

# When a Dairy Farm Became a Radio Blaster

At 3XN, Bell Labs could operate high-power broadcasting tests, free of urban restrictions

BY MARK DURENBERGER

Online research can be frustrating yet often rewarding. Take the case of 3XN.

I had occasion recently to visit the ancient transmitter building of WCCO. In a rusty filing cabinet beside a dusty desk, I came upon a Western Electric pamphlet touting their new “107A transmitter.” The descriptive text invited me to “visit the live testing labs at Whippany New Jersey to see the 50-kilowatt 107A in action.”

The document was circa 1928 so I figured I had missed the boat and all the tickets were gone. But was there more to this invite from the three-year-old Bell Labs?

able and competitive WEA. And once WEA let the “commercials” genie out of the bottle, the imperative among licensees became to produce the biggest signal in order to attract the most advertisers.

Then in 1926 AT&T sold its stations to RCA (NBC) while it remained in the equipment market with Western Electric. Now its hands-on operating research would be limited to its smaller experimental stations. Many of those were impaired by their urban locations and Western Electric needed some breathing room to develop high-power hardware.

Enter Bell Labs.



Fig. 1: The 107-A, commercial version of the Model 7.



a milking parlor. In a few short months of conversion work it became a test-bed for a 50-kilowatt transmitter project code-named “The 7A.”

7A design work focused on the use of quartz-crystal controlled oscillators, stabilized feedback, superior harmonic rejection ... and, in the 7A, a transmitter design that for the first time was capable of sustained 100% modulation. It was a water-cooled behemoth that came to market as the Western Electric 107A (Fig. 1).

(At WCCO I stood in the ballroom-sized space that could accommodate a 107A. The shiny new Nautel “refrigerator” in the corner invited comparison and inevitable observations about progress.)

## THE 3XN ANTENNA

The original 3XN antenna system was a traditional “Flat Top” elevated about 250 feet (Fig. 2). The ground system was a 7,000-square-foot grid of intersecting wires in a rectangular pattern.

The curious among the staff soon

instituted an informal “antenna competition” to evaluate various antenna ideas and to raise the level of knowledge about antenna coupling-networks. One of those experiments, in which a wire was trailed from a balloon, led to the development of the vertical radiator; WABC was the first station to operate this “new vertical technology” in 1928.

3XN operation was limited to the “Experimental Period” after midnight. Soon planet-wide reception reports overwhelmed the tiny Whippany Post Office ... even though the station requested “no QSLs.” Summer operations sought information about fading, skywave and performance during severe weather.

It was at Whippany that a lad by the name of William Doherty developed the “Doherty Linear” system that would revolutionize transmitter design. Meanwhile other engineers and scientists carried forward experiments of interest in the style that would characterize Bell Labs. Before long the 3XN site was being used to evaluate air-to-ground communications, underpinning the development of Whippany as a major defense-industry research site.

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I took to the keyboard.

In the late 1920s a number of major AM stations were planning power increases to as much as 50 kilowatts, and that created a competitive market for high-power transmitters. Early industry knowledge of high-power broadcast transmission was anecdotal and empirical — shared scattershot experiences among the stations of transmitter manufacturers General Electric, Westinghouse and AT&T.

AT&T’s Western Electric manufacturing arm (“WECO”) gained insight from its own stations, such as the vener-

## BELL LABS AND BROADCASTING

The corporate culture of AT&T’s futurists was systematic research; such was the mission of the Bell Laboratories founded in 1925.

In support of WECO’s transmitter development, Bell began looking for a new research site and found a dairy farm in Whippany, two dozen miles from Manhattan. Here Bell could operate high-power tests, free of urban restrictions. The site was licensed for experimental 50-kilowatt transmission with the call “3XN.”

