THE LOCATION OF THE GREATEST RADIO TELEGRAPH STATION

On the American continent. The antennas and transmitting apparatus are located at Rocky Point, about sixty miles from New York. The operators who control the power of this huge station sit at tables in a building in Broad Street, New York. The messages are punched out on a mechanical tape sender and forwarded out over a wire line to the transmitters

"Radio Central"—Conqueror of Time and Distance

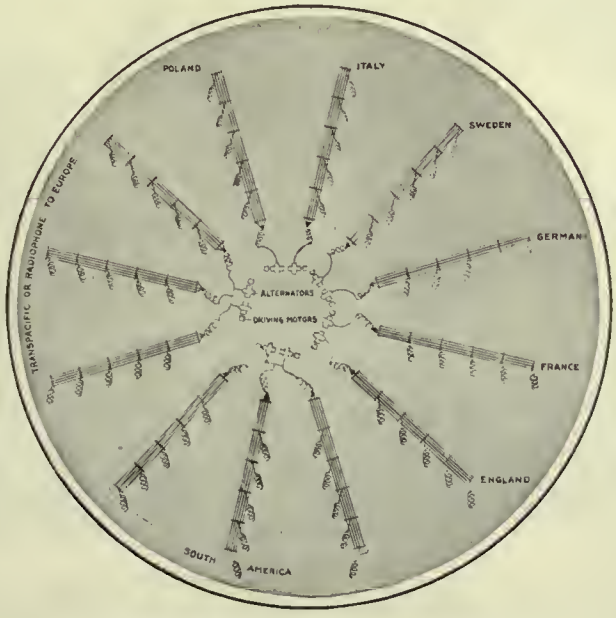
A Visit to the Great Radio Telegraph Station at Rocky Point, Long Island—the Radio Link With England, France, Norway, Sweden, Holland, Germany, Poland, Italy, and South America

By FRED J. TURNER

EVERY minute of the twenty-four hours of the day, every day of the full 365, the dit-dit-da-das of the radio code are shooting through space. And in England, France, Italy, Germany, Norway, Sweden, Poland, Holland, the Argentine, these code characters are being received and translated into messages.

For this, a great human and mechanical organization is needed. Powerful stations are required. Such an organization is the Radio Corporation of America and such a station is the one at Rocky Point, Long Island.

To the average man, an antenna is generally thought of as being a single wire 100 feet long supported from 40 to 60 feet above the ground. The voltage he thinks of in most radio work is seldom higher than 130



HOW THE GREAT ANTENNAS ARE CONNECTED

and he is, for the main, interested only in wavelengths of from 200 to 600.

Picture two antennas each one and one half miles in length, each consisting of twelve wires having a total length of 18 miles. And then picture the supports of these huge antennas, twelve in all, each 440 feet in height with cross arms 150 in length. Then try to understand the tremendous power that sends the messages, 800 amperes and 120,000 volts, and you begin to appreciate what a remarkable thing a great radio telegraph station is.

Arriving at the station, my first impression was that this was a lonesome spot. No houses were visible. Only one other passenger left the train. An automobile was in waiting and we climbed in. A drive of several miles over a fine, macadamized

OUTSIDE THE POWER HOUSE

The water cooling tanks are shown in action. Some of the water is used in the specially built water rheostats The 440-foot towers look strangely dwarfed in the picture

road, a turn into a graveled driveway and our machine came to a stop in front of a long one-storied building. Here I was met by W. H. Graff, the engineer in charge, to whom I presented my pass.

The house I was invited into is called the Community House. It is also known as "Bachelors' Hall," for it is here that the single men employed at the station are housed. The great, long room I saw was both the dining and recreation room. To the right was a billiard table and also a pool table. Dining tables, with their clean white linen and other table equipment, occupied the major part of the left side of the room. A radio set, one of the finest, was near the window. Roomy, restful chairs and settees. A big, open fireplace. The room had much the appearance of a country club.

MASSIVE TOWERS

MY FIRST close-up view of one of the great supporting towers was a surprising one. What had looked like tall, slender things, proved to be massive things of steel. Each tower, known as the self-supporting type, is fifty-four feet wide at the base. Each leg rests on huge blocks of concrete. The height of the towers is 440 feet, and the length of the cross pieces, ten feet wide, is 150 feet, or seventy-five feet in each direction from the center of the upright.

