a sharp icicle. Sliding or twisting the iron away helps break surface tension of the liquid solder so as to leave the joint smooth. Where you apply the iron depends on the configuration of the work. A guiding principle is that the iron should be placed so that the item of high heat capacity (a large terminal lug, for example) benefits from good heat transfer. It is best if the iron can touch all pieces of the joint, but where this is not physically possible, apply it to the largest item. I have been told that, visually, the molten solder has luster, then a hazy look appears during its "plastic phase", and the solidified solder becomes shiny again. When finished, the solder should have conformed to the shape of the joint within it; if it contributes a shape of its own, something beneath has not gotten properly "wet" with solder.

As a blind solderer, I can point out other indications that the process is going well: Items are not hot enough unless solder pressed against them allows feeding more solder. Solder is the best "pyrometer" (high-temperature thermometer) for indicating that everything is hot enough As soon as wetting (alloying) takes place, heat transfer becomes very very efficient. The temperature of a wire or a component, monitored by a finger, goes up markedly.

SOLDERING (Continued)

At that point, I feed perhaps a half inch of solder, then get out of there. When the flux has done its job (having stripped oxides off the work pieces) any small motion of components or the iron "squeaks" so that it can be heard, and the squeaky vibrations felt. This means that the metals are clean and ready to form alloys. The squeakiness is like handling dishes in the sink -- squeaky clean.

Smoke of the flux has an odor. When you smell it, it means that it has been liberated from its tubular housing of solder. Thus, solder must have melted enough to release some flux.

Pretinning Wires and Terminals:
Any time you anticipate difficulty in making a solder connection, pretinning each item (generously bathing it in flux and solder) can facilitate the process. Soldering the joint of pretinned items can be done much faster, since alloys with the solder have already been made, and joining them only requires remelting solder (which happens at a lower temperature). It is sometimes not even necessary to apply more solder when joining pretinned items. Stranded wire should always be generously "tinned" (bathed in flux and solder) before making connections. If this is not done, there is a chance that not all the strands will be heated enough to alloy with the solder, leaving whiskers and loose strands which can cause trouble, or at least, not help in the electrical conductivity.
For tinning stranded wire, the blind technicians in my lab have adopted the procedure of wrapping the stripped end of the wire in a neat coil of solder, then placing this atop the tip of the iron and sliding it off after the coil of solder has melted. The rule is: Use a length of solder twice as long as the stripped wire, and make the solder coil so as to leave the bundle of strands as straight as you can.

Final Entreatments:
Choose an iron that's big enough, not small enough. After all, they all rest at similar temperatures (under 1000 dg. F), so how would the connection know if the iron is 500 watts? Tiny pencil irons are made to address physical constraints, not heating constraints. Whatever the size of iron, just "get in and get out" with dispatch! Since heat transfer partly depends on the "heat capacity" of the soldering iron's tip, choosing a high-temperature setting is viewed by many technicians as good practice. In my lab, we fit our Weller irons with 700 degree tips, not using the 600 degree ones which come with the WTCPM Soldering Stations. Especially with these new irons which do not have exposed copper in their tips, do not use abrasive to clean them. The roughness or dullness they take on consists mostly of carbonized flux residue. Sometimes before I turn my iron on, I gently scratch this roughness away with my thumbnail. Proper cleaning is done by wiping the iron against the wet sponge when it is hot, then very generously applying solder to it. Always allow solder to remain on the tip while the iron is at rest.

Extra Hands:
Frequently, the act of soldering cries for an extra pair of hands. Much frustration can be avoided by stabilizing all work pieces as much as you can before soldering is attempted. Seek out and buy every clamping/holding device you can get. Even a pair of pliers with a rubber band around the handles can serve well at times. First arrange things so they are well situated, then solder them. You can stabilize your arms and hands to reduce tremor, and to prevent the iron from slipping off the joint. For example, placing the spool of solder so that you can rest your hand upon it is a tremendous help. Leads and terminals of old tarnished parts should be swiped with emery cloth to remove most of the corrosion. Flux can do some of the work, but when it cannot, attempts at soldering will just oxidize everything to the point that it becomes unsolderable.

