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er, Comrades -

I've been given the opportunity to copy an unusual bit of RCA history, in the form of a statement of capabilities sent to the Soviet government in late 1944 or early 1945. It was part of an attempt to re-activate the 1935 technology-transfer deal under which RCA built a TV transmitter for Moscow, etc.

This document was rescued during a cleanout of files at the David Sarnoff Research Center; however, my friend who saved it from the dumpster prefers to keep a low profile. His copy may be the only one surviving, outside of some Soviet archive.

The material contains lots of typical RCA self-praise, not to mention a full-page portrait of Big Dave. Enclosed are the sections on RCA Communications; RCA Laboratories; Radiomarine Corp. of America; RCA Institutes; and RCA Victor comm transmitters, comm receivers, and aviation radios. (Feast your eyes on the triple-diversity AR-88 system on p. 71-B!) These portions are a good part of the 270 pages and are a treasure of insight. (But they're close-mouthed about radar and other "hot" topics of the day.)

The document is undated, but was produced after Sarnoff was promoted to the rank of general. Of course, little did RCA know how much German technology the Soviets would soon capture, making a U. S. deal moot.

Enjoy!

Lud

TO

THE PEOPLES COMMISSARIAT OF ELECTRICAL INDUSTRY

FROM

RADIO CORPORATION OF AMERICA

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RADIO CORPORATION OF AMERICA

A SYNOPSIS OF ITS PRODUCTS BOTH PRESENT AND PLANNED AND ITS SERVICES

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TO THE PEOPLES COMMISSARIAT OF ELECTRICAL INDUSTRY

For six years, from 1935 to 1941, the Chief Administration of the Electro-Weak Current Industry of the Peoples Commissariat of Heavy Industry of the U.S.S.R., and the Radio Corporation of America worked together under a technical aid agreement. Experience was gained during those years which makes it logical and mutually advantageous to resume the relations which were interrupted by the war.

In the course of the first agreement much of the history and past accomplishments of RCA became known to the Soviet radio industry. The accompanying presentation, therefore, has been prepared in order to acquaint you with the developments and changes that have taken place since the ending of the agreement in 1941, and to review the basic activities and services of the Radio Corporation of America.

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BRIEF FACTS ABOUT
RADIO CORPORATION OF AMERICA

The Largest Radio and Electronic Company in the Western Hemisphere

This page, and the following one, present in extremely brief form some of the salient facts concerning RCA. This statistical review is amplified in the various sections of this book and the literature outlined in the accompanying index.

RCA VICTOR DIVISION

21,770,000 RCA radio and phonograph sets built to date
452,000,000 RCA tubes built to date. Since 1931 RCA has been the largest manufacturer of vacuum tubes in the U.S.A.
325 (out of 900) broadcast stations in the U.S.A., the largest quantity of any one manufacturer, use RCA transmitters. In each of the last 8 years, RCA has sold more radio transmitters of all types than any other manufacturer in the U.S.A.
25 (out of 91) broadcast stations in Canada use RCA transmitters
2,000 industrial plants use RCA sound systems
6,000 theatres use RCA reproducing equipment. RCA is the largest producer in the world of film sound equipment.

FOREIGN SUBSIDIARIES OF RCA VICTOR

are located in India, Canada, Chile, Argentina, Mexico, Brazil, Australia, England.

RCA COMMUNICATIONS INC.

Normally more than 50 radio circuits to world points

130,000,000 paid words transmitted in 1943
145,000,000 paid words transmitted in 1944

RADIOMARINE CORPORATION OF AMERICA

80% of U.S.A. Merchant Marine uses RMCA radio equipment.

NATIONAL BROADCASTING COMPANY

150 affiliated stations in NBC networks. See booklet #125, "The Fourth Chime" and Booklet #245, "25 Years of Radio Progress with RCA".

RCA INSTITUTES

Over 5,000 students trained in radio courses to date.

RCA LABORATORIES

5 groups of research laboratories, located at Princeton, N. J., 711 Fifth Avenue, New York, 66 Broad Street, New York, Riverhead, New York, and Rocky Point, New York.

RCA has 215 patent licensees, companies manufacturing various products under RCA patents.

RCA EARNINGS FOR THE PAST TEN YEARS

Year	Gross Income
1934	$ 78,756,994.
1935	89,228,898.
1936	101,186,310.
1937	112,639,498.
1938	99,968,110.
1939	110,494,398.
1940	128,491,611.
1941	158,695,722.
1942	197,024,056.
1943	294,535,362.

TOTAL NUMBER OF RCA WORKERS

RCA employs over 1,500 graduate engineers throughout its organization

RCA workers, in all of its member companies, total 40,000.

RADIO CORPORATION OF AMERICA

The activities of the Radio Corporation of America extend over a broad front of research, development, engineering design, manufacture and operational use of all forms of electronic apparatus including the electronic tubes which make such apparatus possible. Closely associated with electron devices and equipment are the fields of acoustics, electromagnetic wave radiation and propagation, optics, mechanics and thermodynamics.

RCA has maintained a leading position in these fields of science to support its enormous electronic program in practical design and applications.

Then, to produce the apparatus embodying the fruits of research and engineering RCA has developed one of the largest and most versatile manufacturing organizations in the world.

There are several important companies in the United States engaged in electronics on a large scale, but, as study will show, RCA is the largest by far devoted exclusively to this field. As a consequence, no other company in the U.S.A. engages in so many aspects of electronics and electronic applications as does RCA.

In the matter of technical operations, the National Broadcasting Company, an RCA company, is the leading broadcasting organization in the U.S.A. and RCA Communications, Inc., another member of the RCA family, is the largest radio communication company in the world. The Radiomarine Corporation of America is the largest company in marine radio communication, while RCA Laboratories is the first and largest organization of its kind devoted to electronic research.

To review the scope of RCA, we present, on the following pages a summary of its activities, a list and description of its products and services.

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RADIO CORPORATION OF AMERICA

INDEX

RCA TECHNICAL PAPERS
AND OTHER PUBLICATIONS

We are presenting separately a collection of typical technical papers by RCA engineers published since 1940. Since 1941, there has been a virtual black-out of technical publication relating in any way with war work, and this includes the great proportion of RCA research, development and design, so that the present papers are only a small fraction of what would be available in the same period in peacetime.

The papers offered will serve to indicate some RCA contributions to recent technical literature and reflect the quality of its research efforts. Other publications issued by RCA provide supplementary information on our overall activities.

Following is an index of the various RCA technical papers and other publications which we are presenting.

RCA COMMUNICATIONS, INC.

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RCA COMMUNICATIONS, INC.

RCA Communications, Inc., although a separate incorporated company, is wholly owned by the Radio Corporation of America and is the point-to-point communications operating branch of RCA.

Primarily it operates:

Radio telegraph circuits between the United States and more than 50 overseas points throughout the world;

Facsimile and radio photo services over a number of such circuits;

A Program Transmission Service for the transmission and reception of broadcasting programs to and from overseas points;

A public radio telephone service connecting Hawaii with the United States and connecting the Philippines with the United States and with a number of other points directly.

The radio telegraph circuits of RCA Communications regularly operated are shown on the following pages:

RCA COMMUNICATIONS CIRCUITS

Between New York and

Moscow, U.S.S.R.,
Leopoldville, Belgian Congo,
Montreal, Canada,
Cairo, Egypt,
Helsinki, Finland,
Paris, France,
Brazzaville, French Equatorial Africa
Dakar, French West Africa,
Bathurst, Gambia
London, England,
Godthaab, Greenland,
Reykjavik, Iceland,
Bombay, India,
Teheran, Iran,
Rome, Italy,
Monrovia, Liberia,
Lisbon, Portugal,
St. Pierre-Miquelon,
Barcelona, Spain,
Madrid, Spain,
Stockholm, Sweden,
Berne, Switzerland,
Beyrouth, Syria,
Istanbul, Turkey,
Buenos Aires, Argentina,
Hamilton, Bermuda,
Rio de Janeiro, Brazil,
Santiago, Chile,
Bogota, Colombia,
Havana, Cuba,
Willemstadt, Curacao,
Ciudad de Trujillo, Dominican Republic,
Paramaribo, Surinan,
Quito, Ecuador,
Guatemala City, Guatemala,
Port-au-Prince, Haiti,
Mexico City, Mexico,
Panama City, Panama,
San Juan, Puerto Rico,
Fort de France, Martinique,
Caracas, Venezuela.

Between San Francisco and

Melbourne, Australia,
Sydney, Australia,
Chungking, China,
Chengtu, China,
Kunming, China,
Honolulu, Hawaii,
Noumea, New Caledonia,
Wellington, New Zealand,
Tahiti, Samoa,
Buenos Aires, Argentina,
Bogota, Colombia,
Panama City, Panama.

Circuits which have been interrupted because of the present war include those between:

New York and

Oslo, Norway,
Amsterdam, Holland,
Brussels, Belgium,
Warsaw, Poland,
Prague, Czechoslovakia,
Berlin, Germany,

San Francisco and

Hsinking, Manchuria,
Shanghai, China,
Manila, Philippine Islands,
Batavia, Dutch East Indies,
Saigon, French Indo-China
Tokyo, Japan

and a large number of Far Eastern circuits operated from the RCA Communications center in Manila, including circuits

between

Manila and San Francisco,
Manila and Honolulu, Hawaii,
Manila and Madrid Station,
Manila and Berlin, Germany,
Manila and Batavia, Dutch East Indies.

The Radio Corporation of America was organized in 1919 primarily to develop and operate point-to-point radio telegraph service between the United States and overseas points throughout the world in competition with the well-established submarine cable communications companies which were then handling 100% of the international telegraph traffic to and from the United States.

In the 25 years of development and expansion which have passed since 1919, the radio telegraph circuits of RCA have expanded, year by year handling a larger and larger proportion of the international telegrams of the United States, not only in competition with the submarine cable companies but also in more recent years competing with other radio communications companies newly organized after the pioneering of RCA had amply demonstrated the practical long distance communications possibilities of radio. Notwithstanding both cable and radio competition the proportion of overseas telegraph traffic to and from the United States handled over the circuits of RCA increased steadily, so that by 1938 RCA was handling a larger proportion of such telegrams than any other American communications company, thus demonstrating the outstanding leadership of RCA in the communications field.

The international radio telegraph circuits of RCA are operated both by long wave and by short wave, thus giving the company ample experience in both fields, the long wave operations having become in recent years mainly a complementary service to the short waves, most useful in maintaining continuity of service with those countries of northern Europe still retaining long wave transmitting and receiving apparatus during periods of severe magnetic disturbances which adversely affect short wave operations, especially over the North Atlantic paths.

Although most of the RCA radio telegraph circuits are still operated by automatic machine transmission and undulator reception using the conventional Morse code, at speeds commonly reaching several hundred words per minute, RCA has been a pioneer in the development of automatic printer operation over long distance radio circuits, having carried on regular operations between New York and London by a mechanized multiple-

channelled radio printer system since 1936 and a multi-channel mechanized system on which printer operation was demonstrated between New York and Amsterdam since 1937. The RCA circuit between New York and Buenos Aires was equipped with a later model of the RCA multiplex and printer apparatus which has been in very satisfactory operation during the past four years.

The America-Australia circuit between San Francisco and Sydney was also equipped with RCA multiplex and radio printer apparatus providing four printer channels on one radio frequency. This circuit has operated continuously and with satisfaction for the past two years.

RCA Communications, Inc. operates both ends of its overseas circuit between San Francisco and Honolulu, Hawaii, and of its transcontinental circuit between New York and San Francisco. Both circuits have been equipped with radio printers and with multi-channeled RCA multiplex apparatus, so that for many years past at various stages of the RCA mechanized operating system two, three or four radio printer channels have been operated over the single radio frequency carrier between these points.

Valuable experience in the development and practical operation of radio printer and multi-channel operation was provided for a number of years over the domestic radio telegraph network of RCA Communications, Inc. between and among twelve large cities, all important telegraph communication centers of the United States. Operation of this domestic radio telegraph system is at present suspended for the duration of the war, both as a measure of conserving frequencies which were much in demand for military services and as a measure of military security, since it was considered undesirable to establish censorship offices at each of these points. The cities included in the RCA domestic network were New York, San Francisco, Washington, New Orleans, Chicago, Detroit, Camden, Philadelphia, Baltimore, Boston, Los Angeles and Seattle. Of these only New York, San Francisco and Washington remain presently in operation.

The radio circuits connecting the cities of the domestic network were equipped with three-channel multiplex apparatus and with radio printers entirely supplanting the conventional method of Morse operation. In addition automatic channel repeaters had been developed and were in regular operation at New York and San Francisco, so that individual channels of each multi-channelled circuit could be automatically repeated into individual channels of another multi-channelled circuit. By this means, for instance, a through connection was provided between Chicago and Los Angeles over one of the printer channels between Chicago and New York, repeated through one of the channels between New York and San Francisco and there again repeated over one of the printer channels between San Francisco and Los Angeles. Since the RCA multiplex terminals are inherently synchronized signal

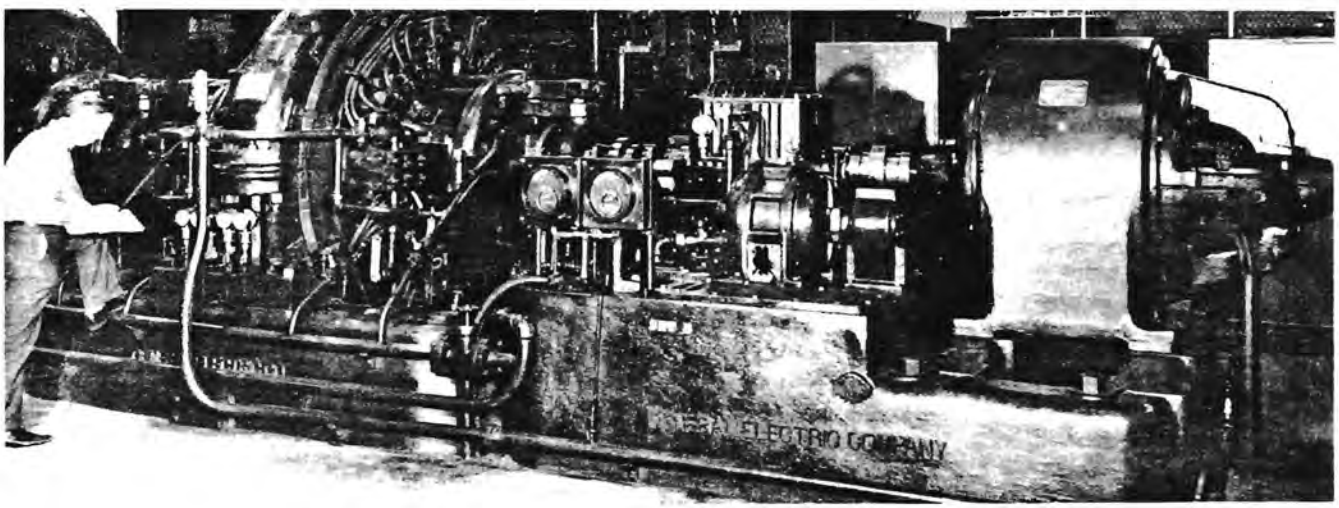
regenerators, any number of such individual channels could be interconnected either permanently, or during pre-determined hours or intermittently as required. Direct user-to-user radio printer connections had not been applied to the radio telegraph network at the time its operation was suspended, but the technique for doing so had been developed and was available.

In addition to radio telegraph service, RCA Communications also operates direct radiophoto or facsimile service over its circuits between New York and London, Cairo, Buenos Aires and Stockholm, as well as between San Francisco and Melbourne and Honolulu. The system of transmitting pictures by the Sub-Carrier Frequency Modulation method was first developed and applied by RCA. This method has been the basis for the extensive expansion of radio picture transmission service by the military and the press during the present war.

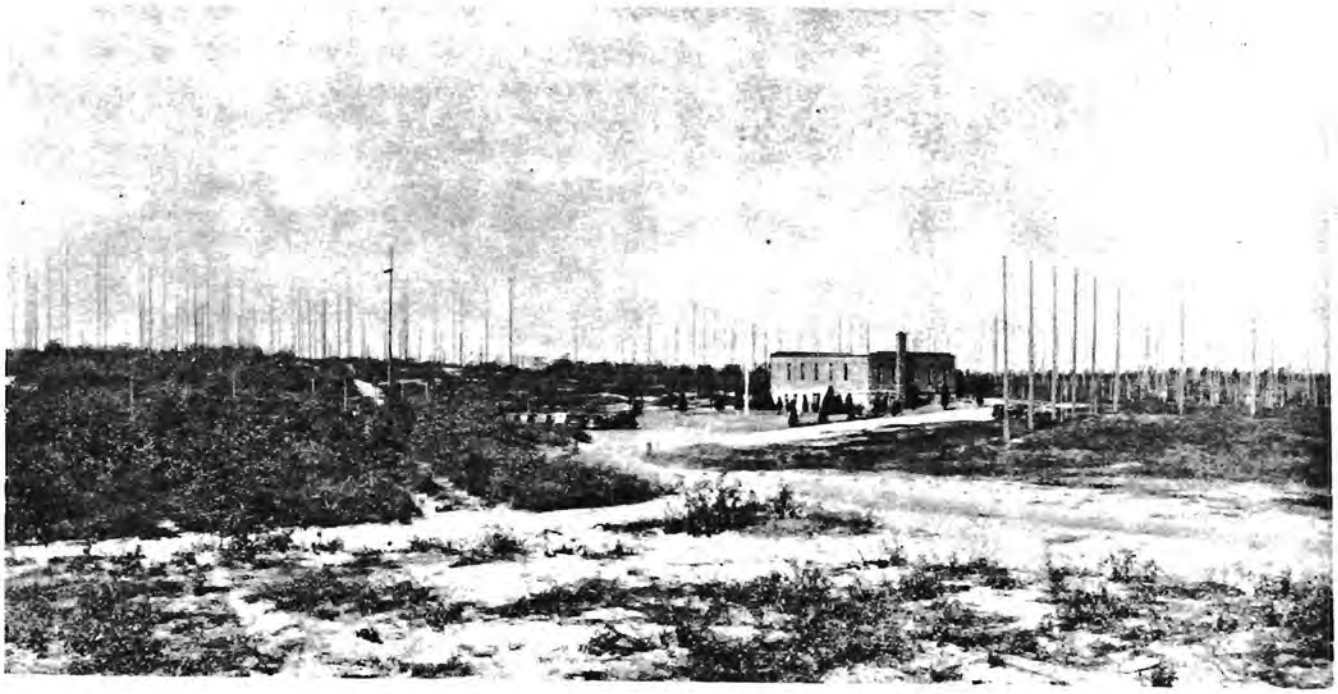
All reception of radio signals by RCA Communications, Inc. at both its international receiving stations and throughout its domestic radio network is by the RCA diversity receiving system, whereby three separate and widely spaced antennas are used to pick up the incoming signal, pass it through three separate receivers and combine the result for automatic re-transmission onward to the central terminal office. The diversity system almost entirely eliminates the fading and extreme variations of signal strength experienced on long distance shortwave circuits. This receiving system is also characterized by extremely fine selectivity and a very high degree of improvement in signal to noise ratio.

RCA Communications demonstrates, to a very fine degree, the manner in which radio engineering and experience flows back and forth among the corporate units of the Radio Corporation of America. Actual daily work in commercial radio communications in all parts of the world brings to the Company as a whole, a wealth of experience which is translated into the design and manufacture that keeps RCA in the forefront of radio and electronics.

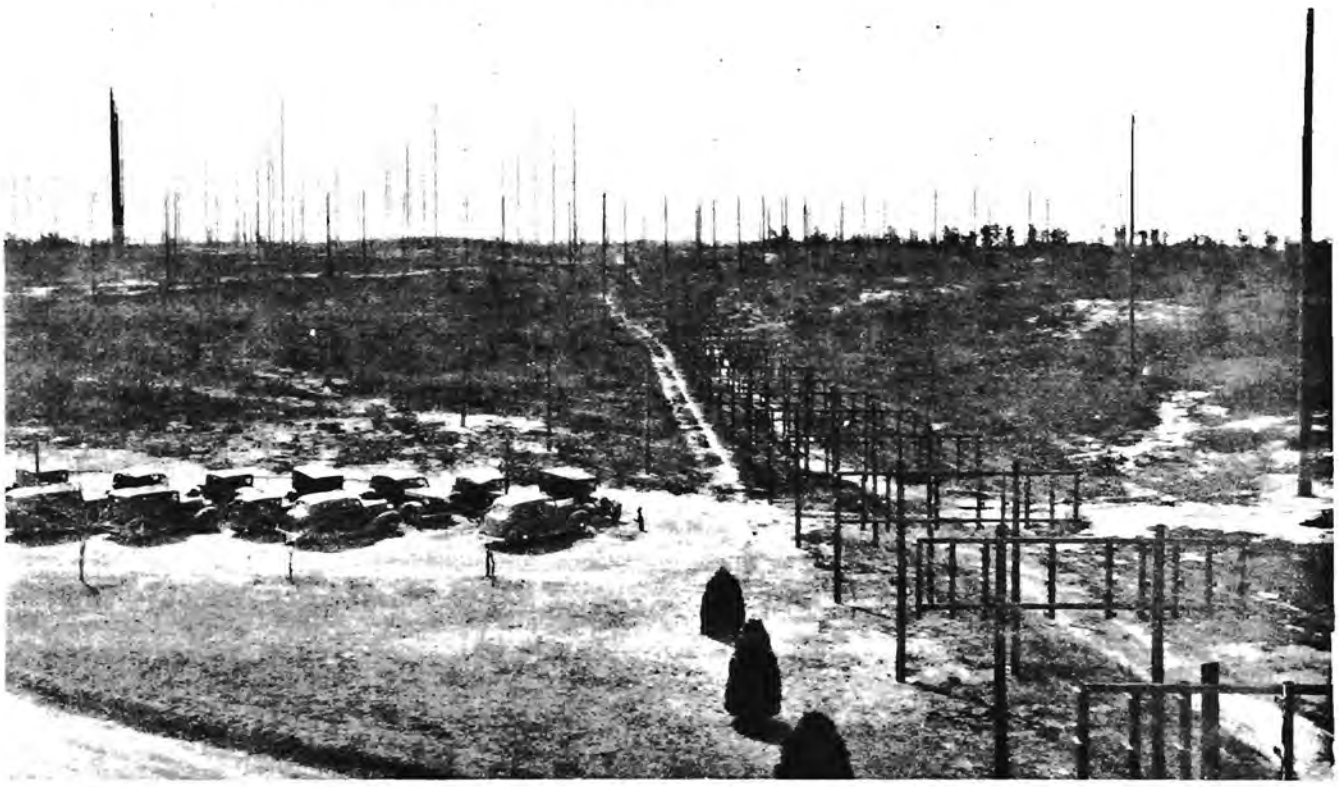
Main Transmitter Building, at R.C.A. Communications transmitting station, Rocky Point, New York. Also shows one of the longwave antennas and a few of the shortwave antennas.



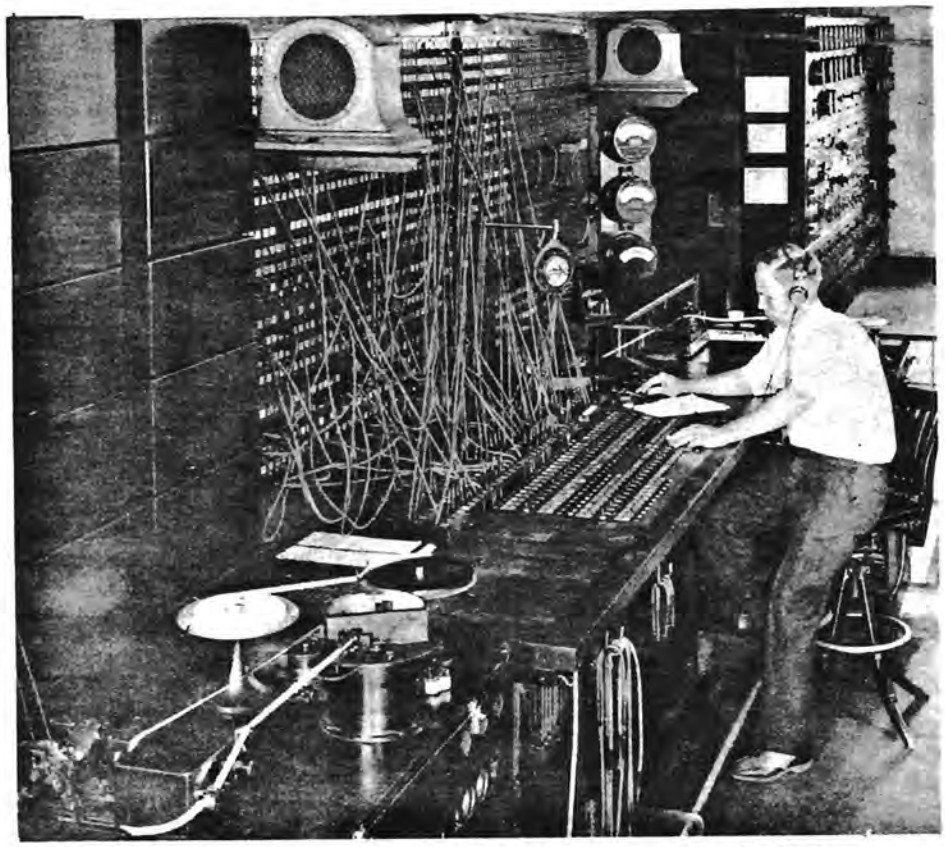
Radio frequency generator machine, part of one of the 200 kw long wave transmitters at R.C.A. Communications transmitting station, Rocky Point, New York.



