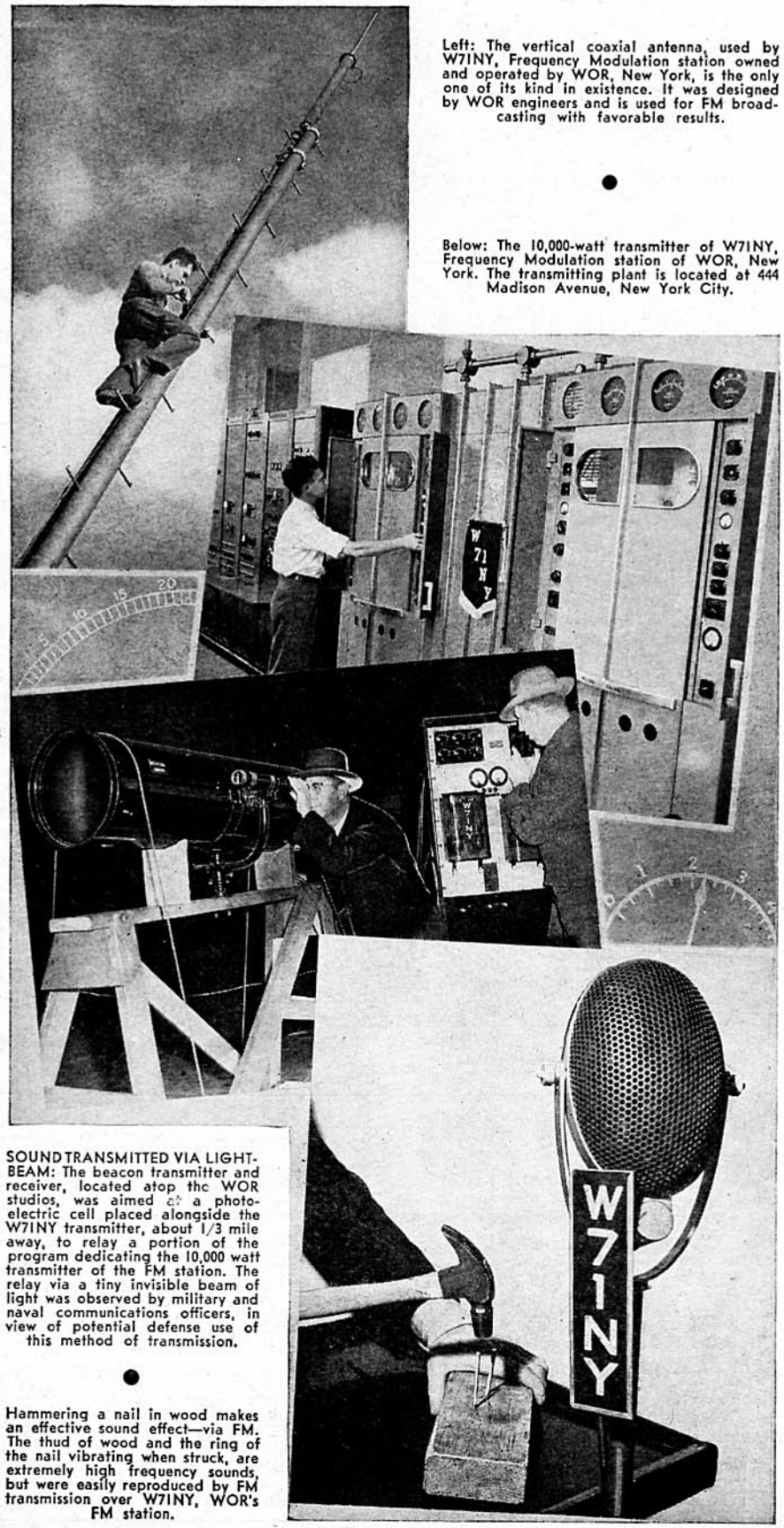
WOR's New FM Station

Power 10KW Freq. 47.1 MC Call W71NY



Left: The vertical coaxial antenna, used by W71NY, Frequency Modulation station owned and operated by WOR, New York, is the only one of its kind in existence. It was designed by WOR engineers and is used for FM broadcasting with favorable results.

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Below: The 10,000-watt transmitter of W71NY, Frequency Modulation station of WOR, New York. The transmitting plant is located at 444 Madison Avenue, New York City.

SOUND TRANSMITTED VIA LIGHT-BEAM: The beacon transmitter and receiver, located atop the WOR studios, was aimed at a photo-electric cell placed alongside the W71NY transmitter, about 1/3 mile away, to relay a portion of the program dedicating the 10,000 watt transmitter of the FM station. The relay via a tiny invisible beam of light was observed by military and naval communications officers, in view of potential defense use of this method of transmission.

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Hammering a nail in wood makes an effective sound effect—via FM. The thud of wood and the ring of the nail vibrating when struck, are extremely high frequency sounds, but were easily reproduced by FM transmission over W71NY, WOR's FM station.

