



## VHF Railroad Radio History

In the last SCAN MAN, we discussed early radio installations on the railroads. Because the components used in these systems were large, heavy, bulky, and required complex antennas and skilled operators, radio use on pre-World War II railroads never caught on. The railroads needed reliable, economical radios that were smaller, lighter, easy to use, and simple to install. Sensing a large market for this type of equipment, Westinghouse began to develop ruggedized VHF communications gear that would meet the railroads' needs.

Needing a test bed for its new products, Westinghouse contracted with the New York, New Haven & Hartford in early 1937 to demonstrate a working VHF radio installation. The setup consisted of a pair of transmitters, one each mounted in a road freight locomotive and a caboose. Transmitter power was 15 watts operating at a frequency of 60 MHz. Separate antennas were used for transmitting and receiving.

The locomotive whip-type antennas were mounted in a loose V-shaped configuration in front of the smokebox, while those on the caboose were roof-mounted in a flattened rabbit ears arrangement. Cab radio power was supplied through a rotary converter connected to the lighting dynamo, with the caboose radio getting its power from a battery bank charged by an axle-driven, 32-volt generator.

The installation proved to be a success, with useful radio communications readily established between the front and rear ends of a 129-car freight train running from Springfield, Mass., to New Haven, Conn. Little interference was encountered despite initial concerns regarding noise generation from the overhead catenary. Only in the middle of the tunnel at New Haven did the signals fade out. Other tests were successfully completed on a train running between New Haven and Maybrook, N.Y.

Other than a lower operating frequency and the use of separate transmitting and receiving antennas, the experimental Westinghouse installation on the New Haven was strikingly similar to modern-day VHF railroad radio setups. The installation was ahead of its time, but in spite of its success, it did not attract much attention from other railroads. It did, however, pave the way for the future adoption of VHF radio by the rail industry.

Many roads, such as the Southern Pacific, continued to regard radio as a last-resort measure to bridge pole line outages caused by wildfires, storms, and slides. To this end, in late 1937, SP installed a 500-watt VHF transmitter and receiving equipment in slide territory at Norden, Calif., and equipped a fire train based out of Emigrant Gap with a 50-watt transmitter and related receiving apparatus.

However, some companies did show continued interest. On December 14, 1937, the Pennsylvania Railroad demonstrated a VHF radio system for locomotive-caboose communication on Train P-9 running from Philadelphia to Paoli, Pa. The equipment, which was supplied by RCA, worked satisfactorily over a half-mile range. The railroad had previous-

ly experimented with VHF radio in yard and terminal operations.

Over the next several years, several roads continued to experiment with VHF, which attracted the attention of the AAR and federal agencies. Following the issuance of an experimental license by the FCC, the Santa Fe equipped a 68-car potato train at Bakersfield, Calif., with Bendix VHF radio gear for locomotive-caboose communication. On June 19, 1944, the train left for Chicago, a distance of 2,200 miles.

Along the way, operating data were gathered for analysis by the Radio Technical Planning Board of the AAR. The equipment, which operated at 100 MHz, worked satisfactorily under all conditions encountered along the way. This marked the first time radio had been used in quasi-transcontinental train service. The Santa Fe had previously used the same apparatus for experimental yardmaster-train communication at Los Angeles.

Throughout 1944, the FCC issued additional experimental VHF radio licenses. On June 5, the Rock Island demonstrated Motorola FM radio equipment at Burr Oak Yard in Blue Island, Ill., for yardmaster-switcher communications. The equipment operated at a frequency of 39.54 MHz, and marked the first time FM transmission had been used in railroad work. As with standard FM radio broadcasts, FM reception is much more resistant to static interference when compared to AM, which is important when transmitting critical information in a railroad operating environment.

On June 18, 1944, the Rock Island conducted VHF radio tests among trains and wayside offices located between Chicago and Kansas City. The company also purchased portable emergency radio sets to bridge damaged pole lines, of which the first application was made in April between Selden and Colby, Kan., where a storm did, in fact, destroy the pole line.

On July 8, 1944, the Seaboard conducted successful end-to-end train radio tests using Bendix VHF gear on a freight train from Richmond to Miami. Bendix also equipped several Burlington freights with end-to-end VHF equipment for extensive testing on the line between Chicago and Kansas City during early July. The Rio Grande conducted experiments using VHF police radio apparatus working in the 30-40 MHz range on freights operating out of Denver, beginning in April.

During 1945, many roads began to experiment with VHF radio communications. These included the Baltimore & Ohio at New Castle, Pa.; the Chicago & North Western at Milwaukee and Chicago; the Illinois Central between Freeport, Ill., and Waterloo, Iowa; and the Texas & New Orleans between El Paso and Valentine, Texas.

Following the end of World War II, declassified reports detailing the successful performance of VHF radio on the battlefield further enhanced its reputation in the minds of railroad executives. This, coupled with the release of VHF military technology to the pri-

vate sector and the desire of manufacturers to find non-military applications for their products, resulted in an explosion of VHF radio use on just about every railroad that could afford it.

In what is generally considered to be the first permanent VHF radio installation, the Baltimore & Ohio in January 1946, implemented a Bendix system at its New Castle hump yard. The system operated in the AM mode at a frequency of 159.27 MHz. With heavy fog often obscuring hand signals and color-light aspects at the hump, switching operations regularly ground to a halt. After a successful series of experiments with VHF, the company decided to install a permanent system to help speed operations.

At the beginning of the VHF explosion, many railroad employees did not accept their new radios. Crewmen would grow weary of the chatter and turn their radios off, claiming that equipment had failed or that signals were unreadable. Others proclaimed radio to be a "eissy" innovation and simply refused to use it.

Operating unions were concerned that radio would eliminate jobs and thought that radio operation crossed craft lines. Many engineers believed they were doing operator's work and argued that only members of the telegraphers union should operate radios. However, when the convenience and safety of radio operations became clear, no one could imagine getting by without it.

Train dispatchers found radio to be both a curse and a blessing. Although radio made for smoother operations, it also increased the amount and density of messages — and stress — they had to endure. Just about everyone on the railroad called the dispatcher to relay messages, order materials, and such. Also, train location information formerly provided by operators was now managed by dispatchers. And, as always, the possibility for miscommunication continued to exist.

Management either mandated radio use and revised railroad rulebooks to govern its operation, or simply installed radios and let crews use them as they saw fit, providing they did not violate any existing operating rules. As radio use became accepted, railroads developed their own communication styles based on existing operations, new rules, and the personalities of its users.

Today, nearly all U.S. and Canadian roads of all types and sizes employ VHF radio to handle a variety of voice and data communications. The availability of quality, reasonably priced radio gear has made it possible for even the smallest shortline, industrial, or tourist railroad to integrate radio into their operations.

The great majority of railroads continue to use conventional VHF FM communication systems that haven't changed much in the past 70 years. Other than the substitution of transistors and integrated circuits for vacuum tubes and relays, things have pretty much remained the same on the railroads. Only recently have railroads begun to implement modern techniques including digital communications and trunked transmissions.

As in the early days of wireless communications, complete adoption of new technologies will likely take some time, but once the industry decides to go with them, things will likely change quickly. Fortunately for railfans, it appears that scanner manufacturers and software developers will be capable of keeping up with the latest developments. ☐