

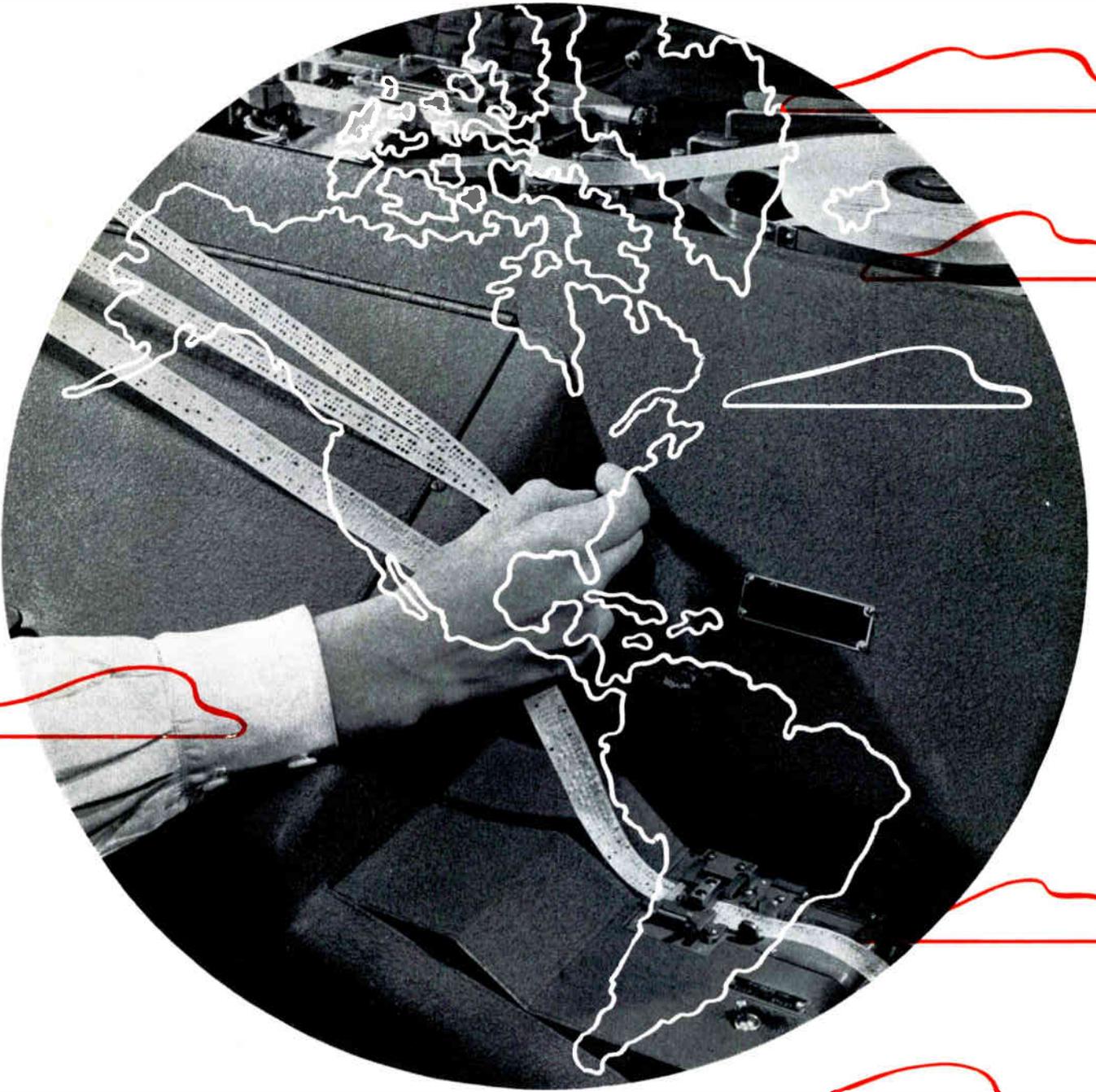
via RCA



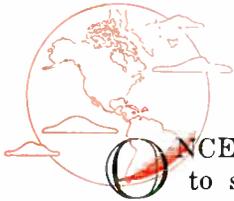
RCA COMMUNICATIONS, INC.
66 BROAD STREET, NEW YORK, N. Y.

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via RCA



ONCE the world as a planet was believed to spin in thin air — air that was empty except for chemical elements and dust. Radio changed that conception. Now the sky and its vastness of space pulse with human thoughts and emotions — messages that travel at comet-like speeds and voices that speak in every tongue. Modern radio encircles the earth and its waves, criss-crossing above the seas and continents flash millions of words and pictures across the hemispheres to business organizations, to homes, to ships and to planes. The air everywhere is vibrant!

World-wide radio communications services operate today at new heights of speed and efficiency. Transmission time for radiograms between the United States and the key capitals of the world has been sharply reduced. Radiophoto services and the international relaying of radio programs have been expanded and improved.

New Operating Technique

Using new operating techniques and methods developed during and since World War II, RCA Communications, Inc.—a service of Radio Corporation of America—has pioneered the modernization of radio's international services. Its purpose is to provide more efficient communications for an era in which political and economic conditions require the rapid exchange of intelligence between nations and peoples in volumes never before achieved. Fast, accurate communications service, which operates with steady reliability across oceans and con-

tinents without regard to natural or man-made barriers, is indispensable to government, business and private individuals.

As World War II drew to a close, RCA Communications made plans for a large scale program of expansion and modernization to be started as soon as hostilities ceased. Wartime advances in radio electronics—many of them contributed by RCA scientists—had revealed new opportunities in communications. These advances, adapted to the RCA improvement program, yielded results considered impossible only a few years ago.

