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Journal of the CALIFORNIA HISTORICAL RADIO SOCIETY

FOR THE RESTORATION AND PRESERVATION OF EARLY RADIO

FROM THE BIRTHPLACE OF BROADCASTING

California Historical Radio Society

HOME OF THE BAY AREA RADIO MUSEUM & HALL OF FAME

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 enable the exchange of ideas and information on the history of radio, particularly in the West, with emphasis on collecting, preserving, and displaying early equipment, literature, and programs. Yearly membership is $30.

CHRS Museum in Alameda

CHRS has been fortunate to through the generosity of its donors to purchase a home for the CHRS museum and education center. It is located at 2152 Central Avenue. The building was built in 1900 as a telephone exchange.

CHRS volunteers are actively restoring the building to make it optimal for use. Our goal is to create an environment to share our knowledge and love of radio and enable us to create an appreciation and understanding for a new generation of antique radio collectors and historians.

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Contact us:

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or info@californiahistoricalradio.com

Visit us at: www.CaliforniaHistoricalRadio.com

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Contents of the Journal

Front Cover: Image and caption from Radio News magazine June 1938, page 24.

Rear Cover: Images from recent CHRS activities.

From the Editor

Once again I've had the pleasure of working with very generous and capable contributors. I want to thank Bart Lee, Bob Rydzewski, Mike Adams, Walter Hayden, Scott Scheidt, and Steve Kushman.

It is my desire to continue to improve this journal and provide you with relevant high-quality content. To do this I need your constructive comments. I am always in need of quality content related to broadcast radio, ham radio, and television. If you have something to contribute, I urge you to let me know. I am especially interested in technical content. It can be of two types, a narrow topic in depth or a more broad topic with less depth.

Enjoy . . .

Richard Watts, jrchrs@comcast.net

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From The President

by Steve Kushman

Each time I sit down to write this message I am reminded of how special CHRS really is. Our supportive membership, our passionate and skilled volunteers, our ability to raise funds, our programs including the Bay Area Radio Museum and Radio Hall Of Fame, our commitment to provide a forum for the exchange of artifacts and ideas, our ability to foster new interest in this 100+ year old technology that still effects our every day lives, are just some of the reasons that make CHRS so special. Being able to raise over $1 Million and purchase our own historic building really says a lot about our ability to get things done. CHRS' future is ours to decide. Our 116 year-old building needs TLC and turning it into Radio Central; our West Coast Center devoted to all things radio is hard work… but well worth it.

We are ready to begin our next major project consisting of a voluntary seismic upgrade on the rear portion of Radio Central; electronics shop remodel and an ADA restroom. The new shop will be one of the centerpieces of Radio Central. It will have new windows, new floor, new lighting, 4 workbenches, 16 high quality parts cabinets, vacuum tube vault and plenty of storage. This project is costly but necessary. Funding will come out of the General Construction fund and dedicated donations. Recently CHRS Member Jon Winchell donated $10,000 with $7,000 going to the shop project and $3,000 going to the Radio Hall Of Fame. Thank you Jon. Specific donations to help this project along are most welcomed and appreciated! This project along with many others will turn this historical wired communications building into CHRS Radio Central where we celebrate 'wireless' as it has existed, for more than 100 years.

Raising Funds… Is an ongoing process of CHRS. We are pleased to report that our Spring auction and Clearance Sale in March netted CHRS almost $8,800! It was lots of hard work by many dedicated volunteers. Thank you. CHRS has also had a presence on eBay for a while. Director Philip Monego and CHRS member Carlos Perez have been handling our eBay sales for us. Now CHRS has our own eBay account and Philip and Carlos are listing more items. Most of the gear we are selling has previously been offered to our members at our auctions and sales at Radio Central. Also some new items will be added. Please check our listings often and bid on some items. Our handle on eBay is: Californiahistoricalradio. All sales will benefit CHRS. Thanks to Philip and Carlos for their efforts. And also a shout out goes to CHRS Member Seth Arp. Seth has been restoring radios that are a bit too modern for our traditional collectors and selling them at the Alameda Point Antiques Faire once a month. With help from Andrew Wellburn, Seth does a fine job of getting old radios into appreciative new hands.

First Technical Facility… Our CHRS Audio Standards Transfer facility has been packed up for almost 2 years and now is being re-assembled at Radio Central. This facility is key to our mission of preservation. We will be digitizing Electrical Transcriptions as part of our CHRS ET Project. We will digitize Reel to Reel and cassette tape for posting on our Bay Area Radio Museum site. In this room we will be able to digitize audio from the following sources: ETs, 78s, 45s, 33s, reel-to-reel, cassette, 8 track, broadcast tape carts and wire recordings. The room is partially working now and will be complete soon. When completed CHRS will offer this vintage audio transfer service to members and the public. Stay Tuned! Thanks to John Staples who originally wired this facility at KRE and is now re-wiring the room and tuning up the gear.

BAY AREA RADIO MUSEUM Updates… Thank you Alan! Alan Bowker continues to update and repair many of the old links and exhibits on our BARM site. It's a time consuming and tedious process. But Alan is pushing ahead and making great progress. Check out all the great audio exhibits on our Bay Area Radio Museum site. Thank you to new CHRS Member Andrew Wellburn for taking home two crates of reel-to-reel tape from Ken Ackerman's collection and digitizing 22 hours worth of material. This new material will be posted on our BARM site as part of the new Ken Ackerman Collection. Stay tuned! Thanks again Andy! CHRS is proud to announce the selection of KYA 1260 AM, San Francisco, as the BARHOF Legendary Station for 2016. Even though KYA has been gone from the Bay Area's airwaves since 1983, it can rightfully claim its heritage as the Bay Area's longest-running Top 40 station, having begun its 25-year tenure in 1958. Come celebrate the Induction of KYA into BARHOF on June 23rd as part of the Broadcast Legends Spring luncheon at the Basque Cultural Center in South San Francisco. Don't delay, vote now for the 2016 Class of the Bay Area Radio Hall Of Fame Class. We encourage you to select your favorite and deserving radio people for induction into BARHOF. This year the final selection of our 2016 Class will be based on a combination of popular public vote and consideration by our new BARHOF Veterans Committee. Voting will close on July 4th, with the 2016 inductees being announced at Radio Day By The Bay 2016 on July 23rd

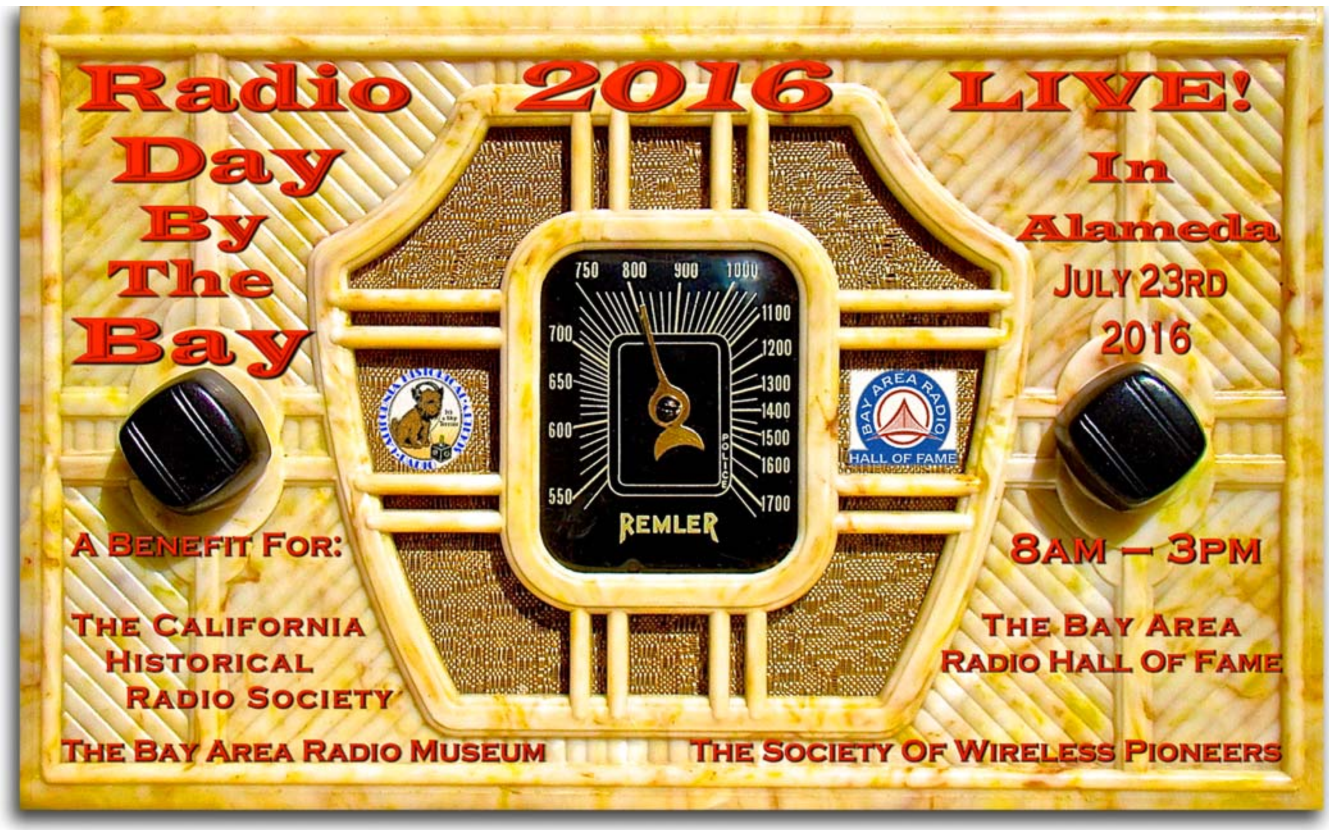
Remember that I always enjoy hearing from you. Whether it's a good comment or a complaint, please let me know. I hope you feel as proud and enjoy being a part of CHRS as much as I do.

Best Regards, **Steve**

(415) 203-2747, kushseal@flash.net ◊

The CHRS annual auction, massive surplus sale, live radio play, and orchestral performance is coming soon . . .

Save the date!



CHRS Central Valley Chapter News

by Scott Scheidt

The Central Valley Chapter (CVC) held its annual Holiday celebration and Radio Restoration Contest awards luncheon in December. It was held in an airport hanger that houses and displays vintage aircraft and related items. The afternoon was enjoyed by all.

The CVC once again participated at the Turlock Model A Swap Meet in late January with a booth displaying vintage radios, especially auto radios. There was much interest by attendees who many inquiries about our club and services. They even purchased a few radios that were for sale by the members.

The Beginning Radio Class meets every Thursday at our club shop in Turlock. The class is being taught by Vernon Larson. The CVC Radio Repair Workshop meets every Wednesday evening from 6 to 8 PM at the same location.

The CVC is exploring opportunities to further expose the community to vintage radio. The CVC is also considering venues to sell surplus club and member items to the public possibly at antique and craft faires.

The CVC is starting to plan for its annual Swap Meet at the Turlock Fairgrounds, this year on October 1st. There was good attendance last year and several sellers presented interesting wares; most of the sellers are located in the Central Valley and typically don't sell at Bay Area meets. All CHRS members are encouraged to attend; it is a great opportunity to see a fresh selection of treasures and bargains they may not see at other meets. ◊

Radio Central Renovation Update

by Walter Hayden

Original exterior front elevation of 2152 Central Ave.

Electrical Upgrade: Kevin Payne continues to improve building electrical system. He is moving electrical loads from obsolete upstairs sub panel to new downstairs sub panel located near downstairs restroom. When the work is complete, most building loads will be fed from two downstairs sub panels, one toward front of building and the other at restroom near center of the building. When all work is complete, the main panel will feed certain critical loads, the two building sub panels and the sub panel in the workshop shed.

Restroom and Tube Storage Room Windows: In February new windows were ordered for the downstairs restroom and tube storage room. The new windows are awning style, which matches style of existing 90 year old windows. Window delivery is expected mid to late March.

Tube Storage Room: Walls and floor of tube storage room are being cleaned in preparation for shelving installation. A plan for the shelving and lighting has been prepared. As a cost savings, the tube storage shelf system used in KRE will be reused in new Radio Central tube storage room.

Restroom and Hallway Floor Covering: Vinyl floor covering in downstairs restroom has been removed because of failed adhesive. Removal of floor covering exposed tile floor installed in 1926. Tile floor is in good condition, so it will probably be cleaned and left exposed. Floor covering adhesive in part of hallway adjacent to downstairs restroom also failed. This necessitated removal of the hallway vinyl floor covering.

Seismic Upgrade: Start of several projects is dependent on issuance of building permit for seismic upgrade. These projects are: seismic upgrade, construction of archives room, electronics shop, upstairs tube storage room, and upstairs men's restroom and upstairs unisex handicap restroom. CHRS representatives and structural engineer Vincent Wu are working with City of Alameda to satisfy requirements for issuance of building permit. We just received notice that the permit has been approved.

Kevin upgrades the electrical service.

Cliff, Walter, and Larry performing final demolition in shop area.

Steve gets in his licks.

Bruno Zucconi and his Scala Radio Company, San Francisco, 1954

By Bart Lee, K6VK © 2016

BRUNO Zucconi, now age 93, owned Scala Radio Company of San Francisco from 1954 when he founded it to 1979 when he sold it to an Oregon company, eventually a subsidiary of German company, Kathrein. Mr. Zucconi and his wife Connie came to CHRS Radio Day By The Bay at Radio Central in Alameda on July 25, 2015. Cynthia Edwards Reinholtz brought Mr. and Mrs. Zucconi down to see the library. There we met to mutual astonishment: mine because I had hoped to find him, or at least more about him, since my writing the CHRS Facebook post about his Scala Radio Company last May; and Bruno and Connie Zucconi to meet someone who had been researching and writing about their Scala Radio Company of many decades ago.

In a CHRS surplus sale I found an oscilloscope probe branded "Scala Radio Company – San Francisco" that sparked my interest. Having done some research, a CHRS Facebook post evolved:

Connie and Bruno Zucconi of Scala Radio, San Francisco, Ca. 1954—1979. Photo taken July 15 by Bart Lee during their visit to CHRS Radio Central.

Another CHRS Surplus Sale Find – San Francisco's Scala Radio Company is long-gone from the City and from its factory at 2814 Nineteenth Street as well. It was founded in 1954. In the 1950s it specialized in instrumentation. Pictured is its 'scope probe -- the "Dual Purpose" BZ-5. It could read direct, or through a resistance, for set alignment purposes. A switch selected which type of operation. The 1956 Allied catalog lists five probes, BZ-1 through BZ-5 with different characteristics, along with two TV test instruments (injectors). Radiomuseum.org notes headphones from 1972.

