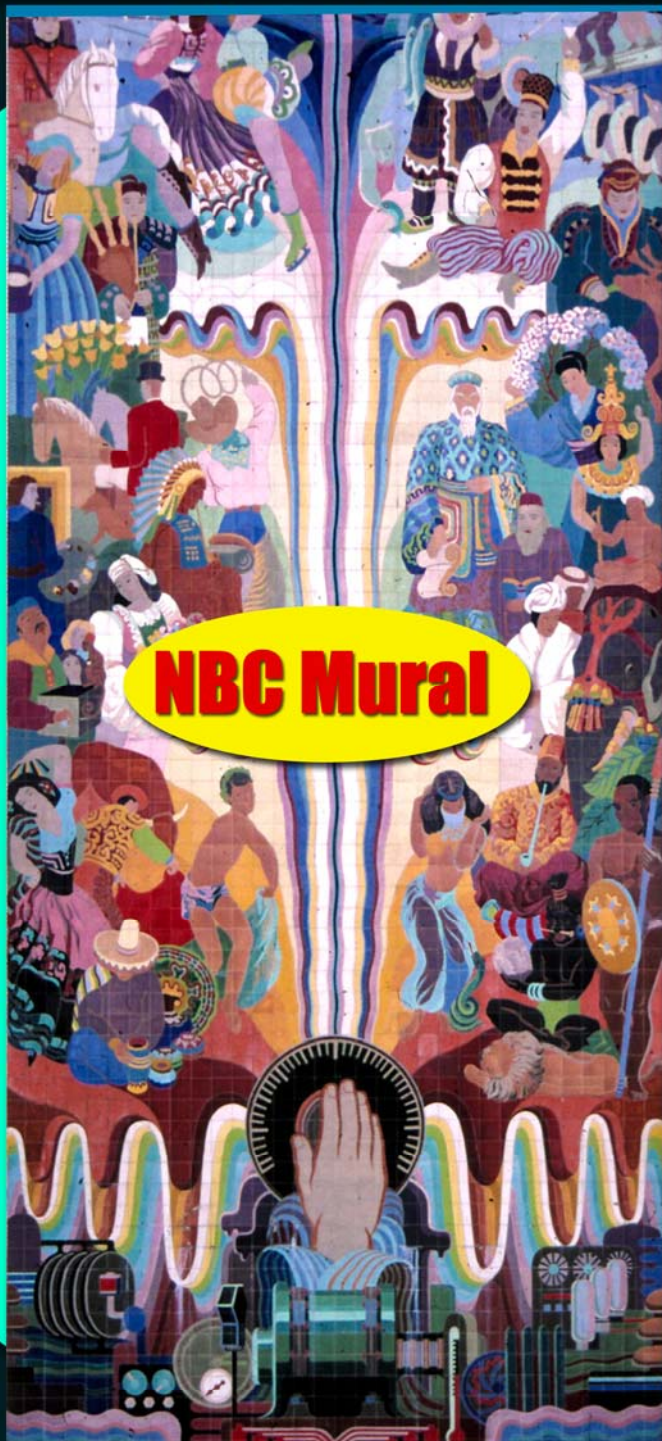




Volume 38, Number 1

Spring/Summer 2019

Journal of the
**CALIFORNIA HISTORICAL
RADIO SOCIETY**



NBC Mural

Chimes



Network

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. Formed in 1974, CHRS promotes the restoration and preservation of early radio and broadcasting. Our goal is to enable the exchange of 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 (\$40 non-USA).

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.

Please come visit us any Saturday 9am to 3pm. Visitors and groups welcome at other times by appointment; Contact Steve Kushman.



Contact us:

CHRS, PO Box 31659, San Francisco, CA 94131
or info@californiahistoricalradio.com

Visit us at: www.CaliforniaHistoricalRadio.com

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Lunch crew: Cynthia Edwards, Keith Scott, Judy Mears, Betty Cosmos

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From the Editor

In this journal, NBC is the focus. John Schneider offers two articles, the first on the NBC Pacific Network serving the West Coast; second on the iconic NBC Radio City Mural in San Francisco. John Staples and John Stuart document their preservation of the recently acquired NBC Chime Machine at CHRS. And I compiled a photo series of the San Francisco Airport exhibit "On the Radio." I wish to thank all the authors for their articles, support, and scholarly contributions.

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, [jrchr@comcast.net](mailto:jrchrs@comcast.net)



From The President

by Steve Kushman

We had a large turnout at the CHRS Holiday Potluck last December 15th. I want to thank Bob Rydzewski for his presentation on the Society Of Wireless Pioneers. And Chairman Mike Adams for his talk on Hugo Gernsback. Plus John Stuart and John Staples gave a great presentation on CHRS' NBC Ranger Chime machine. Later that evening the Society of Broadcast Engineers, Chapter 40 had their chapter dinner at Radio Central where the engineers enjoyed being around our vintage broadcasting gear.

Radio Central is now a film location. Scenes from a documentary called "The Unforgettable Augustus T. Post", about one of the founders of AAA, were shot in January. In preparation, the film crew constructed temporary walls and arranged CHRS radio broadcast equipment to simulate as a radio control room. The 30-minute documentary is being produced by AAA.

We have made progress in transforming Radio Central into a museum and meeting center. The renovation in the downstairs is nearly complete. Over the years, the quality of the building renovation is due in a very large part to the commitment, leadership, and efforts of Walt Hayden, Cliff Farwell, and Robert Swart; and thank you to Kevin Payne for the continuing electrical upgrade.

The Television Gallery is being created by John Staples, Mike Adams, Gilles Vrignaud, Tom Bonomo, and Richard Watts. The W6CF Ham Radio station is nearly on the air under the guidance and watchful eye of Denny Monticelli. The Hall of Communication is being designed by Bart Lee. John Stuart upgraded our building security system. The next area for renovation is the Hall of Fame Gallery and Broadcast Control Room, which expected to be complete by Radio Day.

I want to thank so many who are making RC possible: Bart Lee, David Harris, Rob Rydzewski, and Hil Hampton for reorganizing the Library and co-locating the archive files into the Library; Philip Monego for his generous donation of a second large storage container; Seth Arp for the herculean number of radio repairs and restorations; Kent Leach for the continued organization of the tube collection; David Vasquez for digital transcription of 1940s ETs; and the other dedicated volunteers that regularly lend a hand at RC including Arden Alden, Bob Bell, Christopher Chapman, Betty Cosmos, Jim Fink, Steve Garaventa, Judith Girardi, Vern Haik, Kenneth Kolby, James Pineda, Cynthia Reinholtz, Scott Robinson, Len Shapiro, Keith Scott, Michael Tanaka, David Vasquez, Judy Mears and Jon Winchell to list a few.

CHRS is truly fortunate to have such dedicated and committed volunteers and supporters. It is through their efforts that Radio Central is becoming a reality, and that CHRS is one of the preeminent vintage radio organizations in the country. There is still much to be done . . . Come and lend a hand.

I am always available and encourage your questions and comments.

Best Regards, Steve (415) 203-2747 Steve@CHRSRadio.com

◇

**Save the date,
July 20th for . . .**

A detailed poster for "Radio Day By The Bay 2019" held in Alameda on July 20th, 2019, from 8am to 3pm. The poster features a collage of vintage radio equipment, photographs of radio personalities, and logos for the California Historical Radio Society, the Bay Area Radio Hall of Fame, and the Society of Wireless Pioneers. Text on the poster includes: "LIVE! Antique Radio Auction", "LIVE! Royal Society Jazz Orchestra", "Radio Hall Of Fame Class of 2019", "Food & Drink at CHRS Doggie Diner", "A Benefit For The California Historical Radio Society", "The Bay Area Radio Museum & Hall Of Fame", "The Society Of Wireless Pioneers", "An The Veterans Auditorium, 2200 Central Ave. And CHRS Radio Central, 2152 Central Ave.", "WWW.CHRSRADIO.COM", and "\$10 Donation - Children Free". A central graphic reads "IN RADIOS... Hale Bros LEADS SAN FRANCISCO...".

From The Chairman

by Mike Adams

The twentieth century was the “Radio Century.” From 1900 to 2000, this important one hundred year period began and ended with wireless. And while the current final iteration of wireless is the familiar Smart Phone, those first wireless communication devices were really an attempt to improve upon the wired telegraph and wired telephone, both with distance and reliability problems. These wireless devices were first used by the major transportation vehicle of the new century, the sea going vessel. Wireless devices that solve the problems of routing ships for commerce, and more important the safety of passengers and crew, begins the radio century.

Yes, television was invented in the first half of the Radio Century, but it was really “radio with pictures,” starting its life radio-like with recorded and live music, educational lectures, baseball play-by-play and live theatre. And to add insult to radio’s dominance as the first new media format, in the 1950s television took all of radio’s programming, leaving the mother media to scramble for leftovers like disc jockeys playing recorded music and deep-voiced journalists reading the news.

Through the California Radio Museum of the California Historical Radio Society, we will create displays that explain why radio so important in all our lives. Beginning with our complete communications library and our Society of Wireless Pioneers program, we are well-positioned to tell the stories of the mostly men who were radio operators on the seven seas. To make sense of the first two decades of the twentieth century we have the text and the technology to bring it alive. And unlike many museums these stories will mirror our century old building in Alameda. Radio Central started its life as a home for the wired telephone in the same year that Marconi was sending messages using the wireless telegraph.

Radio Broadcasting, defined as entertainment and information for a mass audience, evolved out of point to point wireless communication. In this era of Facebook and Social Media, we will show that the advent of broadcasting in 1920 brought young people and their parents together for shared social experiences. Teens constructed radios for their friends and mom and dad, and in person they talked about and shared the stations and programs that they received, often listened to in small groups in the living rooms and garages and attics of those who had radios. Young people both learned and taught. It was early social media.

The members and the Directors of CHRS have spent nearly the past 50 years evolving our ability to present this story. We have learned and we are now ready for our teaching moment. We who are collectors, historians of technology, engineers, business owners, writers, researchers and educators are building a communications museum in the Bay Area. In it will be displays of radio and television technology, a working licensed ham radio station, a library and the Bay Area Radio Hall of Fame. This latter attraction features the stations and personalities from the fourth largest radio market in America.

Doing the right thing for our future patrons means getting the history of communications right and making it interesting. We have a museum professional who is volunteering to help us plan a compelling guest experience. We’re not there yet but we are getting close. As we continue to complete the rehabilitation of our 120 year old building, we have received very generous donations, all needed and appreciated. This has allowed us to rehabilitate half of the building, the repair shop, W6CF, the library and conference room. These early donations have allowed us to install an elevator, heating, a television display and a Hall of Communications where you can hear all that’s on the air.

To present the story of radio in an engaging way and make the museum experience a compelling one, we need support. We need your expertise and historical knowledge in preservation and portraying the story of radio accurately; I invite you to step up, participate, and make a difference.

And we need continued financial support. Said Humphrey Bogart in the Treasure of the Sierra Madre: “I need dough and I need it now.” With that in mind, remember that CHRS is a California 501 (c) (3) educational non-profit, so you might have a conversation with your tax attorney. You could consider making a significant donation of cash or property as your legacy.

Thank You.

CHRS Central Valley Chapter News

by Richard Lane

Western Air Recipient for 2018: The CVC membership at the November meeting voted Matt Thompson to be the 2018 recipient of the Western Air Award. Matt was recognized for his outstanding volunteerism and leadership as treasurer for the chapter and was awarded the recognition at a CVC luncheon at Las Casuleas restaurant, in Turlock. Matt and his wife Carol are now embarking on a post retirement move to Washington State.

Annual West Coast Model A Meet: During the last weekend of January CVC members manned a booth at the West Coast Model A swap meet in Turlock. The booth, in its eighth year, is an opportunity for the chapter to make contact with the public, let them know what the chapter does and present a display of approximately 40 working radios and other items for sale. Most public inquiries at the booth are for repairs and items for sale by the public.

Chapter Status: In the past, chapter status was an informal understanding between CHRS and CVC. Recently, the CVC chapter and the CHRS Board have worked together to update the CHRS By-Laws to more formally define the relationship between CHRS and its chapters.

New Treasurer: Mike Loper has been elected to replace Matt Thompson as Treasurer.

Classes: The weekly Wednesday repair class has been very active this Winter with between 4-8 members attending regularly. Some of the restoration activities in the class relate to the "My Favorite Radio" competition which was resurrected by member Mick Daniels after a contest hiatus of 3 years.