Symbol of Leadership

Thus, more than ever before, "Via RCA" is a symbol of leadership and outstanding service in global communications. RCA radiotelegraph circuits now link the United States with more than 60 other nations. Radiophoto transmits drawings, photographs and other graphic material through the air between 17 principal cities of the world. RCA relays broadcast programs between the United States and 35 foreign cities, and provides voice communication between this nation and Hawaii, the Philippines and the Far East by radiotelephone.

Radio is the fastest known means of transmitting intelligence. Its signals flash through space at the speed of light—186,000 miles per second! But ever since Marconi first demonstrated the practicability of radio, science has been challenged to take more and more advantage of its tremendous speed and widespread coverage.

OPERATORS IN RCA'S NEW YORK CENTRAL RADIO OFFICE CHECK MESSAGE TAPES OF RADIOGRAMS ARRIVING FROM BRANCH OFFICES. SECONDS LATER, MESSAGES ARE BEING TRANSMITTED THROUGH THE AIR TO FOREIGN DESTINATIONS.

THIS MODERN SEMI-AUTOMATIC RADIO OPERATING SET IS THE NEW YORK TERMINAL OF THE MOSCOW CIRCUIT. IT CONTAINS SENDING AND RECEIVING APPARATUS OF THE MOST EFFICIENT DESIGN.



signals were made automatic through the use of paper tape to record the dots and dashes. For transmission, the ribbon of tape is perforated by a machine similar to a typewriter. A "Wheatstone" transmitter converts the perforations into dot and dash radio signals. In reception, the signals are recorded on tape by an ink stylus.

Traffic Problems Solved

This automatic method of Morse code operation reached its peak of efficiency shortly before the outbreak of World War II. Speeds of sixty to one hundred words a minute were common, with 500 a minute possible under exceptionally favorable circumstances, over a single radio transmitter.

But with all this improvement, unprecedented increases in message traffic made it clear that still further advances had to be made. The problem was to find methods of handling greater volumes of traffic in a shorter space of time, and to do it more efficiently than ever before. The answer was mechanical processing of messages and world-girdling automatic radio relays.

The success of RCA's modernization program is shown by the fact that, today, it is possible to deliver a radiogram originating in a New York business office to a correspondent in such far-off places as Stockholm,

When RCA entered the field in 1919, the sole service of radio was telegraphic communication in the (Continental) Morse code and even this was far from being fully developed. Operations were a matter of tapping out the code with a hand key. It was a slow, laborious process, and the speed of the average good operator was no more than 25 or 30 words a minute.

As public confidence in radio increased, however, new methods were developed by RCA to meet growing traffic loads. Both the sending and the receiving of Morse code

via RCA

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Paris and Buenos Aires, within five to ten minutes. Under the older Morse system, the average elapsed time is forty minutes. Moreover, with mechanized handling, the element of human error has been eliminated at all relay points.

Pioneering New Methods

The primary handicap of the Morse code method of operating lies in the necessity for completely reprocessing a message letter-by-letter every time it is relayed through an intermediate station. To overcome these deficiencies, RCA pioneered in the application of time and motion saving teleprinter methods, with provision for automatic tape-relay of traffic at transfer points.

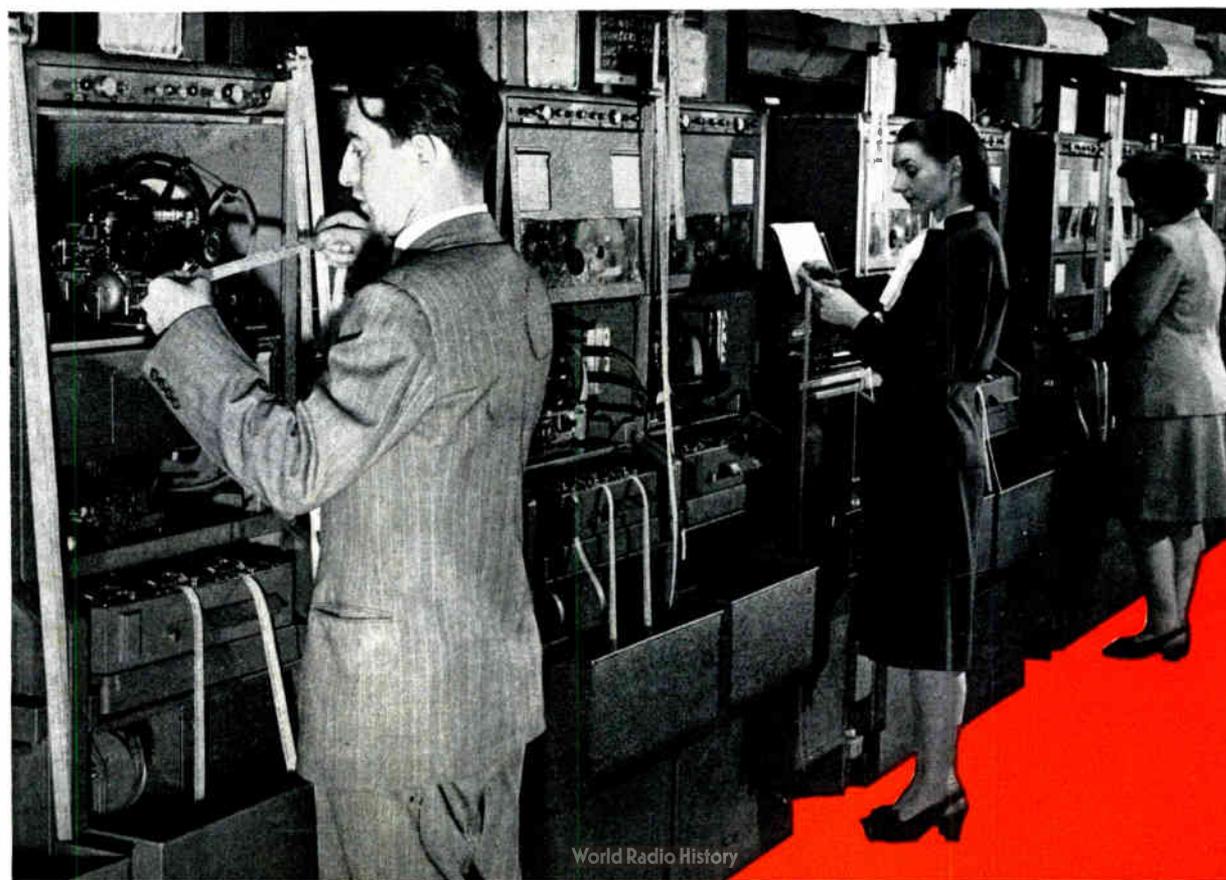
In the teleprinter tape-relay system, a message is processed for transmission only once—at the point of origin—and all relays through intermediate offices are accomplished without manual reprocessing. Furthermore, the message tapes once processed are entirely interchangeable between radio and wire lines. The original processing can be done at any convenient location—customer's office,

