

The National Company

Radios, Friends, and Stories

by

George Maier – W1LSB

Central Electronics Boatanchor Field Day

July 21, 2018

Began business as the National Toy Company

- Incorporated in 1914 by three engineers from Stone & Webster
 - Warren Hopkins – funding
 - Walter Balke - Engineering
 - Rosewell Douglass - COO
- First products
 - “dancing dolly” phonographs
 - power station hardware



- Toy business was really a revenue fill-in between power company contracts

National Company timeline

- 1912 – Hopkins, Balke & Douglass began manufacturing
- 1914 - Incorporated as National Toy Company
- 1916 – Highly profitable, but sought additional investment capital: \$5000
- 1917 – Name changed to National Company to broaden opportunities
- 1919 – Douglass passed away; William Ready became president
- 1924 – National builds Browning-Drake tuners for AM radio
- 1926 – James Millen begins consulting for National
- 1927 – Millen joins National full time as general manager
- 1928 – National SW-2 receiver released
- 1935 – First HRO production
- 1939 – Millen resigns
- 1940 – Warren Hopkins passes away
- 1954 – William Ready retires; C.C. Hornbostel takes over as president
- 1954 – Controlling interest acquired by Lerner Investments
- 1955 – NRCI established as separate entity to build amateur equipment
- 196X- Lerner sells stock
- 196X - NRCI goes bankrupt; assets acquired by FAN-WEL
- 1974 – FAN-WEL re-establishes NRCI
- 1978 – Game over

Top Management



W. A. READY
President



C. C. HORNBOSTEL
*Executive Vice President
and Treasurer*

Malden Plant



61 Sherman Street – 77,000 Square Feet

Malden location today....

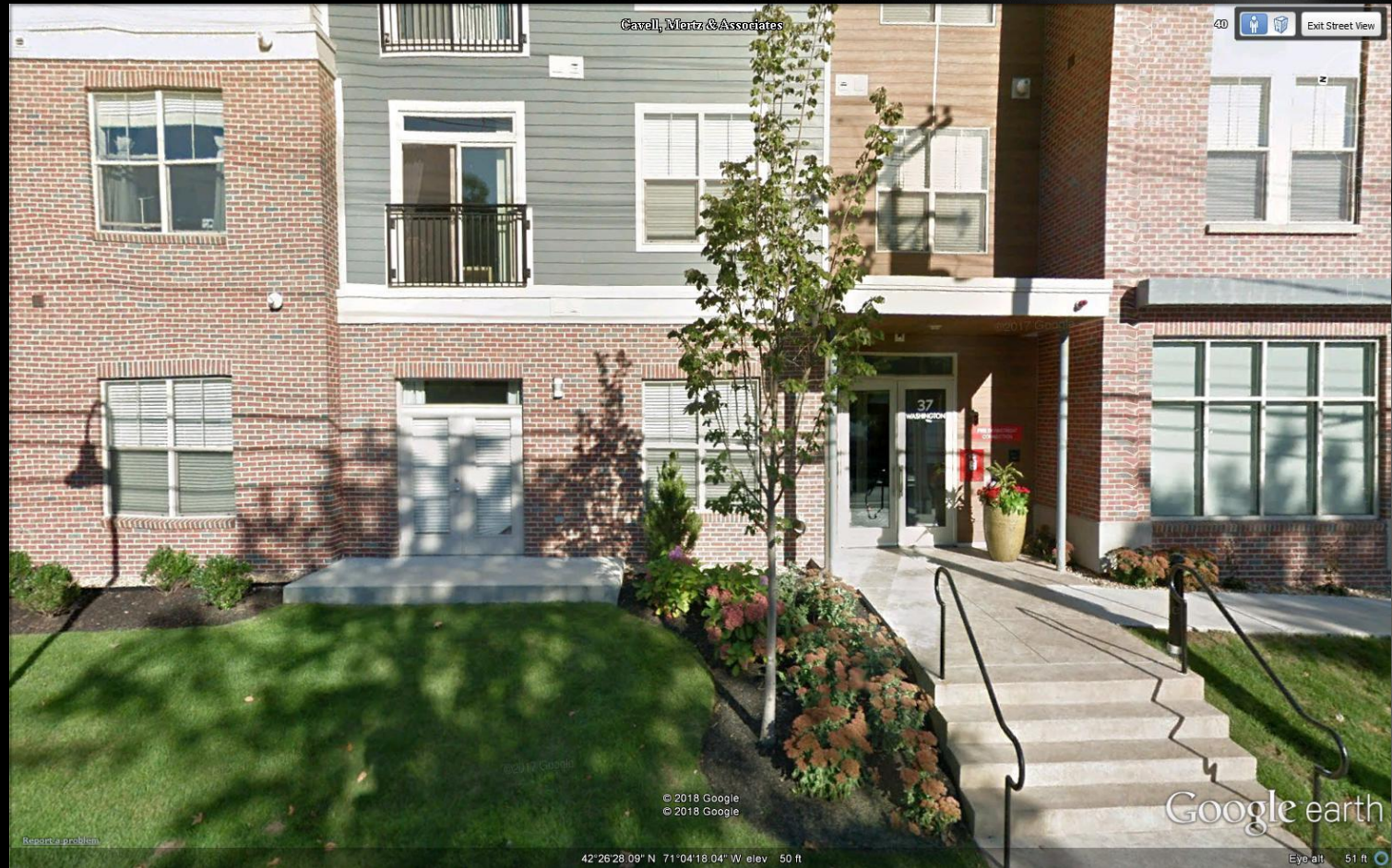


Melrose plant



37 Washington Street – 65,000 Square Feet

Melrose location today....