How 2

Transistor Radio question from RJ Dial
I have a couple of Nordmende transistor radios I'd love to get electrically working again. Anyone out working on the early transistor sets? I can troubleshoot and repair tube sets just fine thanks, but I look at circuit boards and my eyes glaze over, plus the schematic are a little hard to find.
Anyone into these?

Reply by Dan
I do late 50's through 80's transistor radios all of the time and, notwithstanding broken wires, cracks in the pcb or any mechanical stuff I will have to agree with Scott; It almost always comes down to electrolytic caps. Most of the European radios before the late 70's / early 80's have only discrete transistors. Another common problem with the Normende radios is band switches and power configuration switches. The switches are often mounted with rubber grommet or have rubber switch lever bumpers which get rotten and the switch positioning shifts causing failure. However, in the end over 90% of the time it is electrolytic caps. Let me add one anecdote. When I bought the Transita G at the late lamented Marin City Flea Market, it had an audio oscillation. Aha, thought I, weak battery with high impedance, but no. The cause was that the solder joint that grounded the frame of the output transformer had a fracture, floating the frame. In any early PC board equipment, look for mechanical stresses on the board causing cracked traces. It took a while for people to learn how to avoid said stresses in their designs. A stereoscopic magnifier really helps, because you can see the cracks easily. I have one of
these with the #7 lens. They cost about $30, as I recall. I used it even before I became a geezer

Antenna Question from AL

Any ideas on how I can get better reception on my old time radios here in Scotts Valley Ca? AM is difficult to get and FM seems to come and go. Should I buy a large antenna and install it on my roof?

Antennas are what you need.
by Scott
For AM, a piece of wire 30 feet or more long 6 feet or so above your roof will work fine. The lead-in should come down from one end of the antenna to your radio farm. For FM, you can buy outdoor antennas that are for FM only. Winegard and Channel-Master are two companies to look at, and I think they both have websites. Depending on which stations you wish to receive, you may need a rotator as well, since the FM antenna will be directional and needs to point either towards the transmitter or towards the strongest reflected signal. I make a practice of grounding the AM antenna when I'm not listening. Lightning is not so common here, but rewinding antenna coils is a pain. You should ground the mast of the FM antenna, too, and probably the ground of the coax lead-in.

Radio Dial Question from Jaime Arbona
Does anyone have another resource for reproducing dial scales? I've heard of people who can reproduce dial scales by scanning originals, which I have in this case (though damaged). Got leads? It's a Remler dial scale; not a brand that anyone generally stocks.
Thanks.
You can email me direct at ilradio@pacbell.net.

Reply by Dan Healey
Hi Jamie, do you know about Scott Young in San Rafael. He specializes in auto radio dial restoration but I know he has the tooling and capability to do any radio dials. You might at least ask him. His number is (415) 472-5126.
He has done a number of dial restorations for us and he does very good work.

Personal KRE History
by Elliott Pisor

I read the history of KRE only a couple of hours after I was visiting on the second floor of the Claremont Hotel. What a shock. That visit took me to a position only a few feet from the first studio of KRE, the same station I listened to all the way through college at Berkeley. The early owner and news supplier were the Gazette and Daily Cal newspapers, the same two I bombarded with letters to the editor when I was a brash student who knew everything. In 1957, I saw the collapsed tower at the foot of Ashby, not knowing it was KRE. In 1962-63, I took pipe organ lessons at First Congregational, and now I see the organ was a few feet from the first KRE commercially-built transmitter. I practiced on the organ at Chapel of the Chimes, another broadcast location, and owner, of KRE. Back then, I shopped weekly at Capwell's, yet another KRE studio.

In 1981, I called KRE, among others, to see if they wanted to subscribe to a helicopter traffic reporting service I was putting together. They laughed and told me they barely had enough money to pay the light bill. At about that time, one of the secretaries in my law office was a former student at the Pacific School of Religion, yet another owner of KRE. And now I belong to CHRS, which has essentially taken over KRE and installed the collection of Jim Maxwell, some of which came from me back when Jim was my paper-collecting mentor.