The membership continues to stay strong at 20 members. Membership meetings are held on the 3rd Saturday every month in the CVC clubhouse at the corner of Bradbury and Commons just Southwest of Turlock. Start time is 1:30 PM in Winter and 10:30AM during the Summer, consult the website exact times.

Visit us online at:
www.cvantiqueradio.com .



Matt Thompson was recipient of the CVC Western Air Award. He is with wife Carol.



CVC booth at the West Coast Model A Meet.



Radio Central Update

Downstairs Gallery:

The downstairs gallery is finally finished. The painting, trim work, and ceiling tile treatment is done. The W6CF Ham Shack is being configured and becoming operational; the television and Hall of Communications exhibits are being installed.

Hall of Fame Gallery and Broadcast Studio:

This is the next area of the museum to be addressed. The broadcast studio exhibit will require some construction to install an angled window for the control room. The Hall of Fame Gallery requires wall and ceiling tile treatment to simulate a vintage radio studio. Both rooms will have flooring installed. Then this area can then be configured with exhibits.

Radio Central is a Film Location:

Radio Central was chosen as a filming location for of scenes in a broadcast studio as a part of a documentary about Augustus Post, one of the founders of AAA. A broadcast studio was staged in the Main Gallery using equipment from the KRE studio. Shooting occurred January 17 & 18th.



Original circa 1900 exterior front elevation of 2152 Central Ave.



The scene as it is being shot.



CHRS broadcast studio equipment from KRE used to stage the set.



Film crew preparing for the shoot.

NBC's SAN FRANCISCO NETWORK CENTER – 1927 to 1942

By John Schneider, W9FGH, Copyright 2018

A NETWORK IS BORN

The news fell on the fledgling radio industry like a bombshell on September 13, 1926. AT&T – an American pioneer in radio broadcasting – was getting out of the radio broadcasting business, selling its radio assets to RCA!

Although AT&T had been a major shareholder in the Radio Corporation of America and a charter member of the “radio trust”, it had increasingly developed into a competitor to RCA in the field of broadcasting. This rivalry had principally played out on the radio waves of New York and Washington where AT&T operated its two big radio stations, WEA and WCAP, and had tied them together to share programs over its own phone lines. What started out as one-time hookups for special event broadcasts gradually gave way to the regular distribution of programs. Bit by bit, additional stations had been added to the chain, forming the embryo of America’s first real radio network. Simultaneously, a few blocks away in Manhattan, RCA operated its own station, WJZ, which it connected to its Washington station, WRC. But AT&T had refused to make its phone lines available to the competitor, and so RCA was forced to use inferior Western Union telegraph lines. A few other stations had joined this smaller RCA network.

The competition between the two powerhouse companies grew more severe, with the companies trading patent infringement lawsuits and other intrigues, until it reached a surprising conclusion – AT&T’s agreement to retire permanently from the radio broadcasting business, selling its two radio stations and its fledgling network to RCA for \$1 million. In return, RCA pledged to lease its equalized network lines from AT&T, assuring the latter company a continuing and ample income stream from broadcasting without the complexity of creating daily programming. The scarcity of these lines also assured NBC a near-monopoly in the network business.

RCA now found itself in the driver’s seat of the burgeoning broadcast business as the owner of the country’s only two radio station chains. It wasted no time in forming a new division – the National Broadcasting Company, owned 50% by RCA, 30% by General Electric and 20% by Westinghouse. The WEA network was renamed the NBC “Red Network”, and the WJZ network became the NBC “Blue Network”. (The names were derived from the color codes that AT&T used to distinguish the hookups on their maps and control panels.) The inaugural NBC broadcast was a gala program from the Waldorf-Astoria Hotel in New York on November 15, 1926. 25 stations were charter members of the network.

THE NBC "ORANGE" NETWORK

But NBC was “National” in name only, as AT&T’s broadcast lines reached only as far west as Denver. The only way to establish a coast-to-coast hookup was to make a phone call between Denver and San Francisco over ordinary low-fidelity phone lines. AT&T expected a delay of several years before its broadcast lines would cross the Rocky Mountains. And so, as a solution to this dilemma, NBC established a third network: the Pacific Coast “Orange Network”, on December 3, 1926. A full duplicate of the New York program staff was assembled in San Francisco, which would originate programs for seven Pacific Coast stations: KPO and KGO in the Bay Area, KFI Los Angeles, KGW Portland, KHQ Spokane, and KFOA Seattle (this affiliation later changed to KOMO). NBC chose San Francisco because it was the central distribution point for the Pacific Telephone and Telegraph Company’s lines. From the Bay Area, programs could be fed south to Los Angeles and North to the Pacific Northwest, traveling over 1,709 miles of equalized lines.

The inaugural NBC Orange Network program was held on April 5, 1927, less than five months after the first NBC broadcast in New York. It originated from temporary studios in the Colonial Ballroom of the St. Francis Hotel, as permanent studios in the new Hunter-Dolin Building were not yet ready for occupancy. The



Scene from the inaugural NBC Orange Network broadcast.

program opened with an address by Henry M. Robinson, the Pacific Coast member of the NBC Advisory Board and president of the First National Bank of Los Angeles. Robinson spoke from the studios of KFI in Los Angeles. Then the program switched to San Francisco for the broadcasts of music by Alfred Hertz and the San Francisco Symphony, and by Max Dolin, the newly-appointed West Coast music director, conducting the National Broadcasting Opera Company.

The network began a regular schedule of programs on April 11 with "Eight Neapolitan Nights", sponsored by the Shell Oil Company. Its initial schedule was 8 to 9 PM Monday and Saturday, and 9 to 10 PM Tuesday through Friday, giving the network a total of six hours of programs weekly. (The network only operated in evening hours at first because circuits could not be spared from the standard telephone service during the day.)

The Orange Network primarily recreated the same programs heard in the east on the Red Network. At the conclusion of a program in New York, all of the program continuity, including the scripts and musical scores, would be shipped to San Francisco by Railroad Express, where it would be rehearsed for performance a week later. Thus, the San Francisco cast was producing such well-known early network shows as "The RCA Hour", "The Wrigley Program", "The Standard Symphony Hour", "The Eveready Light Opera Program", "The Firestone Hour" and many others. At the conclusion of each program the announcer would state, *"This program came to you from the San Francisco studios of the Pacific Coast Network of the National Broadcasting Company."* This announcement would be followed by the NBC chimes. (The chimes initially were a seven-note sequence, but they were later shortened to the well-known three-note G-E-C progression. The NBC chimes were struck by hand until the mid-1930, when they were replaced with electronically-produced, perfect-pitch chimes.)

Shortly after the NBC Orange Network's inaugural broadcast in 1927, it moved into permanent headquarters in the brand new Hunter-Dolin Building, at 111 Sutter Street. It was from these studios that most of San Francisco's "Golden Decade" programs would originate. The studios occupied the entire 22nd floor, with offices on the second floor. The facility, decorated in a Spanish motif, included three fully-equipped studios. One unique feature was a glass-enclosed mezzanine that opened into the large studio "A", decorated to resemble a Spanish patio. From there, a small audience – usually the program's sponsors - could watch the programs while they were being broadcast. Studio "B" was home to a Robert-Morton two-manual, 6-rank organ on which Paul Carson and other musicians would perform for a number of famous network programs.

To staff its new network in San Francisco, NBC primarily hired talent away from the local stations. KGO and KPO (now KNBR), the network's two local affiliates, lost the most of their staff members to NBC, and this process continued as the network schedule expanded. One of the most popular personalities to make the move was Hugh Barrett Dobbs, who moved his KPO "Ship of Joy" program to the network, where it became the "Shell Ship of Joy", sponsored by the oil company of the same name. It was eventually broadcast nationwide for a short time.



Hunter-Dolin building at 111 N. Sutter St., San Francisco.



Don E. Gilman, head of NBC-Pacific operation.

During the first years of operation, program announcements were made by the actors, musicians, or generally whoever was available. However, as the staff continued to grow, the first full-time staff announcer was hired, who was also borrowed from a local station - Bill Andrews moved from KLX in Oakland to NBC in 1928. Other announcers followed: Jack Keough came from KPO; Jennings Pierce was recruited from KGO; Cecil Underwood was imported from affiliate KHQ in Spokane. Many others were gradually added until there were seventeen at the height of the operation.

The NBC-Pacific operation was headed by Don E. Gilman, vice president in charge of the Western Division. Gilman was a newspaperman and the head of the local advertising association when he was tapped to manage the NBC operation in 1927. He had a good understanding of music performance, and was said to be as good of a pianist as anyone on the staff. In school he had studied electrical engineering, business, English and writing. In short, he was well-versed to oversee the many and diverse activities of a radio network.

Initially, the network had little influence over the day-to-day operations of its two local affiliated stations, other than providing several hours of programming in the evening hours. KGO was operated by the General Electric Company, and KPO by Hale Brothers Department Store and the San Francisco Chronicle, and both stations had their own established program schedules, staffs and audiences. This changed in 1930, when NBC purchased KGO outright and leased the facilities of KPO (which it subsequently purchased in 1932). Once that happened, the program staffs of KGO, KPO and NBC were all consolidated into one collective workforce of over 250 persons under one roof at 111 Sutter Street. This included complete orchestras, vocalists and other musicians (there were five pipe organists alone), and a complete dramatic stock company. It was from there that all programs for the network originated (by then averaging about fifteen hours a week), as well as the local programs heard over KGO and KPO. As a result, those stations lost their independent identities except for their separate transmitter facilities and engineering staffs. (KGO transmitted at 7,500 watts from a General Electric transformer factory in East Oakland. KPO broadcast from the roof of the Hale Brothers Department Store on Market Street with 5,000 watts until 1933, when a new 50,000 watt facility was constructed near the Bay Shore at Belmont.)

As the network expanded into the daytime hours, one of its more popular offerings was the "Woman's Magazine of the Air", The mid-morning home economics show had begun as a local offering on KPO in 1928 before graduating to the network. Broadcast from its own model kitchen-studio in the old KPO studio in the Hale Brothers department store, it was hosted by "Jolly" Ben Walker. Other regulars were Ann Holden, Helen Webster, Marjorie Gray and Bob Nichols, and an orchestra led by Edward Fitzpatrick. Reportedly, the first bona fide singing commercial -- that is, one sung for the sole purpose of praising a product -- was heard on this program, promoting Caswell's National Crest Coffee. Other sponsors included Pet Milk, Safeway Stores, and Van Kamp Seafood.

Among the other programs that originated from 111 Sutter Street during these years, there was "Don Amaizo, the Golden Violinist", who played for the American Maize Company (the musician who performed for West Coast audiences was Music Director Max Dolin); "Memory Lane"; "Rudy Seiger's Shell Symphony", broadcast by remote from the Fairmont Hotel; "Dr. Lawrence Cross"; and the "Bridge to Dreamland", originated by Paul Carson and consisting of organ music by Carson intermixed with poetry written by his wife.

Throughout all of these programs, even though the performers went unseen by their radio audiences, NBC required formal dress. This meant that the actors and announcers wore black ties, actresses wore formal gowns, and musicians wore uniform smocks, with the conductor in tie and tails. This was done for appearance, in the event that the sponsor or some other important person should drop in unannounced. The engineers were required to wear a tie and jacket.

NBC GOES COAST TO COAST

Until September of 1928, there was still no such thing as a weekly "coast-to-coast" network program. Whenever required, the connections between Denver and Salt Lake City were temporarily made by placing a long distance telephone call. Eleven sponsors reached the Pacific Coast with their programs using this method for a few months. Finally, in December of 1928, AT&T completed the important missing link in its broadcast quality telephone network.

The first program to use the new line was "The General Motors Party" on Christmas Eve, 1928. Originating in New York, it was carried on 51 stations east of the Rockies plus the 7 West Coast stations. Regular programming began shortly thereafter, and Western listeners could now enjoy the original Eastern productions for the first time. NBC now boasted a nationwide network of 58 stations, with the potential to reach 83% of all U.S. radios.

With the inauguration of the new transcontinental service, the process of duplicating East Coast programs in San Francisco was discontinued. Instead, many East Coast performances were repeated three hours later for Western audiences. Because there was only one circuit available, the Red and Blue networks could not be fed simultaneously. Instead, a selection of the best programs from each network was fed West of Denver. Thus, the Orange Network continued to exist, although in name only.