There are twelve of these towers. These are divided into two groups, of six each, set 1250 feet apart. They support an antenna containing twelve three-eighth inch copper-clad steel cables, running parallel. Rocky Point is in reality two stations. One is known as WQL and it transmits on 17.15 kilocycles (17,500 meters). The other, WQK, sends its messages through the air on 18.22 kilocycles (16,465 meters).

Both antennas can be connected in an amazingly brief time, whenever it is found necessary, thus giving one or the other station a three-mile antenna containing fully thirty-six miles of over-head wire. With this great unit messages can be driven through space in an astounding way.

The ground around the station is flat as far as one can see. The absence of trees is also noticeable. This part of Long Island was a forest when it was taken over by the company and thousands of trees had to be removed to provide the cleared space required. The Radio Corporation now owns nine square miles in this section.

A tablet on the front of the building stated that this "Radio Central" station was built in 1920. Now, inside the building, and what a sight! Great motors and generators. Tall and wide panels with many switches, meters, lights, indicators and other things so familiar to those who have visited the control rooms of big electric companies. A caged section to the right could be seen with equipment of varying sizes and shapes set row on row, all connected with copper wires and bars of different thicknesses. Something to one side spitting out big blue, electric flashes. The familiar sound of dots and dashes. Something about the entire room that bespoke power and mystery.

EIGHT THOUSAND DOLLARS FOR ELECTRICITY

EVERYTHING in the station, so I was told, had been designed with but one thought in mind, and that was to obtain the maximum of results with the minimum of waste. And it had to be so, for it costs a huge sum to operate a station like this. I understand that the cost of the current used here in one month is in excess of $8000.

The current used to drive the great motors which in turn operate the powerful generators is taken from the Long Island Lighting Company's generating station located at Northport. It is transmitted over high-tension lines at a voltage of 22,000 at 60 cycles and stepped down after it reaches the radio station to 2200 volts, 60 cycles. As is well known to students of electricity, it is more economical to send electricity along at a high voltage and small amperage, because wires of a small diameter can be used to carry it.

The generators, which are one behind the other, are remarkable machines. Each is known as an Alexanderson 200 kilowatt high frequency generator. The one seen first as you enter the plant operates at 17,130 cycles per second and is used to send messages on 17.1 kilocycles (17,500 meters).

In these generators, which are known as inductor type alternators, there are 976 poles. Generators used for ordinary commercial work have only from 8 to 12 poles.

The motors are each of 500 horse-power and are known as induction motors. Each makes some 800 revolutions per minute. Through a set of step-up gears of a ratio of two and three quarters to one, the steel

INSIDE ONE OF THE OPERATOR'S COTTAGES

The company has built living quarters for the staff attached to the station. The married men live in homes like the one shown, while the bachelors have a kind of club, with a dining room, and every convenience