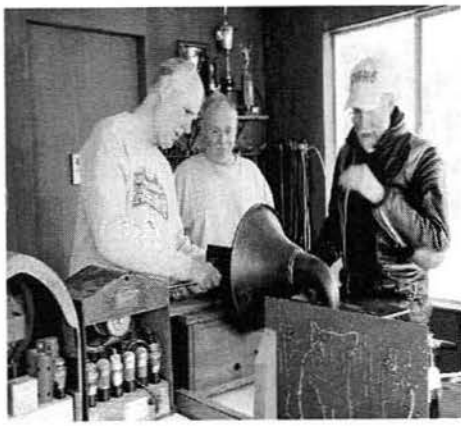
I can't get away from that station. Is the ghost of KRE following me around?

Old Radio Article
by Byron D. Lott

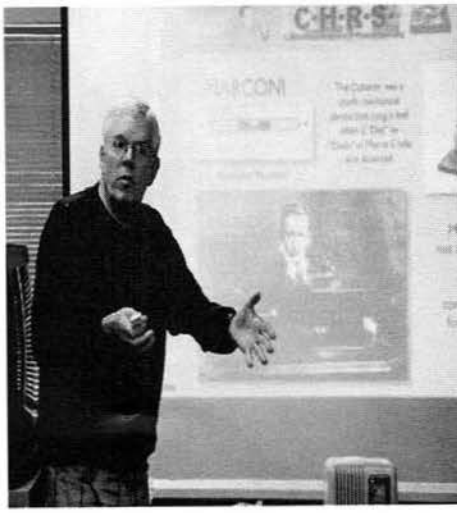
Back in the 30's when I was in elementary school in Los Angeles I was given a stack of radio magazines which started my interest in ham radio and my love in fabricating crystal sets and regenerative tube receivers made from parts of discarded broadcast sets. In one of the magazines there was a construction article for a short wave receiver where almost all of the components were home-made from pieces of wood, coil wire, nails, paper clips, and sheet metal. It was breadboarded and used 2 type 30 triodes - the tuning capacitor and regen capacitor were separate moveable metal sheets with a grounded sheet between them.

Both the antenna coupling and grid capacitor were two L shaped squares made from sheet metal - the grid leak was a small rectangular piece of wood with carbon for resistance scraped from a lead pencil. The tube 'sockets' were holes drilled in the baseboard with paper clips for connections. The interstage transformer was wound on a core of nails with the RF choke scramble wound in three pies on a small piece of wood similar to the grid leak. The plug-in coils were cut sections of a broomstick with wood screws for contacts. The circuit was very elementary for 2 triodes, one a regen detector and the other as an audio amplifier. Power was A and B batteries.

I have been looking for this article for years without success and I would give (almost)anything for a copy! If this rings a bell with you please let me know and I will be delighted to cover any expense you would have in copying it for me. It must have been in Radio Craft or in one of the other magazines popular at the time.