Sixty years ago, television and then color television came to the fore as home entertainment and the primary source of news of the world. With tens of thousands of sets turned on for six or more hours a day, only able and competent servicing could keep them going. The complexity of the analog circuitry challenged radio servicemen. The sets' vacuum tubes ran hot and the picture tubes called for thousands of volts on the outside (anode) of the tubes — one wrong move and that charge could fling you across the room. Alignment, especially of the color television sets, called for patience, skill and instrumentation.

In April 1954 "The Engineering Staff [-] Scala Radio Co." wrote the first of what was to be a series of articles in *Radio - Electronics* about "Killing Those Alignment Bugs" in television sets. (See also the November 1954 issue). The April cover shows scope probes in this use. The September issue of *Radio - Electronics* picked up a Scala Radio press release about the then-new BZ-5 probe (p. 136). "As a direct probe, the BZ-5 is designed for general trouble shooting. Shielding guards against pickup of stray fields near the chassis… [I]n visual alignment work … The arrangement is basically that of a low pass filter …"

Well, as we often find out, there is more to the story. This is what Bruno Zucconi told me:

Mr. Zucconi got interested in audio as a boy living in San Francisco. He was born about 1922 in Genoa, Italy. In his small hometown, only one place had a radio, and he wondered about its sound. He recalled that when he was only a slightly older boy in San Francisco, the battery radio sets of the 1920s were thrown away, even on empty lots (one of which was his father's), because the new AC sets had taken over the market. He and friends got all sorts of parts from these old radios and experimented, for example making oscillators and crystal sets.

Zucconi first met his wife Connie when she was the little five-year-old sister of a friend in their DeHaro Street neighborhood. They shooed her away a lot. She grew up and they met again after Zucconi returned from service in the Army in World War Two. And they married.

Inasmuch as he had been born in Italy, even though he came to the U.S at age eight, Zucconi was considered an "Enemy Alien" when the war broke out. He nonetheless asked to join the Army. This alien classification applied to everyone born in Italy, Germany or Japan. He was, after his request, taken into the U.S. Army and rewarded for his skills. He already had Coast Guard maritime licenses and study as an electrician. The Army made him an instructor immediately, and he says, "A Friendly Alien." He could, for example, have a dog, and was always treated well, although there were military sites off-limits to him. He came out of the service after many adventures in the Pacific Theater. As an Army corporal, he nonetheless served as a ship's officer whenever needed for his electrician and marine engineering skills. He returned to San Francisco and then a couple of years of college.

A couple of years after the War and his college work, Zucconi set out to make a High Fidelity (Hi-Fi) radio and amplifier . He called his enterprise Scala Radio Company of San Francisco. In Italian *Scala* means musical scale, a name quite fitting for a Hi-Fi company.

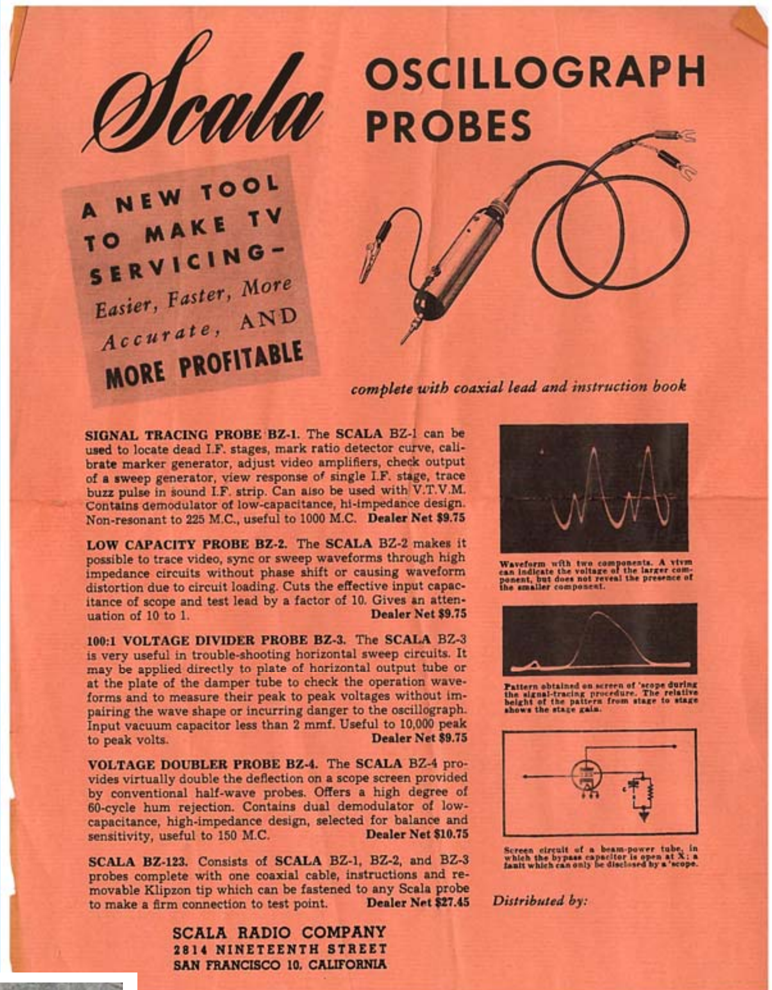
He put his knowledge of audio to work. For speakers he used separate high frequency "tweeters" and low frequency "boomers" (woofers), a better arrangement than the co-axial structure of some competitors. Zucconi's wife Connie did the finishing of the woodwork and some of the construction. She recalled: "When you start out with nothing, you have to do everything." His gear was high quality and would have been very good for stereo audio, but stereo had yet not come onto the scene. Inasmuch as Scala's Hi-Fi was higher quality, it was more expensive. For example, he used type 807 tubes rather than the standard 6L6 power amplifier, for better audio range. He also staggered the IF amplifiers for a wider bandwidth, and added one to make up for the loss of gain. But as Zucconi recalls: "The people who knew quality couldn't afford it, and the people who could afford it didn't know." New business opportunities became attractive.

Dial of a Scala HiFi set. Circa late1940s.

Television (TV) flourished in the early 1950s. This new technology challenged radio technicians. Radio involved a chain of a single signal. TV, he points out, involved multiple complex signals: FM audio, AM video, synch pulses, etc. Zucconi designed a series of probes for oscilloscopes to demodulate and otherwise handle these signals. The technicians with these probes could isolate and examine each signal in the mix.

Zucconi could not afford advertising but he made a deal with Hugo Gernsback's *Radio - Electronics* magazine: he would write articles about how to use the new probes in TV servicing. Several of his articles appeared in the mid-1950s. He authored them as "The Engineering Staff [--] Scala Radio Company" for their advertising value and because promoting his personal name as an author would not directly further the company's business. (The "staff" was Bruno Zucconi and his wife Connie, and Connie did all the typing as well as holding down a bookkeeper's job).

Probes manufactured by the Scala Radio Company.

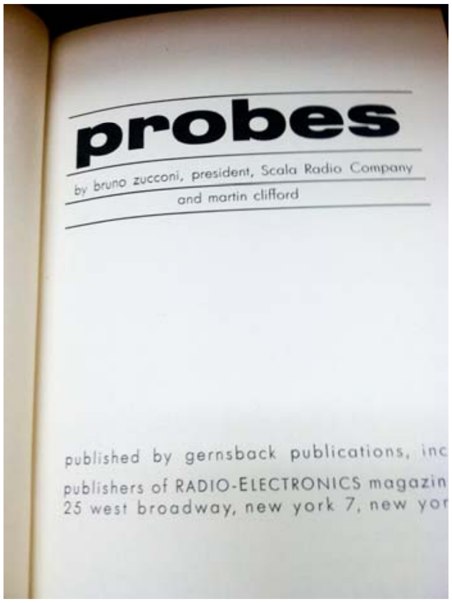


Mr. Zucconi showing an article in April 1967 Service magazine featuring Scala probes.

Miniature vacuum tubes used as a substitute for high voltage vacuum capacitors.

Zucconi tells with pride, for example, how he avoided buying from HP a $100 vacuum capacitor for his high voltage probe. Instead he used a miniature vacuum tube rectifier with plate cap, and coiled wire around the glass base of the tube to get the right value of capacitance. That cost a dollar a piece.

Gernsback Publishing collected his articles into a book titled: "Probes," in its technical series. It went to several editions and formats including a foreign edition. (The CHRS library has two copies, one of which Zucconi autographed during his visit on Radio Day 2015). The book shows a co-author, Martin Clifford. He was the editor but also contributed many drawings. Zucconi thought it only fair to give him the credit he deserved. The book may be found on the Internet in full text. The photos in the book (pps. 19, 20) were taken in his shop. He still has some of the equipment pictured, some of which he constructed himself. *Radio - Electronics* said of his well-regarded book in 1960: "You need this one for better servicing." In his book he explains with care the way to use the various probes in order to use the oscilloscope to best advantage.



Probes authored by Bruno Zucconi and Martin Clifford and published by Gernsback Publishing.

Television signals, especially in the City, could suffer distortions (multi-path from reflections and "ghosting"). Zucconi knew a Yagi multi-element VHF antenna could concentrate the signals and avoid much of this problem. But the available Yagi designs had too narrow a bandwidth for the wide TV signals (6 MHz). Zucconi invented an offset-element Yagi antenna that solved that problem. He staggered the Yagi elements just as he had staggered the IFs in his Hi-Fi. This was the optimal TV antenna design, so other and very big companies promptly copied it. They however, could sell their antennas for less than Scala's cost of materials. Other opportunities again became attractive.

Zucconi worked from a plant on 19th Street in San Francisco. San Francisco hosted a lot of industry at the time. Scala Radio, for example, produced its

Test instruments by the Scala Radio Company.

SCALA TEST INSTRUMENTS

MODEL SMI-53 SUPER MARKER INJECTOR

Mixer-amplifier for mixing sample of sweep voltage with sample of marker voltage (from external generator). Injects large, stable pip into oscilloscope. Marker pip is always the same size—from base to top of curve. Metal case, 10x8x7". For 110-120 volt, 60 cycle AC. Shpg. wt., 13 lbs.
84 FX 600. NET 67.50

Model SMI-53X Duo-Marker Injector. Same as above but with crystal oscillator. Gives 2 markers on response curve—marker frequency and marker frequency plus or minus crystal frequency. With 4.5 mc crystal. Shpg. wt., 13 lbs.
84 FX 605. NET 79.50

TEST PROBES

Model BZ-1 Signal Tracing Probe. Low-C, Hi-Z demodulator. Non-resonant to 225 mc; useful to 1000 mc. With cables. Wt., 8 oz.
84 F 601. NET 9.75

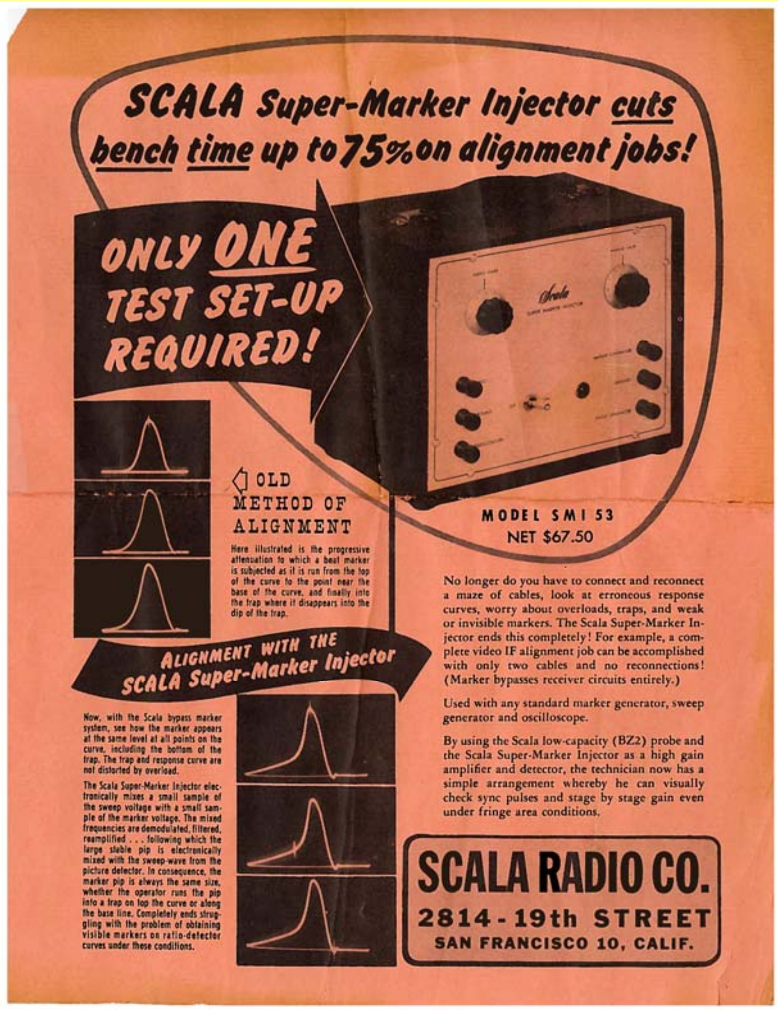
Model BZ-2 Low Capacity Probe. Traces through Hi-Z circuits without distortion from circuit loading. Shpg. wt., 8 oz.
84 F 602. NET 9.75

Model BZ-3 Voltage Divider Probe. Checks wave-forms and voltages at plates of horizontal output and damper tubes. Shpg. wt., 8 oz.
84 F 603. NET 9.75

Model BZ-4 Voltage Doubler Probe. Virtually doubles deflection on scope screen compared with half-wave probes. Dual low-C, Hi-Z demodulators useful to 150 mc. Shpg. wt., 8 oz.
84 F 604. NET 10.75

Model BZ-5 2-In-1 Direct and Alignment Probe. Low-C, shielded probe with coax cable. Switch converts unit to resistive probe for visual alignment work. Shpg. wt., 8 oz.
84 F 009. NET 6.90

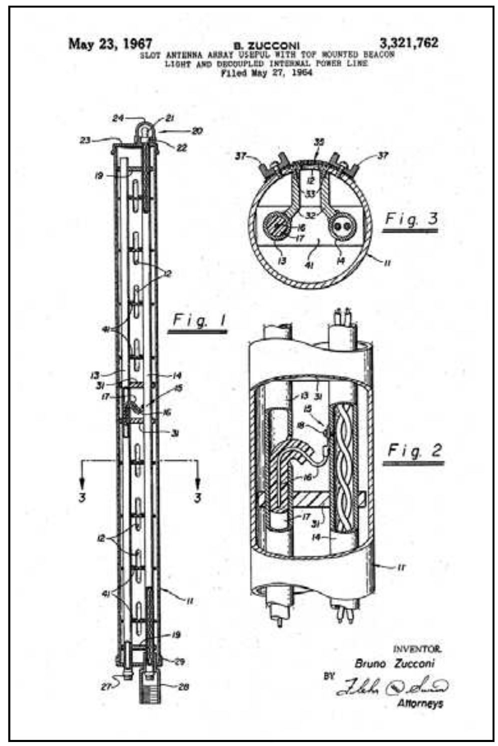
From a 1956 Allied Catalog.



products not far from the Remler Radio Company. Zucconi and Remler's Chief Engineer Harry Greene (Jr.) frequently lunched together. (He is the "g" on a Remler schematic).