Factory assembly



Assembly Line on HRO receiver chassis. Progressive steps install harness wiring, solder hundreds of connections.



Coil-Winding Department has facilities for winding coils and chokes to any set of specifications in quantity.

Engineering Documents Area



K1KGG photo

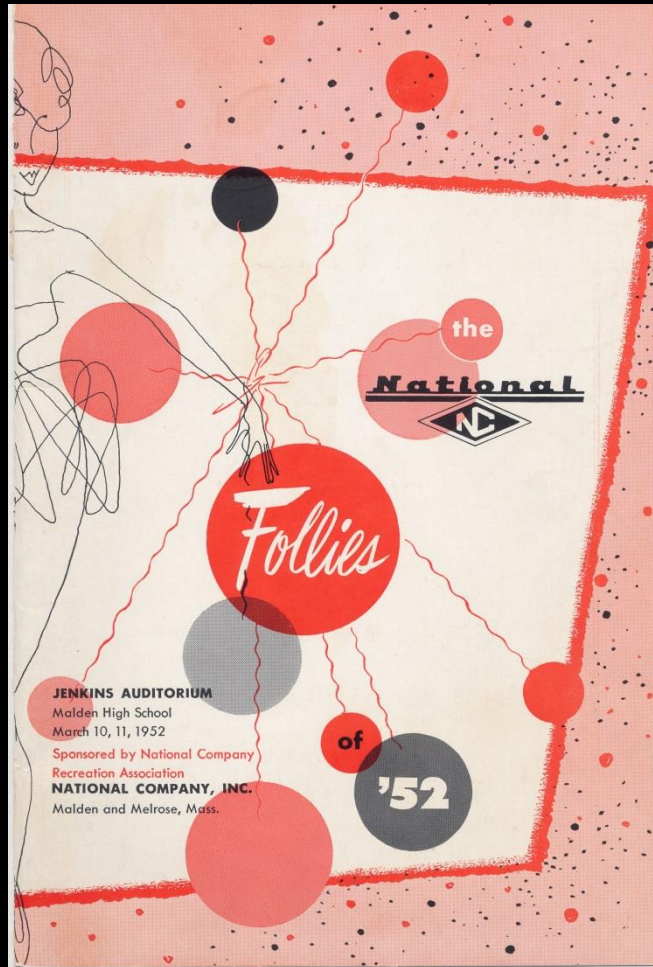
Army-Navy E Banquet - 1943



Management Meeting – June 1953



The social side



The Bowling League



K1KGG photo

Some popular amateur products



SW-3



HRO



NC-173



NC-183D

Popular amateur products



HRO-60



NC-300



NCX-5



HRO-500

Hard to find.....



Harder to find.....



Impossible to find....



NTX-30 Transmitter

Significant amateur milestones

- 1928 – First receiver the SW-2 was released
- 1929 – SW-4 four tube SW
- 1930 – SW-5 & SW-45 five tube SW
- 1932 – AGS first superhet; commercial design for aircraft
- 1933 – SW-3 (produced for 15 years), FB-7, FB-X superhets
- 1934 – HRO introduction; produced for 30 years in varying forms
- 1936 – NC-100 first “catacomb” design
- 1943 – NC-240 series
- 1947 – NC-173 “Kon-Tiki” receiver
- 1952 – NC-183D, National’s first dual conversion receiver
- 1955 - NC-300 “Dream Receiver”
- 1959 – NC-400; an NC-183D on steroids & extremely rare
- 1963 – NCX-3 SSB Xcvr
- 1964 – NCL-2000 Linear
- 1965 – NCX-5 SSB Xcvr & HRO-500 Rcvr
- 1967 – NCX-1000 Xcvr
- 1970 – HRO-600

Many faces of the HRO



HRO Prototype



HRO Tube Receiver Summary

HRO, HRO Senior 2.5vac - 1RF=58, 2RF=58, Mixer=57, LO=57, 1IF=58, 2IF=58, Det/AVC=2B7, BFO=57, AF Output=2A5, Rectifier (in power supply)=80

HRO Senior 6.3vac version, HRO-M - 1RF=6D6, 2RF=6D6, Mixer=6C6, LO=6C6, 1IF=6D6, 2IF=6D6, Det/AVC=6B7, BFO=6C6, AF Output=42, Rectifier (in power supply)=80

HRO Junior - Uses same tube line up as HRO or HRO Senior depending on whether the receiver is the 2.5vac or 6.3vac version