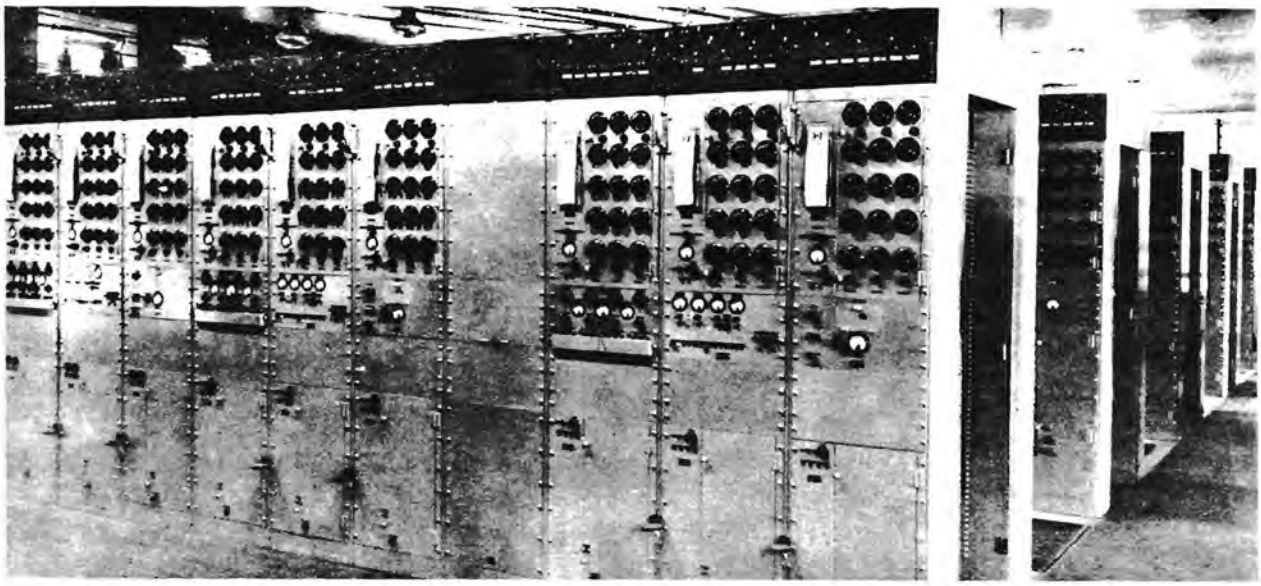
Main shortwave receiving building at Riverhead receiving station of R.C.A. Communications. Showing some of the surrounding antenna poles.



View from front of main receiving building at Riverhead showing one of the transmission line trunk systems and more of the antenna poles.



Control boards at Riverhead receiving station of R.C.A. Communications, line control board in foreground, power control board in rear.

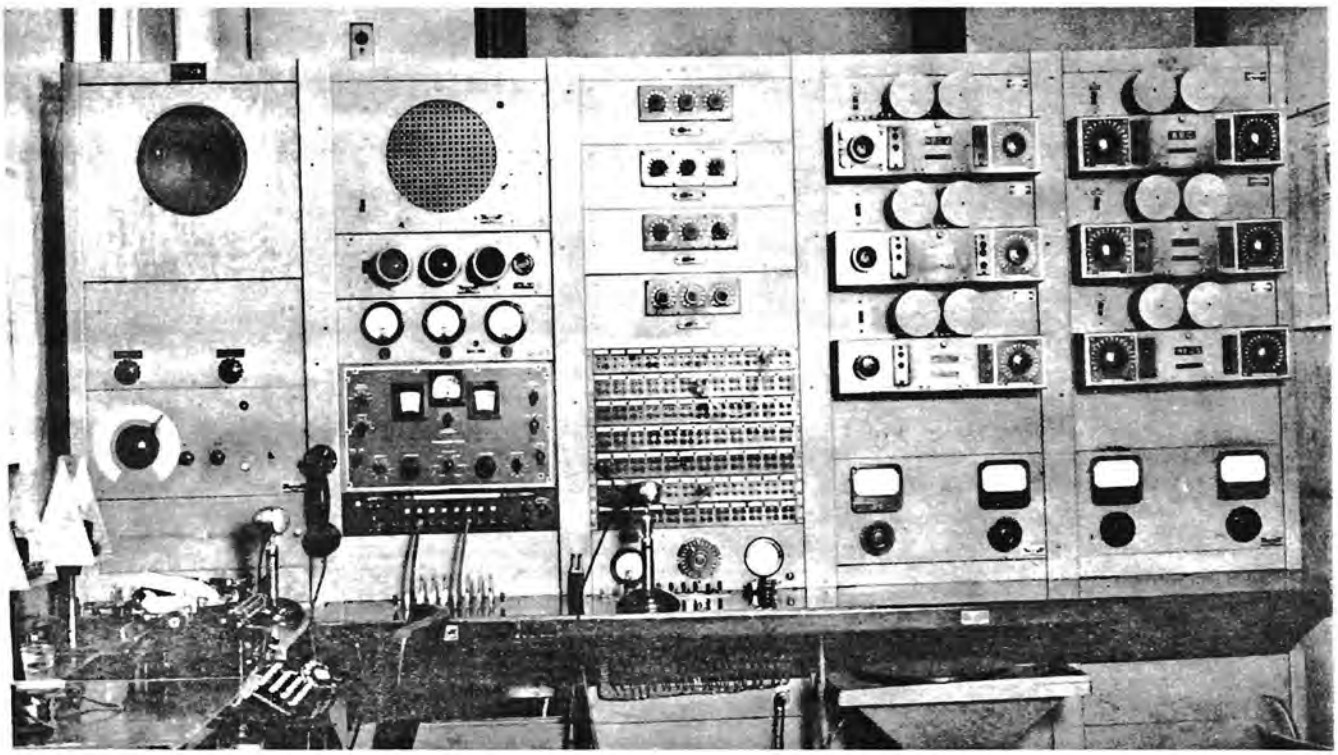


View of one section of receiver room in main shortwave receiving building of R.C.A. Communications receiving station, Riverhead, New York, showing in foreground three complete three-set diversity receiver groups and ends of 11 rows of such receiver groups.

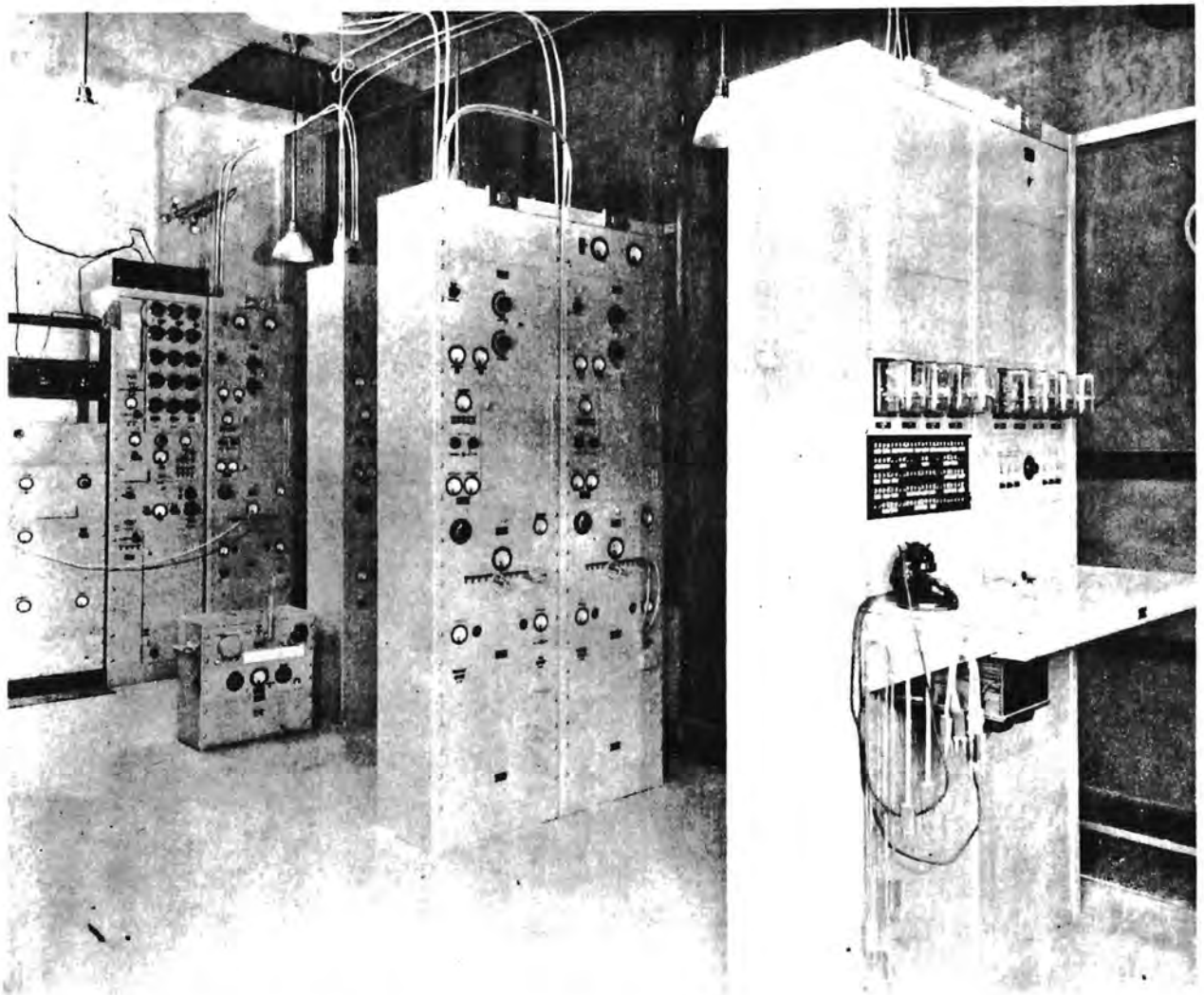
Printer concentrator switchboards controlling banks of private line customers printers. At terminal operating offices of R.C.A. Communications, New York City.

Another interior view of a section of the terminal operating office of R.C.A. Communications, 66 Broad Street., New York City, looking down message belt conveyor with radiotelegraph operating positions at either side.

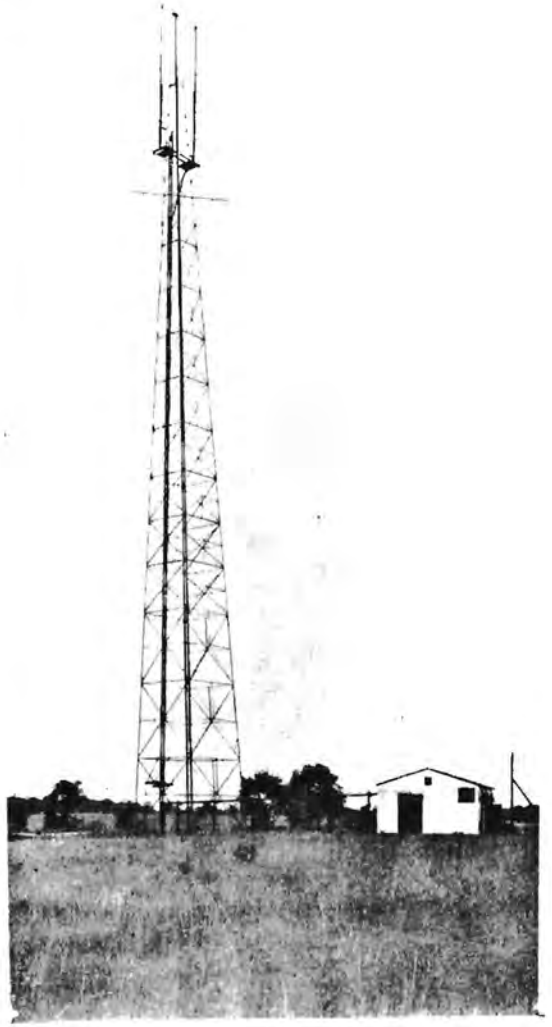
Master Frequency Standard of RCAC located at the Riverhead receiving station. Quartz crystal precision type oscillator with temperature, humidity and barometric controls.



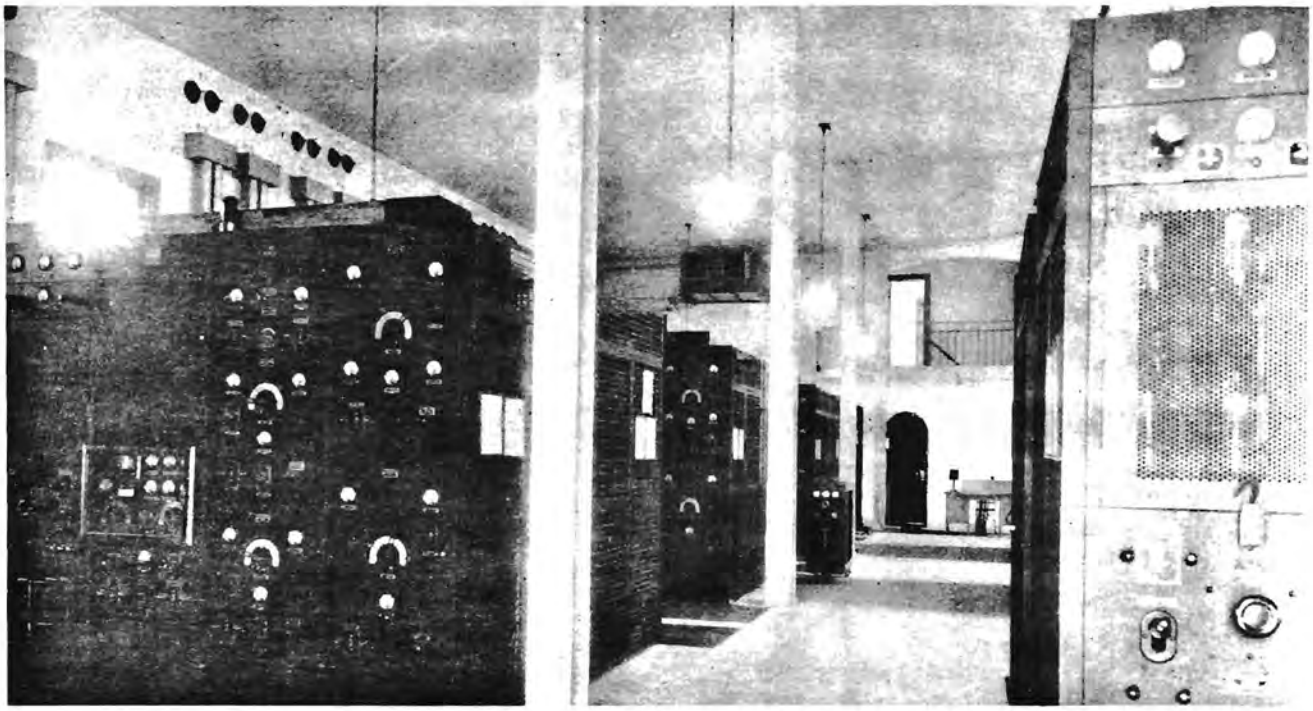
Control position and switchboard for Program Transmission Service connecting principal broadcasting networks of the U.S.A. with the overseas circuits of R.C.A. Communications at New York City.



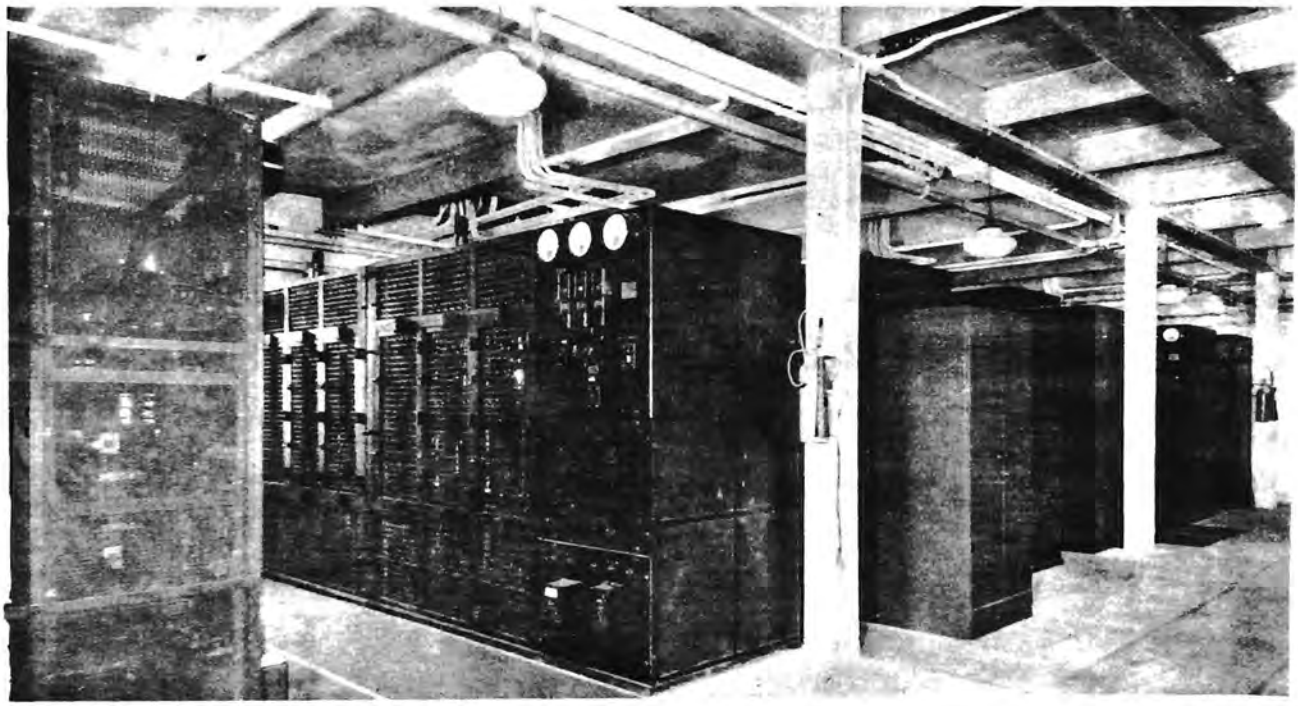
Interior view of R.C.A. Communications ultra-high-frequency relay station on the line between New York and Philadelphia. Showing remote control racks (front) and four uhf receivers and some experimental equipment. Corresponding uhf transmitters are in space beyond screened wall to right of receivers.



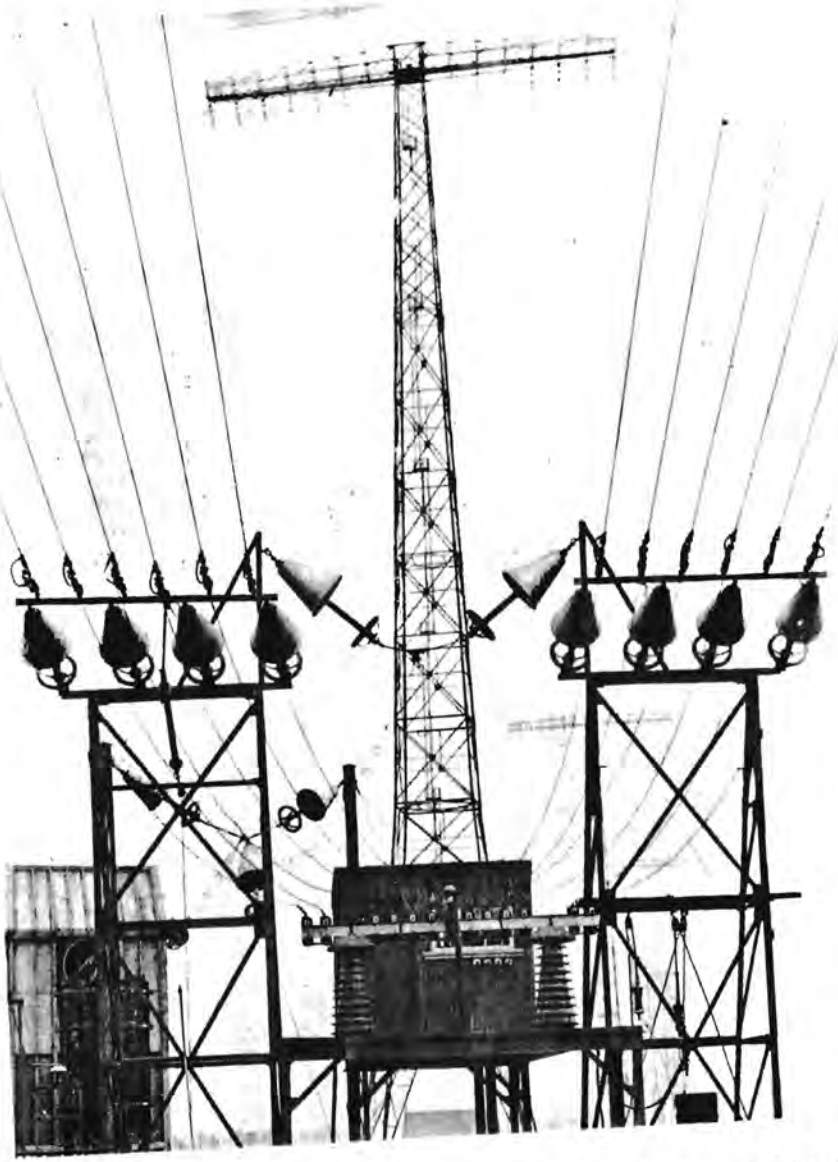
Uhf relay station, exterior view, showing two dipole transmitting arrays at top of tower and rhombic receiving antenna just below them.



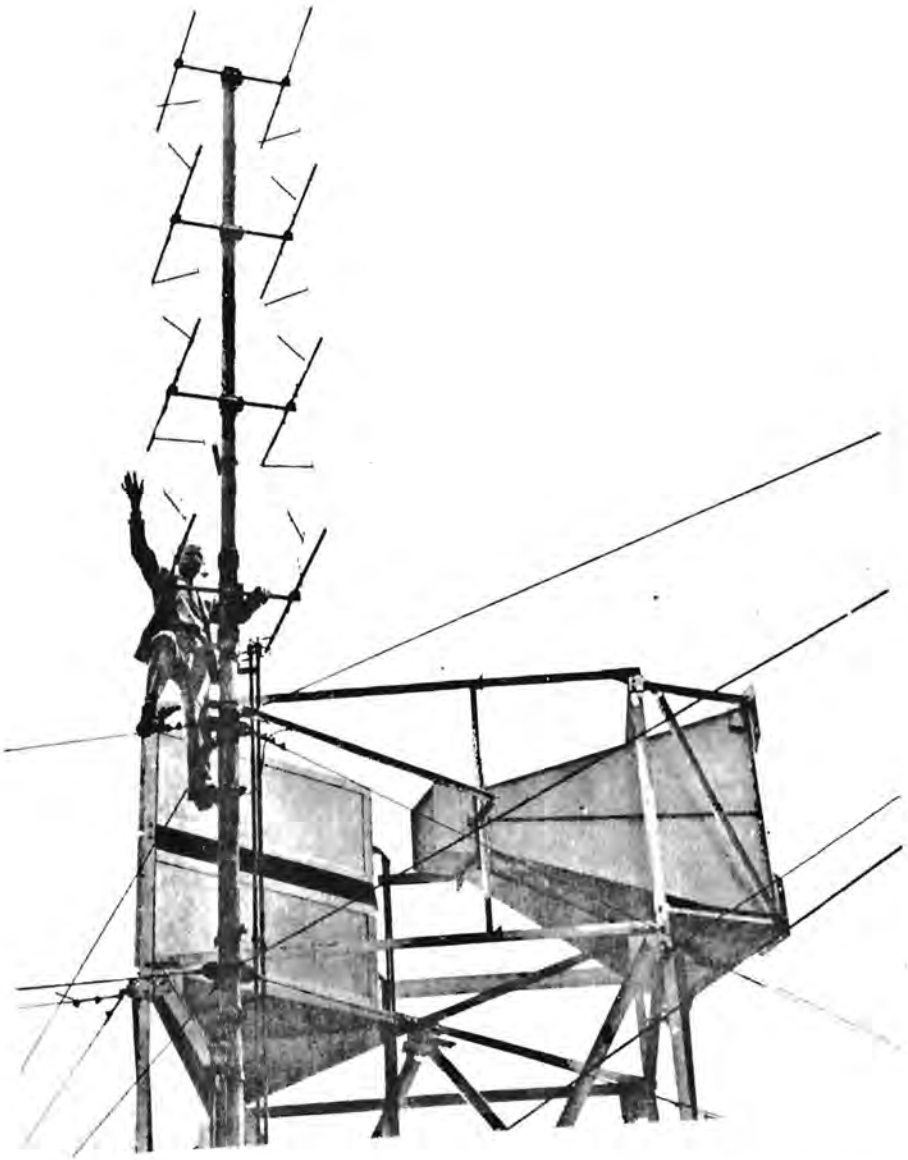
A corner of the second transmitter building at the Rocky Point, New York, station of R.C.A. Communications. At front, left, is control panel of one of the 40 kw shortwave transmitters, of which there are six in that row.