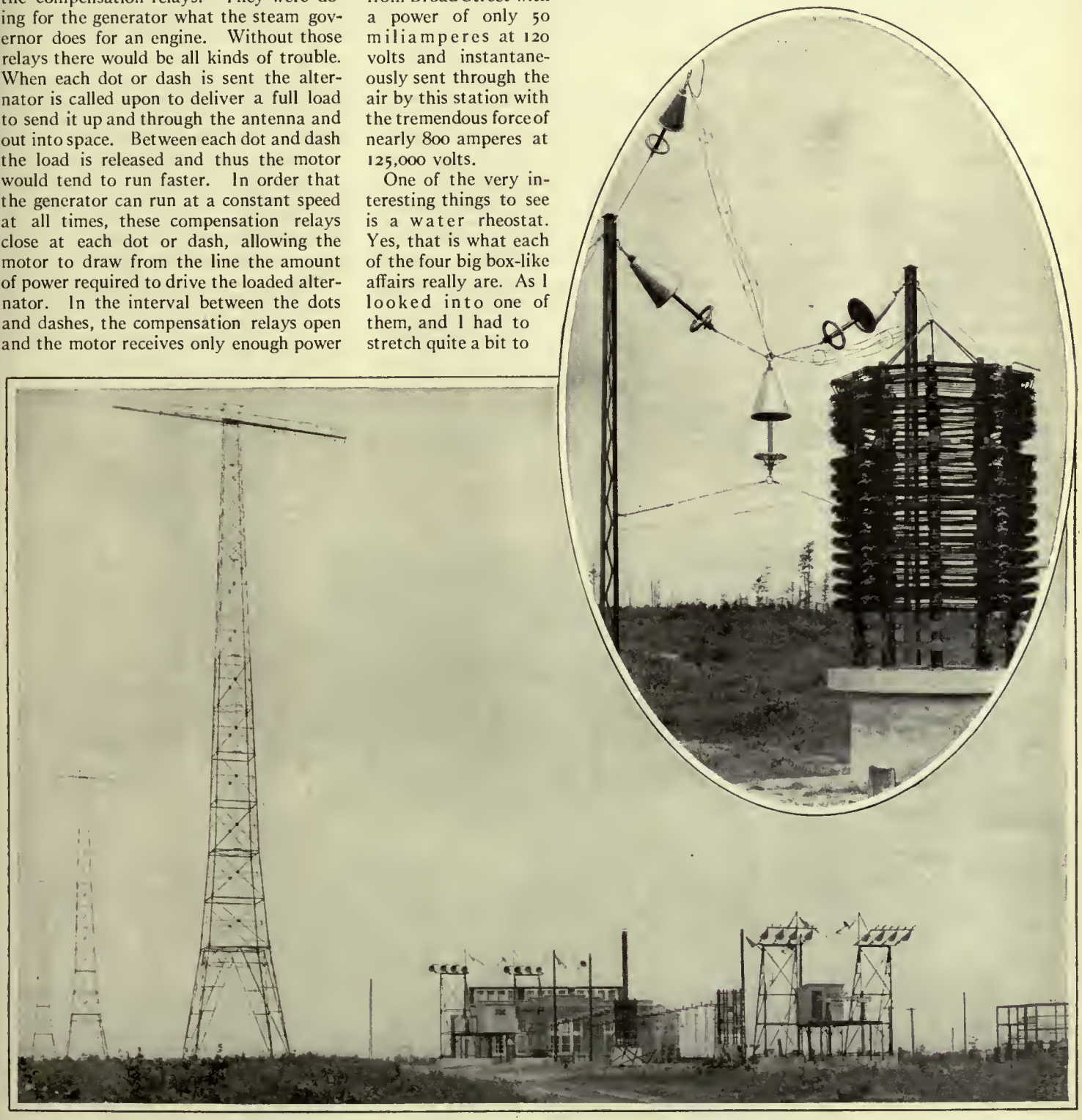
rotor of the generator is driven by the motor at the required number of revolutions.

Just as the two antennas can be joined and used as one, so can both generators be operated in unison. And there are times when this is done, especially in sending messages over very great distances.

Seeing that my attention was being constantly attracted to a set of long, vertical metal arms which were constantly emitting big, blue, electrical flashes, like dots and dashes, I was told that they were the compensation relays. They were doing for the generator what the steam governor does for an engine. Without those relays there would be all kinds of trouble. When each dot or dash is sent the alternator is called upon to deliver a full load to send it up and through the antenna and out into space. Between each dot and dash the load is released and thus the motor would tend to run faster. In order that the generator can run at a constant speed at all times, these compensation relays close at each dot or dash, allowing the motor to draw from the line the amount of power required to drive the loaded alternator. In the interval between the dots and dashes, the compensation relays open and the motor receives only enough power to drive the unloaded alternator at normal speed. For those who like precision it will be interesting to know that if there is a variation of one tenth of one per cent. in the frequency of the generator it is not considered to be working properly.

Down at 64 Broad Street, miles away, in New York, operators are seated in front of typewriters punching the dots and dashes on long ribbons of tape. This tape is run through a machine which causes the dots and dashes to be sent along great land cables to this station. They are started from Broad Street with a power of only 50 miliamperes at 120 volts and instantaneously sent through the air by this station with the tremendous force of nearly 800 amperes at 125,000 volts.