GREATEST strides in frequency-modulation broadcasting development to date are incorporated in the trim, compact, 10,000-watt transmitter of W71NY—the FM affiliate of WOR—which went on the air the night of November 30 with a formal dedication program.

Known as Model 506 A-1, the new transmitter was designed and built by Bell Telephone Laboratories and Western Electric Company technicians and represents sensational gains over earlier FM broadcasting units; its advantages over the very efficient 1,000-watt unit previously utilized by W71NY are manifold.

The transmitter unit as well as the entire technical layout of W71NY located on the forty-second floor of 444 Madison Avenue, New York, is accorded the description of "model facilities", by prominent engineers who have inspected it. *It is the first 10-kilowatt transmitter of its kind*, but, despite its pioneering nature, is a laboratory-perfected job that takes to the air as the result of costly research and collaboration by a group of the nation's leading engineers. *It serves a radius of approximately 52 miles, on 47.1 mc.* (megacycles).

A radical new type of amplifier circuit gives the transmitter the distinction of being the first of its kind to use a *single tube in the last amplifier.* This simplification was made possible by grounding the plate in the final phase. No tuning condensers are incorporated, all tuning control being done by changes in inductance, effected by motor-driven controls.

The single tube used in the final amplifier is the brand new type known as 389 AA; it weighs 55 pounds and is one of the heaviest valves developed for FM work.

The quality of transmission is so high that provisions have been incorporated by W71NY engineers to have certain possible extreme "highs" compressed; actually the quality of the set's frequency range can be better than the human ear can hear it; however, this exceptional range taking to the air on FM could ordinarily raise havoc with neighboring FM channels. This protective development is a W71NY contribution to the art of FM and its engineers have the hope that future commercial FM stations will adopt similar methods so that W71NY, in turn, will be safe from external frequency infringement.

Distortion at the transmitter is less than one per cent—and this is regarded as a definite technical achievement. There is no trace of noise at carrier; the high-fidelity performance is further enhanced by the fact that audio characteristics are flat ± 1 db., 30 to 15,000 cycles.

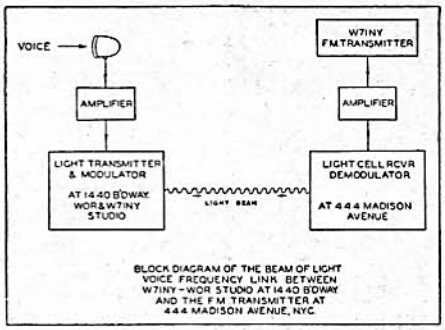
The original 1,000-watt Western Electric transmitter continues in use as an auxiliary standby. Its filaments remain lit at all operating hours so that it can substitute for the 10-kw. unit in any emergency without the loss of a minute's air time. Both transmitters are controlled from a duplicate speech input and monitoring board.

Two Special high-fidelity telephone lines link the speech-input board with the WOR studios where the bulk of W71NY's independent schedule originates. These wires cover frequencies between 20 to 20,000 cycles and are ideal for FM. In the event

that both feed-lines fail at the same time (a very remote possibility) W71NY will still function without an air break; this is assured by having a supersensitive receiver on the control panel constantly tuned in to WOR. In the event of a landline break, the mere throw of a switch assures a continuous program feed to the W71NY speech input.

While programs do not originate at the transmitter location, mikes and turntables, in addition to special acoustical wall construction, make possible the use of the transmitter hall itself as a studio. Technically and practically, the apparatus room can accommodate any "live" program from a single speaker to a symphony concert.

The new 10-kw. transmitter is equipped with a brand new 25-foot vertical coaxial antenna. It was designed by the WOR Laboratories Facilities Division and is the first and only one of its kind in the world. Two vertical 20-foot aerials are also located on the roof, one to serve the auxiliary 1-kw. transmitter, the second to accommodate a



BLOCK DIAGRAM OF THE BEAM OF LIGHT VOICE FREQUENCY LINK BETWEEN W71NY-WOR STUDIO AT 1440 B'DWAY AND THE F.M. TRANSMITTER AT 444 MADISON AVENUE, NYC.

Diagram of Light-Beam Transmission

100-watt unit normally used for short-wave contacting of WOR mobile broadcasting units; this transmitter, however, is also at hand for facsimile broadcasting purposes.

Laboratory and workshop equipment is incorporated in the transmitter floor layout. Costly measuring equipment—a considerable amount of it designed and built by pioneering W71NY FM engineers because of its market unavailability—is located here. This apparatus includes built-in measuring devices as well as costly-intricate portable equipment for measuring signal strength in the field.

Representatives of both the Army and Navy attended the dedication of W71NY's new 10,000-watt transmitter. Special interest was expressed on the part of military and naval observers in W71NY's experiment *in transmitting sound over a beam of light from the WOR studios at 1440 Broadway to W71NY's transmitter at 444 Madison Avenue* where the dedication was held.

The use of light beams to transmit sound was developed in the laboratories of Western Union. Previously tested in the laboratory, W71NY's experiment demonstrated for the first time out of the laboratory the latest equipment developed by Western Union. Military and naval authorities will study its possible uses in connection with practical warfare.