Zucconi used his antenna experience to respond to a government call for high-reliability, heavy-duty VHF antennas. He sold his antennas, as Scala Radio Company, to television stations and government agencies such as the Forest Service, the FBI and even the CIA. He used thick aluminum pipe instead of tubing and big strong connectors. Connie also helped him with the early antennas. He recalls that the U.S. government used his antennas for communications links at the Kennedy and Khrushchev summit in the early 1960s. His antennas also served the Vatican. The agencies often called him on-site for installation, so he also had quite a few antenna adventures. The responsible authorities required reliability and efficiency in communications, up to and including the White House. The frequently called on Zucconi and Scala Radio. His San Leandro plant even features design elements to frustrate surveillance. He contributed many improvements to antennas and their housings. One of his patents (1964) sets out a sophisticated slot (dipole) array with several practical features.

Mr. Zucconi holding an antenna manufactured by Scala.



Patent for slot dipole array. Scala Radio Company.

Gilles Virgnaud of CHRS spoke with Zucconi about Gilles's old company using the Scala Antennas for television remotes and the like. A National Association of Broadcasters (NAB) handbook of the era features and pictures a Scala VHF antenna. A commercial notice for Scala Antennas dating from the San Francisco plant lists: "Complete Antenna Coverage 40 to 1000 Mc; Yagis, Ground Planes, Heated Ground Planes, Corner Reflectors, Paraflectors, Slot Antennas, Omnidirectional and Directional Arrays." Mr. Zucconi still retains an interest in his San Leandro plant, where he made the antennas after his San Francisco operations (see some nearby photos). In retrospect, he says he is a little surprised at his success in antennas because he was so focused on audio in the beginning.

SCALA RADIO CORPORATION•2814 19th St., San Francisco

Complete Antenna Coverage 40 to 1000 Mc; Yagis, Ground Planes, Heated Ground Planes, Corner Reflectors, Paraflectors, Slot Antennas, Omnidirectional and Directional Arrays

Mr. Zucconi wanted to retire about 1979 after a very successful business career. A buyer of his antennas for TV station purposes in Oregon (Cascade) feared that they might lose his product, so it bought Scala Radio (and soon thereafter Kathrein of Germany bought that company).

Kathrein has manufactured the Scala antenna line in Oregon and it is now moving production to Mexico. Kathrein is a large German communications concern founded in 1919. It dates its American presence from Mr. Zucconi's founding of Scala Radio Company in 1954. A quick patent search shows patents in Zucconi's name as late as 1988. Some of his patents are technologically very sophisticated. He says he assigned most of his patents to Kathrien but did keep some for himself. Many of his patent lawyers, he says, came from a distinguished San Francisco law firm that had represented Phil Farnsworth against RCA. (The Flehr patent law firm appears on his 1964 patent).

Mr. Zucconi still has an interest in antennas.

Scala Radio in effect moved to Oregon in 1979 and Bruno Zucconi retired. On January 25, 1979, Scala Electronic Corporation (corporation number C0909018) surrendered it legal status in California. The Scala company now operates as a division of Kathrein in Medford, Oregon and Mexico. That company makes communications gear for use worldwide. Oregon Scala began to merge with Kathrein in 1985 according to the Kathrein website: www. kathrein-scala. com. It is there that Kathrein dates itself from Scala's 1954 founding.

The website for Kathrein Inc., Scala Division, notes that it is:

> "… a leading manufacturer of professional antenna and filter systems for communications and broadcasting, serving commercial and governmental markets worldwide. Our product groups include professional antennas, RF filters, and accessories for a wide range of applications, including:
>
> * Wireless mobile communications
> * TV and FM Broadcasting
> * Wireless local loop and Internet
> * Radio paging systems
> * Point-to-point and point-to-multipoint data and control networks
> * Land-mobile radio communications systems of all types[.]"

The website notes:

> "In addition to [Scala's] own designs, the company builds antennas having their origins at Kathrein, but have been redeveloped for the North American marketplace. With Kathrein firmly positioned as the world's oldest and largest source of antenna and filter products for wireless communications and broadcast technology, it made good sense to align Scala with that visibility and the company became Kathrein Inc., Scala Division on January 1, 2000." (www. kathrein-scala. com/ aboutus. htm).

Not bad for a little company that started out in San Francisco with a Hi-Fi and the BZ-1 Oscilloscope probe. (Thanks to Bruno and Connie Zucconi for many interesting talks, and also to www. American Radio History. Com. The video interview of the Zucconis may be found on the CHRS website).

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The Great Radio Language War

By Bob Rydzewski

Language is as fundamental to broadcasting as electronics is to radio. Bob Rydzewski captures the story of unfolding events in the 1920s that could have significantly altered broadcasting, amateur radio, and especially international communications as we know it.

A decade after the Great War erupted in Europe, a bloodless but no less ferocious struggle began among proponents of different artificial languages expected to dominate international radio communications. The opening shot was fired not in Sarajevo but in the pages of Hugo Gernsback's *Radio News* by way of an article innocently entitled "A Radio Auxiliary Language for Trans-Oceanic Work."[1]

The Radio Tower of Babel

In the early 1920s amateur radio, then largely but not exclusively an American enterprise, succeeded in its quest to span entire oceans.[2] Around the same time a new concept, radio broadcasting, sparked a craze that began with a rush to "home brew" receivers and soon resulted in entire new industries.[3] While ham radio operators were pushing the envelope to achieve the most distant communications, broadcast receiver owners found the prospect of pulling in distant—and eventually overseas—stations equally alluring. Both of these groups of "DX fiends" had a new problem to deal with.

"Now that trans-ocean amateur communication is with us, what are we going to do when we can't talk the other fellow's language and when he doesn't know ours?"[4] Similarly, what good was listening to a broadcast from overseas if it was in a language you didn't understand? For two-way communications Q-codes and the like, available even then, did allow basics like location and identity to be exchanged without the need for many words. More elaborate codes were possible. For example, simple five-letter international maritime codes could convey messages like "Fire is gaining rapidly. Take off passengers and crew," (ITWEX) and "You should induce sweating by wrapping a blanket wrung out in very hot water and give copious drinks," (NIZQY, the last part always good advice).[5] But such codes, though useful, would always be limited and cumbersome. What was the international code for "I haven't got hot water or drinks"? And what could a broadcast listener do to understand foreign broadcasts, short of hiring a translator or learning the language himself?

Fig. 1. The Radio Tower of Babel, with apologies to Bruegel.

The problem was the diversity of languages in use, the Babel Effect (figure 1). If everyone could speak a common language there would be no problem. Nowadays, when 80% of all websites are in English and most of the remaining 20% can be converted into something resembling English with programs like Google Translate, the world is much closer to having a common language, but in the early days of radio English played a smaller part on the international scene. Experts agreed on the need for a common language, but which one? People would naturally favor their own mother tongue, thereby placing the burden of learning another language—no easy task—squarely on the shoulders of everyone else. It would be tough to convince hams and broadcast listeners of Country A to learn the language of Country B, even if only as a back-up language. The solution seemed to be something different, "a neutral language, objectionable to none on political or sentimental grounds, easily mastered by all, and therefore recognized by all nations and races as the accepted medium for international communication," that is, an *auxiliary international language* (AIL).[6] But which AIL?

Fig. 2. Dr. Ludwik Zamenhof (1859-1917), inventor of Esperanto.

The Contenders

Dr. Ludwik Zamenhof was born in 1859 in what is now northeastern Poland but at the time was part of the Czar's Russian Empire (figure 2). He was also not far from East Prussia, and grew up in an environment where Yiddish, Polish, German, Russian, and Lithuanian were all commonly spoken. Was it any wonder that at the age of 10 he wrote a play called *The Tower of Babel*? "I was raised to be an idealist," he said, "and I was taught about the brotherhood of all people. However, every time in the street and courtyard I was persuaded that there are no people… only Russians, Poles, Germans, and Jews."[7] An idealist indeed, he attributed much of the strife he saw around him to the lack of a common tongue by which people could communicate and eventually learn to understand each other as fellow men and women rather than sinister foreigners who might as well have been from another planet. By today's cynical standards this idea might well be considered naïve, but in those days before the World Wars, global understanding, like peace and prosperity, was not seen as an unreachable goal. To many it was, in fact, the very direction in which Progress was inevitably headed.

Zamenhof obtained his medical degree, becoming an ophthalmologist, but even through his medical school days he pursued his real passion, the construction of a new language that could be used by all. His was far from the first attempt to produce such an "artificial" or "constructed" language. The idea went back centuries and had more recently been popularized by a language that was given the euphonious name of Volapük. For a while Volapük had been all the rage, with a large international following, societies, translations, and its own literature.[8] But it soon ran into a problem. A schism developed between those who were in favor of changing and—they said— improving it, and the group that included its original creator, Johann Martin Schleyer, that liked it exactly the way it was. This fracture in the Volapük community essentially killed it as a viable international language. By the time Zamenhof created his new language in 1887, which came to be called Esperanto for the pseudonym he used (Doktoro Esperanto), Volapük was not so much a language as a warning about everything an international language would need to avoid. Volapük had not been an easy language to learn, and had expressly aimed to replace others as a primary language, lessons Zamenhof took to heart in trying to make his Esperanto a simple, straightforward, and only auxiliary language.

By the turn of the century, with radio still in its infancy, another field was already in search of an AIL, namely, science. Then as now publications and international conferences were the necessary means of communicating research and advances in the sciences. The "big three" languages for science, of which scientists would need to have at least a basic understanding to avoid being seriously handicapped, were English, French, and German. But beyond these, by 1900 improving worldwide education and economies meant that research was increasingly globalized, with contributions appearing in languages like Russian, Japanese, Italian, Danish, Spanish, etc. Relatively few scientists outside of those countries could read or understand them, and although abstracts in more common languages sometimes appeared, this was not enough. Science conferences were even more problematic: "The diversity of language still stands like a menacing angel with drawn sword at the portal of all international gatherings, threatening with misunderstanding and difficulty all who seek to enter."[9] Clearly, an AIL for science, including radio physics, was needed.

An authoritative body, the International Association of Academies met in Paris in 1900, and within the relatively short time (in a bureaucratic terms) of less than a year established a Delegation for the Adoption of an International Auxiliary Language tasked with officially anointing an AIL. Wilhelm Ostwald, the soon-to-be Nobel laureate sometimes called "the father of physical chemistry" became its chair in 1906. Ostwald was quite familiar with Esperanto and had advocated its use for some time, although he was aware of the difficulties in using it as a science language. By the time the Delegation met, Esperantists were confident that their language would be endorsed as the official AIL of science, especially since other candidate languages were weak. Volapük was essentially dead except for a reformed version called Idiom Neutral. Some had suggested a return to Latin, the common language of science centuries ago, but even linguists had to admit that it was a difficult, archaic language in need of major revision before being useful as a language of modern science. Writing about electrons or radioactive decay in the language of Caesar, even if the words could be coined, just seemed anachronistic. Surely Esperanto was a shoe-in.

Except that it wasn't. After lengthy and often deadlocked sessions, the delegation committee met one morning to find on their desks copies of new, constructed language anonymously attributed to an author with the pseudonym of "Ido" ("Descendant" in Esperanto). This looked much like Esperanto but incorporated many revisions that Esperantists, with their stodgy (they would say "stabilizing") established mechanisms for considering changes to their language, would not be ready to accept. On October 24, 1907, in what those who supported the new Ido (pronounced "ee-doe") language considered a simple, logical proposition but which conservative Esperantists took to be a shameless stab in the back, the Delegation accepted Esperanto as the universal AIL, *but* "on the condition that certain modifications be made by the permanent Commission in the sense defined by the conclusions of the secretaries' report and the project of Ido, in seeking an agreement with the Esperantists linguistic committee."[10] Essentially, Esperanto would be the official AIL of science as long as it agreed to incorporate changes that would more or less make it Ido.

If the reader is wondering how different the two languages are, Table 1 shows a sample translation of a paragraph from a speech into Esperanto and Ido. Looking at these and other samples with no real knowledge of either language, this author sees Ido as potentially easier to understand, that is, closer to English ("modern" is "moderna", not "nuntempa", "marvel" is "marvelo", not "mirindajho", etc.) but whether this makes it a better *international* language is quite debatable, now as then.

English	Esperanto	Ido (Ilo)
Esperanto is the language of that modern marvel, the radio telephone in the employment of the latter across frontiers, and also will be the language of the talking moving pictures, which will soon be a success. Esperanto will go by leaps and bounds throughout the world from now on, because the radio and talking movies will carry it to all people.	Esperanto estas la lingvo de la nuntempa mirindajho, la radio-telephono en la uzado de chi tiu trans landlimojn, kaj ankau estos la lingvo de la parolantaj kinematografajhoj, kiuj baldau estos sukcesaj. Esperanto iros per saltegoj tra la mondo de nun antauen, char radio kaj parolantaj kinematografajhoj portos ghin al chiu popolo.	Ilo esas la linguo di la moderna marvelo, la radiotelefono en la uzado di ica trans frontieri ed anke esos la linguo di la parolanta kinemal pikturi, qui balde sucesos. Ilo pariros la mondo saltege de nun avane pro ke radio—uzado e parolanta kinemal pikturi portos ol ad omna populi.

Table 1. Excerpt from James Sayer's speech translated into Esperanto [Sayers, *Radio News* August 1924, p. 169] and Ido [Roos, *Radio News* October 1924, p. 471] . Note that the alternate, non-circumflexed form of the Esperanto alphabet was used and that the Ido translation substitutes "Ilo" for "Esperanto."

With the Delegation's decision it was obvious to all that the same type of schism that had killed Volapük was now rupturing the Esperanto community. Ostwald, having become convinced that Ido was the more suitable language for science, corresponding with Zamenhof and, advising him against recalcitrance, noted that the failure of Volapük to reform had led its downfall, to which an outraged Zamenhof fired back that "Volapük failed precisely through *reforms*."[11] The battle lines had now been drawn; associations and scientific journals began endorsing Esperanto or Ido (*Scientific American* chose the latter, for example). An attempt was even made to draw the world's best-known scientist, Albert Einstein, into the fray; perhaps not surprisingly, he proved too smart to take the bait.[12]

But how did this somewhat arcane debate among linguists and scientists spill over into a major controversy over a radio AIL? The world of international science being a rather small one, Ostwald had been invited to Harvard as a guest lecturer a few years prior to his Delegation committee chairmanship, where among other things he lectured on the need for an AIL. Among those who probably heard his lectures or otherwise absorbed the science AIL story during Ostwald's few years in America was John Stone Stone, the renowned radio physicist and I.R.E. fellow later to become president of that organization.[13] Stone's "right hand mathematical assistant and research engineer" was one Oscar C. Roos (figure 3).