Although the duplication of programs was no longer necessary, the Western Division staff was not dissolved. It continued to produce additional programs for western consumption only, augmenting the eastern schedule. Because of the time difference, the later evening hours were all filled with West Coast programs.

and his NBC Orchestra, augmented with Western music by Charlie Marshall and the Mavericks, and the sweet ballads of vocalist Tommy Harris. The "Carnival" was broadcast in front of a live audience from the stage of the Marines' Memorial Theater from 1933 to 1936 -- starting as a West Coast feature but soon expanding nationwide over the Blue Network.

However, the most famous program to ever originate in San Francisco was "One Man's Family". It was a national favorite on radio and television for 27 years, and always ranked among the ten most popular programs nationally. Its author, Carleton E. Morse, was one of the biggest figures in San Francisco radio at the time.

Moving into radio from the newspaper business, Morse was hired by NBC just two weeks before the 1929 stock market crash. He later explained how he was hired:

They had a show coming in from New York -- it was called "The House of Myths", dramatizations of Greek classics. They said, "We can't do these -- they're terrible. Can you take them and rewrite them, or dramatize some myths that we could produce?" So, they sent me home and I conceived the idea of doing the myths in modern vernacular with a heavy ... tongue-in-cheek innuendo on the sex life of the Gods.

Morse's version of the "House of Myths" received good listener response on the Coast, although it drew little reaction in the east where it was also performed for a while. After the series ended, he dabbled with several other ideas but failed to draw any significant listener response, but he caught listeners' attentions when he tried his hand at mysteries. A number of popular Morse mystery series followed: "The Witch of Endor", "The City of the Dead", "Captain Post: Crime Specialist", "The Game Called Murder", "Dead Men Prowl", and others. Especially well liked were a series of four programs based upon the files of the San Francisco Police Department, "Chinatown Squad", "Barbary Coast Nights", "Killed in Action" and "To the Best of Their Ability". San Francisco Police Chief William J. Quinn worked closely with Morse in the writing of these episodes, and narrated all four series.

By 1932, Carleton E. Morse was the biggest name in radio drama on the coast, but he had tired of the continual diet of murder and violence. As an antidote to this, he began working on a series he called "One Man's Family", inspired by John Galsworthy's "Forsythe Saga". Morse was appalled by what he felt was the coming deterioration of the family life style in America, and so he decided to write a series giving "a down-to-earth, honest picture of family life".

"One Man's Family" told the story of the Barbours, an affluent, moral family residing in the Sea Cliff district of San Francisco. The concept did not fit into any previously-tried program formulas, and was unlike anything that had been done on radio up to that time. It simply told the story of everyday life in a model family. Morse hoped it would become popular because the public would identify closely with its characters, and he was right.

"One Man's Family" made its debut on Friday, April 29, 1932. It was carried from 9:30 to 10:00 PM on just three stations, in San Francisco, Los Angeles and Seattle. However, after the first few episodes, other West Coast stations asked that the program be opened to the entire network.



The second version of the NBC "Announcer's Delight" at 111 Sutter Street, about 1930. It includes a Telechron clock. Every NBC-San Francisco announcer had stories to tell about encounters with the "announcer's delight". Network announcers - not the engineers - were responsible for pushing the correct series of buttons to direct programs to the right stations. Sometimes the wrong show or an inappropriate announcement went over the airwaves. Once an errant voice interrupted a speech by the Pope to announce, "this nonsense was brought to you by the National Broadcasting Company. Engineer Oscar Berg demonstrates the new unit to Alice Tyler.



"One Man's Family" broadcast circa 1934.

The four main characters forming the nucleus of the cast were portrayed by the same actors for the entire 27 year run of the program. They were: Father Henry Barbour, played by J. Anthony Smythe; Mother Fannie Barbour, played by Minetta Ellen; Paul Barbour, who was played by Mike Raffetto; and Hazel, portrayed by Bernice Berwin. Other characters were the twins, Clifford and Claudia, played by Barton Yarborough and Kathleen Wilson, and Jack, who was played by Page Gilman (son of Western Division head Don Gilman). All of these actors had been hand-picked by Morse from the beginning of the program. In fact, each character had been created specifically with its actor in mind, encompassing his or her own personality traits, so that -- as Morse put it -- they could really "get into their own parts".

Western listeners responded to the program almost immediately, and their response was overwhelming. "One Man's Family" quickly became one of the most listened-to programs on the coast. Nonetheless, it remained unsponsored until Wesson Oil and Snowdrift bought the program on January 18, 1933. Then on May 17, it became one of the first San Francisco programs to be sent eastward through the trans-continental line to be heard nationwide, although it was broadcast in the east as a sustaining (unsponsored) feature. Separate scripts had to be utilized for nearly eight months until eastern audiences could catch up with the story line and the two productions could be consolidated. In 1934, the program was being performed three times: Fridays from 7:30 to 8:00 PM for the Mountain and Central time zones; 8:15 to 8:45, sponsored by Wesson Oil for the Pacific Coast; and again the next day at 5:30 for Eastern listeners. When a national sponsor was finally found, "One Man's Family" moved to Wednesday nights on November 21, 1934, sponsored by Kentucky Winners Cigarettes. But there was such a public outcry that such a "wholesome" program would be sponsored by a cigarette company that the sponsor cancelled after only ten weeks on the air. The show moved again, this time to Sunday nights, and went another two months without a sponsor. Finally, in March of 1935, Standard Brands, Inc., began a fourteen year sponsorship of the program, and during the remainder of radio's golden years, "One Man's Family" would be synonymous with Royal Gelatin Desserts and Tender Leaf Tea.

It was about this time that Morse began tiring of the repetitiveness of "One Man's Family". Just as he had grown weary of continual murder-and-violence stories, he now tired of the sugar and syrup of his latest and most successful program. He needed to create another series to create some excitement, and so "I Love a Mystery" was born. This children's' adventure series, featuring the trio of adventurers Jack, Doc and Reggie, was a national favorite for nearly two decades, and was heard on NBC through network radio's declining years.

NEW PHONE LINES BRING EXPANSION

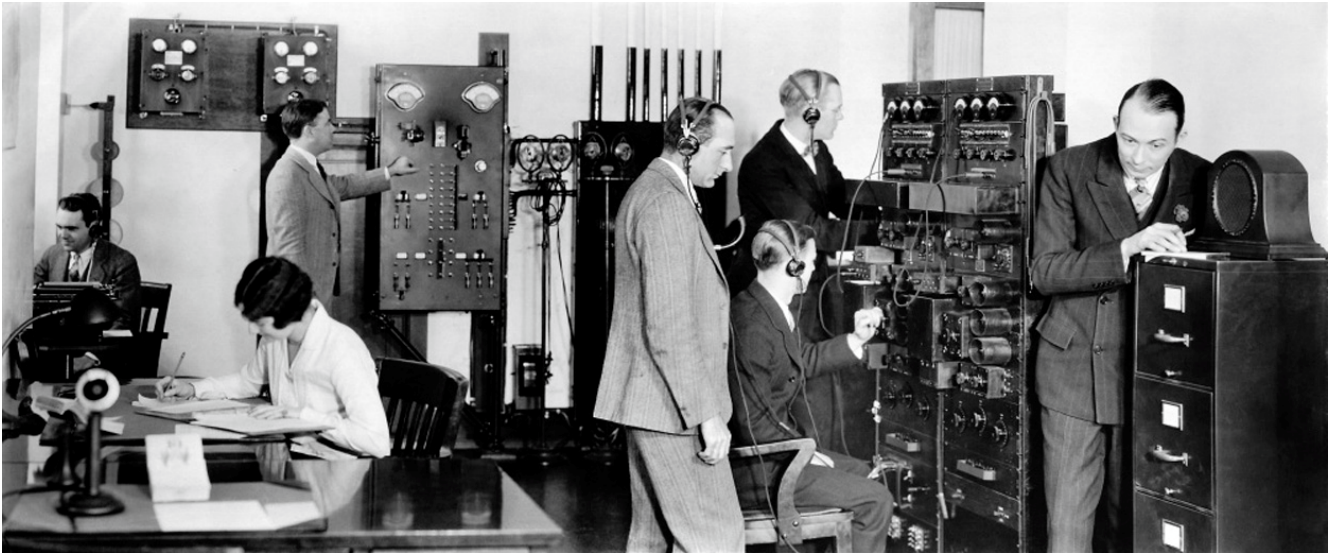
By the early 1930's, additional network-quality lines had been installed up and down the Pacific Coast, and this opened up expansion possibilities for NBC. When the owners of the four-station Pacific Northwest ABC group went bankrupt after the stock market crash, NBC acquired its stations: KEX Portland, KJR Seattle, KGA Spokane, and KYA San Francisco. Incorporating these into the company's operations, NBC debuted the Pacific Coast "Gold Network" in 1931. It consisted of KPO San Francisco, KECA Los Angeles, and the three Northwest stations – KEX, KJR and KGA. The



Left: Master Control at NBC in San Francisco, used from 1927 to 1942 with studio amplifiers, bridging equipment, power and testing equipment.



Right: A panel with the incoming broadcast lines and audio lines from other points in San Francisco.



Another view of the NBC studio control equipment and staff.

Gold Network operated in parallel with the Orange Network, which fed KGO, KFI, KGW, KOMO and KHQ. Additionally, KTAR Phoenix and KSDO San Diego signed up as auxiliary affiliates that could choose programs from either network. NBC was now feeding 119 hours of network programs per week from San Francisco – 47% of which were sponsored. (KYA was not a part of either network, and it broadcast separate local programs also produced at 111 Sutter Street.)

But the Gold Network lasted only two years. By April of 1933, at the bottom of the depression, sponsorship was dropping while line costs were increasing. Scaling back its Pacific Coast operations for the first time, NBC elected to close down the Gold Network. In its place, it announced it would broadcast its secondary network programs through KPO's new high-power 50 kW transmitter in San Francisco, which was providing clear nighttime coverage up and down the coast. KGO replaced KPO as the new key station for the Orange Network. The three Northwest stations were leased to the Orange Network affiliates in their respective cities for \$1 a year – and so KOMO in Seattle took over KJR; KGW in Portland took over KEX, and KGA in Spokane joined up with KHQ. (Subsequently, those Orange Network affiliates purchased the three stations outright.) Although they would occasionally be tapped to broadcast overflow NBC programs that were preempted by their main stations, the three Northwest stations were otherwise locally programmed. NBC soon after also disposed of KYA in San Francisco, selling it to the Hearst Newspaper chain in 1934.

By 1936, the economics of the radio business had rebounded somewhat, and the networks and some of the larger stations were earning good money. Also, some major changes with AT&T's management of its broadcast lines opened up new opportunities for network broadcasting. The telephone utility had finally installed a second NBC broadcast line, allowing both the East Coast Red and Blue networks to be fed simultaneously to the coast. Now, for the first time, the entire complement of programs from both networks could be heard on a nationwide basis. As a result, the original NBC "Orange Network", with the exception of KGO, became the Pacific Coast Red Network. KGO, along with KECA Los Angeles, KFSD San Diego, KEX Portland, KJR Seattle and KGA Spokane, formed the new Western Blue Network. The West Coast Blue Network was inaugurated with the broadcast of the Rose Bowl Game from Pasadena on New Year's Day, 1936.

Prior to 1932, only a limited number of West Coast programs were fed eastward. The AT&T lines were one-way circuits, and they fed westward to San Francisco and then up and down the coast. In order for a program to be fed to the east, it was necessary for attendants at each line amplifier location to simultaneously manually patch the circuits to feed in reverse. Additionally, the programs had to first be fed all the way to New York, from where they would be sent onward to the Midwest and South, doubling the per-mile line charges. This was a dilemma for the networks, because the national demand for West Coast programs was increasing, spurred by success of "One Man's Family" and "Carefree Carnival". More than 20 new Hollywood programs were planned by networks for fall 1935.

As a solution, AT&T introduced a new system called the "quick reversible" circuit in 1936. Under this arrangement, the operation of a single key would reverse the direction of every amplifier in the line between the West Coast and Chicago,

so that a line that formerly fed westward could now move programs from west to east. By this method, the circuit could be completely reversed in less than 15 seconds -- well within the time of a station break. Additionally, Midwest stations could now take the program off the main line on its way east, instead of having to double back from New York.