HRO-5/W - 1RF=6K7, 2RF=6K7, Mixer=6J7, LO=6J7, 1IF=6K7, 2IF=6K7, Det/AVC=6SQ7, BFO=6J7, AF Output=6V6, Rectifier (in power supply)=80

HRO-5A-1 - Same as HRO-5/W except add Noise Limiter Amp=6J5, Noise Limiter Rectifier= 6H6

HRO-6 - Same as HRO-5A1

HRO-7 - 1RF=6K7, 2RF=6K7, Mixer=6J7, LO=6C4, 1IF=6K7, 2IF=6K7, Det/AVC=6H6, BFO=6J7, NL=6H6, 1AF=6SJ7, AF Output=6V6, Voltage Regulator=0A2, Rect (in PS)=80

HRO-50 - 1,2RF=6BA6, Mixer=6BE6, LO=6C4, 1,2IF=6K7, Det/AVC=6H6, NL=6H6, 1AF=6SJ7, Phase Inv/S-meter Amp=6SN7, BFO=6J7, P-P AF Output=6V6(2), Rect=5V4, VR=0B2

HRO-50-1 - Same as HRO-50 except change 2IF to 6SG7 and add 3IF=6SG7

HRO-60 - 1,2RF=6BA6, Mixer=6BE6, LO=6C4, 2ndConverter=6BE6, 1,2,3IF=6SG7, Det/AVC=6H6, NL=6H6, Phase Inv/S-meter Amp=6SN7, BFO=6SJ7, 1AF=6SJ7, P-P AF=6V6(2), Rect=5V4, VR=0B2, Filament Current Regulator=4H4