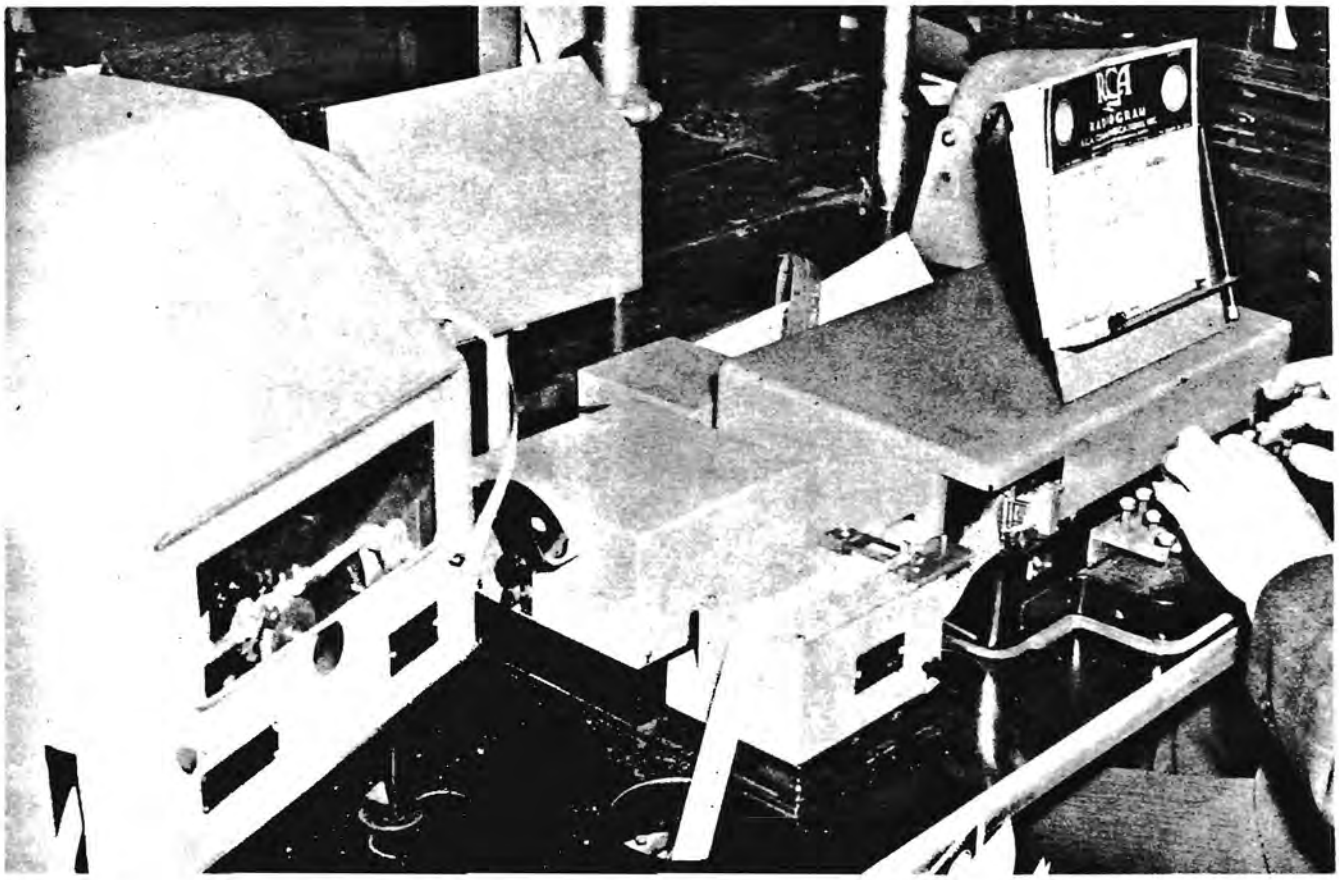
Bank of high voltage rectifiers furnishing the power supply for the 40 kw shortwave transmitters located on the floor above. At Rocky Point, New York transmitting station.



View at Rocky Point transmitting station. Downlead terminations for one longwave antenna in foreground, towers of second longwave antenna in background.



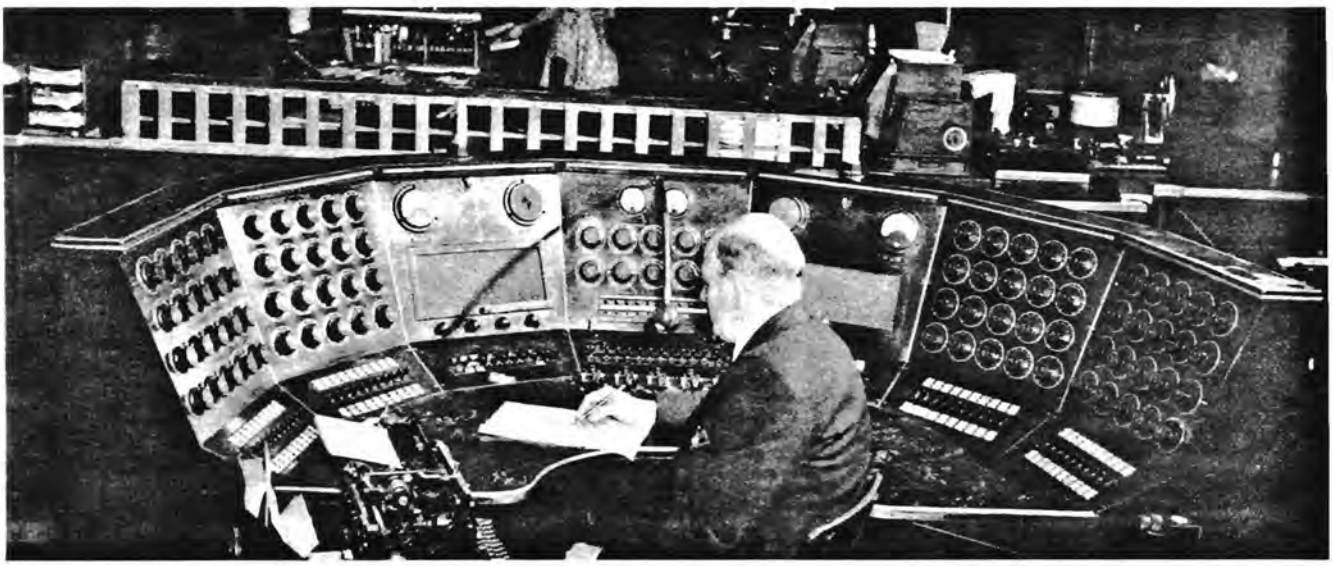
Uhf transmitting antennas on roof of high building at New York City end of R.C.A. Communications radio relay circuit.



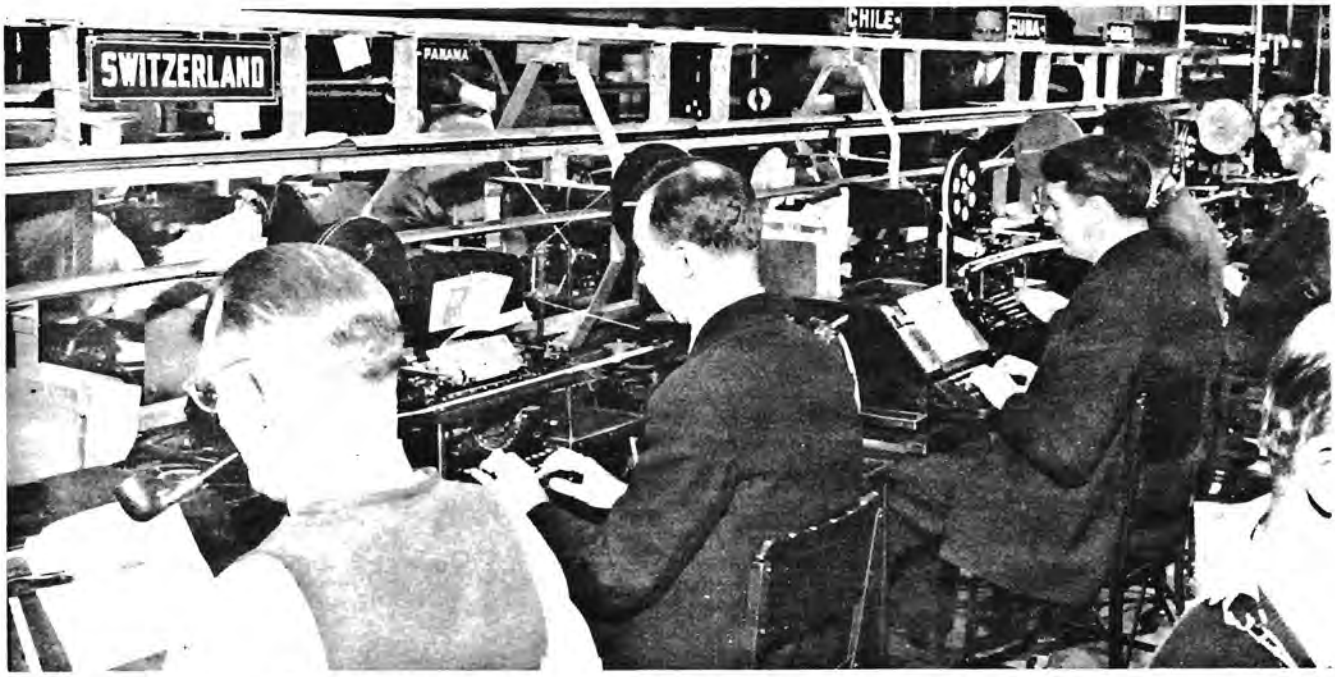
Radioprinter position, showing receiving printer (left), synchronous transmitter and printer perforator (right).

Radioprinter operating position in terminal operating office of R.C.A. Communications, New York City. Shows receiving and transmitting positions terminating one channel of an R.C.A. multichannel radioprinter circuit.

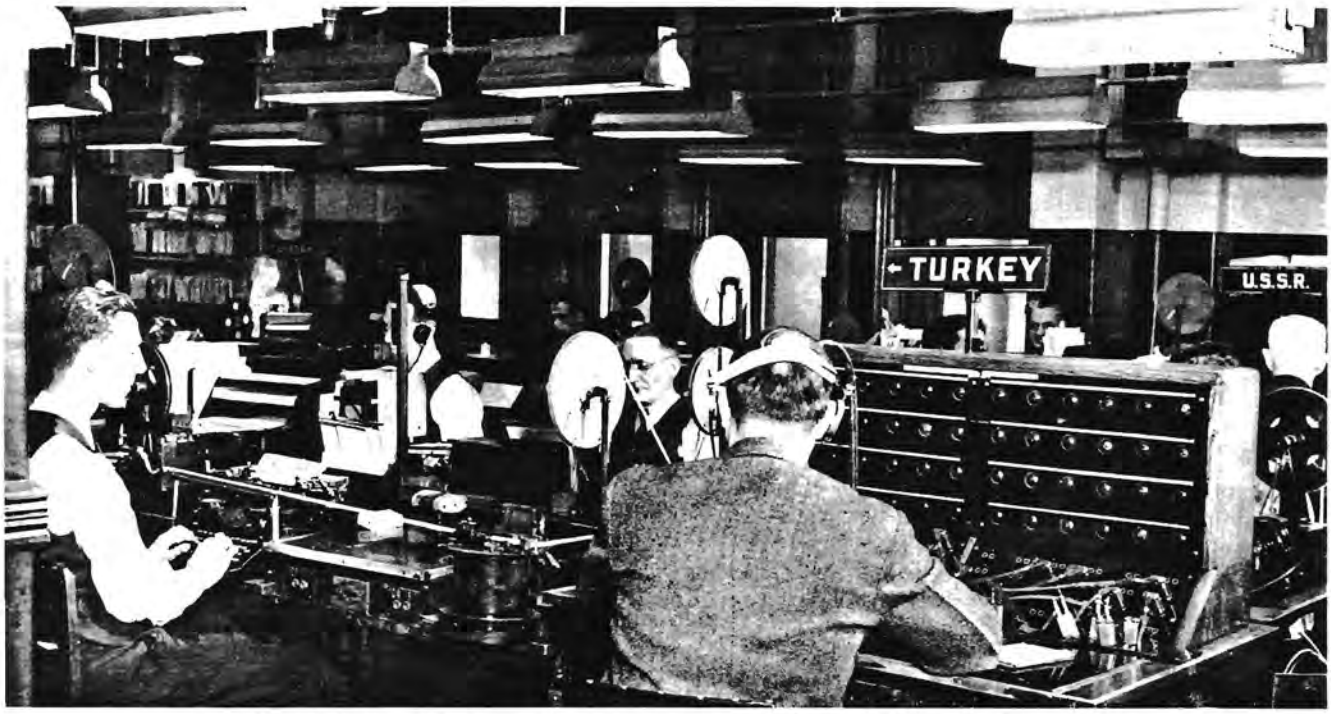
Corner of Technical Control Room, in the terminal operating office of R.C.A. Communications at New York City. Shows bank of signal amplifiers, patching switchboard and test table.



Technical control position, in terminal operating office of R.C.A. Communications, New York City. The central point of contact between receiving stations, transmitting stations and radiotelegraph operating positions throughout the terminal operating office.



Radiotelegraph operating positions in terminal operating office of R.C.A. Communications, New York City. Also showing special non-shadow lighting fixtures and high-speed belt conveyors for telegrams.



Section of terminal operating office of R.C.A. Communications, New York City. Foreground shows radiotelegraph concentrator position for switching of non-continuous circuits to active operating positions.

RCA LABORATORIES

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RCA LABORATORIES

RCA Laboratories is a grouping together under one management of the various research activities of RCA. Although the new laboratory at Princeton is the largest and most modern center of radio and electronic research, such activities are also carried out at Riverhead and Rocky Point, Long Island, and in New York City at 66 Broad Street and 711 Fifth Avenue. Ground was broken for the new building on August 8, 1941, and a little over a year later, in September, 1942, construction workers left the scene and the research scientists and engineers moved in. Built on 260 acres of New Jersey farmland at Princeton, seat of the famous university, a stimulating atmosphere has been created which is conducive to scientific discovery and creative work and from which will radiate scientific, industrial and social progress. Among the men who are at work in the laboratories are those who invented the Iconoscope and Kinescope, the eyes that made television practical; the men who built the RCA electron microscope, the electron multiplier tube, radio and electronic tubes for the home, for aircraft, for battle fleets and the Merchant Marine. Now, in these laboratories, with facilities for research unsurpassed anywhere in the world, they have outdone even the wonders of the past.

The main laboratory building is a three-story structure with long corridors into which open one hundred fifty laboratory bays. The basement is the nerve center. Into it, through underground arteries and pipes, are fed the electric power, gas and water supply. Alongside huge water tanks and air conditioning apparatus are transformers and vault enclosed power regulators. Compressed air and steam is supplied from the heating plant. From two three-hundred-foot wells, six hundred gallons of water are pumped in a minute. All the services of electricity, water and gas flow in conduits on the basement ceiling under the main corridor. One hundred and four vertical shafts with outlets on each floor carry the vital services to four hundred and twenty benches, each six feet long. These unique service shafts are considered a most important feature and development -- an original contribution to laboratory construction.

Each of the main corridors is four hundred eighty-eight feet long with doors, on both sides on all three decks, opening to the many laboratory bays and to the nine administrative research offices and workshops.

The many laboratory bays indicate the great variety of activities within the laboratory. Each is brightly lighted by daylight exposure and modern indirect lighting.

The television laboratory adjoins a control room and a two-story studio. There are also included optics laboratory bays, an optical dark room, and a lens grinding room.

The chemical laboratory has completely dust-proof rooms for experiments with fluorescent materials.

The acoustical laboratory has been provided with the most modern facilities. It includes: a unique double wall; double door isolation room for sound tests; a high pressure room; and tanks for underwater sound tests. Its most novel section is the free field sound room, heavily padded on the inner side, in which there are no echoes or reflections, or extraneous sounds whatever. There is also included a *"living room"* designed to be the acoustical equal of the ideal home living room in which the experiments with sound instruments for home use are made.

The electronic tube-making laboratory is equipped with hydrogen furnaces and exhaust pumps and manned by expert glass blowers. The radio facsimile laboratory includes a room for chemical work necessary for the study of dyes and inks.

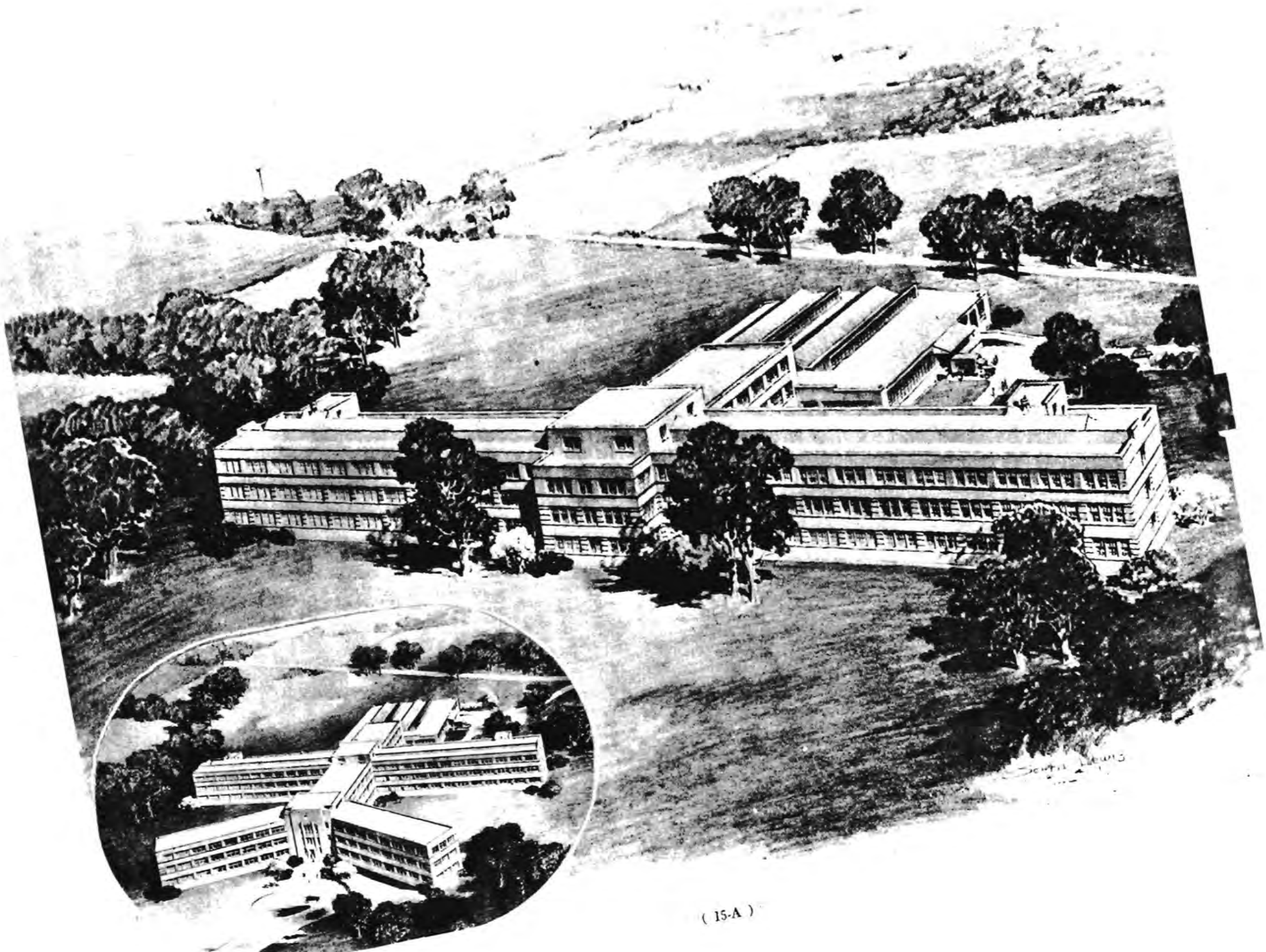
There are laboratories for work on transmitting tubes, for cathode ray research, for high frequency transmitter and antenna research, and a field laboratory for outdoor sound measurements and antenna development. There is an extensive model shop equipped with everything from huge presses capable of pressures measured in tons to gauges accurate to five millionths of an inch. There is a coil and cable department, a lacquer room, a plastics room, an electroplating room, a cabinet shop and a tool crib. The stockroom carries twenty thousand different parts, every conceivable thing that may be needed to make up an electronic device. There is also a raw materials stockroom. There is a metals laboratory for testing all types of metals and a meter room for calibrating the three thousand different meters used in the laboratory. There is also a drafting room, a blueprint room, a photographic room, and an extensive technical library; and finally there is a kitchen and cafeteria to serve the needs of the personnel.

In these modern laboratories, every facility has been provided for carrying on advanced research and development in all electronic fields. In addition, all branches of science, which are closely allied to the successful operation of electronic devices, are also given a opportunity for development here. The RCA Laboratories is a community of scientists engaged in many diverse projects in a great number of scientific fields. Each contributes to the overall progress of the electronic art. All branches of science — chemistry, physics, astronomy, mathematics, biology, and others, are called upon to serve the electronic industry. It has made in the past, and will make in the future, great contributions in turn to every one of these scientific fields.

It was conceived as a headquarters for all research and original development work of RCA. It was planned to foster the growth of radio as an art and an industry and to meet the demands of national defense.

Not only has RCA Laboratories met the demands of defense, but as the war enveloped the United States, it became an arsenal of offense, helping the United Nations as a whole. Many vital developments have been accomplished, developments of such importance that the course of the war has been changed.

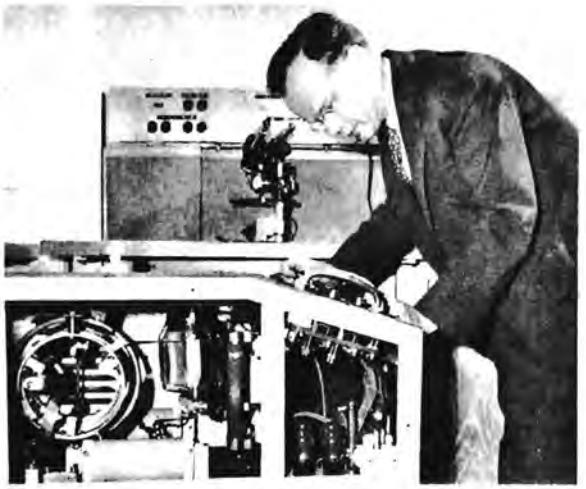
As General David Sarnoff, President of the Radio Corporation of America, stated in announcing the organization of RCA Laboratories: "The achievements of modern radio are capable of increasing and improving industrial output in many lines. By the application of electronic devices to industrial processes the Radio Age promises to electronize modern industry, just as the application of electrical devices to industry at the beginning of this century created the electrical age. By the establishment of the new Laboratories, radio quickens its pace alongside the older industries -- electrical, steel, automobile, wire communications, chemical, metallurgical, and others -- which, through research, have contributed to the industrial leadership and progress of this country. It is through invention and the practical applications of research that American ingenuity has raised the standards of living."