But the most important change was the substantial reduction in broadcast line rates that AT&T put into effect in October, 1936. Pressed by an FCC investigation into its pricing practices and monopolistic control of network lines, AT&T elected to cut its line rates almost in half. It also instituted a number of other flexibilities that further reduced costs and offered new options to the networks.

These technological and pricing changes combined with market forces to set the stage for the future decline of San Francisco as a network center.

HOLLYWOOD CALLING

In the early years of the networks, the relationship between the radio and motion picture industries was strained. In 1928, a special broadcast extravaganza originating from Hollywood, promoting the introduction of a new Dodge automobile, played the voices of Hollywood film stars like Douglas Fairbanks, John Barrymore, Charles Chaplain and Dolores Del Rio through American radios for the first time. That broadcast was a huge success, and it demonstrated the public's appetite for hearing big-name movie stars on their radios.

Nonetheless, the film studio executives perceived radio as a competitor that was siphoning off box office receipts by offering free in-home entertainment during prime theater hours. The result was a complete studio ban in 1932 -- all major studios (except RKO, which was owned in part by RCA) adopted a policy of keeping their contracted stars off the air. However, this resolve gradually faded as the executives came to realize that having their stars appear on radio generated free publicity for their films. Additionally, the studios wanted to incorporate some of radio's newly-minted stars into their own productions. In 1931, Rudy Vallee, while in Hollywood for the making of a motion picture, broadcast his weekly program from California and introduced his audience to many film star guests. Before long, the relationship between the studios and radio networks thawed and the boycott was forgotten as each side saw the other as an effective vehicle for cross-promotion. By the 1934/35 radio season, there were no less than 20 network programs being broadcast from Hollywood over NBC and CBS.

But before 1936, it wasn't easy for Hollywood stars to appear on NBC programs. The network lines emanated south out of San Francisco, and Hollywood was at the end of the line. To broadcast a Hollywood celebrity, they either needed to fly to San Francisco or NBC had to purchase a one-time temporary hookup from Hollywood to San Francisco. If a program was to be fed nationally from Los Angeles, it needed to be fed eastward over a separate circuit to Chicago, where it could link up with the network. When Eddie Cantor moved his "Chase and Sanborn Program" to Hollywood, this factor added \$2,100 per week in line charges to the program's budget.

There was considerable pressure on NBC to find a better solution. One result was the Quick Reversible circuit. Additionally, the new circuit that brought the Blue Network to the coast in 1936 terminated in Los Angeles instead of San Francisco. For the first time, it became economical for NBC to produce national programs in Hollywood on a wide scale. Hollywood stars like Al Jolson, Bob Hope and Clark Gable were regularly heard on NBC after that time.

THE EXODUS BEGINS

If it was going to originate more than a few programs from Hollywood, NBC would need studio facilities in that city. The first programs in 1935 had been broadcast from a temporary studio on the RKO motion picture lot, but the network now sought a permanent home. In 1935, the company acquired a building at 5515 Melrose Avenue that had formerly housed the Consolidated Film Industries studios. Its grand opening as an NBC facility was held on December 7, 1935. The two story building housed four studios, including two auditorium studios with seating for over 200 persons.



First NBC Hollywood studio at 5515 Melrose Ave. circa 1935. After NBC moved out, the building has since been the home to KHJ Radio, Capitol Records, KCAL-TV, KRTN-FM, and today is occupied by Paramount Pictures.

Don Gilman, NBC's West Coast VP, told the press, "The need for adequate studios in Hollywood has long been apparent. The growing importance of Hollywood has caused us to prepare to take advantage of the great reservoir of talent. It's expected that more programs of national interest will originate in Southern California when we have provided proper facilities." Nonetheless, Gilman continued to work out of San Francisco, commuting to Hollywood for his regular visits. He insisted to the press that the network's presence in the city by the bay would not be diminished in spite of its expansion into Southern California.

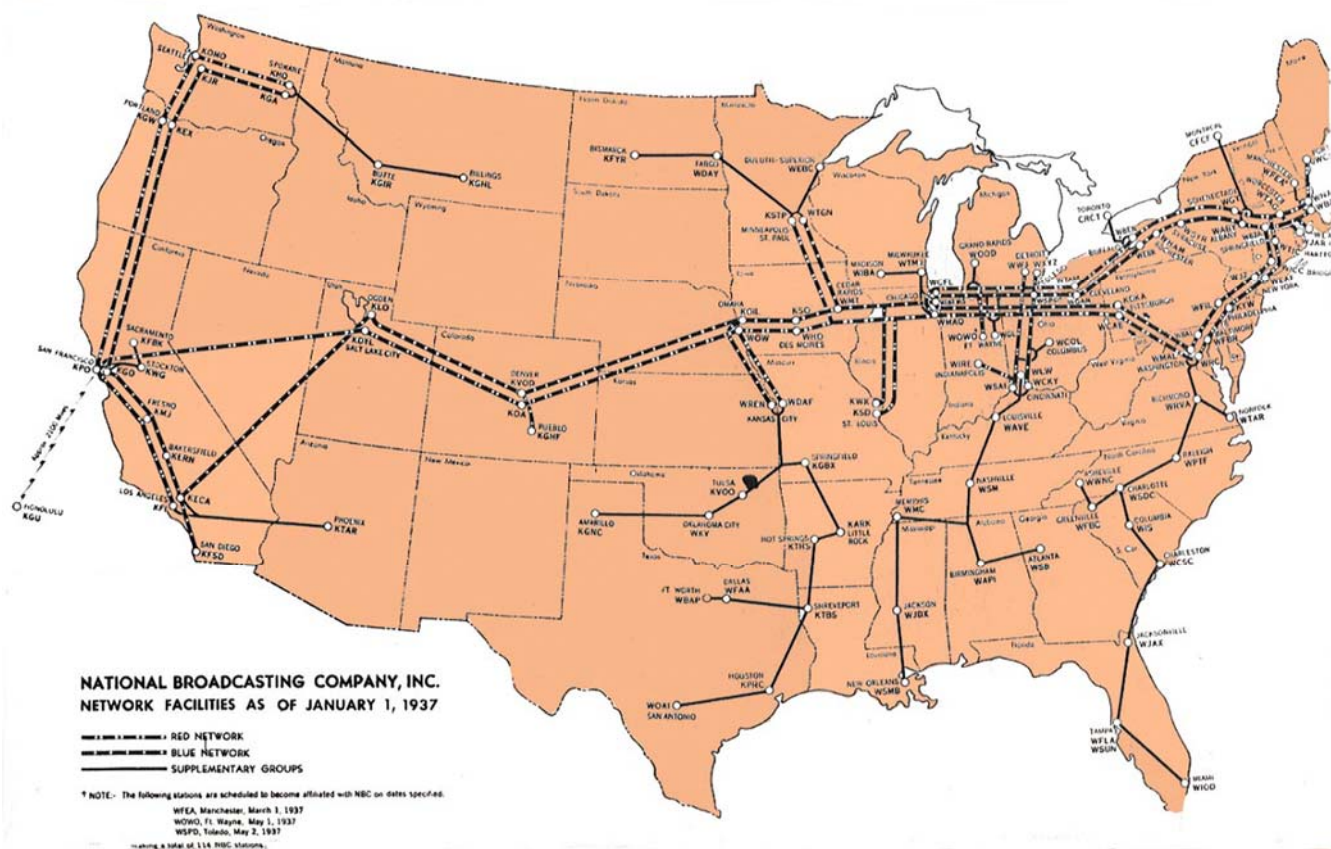


Second NBC Hollywood studio at Sunset and Vine.

However, by December of the following year, it was already apparent that the Melrose studios were too small for NBC's growing needs. Gilman then announced plans to expand NBC's facilities in both Hollywood and San Francisco. A 4-1/2 acre tract at Sunset and Vine was acquired, and a rush construction project undertaken.

The palatial \$2 million NBC Hollywood studio complex officially opened for business October 17, 1938, and it became the new Western Division headquarters. All West Coast executive offices that had previously been divided between San Francisco and Hollywood were consolidated in a new three-story executive building on the property. On the production side, there were eight studios, including four auditoriums that seated 350 persons each, the largest ever constructed for radio.

In spite of Gilman's declaration to the contrary a year earlier, the completion of the NBC Hollywood complex accelerated a trend that had already begun – the relocation of San Francisco programs to Hollywood. In 1937, concerned over loss of payroll and jobs, the San Francisco Chamber of Commerce protested the exodus of radio production to the network. The relocation of "One Man's Family" alone had shifted south over \$2,000 in weekly payroll. One newspaper columnist called San Francisco a "Radio Ghost Town: "By mid-autumn, San Francisco will



merely be an outlet on a 'ghost to ghost' network – an outlet for Los Angeles airshows which formerly originated here.” The Musicians Union also protested the dismissal of studio orchestra musicians in the city. For its part, the entire NBC management team was moved to Hollywood. By 1942, only a skeleton crew remained in San Francisco – just enough to generate the programs for the two local NBC stations.

NBC wasn't alone in this. CBS established a beachhead in Hollywood with its purchase of KNX in 1936. At the same time, the Don Lee Network was moving the production of many of its programs from KFRC in San Francisco to KHJ in Los Angeles. Both companies built opulent studio buildings in Hollywood, located just a few blocks away from NBC. Soon, hundreds of radio actors, artists and musicians were shuffling between the network buildings to produce a growing number of radio shows. Clearly, the nation's new radio production center had sprouted from the ground up almost overnight.

RADIO CITY

During the intervening period when NBC had intended to operate equal personnel and artist staffs in both cities, it had drawn up plans for a new San Francisco studio building to replace the outmoded facility at 111 Sutter Street. This was NBC's "Radio City", designed to match the opulence of the new Hollywood facility. It drew national acclaim for both its architectural styling and broadcast innovations. And it was a colossal mistake.

In 1940, bids were taken for the construction of an ultra-modern four-story studio complex at Taylor and O'Farrell Streets. About this same time, the NBC executives in New York were arriving at a decision to close down the San Francisco network operation. According to one story, the ground breaking was set to begin when Al Nelson, the network's West Coast vice president, received a telegram from New York. It said a decision had been made to phase out the San Francisco operation, and that the new building must not be built. But, it was too late; the contracts had already been let, and the event, once set into motion, could not be reversed. The vice president himself officiated at the ground breaking ceremony that day, with the telegram in his pocket.

NBC's million dollar San Francisco facility was formally dedicated April 26, 1942. It was an impressive edifice -- four stories of pink, windowless walls with layers of glass brick

delineating each floor. Over the marquee, at the main entrance to the building, was a three-story mosaic mural designed by Gerald F. Fitzgerald which depicted different facets of the radio industry. Inside, the facilities included a 41-by-72 foot main studio, two 24-by-44 secondary studios, and four smaller studios. A parking garage occupied practically the entire first floor. One of the smaller studios, Studio "G", was equipped with a false fireplace, fur rugs and comfortable furniture. It was reserved for V.I.P. guests exclusively, and Harry Truman, General Sarnoff and H.V. Kaltenborn were just a few of those who eventually used it. Another feature of NBC's radio palace was a roof garden where Sam Dickson, Dave Drummond, James Day and other staff writers could produce scripts in their swimsuits and work on their suntans at the same time.

The building was a magnificent tribute to the state of the art. It was also San Francisco's last great fling as a radio center, for less than a year after its completion the southward exodus had ended, and most of the facility stood unused except for



Announcers, Engineers and other staff of the NBC San Francisco operations, taken in Studio 'A' on the 22nd Floor at 111 Sutter Street in 1941. The occasion was the last day as an announcer of Bill Wood, preparing to enter active service as Lt. j. g. Bill Wood. There are several men from NBC New York in the photo, perhaps because of the concurrent construction of the NBC Radio City building.

an occasional network sustaining feature. In the ensuing years much of the building was sublet as office space, and the entire radio operation consisted of a disc jockey playing records from a third floor booth. KGO moved to Golden Gate Avenue in the early 1950's, and KPO, by then known as KNBR, moved out in 1967 once NBC's 25 year lease on the building expired. That was the year the building was acquired by the Kaiser Broadcasting Company to become the new home of KBHK Television. At last, the structure would see extensive usage for the purpose for which it was built.

POST SCRIPT

Most all network program production had departed from San Francisco by 1942. After that time, the city still saw some national prominence as a network news center for the war in the Pacific. It was also the programming and transmission headquarters for three powerful short wave stations that broadcast to the Pacific, programmed by the Office of War Information (part of the genesis of the Voice of America). Additionally, San Francisco did retain some importance as a switching center for the AT&T network. But it would never again see the prominence in broadcasting it experienced during its heyday of the late 1920's and 1930's.



