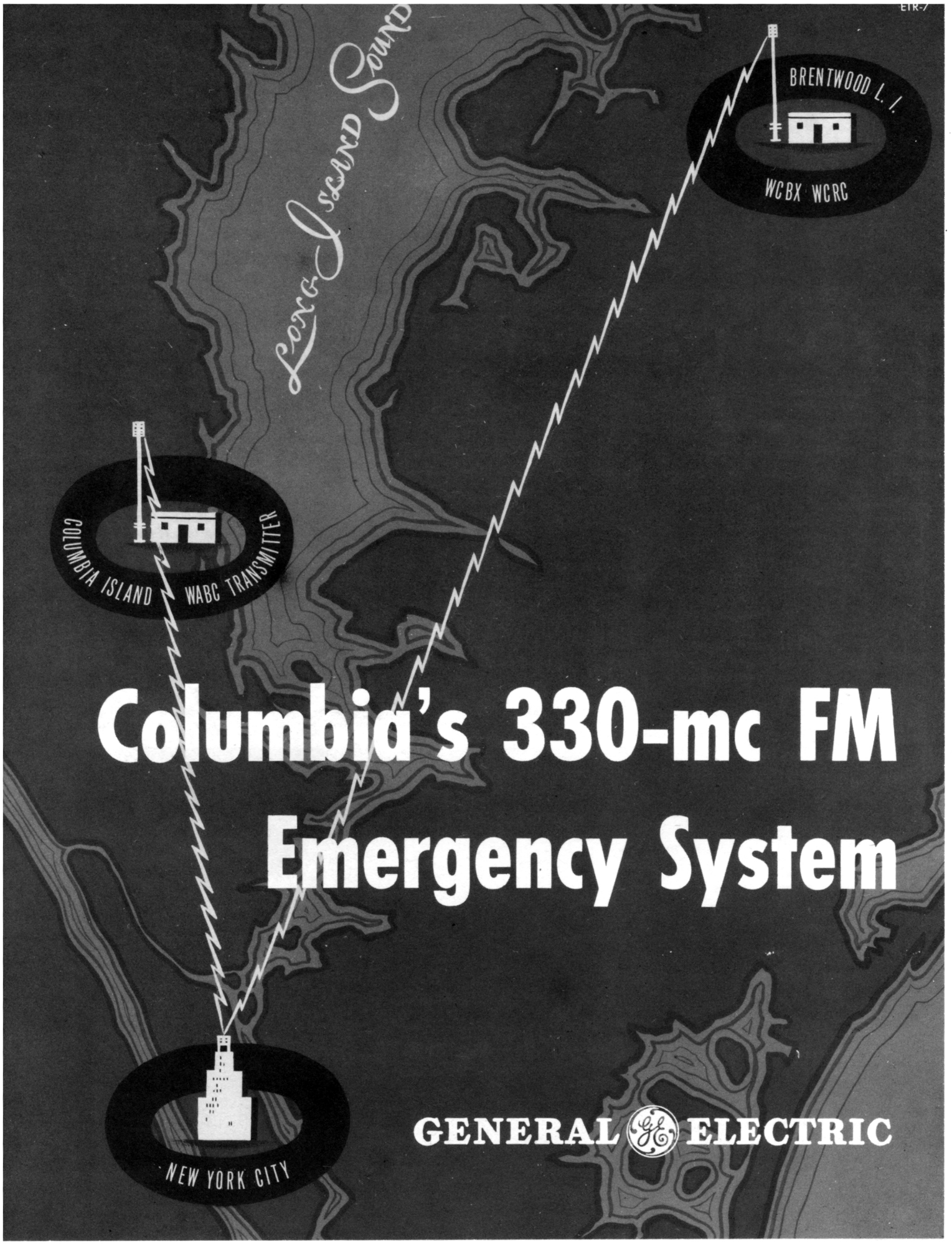

Columbia's 330-mc FM Emergency System

GENERAL ELECTRIC

Columbia's 330-mc FM Emergency System

330-mc link gives reliable communication over 40 miles in case of wire failures

RECEIVING antenna is mounted on 200 ft. pole above another antenna

● Linking together its New York studios and its high power short wave transmitters approximately 40 miles east on Long Island, Columbia Broadcasting System has a 25-watt ultra-high frequency FM system that over a long period of time has proven eminently satisfactory. The equipment was installed and is used only for emergency purposes in the event of wire line failures on Long Island where storms frequently are violent. In an emergency it may also be used to feed WABC's island transmitter.