(15-A)

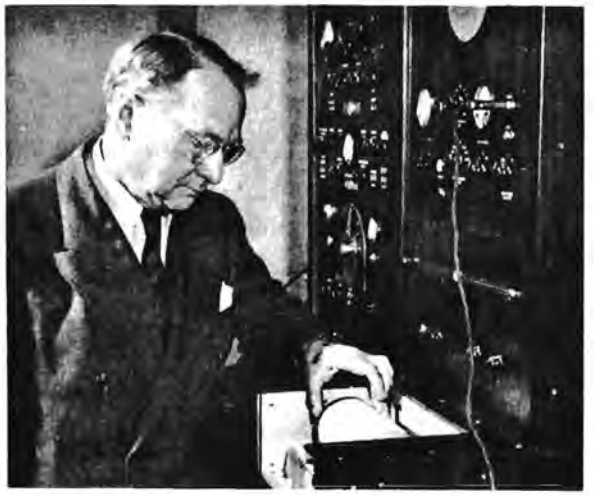
*** B.J. Thompson, Associate Director, tests an electronic device used in radio and electronic research in the RCA Laboratories at Princeton, New Jersey.**

** Killed in action in the Mediterranean theatre of operations while serving on a special mission "of direct and vital importance to the war" for the Secretary of War.*

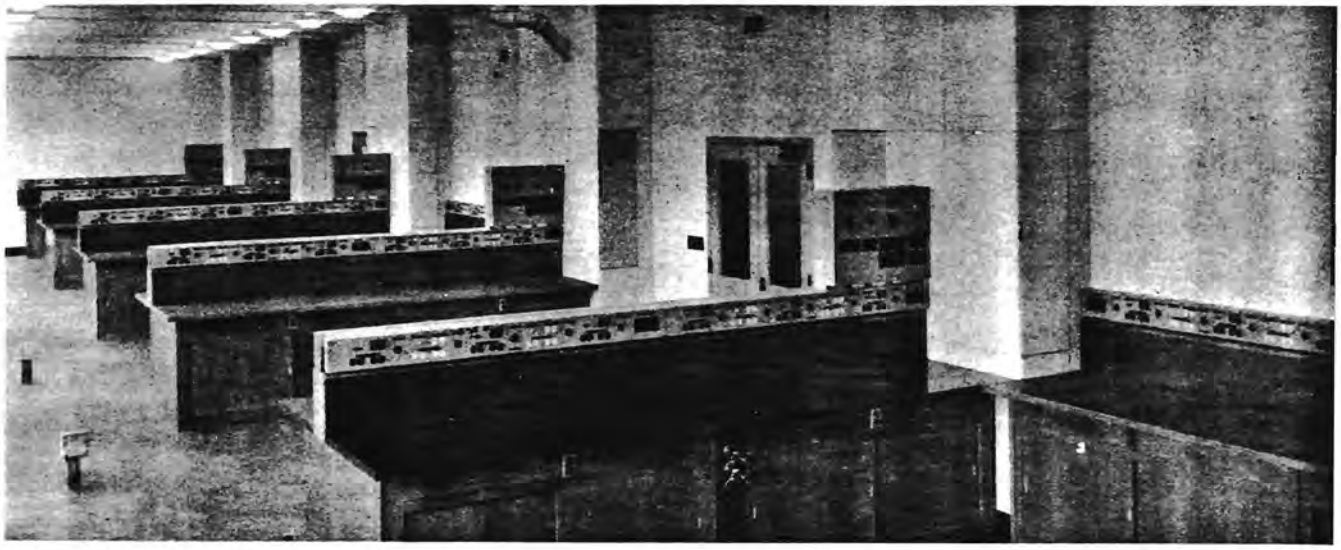


E. W. Engstrom, Director of RCA Laboratories at Princeton, New Jersey., looking over an electronic testing device used in radio and electronic research.

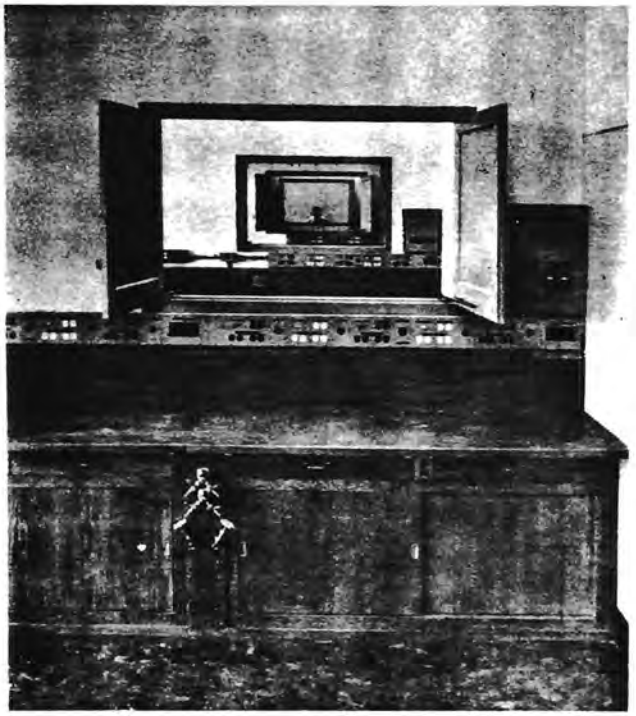
Dr. Vladimir K. Zworykin, Associate Director, examining a piece of test equipment in the RCA Laboratories at Princeton, New Jersey



Each spacious laboratory has broad daylight exposure supplemented by modern lighting, which casts no shadows.

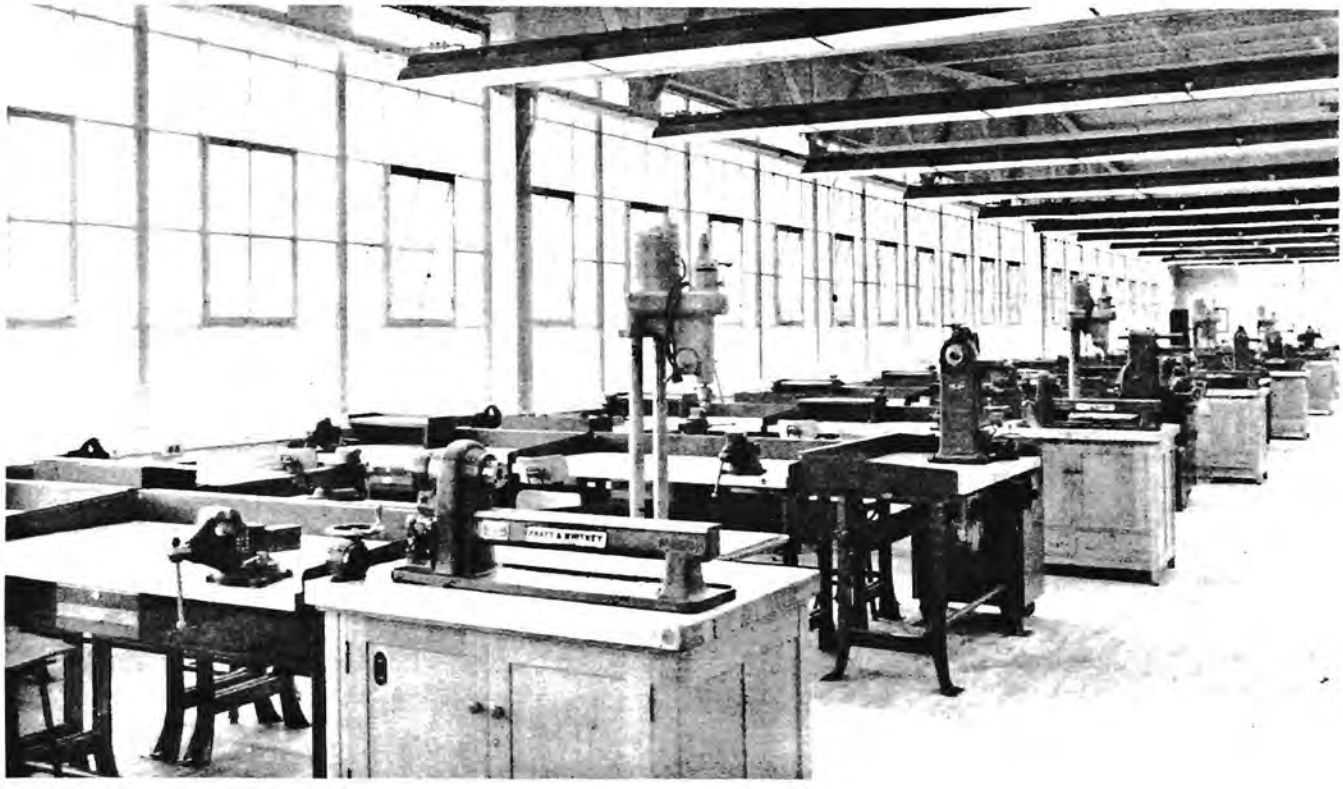


A huge wooden door, heavily padded on the inside, leads into the Free Field Sound Room, in which spoken words are heard exactly as uttered, free from echo, reflection and resonance.

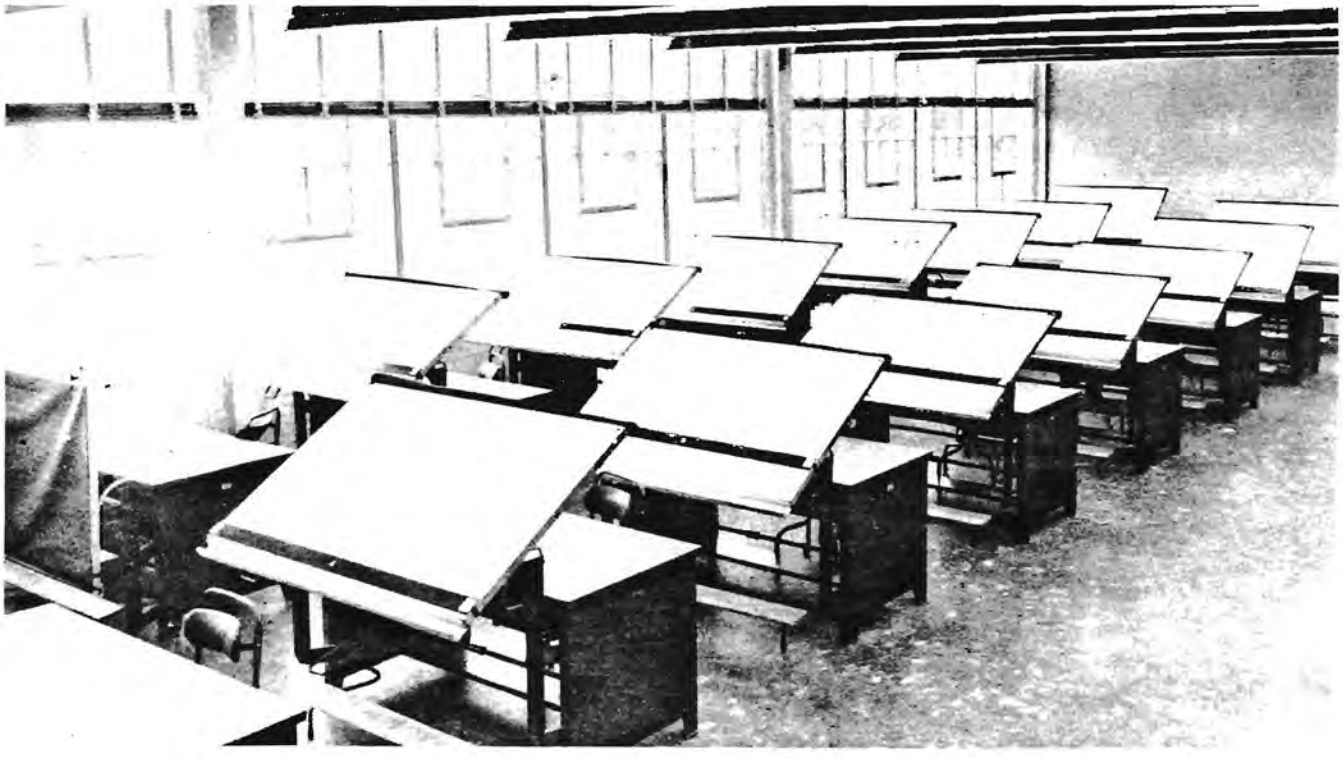


The Optic Laboratory bays are ingeniously connected by door-like windows in the walls, making possible long focuses through the rooms.

The Model Shop of RCA Laboratories is one of the most modern and completely equipped in the world.



The Drafting Room, favored by north lights, has desks for fifteen draftsmen.



The Stock Room carries 20,000 different parts -- every item that goes to make up a radio set or an electronic device.

The Meter Room has complete calibrating equipment and 3,000 different meters available for covering voltage, current, temperature and speed.

RADIOMARINE CORPORATION OF AMERICA

★ ★ ★

RADIOMARINE CORPORATION OF AMERICA

While Radiomarine throughout its early years was primarily a communications company operating extensive ship to shore, shore to ship and ship to ship radio services, it has now become a large manufacturer of a complete line of marine radio apparatus as well. Consequently, an adequate description of the company must cover these two related but distinct fields.

The present communications services of Radiomarine are the progressive outgrowth of long experience in marine radio which began with the Marconi Wireless Telegraph Company of America many years ago. The bulk of this service is handled by telegraphy with the traffic being composed of radiograms to and from passengers, information relating to weather conditions and to obstructions to shipping, orders and information pertaining to ship operations and special services such as medical advice and the transmission of news for publication on vessels.

Some of the larger passenger liners were also equipped with radiotelephone equipment which provided long distance service directly linking the ship with shore exchanges, while low power equipment was also available for short distance work such as harbor communication with tugs.

The radiotelegraph services were carried on through some sixteen coastal stations owned and operated by Radiomarine, while the telephone services utilized the existing telephone companies on the shore end.

The war almost completely closed these services, but at present four coastal stations have been reopened and it is expected that in the future complete service will be resumed. At this time no radical changes are contemplated in the operation of these communication services, but as improvements in equipment or other developments take place Radiomarine will take full advantage of such, if by so doing its marine communications can be bettered.

In the field of engineering and manufacturing of marine radio equipment Radiomarine occupies the leading position in the United States and has pioneered many important developments. Prior to the war these activities were on a relatively small scale, but with the vast increase in the merchant marine and the demand from other government services for marine radio equipment a tremendous expansion of both engineering developments and manufacturing took place. An idea of the manufacturing facilities can be gained from the fact previously mentioned that approximately 80% of the American Merchant Marine is equipped with apparatus manufactured by Radiomarine.

Constant design improvements have been made and a number of new transmitters and receivers have been put into production in the last several years. A major step forward was taken with the design and production of self-contained console type equipments including all the radio communication and navigation equipment for a ship in one unit which could be readily installed in a minimum of time.

While navigational and safety equipment is still much the same as it was several years ago, it is expected that some of the techniques of aircraft navigation developed during the war will be applicable to vessels as well. When this takes place Radiomarine will be in the forefront of the production and application of such equipment.

A brief outline of the principal products of Radiomarine is given below.

1. **MODEL 4U** - This is the new self-contained console unit mentioned previously which has been primarily designed and manufactured for installation on U.S. Maritime Commission vessels. The primary purpose of the design was to reduce the installation time and make it easier for less skilled workers to handle the installation. This is accomplished in the Model 4U by means of *"unit frame"* construction wherein the various radio units are completely assembled and wired at the factory in their respective frames. Pre-fabricated *"inter-frame"* cables are supplied for ready connection inside the console. This equipment has been so successful that it is in use on a majority of vessels built during the war.

   The component units are also new and the major ones are listed below.

   a. Main Transmitter, three tubes, 200 watts output, 8 frequencies, 350 to 500 kc, A-1 and A-2 emission, Model ET-8024-A.

   b. Emergency Transmitter, six tubes, 40 watts output,- 5 frequencies, 350 to 500 kc, A-2 emission, Model ET-8025.

   c. High Frequency Transmitter, five tubes, 200 watts output, 2000 to 24,000 kc, A-1 and A-2 emission, Model ET-8023.

   d. Main and Emergency Receiver, five tubes, low and intermediate frequency, 15 to 650 kc, Model AR-8510.

   e. Communication Receiver, ten tubes, intermediate and high frequency, 85 to 550 kc, and 1900 to 25,000 kc Model AR-8506-B.

f. Emergency Crystal Receiver, intermediate frequency, 350 to 515 kc, Type D.

g. Auto Alarm, nine tubes, for automatic reception of the International Auto Alarm Signal on 500 kc, Model AR-8601.

h. Alarm Signal Keyer, for automatic transmission of the International Auto Alarm Signal, Model AR-8651.

Motor generator equipment is included as part of the Model 4U as well as the necessary batteries and battery charging facilities. Antenna material and spare parts are also furnished so that the Model 4U is a complete equipment ready for operation after proper installation.

2. **ET-8010 - 8010A** - This is a radiotelegraph transmitter having an output of 200 watts and covering a frequency range of 355 to 500 kc with five pre-tuned frequencies. It has been designed for operation both from the ship's main power supply and from the emergency storage battery supply.

3. **ET-8019** - A high frequency radio telegraph transmitter utilizing beam pentode tubes and covering a frequency range of 4140 to 16,660 kc with an output of 200 watts and also 22 mc with an output of 150 watts.

4. **ET-8003** - This transmitter has been in use as an emergency low frequency telegraph transmitter, having an output of 50 watts, for many years. The great majority of U.S. vessels and a number of foreign ships have used this equipment.

5. **ET-8004A** - This is a companion transmitter to the ET-8003 and has an output of 50 watts. It operates on selected bands between approximately 5500 and 16,680 kc. The motor generator unit furnished with it also operates the ET-8003 and can be driven either by the ship's main power supply or the storage battery emergency supply.

6. **ET-8017** - This is a high power intermediate frequency telegraph transmitter including provision for ten output frequencies with instantaneous change from the 500 kc calling frequency to a working frequency. The power output is approximately 1 kw and the frequency range covered is 350 to 500 kc.

7. **ET-8016** - This transmitter operates on ten frequencies with a power output of 1000 watts in the frequency band of 110 to 160 kc. Otherwise it is similar in most respects to the ET-8017.

8. **ET-8018** - A high frequency radiotelegraph transmitter with an output of 1000 watts operating on five selected bands between approximately 4100 kc and 22.2 mc. Within each of the five

basic frequency bands provision is made for six crystals so that a total of 30 output frequencies may be obtained.

9. **AR-8510** - This is a newly developed low frequency receiver taking the place of the old Model AR-8503. Continuous frequency coverage between 15 and 650 kc is provided and in accordance with the FCC regulations it includes a non-radiating regenerative detector. This unit is battery operated in order that it may be suitable for emergency service.

10. **AR-8504** - This is a compact intermediate frequency receiver designed primarily for emergency use. It covers a frequency range of 300 to 900 kc and operates from battery power.

11. **AR-8505** - A compact rugged superheterodyne receiver for operation directly from either 115 or 230 volts AC or DC line. It covers a frequency range of 540 to 30,000 kc in four bands.

12. **AR-8701A** - This is a medium sized direction finder for installation in the wheelhouse or chartroom of passenger or cargo vessels. It includes a highly selective and sensitive eight-tube superheterodyne receiver and the entire unit is ruggedly constructed to withstand the heaviest kind of shipboard use. In order that the ship's magnetic compass will not be affected, no steel or iron is used with the exception of ball bearings.

13. **AR-8703A** - This is a large binnacle type direction finder designed for installation in the wheelhouse or chartroom of passenger or cargo vessels. It also includes an eight-tube superheterodyne receiver and the entire equipment is very ruggedly constructed with no steel or iron being used except for ball bearings. The batteries are mounted in the lower section of the binnacle, thus making for a more compact installation.

14. **AR-8703B** - This unit is very similar to the AR-8703A except that it includes a smaller loop with a different type of mounting on the binnacle.

15. **AR-8707** - This direction finder is designed for smaller cargo or passenger vessels or larger yachts. The receiver is essentially the same as in the previous units and the chief differences are in the method of mounting the compass scales and a different type of binnacle.

16. **AR-8704 and 8700AS** - These are direction finder chassis which have been developed to permit modernization of older types of direction finders and provide a more sensitive and selective radio receiver together with improved reliability and operation. The Model AR-8704 has been designed primarily for use on the Great Lakes of the U.S. where operation is generally

direct from the shipboard 110 volt DC power supply. This design eliminates the use of all batteries and, accordingly, makes it unnecessary to remove batteries when the vessels are laid up during the winter season. The AR-8700AS utilizes battery supply in old type binnacles and provides an eight-tube superheterodyne receiver.

17. **ET-8028** - This is a compact low power radiotelephone transmitter and receiver with remote control unit designed primarily for two-way mobile marine communication. The transmitter is nominally rated at 5 watts and covers a frequency range of 2000 to 3500 kc. Four pre-tuned frequencies within this band are used.

18. **ET-8027** - A compact low power radiotelephone transmitter and receiver having an output of approximately 25 watts and covering a frequency band of 2000 to 3500 kc. Provision is made for the use of a maximum of six pre-tuned frequencies within this band. It can be supplied with power units for operation on any one of the following voltages: 12 volts DC, 32 volts DC, 115 volts DC, 230 volts DC and 115 volts AC.

19. **ET-8020** - This is a radiotelephone transmitting and receiving equipment designed primarily for service on the Great Lakes in the U.S. It provides two-way selective calling, automatic operation on 2181 kc, six channels with complete remote control. Power output is 100 watts and the frequency range is 2000 to 9000 kc with six pre-tuned transmitting and receiving frequencies as mentioned above.

20. **ET-8012B** - This is a compact radiotelephone transmitting and receiving equipment in a single unit for smaller vessels such as yachts and tugs. It has been designed primarily for voice communication with coastal harbor stations and other ships. The power output is 75 watts and the frequency range is 2000 to 3000 kc with ten pre-tuned frequencies within that band. The radio receiver includes a built-in automatic ringer which enables the coastal harbor stations to call the vessel by bell, eliminating the need for standing by on the loudspeaker for such calls. A loudspeaker is provided however.

21. **ET-8011A** - A low power radiotelephone transmitting and receiving equipment for two-way voice communication with harbor stations or other vessels. The power output is approximately 15 watts and six pre-tuned frequencies between 2000 and 3000 kc are provided on the transmitter while the receiver is tuneable over three frequency bands and covers 540 to 1550 kc., 2300 to 7000 kc and 7000 to 22,000 kc.

22. **ET-8009A** - A radiotelephone transmitting and receiving equipment designed for large vessels and to provide long distance two-way communication. The power output is 600 watts and the frequency range of approximately 4140 kc to 17,608 kc is covered in five bands. Each of the five bands has provision for six crystals so that a total of 30 output frequencies may be obtained. When required the control unit which provides facilities for a maximum of five telephone extensions throughout the ship can also include a speech scrambler unit.

23. **ET-8007** - This is a lifeboat radio transmitting and receiving equipment which complies with U.S. Government requirements for a radio installation on motor lifeboats of some passenger vessels. The equipment is battery operated and the transmitter operates on 500 kc with a plate power input of not less than 75 watts. The receiver covers 350 to 550 kc and is tuneable over this range.

24. **AR-8600** - An auto alarm equipment approved by the FCC and designed to stand watch on the International 500 kc distress frequency. When a distress call is received warning bells within the auto alarm are actuated. The unit consists essentially of the radio receiver for installation in the radio room and two bell and warning light units, one of which is installed on the bridge and one in the radio operator's cabin. A bell and warning light unit is also included on the equipment installed in the radio room.

25. **ET-8010B and D** - This transmitter provides 275 to 325 watts on A-1 emission, and 350 to 400 watts on A-2 emission. Five pre-tuned frequencies between 355 and 500 kc are available. This transmitter is also available for emergency as well as main operation in which case it would operate from a storage battery with an output of 50 watts. The B and D models are the same in all respects with the exception of the motor generator set.

26. **ET-8010C and CA** - This transmitter provides 200 watts output with eight pre-tuned frequencies in the frequency range of 355 to 500 kc. The CA model combines both main and emergency operation in which case it will operate from a battery and provide 50 watts output.

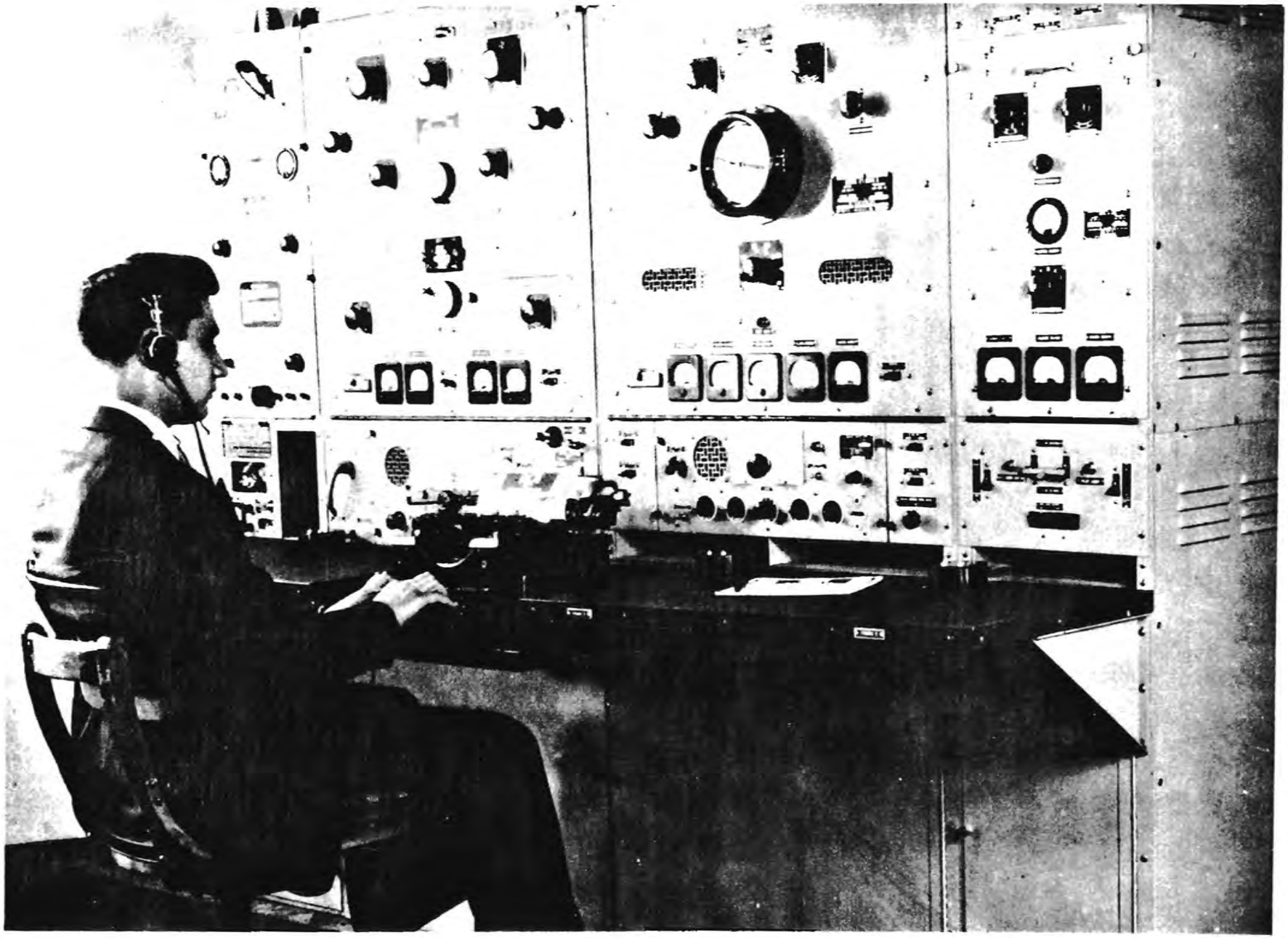
27. **ET-8019A** - A radiotelegraph transmitter with an output of 200 watts between 2050 and 17,000 kc and 150 watts between 17 and 22 mc. The frequency coverage is continuous by means of front panel controls.