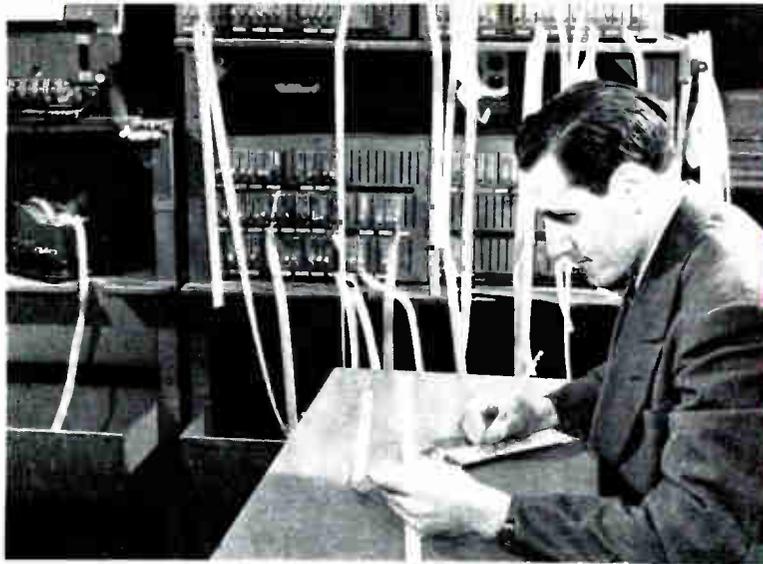
branch office or central office. Reception at each relay point is on tape identical to that prepared in the first instance and consequently is ready for immediate re-transmission. At the ultimate destination, a page printer is substituted for tape reception, and the message is received in printed form ready for delivery.

New York and San Francisco are the terminal cities for all RCA communications traffic between the United States and the rest of the world. When a message on tape is received at either of these points from a branch office of RCA or from a customer's office, it is immediately numbered to prevent loss. It is then taken to a tape-relay section, where all radio circuits terminate in semi-automatic operating sets, which include all apparatus necessary for sending and receiving. Outward messages are handled by automatic numbering transmitters, and inward messages are received on automatic typing and perforating machines.

When a message tape from overseas is received at a tape-relay station, it is carried by a special type of pneumatic tube to a sending operator, who inserts it in an auto-

BATTERY OF RCA SEMI-AUTOMATIC RADIO OPERATING SETS.





MESSAGES FROM OVERSEAS ARE IN-
DEXED FOR ADDRESS AND PROPER
ROUTING. THEN THEY ARE DELIV-
ERED ALMOST INSTANTANEOUSLY BY
AN ELECTRICAL PAGE PRINTER IN
THE CUSTOMER'S PRIVATE OFFICE.

ABBREVIATED RADIO CODE ADDRESSES
ARE REDUCED BY FULL SUBURBAN
ADDRESSES AT THE CENTRAL RADIO
OFFICE ROUTING DESK IN NEW YORK.

matic transmitter for forwarding to the next station. The functions of the sending operator, like those of the receiving operator, are reduced to the utmost degree of simplicity. This permits him to devote undivided attention to the important job of transmitting messages correctly without the performance of difficult manual operations. One operator can send to twelve branch offices simultaneously. At the branch offices, messages are received in printed page form and the primary functions of the terminal receiving operator are to insure correctness of the message and its prompt delivery.

Overseas Cooperation

Most of the distant terminals of overseas radio circuits are not controlled by RCA, but are operated by the administrations of their respective countries. The cooperation of these administrations was, of course, essential to the success of RCA's plans for automatic tape-relay operation. Just as soon as these plans were developed, full information was given to the foreign correspondents. RCA Communications offered engineering assistance and aid in the procurement of necessary equipment.

