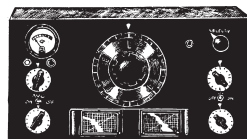


THE COMMUNICATIONS RECEIVER



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The Browning-Drake Receiver

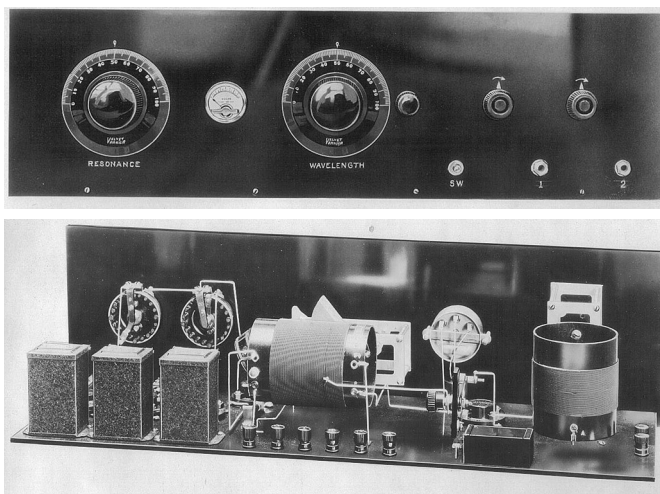
The Browning-Drake receiver evolved from the Glenn Browning and Fred Drake studies on RF transformers at Cruft Laboratory, Harvard University, in 1923. The typical RF transformers of the time were only about 20% efficient when compared to the maximum theoretical performance. Browning and Drake found that the reason for this poor performance was an EMF generated by capacitive coupling between the primary and secondary windings. This EMF was out of phase with the EMF generated by the magnetic coupling between the those windings. By winding the primary in a narrow slot near the end of the secondary, they were able to reduce the capacitive coupling to the point that the RF transformers were up to 90% efficient.

Browning and Drake approached The National Company to produce tuning units called "Regenaformers." These units consisted of a National 350 pF variable capacitor coupled to an RF transformer designed according to the Harvard experiments. Also included was a tickler coil that could be turned from parallel through a right angle and on to 180 degrees with respect to the secondary.

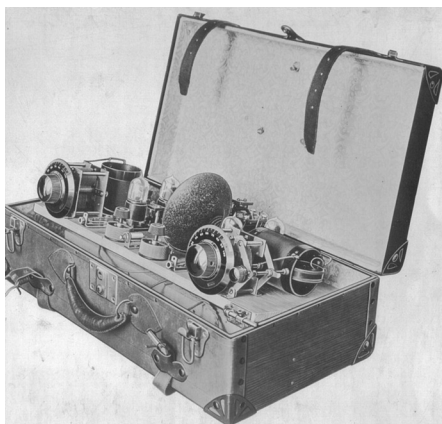
The unit was originally equipped with a National type "A" vernier dial, marked from 0 to 100 over 90 degrees and incorpo-

rating a 4-to-1 reduction. Later, the type "S" variable ratio dial, as used in the National SW-3 receiver, was supplied. National also produced an RF coil with a 500 pf variable capacitor and the same dial system. These were made available from 1924 through 1927 as the "Official Browning-Drake Kit Set." The price was about \$22.00. Quite a few articles describing the construction of a receiver using these tuning units appeared in such publications as *Radio Engineering* and *Radio News*. This prompted Browning to publish a brochure, available for 10 cents, describing the construction and recommended parts for the "Browning-Drake Receiver."

The tubes available in 1923/1924 included the DR-3, UV-199 and 201A. Browning and Drake found that all were usable for the RF amplifier, but the 201A gave more power for audio amplification. The UV-199 on the



Front and interior view of Browning-Drake with impedance coupled audio.



The two-tube "tuner in a suitcase."

other hand, simplified "balancing," or what we would now call neutralization. The reason: being smaller than the 201A, it had lower grid to plate capacitance. A typical receiver of the type shown in the Browning brochure had the UV-199 RF amplifier, a 201A detector and three more 201As as audio amplifiers. National also advertised a tuner unit with two UV-199s and no audio amplification.

Recently I was given scans of the first National *Annual* by the grandson of W. Ready, the president of National Company. These pictures included a drawing of the type A dial, several pictures of early breadboard transmitters and quite a few pictures of Browning-Drake receivers. Included was a picture of the two-tube tuner in a suitcase that is also shown in other publications, such as a 1927 *Radio News* article by Lynch.

The National album also included the pictures shown in the Browning brochure. One of the receivers shown has an inductance coupled audio amplifier; another shows transformer coupled

audio amplifier tubes. The inductance coupled system has a dial unit like that used in the SW-3. Most of the early National coils had tags bearing "Regeneformer" and "National" labels and are wound with green double silk covered wire.

In July of 1927 Browning ended his relationship with The National Company to spend his full time with the Browning-Drake Corporation, which was formed to provide kits and completed receivers. These had been manufactured by The National Company up to that time. They included the tuning unit kit, the B-D Standard, Junior and Senior receivers and the Drake 5R (introduced in 1926.) The "5" indicated the number of tubes, the "R" indicated resistance coupled audio amplification.

The kit did not have "Browning-Drake" on the front panel, but the BD receivers did. My 5R does not have tags on the RF coil or the "Regeneformer," and National does not appear anywhere on the receiver.

Some sources tell us that that Browning-Drake brought suit against The National Company for continuing to produce and



The author's Browning-Drake 5R.

sell Browning-Drake tuning units marked with the Browning-Drake name. However, I haven't found direct evidence that there was a problem between the two companies. In fact, Browning appears to have done additional work with Millen at National in 1929 and 1930. During this period National produced a TRF AM tuner and external amplifier with speaker and power supply. These were designated the "MB-29" and "MB-30". I believe that the MB stands for Millen and Browning.

I do have a pair of late National Browning-Drake tuning sets that include the RF coil and RF transformer, National capacitors and type "S" dials with tags that state "National Company." The transformer is tagged as a "Raegeneformer." Perhaps this change in spelling of the RF transformer tag was to assist in a legal defense against the Browning-Drake Corporation. These coils were wound with enameled wire. Incidentally, Millen's opinion of Browning and Drake was that Browning was a really nice guy, but Drake was the brains of the group.

By now you may be wondering how a well known broadcast-band receiver made it into the "Communications Receiver" column. The reason stems from an article by Glenn Browning in the April, 1925 issue of *QST*. Titled "The Regeneformer," it discusses a 3-tube receiver (RF amplifier, regenerative detector and transformer-coupled audio stage). Details are given for the construction of RF and "Regenaformer" coil sets to cover the then new "Short Wave" bands (60 to 200 meters and 15 to 76 meters) as well as the broadcast band.

See the bibliography for several later articles concerning the Browning-Drake design. Among those included are: "The Evolution of the Browning-Drake Receiver,"

which introduces a "Phasatrol." This is a device consisting of a fixed capacitor with a variable resistor which provides phase shifted neutralization voltage having less variation with frequency. The article also discusses impedance and transformer coupled audio.

"A Lamp-Socket-Operated Browning-Drake Receiver," which shows a method to supply power from an AC socket for the DC tubes (UV-199, 201A); and "A Booster Unit for the Browning-Drake," that uses the new 222 tetrode as an RF amplifier.

I would like to hear from anyone who has, or has seen a short wave Browning-Drake.

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