28. **ET-8019B** - A radiotelegraph transmitter having an output of 200 watts between 4000 and 18,000 kc and 150 watts at 22 mc. Eight bands are provided between 4000 and 22,000 kc.

29. **AR-8506B** - This is the high frequency receiver used in the Model 4U equipment. It is a ten-tube superheterodyne covering a frequency range of 85 to 550 kc and 1.9 to 25 mc. It may be operated directly from either 115 volts AC or DC.

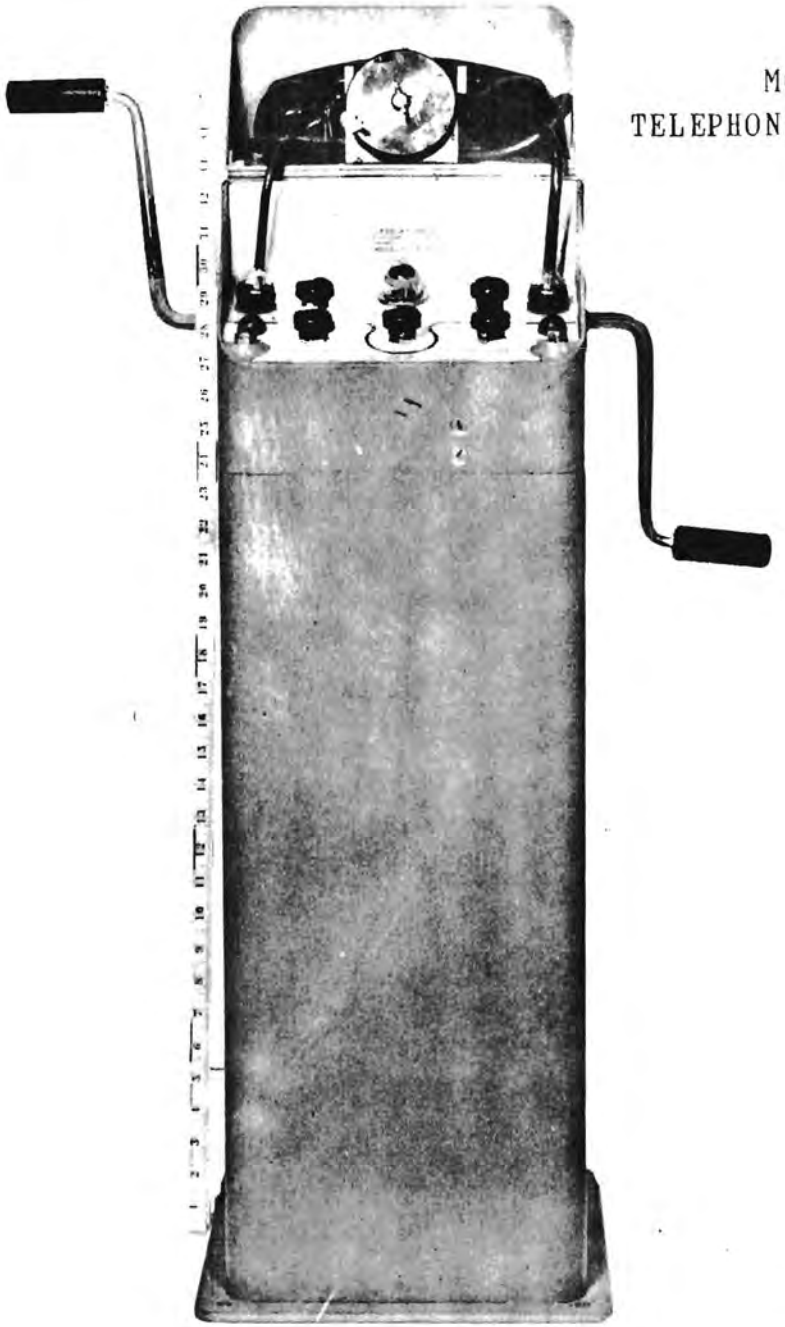
30. **ET-8022C** - A lifeboat equipment including a compact transmitter and receiver mounted in a water-tight cabinet and a small hand-driven generator for furnishing power. Thus, no batteries are required and since the power requirements are low one or two persons may readily rotate the generator unit. The transmitter delivers 3 to 4 watts into the antenna and operates on the International distress frequency of 500 kc. The receiver also operates on the same frequency.

31. **ET-8030** - This is a new type lifeboat telephone and telegraph equipment completely housed in a watertight binnacle which also includes a built-in hand-driven generator. It can be used to automatically transmit SOS signals for distress and long dashes for direction finding both on 500 kc distress frequency and a shortwave frequency of 8280 kc. The receiver included is pre-tuned to 500 kc and can be tuned to any frequency between 8100 and 8600 kc. The entire equipment therefore may be used for two-way telegraph or telephone communication as well as automatic telegraph transmission. It can be operated with either a kite or balloon supported antenna or with a fixed antenna rigged to the sailing mast.



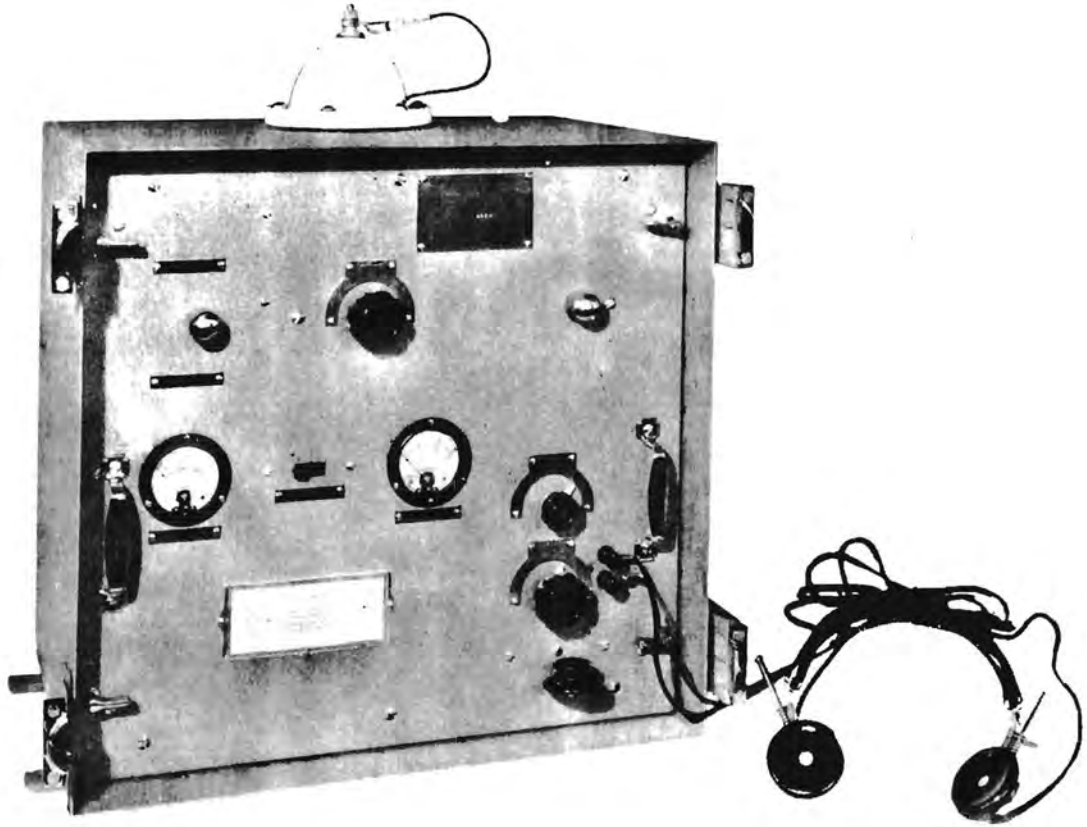
MODEL 40 RADIO UNIT

(23-A)



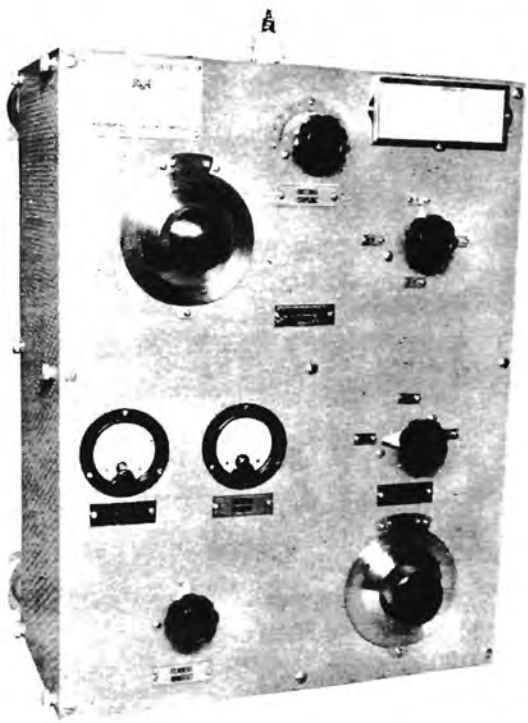
MODEL ET-8030 LIFEBOAT RADIO
TELEPHONE - TELEGRAPH TRANSMITTER - RECEIVER

MODEL ET-8007
LIFEBOAT RADIO TRANSMITTER-RECEIVER
EQUIPMENT

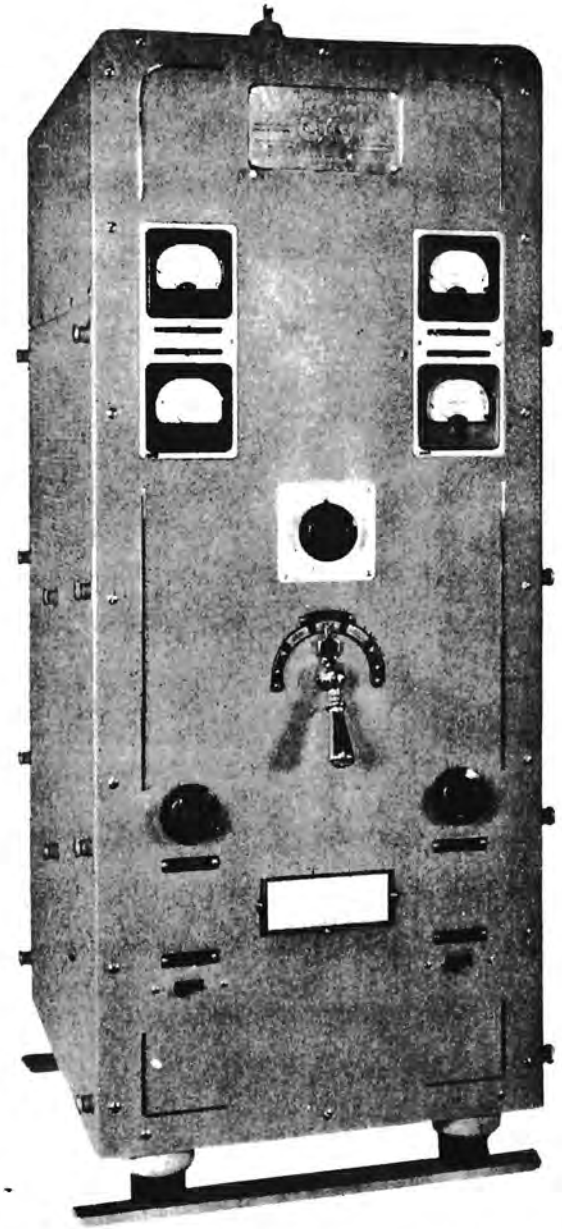


MODEL ET-8003 EMERGENCY RADIO-
TELEGRAPH TRANSMITTER
50 WATTS, 375 TO 500 KC.

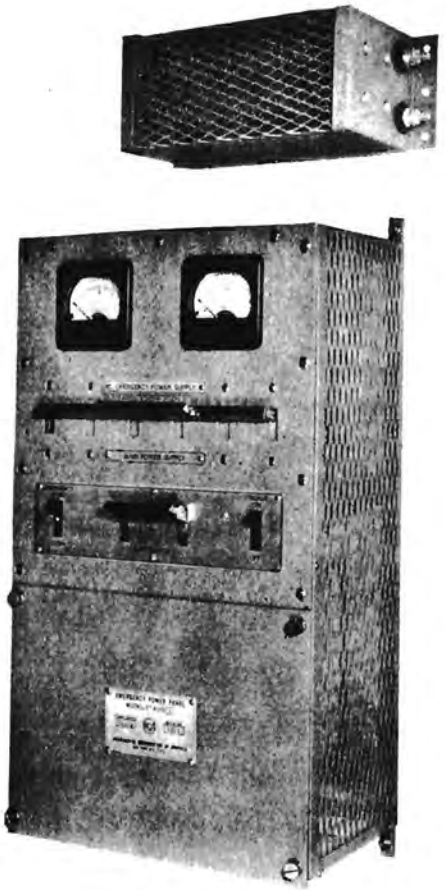
CONTROL PANEL
POWER CONTROL AND CHARGING PANEL



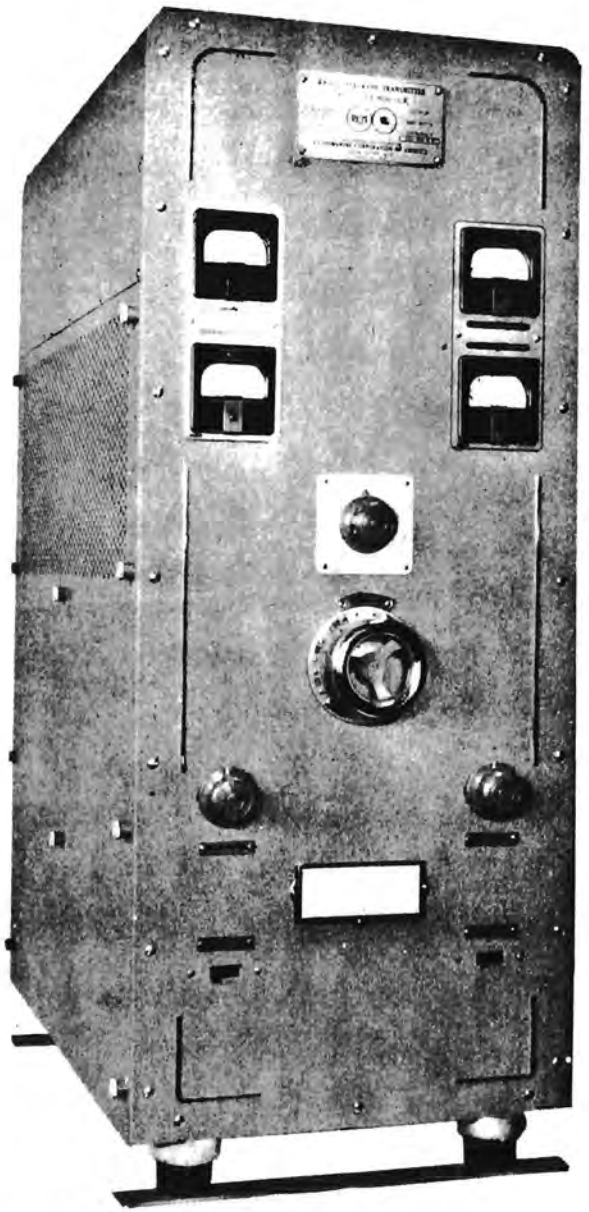
MODEL ET-8004-A
HIGH FREQUENCY RADIOTELEGRAPH TRANSMITTER
25 TO 50 WATTS, 5510 TO 16680 KC.



MODEL ET-8010 MAIN RADIOTELEGRAPH
TRANSMITTER
200 WATTS, 355 TO 500 KC.

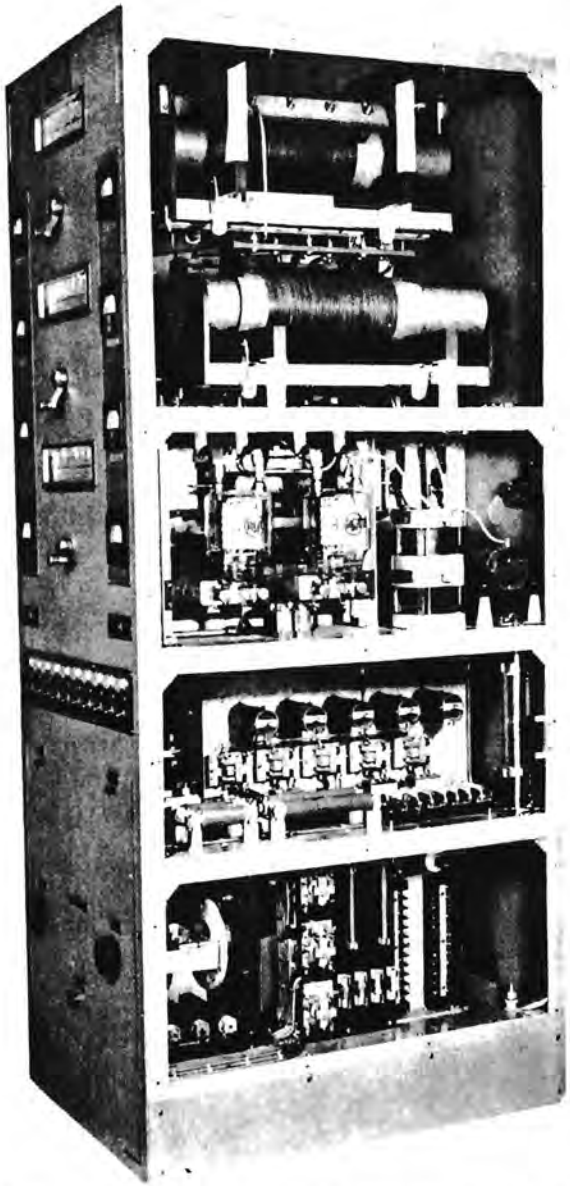


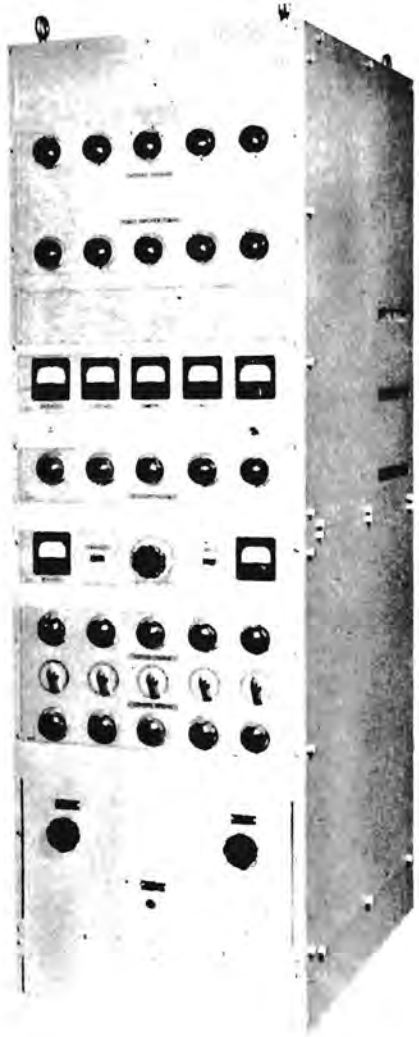
ET-8010-A
EMERGENCY POWER PANEL

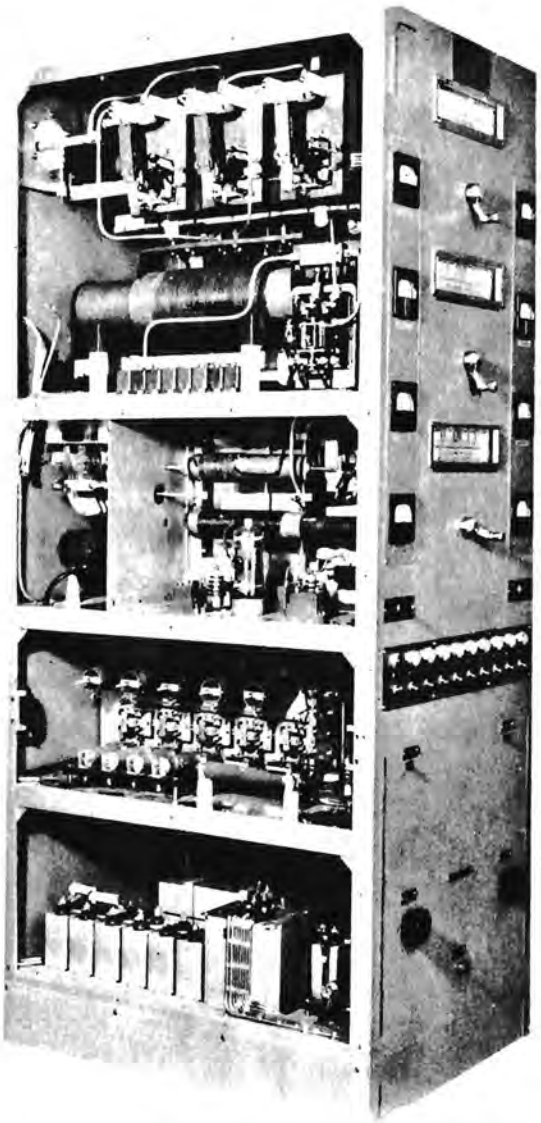


MODEL ET-8010-C MAIN RADIO-TELEGRAPH
TRANSMITTER

MODEL ET-8018 HIGH FREQUENCY
RADIOTELEGRAPH TRANSMITTER
1000 WATTS, 4140 TO 22200 KC.

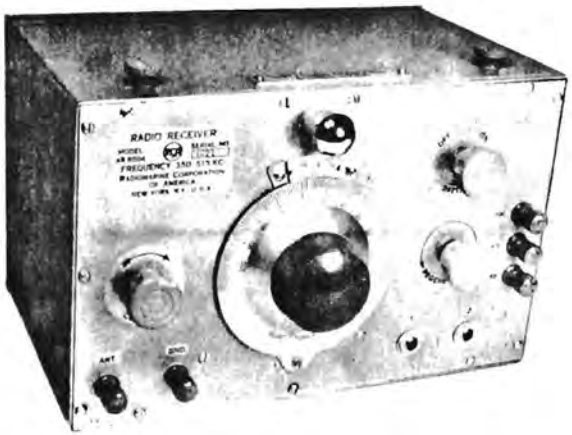




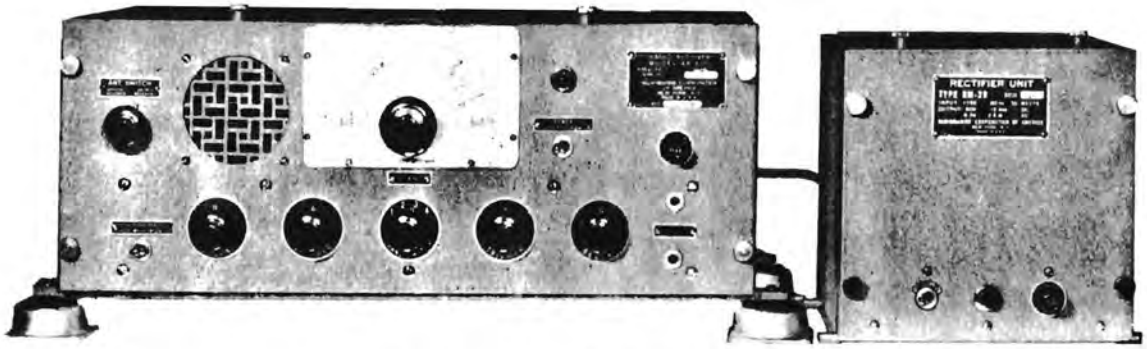


MODEL 8017-2 INTERMEDIATE FREQUENCY
RADIO TELEGRAPH TRANSMITTER

MODEL ET-8017-1 INTERMEDIATE-FREQUENCY
RADIOTELEGRAPH TRANSMITTER
1000 WATTS, 350 TO 500 KC.