“other” HRO’s

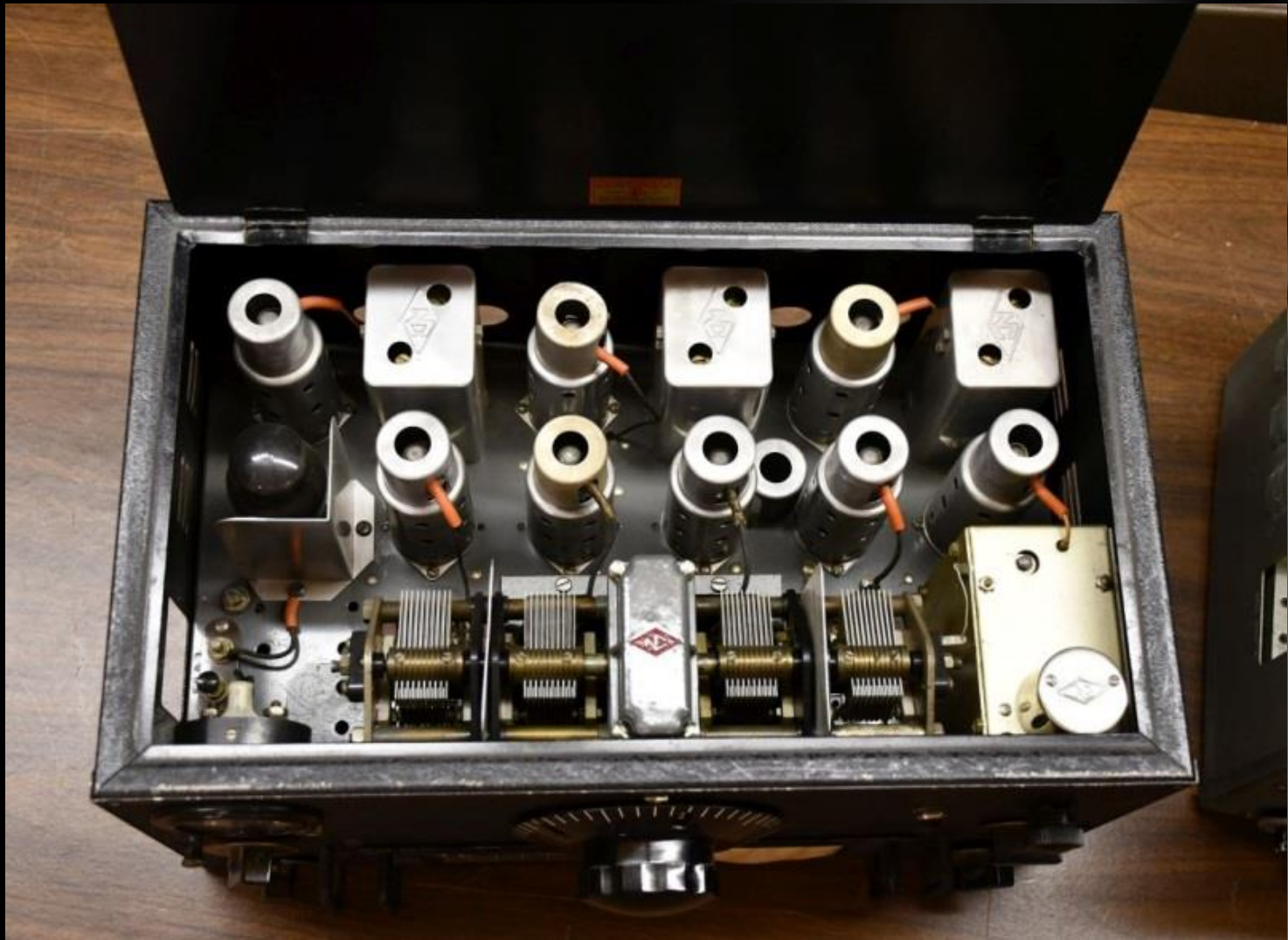


K1ANX showing a German copy – the Korting KST

Korting KST



Korting vs National

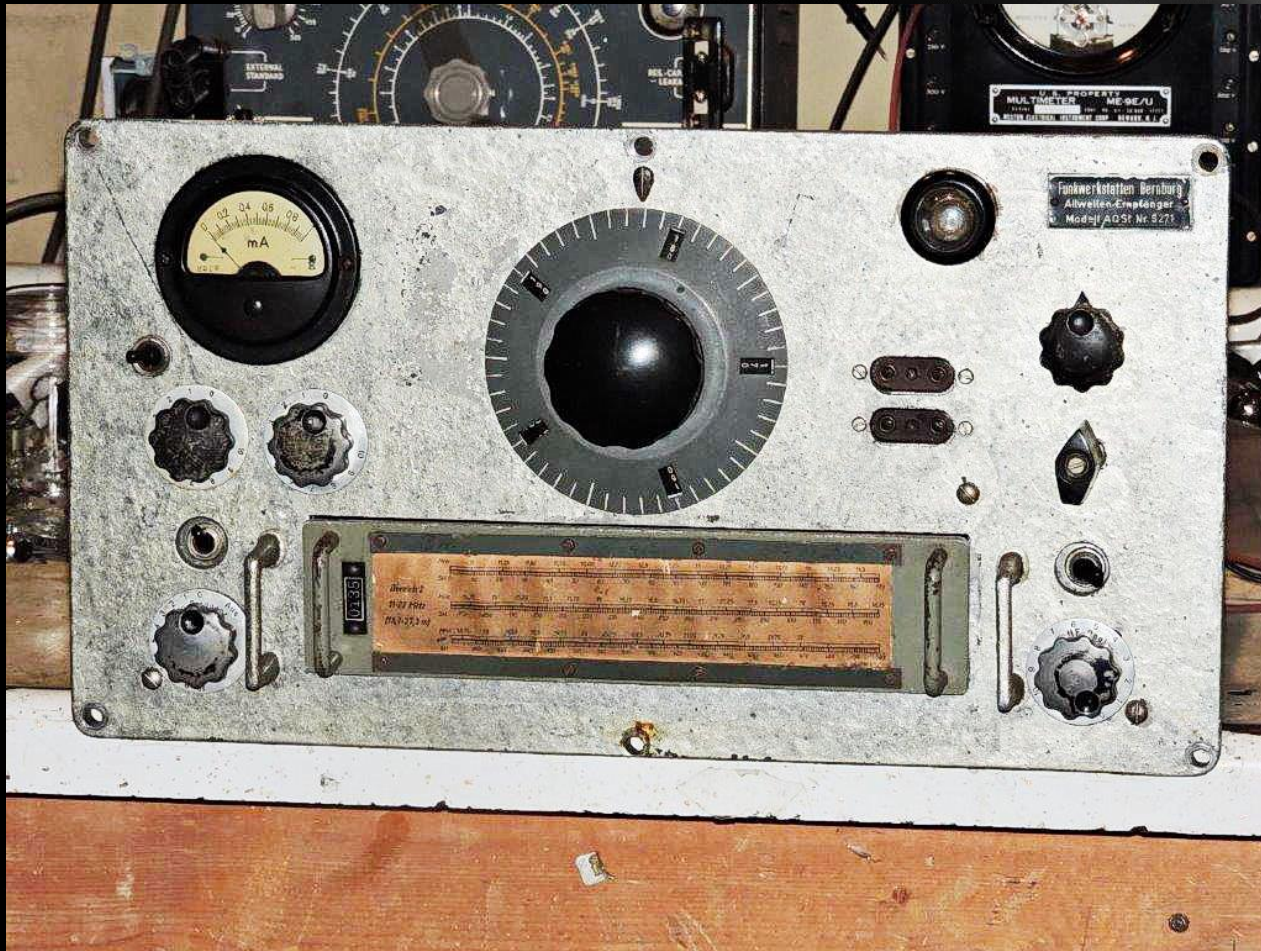


K1ANX collection

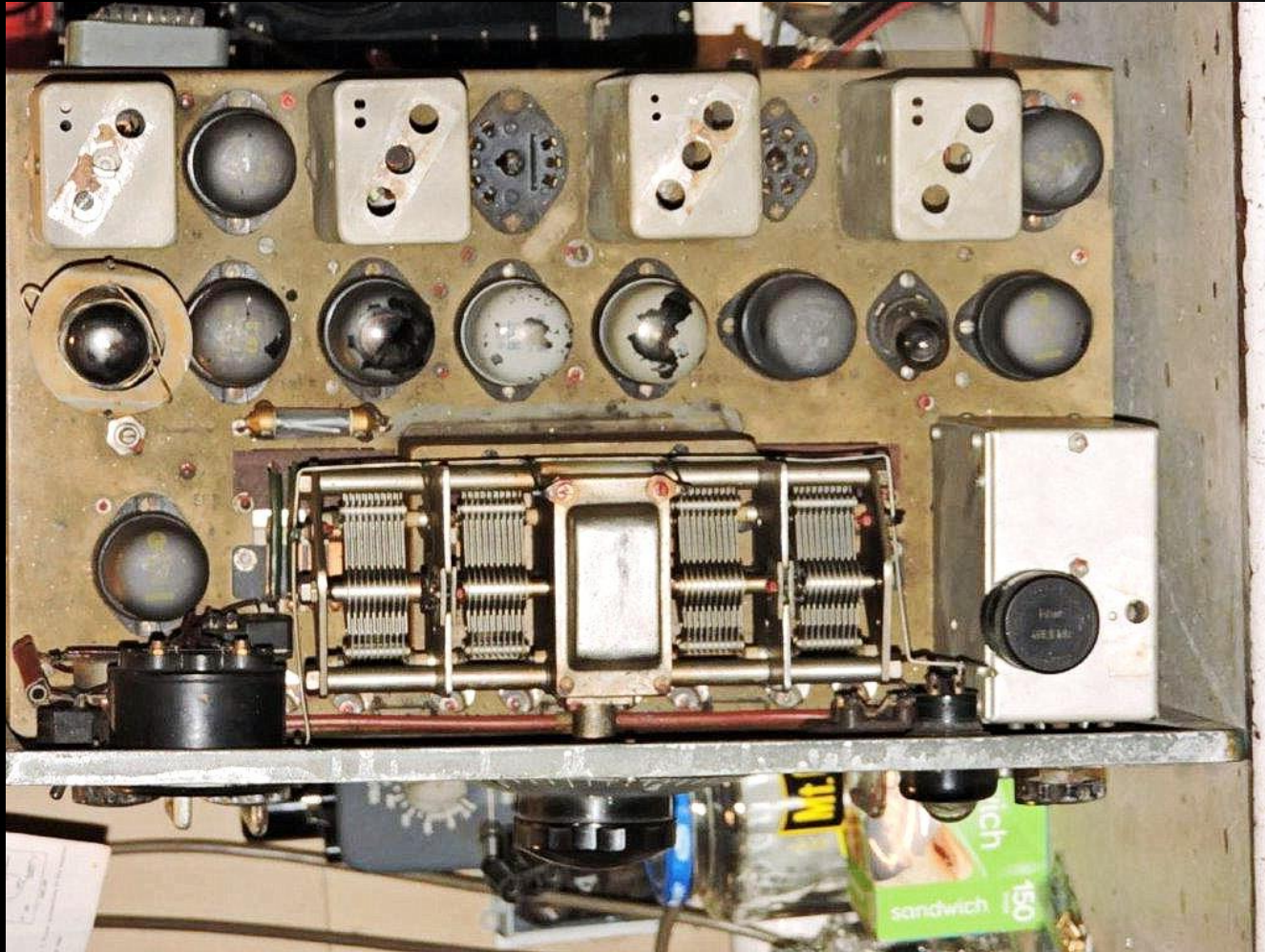
Korting vs National



Funkwerkstätten Bernburg AQST



FWB AQST



More HRO clones



Kingsley A7-R



Japanese HRO



Siemens R-IV

James A. Millen W1HRX



Began as contractor to National ~ 1924

- SW-5
- SW-3
- FB-7