Many forward looking foreign administrations responded quickly and with enthusiasm. It was well known that improvements in terminal operating methods were long overdue and essential to the welfare and prosperity of the industry. All of the countries of Latin America quickly agreed to use

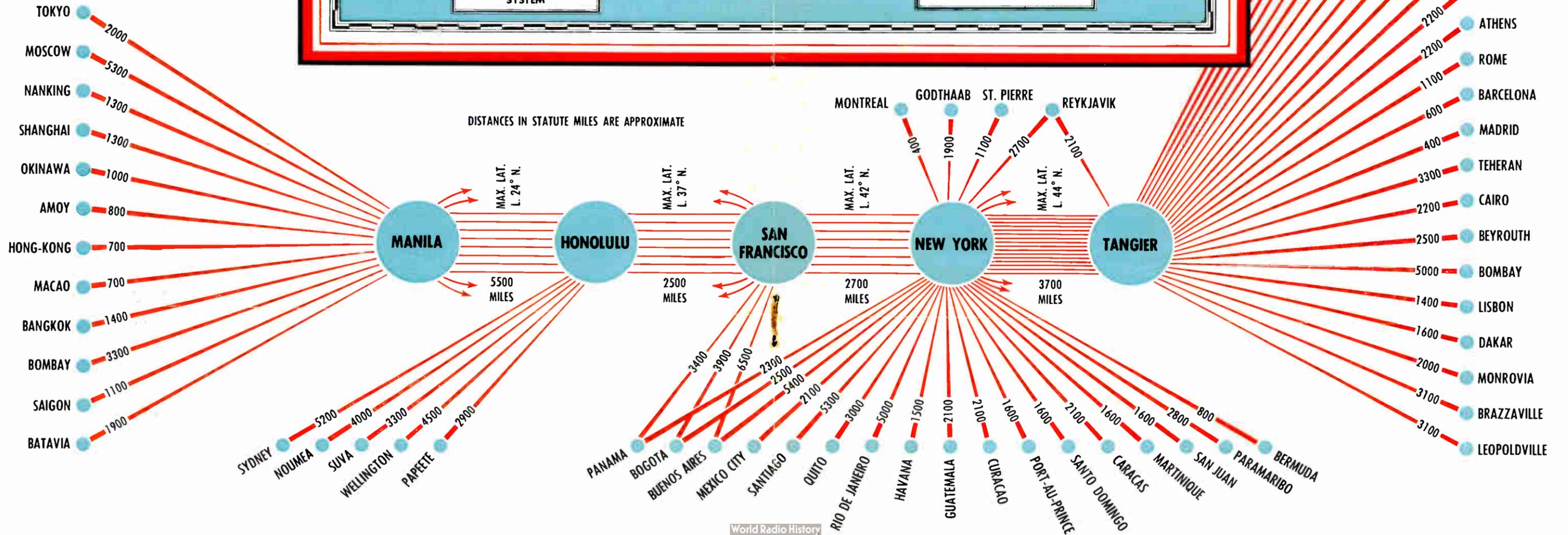
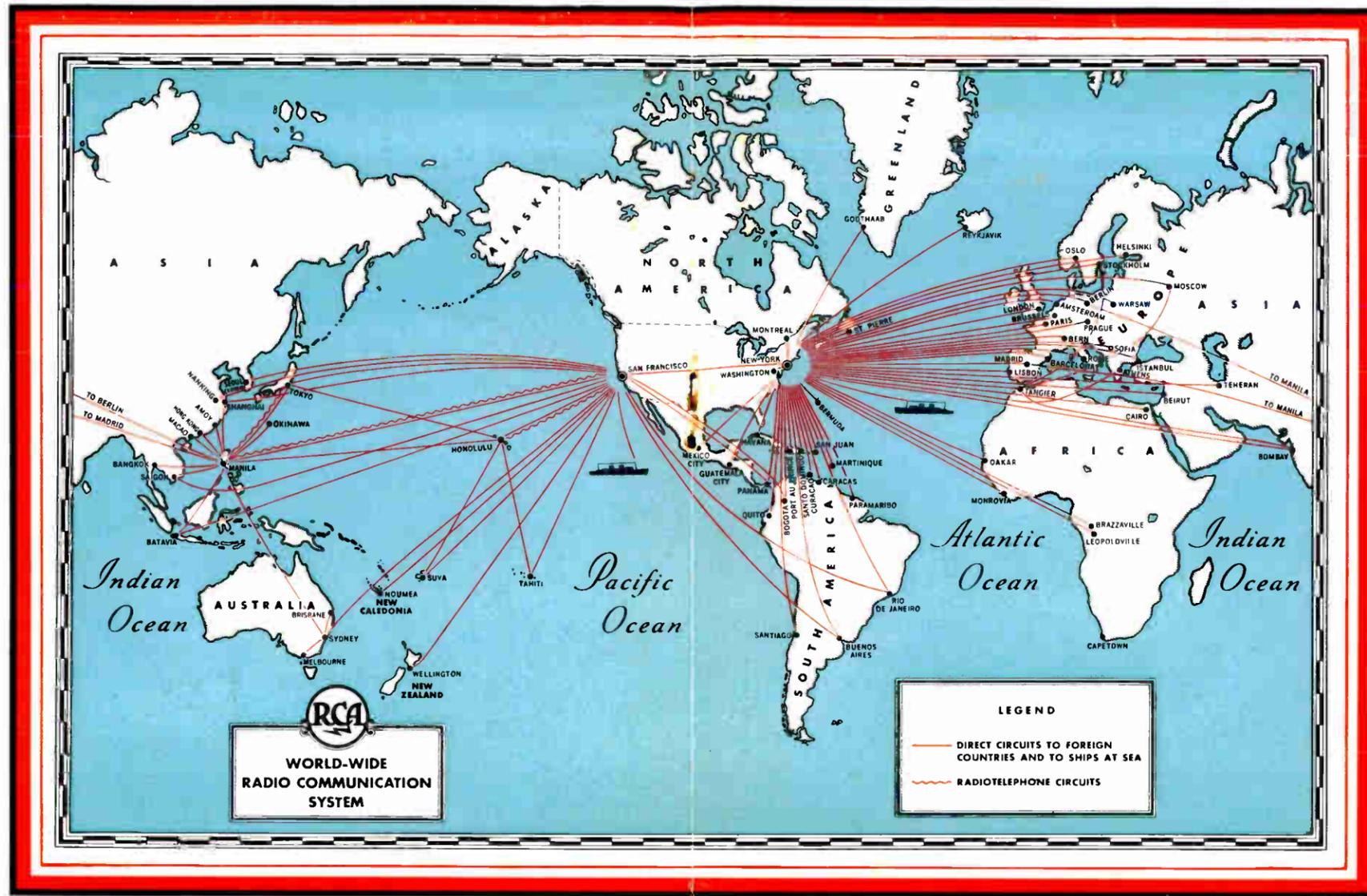