Enclosed antenna

The transmitter is a General Electric model 4G8A1 operating on a frequency of 330.4 megacycles. It is installed on an upper floor of a tall office building approximately 860 feet above street level. The antenna is a Franklin type, completely enclosed in a wooden housing as a measure of protection against the elements. It is fed with a dual line coaxial cable. Between the transmitter in New York and the receiver on Long Island it is practically line-of-sight.

Although the equipment is seldom used, a program of twice-a-day tests has been carried on for a sufficiently long time to demonstrate that there is remarkably little variation in signal strength irrespective of season, the hour of day or night or weather conditions. Following are figures representing a considerable number of measurements made under a wide variety of conditions:

	Limiter Current	*Equiv. Recvr. Input voltage*	*No. of Measurements*
Day	.68 ma	150 microvolts	2
	.665 ma	135 microvolts	7
	.65 ma	120 microvolts	4
	.615 ma	85 microvolts	3
	.60 ma	75 microvolts	1
Night	.665 ma	135 microvolts	10
	.65 ma	120 microvolts	1
	.63 ma	100 microvolts	2

The range of noise level recorded during these measurements was extremely low, running from —48 to —59 db below program level. In a number of other measurements, however, noise as low as —65 db under program level has been recorded. Distortion has never been a problem, averaging in the neighborhood of 1.9 per cent with the highest ever recorded over a long period touching 4.8 per cent. On numerous measurements the distortion shows up at 1.6 per cent or better. These measurements were made at the output of the receiver and therefore represent overall distortion in the whole system.

Receiver installation

At the Long Island end of the link the receiver is a General Electric model LM156A. It is installed in a receiver house quite a distance from the transmitter and is turned on and off as occasion demands, by remote control. Periodic checks of the receiver are made but it has never been found necessary to make such checks very frequently. The antenna is approximately 200 feet

TRANSMITTING antenna, here shown in experimental form, is a Franklin type completely enclosed and mounted on the roof of a 62-floor building

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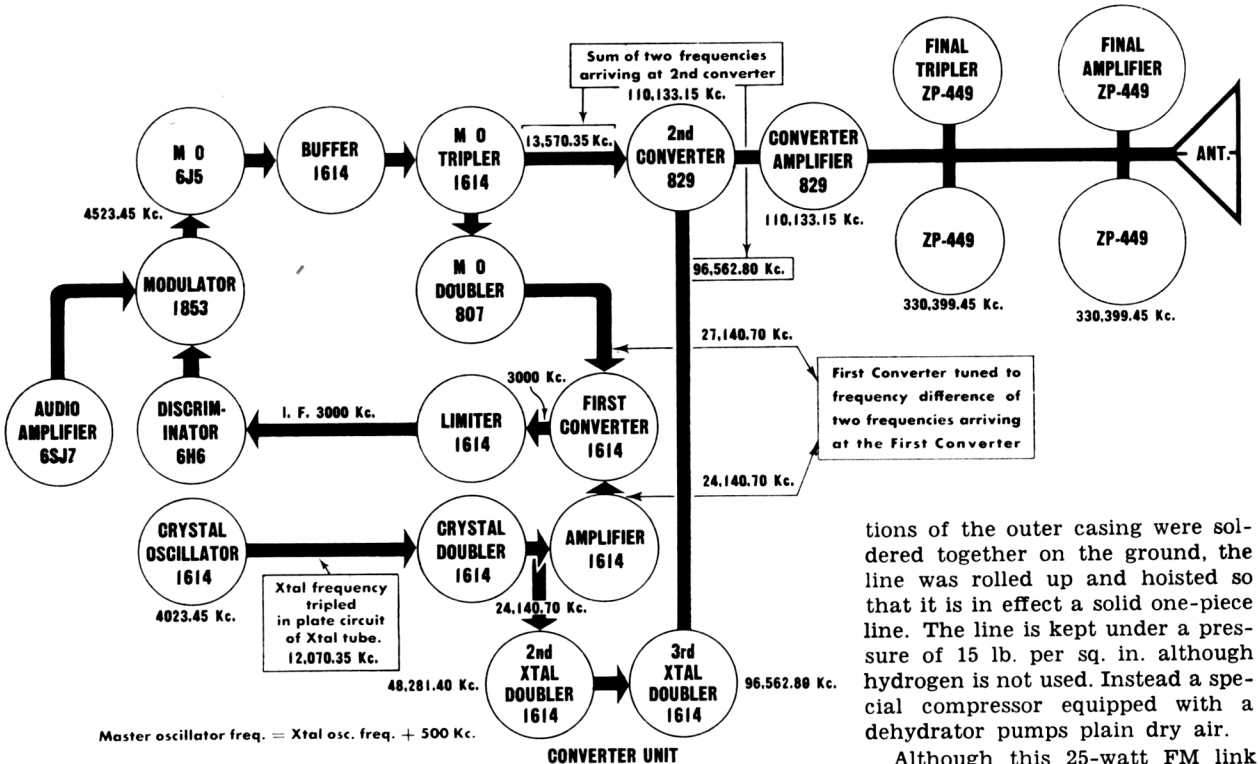