- AGS
- 1-10
- HRO

Resigned in 1939

Millen Company operated from 1938 to 1977
(SK) in 1987

Millen Company location today



150 Exchange St. Malden, MA

QSL Card



W1HRX

61 SHERMAN ST., MALDEN, MASS., U. S. A.

TRANSMITTER
Class C Stage: 2-852s 600 Watts Input
Class A Modulation: 2-849s 3000 Volts

RECEIVER
National AGSX

Acknowledging our recent QSO
Your signals QSA R

James Miller

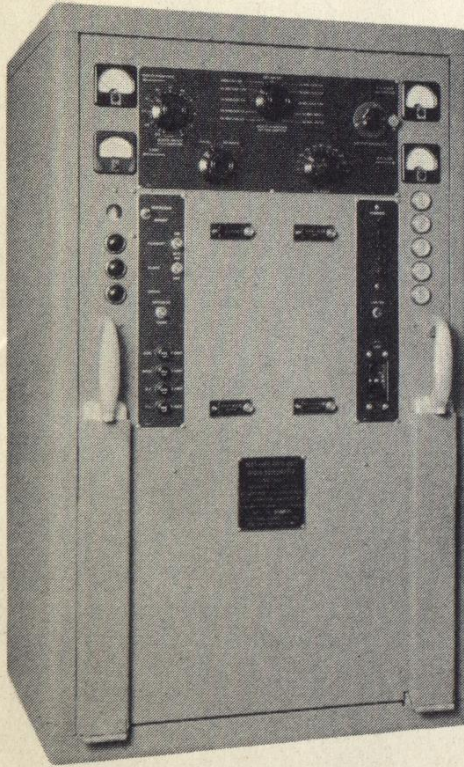
Ed Harrington - W1JEL (SK)