The Proponents

Roos, also an I.R.E. fellow, was an established radio engineer with a number of U.S. patents to his credit. He had worked for DeForest in 1902-1904 during the "radio yacht" days and later worked for Stone and for Fessenden. He had been chief engineer for the Radio Telegraph & Telephone Company on the Great Lakes.[14] He had developed commercial arc stations in Ohio, and was "in charge of the Philippine radio system" between 1910 and 1917. Among his avocations was linguistics, particularly AILs.[15] His would be the strongest voice in advocating for the adoption of Ido as the AIL for radio amateurs and international broadcasters.

Fig. 3. Oscar C. Roos (1879-1929), proponent for the adoption of Ido as Radio Auxiliary International Language. Reproduced from *Wireless Age*, December 1924, p. 18.

In this he would be opposed by an equally fervent Esperantist named James Denson Sayers (figure 4). The facts about Sayers' life, as far as they can be determined, are "stranger than fiction." Sayers was born in Louisiana and had been a telegrapher for United Wireless on the Pacific coast.[16] While living in Dallas in 1920 he served as a Texas delegate to the Socialist National Convention, shortly thereafter moving to New York City where he later ran (unsuccessfully) for a New York State Assembly seat.[17] How he was introduced to Esperanto is not known, but as early as 1922 he was advocating for its use over WJZ and urging fellow telegraphers to learn it.[18] One of his Esperanto talks over WOR (Newark) would later be picked up as far away as Tokyo, likely an international language DX record at the time.[19] Sayers would go on to write Westerns like "Gun Thunder on the Rio" and "Rustlers on the Smoky Trail" under a variety of pen names, as well as a novel in Esperanto under his own name. Later still he would serve as an Information Officer for the U.S. Army in occupied Germany.

Fig. 4. James Denson Sayers (1888-1957), proponent for the adoption of Esperanto as Radio Auxiliary International Language. Reproduced from *Wireless Age*, July 1925, p. 18.

These days, though, his notoriety stems from an altogether different topic and one that is anathema to the Esperanto community, his blatant racism. In 1929 he wrote a book entitled "Can the White Race Survive?"[20] Unfortunately, he was far from alone in his bigotry at the time. Anyone glancing through magazines of the 1920s today can find ample evidence of mainstream xenophobia. Case in point is a discourse on which "races" are inventive and which are not (can you guess?) in *Radio News* by Professor Fessenden himself, who also had an interest in an AIL for the purpose of maximizing audibility/readability for a proposed communication device.[21] Sadly, acceptance of a universal language did not imply acceptance of universal equality.

The Battles

The struggle for a common language on the international airwaves—or ether waves back then—began with Roos's innocently titled article "A Radio Auxiliary Language for Trans-Oceanic Work" which appeared in the May 1924 issue of Hugo Gernsback's *Radio News,* a magazine proudly noting its "Circulation Larger Than That of Any Other Radio Publication" on the front cover.

"Radio fans who want to start writing DX cards to Europe or South America in the next two years should learn a simple international auxiliary language if such can be found… Since 1907 we have had just such an auxiliary language, named 'Ilo'… It is absolutely dependable and already in extensive use… All that is necessary to use it in Radio work for DX postal cards is a logical mind, and 10 lessons." It was as simple as that. Everyone from WLW, which gave over-the-air lessons in it (figure 5), to Crosley Radio, which had received orders in it, to Russian Communists, who had "officially

Fig. 5. Fred Smith of WLW giving a lesson in Ilo over the air circa 1925. Reproduced from *Wireless Age,* May 1925, p. 18.

adopted" it (thereby suggesting an association Powel Crosley would rather be without)— everyone was already using Ilo (another name for Ido). Roos had a list of 1300 necessary radio and electrical terms in Ilo. "Do you want to communicate with your co-workers in Europe without wracking your brains during the next 18 months in trying to learn French, Swedish, Danish, German, Spanish, Italian, and perhaps Russian? The very idea is preposterous! Help to banish it by learning 'Ilo' *now*. Write to me at…" The use of Ilo for radio work was a forgone conclusion. No other candidate language was even mentioned.[1]

Roos had by this time already been involved in the formation of an organization to support just such a radio AIL, the Radio Auxiliary International Language Society (RAILS). This group was led by the cream of the crop of radio engineers. Roos's fellow officers included Ernst Alexanderson of alternator fame, John Stone Stone, and "the father of radio control," John Hays Hammond, Jr. Their goal was to help radio amateurs "do in two years what academicians and literary lights have failed to do in several decades" and adopt a common language, which very much seemed to be Ido.[22]

In those days before the Internet, text messaging and tweets (which these fathers of radio would ultimately bear some responsibility for) it took several months for objections to the assumption that Ido would be the RAIL to appear in print. But come they did. Strangely, Hugo Gernsback (figure 6), who had published Roos's article without commentary, spearheaded the counterattack that would be led by Sayers. In the August 1924 issue of *Radio News* appears this notice atop Sayers's article: "After a wide investigation it has been found that Esperanto is the most widely used of the auxiliary languages and is, possibly, the easiest with which to work, since it has a well established vocabulary. Therefore, RADIO NEWS accepts it as the international auxiliary language." The details of the *Radio News* investigation are lost to history, but there it was: as far as they were concerned Ido was already out and Esperanto in.

In the article that followed Sayers refers to Ido as a plagiarism of Esperanto, a "corruption of the original." There was a reason that proposed changes to Esperanto were required to go through the Language Committee and the Esperanto Academy: "Such procedure insures that the language will be held to a conservative and standard growth throughout the world and *not be butchered and botched here and there at will by every theorist who feels himself moved by a bright and shining idea*."[23] Take that, Idists! The more widespread use of Esperanto, always one of their favorite arguments, is then brought out, complete with Esperanto's extensive literature and poetry. Publications in Esperanto are said to outnumber those in Ido by 100 (including many of "high literary quality") to 3 (of which 2 were of "uncertain and sickly existence"). As to the lack of an Esperanto radio vocabulary, Mr. Sayers was addressing that even as the then-readers then read. Finally, he hinted that the ARRL, led by Hiram Percy Maxim at that time, had been talked out of adopting Ido as a RAIL by European amateur radio groups and was, in fact, about to endorse Esperanto.

Fig. 6. Hugo Gernsback (1884-1967), proprietor of the Electro-Importing Company, inventor, science fiction writer and publisher, prognosticator, and the editor of *Radio News* at the time the battle over a Radio Auxiliary International Language raged.

This turned out to be true—sort of… "After a two-year's survey of the international auxiliary language situation the American Radio Relay League, subject to the qualifications herein set forth, has decided in favor of Esperanto as its official international language, and it recommends that language to its membership." Their "endorsement," however, smacked of half-heartedness. They admitted that "the great majority of us will not find our radio activities alone of enough moment to spur us to this effort [learning Esperanto]." The decision was again based on Esperanto's dominant position in its field. The less-than-ringing approval, reminiscent of the Delegation's specious endorsement in 1907, notes that the ARRL "does not regard that language in its present form as necessarily the one which should eventually come unchanged into world-wide recognition, and that it stands ready to adopt such modification of Esperanto or whatever other language may eventually be agreed upon by an authorized international agency of the great nations of the world… We believe that our members may accept Esperanto in the expectation that it will be one of the factors taken into account in the formation of the eventual I.A.L., if not indeed the chief support thereof." Would amateurs rush to learn Esperanto if it wasn't a useful international language but just "one of the factors taken into account" in the eventual formation of one? One senses dissent within the ARRL on this decision.[24]

The following month, Roos returned Sayers's fire in "Esperanto or Ilo—Which?"[25] "The readers of RADIO NEWS have been given a rosy prospectus of Esperanto promises… If majority rule is a sufficient reason for the adoption of Esperanto, then English has the better practical right, on account of its governmental backing in England, in most Anglo Saxon Universities and in the League of Nations." In fact, many considered the League of Nations as capable of rendering the ultimate approval of an AIL, and some Esperantists articles indicated that it had actually, in some way, done so. "By clever omission," said Roos, "the Esperantists have tried to create the impression that the League of Nations recommended their jargon for teaching in the public schools of the world. It did no such thing." Roos detailed some machinations by which a Swiss Esperantist, Dr. Privat, was appointed as a Delegate from Persia (!) and authored a favorable report on Esperanto that subsequently had to be suppressed by the League. "In other words the Esperantists tried to chloroform or stampede the Committee on Intellectual Co-operation making the report… So much for the great victory!"

As to the language itself, "Esperanto puts things together in a deceptively easy—even careless—system. The result is a mass of hybrid monstrosities… Etymological hooch!" Roos voiced the objection of many to some characters in the Esperanto alphabet, which had five "hatted" or circumflexed letters: ĉ, ĝ, ĥ, ĵ, and ŝ (pronounced like the consonants in cho, joe, the end of the Scottish word "loch", zho, and sho, respectively) and one diacritical vowel, ŭ, pronounced as a "w". Understanding that these would look foreign to many, Zamenhof allowed a following "h" to substitute for the circumflexed consonants (ch, gh, etc.) and the diacritical ŭ to be represented by a simple "u", but Idists like Roos still took a particular dislike to them, calling them "Czecho-Slovakian letters" (which they are not).[26] Needless to say, they were omitted from the Ido alphabet.

The battle was now joined by the auxiliary forces of *Radio News* readers who bombarded the magazine with a barrage of letters to the editor for the remainder of the year. Judging by this, Gernsback had found a controversy that not only inspired passions on both sides, but also, more importantly, filled pages for free and was good for sales. Among ads for the Omnigraph and Myers tubes appear letters like that of JP Callaghan, Manager of the Promotion Department at *La Presse*, a Montreal newspaper that owned radio station CKAC: "I *know* Ilo is the only perfect radio auxiliary language in existence… Your investigator was subjected to a great dose of Espo chloroform, and was, naturally enough, still very much under its influence when he induced you to support a decadent language system, which the men on Main Street will never, never, never, never, never accept! Too bad, indeed, that the Espists have 'put one over on you'…" In case five nevers in a row wasn't strong enough, Callaghan told of how *La Presse* conducted its own investigation. "From CKAC, we gave several Espist talks and radio fans very bluntly told us to choke the lecturer. Poor old gentleman, he did his little best, and failed horribly." In contrast, "Ilo has proved to be an immense favorite with the public… CKAC's mail from Ilo enthusiasts is assuming alarming proportions… We will be on the air every night with Ilo as soon as we get our new, big set installed."[27] The "new, big set" was likely installed in 1929. CKAC, AM 730, no longer owned by *La Presse*, as of today features a traffic report format, but—alas!— in French, not Ilo.

Roos tried his best to resuscitate Ilo from the "Espo chloroform" that had resulted in endorsements by ARRL and *Radio News*, becoming increasingly astringent in his appraisals of Esperanto. Esperanto was "a childish jargon, which has failed to make good with thinkers in 37 years." In written form, it looked "like a Prague news sheet." To another epistolarian who argued that Ilo was just a modified form of Esperanto he replied, "Mr. Woolf has the idea that Ilo comes from Esperanto. So does man from the ape?"[28] One feels sorry for Mrs. Roos, if there was one, around this time.

As always, the escalation in rhetoric on one side brought forth the same on the other. Esperanto supporters noted the prejudice underlying Roos's abhorrence of those "Czecho-Slovakian" letters. "The good Idists make the world believe that Esperanto has Polish or Czechoslovakian accents, because they despise the Slavonic people. Esperanto has not their accents, but entirely its own… What a moron one must be to consider Esperanto a system of difficult writing!"[29] The gloves were now off: "Your investigation doubtless revealed the fact that Ilo or Ido is an offspring of Esperanto, but you may not have been informed that, as is well known to those conversant with the facts of its origin, the bar sinister [heraldic symbol of illegitimate birth] occupies a prominent place in its escutcheon."[30] Sayers himself struck a similar tone, calling Ido "a mongrel infant" lacking the sounds found in Esperanto that make for greater audibility (an important consideration for its use in radio). Zamenhof had refused to copyright Esperanto, making it a sort of open-source code of its day, and thereby giving it "freely to the world, thus innocently leaving it possible for 'robbers to break through and steal.'" As to the eminent RAIL society, Sayers would have no truck with them: "RAIL is a pet scheme, a skeleton organization for Ido in the radio field, put forth and sponsored wholly by the Boston Idists."[31]

Meanwhile, Gernsback elaborated on his thinking in the somewhat defensive "Why Radio News Favors Esperanto".[32] "In selecting an automobile it is usually very pleasing to purchase one that is different, in some respects at least, from that of your neighbor. It is a human whim to be exclusive, but when it comes to the selection of a language that is to be universal, it is quite important that all whims be set aside and that each lamb follow the next…"("to the slaughter," Roos would surely have added). To Gernsback's thinking, Esperanto was "the most widely used and is too strong to break down… The sooner the others are forgotten, the better." For his part, he did all that he could to bring this about. As shown in Figure 7, beginning in 1925 mention of Ido or Ilo experienced a precipitous decline in the pages of *Radio News*, disappearing almost completely by year's end. From 1925 on, AIL articles would be penned by Sayers, not Roos.