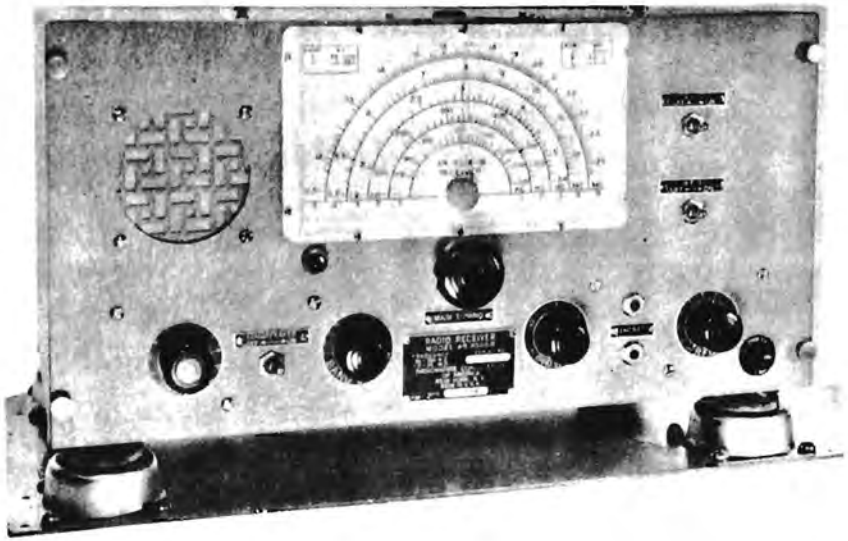


MODEL AR-8504 RADIO RECEIVER
300 TO 900 KC.

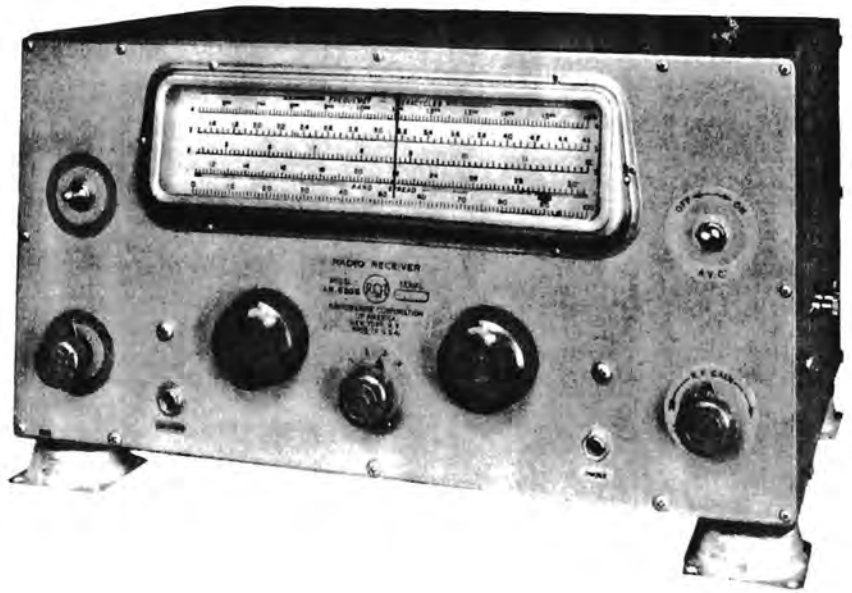


MODEL AR-8510 RADIO RECEIVER
and
TYPE RM-29 RECTIFIER UNIT

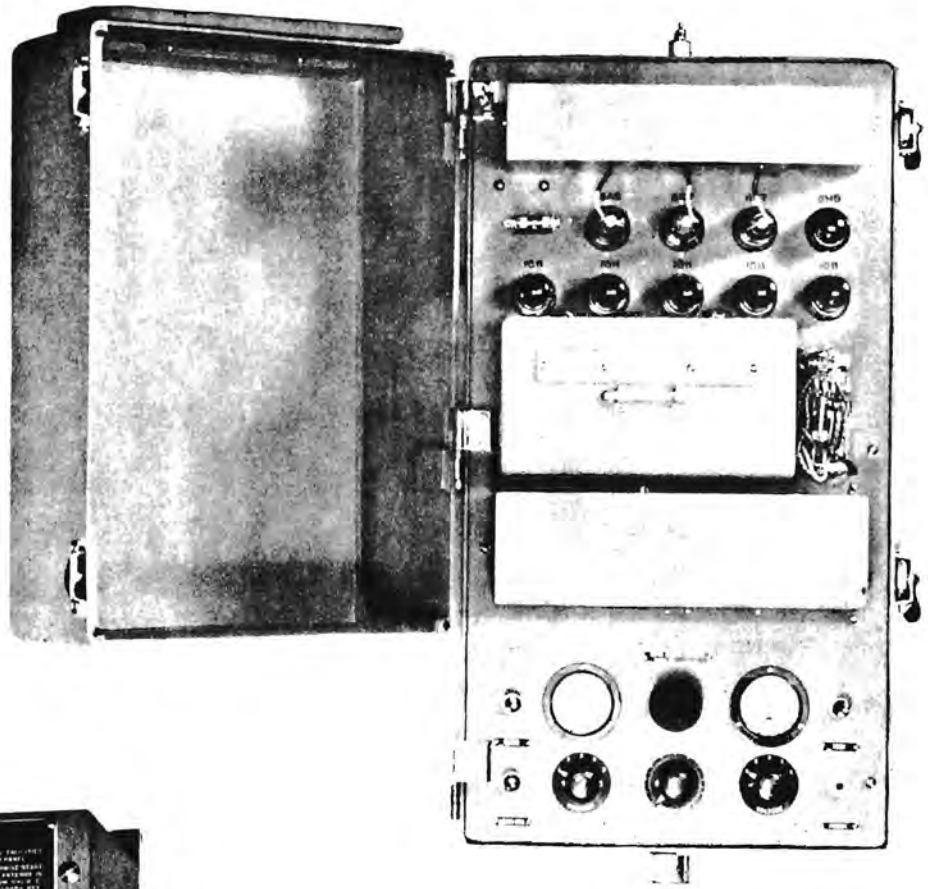
MODEL AR-8506-B RADIO RECEIVER



MODEL AR-8505 HIGH FREQUENCY
RADIO RECEIVER
540 TO 30,000 KC.

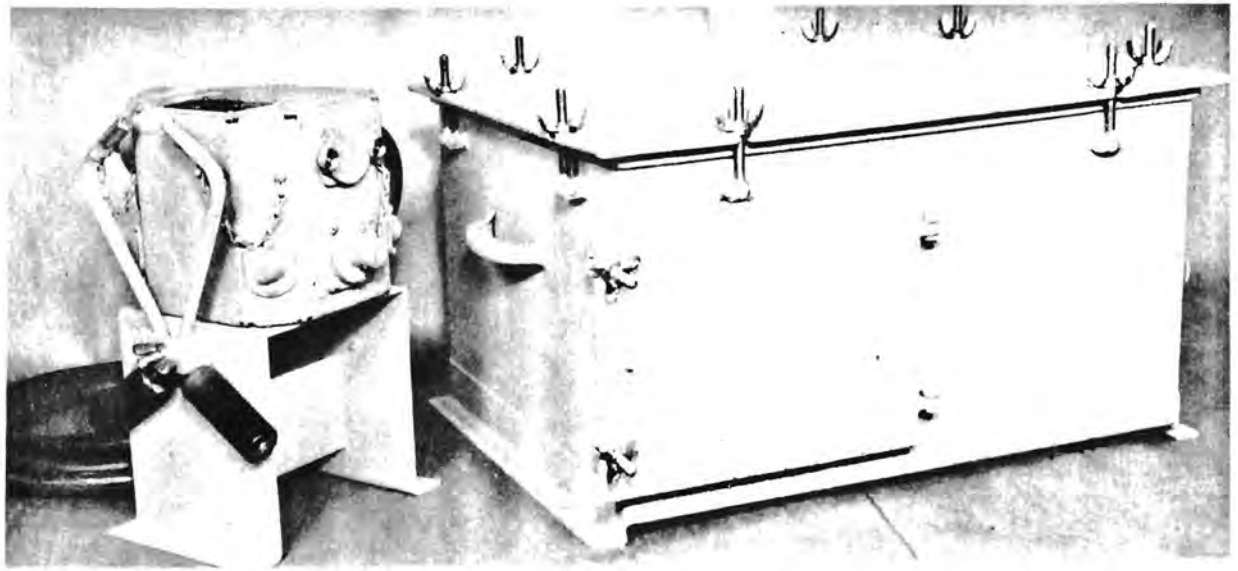


MODEL AR-8601 AUTO ALARM

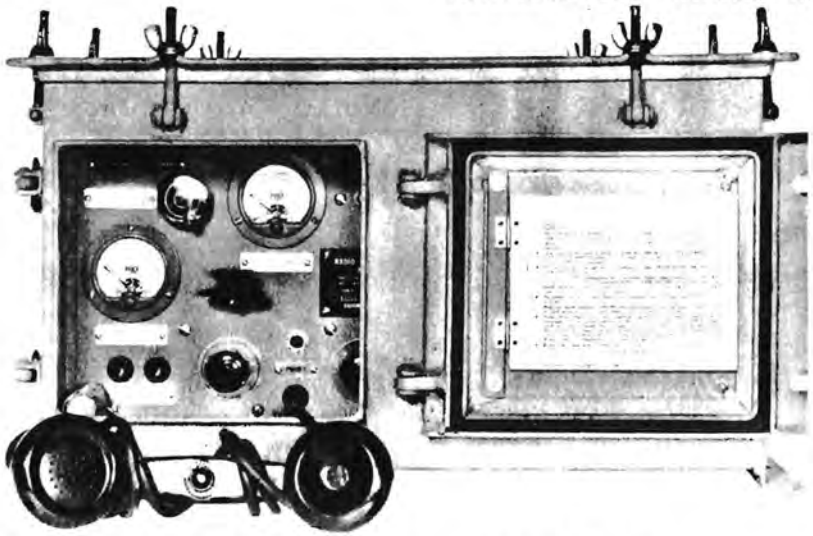


MODEL AR-8600-1
AUTO ALARM

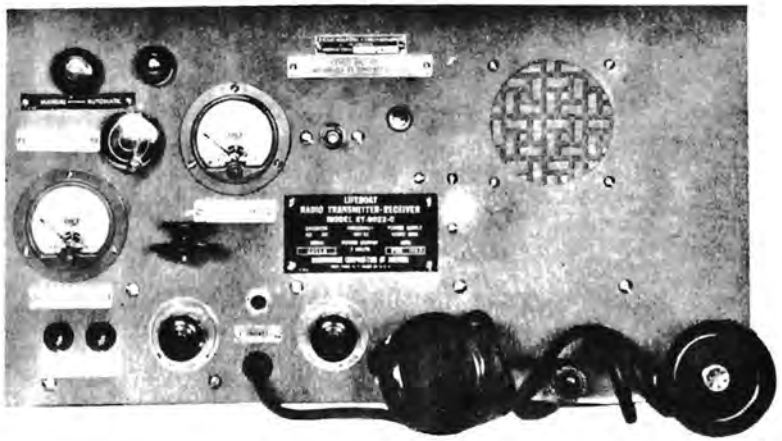
MODEL AR-8651 ALARM SIGNAL KEYER



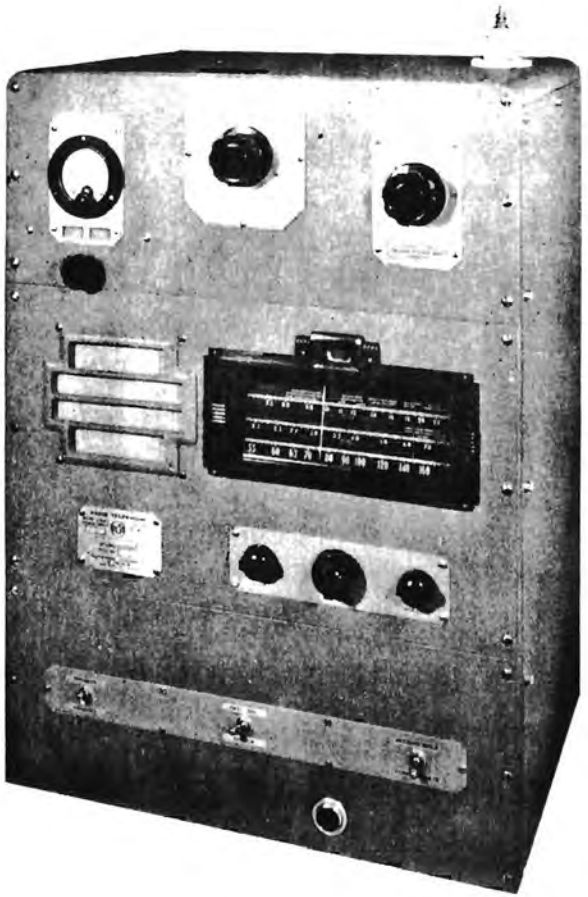
MODEL ET-8022-C LIFEBOAT RADIOTELEPHONE AND RADIOTELEGRAPH
TRANSMITTER-RECEIVER and HAND DRIVEN GENERATOR



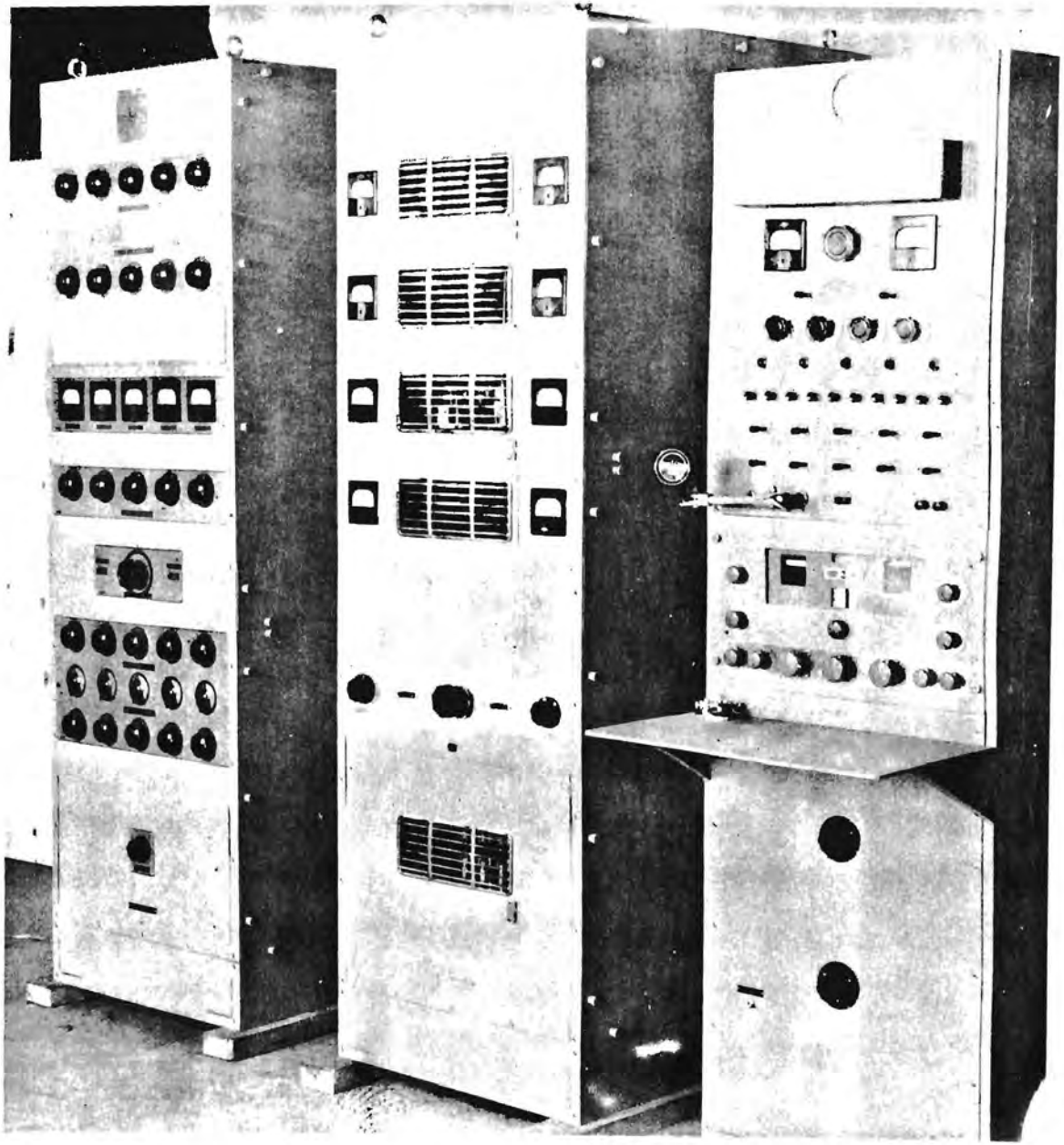
MODEL ET-8022-C LIFEBOAT
RADIOTELEPHONE AND RADIOTELEGRAPH
TRANSMITTER-RECEIVER



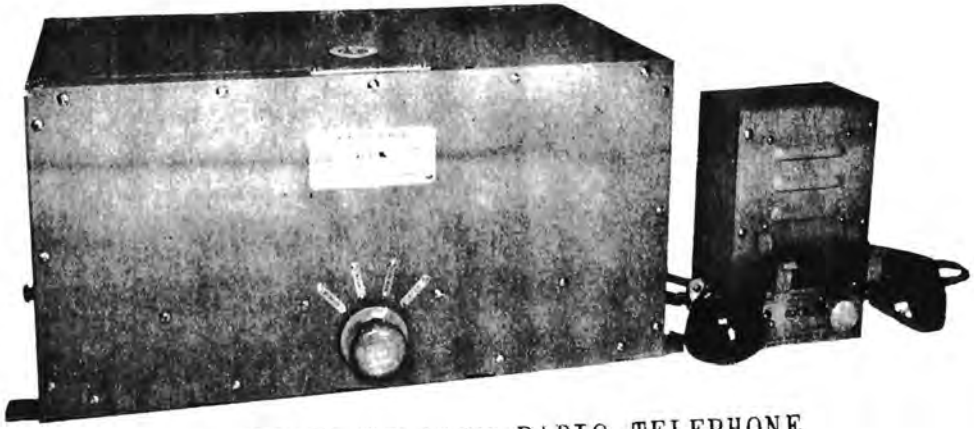
MODEL ET-8022C
LIFEBOAT RADIO TRANSMITTER - RECEIVER



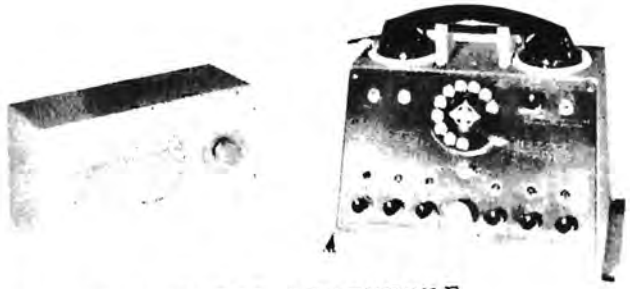
MODEL ET-8011-A RADIOTELEPHONE
15 WATTS, 2000 TO 3000 KC.



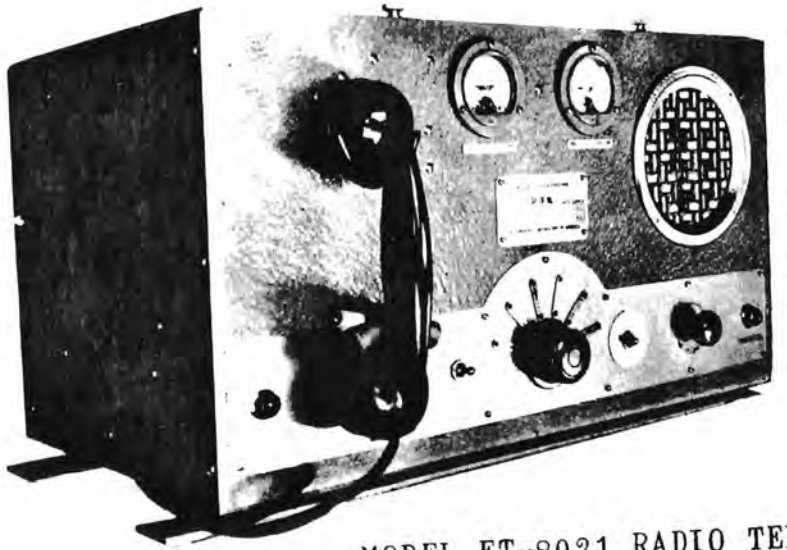
MODEL ET-8009-A RADIOTELEPHONE EQUIPMENT
600 WATTS, 4140 TO 17680, 5 BANDS



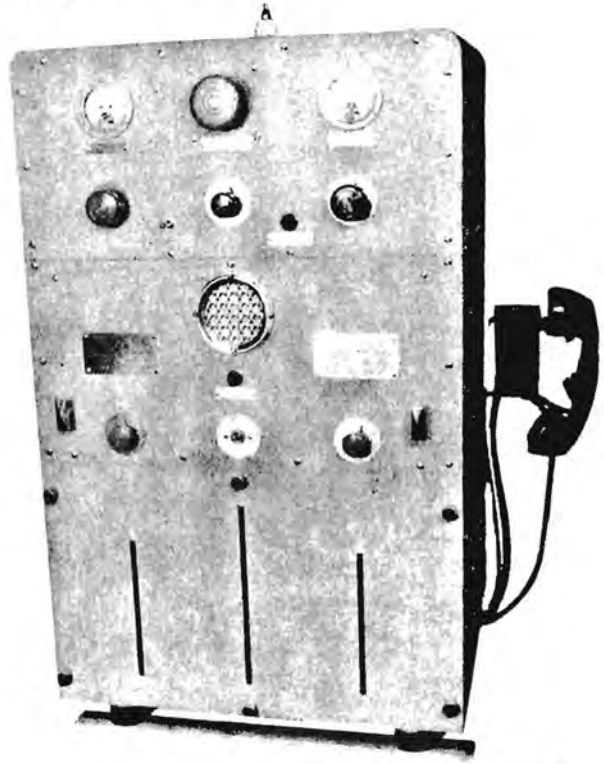
MODEL ET-8022 RADIO TELEPHONE



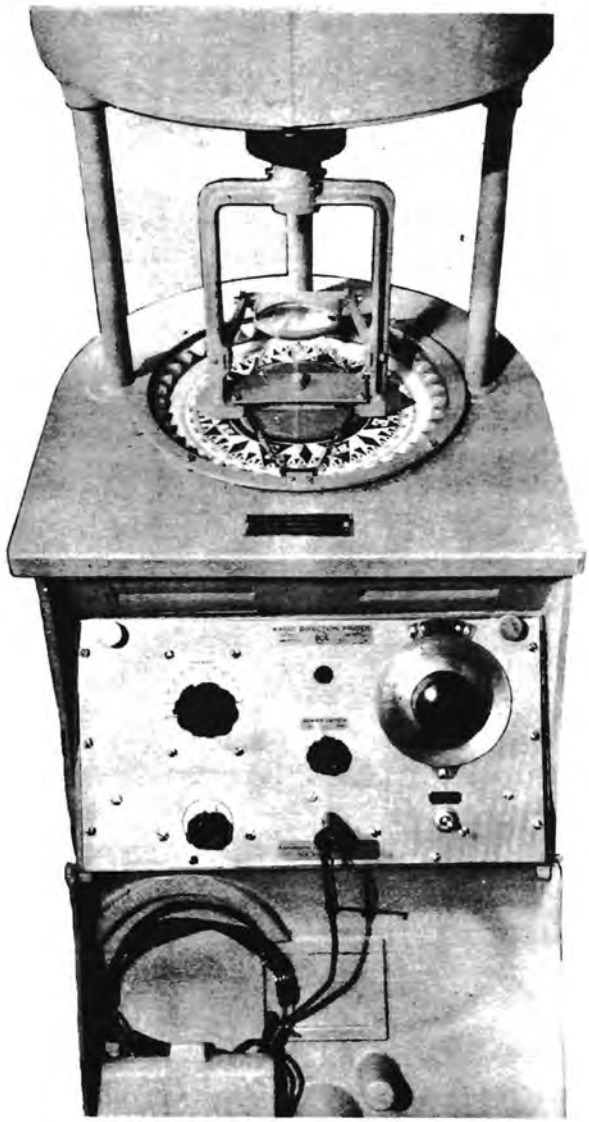
MODEL ET-8020 RADIO TELEPHONE
and
SPEAKER-BELL UNIT
100 WATTS, 2000 TO 9000 KC.