One of the very interesting things to see is a water rheostat. Yes, that is what each of the four big box-like affairs really are. As I looked into one of them, and I had to stretch quite a bit to do so, I saw water rushing over a sort of a dam, set in front of a number of uprights. That dam, I was told, is raised and lowered at the will of the engineer. The higher the dam, the more deeply the uprights, or electrodes, are immersed in the water and the greater, therefore, the amount of current which flows between the electrodes through the water. This water constantly circulates through the electrode compartment and then past cooling coils to keep it from boiling.



A CLOSE-UP OF ONE OF THE MASTS

And back view of the transmitter house at the great Rocky Point Station of the Radio Corporation of America. The power is fed to the antennas from the wires supported on the quartet of insulators. The insert shows one of the multiple tuning inductances employed in adjusting the wavelength of the antenna. A man's head would come up a bit above the concrete base of the coil support, which gives some idea of its size

A FOREST OF METERS

CLOSE by, I saw a number of air blowers which were being used to send their cooling draughts along to the relays. It was by this means that the contacts were cooled and the arcs extinguished. (The arcs form when the relays are opened.)

The many meters, as one can see, are so arranged that they are visible from almost every part of the power house. Some of these were pointed out to me. One, a graphic meter, recorded all the variations in generator frequency. Another, close by, showed the frequencies and voltages of the incoming current supply.

Another look at the generators brought forth further information. They are the biggest of their type in the world. The armatures and fields are stationary and the high frequency is generated by large slotted steel rotors. The weight of each is two and one half tons. Each generator has two armature sections, one on each side of the rotor. There are 32 armature coils in each section and each armature coil is connected to the separate primary coil of one of the two air core generator output transformers belonging to each generator.

From the generator the current is passed along into the instruments which I had noticed in the caged section. Signs of brilliant red and big white letters warn of "Danger, High Voltage." A number of big, barrel-shaped things, with regular windings of three-eighth inch wire, I was told, were transformers. A giant variometer caught my eye. What a size! More than three feet in diameter. It, together with others of a similar size, is regulated from the engineer's position, much like we who are broadcast fans regulate those in our sets. A number of big steel tanks close to the floor were pointed out and I learned that they were the variable impedances that actually controlled the flow of current from the generator output transformers to the antenna. Each of the variable impedances is oil insulated and water cooled.

The impression of bigness grows the longer one remains in the power house. In one section I saw hundreds and hundreds of fixed condensers joined together by ever and ever so many wires. The same kind of condensers used in our sets, but truly monsters when compared with ours.

Now, outside, the first thing I saw was a big coil on a platform. Its height was fully fifteen feet above the platform on which it stood. It is an antenna tuning coil. The current enters this at 7000 volts and leaves it at the top at 125,000. The men here are never careless. Each knows just what he is going to do before he does it. So great is the amount of electricity thrown out by those huge antennas that none of the workers attempts to crank their automobiles until they have grounded the handles by laying a long piece of steel against them. The metal of the automobile takes up the current which is prevented from reaching the ground by the rubber tires.

The insulators which look big from where I stood, I learned were really big. They are of the finest glazed porcelain, each being a hollow tube 72 inches long, three and one half inches in diameter, with walls one inch thick. At the lower end, looking much like the steering wheels of automobiles, are the corona shields. Dropping over the insulators are the rain shields, called by the men, "petticoats."

At one side of the power house are small structures of metal on elevated platforms. Into each of these structures each of the twelve wires of the antenna terminate. At this point the twelve are converted into one by a series of switches, and as one wire is carried to the big antenna tuning coil. From there it goes to the power house. In the winter these metal structures are used for melting the ice and sleet which form on the antenna wires. If this were not done, the tremendous weight would cause them to fall to the ground. By sending a 60 cycle current through each wire, sufficient heat is created to melt the ice.