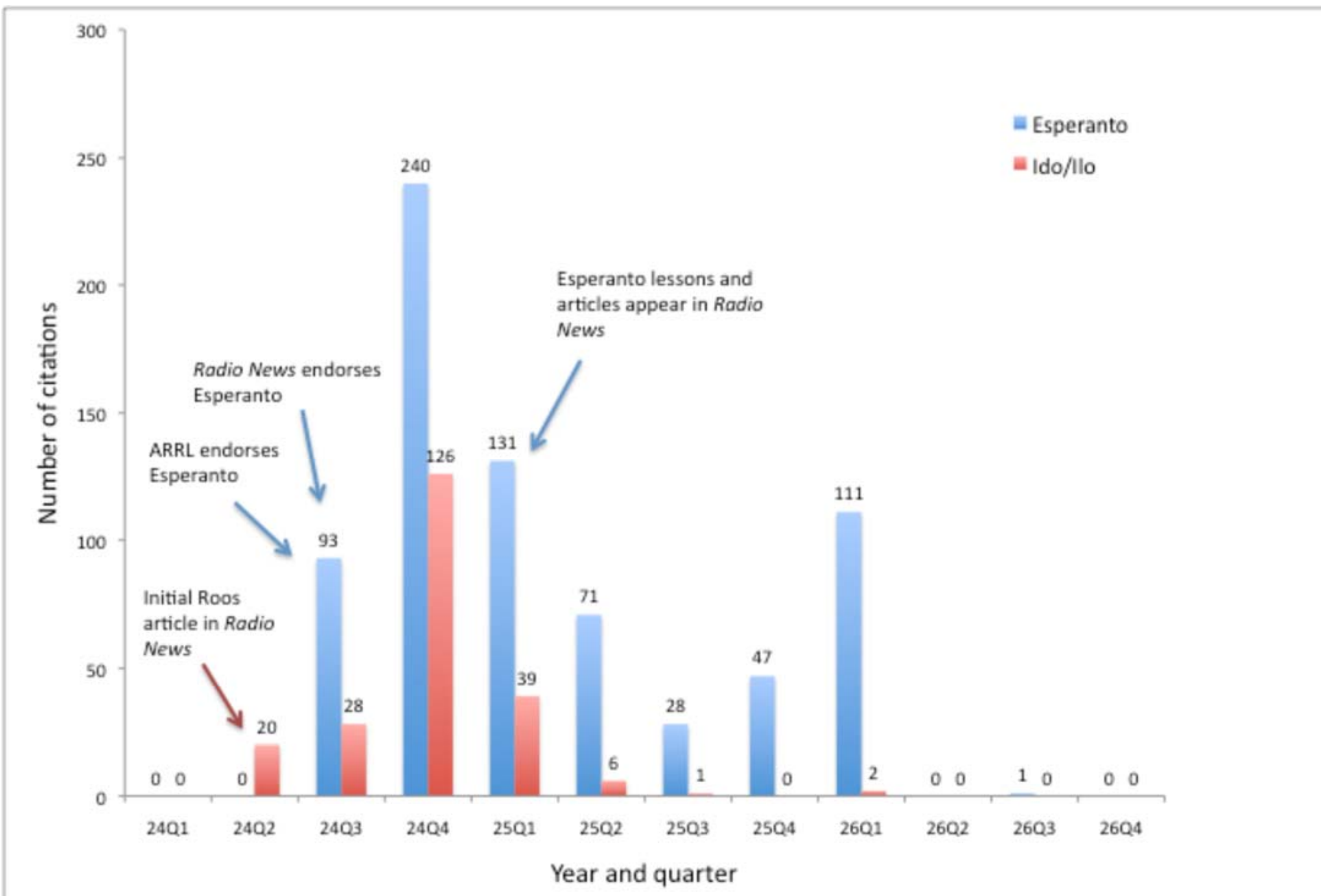

Fig. 7. Number of "Esperanto" and "Ilo" or "Ido" citations by quarter in *Radio News*, 1924-1927.

Roos's opinion on the matter could still be found, but in the pages of the less popular *Wireless Age*. And even he had to admit that divisions were developing within the international Ilo community. One of its leading standard bearers, Dr. Max Talmey, was agitating for major changes to that language while it was still in a "period of stability" during which changes could not be made. As a result, "although Dr. Talmey is one of the honorary Vice-Presidents [of the International Language (Ido) Society of Great Britain] it no longer supports him, although some of its past leading members do."[33] Sayers was quick to brand this now-familiar scenario an example of Idists "showing their anarchic tendencies against authority." Interestingly, in the same article he chides the Idists for using the word "brodkastar," which would be familiar only to those who knew English. In contrast, Esperanto used the word "disaudigi", which, he said, "any Japanese, Russian or Malay Esperantist, as well as any Englishman or American would recognize instantly!"[34]

So while Ido lessons appeared in *Wireless Age* and over stations such as CKAC (Montreal), WBZ (Boston), WCX (Detroit), WJAX (Cleveland), and WLW (Cincinnati), Esperanto lessons were likely more common, appearing in *Radio News* and over CKY (Winnipeg), WJZ (New York City), and WOR (Newark) among others. In Europe Esperanto predominated as well, with 16 British and 11 German stations broadcasting talks or lessons in that language in 1925.[35] There was even a movement to simplify the Babel situation for shortwave DXers in search of QSL cards by having all stations provide station identification in Esperanto (e.g., "Brita Stacio Una", "Germania Stacio Du") although this proposal was never widely adopted. The BBC, for example, found itself "unable to fall in with the particular proposals," drily observing "it is not expected that room can be found."[36]

All the same, Esperanto appeared to have won the field from Ido as evidenced by numbers of endorsements and citations. But what exactly had it won? Although "Rezistanca Kuplita Amplifikatoro," Sayers's translation of a Fred Parsons article on building an amplifier with two 01A lampoj (tubes), had appeared in *Radio News*,[37] Esperanto articles were not exactly pouring in, and its adoption by radio hobbyists was doubtful. By the spring of 1926, Esperanto too had essentially disappeared from Gernsback's journal. It would take twenty years and another World War before he would address constructed languages again. "A universal language is not in sight, at least for many generations to come. An artificial language, of the type of Esperanto, Volapük, or others, may be ruled out completely. Past experience has shown that they never can become popular."[38]

The Aftermath

To the amateur radio operator or broadcast listener—not to mention businessmen, diplomats, and scientists—constructed languages proved a false hope. Few trans-oceanic QSOs were made in any constructed language. Despite all the logical arguments in favor of a neutral universal language, Italian shortwave stations, for example, were broadcasting in not one but sixteen different languages by the late 1930s[39] and the Voice of America in many more than that several decades later. The United Nations, successor to the League of Nations, today has not one but six official languages, none of them neutral or constructed.

Thus reality confounded expectations. No constructed language reached the critical mass required to make it worthwhile for most people to learn. They would sooner overcome their reluctance to learn the difficult but widely spoken language of a foreign country than learn a simpler but so-far uncommon language that wasn't native to anywhere.

Although the need for a "neutral" language had been an article of faith to both Idists and Esperantists, there were those who had disagreed even then. William H. Easton of Westinghouse, manager of WJZ, addressing constructed languages in 1925, noted that "there has been a great deal of discussion on this point, especially by those who have gone to infinite labor to invent or learn some artificial speech, such as Volapük, Esperanto, or Ido… It seems to me that the weight of probability lies with the adoption of some living language, and that, furthermore, the chances are that English will be adopted for this purpose."[40] Surprisingly, even some non-native English speakers agreed. Professor Erich Hoffmann of Bonn University, famous as co-discoverer of the bacterium that causes syphilis, "is pushing an active propaganda for the adoption of English as the international language." His argument—to the dismay of Esperantists, who thought *their language* was popular—rested on how widespread English had already become: "every deep-sea sailor knows English, no matter what his nationality." "The example of the United States," he noted, "has moreover proved that members of other nations can learn English adequate for the purposes of communication sufficiently easily and rapidly."[41] In the end there proved to be no single universal language, but, against all expectations English, "a bastardized form of low German with idiosyncratic syntax and grammar, non-phonetic spelling, and attendant cultural biases"[42] would become the closest thing to it on the airwaves.

Still, constructed languages live, having survived real wars, revolutions, and the wrath of dictators, including Hitler, who called Esperanto "the language of Communists" and consigned Zamenhof's own children to the horrors of the death camps. Although today non-Esperanto speakers may think of it as an obscure language best remembered for the fact that William Shatner once made a movie in it (*Incubus*), Esperanto gathered a wide following, is still spoken now, and is even the first language of about a thousand people, mostly the children of parents who had no other language in common. In what seem like déjà vu, there's even a political party, EDE, pushing for the adoption of Esperanto as the official language of the European Union. Fate has not been as kind to Ido, but that language still exists and is in use by perhaps a thousand people worldwide.[43, 44]

Could it have been different? If the Esperantists had accepted the proposed Ido reforms or if Idists had decided to work within the Esperanto system for gradual adoption of reform or had given up their objections altogether, would the resulting language rather than English predominate on the Internet today? Could widespread adoption of an AIL have furthered the cause of world peace, as Esperanto's creator had hoped? We'll never know, of course, but it seems doubtful. The bitterness of the disputes over an AIL for science and for radio serves to demonstrate just how high the barriers of stubbornness, divisiveness, and the settling of personal vendettas can be in pursuing the common good. In the end, languages would continue to spread the old fashioned way, by military and/or economic conquest. The time and effort involved in learning any new language was just too high for it to be otherwise.

Which in itself was not a new thought. In 1629 the philosopher René Descartes, musing on the possibility of a constructed language for international use, did not see this as a real-world option. "But do not hope to ever see it in use," he wrote, for that "would require that the entire world become a terrestrial paradise."[45] It seems the world of the 1920s was far from that.

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Notes

1. Oscar Roos. A Radio Auxiliary Language for Trans-Oceanic Work. *Radio News,* May 1924, p. 1565.
2. See Clinton DeSoto, *200 Meters and Down*, 1936, American Radio Relay League, Hartford, CT.
3. For a fascinating history of the wildly expanding broadcast receiver industry in those days, see Alan S. Douglas, *Radio Manufacturers of the 1920s,* Volumes 1-3, 1988-1991, Sonoran Publishing, LLC, Chandler, AZ.
4. Oscar Roos. Get Ready for "IL" Work With Foreign Amateurs. *QST,* February 1924, p. 21.
5. *The 1931 International Code of Signals American Edition, Volume II: For Radio Signaling*, 1933, United States Government Printing Office, Washington, D.C.
6. Ivy Kellerman. The Necessity For an International Language. *Popular Science*, September 1909, Vol. 75, p. 281.
7. Quoted in Andrej Wincewicz et al. To Heal the Mind's Eye of Hate—Dr. Ludwik Zamenhof. *Israel Medical Association Journal,* May 2007, Vol. 9, p. 352.
8. For this and a wealth of information on constructed languages including the tale behind the eventual ascendancy of the English language in science see Michael D. Gordin, *Scientific Babel*, 2015, University of Chicago Press, Chicago, IL.
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The Author

Bob Rydzewski is a chemist by training and the author of a technical book, "Real World Drug Discovery", which was his segue into the world of professional writing. Although his mother had worked for Zenith and Belmont Radio back in the 1940s, his interest in radio (collection, restoration, and history) dates back only about 15 years and developed in large part thanks to the folks at the California Historical Radio Society. He enjoys collecting old (1920s and 1930s) and "oddball" sets, and especially enjoys researching forgotten issues in radio history, about which he plans to write further articles.

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The Device that Defined a Decade

By Mike Adams

This article was presented in May 2015 by Mike Adams at a meeting of television collectors and enthusiasts.

Question: What 1940s electronic device both predicted the future and proclaimed the past? What 68-year-old device introduced a then fledgling technology that has come into its own during the past few decades? And what manufacturer was so concerned, so careful, not to introduce an out-of-date device, that half of it was obsolete before it was ever made? Had enough? The answer to all these questions is the 1948 General Electric Super Distance 901 projection television, radio, and phono combination. Look closely and you'll see that the real story behind the GE 901 is one of powerful interests and postwar confusion, and claims by soon-to-be competing interests in a new telecommunications environment. More than just a television, the GE 901 provides a brief history lesson on postwar attitudes held by broadcasters, manufacturers, and government regulatory agencies concerning the future of TV and FM. Look closely at the dial of the 901; it reflects the uncertainty surrounding the FCC frequency allocation process between 1945 and 1948.

The View of the 40s

From a mid-40s perspective, the future would be one in which every home would have a plethora of communications media. World War II and its restriction on the manufacture of consumer goods had just ended and those companies involved in radio prior to the war were certain that television was about to enjoy a boom not unlike that of radio in the 1920s. The major radio broadcasters realized that much of the post-War communications expansion would probably be in television and FM and they wanted those channels. Manufacturers like GE knew in the mid-40s that if the newly empowered consumer was to embrace television, channel standards would have to be set and the resulting new sets would have a screen size much larger than those few experimental pre-war models.


General Electric 901 projection television. 1948.

So General Electric, the original maker of radio receivers along with Westinghouse under the RCA agreements, and the sole maker and supplier of the famous Alexanderson Alternator would truly have to come on strong with a serious television *and* an AM/FM/Short wave radio *and* a phonograph all in one very large cabinet. You would be the envy of the neighborhood. You would also have to be very wealthy as the GE 901 was advertised in the $1500-$2000 range, more than the price of some automobiles.

Allocation Wars

Perhaps the designers of the 901 were told: "no matter what the government does in the area of channel assignments, we want this one to have every consumer radio and television service possible." And it did. AM: naturally the 540-1600 kilocycle (since named kiloHertz) broadcast was still, after the war, the most popular broadcasting service anywhere. Didn't we depend on the big networks to bring us both the news of the war and provide escapist entertainment in the form of music, comedy, and drama? There were also two international shortwave bands, 9.4-9.9 and 11.6-12.1 Megacycles (now MegaHertz or MHz), for still another window on world events during the great war. Shortwave bands began appearing on radios in the middle 30s and would continue to be an obligatory feature of big radios throughout the 1940s. AM radio, broadcast and shortwave, was still the pre-eminent broadcast service.

TV was another story. From 1928-1937, both mechanical and experimental electronic television operated in the 2.0-2.2 and 2.7-2.9 MHz band, just above the AM broadcast band. In 1937, the government gave television 18 channels that were 6 MHz, each in the 44-294 MHz band. Throughout the 1930s, electronic television had gradually evolved from a low definition 60-line picture to the final 525-line standard approved in the spring of 1941. The National Television Systems Committee, NTSC, finally accepted what was then called "high definition" TV, just a few months before Pearl Harbor dragged a previously isolationist America into a war. The NTSC standard notwithstanding, television broadcasting would have to wait until later.

This also meant that frequency allocations for both TV and FM could not be resolved either. Indeed, for broadcasters and the Federal Communications Commission, the early 1940s were filled with enough important issues. The major networks were fighting the music licensing group, ASCAP, and the FCC was attempting to curtail the influence of the networks and return more control to the local station. The fact that Major Edwin Armstrong and the TV people were arguing over where FM and television would reside on the hypothetical dials of tomorrow was an ongoing issue that would also have to wait until after the war. Little noticed in 1940, the FCC, angry at RCA pressure for permanent TV channels, threw out the then channel one (42-50 MHz) and gave it to FM. Channel one would be back.

Dial of the GE 901 showing the old FM One and newly allocated FM Two bands, as well as AM and Short Wave bands, and television channels 1-13.

At the conclusion of 1944, the few television stations that had remained on the air during the war had been using channels 1-5 in the 42-90 MHz band. In 1945, the FCC gave TV their current 13 VHF channels on the 42-88 MHz (channels 1-6) and 174-216mhz (channels 7-13) bands, and moved FM from 42-50mhz to 88-106mhz (later to 108mhz). Obviously, FM interests, led by Armstrong, were angry about the move, arguing that many thousands of pre-war FM transmitters and receivers would instantly become obsolete. To resolve this problem, FM stations were allowed to broadcast on both bands between 1945 and 1948. This move effectively kept television's future use of their new channel one in government regulatory limbo and did nothing to resolve the long fight between Sarnoff and Armstrong for that channel.