The original Whippany building was

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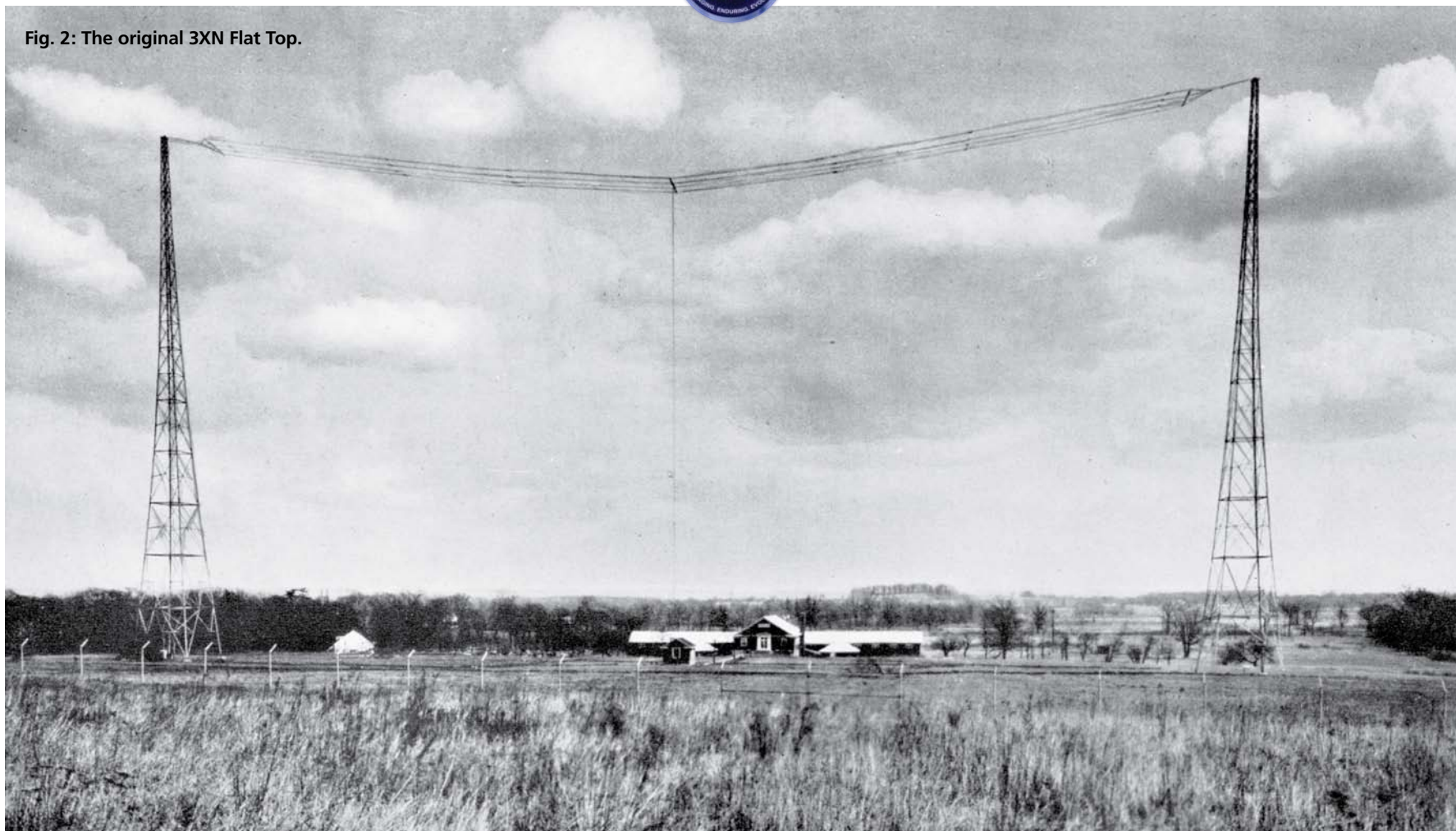
## TV ON RADIO

Whippany was probably best-known for a well-planned event that took place on April 7, 1927, when 3XN transmitted television by radio.

Engineers had designed a TV system prototype that used three separate information channels (“voice,” “picture” and “synchronization”). The 3XN transmitter/antenna was apparently used for the aural and multiplexed sync information, and a separate 5-kilowatt transmitter and antenna were installed for the “picture.” Both operated on standard AM channels (thorough details on this experiment are presented in typical Bell Systems

(continued on page 22)



**Fig. 2: The original 3XN Flat Top.**

## 3XN

(continued from page 20)

fashion in the Bell Systems Technical Journal for October 1927).

Herbert Hoover, whose live visage was used during the tests, became the first game-show contestant of the 20th century.

### QUESTIONS REMAIN

Little regulatory history remains within reach about the other technical operations of 3XN. For example, it appears the call letters 3XN were assigned in late 1926, yet “DX-er” reports of 3XN reception are sprinkled through their reports during the early 1920s. What signal were they hearing?