Radio City was the model studio complex that NBC built at the corner of Taylor and O'Farrell Streets in San Francisco, as it appeared in 1942. Notice the mural over the entrance.

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The NBC Chime Machine at CHRS

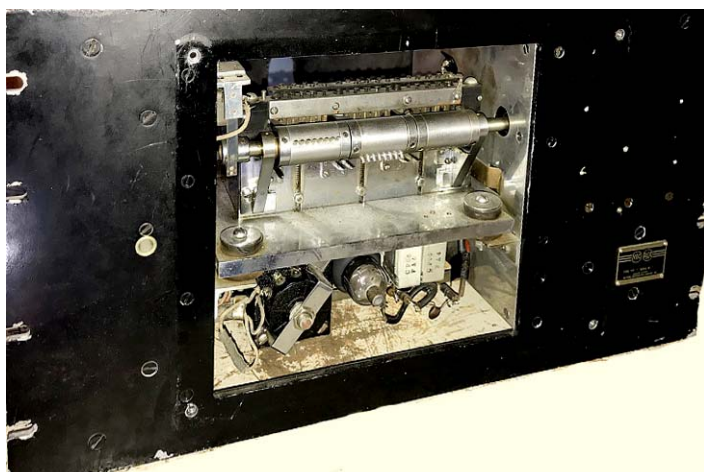
By John Staples, W6BM & John Stuart, KM6QX

As early as 1922, musical dinner chimes were used to identify radio station WSB in Atlanta, GA.⁽¹⁾ The soft-toned melodic dinner chimes, then in common use by cruise ships, railroads, theaters, and concert halls, were thought to add a touch-of-class to the station's radio broadcasts. A number of other radio stations followed suit. In 1926 the National Broadcasting Company (NBC) network was formed by using AT&T's telephone lines to distribute radio programming nation-wide. Six NBC switching centers were located in New York, Washington, Cleveland, Chicago, San Francisco, and Hollywood.⁽²⁾ At the conclusion of each program (typically every 15 minutes), the dinner chime melodies were used as a switching cue for AT&T engineers to reconfigure their wireline networks to feed the next scheduled programs to the proper affiliate radio stations.

Various NBC dinner chime melodies were soon standardized to the familiar three notes G-E-C that everyone now associates with "NBC". By the mid 1930's, the hand struck chimes were replaced with custom built, motor driven, three-note 'music boxes' known as the NBC Rangertone Chimes Machine.⁽³⁾



Three-tone chimes custom made for NBC by J. C. Deagan, Inc.
Source RadioRemembered.org



Front view of the chime machine with rack mount ears, cover plate, and serial number badge. Front panel has been removed showing the rotating drum with pluckers, heavy vibration isolation plate, and amplifier components below.

CHRS Acquisition

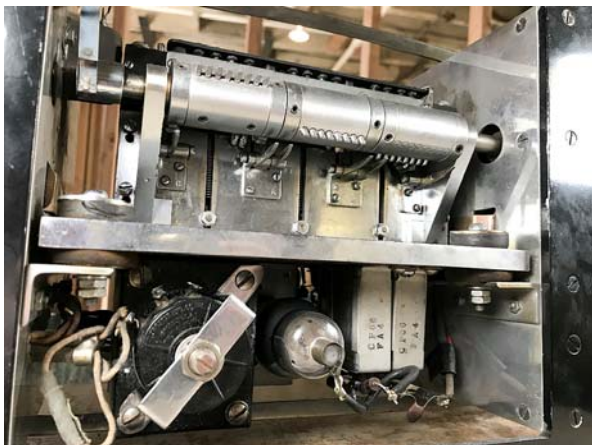
Last year, the California Historical Radio Society acquired *Serial No. 2* of these rare electro-mechanical music boxes. In 1932, this was one of two Rangertone chime machines originally installed in NBC's San Francisco Network Studios, which was located at 111 Sutter Street at the corner of Sutter and Montgomery Streets.

In 1942 it was probably moved to the (then) new NBC Radio City, an ultra-modern four-story studio complex at Taylor and O'Farrell Streets.⁽⁴⁾ When it was removed from service, the chime machine became part of the Walt Palmer collection, and was then acquired by former NBC Engineer Bill Newbrough. In 1999, it was featured in The Radio Historian website, by John Schneider.⁽⁵⁾ Then in 2018, Bill Newbrough donated NBC Chimes Machine Serial No. 2 to the CHRS.

This CHRS Journal article describes *Serial No. 2* in detail, and provides references to sources of information about these extremely rare artifacts of early radio network broadcasting. For more historical information about the use of chimes in radio broadcasting, see the referenced websites listed at the end of this article.

Mechanical Design

The NBC chime machine weighs a hefty 52 pounds and is built on the back side of a standard 10-1/2" x 19" aluminum rack panel. A 9" x 12" removable plate is provided in the panel for maintenance access. (see photo above). The back side has a removable 16.5" x 10" x 8" deep steel case which houses and electrically shields the mechanical systems, capacitive reed sensors, and vacuum tube amplifier.



A close-up better showing rotating drum with pluckers, heavy vibration isolation plate, and 6C6 amplifier components.



View of the capacitive pickup fingers and three vibrating reed combs. Note several reeds have been broken off.



View of the underside 6C6 amplifier circuitry, motor, and power supply.



The Telechron clock controller that accompanied the chime machine.

A 115 VAC Bodine Electric Company speed reducer motor is used to rotate a 1" diameter x 5.5" long drum at 17 RPM (3.5 seconds per revolution). The drum has three sets of fingers that pluck the three sets of reeds, as the drum rotates through one revolution. The motor and worm drive gearbox are mounted with vibration isolating rubber biscuits. The vibrating reeds, capacitive pickups, and rotating drum assembly are mounted on a very heavy steel plate which is also vibration isolated with rubber biscuits. Even the vacuum tube socket is vibration isolated. This vibration isolation prevents motor vibrations, relay clicking, and other rack/room noises from being picked up by the very sensitive capacitive reed sensors and vacuum tube amplifier.

The original design had a Bodine motor with a slower 10 RPM gear reduction. They were later replaced in the field with 17 RPM motors to reduce air-time of the three tone chime, from 5.8 seconds to 3.5 seconds.

The Telechron clock (photo above) would have been part of several "Announcer's Delight" lectern control cabinets in NBC's studios. An announcer could press one of the buttons to trigger the chime machine prior to making his announcement. The switches are for both studio and "NEMO" broadcast lines. "NEMO" was a term used in early radio to indicate a remote broadcast; It comes from a telephone term "Not Emanating Main Office."⁽⁵⁾

How are the tones produced?

The early chime announcements were produced by the announcer on a hand-held xylophone. This led to many errors in timing and hitting the right notes.

So, instead, the chime sounds were produced electronically. Richard Ranger, a manufacturer of electronic organs already had a background in electronic musical instruments. At the request of NBC, he produced a machine to generate the chime signals.

Instead of a xylophone arrangement, he elected to invent a device similar to a music box. A music box plucks tuned reeds which resonate using a soundboard to acoustically amplify the sound. Instead of a soundboard, Ranger used an electronic pick-off similar to that used in capacitor microphones. The machine emits very little acoustic noise as it plays: the output is an electrical signal.

Condenser microphones operate by placing a diaphragm, vibrated by pressure waves in the air near a charged plate forming a capacitor with a charge across the electrodes. When the diaphragm vibrates, the capacitance between the electrodes varies, inducing an alternating voltage between the electrodes. This voltage is amplified and that is the signal from the microphone.

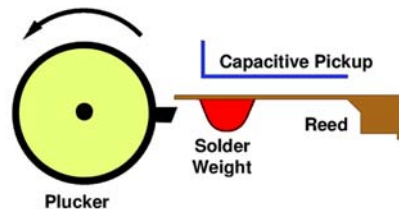
The chime machine uses the same capacitance principle to generate the electrical signal.

The chime machine is fitted with a series of reed blocks for the three tones produced: G, E and C. A rotating drum with “pluckers” passes by the reeds, strumming them and setting them in motion.

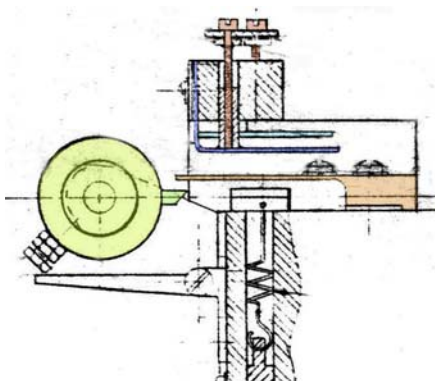
Each tone consists of several individual notes than blend together. Three reed blocks each have up to eight individual reeds, each tuned to a separate note of the musical scale.

In addition to the pluckers, a set of dampers is applied to the reeds after a short time to quiet them so the three tones do not overlap each other. A large projection on the rotating drum engages a lever that lifts pads resting on the reeds, allowing the reeds to ring. A return spring below the pads returns the damping pads to the reeds, cutting off the vibration.

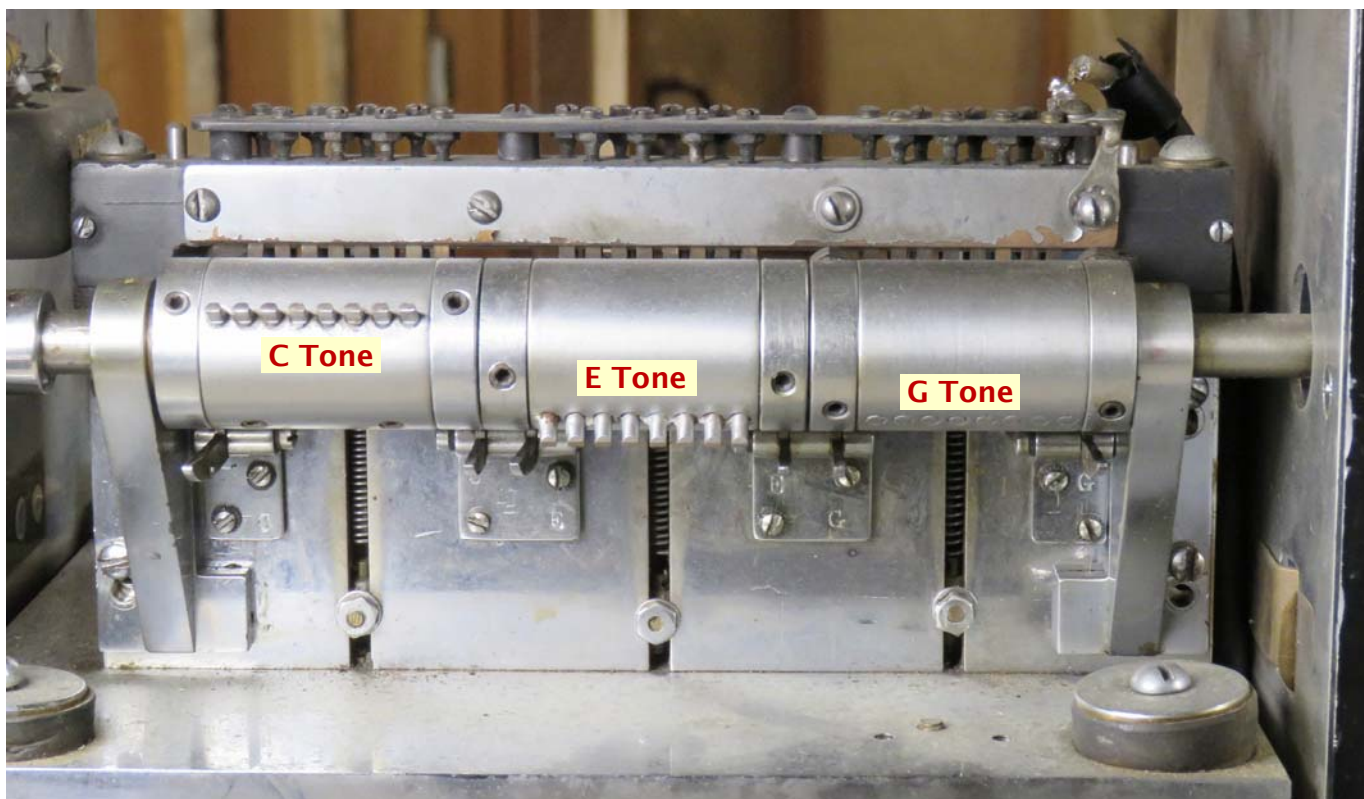
The three sets of reed plates are assembled in a row, with the G, E and C tones from right to left. A drive motor off to the right rotates the cylinder at the bottom which contains the “pluckers.”