Post war frequency allocation pressure was not just limited to broadcasting. Sure, TV wanted at least 30-40 channels, 6 MHz wide (some more enlightened types even wanted to move TV up around 400-1000 MHz and establish 13 MHz wide channels, just like some high definition analogue people are saying in the early 1990s. The fact was that in 1945, the railroads asked for 124 channels between 100-200 MHz, bus and trucking wanted 50 channels, facsimile interests wanted 180 channels between 52-56 MHz, aviation wanted the entire 50-200 MHz band while the forestry service and other two way users continued to press for channels, all on the FM. There was so much intense lobbying for FM spectrum space and so much uncertainty surrounding frequency allocations that it was going to be very difficult to manufacture any device with TV or FM. But, while the allocation controversy was mostly resolved by 1948, there must have been a few unanswered questions as the 901 was rolling off the assembly line. The dial on the GE 901 reflects this uncertainty about FM. Some older stations were still on 42-50 MHz and Armstrong had even petitioned the FCC again in late 1947 to make it permanent. And because the conventional wisdom suggested that FM would go to its present location of 88-108 MHz, there were some who believed that TV might get its channel one back. The FCC had changed its mind plenty of times between 1945 and 1947 and GE probably felt compelled to include both the old FM band and a TV channel one on the 901. But by the time the sets were on the market in 1948, the FCC had struck a final compromise with television concerning channel one. They agreed to let TV use channels 2-13 exclusively, no more sharing with other non-TV fixed and mobile services. In return, the 42-50 MHz (proposed TV channel one and the old FM band) was to be strictly for two-way communications use.

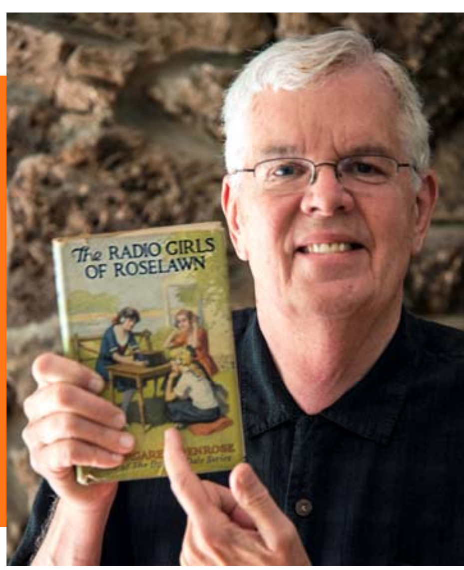
The Success and Failure of Technology

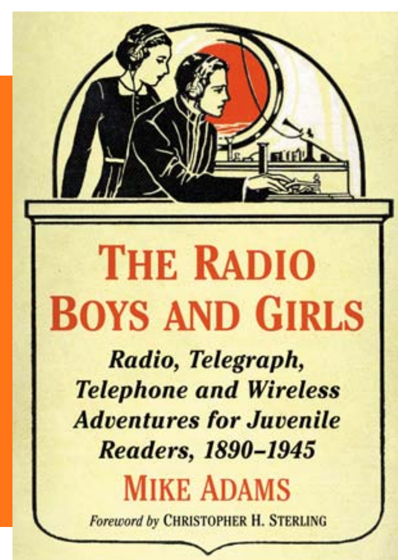
Looking closely at its 1948 technology, the GE 901 contained both a device important to the future and one to be relegated to the past. Even though experimental projection television systems were tried as early as the late 1920s using mechanical scanning disc and neon bulb technology, the GE 901 employed an all-electronic system. Developed by RCA, it used a 5-inch cathode ray tube and several reflectors and mirrors a parabolic mirror, a correcting lens and a front-surface mirror to focus the image on an 18-by-24-inch ground glass screen. To make the screen bright enough for a family audience, the picture tube required a staggering 27,000 volts – scary. Altogether, there are 43 tubes in this radio/phono/TV. But there was one notable feature in the design of the "home entertainment center of tomorrow." This 1948 set had as its record playing device a single speed, 78 rpm record changer. Uh oh, in less than a year, in 1949, RCA had introduced their 45 rpm system using a 7 inch record with a large center hole and Columbia had premiered their incompatible 33 1/3 rpm 12 inch long playing record with a small center hole. Shades of Betamax and VHS!

I have one of the few GE 901s in existence. Since I've been in possession of it, it has mostly been on display in a department of Radio/TV/Film where its overpowering presence provides enough material for several lectures on post-war broadcasting dreams and realities, triumphs and failures. Soon the GE 901 will be a part of the CHRS Museum in Alameda. There, a whole new generation of history fans will get to see what it was like in the early days of television. The 1948 General Electric 901: just looking at the dial of this giant is a complete lesson in the politics of post-war frequency allocation. Without realizing it, General Electric did broadcast historians a favor when they designed a device that helped define the 1940s in radio and television.

This article originally appeared in the Winter 1992 Feedback, a journal of the Broadcast Education Association. It has been updated for the CHRS Journal.

Mike Adams has been a radio personality and a film maker. Currently he is professor emeritus of radio, television, and film at San Jose State University, where he has been a department chair and the Associate Dean of the College of Humanities and the Arts. Adams has taught at the Shanghai Theatre Academy School of Television and Film. As a researcher and writer of broadcast and early technology history, he created two award-winning documentaries for PBS, the Emmy-nominated "Radio Collector," and "Broadcasting's Forgotten Father." Mike is the Board Chair of the California Historical Radio Society, CHRS. For his service to historical radio research and publication he received the AWA Houck Award, the SCARS President's Award, the TCA Stokes Award, the Ralph Batcher Award from the Radio Club of America, and he was named a CHRS History Fellow. He has had published numerous articles and six books, including "The Radio Boys and Girls: Radio, Telegraph, Telephone and Wireless Adventures for Juvenile Readers, 1890-1945," McFarland Press, 2015.





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Signal Tracers

By Richard Watts

John F. Rider had a grand idea for his latest innovation, the Chanalyst introduced in the Fall of 1938. In a brochure he declared that the Chanalyst was “The Greatest Advance Ever Made in the History of Radio Service Instruments.”

> “The Rider Chanalyst opens a new era in the analysis of receiver troubles. It is based upon an entirely new, easier method of attack, enabling the application of the same systematic diagnosis to all receivers — yesterday’s, today’s, and tomorrow’s. This is possible because the utility of the instrument is independent of the complications in receiver design . . . Tuned radio frequency or superheterodyne receivers with all special circuits are diagnosed with equal facility.”
>
> “The speed with which troubles can be positively identified is startling . . . Tests can now be made with the Chanalyst that have been impossible heretofore and these new tests are so all-revealing and so quickly made that your daily output of serviced receivers will increase beyond belief.”

Coincident with the Chanalyst introduction, John Rider published a two part article in October and November 1938 issues of Radio Craft magazine in which he describes how signal tracing techniques can be effectively applied to all facets of radio servicing. In 1939 he also published a book entitled “Servicing By Signal Tracing” which did the same in much more depth. In the book he begins with “What do we mean when we speak of signal tracing in connection with receiver servicing? Essentially it is a system of locating defects in communications systems with the greatest speed, accuracy and convenience.” He describes the process as injection of a known signal at the antenna and “observing the presence, absence, and character of the test signal at key points throughout the receiver system.”

In his view, signal tracing is the “primary or fundamental test” to be performed when initiating a radio repair. Once an assessment is made via signal tracing and a fault is localized to a receiver section or perhaps even a fault with a specific component, then secondary tests of voltage or resistance measurements might be made depending on circumstances. He makes the case that “the signal is the common denominator of all communications systems. ... The signal is the fundamental basis of determining whether a receiver or transmitter or for that matter any communications system is defective or perfect.” In his view operating voltages and resistance are not fundamental. This is because “any number of defects may exist in the system without in any way altering the operating potentials or d-c resistance values. … All operating voltages may be normal in a radio receiver, yet the signal may not be normal.” In the case when voltages or resistances are abnormal, this too will alter the signal. It also enables assessing the relative gain in each stage of the receiver. Given that the set powers on, it is thus his thesis that signal tracing will localize defects in every case.

Mr. Rider and other authors at that time referred to direct evaluation of an operating set’s signal as dynamic testing, while voltage and resistance measurement are considered static testing. Kendall Clough, a principal of Clough-Brengle Inc. and manufacturer of test instruments, authored a five-part article that appeared in the January through May 1939 issues of Radio Craft. Therein he supported the importance of dynamic testing as a primary approach to radio servicing and detailed a comprehensive approach to evaluating the performance of each radio stage. However, instead of centering the procedure on the employment of a signal tracer, he instead detailed the application and advantages of an oscilloscope. Clough-Brengle manufactured oscilloscopes and it is no surprise that Mr. Clough would want to quickly respond to Rider’s announcement and to reinforce to the radio service industry that oscilloscopes offer a more visual and, in his view, an arguably preferred form of signal tracing. For those not familiar with Mr. Rider’s or Mr. Clough’s articles, they are well worth reading.

Signal tracing was not entirely new in 1938. There is an early 1930’s Marconi 34160 Trouble Finder that appears to have this capability. There were also articles on how to adapt a TRF radio or crystal circuits for signal analysis and troubleshooting. But with all this fan fare, now dynamic testing and signal tracing had a significant market presence.

The Chanalyst

John F. Riders' Service Instruments, Inc. introduced the Chanalyst Model 11 in Fall 1938 for $107.50 — expensive at $1,800 in today's dollars. When RCA purchased Service Instruments Inc. in 1940, RCA continued to offer the Rider Chanalyst as Model 162 with only a few minor modifications from the Model 11. The design of the Chanalyst set the bar for this genre and influenced the design of competitor's products.

The Chanalyst offers five separate functions: a tunable RF-IF signal tracer "channel" with a range of 95 to 1,700 kHz ; a tunable high frequency Oscillator signal tracer "channel" with a range of 600 kHz to 15 MHz ; an Audio signal tracer "channel"; a vacuum tube voltmeter (VTVM); and wattage measurement to assess the power consumption of the device under test. Eye tubes are used as indicators for RF, oscillator, audio, and wattage; the VTVM uses a meter. Each channel operates independently from the others enabling all channels to be operated simultaneously. See figure 1 below.

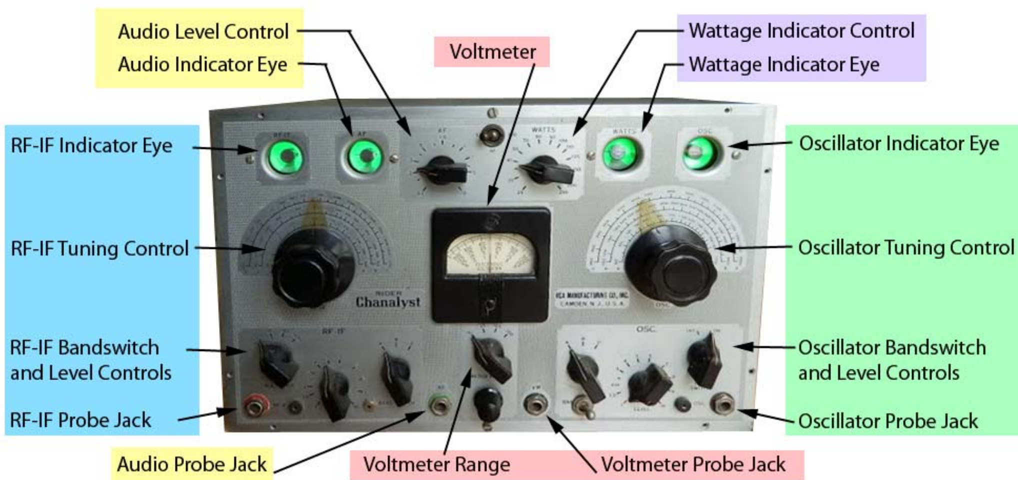


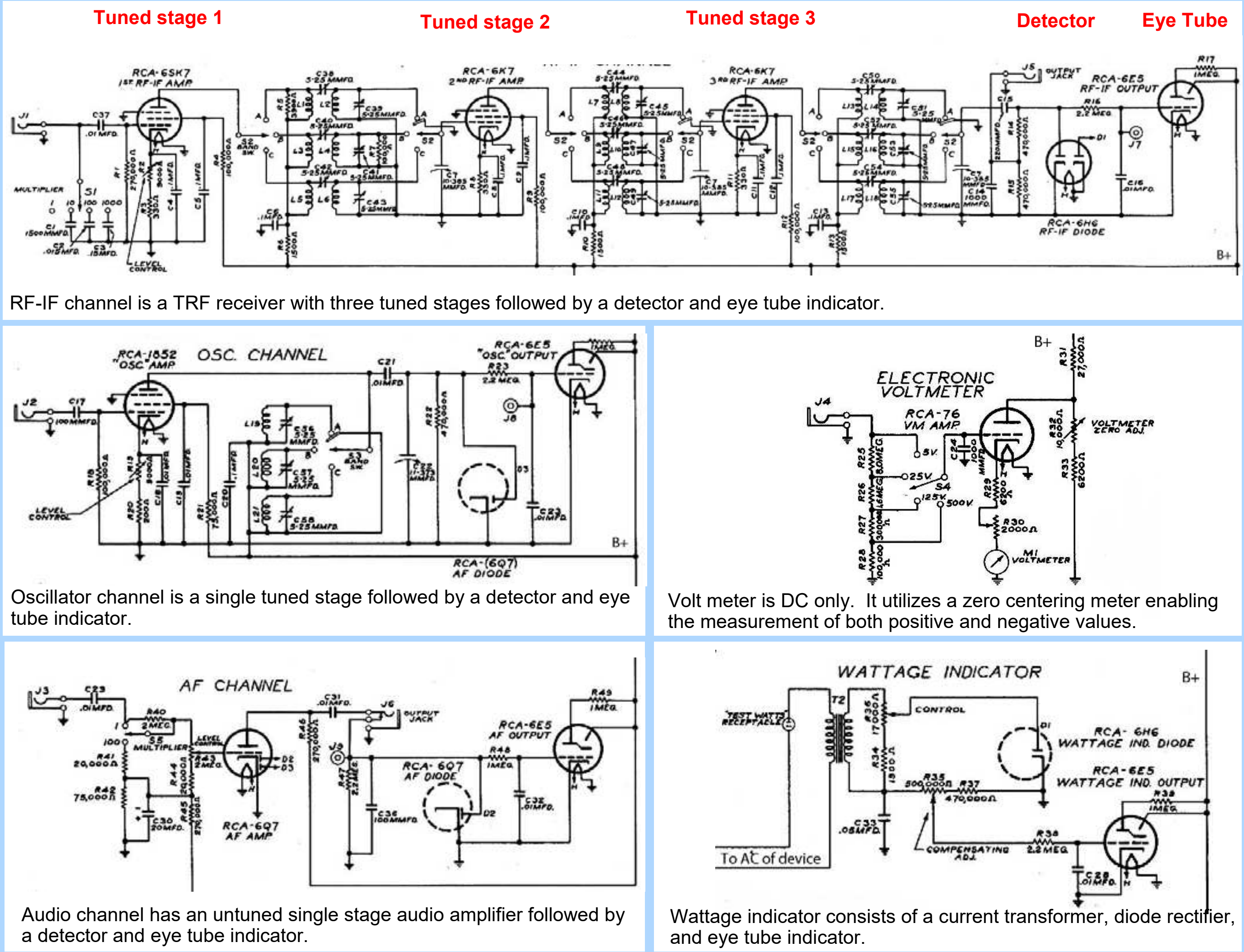
Fig. 1: RCA Model 162 Chanalyst front panel with functions indicated. (Author's collection).