the new methods. They recognized that the increasing commerce and hemispheric solidarity between the United States and her southern neighbors would be stimulated by more adequate communications. From Europe and Asia came similarly enthusiastic responses. By August, 1947, twenty-eight RCA circuits had been converted to the teleprinter method of operation, with substantial gains in economy and quality of service. Plans have been completed for the early conversion of other circuits, and RCA's program of modernization has attracted such world-wide interest that virtually all foreign telegraph administrations are giving detailed study to the new methods.

It was appreciated at the outset that successful use of the teleprinter tape-relay method of operation required the best ob-

RCA World Communications Map and Radio Relay Trunk System

Direct radio circuits of RCA Communications, Inc., link the United States with more than sixty nations of the world, as shown in the map at right. Below is a chart of RCA's projected radio relay trunk system designed to overcome magnetic disturbances and to speed up transmission of messages. It also makes more economical use of radio frequencies. A substantial portion of the relay system already is in operation.



Relay stations of the kind RCA has recently placed in service would be impracticable with the older Morse method of operation because every relayed message would require manual letter-by-letter reprocessing at each intermediate point. This would be prohibitively expensive, and lead to errors and delays. Only by the use of automatic teleprinter tape-relays is such a system of relay offices practicable and advantageous.

Major attention has been given in RCA's planning to local distribution systems for the collection and delivery of radiograms within the United States, because without an efficient distributing system the advantages of superior service over the radio circuits would be largely dissipated. In New York, San Francisco and Washington, a system of branch offices served by the automatic teleprinter tape-relay method from central

tainable radio circuits. Radio transmission between East and West in the northern latitudes is subject to occasional magnetic disturbances and, for this reason, the modernization program included a project for the establishment of a world-girdling system of relay stations that would be efficient and dependable. The plan calls for such relay points close to the principal traffic centers of the world and so located with respect to them as to provide virtually uninterrupted operation at all times.

Bombay, thus improving materially the service between the United States and India. Messages from other stations in the near East and in Africa are relayed through Tangier as a means of conserving radio frequencies and giving better service to this traffic.

San Francisco is the western gateway relay point for traffic to and from Pacific and Far Eastern points. This traffic is sent direct to such points as Shanghai and Tokyo, or is relayed through Manila, depending upon which path is most suitable at the moment. Direct transmission is preferred when signalling conditions are favorable, but during periods of magnetic disturbances, the relay points are essential to efficient operation.

Relay Station at Tangier

This new system of relay stations is in an advanced stage of development. One of the most important relay stations is located at Tangier in North Africa. It provides virtually uninterrupted year-around radio operation with Moscow, Stockholm and other northern European points that lie close to the North Auroral zone, in which interference with direct transmission is most serious.

The Tangier station has also provided a badly needed relay point in the 13,000-mile long radio circuit between New York and

THESE MACHINES AUTOMATICALLY CONVERT MESSAGES ON 5-UNIT CODE TAPES TO CONTINENTAL MORSE TAPES FOR TRANSMISSION TO RCA OVERSEAS CORRESPONDENTS.

MONITORING ALL RADIO MESSAGES IS A PART OF THE IMPORTANT JOB AT RCA OF TRANSMITTING MESSAGES CORRECTLY WITH THE LEAST POSSIBLE LOSS OF TIME.



THROUGH THIS SWITCHBOARD PASS INCOMING AND OUTGOING INTERNATIONAL RADIOGRAMS FOR RCA'S PRIVATE TELETYPE CUSTOMERS. MORE THAN 250 CUSTOMERS OF THIS TYPE IN THE NEW YORK AREA ALONE ARE SERVED BY RCA.

RADIOGRAMS RECEIVED FROM FOREIGN POINTS ARE FED INTO THIS SWITCHBOARD WHICH PASSES THEM ON AUTOMATICALLY TO RCA BRANCH OFFICES OVER LAND WIRES.

offices insures fast service to a constantly growing volume of general radiotelegraph traffic, while extensive use of printer-operated private lines insures fast dependable service to customers whose traffic volume warrants provision of such facilities. All this is made possible by the adaptability of tape-relay to both wire and radio channels.