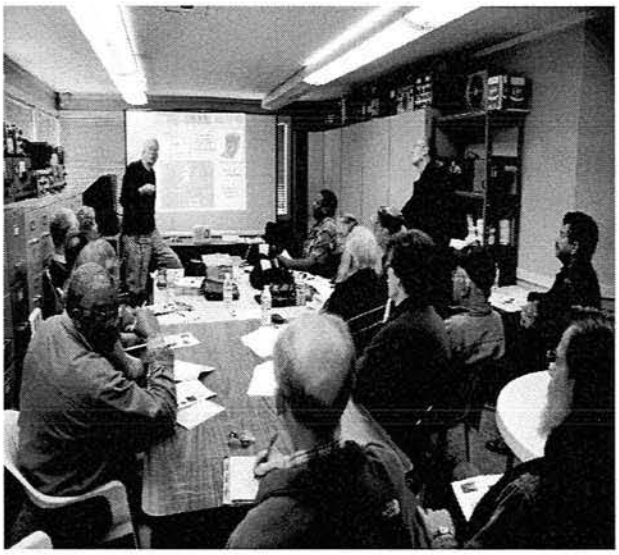


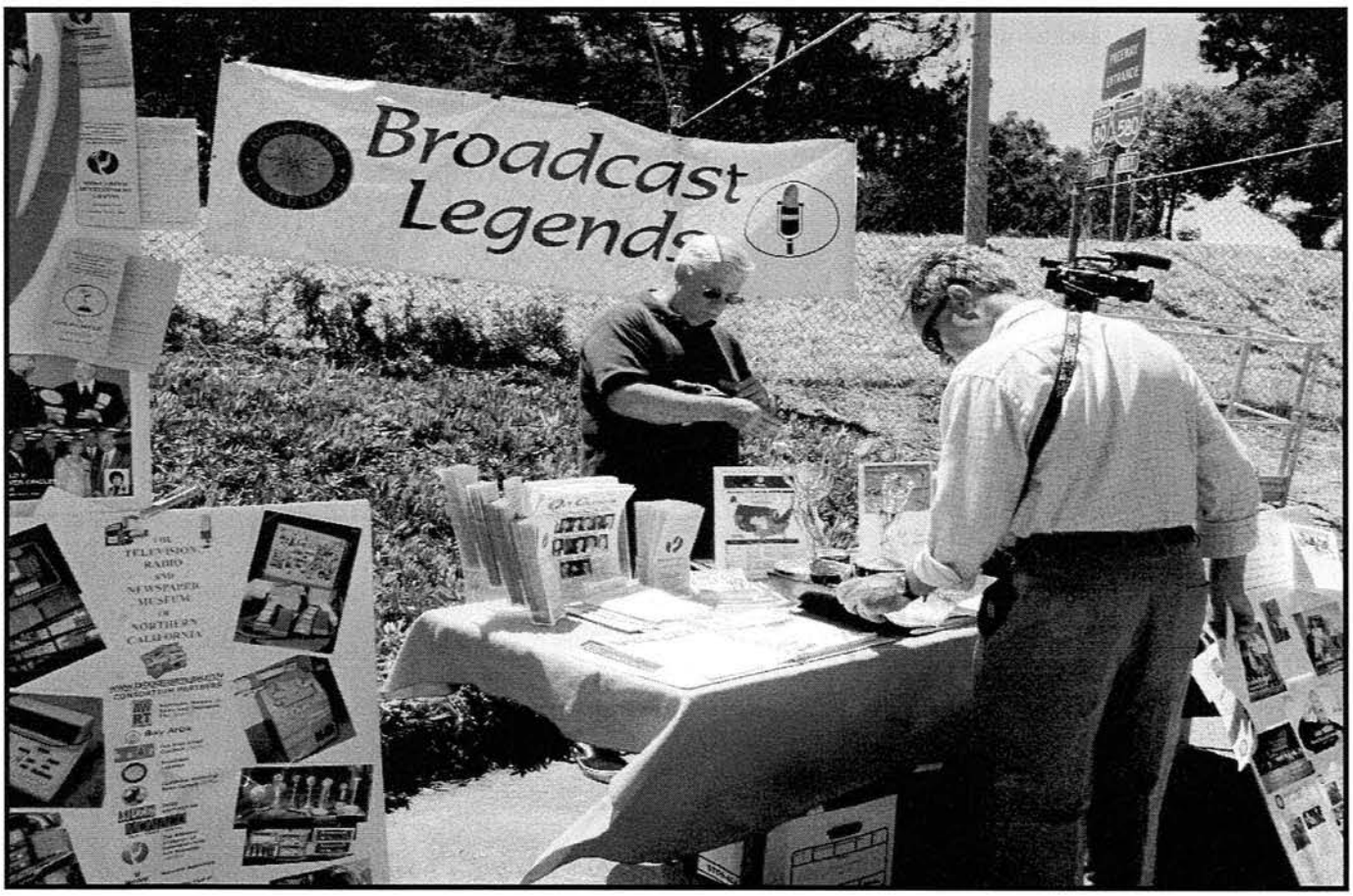
John, Fred & Scott



Mike Adams

KRE Events




Broadcast
Legends
TELEVISION
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CALIFORNIA

Contents

CHRS has accepted two contempory radios from the Eton Corporation of Pal Alto (Formely Grundig - USA), into its permanent collection. Eton, by its President Esmail Amid Hozour, has graciously provided this red Model S350DL and the state of the art XM satellite, short wave and AM-FM, Model E-1.

These radios are outstanding in terms of design and performance.
(Photos by Mike Adams)

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CHRS on the Internet:
www.californiahistoricalradio.com