BLOCK diagram of the 25-watt General Electric transmitter showing manner in which crystal and master oscillator frequencies are combined and eventually produce the final operating frequency of 330.45 megacycles

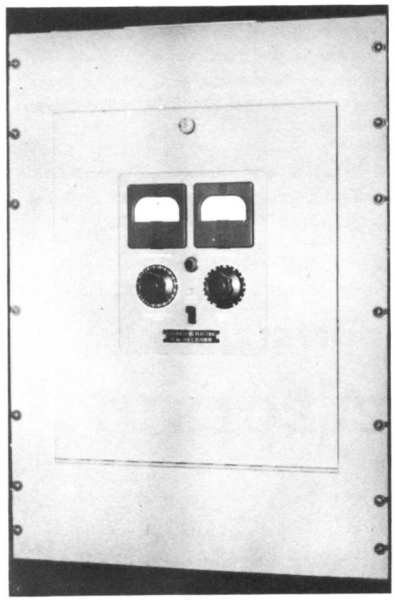
high at the top of a pole used for another antenna. It consists of five dipoles, each .64 wavelength long stacked above each other ½ wavelength apart with a copper screen ¼ wavelength behind the whole system. Inasmuch as the height of the antenna is about 200 feet and the receiver house is quite a distance from the base of the pole, a transmission line some 400 feet in length is necessary between the antenna and the receiver.

This is an Isolantite dual balanced line ¾ in. inside diameter and containing a pair of wires spaced ⅜ in. Losses in the line have been established as about 2 db per 100 feet. An interesting feature of the line is that it is jointless. Sections of the outer casing were soldered together on the ground, the line was rolled up and hoisted so that it is in effect a solid one-piece line. The line is kept under a pressure of 15 lb. per sq. in. although hydrogen is not used. Instead a special compressor equipped with a dehydrator pumps plain dry air.

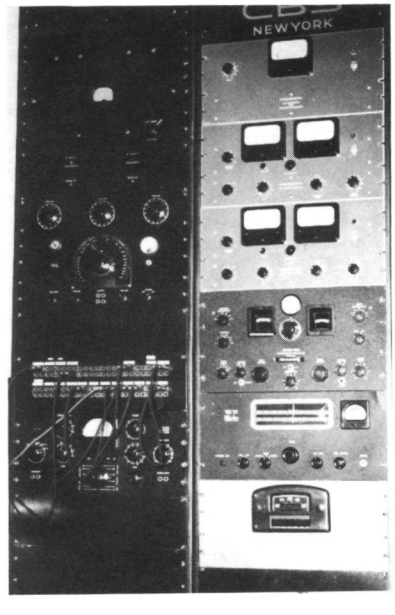
Although this 25-watt FM link system is maintained only for emergency use and interruptions to wire service seldom make its use necessary, it can be put in operation with a program on the air in less than a minute and a half. E. Fubini and Frank J. Bleil, Columbia Broadcasting System engineers, were in charge of the installation of the link and had the responsibility of ironing out kinks and getting it into its present smoothly operating condition.

TRANSMITTER is a standard GE model and is rated at 25 watts power

RECEIVER, 200 ft. from pole is remotely controlled from transmitter



TEST equipment and measuring panel at New York end of the link



GENERAL ELECTRIC

S-T

EQUIPMENT

IS IN USE TODAY AT AM, FM, TELEVISION AND INTERNATIONAL STATIONS

WBCA, Schenectady has used the S-T relay system regularly for more than two years (more than 6,000 hours on the air). WBCA has found the S-T link a practical and economical means of conveying a high-fidelity signal from studio to transmitter regardless of conditions. Airline distance, 12½ miles.