As plucker (yellow) rotates, it strikes the reed (orange) producing a tone which is sensed by the capacitive pickup (blue).

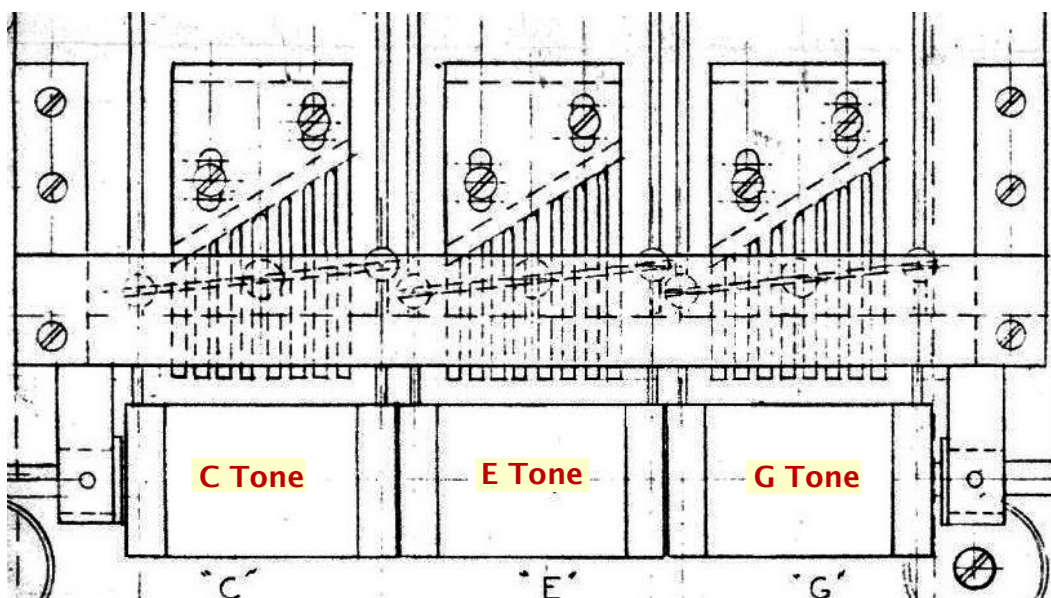


Manufacturer's drawing of a the mechanism.



3-tone chime assembly.

The reeds are arranged behind the rotating drum that contains the pluckers.



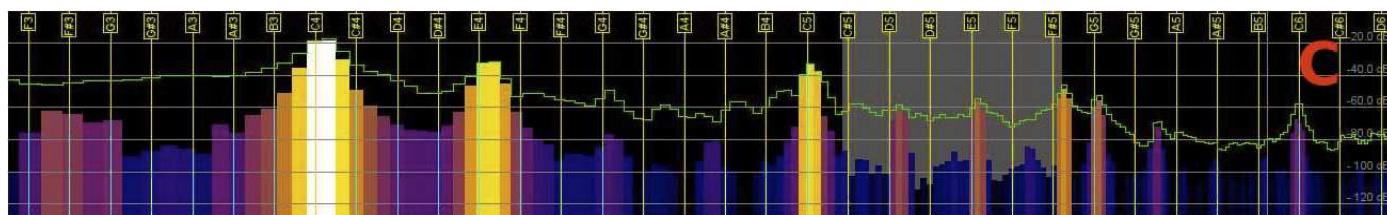
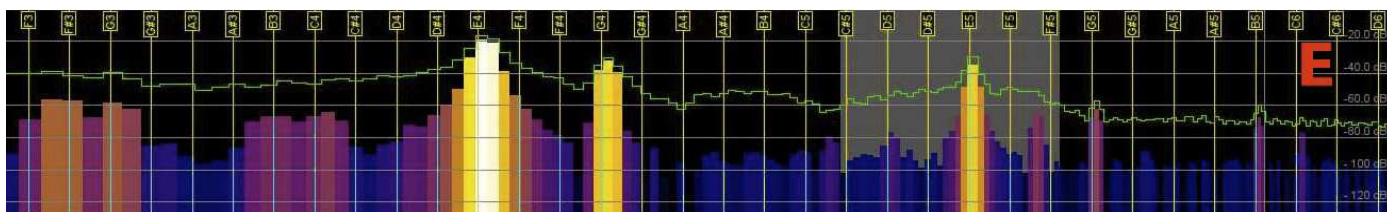
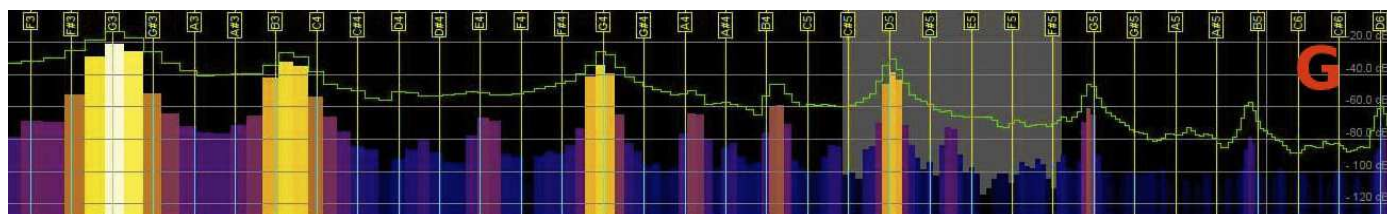
Manufacturer drawing of the 3 reed blocks.

The first note, the “G”, is produced by the reeds on the right, progressing to the “E” and the “C” note as the drum rotates. Note that there are eight pluckers, one each for the eight reeds for each note.

What are the tones that are produced by the reeds?

The electrical signal from the chime machine is recorded and analyzed to identify the individual frequencies produced for each of the G, E and C notes. The audio analysis tool SpectrumLab supplies the frequency plots.

The spectrum of each note, starting with G is shown here. The musical name of each note is shown.



The amplitude of the note is indicated by the brightness and the height of each line in the spectrum. Only the most significant notes are selected, as the others are too weak to be heard, and may be a results of distortion products in the electronics.

The most intense frequencies contained in each note, along with the name of the note, derived from the spectral analysis are listed here.

G Chord	
Tone	Frequency (Hz)
G3	196.0
B3	246.94
G4	392.0
D5	587.33

E Chord	
Tone	Frequency (Hz)
E4	329.63
G4	392.6
E5	659.26

C Chord	
Tone	Frequency (Hz)
C4	261.63
E4	329.63
C5	523.33
F#5	739.99
G5	783.99

The frequencies chosen are closest to the musical notes in the scale: they may be slightly different, as the frequency resolution of the analyzer itself contributes an uncertainty. See the sidebar for an explanation of the equal-tempered musical scale and the names of the notes.

Tuning the Reeds

These reeds, if plucked without any additional weight attached, would resonate at a higher frequency than desired. Each reed forms a beam, or a cantilever, fixed at one end and free at the other. A plucked beam oscillates in several modes.

The modes are labeled by the number of zero crossings of the axis: 0, 1, 2 ... The frequencies of the N = 1 and 2 modes are 6.3 and 17.6 times the fundamental N = 0 mode for an unweighted reed.

Using the dimensions of the reeds, the natural resonant frequency of each reed is with uniform cross section is calculated. The reeds appear to be made of steel. The frequency is given by

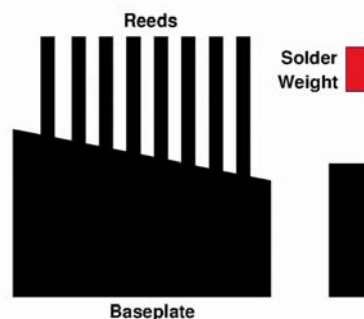
$$f(\text{Hz}) = \frac{1}{2\pi} \alpha_i^2 \sqrt{\frac{E I}{\rho L^4}}$$

where $\rho = 7850 \text{ kg/m}^3$, the density of steel, the Young's modulus $E = 2.1 \times 10^{11} \text{ kg/m-sec}^2$, the "elasticity" of steel, $I = w b^3/12$ is the moment of inertial for a cantilever, fixed at one end and free at the other, where L , w and b are the length, width and height of the reed. Alpha is a value related to the mode number, and is 1.875 for the fundamental mode.

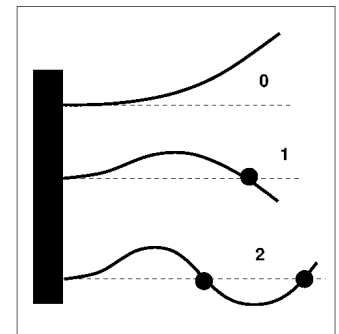
It turns out that the resonant frequency of a reed of uniform cross section is independent of the width of the reed, goes as the reed thickness to the 3/2 power, and goes inversely as the square of the length.

From the dimensions of the reeds shown in its drawing, the resonant frequencies in Hertz of the lowest mode, from the shortest to the longest are:

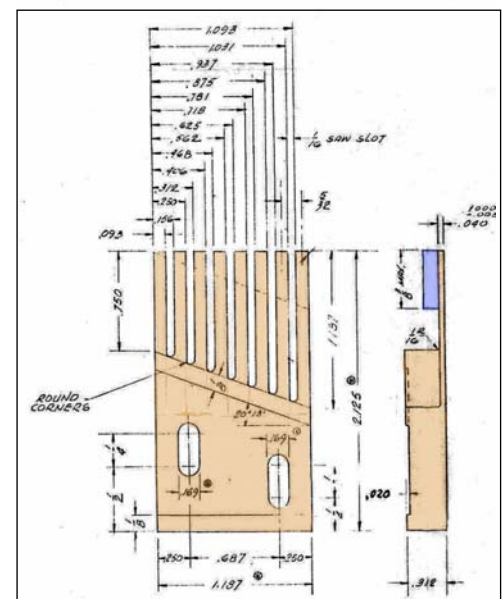
Reed	Resonant Freq. (Hz)
L1	2340.1
L2	1987.3
L3	1708.6
L4	1484.7
L5	1302.1
L6	1151.2
L7	1025.1
L8	918.7



Reeds have increasing length.



Modes of oscillation of a reed.



Manufacturer drawing of a reed block.

These frequencies are all higher than the ones actually measured. To tune the reeds to the desired frequencies, each has a solder weight attached near the open end to weigh it down and reduce the resonant frequency.

The calculation of the frequency with the added solder weight is complicated, as it depends on the detailed distribution of the added weight to the reed. It appears that solder was added to each reed until the desired frequency was achieved.

Here is a detail of the “G” reeds seen from underneath, with the “E” reeds to the left. Large blocks of solder are seen attached to the reeds, which are hidden behind the drum. It appears that some solder flux remains on some of the reeds.



Solder was added to a reed to tune it to the desired frequency.

Shaping the amplitude of the notes

The amplitude of the electrical signal from each reed depends on the distance from the capacitive pickoff electrode. The relative amplitudes seem to have been established to give the fundamental frequency the largest amplitude, with the other tones higher in frequency at lesser amplitude.

Each reed has a mating extension reed from the pick-off electrode bar, with each pick-off reed position determined by a set screw that positions the pick-off reed distance to the tone reed. The closer the pick-off to the tone reed, the higher the amplitude signal from that reed.



Pick-off reeds shown above the tone reeds.

The pick-off reeds are shown above the tone reeds. The screws that adjust the distance of the pick-off to the tone reed are in the pick-off support bar at the bottom.

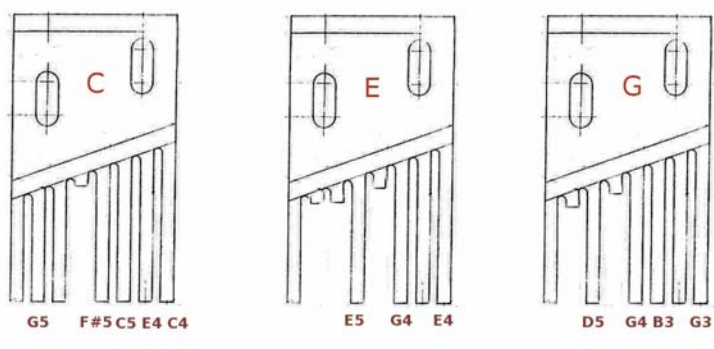
The fundamental note for each reed plate is on the right side, and the pick-off for that reed is seen in the picture to be close to the reed itself. Other capacitive pick-offs are seen to be farther away. The pickoffs that are farther away will produce a smaller output, so the tonal structure of each chord can be varied.