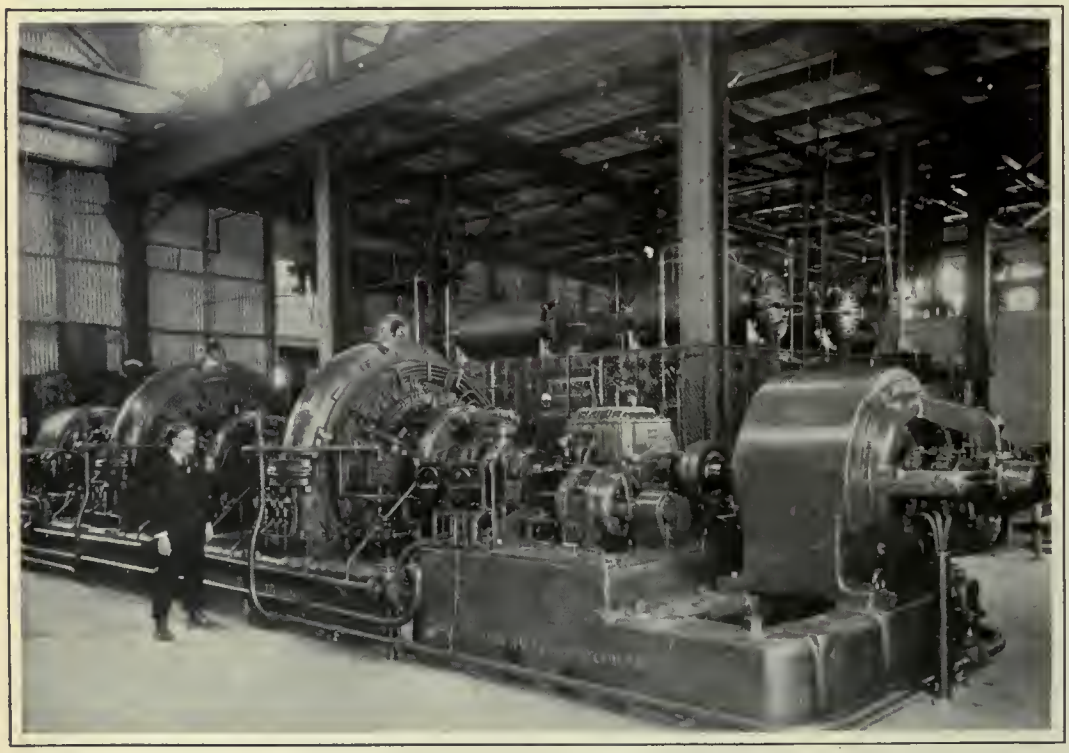
Looking up at those giant supports and meeting the long straight ladders that lead to the top, a platform at each 100 foot level breaking the climb, one cannot help but admire the nerve and skill of the riggers who work away up there.

There are five more huge tuning coils, one connected to each antenna at regular intervals throughout its length, in addition to the one just outside the power house. These insure the most efficient distribution of current over the entire antenna and ground system. This system is known as the multiple tuned antenna.

The ground system of this station is extremely interesting. Running parallel with the antennas, one on each side, are a number of telegraph poles, supporting a dozen or more wires. These, of course, are the same length as the antennas. Around each pole, about one third the distance from the ground, is a wire coil. Each coil is smaller the further away it is from the power house. Direct contact to the ground is made from them.

It can now be understood how this ground system is used. With a single ground connection, all the current would be concentrated in one spot and a great deal of energy would be wasted. A large number of ground connections, each receiving only a fraction of the total current, ensures low resistance and maximum efficiency. It will no doubt surprise many to know that two hundred and forty miles of bare copper wires are buried in the earth under the antennas for ground connections.

Before leaving I could not help stopping to look at the power house again and I got quite a thrill thinking that at that moment messages were being sent from New York over great land lines, through the many instruments inside the building and out into space to England, France, Italy, Holland, and the other countries almost as quickly as I could wink my eye.



TWO ALEXANDERSON ALTERNATORS

Each of 200-kw. capacity, used to furnish power to the antennas. These machines, developed by Dr. E. F. W. Alexanderson of the General Electric Company, are much different from the usual commercial type of alternator in that they develop radio frequency current which is fed directly to the antenna. The armature and field coils are stationary and a carefully balanced rotor causes the magnetic fluctuations necessary to produce the current