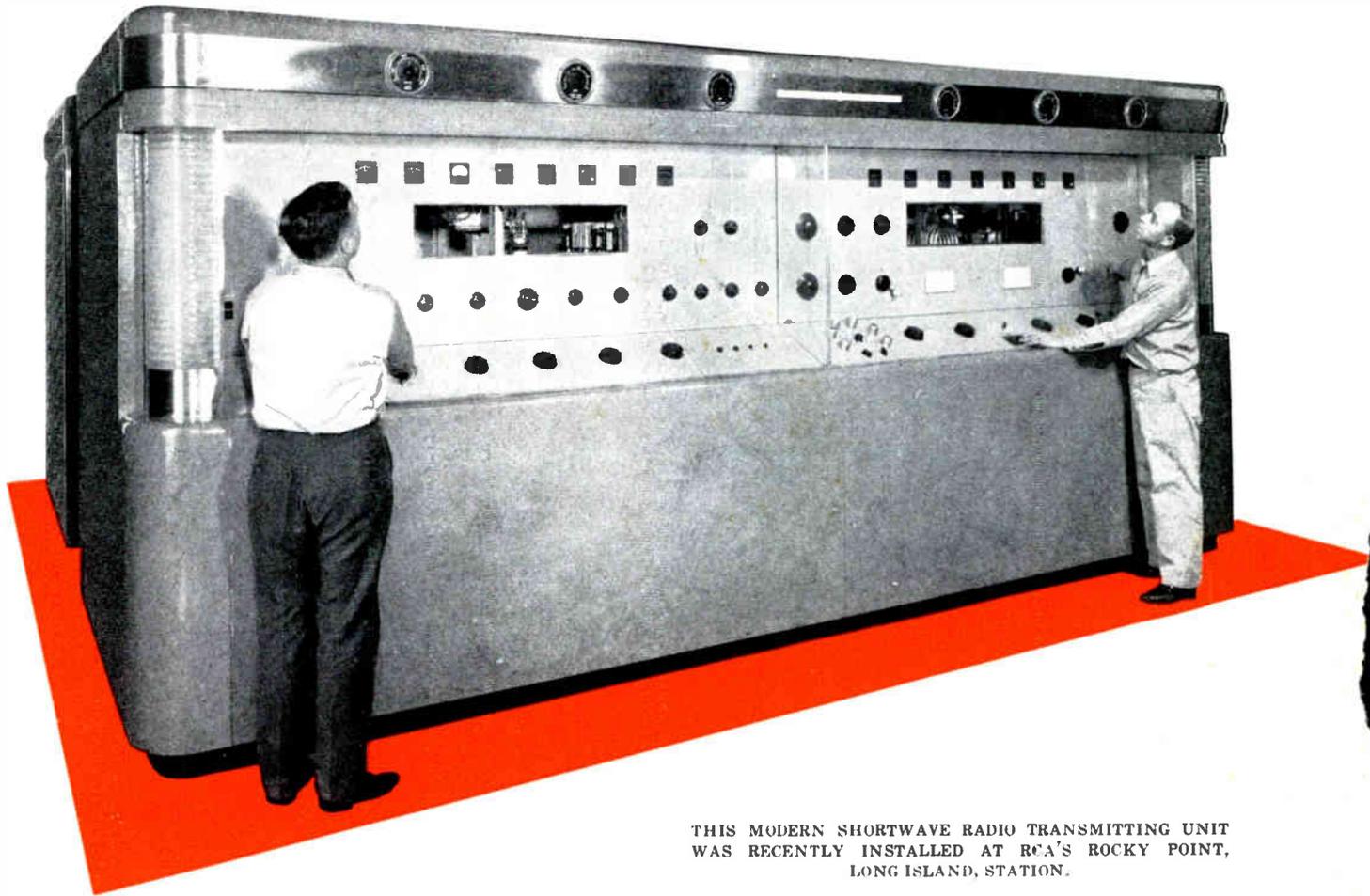
Traffic to and from points in the interior of the United States is handled over the landline facilities of The Western Union Telegraph Company. To facilitate this service, RCA maintains representatives in some of the principal cities. Messages filed at interior cities should be marked "VIA RCA". They are turned over to RCA at New York or San Francisco, where they are transmitted directly to points of destination, or relayed through one of the relay stations.

Another important step in RCA's modernization program is the expansion of multiplex facilities, by means of which as many as eight communication circuits can be operated on each radio frequency. Multiplexed channels now are utilized on RCA's radio circuits to England, France, Italy, Russia, Germany, Argentina, Morocco, Hawaii, Australia, and the Philippines. Since multiplexing of radio circuits has the effect of multiplying the communications capacity of the transmitters, it makes possible considerable savings not only in the number of radio-frequency bands required but also in station construction, operation, and maintenance costs. Both Morse and teleprinter communication may be used simultaneously on different channels of a multiplex circuit.



BEFORE RCA INAUGURATED ITS MODERNIZATION PROGRAM, THIS MANUAL METHOD OF CHECKING MESSAGES DESTINED FOR DELIVERY IN THE UNITED STATES WAS COMMONPLACE.

OPERATOR AT LEFT TRANSCRIBES MESSAGE RECEIVED ON MORSE INK RECORDER TAPE WHILE THE ONE AT RIGHT PREPARES A MESSAGE FOR TRANSMISSION IN THE SAME MANNER.



THIS MODERN SHORTWAVE RADIO TRANSMITTING UNIT WAS RECENTLY INSTALLED AT RCA'S ROCKY POINT, LONG ISLAND, STATION.

Program Transmission

Immediately after World War II, the Program Transmission Service of RCA Communications launched a program to restore its world-wide broadcast circuits and, at the same time, to expand broadcast program facilities to meet the world's increasing requirement for these communications. A comprehensive procurement and installation program was established and, as rapidly as war-torn countries received new equipment, additional program transmission circuits were put into service.

In addition, the international interest in radio programs prompted the installation of radio broadcast circuits to overseas points heretofore not covered. The installation of facilities between New York and San Juan, (P.R.), is an example of this expansion program.

Current modernization of RCA's Program Transmission Service includes a number of technical advances. Already designed and built is a multi-channel program control console capable of selecting twenty-four different program circuits and operating any sixteen of them simultaneously.

RCA commenced operation of its Program Transmission Service in January, 1932, when foreign broadcasts were exchanged between America and Europe and the Far East. Since that time, the service has been expanded to include broadcast program facilities between America and thirty-five foreign points. More than three-quarters of the foreign programs heard by the American people are brought to the United States and fed to the major broadcasting networks by RCA.