The RF-IF and Oscillator channels are tuned voltmeters. The tuning feature enables the measurement of only the specific frequency tuned — as contrasted with an untuned device that measures the full composite of the signal's entire frequency spectrum (limited only by the untuned device's bandwidth). Each tuned channel is followed by a diode detector to provide signal level measurement. The RF-IF channel is sensitive having three tuned stages; whereas the oscillator channel is less sensitive with only a single tuned stage which was deemed sufficient for it primary purpose of analyzing radio oscillator sections. The audio channel is an untuned single stage audio amplifier. The RF-IF and Audio channels have output jacks prior to the detector that can be used to connect to other devices such as an oscilloscope to view waveforms, or to high impedance headphones to enable monitoring of the signal and hearing the quality of the audio signal. The RF-IF and oscillator channels also have pin jacks after the detector to enable plugging in the unit's or another voltmeter for more precise signal level measurement. Schematics of each function are shown on the next page (figure 2).

The VTVM has four ranges from 0 to ±500 volts DC with a constant input impedance of 10 megohms. The high input impedance enables the evaluation of sensitive AVC voltages and, I suspect, this would have been a welcome capability by radio servicemen; general purpose volt-ohm meters of the day typically had much lower input impedances and would load high impedance radio circuits like AVC to the point were diagnosis was difficult or impossible. To further address this and similar needs, John Rider's Service Instruments Inc. would introduce the Voltohmyst in mid-1939, a full functional vacuum tube voltage and resistance meter. Other manufactures introduced VTVMs in 1939 as well.

Each channel has it's own probe. The RF-IF and oscillator channels each use a low capacity probe; the blocking capacitor at 1pf was made very small so it wouldn't noticeably load the source. The VTVM probe has a 1 megohm in-line resistor. The audio probe is straight-through.

The channels have a level control plus the RF-IF and audio channels also have a multiplier switch. If the signal being processed is strong it will cause the eye tube display to overlap, or if the signal is weak the eye tube pattern will not be



RF-IF channel is a TRF receiver with three tuned stages followed by a detector and eye tube indicator.

Oscillator channel is a single tuned stage followed by a detector and eye tube indicator.

Volt meter is DC only. It utilizes a zero centering meter enabling the measurement of both positive and negative values.

Audio channel has an untuned single stage audio amplifier followed by a detector and eye tube indicator.

Wattage indicator consists of a current transformer, diode rectifier, and eye tube indicator.

Fig 2: Schematics of RCA 162 Chanalyst functions.

closed. The level and multiplier controls are then adjusted to so the eye pattern just closes. The values on the level and multiplier controls are calibrated and will indicate the relative signal level. For the RF-IF channel a signal of about 5 to 7 millivolts is required at the probe tip to close the eye when the multiplier and level controls are each set to 1. The accuracy of calibrations is within 20% which the manufacturer felt was sufficient for general use and service work. Similarly, the wattage control is adjusted in the same manner to indicate the power consumed by the device under test.

The Chanalyst manual details procedures for many uses:

- As a signal tracer establishing the presence, absence, and level of signals at points in a radio under test.
- To determine the origin of noise developed within the radio under test.
- As a simple field strength meter. Also testing the performance and directionality of an antenna.
- Determining the frequency if an unknown signal.
- Evaluating the performance of a signal generator or other signal source.
- As a resonated (tuned) vacuum tube voltmeter for general purposes.
- Since the Chanalyst is a TRF receiver, it can even be used as a radio. One can connect an antenna to the RF-IF input and connect high impedance headphones to the RF-IF output, then tune the station with the RF-IF tuning control and bandswitch.
- The audio channel can be used as an audio amplifier. It can also be used to determine the presence of hum or noise.
- The VTVM can be for general use DC voltage measurement. It did not include resistance measurement capability.

Chanalyst Competitors

Test equipment manufacturers were quick to respond to Rider's Chanalyst introducing similar products based on tuned voltmeter designs. This design was the norm for early signal tracing devices, those introduced prior to World War II. A summary of the devices follows and their photos and a table of device comparisons is on the next page.

The **Million** Radio and Television Laboratories was announced their **Signalizer** within two months after the introduction of the Chanalyst. It was advertised at only $24.95, a very cheap alternative to the Chanalyst. It advertised the same functionality except for the wattage indicator. The VTVM used an eye tube, not a meter. Very little information exists about this device and it seems to be quite rare perhaps indicating a low volume of sales.

In mid-1939 **Meissner** Manufacturing Co. introduced the **Model 10-1154 Analyst**. The design and functionality is very similar to the Chanalyst except the VTVM used an eye-tube. It is described in a November 1939 Radio Craft article. The device was offered at $60, quite affordable compared to the $107.50 of the Chanalyst. It was also available in kit form, according to the ad, "for nearly half that amount." There was also a **Model 9-1025** that was similar (or identical) to the 10-1154 in appearance and features. Within a year it was upgraded to the **Model 9-1040** and its VTVM used a meter. The price increased to $88.50 but was a still a very affordable alternative for essentially the same capability offered by the Chanalyst. The model 9-1040 seems fairly common while the earlier models seems more rare.

Also in mid-1939 the **Jackson** Electrical Instrument Co. introduced the **660 Analyzer** at $79.50. It offered similar capability as the Chanalyst but with a different design approach. Instead of eye tube indicators, Jackson opted to use only meters; a large meter for the tuned single RF channel which covered the Chanalyst's RF-IF and oscillator frequency ranges. There is no audio channel; instead the VTVM was capable of both AC and DC measurement, so the functionality of the audio channel can be somewhat realized by using the AC portion of the VTVM.

Another mid-1939 offering was from **Supreme** Instrument Corp., the **Model 560 Vedolyzer** at $126.90. It has a very different and interesting design. Instead of eye tube indicators, it has an internal CRT oscilloscope. It has a single tuned channel that covered a much broader range than the Chanalyst; it's ranges are 20Hz (audio) up to 4.5 MHz. It offers a VTVM with ranges of 0-900 VAC, 0- 6,000 VDC, and a resistance measurement capability 0-1,000 megohms; the VTVM has a dedicated meter. As with all Supreme devices, this one is well built and high quality.

Supreme offered another device a couple months later in Fall 1939 — the **Model 562 Audolyzer** at $76.90. It has a single channel covering the Chanalyst's RF-IF and oscillator range. It also has a separate audio channel. The VTVM is DC only and has resistance measurement capability. The device has only one meter which is shared by each of the functions and selected via a function switch. The Audolyzer also has an internal speaker.

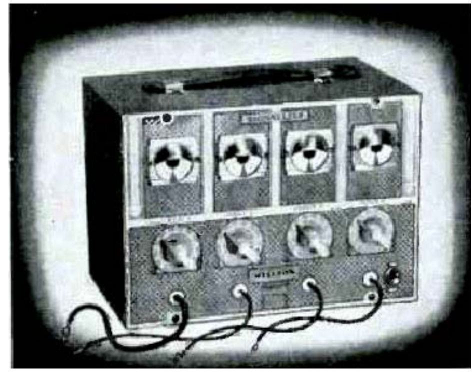
In Fall 1939 the Radio Industries Manufacturing Co. (**RIMCO**) introduced the **Model 701 Dynalyzer**. It is remarkably similar to the Supreme 562 Audolyzer offering identical functionality. This appears to be a rare device.

Also in Fall 1939, **Superior** Instruments Inc. introduced the **Model 1130-5 Channel Analyzer** at $19.75. This pricing was consistent with Superior Instruments marketing strategy to offer low cost affordable test instruments. This device has a single tuned RF channel for the Chanalyst RF-IF and oscillator ranges; a separate audio channel; and a VTVM. It used a single meter shared for each of the functions.

March 1940 the **Hickok** Electrical Instrument Co. introduced the **Model 155 Traceometer**. It offers the same capabilities as the Chanalyst but uses individual meters for each function rather than eye tube indicators. It is very well built and a high quality accurate device. Properly used, the Traceometer offered more measurement precision than the Chanalyst. The Traceometer was updated in 1941 with minor enhancements including an internal speaker.

In May 1940 Dayton Acme Co. (**DACO**) introduced the most expensive of the genre, the **600 Radiometer** at $194.90. It appears to have been extremely well built, perhaps lab quality. I was unable to find much information about this unit and it seems to be rare. It has a single RF channel up to 20 mHz; an audio channel; and a VTVM with resistance measurement capability and a decibel range. It has separate meters for each function plus it has an internal oscilloscope. This was designed for television servicing as well as AM-FM receivers.

RCA 162 Chanalyst (Author's collection).



Million Signalyzer (Service magazine March 1939).

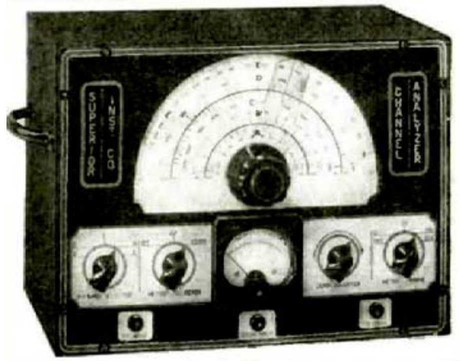
Meissner Analyst 9-1040
(Author's collection).

Jackson 660 Analyzer (Ebay listing photo).

Supreme 560 Vedolyzer (www.myvintagetv.com).

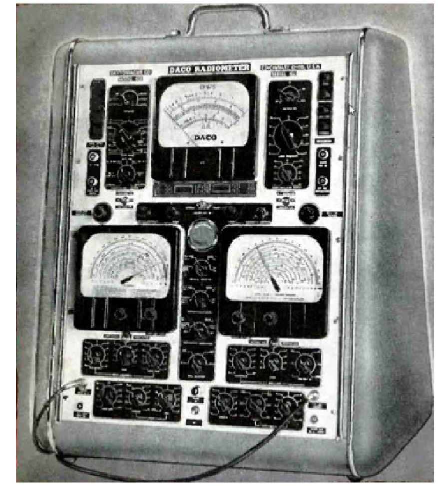
Supreme 562 Audolyzer (Author's collection).

RIMCO Dynalyzer (Ebay listing photo).



Superior 1130-5 Channel Analyzer
(Radio Craft magazine, September 1939).

Hickok 155 Traceometer (Author's collection).



DACO Model 600 Radiometer
(Radio Retailing magazine, May 1940).

EARLY SIGNAL TRACERS

Manufacturer Model	RF/IF Channel		Oscillator Channel		Audio Channel		Voltage and Resistance		Wattage or Current		Speaker	Price
	Range	Indicator	Range	Indicator	Range	Indicator	Range	Indicator	Range	Indicator		
Rider Chanalyst Model 11	95 - 1,700 kHz	Eye tube	600 - 15,000 kHz	Eye tube	15 - 50,000 Hz	Eye tube	0 - 500V; No ohms measure	Meter	25 - 250 Watts	Eye tube	Headphones can be used	$107.50
Million Signalyzer	95 - 1,700 kHz	Eye tube	?	Eye tube	?	Eye tube	? No ohms measure	Eye tube	No		No	$24.95
Meissner Analyst 10-1154 (1939) 9-1040 (1940)	95 - 1,700 kHz	Eye tube	600 - 15,000 kHz	Eye tube	50 - 50,000 Hz	Eye tube	0 - 500V; No ohms measure	Eye tube early, then a Meter	0.3 - 3.0 Amp	Eye tube	Headphones can be used	10-1154 $60.00 9-1040 $88.50
Jackson 660 Analyzer	90—16,000 kHz; Meter display				Use VTVM AC measurements		0 - 500V AC or DC; No ohms measure	Meter	No		Headphones can be used	$79.50
Supreme 560 Vedolyzer	20 Hz - 4.5 MHz; display via internal oscilloscope CRT						0-6,000 VDC; 0-900 VAC; 0-1,000 megohms	Meter	No		No	$126.90
Supreme 562 Audolyzer	95—14,500 kHz; Display via shared meter				?	Shared meter	0-1000 VDC; 0-20 megohms	Shared meter	No		Yes	$76.90
Rimco Dynalyzer	95—14,500 kHz; Display via shared meter				?	Shared meter	0-1000 VDC; 0-20 megohms	Shared meter	No		Yes	?
Superior 1130-5 Channel Analyzer	100 - 20,000 kHz; Display via shared meter				?	Shared meter	? No ohms measure	Shared meter	No		Headphones can be used	$19.75
Hickok 155 Traceometer	95 - 1,800 kHz	Meter; 5000 micro-volts to 25 volts	600 - 15,000 kHz	Meter; 0.3 - 150 volts; 1.5 - volts	40—20,000 Hz	Meter; 0.1 - 500 VAC	0-500V; No ohms measure	Zero Centered Meter	0 - 300 Watts	Meter	Headphones can be used; Updated model has speaker	$120.54
DACO 600 Radiomeater	100 - 20,000 kHz; Direct reading on meter display or internal oscilloscope				20 - 150,000 Hz	Meter	0 - 1,000 volts; 0 - 100 megohms	Meter	No		No	$194.90

Post-WWII Signal Tracers

Many of the pre-WWII tuned signal tracers continued to be sold well into the early/mid-1950s. The RCA Chanalyst, Hickok Traceometer, and Supreme Audolyzer appeared in 1950s Allied catalogs and are featured in Coyne's book, *Latest Instruments for Servicing Radio Television,* until at least 1957. These models received minor updates. The Hickok received minor circuit and cosmetic changes and became the model 156A. The Supreme Audolyzer received a metal cabinet. The Meissner Analyst appears to be advertised only until the late 1940s. Two tuned signal tracers were introduced after WWII — the National Radio Institute (NRI) 33 in the 1950s and the NRI Conar 230 in the 1960s.

After the war the number of test equipment manufacturers blossomed; it was advantageous to be price competitive to survive. New signal tracer product offerings were untuned and comparatively simple in design to pre-war devices which enabled them to be manufactured much more inexpensively. Manufacturers of economy devices could keep costs down further by incorporating highly available war surplus components in their designs.

Fig. 3: Weston 669 (1939). Author's collection.

The untuned design was predominate throughout the 1950s and 1960s. The earliest product I can find using an untuned approach is the Weston 669 Vacuum Tube Voltmeter (figure 3). It was introduced in mid-1939 about the same time as Rider's Voltohmyst. It had a headphone jack which enabled signal monitoring and assessing relative stage gain. Interesting the lit neon lamp serves as a voltage regulator. The input to the meter is actually the grid cap of the 78 tube in the upper right corner. The meter came with various cables and attachments having a grid cap to mount on the tube. After restoration it works like a champ.