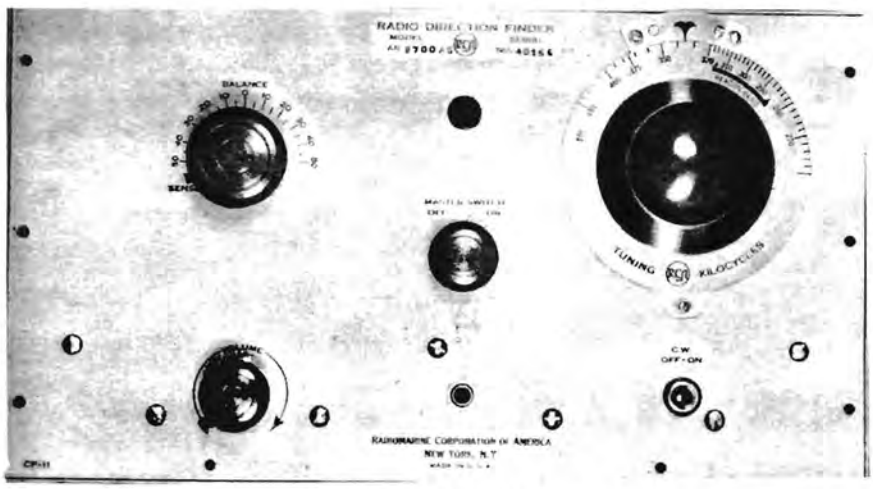
MODEL ET-8021 RADIO TELEPHONE



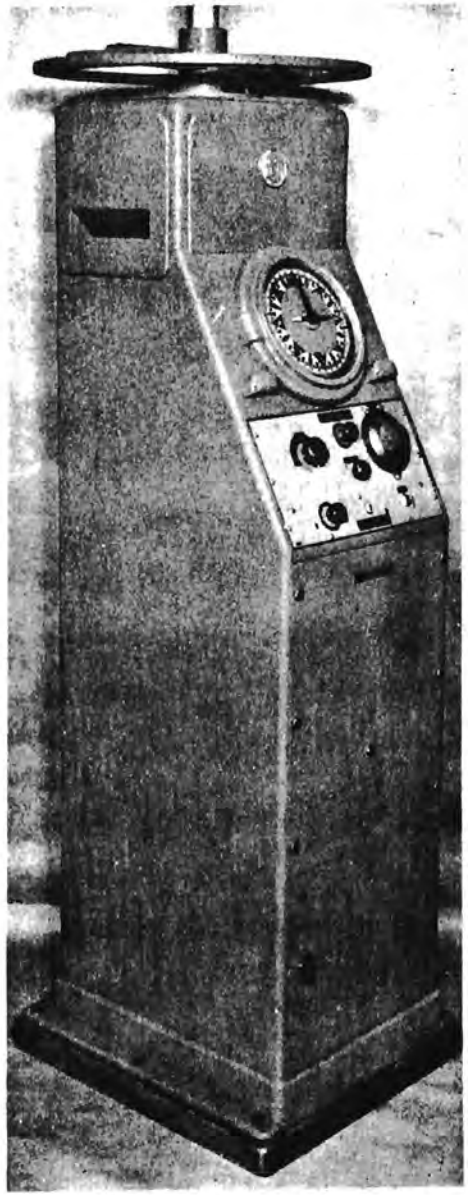
ET-8012-B RADIOTELEPHONE
75 WATTS, 2000 TO 3000 KC.



MODEL AR-8700S
RADIO DIRECTION FINDER

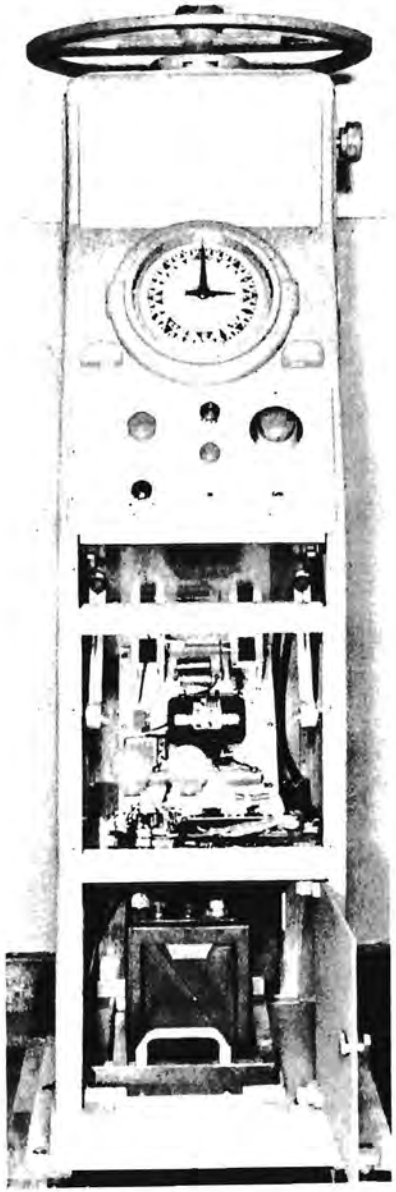


MODEL AR-8700 AS
DIRECTION FINDER CHASSIS

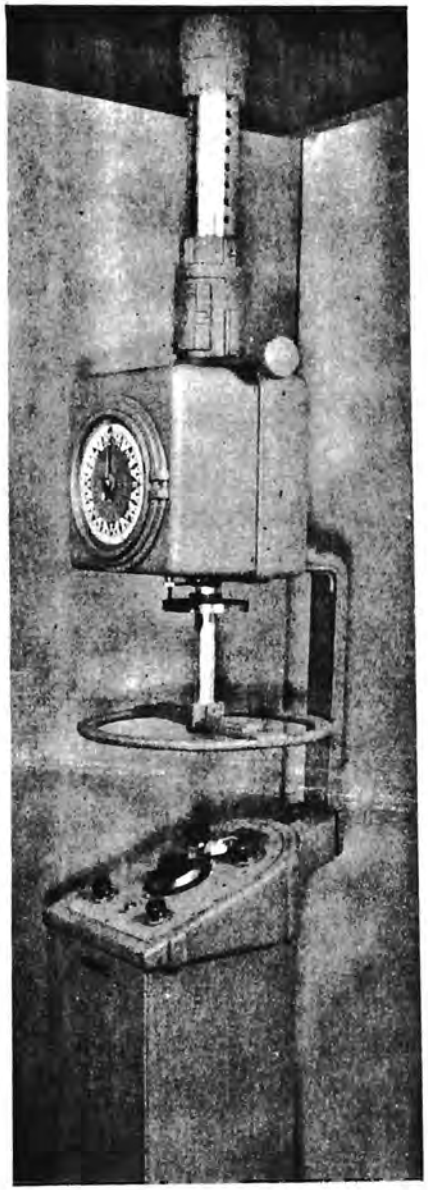


MODEL AR-8703-B
RADIO DIRECTION FINDER

MODEL AR-8703-A
RADIO DIRECTION FINDER



MODEL AR-8703-B
RADIO DIRECTION FINDER



MODEL AR-8707
RADIO DIRECTION FINDER

RCA INSTITUTES

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RCA INSTITUTES

The RCA Institutes, located in New York City, is a technical school devoted exclusively to instruction in radio and electrical communications and associated electronic arts. The primary purpose of the Institute is to afford adequate facilities for broad and thorough training of its students, thereby providing dependable, trained personnel to carry on the technical work in the industry in its many phases.

RCA Institutes was founded more than thirty years ago, and since that time more than 5,000 students have finished courses there. Today more than 600 are enrolled, a maximum of 1400 having been registered earlier in the war training period. It is the oldest radio school in America and has been in continuous operation throughout the long years of radio growth, its educational facilities keeping constantly in pace with the advance of the industry itself.

By providing dependable, trained personnel to carry on essential technical work in the radio field, RCA Institutes has been of value to the industry and is one of the means by which the United States has made itself self-sufficient in the electronic field.

Adequate preparation for the technical positions in the radio industry requires careful training in both theory and practice. The laboratories of the RCA Institutes schools contain an extensive array of equipment for the practical instruction of its students and include a radio frequency laboratory and an audio frequency laboratory, a video frequency laboratory, the electrical laboratory, and the receiver laboratory. Many classrooms are provided for demonstrations and lectures. The teaching personnel numbers about twenty-five well-trained capable instructors. There are two RCA Institutes schools, one a School of Technology which provides a single course of study; the general course, which requires eighteen months to two years to complete. The Vocational school offers four courses of instruction as follows:

1. Aviation Communications
2. Commercial Radio Operating
3. Radio Service
4. Preparatory Course

RCA Institutes is recognized in the United States and many foreign countries as an institution of high standards. Its methods of teaching have been widely observed and followed by many other similar schools. It has supplied more than five thousand well-trained men for all classes of communication work -- servicemen, technicians, operators, engineers. It is one of the highly significant and worthwhile services RCA renders to the radio industry.

IX - COMMUNICATIONS TRANSMITTERS

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IX - COMMUNICATIONS TRANSMITTERS

In view of the very large sums we have expended in transmitter development and the likelihood that this subject will be of special interest in the Soviet Union, we set forth in some detail our present status in this field. The specifications for such apparatus are lengthy and complicated and our abbreviated comments may leave much wanting in the way of detailed information, nevertheless it will show that we have been very active in the work and have some new and interesting products. Since 1941 we have done some important work in high power low frequency transmitters, station design and antenna design. In the high frequency range, multi-frequency transmitters have been the subject of special efforts and new designs. In police and emergency communications by voice, new methods of design and the more extensive use of frequency and phase modulation will be of interest. Special aspects of communication, such as aviation, marine, microwave relaying, etc. are treated separately in other parts of this presentation.

Our present developments for both transmitting and receiving apparatus include frequency shift keying devices. This method of keying appears to be destined to replace the conventional make-break keying in future, following the trend already well established, in which the Soviet Union has been very influential. Such a system provides true polar operation and is especially useful for high speed telegraph and teleprinter services. This, together with the widespread adoption of diversity reception originally developed and sponsored by RCA, provides the topmost effectiveness in fast reliable communications at the present time. We are also interested in the application of frequency shift keying to the carrier wave of a short-wave broadcast transmitter so as to transmit (and receive) simultaneous telegraph and telephone communications, and plan to explore this technique in the near future.

A. LOW FREQUENCY TELEGRAPH EQUIPMENT

1. *TE147, 50/100 kw 44-155 kc Transmitter With Remote Control.* A new design high power equipment, designed in 1942/43 and which has given excellent service at two stations. The Soviet Union has shown interest in acquiring one or two of these from our Canadian company, RCA Victor Co. Ltd., and the design has been released by the Canadian government for this purpose. It is the largest air-cooled radio transmitter built anywhere to-date and is believed to be the only high power 1-f set with complete front-panel tuning for transmitter and antenna system. A-1 and A-2 emission up to 125 words per minute. Duplicate master oscillators used.

2. *LF Antenna System* - A new design antenna system for use with TE147. Developed for optimum cost/efficiency characteristics for severe climatic duty from exploration with UHF antenna models. Modern safety-core insulators are employed throughout, for working potentials of 125 kilovolts.

3. *TE343A 5/10 kw 100 to 500 kc Transmitter with Remote Control* - A 1943/44 design transmitter of excellent and proven performance. Four such transmitters are now in service with excellent records of reliability and trouble-free operation: A-1 and A-2 emission 60 words per minute; all air cooled; front of panel tuning for whole frequency range; master oscillator drive.

4. *TE343B 5/10 kw 90 to 200 kc Transmitter* - Same basic design as TE343A except for frequency range. Several of these are now in construction.

5. *TE260B/D 2/3 kw 123 to 500 kc/100 to 500 kc Transmitter* Designed in 1942/43, these two versions of the same transmitter design have proved very satisfactory and almost 100 of them have been manufactured to date. A-1 and A-2 emission, 60 words per minute, air cooled, all front panel tuning, remote control and master oscillator. Originally a commercial design, it has been used by several different military services and government airways services.

6. *TE237 500 Watts 150 to 200 kc Transmitter* - Designed in 1942 for use on the arctic airways of Canada, this transmitter has had a fine service record in every station where it has been used. It is crystal driven, remotely controlled.

7. *Low and Medium Power LF Antenna Systems* - We have done a large amount of development work and study of low frequency antenna systems and have evolved some valuable designs for locations where severe climate is encountered and where minimum heights had to be employed because of airways obstruction or plain economy considerations.

8. *ET4335 LF 250 Watts 150 to 600 kc Transmitter* - Designed in 1942, this compact design set can be used for fixed or mobile use, and provides A-1 and A-3 emissions. It has been used during the war for military and commercial use. It is crystal controlled.

9. *Other LF Transmitters* - We are also doing preliminary work on low frequency telegraph equipment very much higher in power than any described herein. How far this goes will depend on the war situation.

B. HIGH FREQUENCY COMMUNICATION TRANSMITTERS

In the past we have designed and manufactured a wide variety of h-f transmitters and have participated activity in the rapid evolution of this important field of engineering and manufacturing. The immense quantities of such equipments required in the war gave RCA an unparalleled opportunity to mass produce, in hundreds and often thousands, transmitters which heretofore were required in dozens only. This experience has had very beneficial effects on the new designs now being worked on.

Some of our new equipments are:

1. *AT3 (TE134) 300 Watts 2-Channel Transmitter* - This was developed in 1939 for the Royal Canadian Air Force but has now been released for commercial sale. This unusual transmitter has been mass-produced since 1940 and has established a great reputation. Designed to the very highest standards of performance and quality, it offers more features in one transmitter than any other set known to us. It has been used in military mobile, aviation, point-to-point, and public service applications over much of the world and under all climatic conditions. It has been constantly in manufacture and constantly improved up to the present. We plan to continue this equipment for commercial sale post-war. It has remote control, two channels 2.5 to 20 mc continuous from front panel, tone keying up to 200 words per minute, A-1, A-2 and A-3 emissions, high stability master oscillator, and also crystal control in each channel, voice operated carrier, separate or common antennas, and has, as an accessory unit which becomes an integrate portion of the transmitter, the networks for feeding balanced loads.

2. *AVT 22B Multi-channel 5 kw Transmitter* - Originally designed in 1939 but revised and improved in 1942-43. This transmitter has been extensively produced during the war for point-to-point and airways ground use. It has from two to four fixed-tuned r-f channels which are switched under push-button control. Covers range 2 to 18 mc with A-1 and A-3 emissions. We contemplate further evolution of this design in future.

3. *ET4750X 15 kw HF Telegraph Transmitter* - This is a recent modification of our ET4750 to provide A-1 operation only, at 15 kw.

4. *ET4332B 250 Watts HF Transmitter* - A 1941 design general communication transmitter which has been mass-produced during the war for use all over the world. It is a 1-channel 2-20 mc set giving A-1 and A-3 emission.

5. *ET4336 250 Watts HF Transmitter* - Designed in 1943, it is similar to ET4332B but reduced in size, shock-mounted and adapted to mobile use. Vast quantities of these have been produced during the war.

6. *75 kw HF Telegraph Transmitter* - Now scheduled for early development, this is an adaption of our 50 kw HF Broadcast Transmitter for A-1 emission for telegraph service.

7. *ET4339 200 Watts HF Transmitter* - A recently completed new design low power general communication set covering 2 to 20 mc, A-1 and A-3 emission. It is designed as a strict economy unit and is available with either 1 or 2 RF channels.

8. *ET10 300 Watts HF Transmitter 2 to 20 mc 4 Channels* - Just now nearing completion in design, this is a multi-frequency set for A-1 and A-3 emission, remote control. It uses a number of advanced features of performance and construction at low cost.

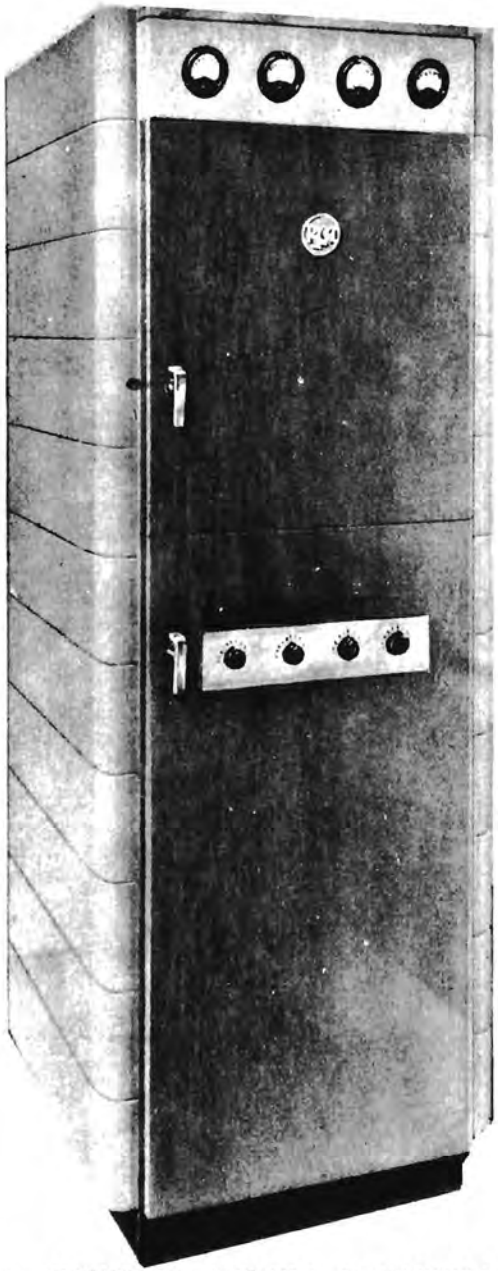
9. *ET11 1000 Watts Transmitter 2 to 20 mc 4 Channels* - Similar in conception and purpose to the ET10 but higher power.

10. *ET12 5 kw Multi-channel HF Transmitter* - Now in the preliminary planning stage, this will be a combination of fixed-tuned r-f channels and an automatically tuned unit where a greatly diversified service must be maintained with one transmitter. The number of channels can be varied as required, and provisions are made for simultaneous operation of 2 or 3 channels. It will have A-1 and A-3 emission and remote control.

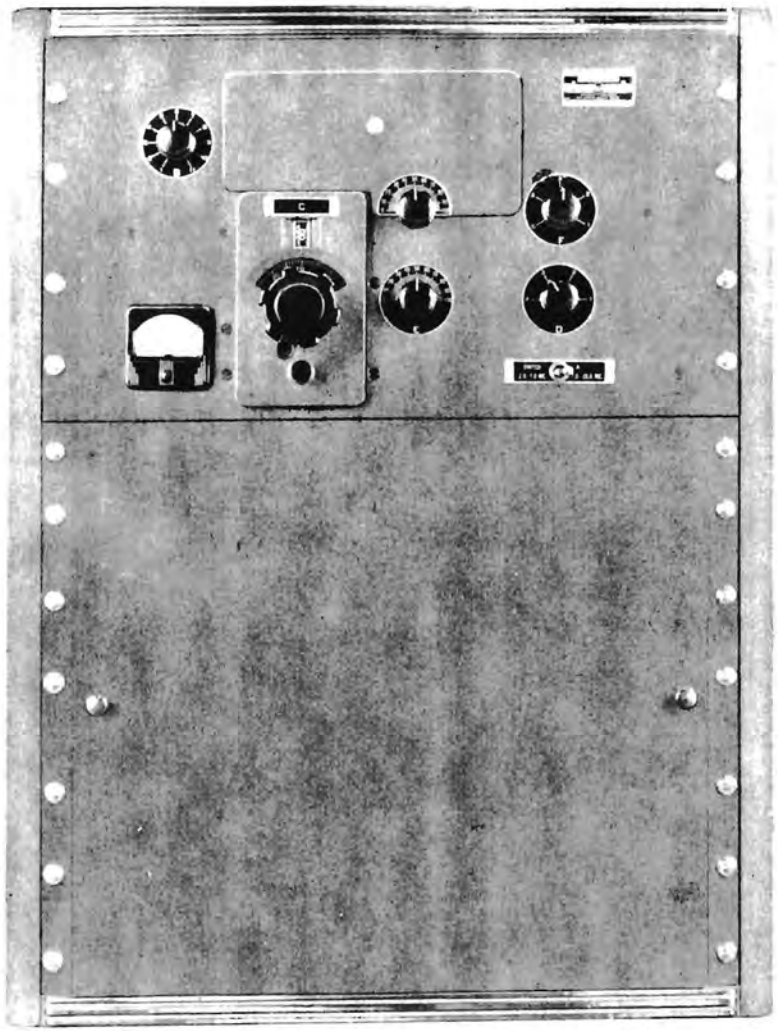
11. *Advanced Developments in Automatic and Self-Tuning Methods* - In connection with the above project we have devoted much study to practical and economical methods of obtaining multi-frequency operation by automatic tuning and also self-tuning. Some basic work of importance in future designs has resulted already and further work is in progress.

12. *ET15 25 Watts HF Transmitter 2 to 20 mc* - A single channel economy design for miscellaneous use where very low power suffices. It will have A-1 and A-3 emission, one channel.

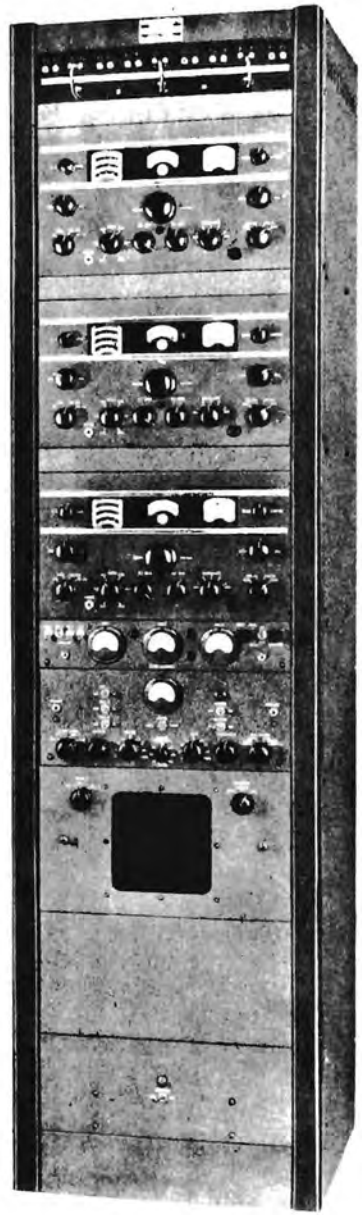
13. *Frequency Shift Keyer Unit* - A basic unit for use with any of our high frequency transmitters is in development for A-1 frequency shift keying.