WBOS—A Westinghouse international station—uses an S-T system as the studio-to-transmitter link during line failure. The studio is in Boston, and the transmitting station across the harbor at Hull, Mass.

WGFM—The G-E proving ground FM station—with studios in WGY transmitting and transmitter atop the Helderberg Mountains, uses an S-T system exclusively as the studio-to-transmitter link. The S-T link has given excellent service, even during periods when all communication lines in the area of the transmitter have been down.

WMIT—The Gordon Gray station, Winston-Salem—bridges a 110-mile gap between the studio and transmitter with an S-T link. The availability of the S-T equipment made practical the selection of the highest site east of the Mississippi River for the transmitter, giving this station complete coverage of a major portion of seven states . . . the largest area covered by any FM station.

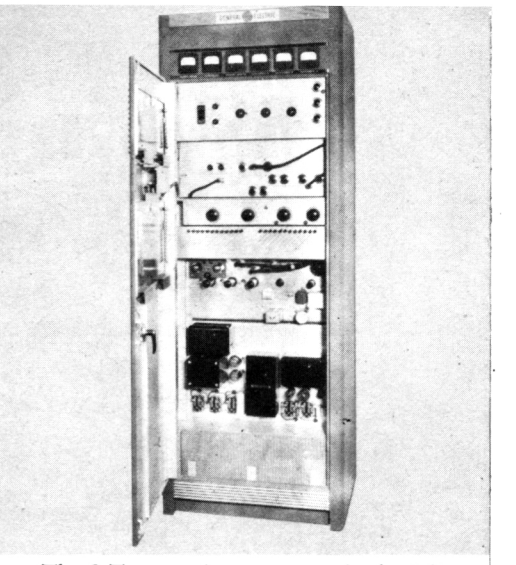
WRGB—The nation's finest television station—uses a 167.75-mc S-T link for audio and a special S-T link for video between the studio in downtown Schenectady and the transmitter 12½ miles distant. A similar S-T unit is used between the station's New York network relay station and the main transmitter.

WABC and the CBS international stations, WCBX and WCRC, New York City, have S-T links as standbys against line failure. The S-T links can be placed in operation in less than ninety seconds after a line failure.

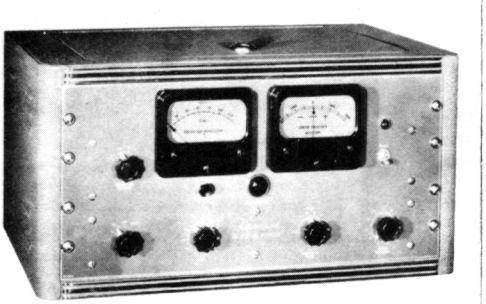
Electronics Department

GENERAL ELECTRIC

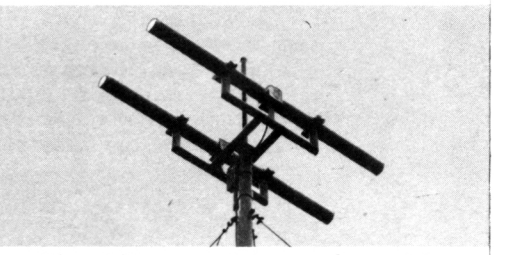
Schenectady, N. Y.



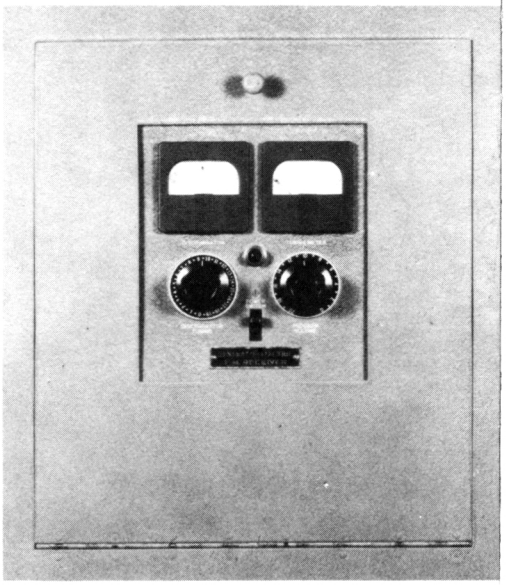
The S-T transmitter operates in the 260- to 350-mc range. It is compact, occupying less than five square feet of floor space.



The frequency monitor used in the S-T system.



The S-T transmitting and receiving antenna.



The S-T receiver.

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