Looking down from the top, the three reed plates are seen slightly hidden by the capacitive electrical pick-offs. Several of the reeds are seen to be broken off. Since some of the broken reeds were found in the machine, they were probably not broken off intentionally. It may be possible that all reeds were originally tuned and used.

From the spectral analysis of the tone from each reed, along with the measured amplitude of each tone and the physical distance between the pick-off to the tone reed, the amplitude contribution of each reed is estimated.

Several other very low-amplitude frequencies were seen in the spectral analysis of the notes. These could have been power-line harmonics of 60 Hz, which were seen, lingering notes from previous chords not quieted by the dampers, or distortion in the amplifier or recording equipment.

Our best guess is based on the remaining reeds, and the distances the capacitive pick-offs from the reeds.



Pick-off reeds shown above the tone reeds.

The musical chords

Based on our best guess of the tones measured from the electrical output signal, the components of each cord, along with its approximate frequency and musical interval are listed.

Most of the chords comprise thirds, fifth and octaves. However a few anomalies seem to have crept in, such as in the E chord with a diminished third and a strange F#5 in the C chord. These may have been deliberately introduced, or the result of damage or age of the chime machine.

Historically, after Richard Ranger produced the first chime machine, the musicians at NBC adjusted the device to produce more pleasing notes. The details are unknown, but one change noted was the addition of a capacitor across the electrical output, which would have the effect of attenuating the higher frequencies. Note that the chords do not have the same harmonic mixtures that a xylophone has, where the overtones are in general not harmonically related to the fundamental notes. Whether the original tuning attempted to imitate a xylophone we do not know.

G Chord	Note	Frequency	n	Chord
	G3	196.0	-14	Fundamental for G Chord
	B3	246.94	-10	Perfect third above G3
	G4	392.0	-2	One octave above G3
E Chord	Note	Frequency	n	Chord
	E4	329.0	-5	Fundamental for E Chord
	G4	392.6	-2	Diminished third above E4
	E5	659.26	7	One octave above E4
C Chord	Note	Frequency	n	Chord
	C4	261.63	-9	Fundamental for C Chord
	E4	329.63	-5	Perfect third above C4
	C5	523.25	3	One octave above C4
	F#5	739.99	9	(strange note)
	G5	783.99	10	Perfect fifth above C5

Sidebar: The Equal-Tempered Musical Scale

Music is based on frequencies in a *scale*. One in frequent use in Western music is the *equal-tempered* scale. Here, the musical octave, where two notes differ in frequency by a factor of two, is divided into 12 semitones, each tone a fixed frequency fraction above the previous one.

The notes in the equal-tempered scale are related to each other by the relation

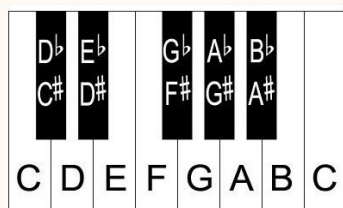
$$f(\text{Hz}) = 440 \cdot (2^{n/12})$$

where middle A has a frequency of 440 Hz. The notes in the scale differ by a *semitone*, and the number of semitones is the difference in the value of n .

The notes are given name, such as A4 for middle A, at a frequency of 440 Hz. Each tone is 5.9463% higher than the preceding one. The notes are given name, such as A4 for middle A, at a frequency of 440 Hz. Each tone is 5.9463% higher than the preceding one. The distance of the notes from middle A is the value n , starting at zero for middle A.

Blending of two or more frequencies forms musical *chords*. Musical chords sound the most pleasing to the ear when the frequencies are in ratios of small numbers. Examples of these ratios have the names "perfect third" when the frequency ratio is 5:4, "perfect fifth" when the ratio is 3:2, and the octave where the ratio is 2:1. In the equal-tempered scale, fifths and thirds are not exactly in ratios of 3:2 and 5:4, but close, and produce a slow beat note. The equal-tempered scale allows music to be transposed to any set of keys on a piano, for example, as the ratio of the spacing between the notes is preserved.

Perfect fifth chords have notes that differ by $n = 4$, thirds by $n = 7$, and octaves by $n = 12$.



The perfect thirds and fifths in the equal-tempered scale are not in the exact ratio of 5:4 and 3:2, however. The ratios are 1.2599 instead of 1.2500 and 1.4983 instead of 1.5000. This results in a slow beat between the notes, which, to some ears, enlivens the chord.

If you have a keyboard, play the C, E and G notes, which contains thirds and fifths and listen to the blend of the notes.

A Portion of the Scale

Notes	n	Frequency (Hz)
C3	-21	130.81
C#3	-20	138.59
D3	-19	146.83
D#3	-18	155.56
E3	-17	164.81
F3	-16	174.61
F#3	-15	185.00
G3	-14	196.00
G#3	-13	207.65
A3	-12	220.00
A#3	-11	233.08
B3	-10	246.94
C4	-9	261.63
C#4	-8	277.18
D4	-7	293.66
D#4	-6	311.13
E4	-5	329.63
F4	-4	349.23
F#4	-3	369.99
G4	-2	392.00
G#4	-1	415.30
A4	0	440.00
A#4	1	466.16
B4	2	493.88
C5	3	523.25
C#5	4	554.37
D5	5	587.33
D#5	6	622.25
E5	7	659.26
F5	8	698.46
F#5	9	739.99

The electronics

As mentioned earlier, the output sound is not produced acoustically, as in a music box, but electronically with capacitive pick-offs.

The higher modes will not couple strongly to the capacitive pick-offs, so each reed is expected to produce only one significant signal, the fundamental mode. Thus the octave overtones seen are not produced by a harmonic of a lower-frequency reed, but by separate, individual reeds, or possibly by harmonic distortion in the electronics.

All the capacitive pick-offs are tied together and sensed by one vacuum-tube amplifier.

The 6C6 amplifier tube is triode connected, with the control grid connected through the 0.001uF capacitor to the pick-off bar, insulated from the case and charged to 350 volts.

When the reeds vibrate, their capacitance to the pick-off electrodes varies which induces an alternating voltage on the input to the 6C6 amplifier.

The amplified signal is transmitted through the output transformer in the plate of the 6C6. The signal level is suitable for introduction into the studio equipment.

Our recordings were taken with a voltage of 70-150 volts to the anode of the amplifier tube, as well as the polarizing voltage to the pick-off electrodes. The unit is designed to operate with up to 350 volts to the tube and the pick-off electrodes.

A relay controls the motor. A momentary switch halts the turning of the plucker drum after one revolution.

The NBC chime machine, serial number 2, is being preserved in original condition and is once again operational. CHRS is honored to have this valued historical artifact and will display it prominently in the museum.

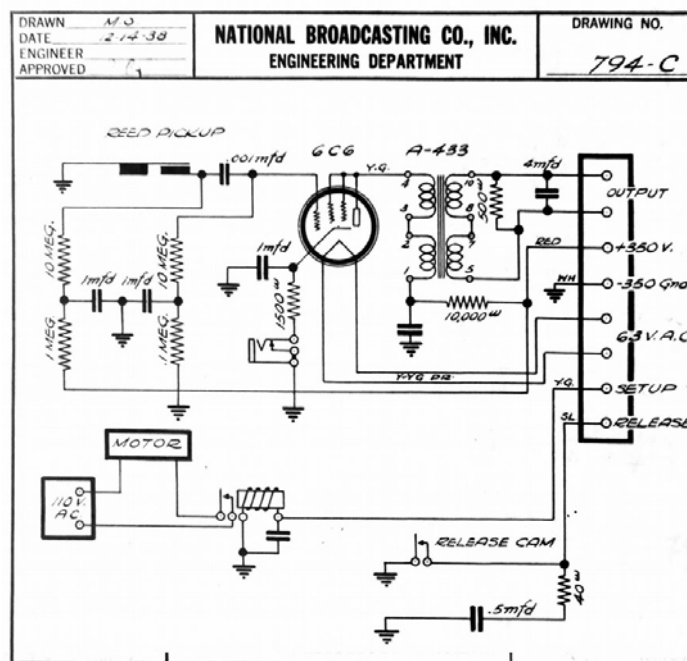
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- (5) The NBC Chimes Machine, by John F. Schneider: www.theradiohistorian.org/chimes.htm

The Authors

Dr. John Staples, W6BM, designs and builds particle accelerators at the Lawrence Berkeley National Laboratory. He received his Extra Class ham license and First Class Radiotelephone and Radar licenses in 1958. Besides being an avid collector of vintage electronics, he has been a passionate motorcyclist for over 50 years.

John Stuart, KM6QX, is a CA Licensed Mechanical and Control Systems Engineer. He had a 35 year career with PG&E in San Francisco doing design and construction projects on 500,000 volt substations and 36" transmission pipelines; primarily in the instrumentation, measurement, and control fields. After retiring from PG&E, he worked 14 years for San Ramon Valley Fire as a radio technician and facilities engineer. His interests include ham radio and measurement instrumentation.



Amplifier and motor circuits.

The Creation of the NBC Radio City Mural

By John Schneider, W9FGH

CREATING OF A WORK OF ART:

There is a fascinating story associated with the ceramic tile mural that graces the façade of the NBC Radio City Building in San Francisco (now known as the 420 Taylor Building). The author was fortunate to acquire the files of the mural's designer, architect Gerald F. Fitzgerald, which revealed a number of heretofore little-known details.

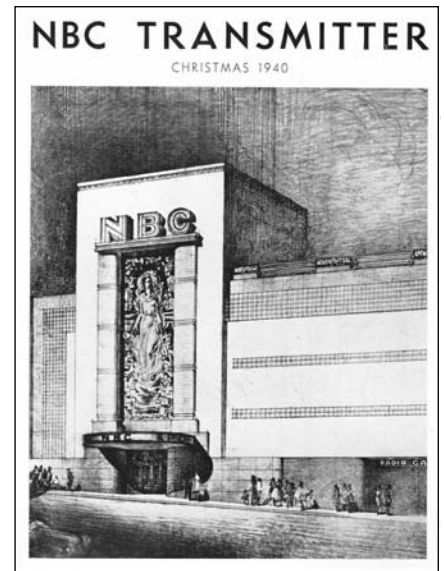
In 1941, when the building was first being designed and constructed, it was decided that an important feature of the façade would be an imposing mural set into the 80 foot pylon that was to rise above the entrance marquee. But the subject of the mural was yet to be decided. Early architectural drawings of the building depict the large figure of a standing woman with nondescript figures scattered around her. In reality, this was just a conceptual drawing to the fill the space, and the true nature of the mural was yet unknown.

As construction progressed, a committee was formed to decide on the artwork and implementation of the mural. It consisted of Albert Roller, the building's chief architect; Roller's architectural designer, Gerald F. Fitzgerald; Al Nelson, NBC assistant vice president in charge of San Francisco operations; O. B. Hanson, NBC's vice president of engineering; William A. Clark, the manager of NBC Technical Services; and Curtis Peck, chief engineer of NBC's San Francisco operations. Scores of ideas were discussed by the committee, but they could not come to an agreement. Outside artists and sculptors were invited to submit suggestions, and yet weeks passed without a decision. Finally, Fitzgerald proposed a mural that would portray radio broadcasting serving all the peoples of the world. He submitted a rough sketch, and it won unanimous approval by the design committee. Fitzgerald was then put in charge of the design and execution of the mural project.