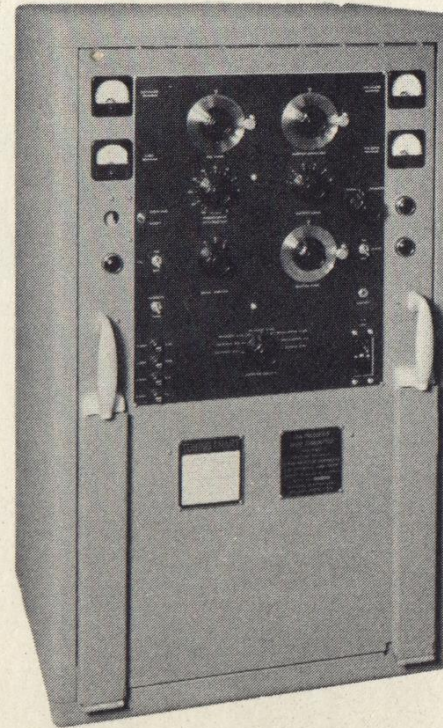
Coast Guard 1942-1948 - Joined National in 1948

- Multi-Channel CAA transmitter
- NBS-2 receiver
- HRO-60
- NC-300

CAA Transmitters



VHF. Transmitter now in use at all Civil Aeronautics Administration ground stations throughout the world.



LF. Transmitter also used in all Civil Aeronautics Administration ground installations.

NC-183MR / NBS-2 Receiver



R-651/URR-39
Bandswitch Coverage

I: 65-155 kc

II: 12-31 Mc

III: 4.4-12 Mc

IV: 1.5-4.4 Mc

V: 0.5-1.5 Mc

NBS-2 dial calibration



The NC-300 “Dream Receiver”



NC-300-CC



Electric Radio – August 1990

Ed Harrington, W1JEL

The man behind the NC-300 "Dream Receiver"

by George Maier, KUIR
64 Shadow Oak Drive
Sudbury, MA 01776

When I first called Ed Harrington to ask if he was interested in talking about his days at National, he said "Why me? There were a lot of people that did more interesting things than I did." In fact National did have a great deal of talent pass through its portals over the course of time, but Ed's work had a profound impact on Ham Radio, and its effects are still recognized today by many classic radio enthusiasts.

Ed grew up in Medford, Massachusetts, and attended the local vocational high school where he became licensed as W1JEL during his third year. After graduating, Ed found that jobs were very difficult to get; it was the mid-thirties, and the country was still feeling the effects of the great depression.

Having an interest in radio paid off because Ed found work as a part time radio repairman, afternoons and Saturdays, for \$8 a week. A few years later, in 1940, things improved considerably when he found full time employment, through a ham friend, at the National Company in Melrose. His first assignment was learning how to align HRO receivers, as a great many of them were required to fill orders placed by the British Military; it was the start of World War II in Europe. In two years Ed was working in the final test department, which, as the name implies, was the last performance evaluation prior to shipment.

In 1942, Ed joined the Coast Guard and attended classes in Radar, Sonar and Loran at the Anacostia Naval Base in Washington, DC. After that he spent some time at a base in New Jersey and at the Coast Guard Academy in New London,

Connecticut, lecturing young cadets in circuit theory; all the while hoping for a shipboard assignment. As the war was drawing to a close, his wish for sea duty came through; much to the chagrin of his new bride.

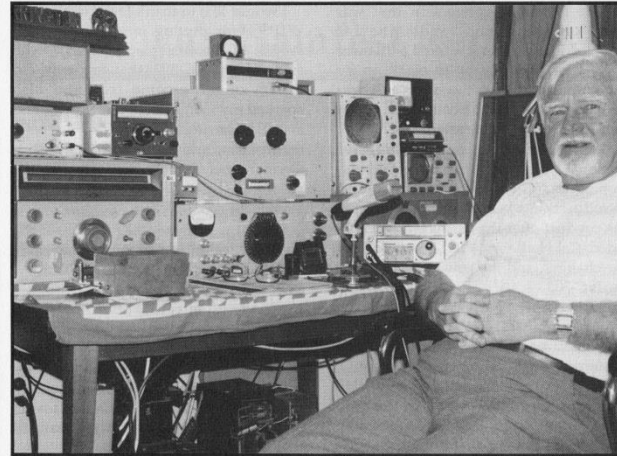
After roaming the Pacific for a few years, Ed had enough points built up to leave the service, and in 1948, he rejoined his wife along with their new daughter. Fortunately, he also rejoined the National Company.

A year and a half later, and with more test experience under his belt, Ed was assigned to the engineering department to work with Ray Calk (designer of the NC-173) on a multi-channel VHF transmitter project for the CAA (forerunner of the FAA). "The funny thing about that was, that Collins, who had a great reputation in transmitters at that time, won the receiver contract, and National (who specialized in receivers) won the transmitter contract."