Services of Radiophoto

RCA's radiophoto service long ago captured the imagination of American newspaper readers. They note the latest events abroad and there, right alongside the news story, are pictures of world leaders mentioned in the account, or of action described therein — remarkably clear pictures taken only a few short hours earlier at scenes across oceans and many miles distant.

Especially did people marvel and thrill at the miracle of radiophoto during the war. They saw in their local newspapers news-photos of battles, of mass bombing forays over Fortress Europe, of air-raid damage and other war scenes side-by-side with up-to-the-minute accounts of the war's progress.

The war and subsequent international events accelerated RCA's radiophoto service. But it by no means is limited to serving news agencies and newspapers. Business men everywhere, ever on the alert for the fastest means of exchanging material with foreign associates, have come to look upon radiophoto as a solution to their problem. They realize that radiophoto can save them time, money and effort by transmitting information that cannot be adequately conveyed by words alone.

Aid to Business, Industry

Legal documents, advertising layouts, financial statements, patent drawings, building plans, magazine copy, photographs and sketches are among the items transmitted by the International Radiophoto Service of RCA Communications, Inc., for business men.

Radiophoto enables international business firms and corporations to present to their boards of directors detailed accountings of operations within a few hours after each month's accountings and balancings.

A striking example of the potential possibilities of RCA's radiophoto service occurred when a British-built cargo ship suffered serious damage to its rudder and propulsion

gear in mid-Atlantic. A tow ship was dispatched to bring the crippled vessel to the United States.

The only blueprints of the damaged parts were in England, so the operators of the ship obtained the prints from the builder and sent them via RCA Radiophoto to New York. A few days later, when the freighter was towed into an eastern port and placed in drydock, a new rudder and replacements for other damaged parts were ready for installation.

RCA Radiophoto had saved thousands of dollars in what otherwise would have been an unavoidable delay.

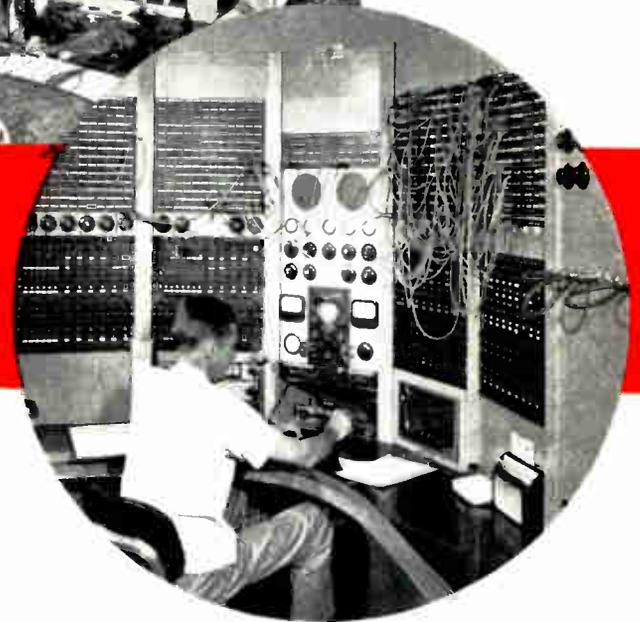
Expansion of these radiophoto facilities is an immediate goal of RCA Communications. It now has radiophoto links between the United States and England, Germany, Italy, France, Switzerland, Sweden, Austria, Russia, Egypt, Argentina, Hawaii, Australia, the Philippines, India and Korea. Arrangements for additional circuits with Mexico, Japan, China, and several other countries are being made.





RADIOGRAMS ORIGINATING IN EASTERN UNITED STATES ARE "PUT ON THE AIR" AT RCA'S MAIN TRANSMITTING STATION AT ROCKY POINT, LONG ISLAND.

FROM THIS CONTROL BOARD AT THE ROCKY POINT STATION ARE SENT OUT GOING SIGNALS FROM THE CENTRAL RADIO OFFICES TO POWERFUL LONG-DISTANCE RADIO TRANSMITTERS.



Growth of Radio

Not until the 19th century, when knowledge of electricity outgrew the laboratories and found practical use, did communication begin to approach its present scale. First the telegraph, then the telephone, and finally radio opened miraculous possibilities for the rapid exchange of intelligence.

Guglielmo Marconi took the first step to bring radio into commercial use when, in 1896, he obtained an English patent on a system of wireless communication. Commercial interests were quick to see the potentialities of Marconi's wireless, and a year later an English company was formed to exploit the new development. In 1899, this British firm organized a subsidiary, the Marconi Wireless Telegraph Company of America. In 1901, Marconi transmitted wireless signals across the Atlantic Ocean for the first time, and when the United States entered the first World War, the British and American Marconi companies were providing regular commercial trans-Atlantic radio communication between Canada and England.



MAIN RECEIVER BUILDING AT RIVERHEAD, LONG ISLAND, WHERE RADIO SIGNALS FROM ABROAD ARE PICKED UP AND AUTOMATICALLY RELAYED TO CENTRAL RADIO OFFICES IN NEW YORK.

The United States Government took over all radio communication facilities in this country when it declared war on Germany in 1917, and international and marine radio services were operated during that war by the United States Navy. By the time the war ended, the Navy had the most powerful radio communication system in the world. After the Armistice, however, the seized communication facilities had to be returned to their owners, and this country faced the prospect of losing its war-won leadership in the field of international radio. To avoid that possibility, Government officials suggested the organization by commercial radio interests of an all-American radio corporation to compete with the European-controlled communication systems. The product of this suggestion was the formation on October 17, 1919, of the Radio Corporation of America.

Operations Improved

RCA acquired the Marconi Wireless Telegraph Company of America, and on March 1, 1920—the day after the Government relinquished control of the seized radio stations—RCA transmitted its first commercial trans-Atlantic message. It also was the first direct trans-Atlantic radio service between the United States and Europe.