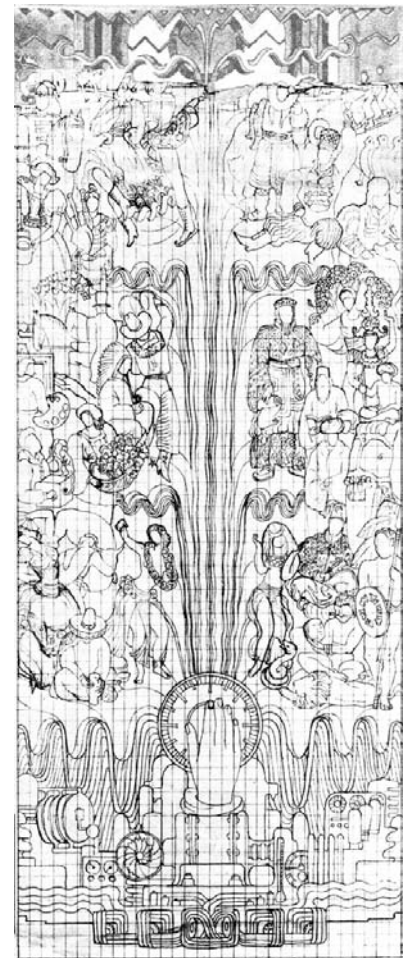


Fitzgerald is seen working on his oil painting rendition of the mural, matching each individual color to the glazed tile samples laid out on the table in front of him.

His design depicts the story of radio broadcasting as a means of mass communication reaching all the peoples of the earth. The mechanics of broadcasting are represented at the bottom of the work, with condensers, a dynamo, stop watch, insulators, transmitter tubes, a thermometer, wiring symbols, and an RCA microphone. Immediately above that, a large human hand adjusts a radio dial creating radio waves that extend upwards towards the very top of the mural. On each side of the wave, more than 50 characters are depicted. They represent



An architect's rendering of the NBC studio building, showing the preliminary image of a different mural, 1940.



Fitzgerald's original concept sketch of his NBC mural, which was approved by the committee

populations from the South Seas to the Arctic, from the Orient to the West, and from the tropics to the poles. The Oriental peoples are seen on the right, and western populations are at left; the people of the tropics are at the bottom, and the Arctic regions are represented at top. Individual characters portrayed include Africans with a lion, Asians with a Chinese mandarin, and the peoples of Spain, Mexico and South America. There are an American cowboy and Indian, a Canadian Mountie, and an English riding gentleman. Balkans, Scandinavians, a Cossack are represented; an Eskimo is seen with a polar bear, penguins, a totem pole and an igloo. Also depicted are a bullfighter, a head hunter, an artist, reindeer, dancing girls and a Scottish piper.

The committee then turned to the details of the physical construction of the mural. It would be 16 feet wide and 40 feet high. The façade of the concrete wall that would surround the mural would be textured with horizontal fluting; the shadows caused by the fluting were designed to darken the surface to the eye, thus creating a darker grey background for the mural.

Most murals of the early 20th century were painted on indoor walls, allowing the portrayal of extremely fine details. But outdoor murals typically were constructed of small single-colored tiles that were assembled to create an image. This technique would not display the level of finer detail of the individual characters that were depicted in Fitzgerald's drawing. In a search for a method to display such detail in an outdoor work, the committee's attention was drawn to the artistry of the ceramics manufacturer Gladding, McBean & Co., in Glendale, California, and it soon met with Leon G. Levy, the company's vice president. Levy offered a concept that had never been attempted before – the mural could be built from individual six-inch-square glazed tiles, and each tile would be hand colored with small segments of the total image. The square tiles would be set end-to-end, with no mortar separating them, to form a continuous, detailed image. Unlike other methods, the brilliant colors of these glazed tiles would never fade with time.

The committee accepted the proposal, and Fitzgerald set to work turning his conceptual drawing a reality. First he spent weeks immersed in books at the library, studying the costumes, environment and customs of the fifty different population that he would represent in his mural. Then he spent several days at the Gladding, McBean facility, selecting the 114 colors of the manufacturer's glazing that he would use in his image. Once back at home, he labored for weeks on an oil painting of the mural, using only the colors he had selected in Glendale. Finally, he made a line tracing of this oil painting, which was divided into sections and enlarged to full mural scale by projecting light through the tracings. These full-sized drawings were annotated with their individual color numbers, and the drawings were sent to Gladding, McBean in Glendale.

At the ceramics shop, work began on making the 2,560 individual six-inch tiles that would be used for the project. The materials for each tile were mixed from a finely-ground combination of talc, silica, rock and clay. They were pre-cut to their precise size, with an allowance for shrinkage during firing, so that each finished tile would be accurate in size within 1/13,000th of an inch. The tiles were fired as they moved for 2-1/2 hours through a 108-foot-long kiln tunnel heated to 2,150 degrees Fahrenheit. After firing, graphic artist



Detail showing two of the differences between the concept drawing and final work: Details of the dynamo are changed, and a microphone is added (top); and a Hawaiian hula dancer is replaced with the image of a young boy (bottom).



This is the way the new mural for the outside of the new NBC building, Taylor and O'Farrell streets, was made. Each glaze or color, in liquid form, was placed in a rubber bulb syringe. Each syringe carried a number corresponding to numbers on the sections of the working pattern. By following this check Marcello Marruffo's two expert assistants, Irene Dodge (left) and Phyllis Brush (right) apply the proper glaze to each section as outlined by the oil lines.

Painting the tiles at Gladding, McBean & Co. in Glendale.

Marcello Maruffo drew the lines of each image segment onto the raw tiles, and then a crew of female artisan workers flowed the metallic oxide colors onto each tile from syringes. Once the tiles dried, the glaze was applied and they then made a second trip through the kiln tunnel – this time for 16 hours at 2,000 degrees Fahrenheit.

When sections of the mural were first assembled, the Gladding, McBean crew was excited to note that the colors were even more brilliant than Fitzgerald's oil painting. Even so, no one could see the complete mural in its final form until after it was set into place at the NBC building, because there was no space large enough to assemble it.

Back in San Francisco, the tiles were set in place on the Radio City Façade by the Sunset Tile Company, working behind a canvas tarp to hide the project from the public eye. Only two mistakes had been made during the entire process: one tile broken during setting, and a missed eyebrow on one of the characters, and these defects were promptly corrected.

Finally, a grand unveiling ceremony was held on January 17, 1942. The one-hour event took place in front of a live audience on a temporary outdoor stage constructed at the front of the NBC building. The second half of the event was broadcast live over NBC's station KPO. The dedicatory program consisted of dignitary speeches, music by the NBC orchestra and the Symphonic Seven jazz band, songs by several local vocalists, and an original tone poem by Forrest Barnes. Finally, Fitzgerald himself was introduced to make a short statement:

Thank you John Galbraith. It is a new experience for me as an architect to be called an artist. In accepting this very high honor which you bestow on me, I should like to acknowledge the enthusiastic support given me by Mr. Albert Roller and the friendly criticism of Mr. Nelson Poole, the skillful workmanship of the Gladding, McBean Company in Glendale where these tiles were manufactured, and the Sunset Tile Company of San Francisco who set them in place. In creating this mural, I have attempted to portray the unlimited scope of radio broadcasting, and its service to all the peoples of the world. Thank you.



Fitzgerald is seen speaking at the dedication ceremony of the Radio City mural.

had studied architecture at the University of California in Berkeley, and then worked for the architectural firm Miller & Pflueger during the design of stately the Paramount Theatre building in Oakland. According to David Boysel, curator of the Paramount Theatre, Fitzgerald designed the two large gilded murals that still grace the front of that imposing structure, and was also responsible for the designs of the grand lobby and auditorium ceiling. Apparently, he also served as an architectural consultant during the construction of the Bay Bridge. Fitzgerald left the employment of Miller & Pflueger sometime in the late 1930s, and was working for Albert Roller at the time of the NBC building project. However, nothing is known about

The grand finale to the program was the dropping of the canvas covering, and the creator and audience alike were treated to its first view of Fitzgerald's masterpiece mural, which continues to grace the streets of San Francisco to this day.

FOOTNOTE

Very little is known about the artist, Gerald J. Fitzgerald. It was reported at the time that he



The grand unveiling of the mural.



Fitzgerald's completed mural, 1942.

Fitzgerald's work or his life after he completed the NBC mural. His legacy survives in the form of the two great building murals he designed, which fortunately still survive today. If one looks closely at the Radio City mural, they can see Fitzgerald's signature in the tiles at the lower right-hand corner.



The finished mural, in full color, as seen today.



Close-up showing Fitzgerald's signature on the mural. Photo by David Boysel.



Fitzgerald's 1930s murals on the Paramount Theatre Building, Oakland.

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- Correspondence between the author and David Boysel, curator of the Paramount Theatre, Oakland. July & August, 2018.



Radio Exhibit at the San Francisco Airport

By Richard Watts; photos by Jaime Arbona and Steve Kushman

In March 2018, The San Francisco Airport museum created an exhibit in their main Terminal 3 concourse dedicated to Radio. CHRS helped coordinate the exhibit. The artifacts were provided from CHRS and Bay Area collectors. They include: Tom Albrecht, Jaime Arbona, Steve Cabella, The CHRS museum, History San Jose, Steve Kushman, The Museum of American Heritage, and John Schneider. This exhibit was on display until October 2018.

The exhibits were encased in large acrylic cases for protection. The display also included several large images telling the story of radio. The San Francisco Airport has an extensive museum and large facility to support behind-the-scenes efforts to build and prepare exhibits, and for storage.

In October, a group from CHRS was given a tour of the museum facility and the Radio exhibit. The following are images from that visit.

The Exhibit







The "Mystic" Radio Bug and headset c. 1927
Brush Research Laboratories
Zanesville, Ohio
ceramic, glaze, plated metal, Bakelite, fabric-covered wire
Courtesy of Steve Kushman
L2018.0302.002A-B

Behind-the-Scenes

The San Francisco Airport has allocated a large facility for the museum exhibit preparation and storage. There are a variety of dedicated shops including a woodshop, metal shop, plastic shop, mannequin shop, and others. There are large rooms and mobile shelving devoted to storage. The following images are of this facility.

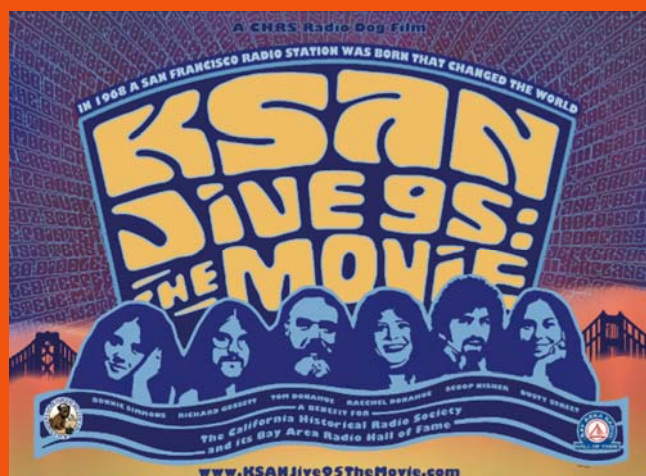


KSAN Jive 95: The Movie

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.

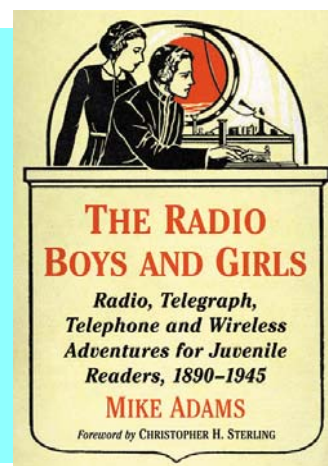


CHRS Publications

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.

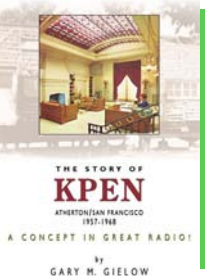
This book covers more than 50 volumes of wireless and radio themed fiction, offering a unique perspective on the world presented to young readers of the day. The values, attitudes, culture and technology of a century ago are discussed, many of them still debated today, including immigration, gun violence,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

Available now at Amazon.com

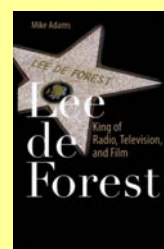


The Story of KPEN: A Concept in Great Radio! CHRS member and Broadcast Legend Gary Gielow has written a new book chronicling the tales of two young men from Stanford, he and James Gabbert, who brought Stereo and new ideas to the FM radio band in the late 1950s and 1960s. This book is the definitive history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



Also available in the museum store



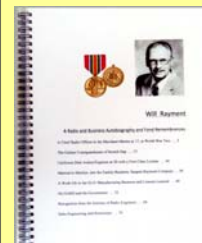
Lee de Forest



Bay Area Radio



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



Will Rayment



KSAN Live Jive CD



So Much to do at CHRS!