Later, Ed designed the military version of the NC-183, which required changing the frequency range from the standard version. "Then I did the HRO-50-2, which became the HRO-60 before it hit the market; after that, I did the NC-300".

During that period of time, a lot of changes took place at National. Bill Ready, the owner and one of the original founders, sold the company, and of course the management structure as well as the general business philosophy changed considerably. One of the new owners was a member of the Macy family, and National built consumer Hi-Fi's for a while that were sold in Macy stores.

The NC-300 was Ed's project from the start. He attended many trade shows for National and answered technical questions from customers.



Ed Harrington, W1JEL

At one particular show he looked longingly at the Collins gear and thought "how nice it would be if we could come up with something that was somewhat competitive but nowhere near the price".

Taking this thought home with him, Ed launched into a period of brainstorming and decided to work on a plan for the "Dream Receiver". "During a visit to the ARRL, we kicked a few ideas around, and Ed Tilton, WIHDQ, suggested putting a converter range in the new receiver". Ed (Harrington) thought that was a good idea and took it a step further by adding direct calibration on 6M, 2M and 220 Mhz.

Another noteworthy contributor was radio store owner Carl Evans, W1BFT; in fact, several National dealers gave their inputs. "When I was done gathering ideas, I put it all together in a proposal, wrote a design objective, presented it to the new National management, and they approved it." At completion, the entire receiver cost National about

\$35,000 in engineering, and each unit ran about \$100 in parts to produce. With overhead added, the final cost was about two and a half times that.

When the NC-300 was introduced, it became an overnight success. The first production run of 2000 units sold out immediately, and a second run of 2000 units followed quickly. "We had never made so many units at one time, except for SW-54's, maybe."

The crowd at Hallicrafters "was taken completely by surprise, and admitted that they had no Ham band receiver in the works." They wired me immediately and made me a nice job offer, but I didn't want to move to Chicago. "It didn't take them long to get going though, they moved pretty fast." And so the SX-101 came into being!!!

When I asked Ed what he would change if he had to do the NC-300 over, he answered this way: "The biggest drawback was the dynamic range."

Walt Schreuer – K1YZW (SK)



National Company from 1958 to 1966
Mostly government projects
His HB amplifier became prototype for NCL-2000
Started Comdel in 1967 – later Vomax

Annual Reunions



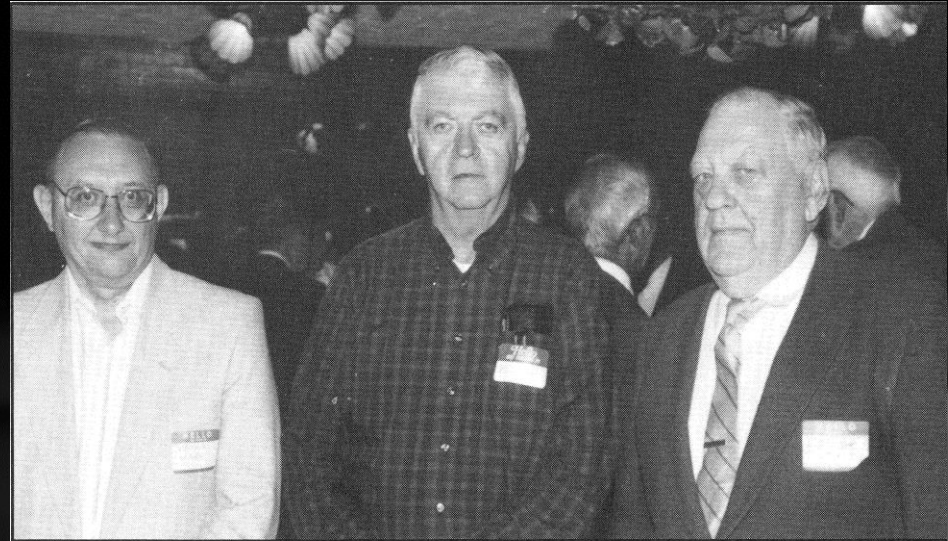
Vin Messina, W1HRW

“This is the time of year when good friends of the National Company Get together for their annual reunion and dinner.”