FM in 1942 — As I See It

J. R. POPPELE
Chief Engineer, Stations WOR and W71NY

IT would take a prophet of the ancient world to tell what the status of frequency modulation broadcasting will be twelve months from now. But for those who may have grave doubts, occasioned by the possible limitations of set output due to war efforts, let's see what we have to date.

First, there are 50,000 sets on which to receive FM programs in Greater New York, with the National total reaching a quarter of a million. Secondly, as of January 15, 1942 there were 24 commercial FM stations on the air with 39 more in the process of being built. There are 53 applications for commercial licenses pending in Washington and 12 experimental stations offering program service, in most cases prior to commercial transmission.

From the above it would seem that FM, which started out as a radio step-baby, is no longer an immature child. FM is here to stay and is growing daily. If the manufacture of sets should be seriously curtailed during the months to come, there are already in existence enough sets and enough stations broadcasting programs to guarantee a healthy status quo pending resumption of set manufacture.

If I take W71NY, WOR's station, as a typical example, it is with the pardonable pride of one of its "fathers". Ever since April 1, 1941, the station has been New York's first full-time commercial FM outlet. On November 30, 1941, W71NY's new 10,000 watt transmitter was dedicated on top of 444 Madison Avenue in New York City. During both 1940 and 1941 W71NY broadcast a daily schedule from 8 a.m. to 11:30 p.m. composed of a small percentage of WOR programs, some Mutual network programs not otherwise heard in our territory, but primarily programs of W71NY's own origination.

This complete program schedule plus the original investment of capital, reaffirmed by the purchase of the 10,000 watt transmitter is an indication of WOR's faith in FM as a broadcasting medium. Granted that the 10,000 watt installation was planned before the United States entry into the war, with all of its subsequent potentialities of limitation of non-essential production, the fact remains that we are continuing to operate normally.

Our present plan is to continue to operate for the same number of hours for the first half of the year to come. At that time we will undoubtedly reevaluate our operation in terms of set sales, audience, and commercial possibilities. Unless world events and our production set-up take an acute turn for the worse, the chances are we will continue our activities for the second six months on about the same basis. We feel that FM has been developed too far to be sidetracked, and we regard an audience of 50,000 sets with their multiple listeners for each, an audience worth cultivating.

I've been writing about the future. Let's consider one or two of the highlights of the past year. One of the most notable of these was the linking together of six stations for point-to-point broadcasting. This special one-time network, which carried *commercials,* was assembled as part of a salute program for W71NY's new transmitter. The technical results were amazingly successful. The stations involved—W2XMN, Alpine, N. J.; W65H, Hartford, Conn.; W43B, Boston; W53PH, Philadelphia; W39B, Mt. Washington, N. H., and W47A, Schenectady, N. Y., "blanketed" New England. Although the test was made under clear winter conditions, it is easy to realize how such a test under summer conditions with attendant static, would have been even more dramatic, especially to listeners in the more remote receiving locations such as the mountainous regions of New England.

Not much publicity has been given to FM as a communication medium for Army and Navy use. The reasons for this reticence are obvious, but it is easy to conceive and foresee the potentialities of such use. Unpublicized as military use of FM is, radio broadcasters are mindful of their contribution to this phase of our national military efforts, by continuing the fostering of frequency modulation transmissions with its attendant experimentation.

Up until now the advertisers have been extremely helpful in furthering the sales of FM sets. How much longer their cooperation can be expected if production is curtailed is, of course, problematical. But I do not believe that any of us, today engaged in this form of broadcasting expect prompt financial returns on our efforts. We are prepared to carry on for a number of years before receiving any substantial return on our investments.

The above does not mean to say that there will be no returns. An audience of some 150,000 listeners in our area is not an audience to be disregarded. Once we know more about this audience we will be able to cater more directly to its preferences and we will have a story to tell our advertisers. Research will do much to foster the commercial advancement of FM and research is included in our plans.

It wasn't so very long ago that the average man on the street was completely ignorant of the meaning of the letters "FM". It is gratifying to find out that this is no longer the case. Here again, the set manufacturers and dealers were wise enough to promote FM generally in their advertising along with the merits of their individual sets. They realized that a job had to be done and they went out whole-heartedly to do it. The FM *broadcasters* are doing the same thing.

One indication of the effectiveness of this general education process and the growing interest in the subject, is the fact that two large New York morning newspapers—the *Herald-Tribune* and the *New York Times* both now list W71NY's program schedule daily in its entirety. Furthermore, at the time of the W71NY dedication in November, 1941, the *Herald-Tribune* published a 16 page special FM section, devoted to this form of broadcasting as a whole, and tracing the rapid advances that have been made. The interest in newspapers, which in turn are guided by their reader interest, is a healthy sign of the shape of things to come. There have been other effective special newspaper sections in various areas of the country during the past year as well.

One point that must not be neglected during the coming year is *program service.* It is not enough to point to the technical virtues of *frequency modulation.* People must have something to which they can listen with enjoyment and interest.