One of RCA's first achievements in the

improvement of international communication was the introduction of automatic radio transmission and reception. Use of tape made it possible for the receiving operator to transcribe incoming traffic at his own speed and in his own time—and removed the necessity for the transmitting operator to restrict his speed to that of the operator at the other end. The introduction of tape transmission also made it possible for ten operators to feed a single high-speed radio circuit.

Communications Capital

At the same time, RCA began a construction program designed to make New York City the communication capital of the world. On a nine-square-mile tract at Rocky Point, Long Island, RCA built a transmitting station that eclipsed all previous radio stations. Mile-long antennas were constructed to hurl long-wave radio signals to all points of the compass. A comparable receiving station was constructed sixteen miles away at Riverhead, and receiving antennas more than eight miles long were erected to pick up the incoming signals. "Radio Central," as the Rocky Point station was called, was formally dedicated on November 6, 1921, with a radiogram from President Warren G. Harding broadcast to twenty-eight countries simultaneously.



EARTH CURRENT METER AT RIVERHEAD RECEIVING STATION GIVES WARNING OF MAGNETIC DISTURBANCES THAT MAY AFFECT COMMUNICATIONS CIRCUITS.

NEW SHORTWAVE RADIO TRANSMITTER DEVELOPED BY RCA FOR USE AT ROCKY POINT OCCUPIES ONLY ONE-QUARTER OF SPACE USED BY EARLIER TYPES.



These developments set new standards for speed and economy in trans-Atlantic communication. In 1924, RCA introduced short-wave trans-Atlantic communication with high-frequency radio signals generated by tube transmitters. These replaced the cumbersome, high-power long-wave arc transmitters that previously had been the only means by which signals could be carried across the seas. Not only were short-wave signals relatively free from static interference, but a short-wave transmitter afforded greater effective signal strength than a long-wave transmitter of the same power output. Technical difficulties still remained to be corrected in the reception of short-wave signals, but RCA's research engineers developed a technique of diversity reception, using three or more receiving antennas for each incoming radio circuit, to greatly increase the reliability of short-wave communication.

Pictures Across the Ocean

This perfection in the speed and accuracy of radio transmission resulted in the development by RCA, of techniques for the trans-oceanic radio transmission of music and pictures. On July 6, 1924, a photograph of Secretary of State Charles Evans Hughes was transmitted by radio from New York to England and back to New York. This was a scientific demonstration rather than a

practical service, but a few months later the RCA scientists in New York received radiophotos transmitted from London. These pictures appeared on the front pages of the New York newspapers, with columns of praise for a great stride forward in radio.

Transatlantic Broadcast

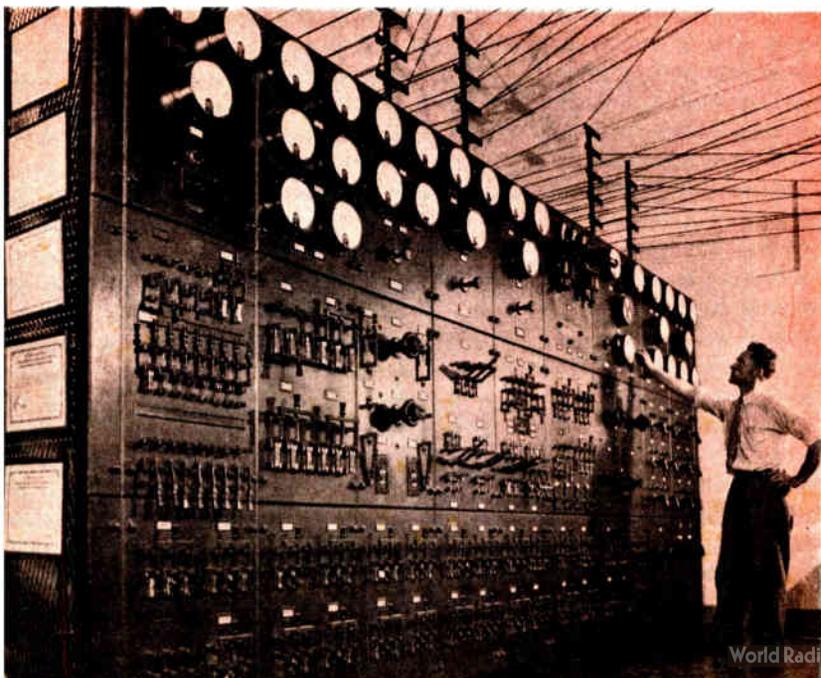
Only eight months after the first international radiophoto transmission, the New York radio audience heard its first trans-Atlantic broadcast, again through the pioneering efforts of RCA. This was on February 14, 1925. The broadcast originated in London. It was transmitted by long-wave from Chelmsford, England, and picked up by an RCA receiving station at Belfast, Me. From there it was automatically relayed via short-wave to New York, where it was again broadcast by long-wave from station WJZ.

Meanwhile, RCA continued to expand its Morse circuits throughout the world. But in keeping with its original service, completely free of alien control, RCA entered into reciprocal agreements with native communications interests in the various countries to which its circuits were extended.

Through pioneering, RCA has made some of the most important and dramatic contributions to the science and art of communications. Its radio facilities now operate between the United States and almost every important nation on earth and, with their new efficiency, they can match any demand of international communications in war or peace. These facilities are at the command of the American public—if they will endorse upon their telegrams, the simple, but magic formula:

via RCA

THE POWER CONTROL BOARD AT THE RIVER-HEAD RECEIVING STATION. OVERHEAD, RUN FEEDER WIRES THAT CARRY INCOMING SIGNALS FROM ANTENNAS TO RECEIVERS.



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