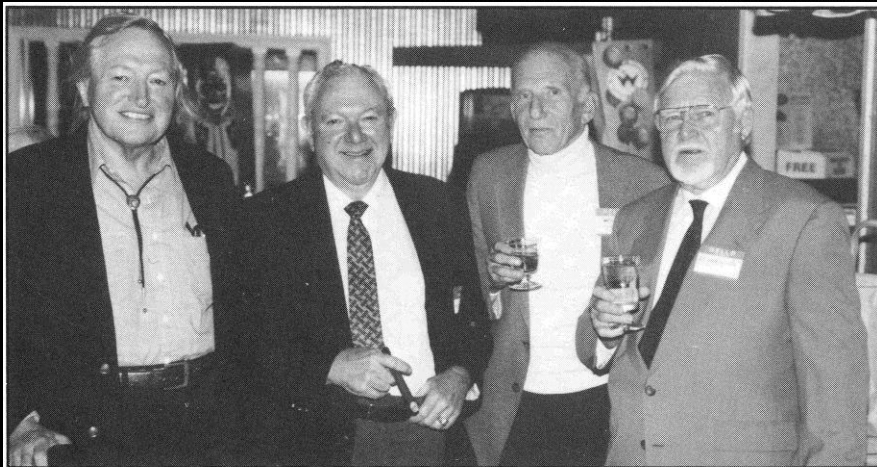
1992 National Reunion



Left to right: Tom Potts, W1NRY; Conrad Espinola; Max Fuchs, WA1NJG



Left to right: Wayne Ledger, W1EWL; Phil Guinan; Don Poulin, W1MXC.

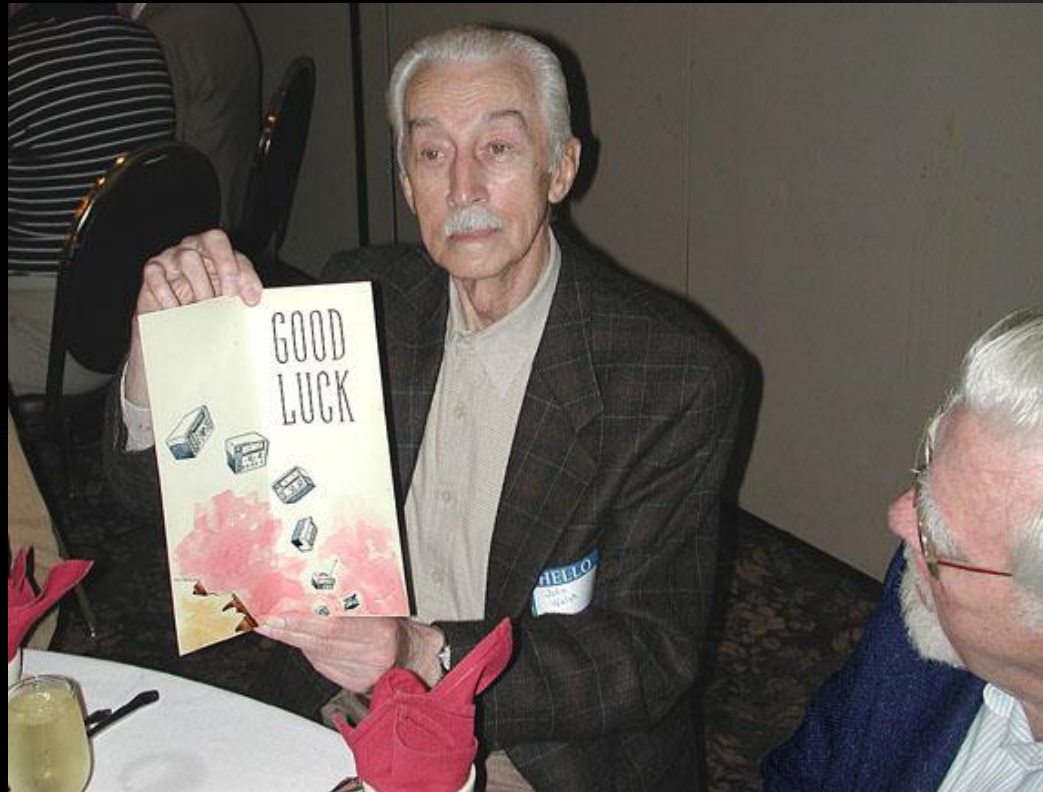


Left to right: Henry Cross, W1OOP, Arthur Orenburg, Walter Schreuer, K1YZW, Ed Harrington, W1JEL



Left to right: Bob Williams, W1JOX and Jack Ivers, W1HSV.

2000 National Reunion



John Walsh & Ed Harrington: designers of the NC-300

Personal experiences....

NCX-3 Transceiver
NCX-5 Transceiver
NCX-1000 Transceiver *
NC-173 Receiver *
NC-183 Receiver
NC-183D Receiver
NC-200 Transceiver
NC-300 Receiver
NC-300CC Converters
NC-303 Receiver
HFS Receiver *
HRO-5 Receiver *
HRO-5TA1 Receiver *
HRO-7 Receiver *
HRO-60 Receiver *

NCX-A Power Supply



More info.....

A Brief History of the National Company, Inc.

By John J. Nagle, K4KJ

http://www.qsl.net/jms/bio_rem/bhnc.html

The Evolution of the National HRO and Its Contribution to Winning World War II

https://www.prismnet.com/~nielw/HRO_BarryWilliams/HROArticle.htm

Western Historic Radio Museum

<http://www.radioblvd.com/>

James Millen Society

<http://www.isquare.com/millen/millen-page.htm>

DATING THE EARLY HRO

<https://www.prismnet.com/~nielw/datghro/datghro.htm>

Electric Radio # 16 – August 1990 & # 43 – November 1992

CQ Magazine – May 2001, page 77

QUESTIONS & THANK YOU!



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