The new genre of signal tracers introduced after WWII in 1946 used an RF demodulator probe followed by an untuned two or three-stage high-gain audio amplifier; some devices had a separate audio probe. Detection in untuned devices occurred in the RF probe whereas the detector in tuned devices was located after the tuned stages and before the signal level indicator (meter or eye tube). Several manufacturers exposed the output transformer and speaker via front-panel jacks enabling the technician to utilize or substitute an output transformer or speaker during a repair. In the early-mid 1950s many manufacturers (Eico, Heathkit, Knight, McMurdo Silver, Paco, and many others) added an eye-tube to give a visual indication of signal strength. The Eico 147A includes these typical features and its

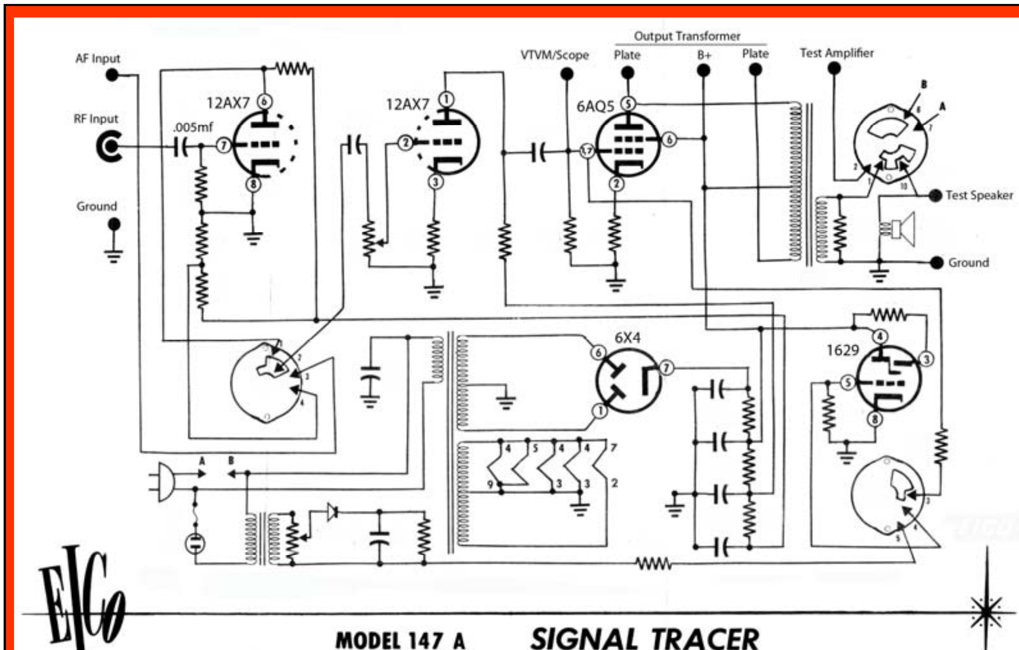


Fig. 4: Eico 147A schematic. The Eico 147A has typical functionality for signal tracers from the early 1950s into the 1960s. It has a three-stage high-gain audio amplifier. The 1629 eye tube indicates signal level present at the third stage. The eye tube can also indicate the wattage drawn from the device under test. The speaker and output transformer are exposed via banana jacks for test access and component substitution.

Model 147A - $44.95 (1963-?), Photo from Antique Radio Forum.

Model 145 - $18.95 (1949-1954). Author's collection.

Model 147—$39.95 (1955-1962), very similar to the 147A.

Model 145A - $32.95 (1957-1962?) has a smaller footprint than 145. It offered a more affordable alternative to the 147 in the late 1950s.

Model T-I - $19.50 (1948-1949).

Model T-2 - $19.50 (1950-1952).
Author's collection.

Model T-3 - $22.50 (1952-1957).

T-4 - $19.95 (1958-1962),
IT-12 - $19.95 (1963--?),
above is an IT-12
Author's collection.

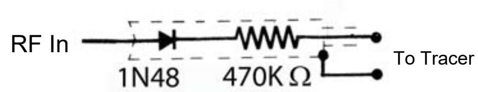
Fig. 5: Heathkit signal tracer evolution. Updated circuit designs include added functionality: The T-2 added jacks for speaker and transformer; The T-3 added the eye-tube; T-4 reduced the footprint. The model T-4 and its replacement, the IT-12 have an identical form factor and only differ in cosmetic changes.

schematic provides an example of post-WWII signal tracer design (figure 4). The evolution of features from the late 1940s through the 1960s is illustrated in figure 5 showing the sequence of Heathkit models.

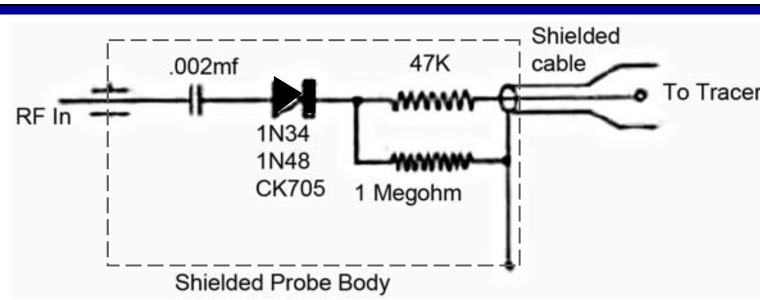
RF demodulator probe circuits employ a series-type diode or crystal detector; the design evolved as semiconductors became available. Since germanium diodes were only newly introduced for commercial use in 1946 by Sylvania, several signal tracer manufacturers (Feiler Electronics, Philco, Speco, Superior, and others) in the late 1940s opted to use a vacuum tube probe for their products (figures 6 & 7). The vacuum tube probes have the benefit of being very sensitive. RF probes using germanium diodes became increasingly dominant in the late 1940s into the 1950s and designs commonly used 1N32, 1N48, or equivalent. Most also used a series resistor. A DC blocking capacitor would either be located in the probe or within the signal tracer at the RF input jack. Various RF probe designs are shown in figure 6. Audio probes were direct straight-through and, in later models, often plugged into a separate dedicated Audio In jack.

The genre of untuned signal tracers proved quite versatile and offered several features handy in a repair shop:

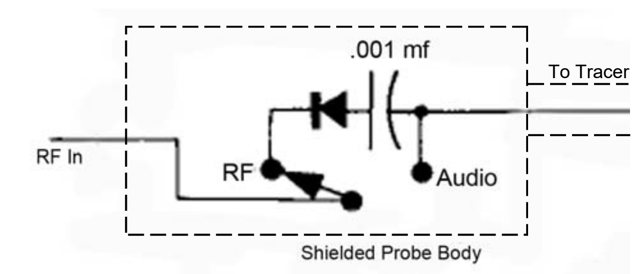
RF/Audio signal tracer: These devices were quite satisfactory to determine the presence and important aspects of a signal as well as the relative gain of receiver stages. Since these devices are untuned, repair shops would use a signal generator to inject a specific frequency for evaluation. Howard Burgess, W5WGF authored an article in the June 1954 CQ magazine, detailing his use of a Heathkit T-3 in his ham shack for modulation checking, V.H.F. measurement, assessing bandpass characteristics and resonance, locating sources of RF and noise, checking hum level, etc.



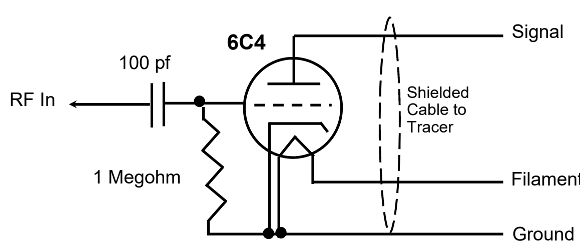
Eico 147A probe is a simple series diode probe.



Heathkit T-3 probe. Has 1 megohm resistor to ground.



Heathkit IT-12 probe with switched RF detector and Audio direct settings.



Feiler TS-3A vacuum tube probe. The TS-3A uses a 6C4; other devices like Feiler TS-2, Speco, and Superior used a 1T4.

Fig. 6: Various signal tracer RF demodulator probe designs.

Test Speaker: As previously mentioned, most models exposed the speaker and many exposed the output transformer as well via jacks on the front panel. When the technician detached the speaker and removed chassis from a set, the signal tracer speaker (or transformer) could be attached to the chassis while it was on the bench.

Utility Amplifier: Most signal tracers exposed the internal audio amplifier via jacks on the front panel to enable it to be used as a general purpose audio amplifier. This enabled the testing of record turntables, tuners, or microphones. By connecting a microphone, it could be also used as a portable PA amplifier.

Feiler Electronics TS-3A Electronic "Stethoscope" $39.95 (1947-?). Author's collection.

Philco 7030 Dynamic Analyzer, $52.50 (1946-?).

Fig. 7: Two models that use a vacuum tube probe. Other late 1940s models offering a vacuum tube probe include other Feiler and Philco models, the Speco STAP and STAC, Grommes 250, Eico 113A, early

Noise Detection: Heathkit has a noise feature where it can enable the application of a 100 to 200 volt DC potential to a component under test (e.g. suspected noisy resistor or capacitor, bad solder connection, silver mica contamination, etc.) via the audio probe. The RF probe can then be used to detect the presence of noise from that component. Precautions must be observed for this test including making sure the tested device is powered off and unplugged.

Wattage Indicator: Several devices with an eye-tube offered a wattage measurement capability.

To differentiate their products, some manufacturers offered devices that included other functionality in addition to signal tracing. For example, the Superior model 76 includes a Capacitance–Resistance Bridge.

Another is the Lafayette KT-208 and its look-a-like, the Accurate 153. It included both a signal generator and signal tracer. To me this makes a lot of sense since a signal generator and tracer tend to be used together for signal injection and evaluation. I found this is unit (figure 8) after a CHRS surplus sale; it had been passed over and went unsold after several sales events so it was earmarked to go to the recycler. Someone had attached a note saying it had an intermittent problem but that was minor issue and very easily corrected. There were no faulty components and no recap was needed. It now works perfectly and the signal generator is dead-on accurate without any need for alignment.

Fig. 8: Lafayette KT-208 - $24.95 (mid 1960s). It also includes a signal generator. Author's collection.

So at the next swap meet as you pass by one of these cute frisky bright-eyed marvels wagging for your attention, you might give it a moment. You may even grow fond enough to give one a good home. It promises to be a faithful companion and provide much enjoyment.

References

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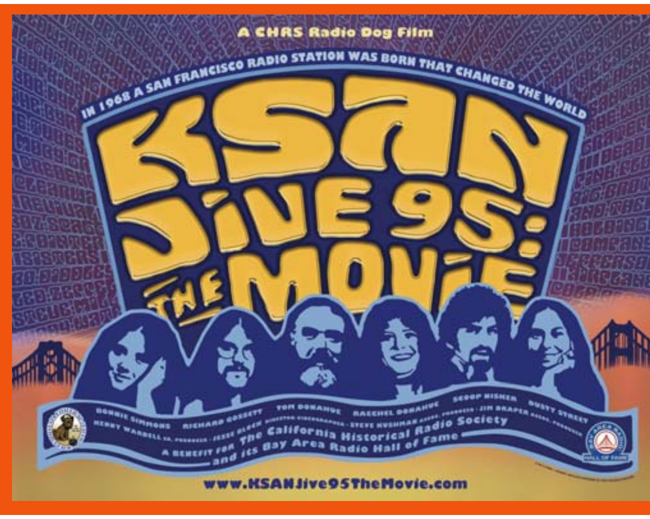
KSAN Jive 95: The Movie

Our CHRS Radio Dog Production, **"KSAN Jive 95: The Movie"** continues in production. But making a feature length documentary is costly. We are seeking to raise $150,000 to produce this film. The KSAN Jive 95 story is perfect for CHRS to tell and immortalize in film as it is an important part of our mission to preserve and present local radio history. KSAN, during the period 1968-1980, was pivotal in the development of our popular culture. This film will raise awareness and refresh remembrances of a time when a radio station could create change and really make a difference in so many ways.

Part of our recent grant from the Rex Foundation was earmarked toward the KSAN Movie project. We commissioned famous poster artist Wes Wilson for a movie poster. Wes and his daughter Shirryl Bayless collaborated to create this outstanding poster.

Now it's your turn to help. Please visit www.ksanjive95themovie.com and see how you can get great perks for donating to this project and help to preserve the KSAN Jive 95 legacy.

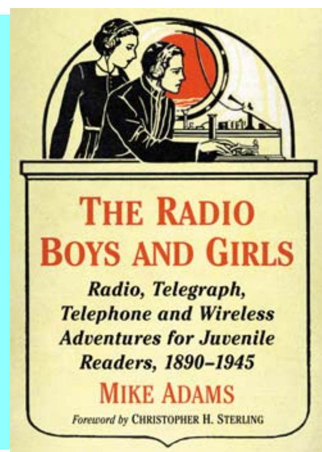


CHRS Publications

The Radio Boys And Girls—Radio, Telegraph, Telephone and Wireless Adventures for Juvenile Readers 1890-1945 is the latest book by Mike Adams, It captures the genre of series fiction about wireless and radio was a popular in young adult literature at the turn of the 20th century and a form of early social media. Before television and the Internet, books about plucky youths braving danger and adventure with the help of wireless communication brought young people together. They gathered in basements to build crystal. They built transmitters and talked to each other across neighborhoods, cities and states. By 1920, there was music on the airwaves and boys and girls tuned in on homemade radios, inspired by their favorite stories.

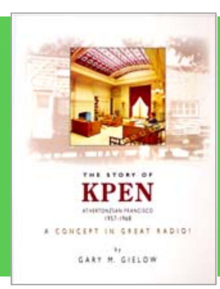
This book covers more than 50 volumes of wireless and radio themed fiction, offering a unique perspective on the world presented to young readers of the day. The values, attitudes, culture and technology of a century ago are discussed, many of them still debated today, including immigration, gun violence, race, bullying and economic inequality.

Available now at Amazon.com



The Story of KPEN: A Concept in Great Radio! CHRS member and Broadcast Legend Gary Gielow has written a new book chronicling the tales of two young men from Stanford, he and James Gabbert, who brought Stereo and new ideas to the FM radio band in the late 1950s and 1960s. This book is the definitive history of KPEN 101.3 FM, the 2015 BARHOF Legendary Station. 100% of the proceeds benefit CHRS.

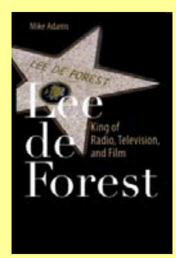
Available in the Museum Store or on the website.



Behind the Front Panel: The Design and Development of 1920's Radio by David Rutland has been re mastered by Richard Watts for CHRS. With emphasis on radio technology, Rutland describes the development of 1920s tubes and radio circuitry designs by De Forest, Marconi, and other inventors and manufacturers. A classic!

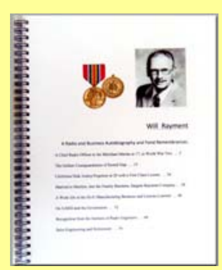
Buy at Amazon.com

Also available in the museum store



Lee de Forest

Bay Area Radio



Will Rayment

KSAN Live Jive CD

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St. Mary's College student's museum visit

CHRS ROCKS

CHRS receives AWA Houck Award

Cynthia & Betty prepare for the Spring Auction

Spring Auction - Surplus Sale