And why did The Talking Machine World of June 1928 report that Powel Crosley “intended to purchase 3XN if he was granted 50-kilowatt authority for WLW”? Was there an interference issue that had to be resolved to clear WLW for high power?

Online research is rewarding, but at the end of the day one is subjected to the possibilities of poor journalism or speculation and a grain of salt must remain on the menu. The available Bell records are thorough and detailed as to the first TV transmission, but sadly we’ve not found such detail on the work

behind the 107A and its successors.

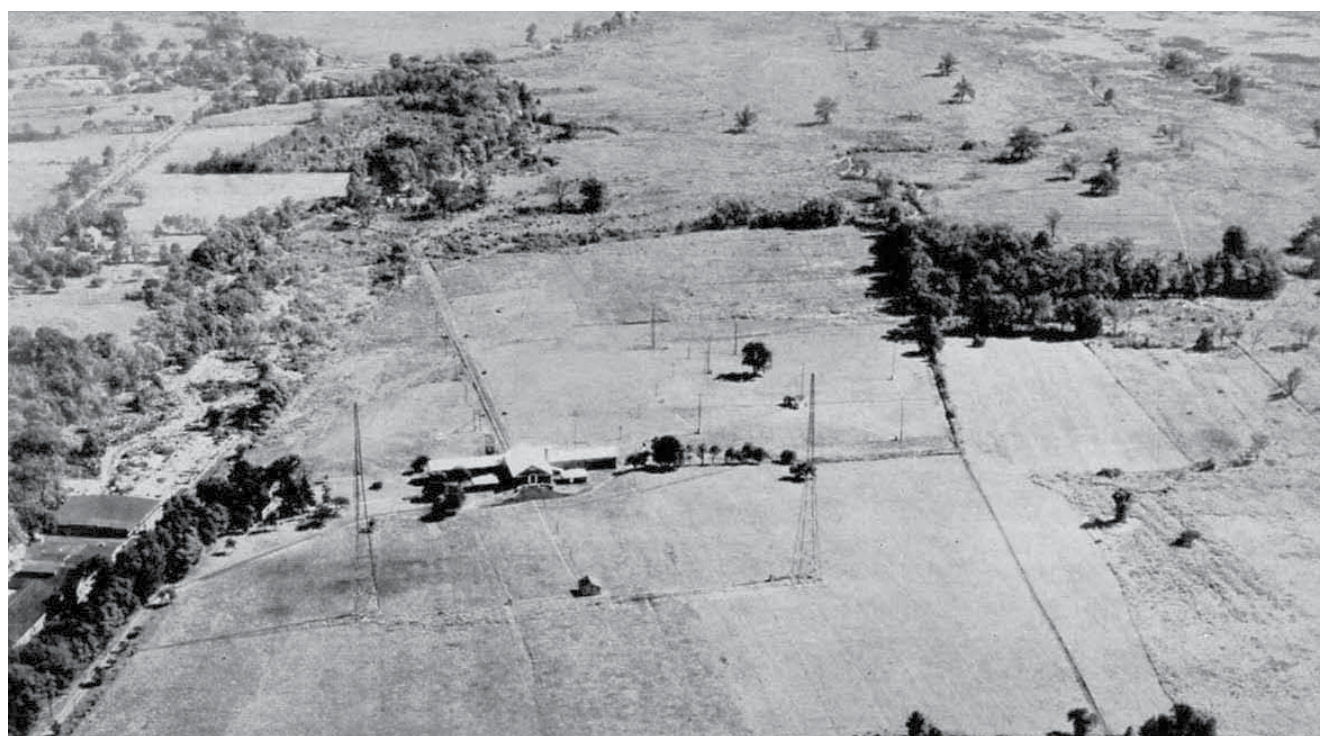
It’s likely that somewhere ... in some attic ... lie personal notes and diaries of those who were part of 3XN. It’s less likely that a “visit to the vaults” of some Bell Labs facility somewhere will be illuminating.

But perhaps this report will stimu-

late your own interest in researching 3XN; if so, we trust you’ll share your research success. (A search “non-hint”: Given the highly competitive market for 50-kilowatt transmitters as major stations scrambled for signal superiority, it’s unlikely you’ll find much about 3XN in the RCA or GE publications.)

The Western Electric transmitters, particularly their Doherty systems, were “good iron”!

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**Fig 3: The Whippany test site.**