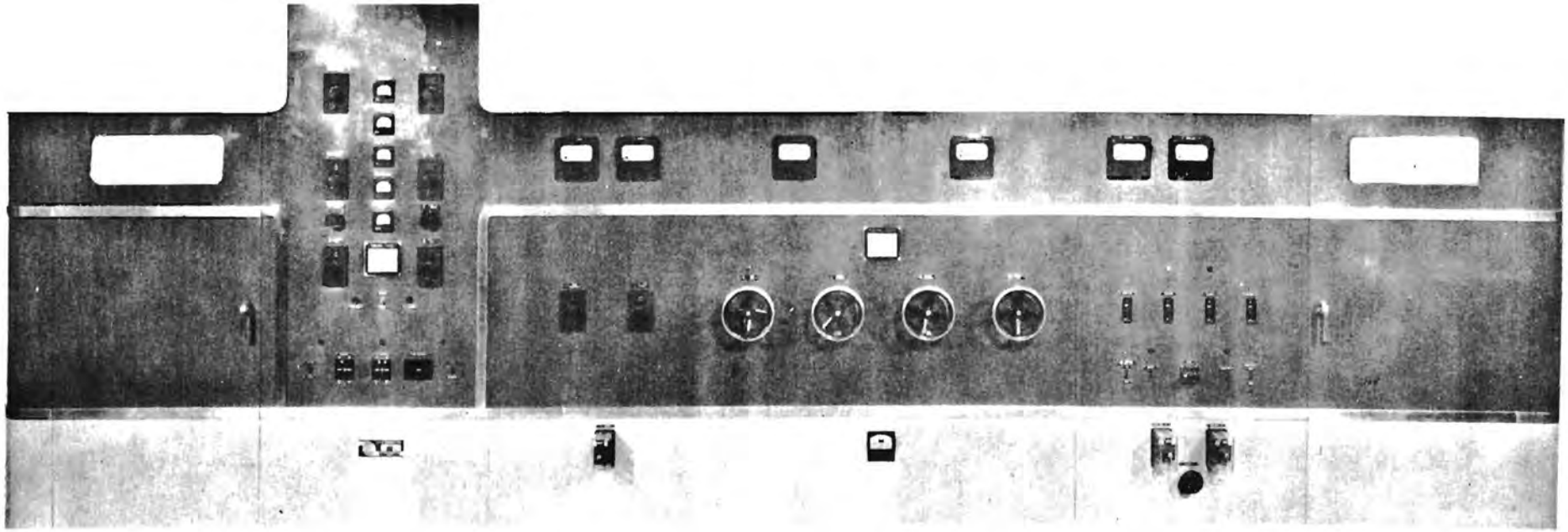
ET-10 COMMUNICATIONS TRANSMITTER
2 TO 20 MC., 300 WATTS



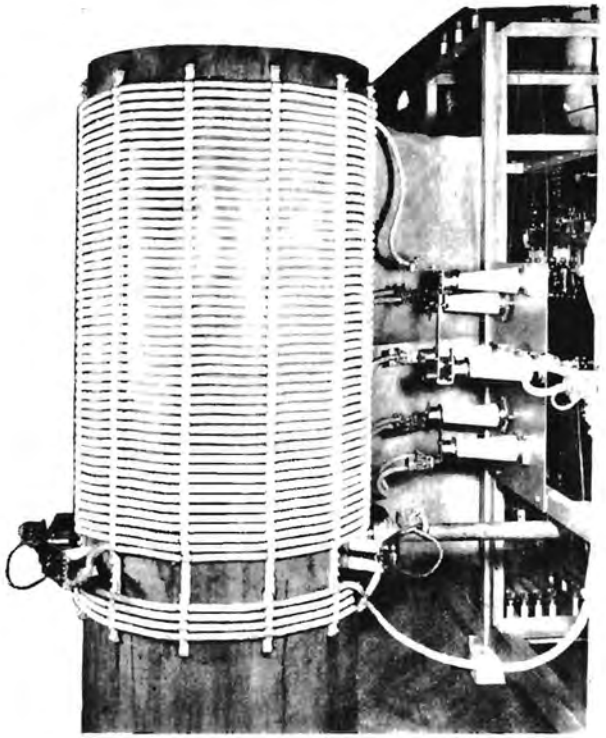
MI-19427-B
MASTER OSCILLATOR



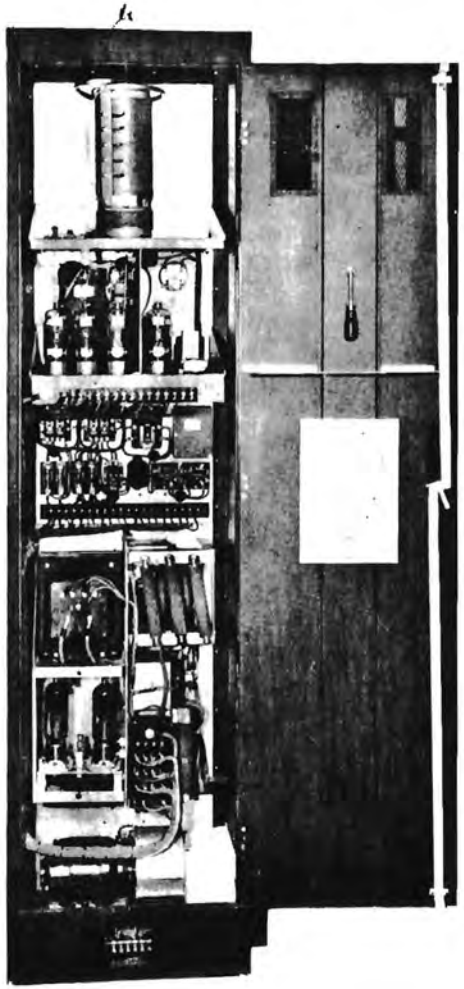
DR-89 DIVERSITY RECEIVER



TE343
5/10 KW LF TELEGRAPH
TRANSMITTER

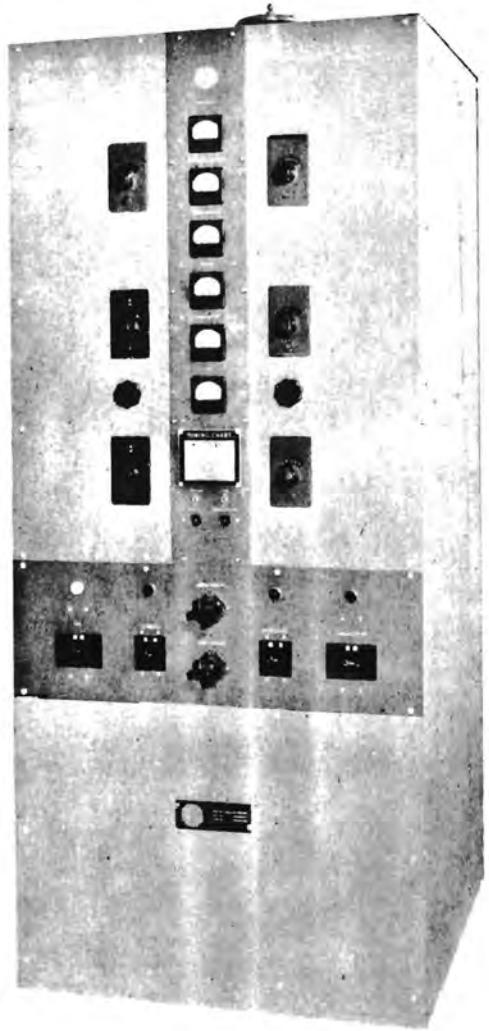


ANTENNA TUNING INDUCTANCE
FOR TE343 TRANSMITTER

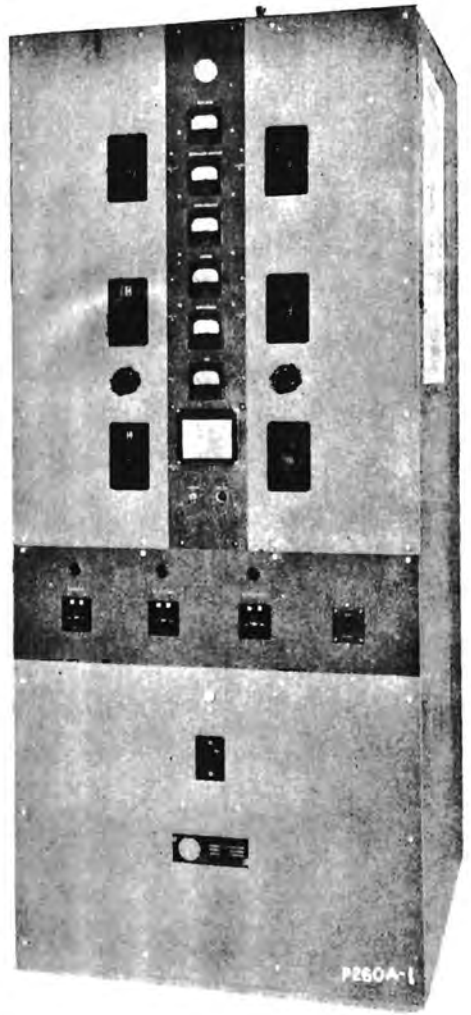


TE237 500 WATT LF
TELEGRAPH TRANSMITTER
(Rear)

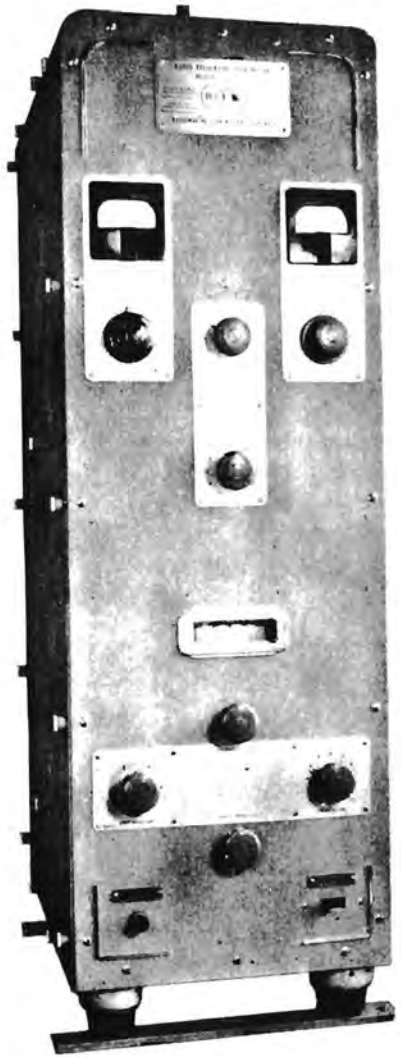
TE237
500 W LF TELEGRAPH
TRANSMITTER



TE260 B
1.5/3 KW LF RADIOTELEGRAPH
TRANSMITTER

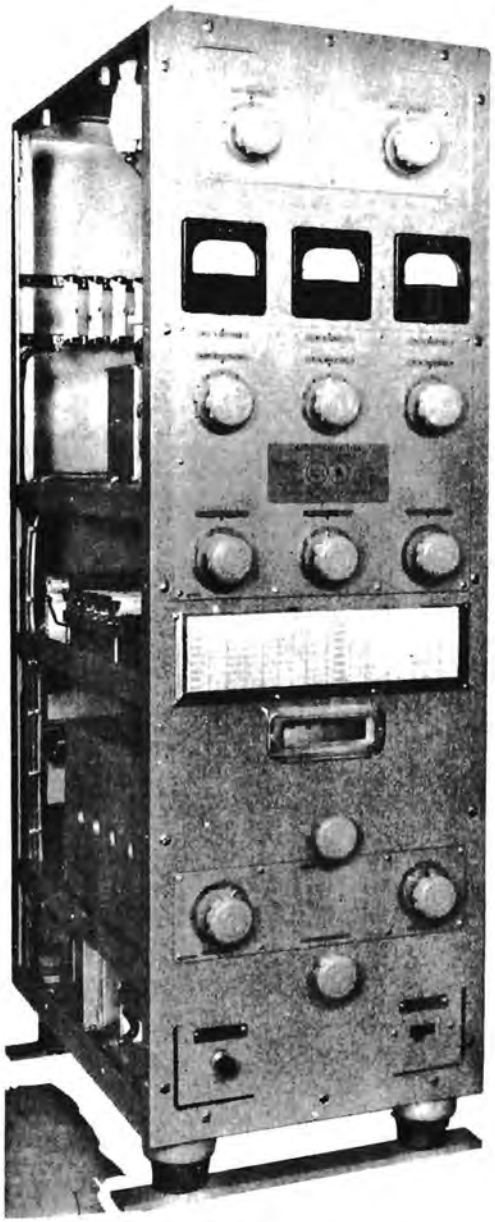


TE260 A
1.5/3 KW LF TELEGRAPH
TRANSMITTER

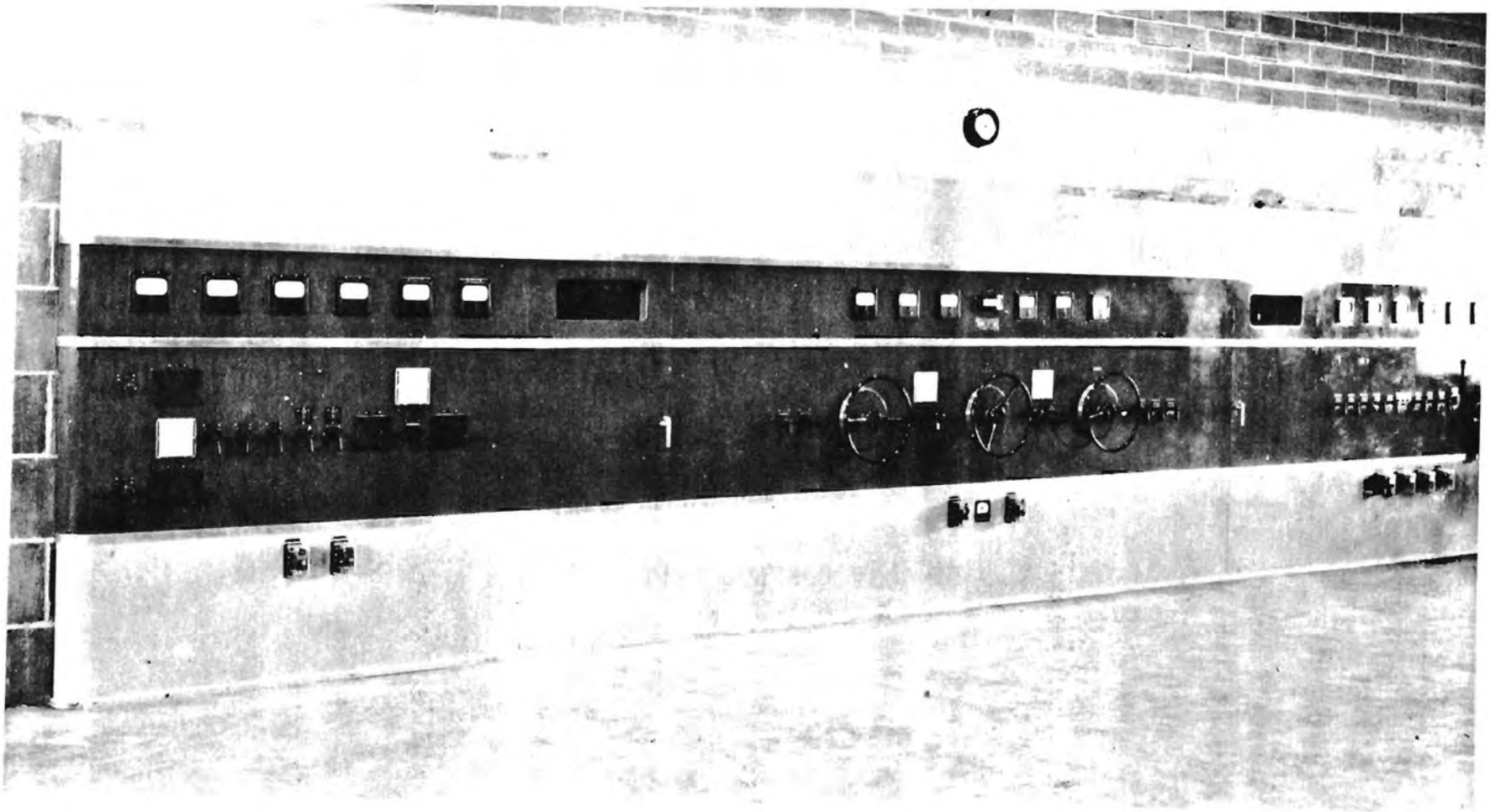


MODEL ET-8019
HIGH-FREQUENCY RADIOTELEGRAPH TRANSMITTER
200 WATTS, 4140 TO 16660 KC.

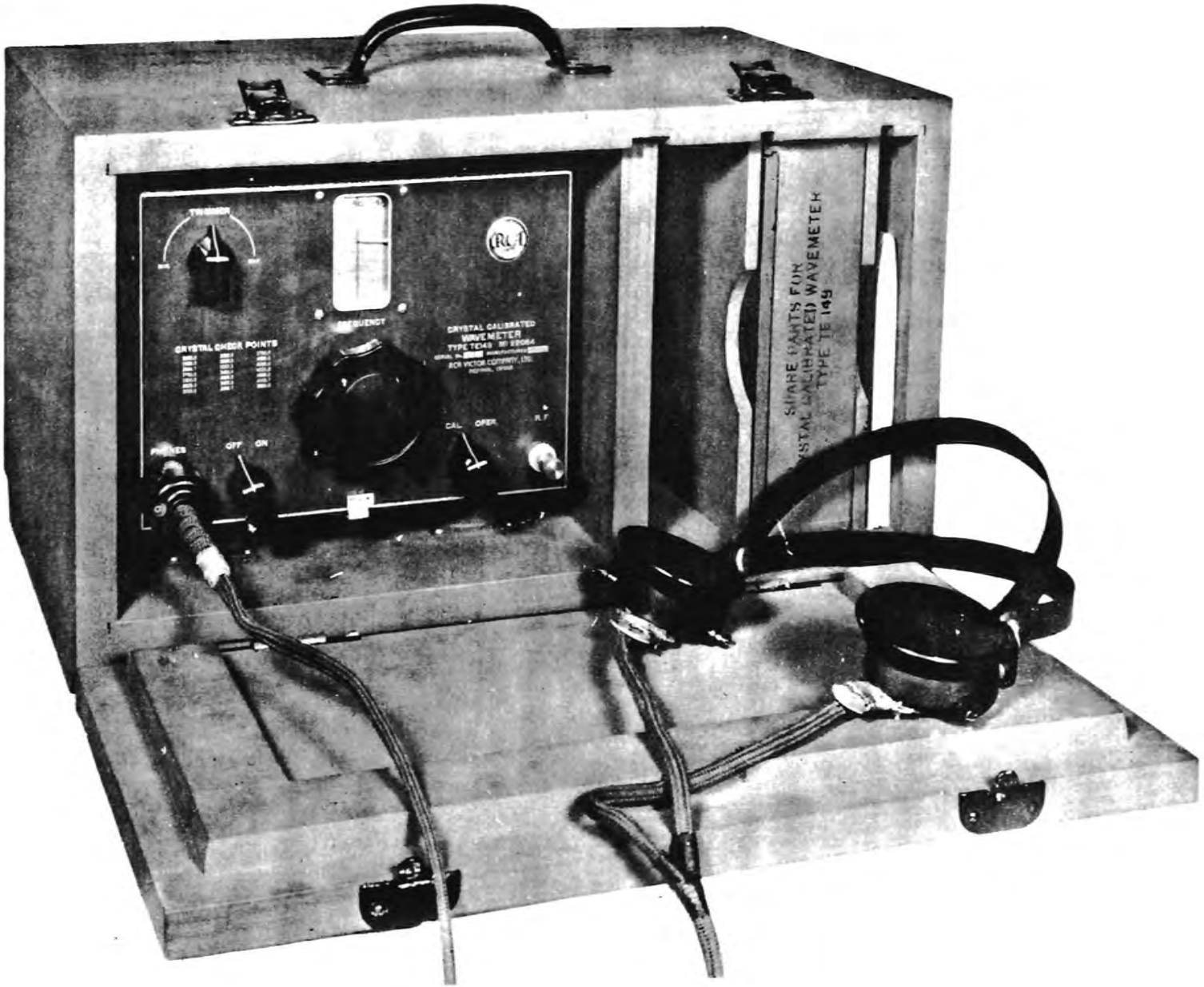
ET-8019 CONTROL UNIT



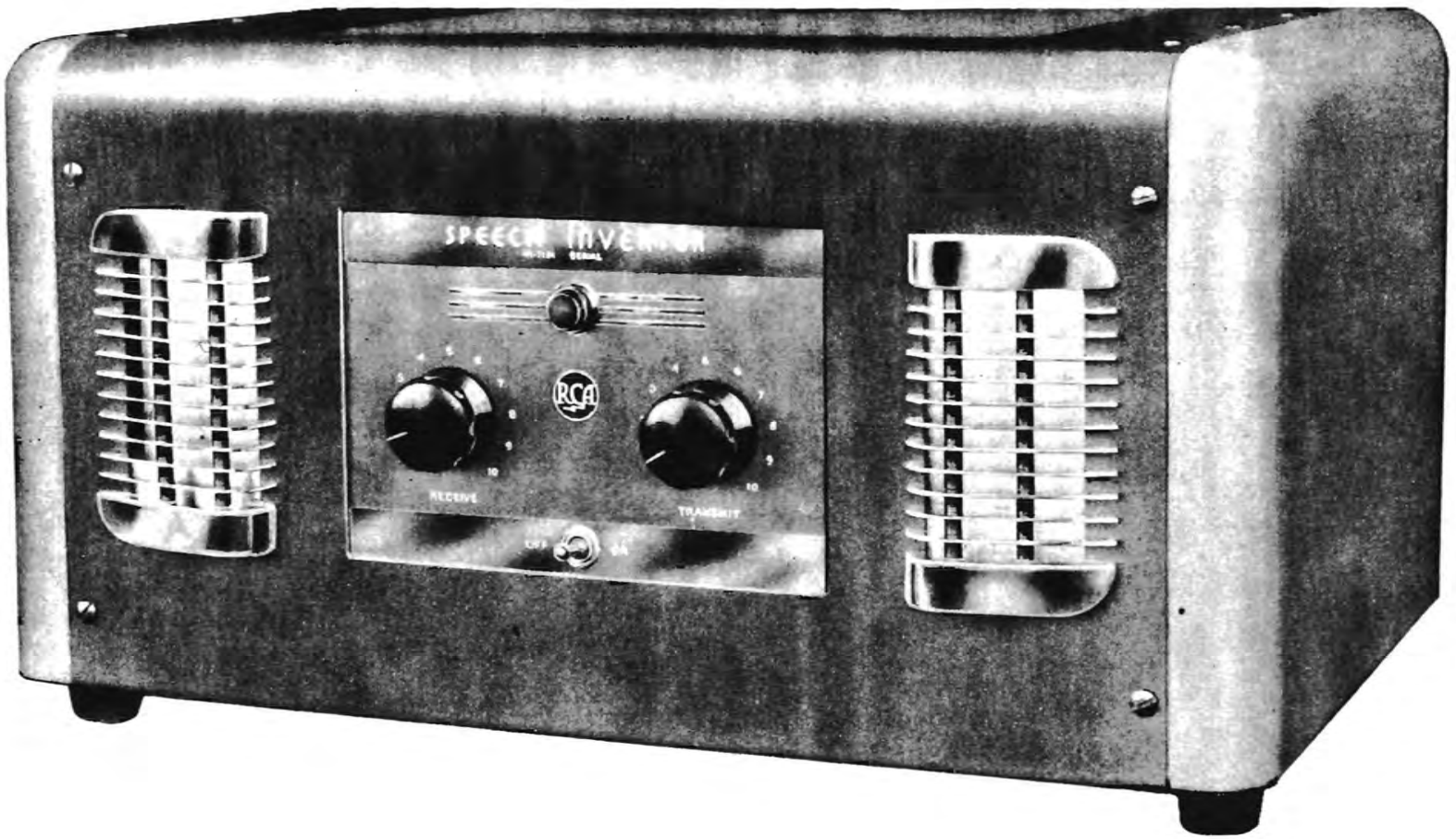
MODEL ET-8019-A HIGH FREQUENCY
RADIOTELEGRAPH TRANSMITTER



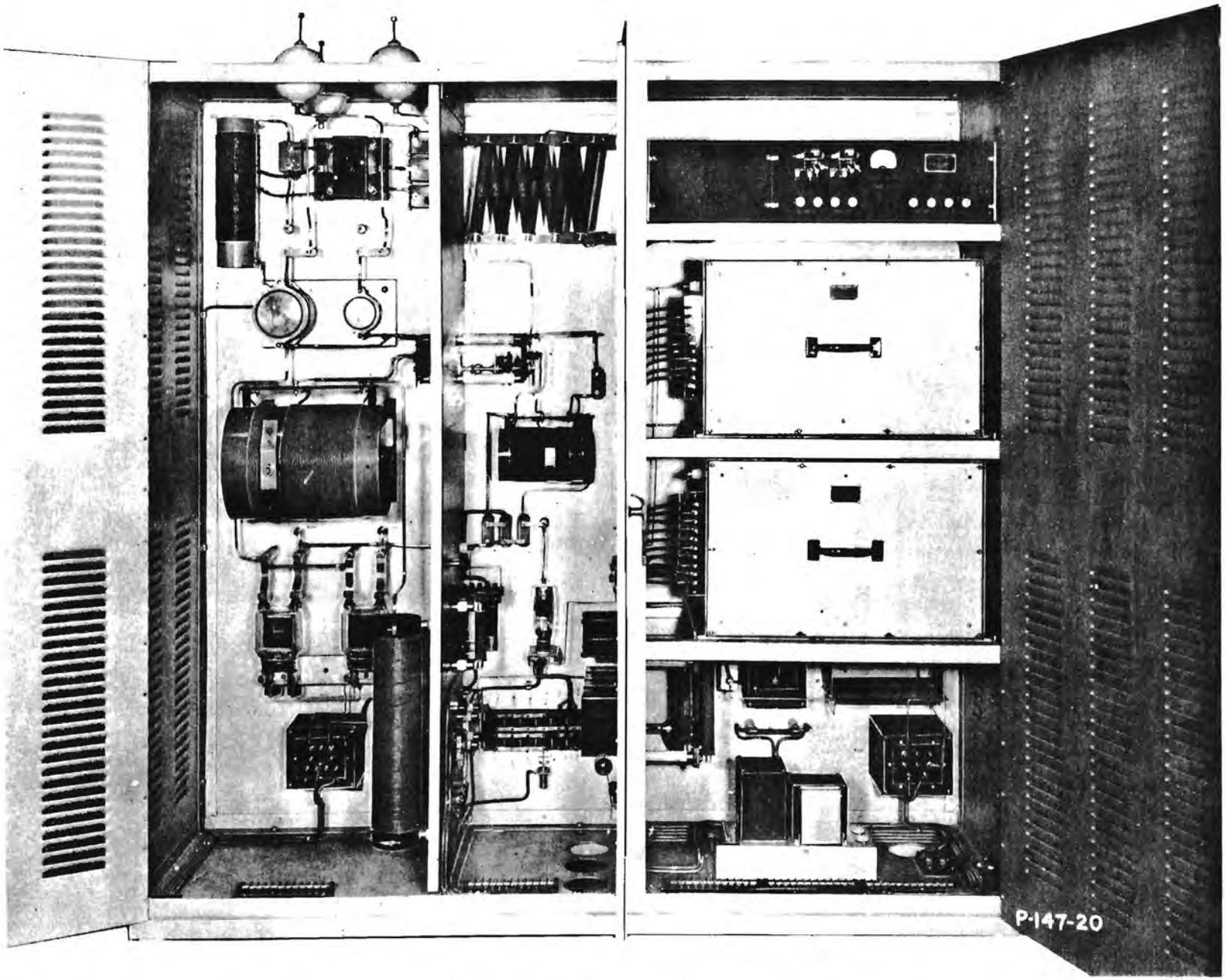
FRONT PANEL OF TE 147 50/100 KW 44/155 KC TELEGRAPH TRANSMITTER.



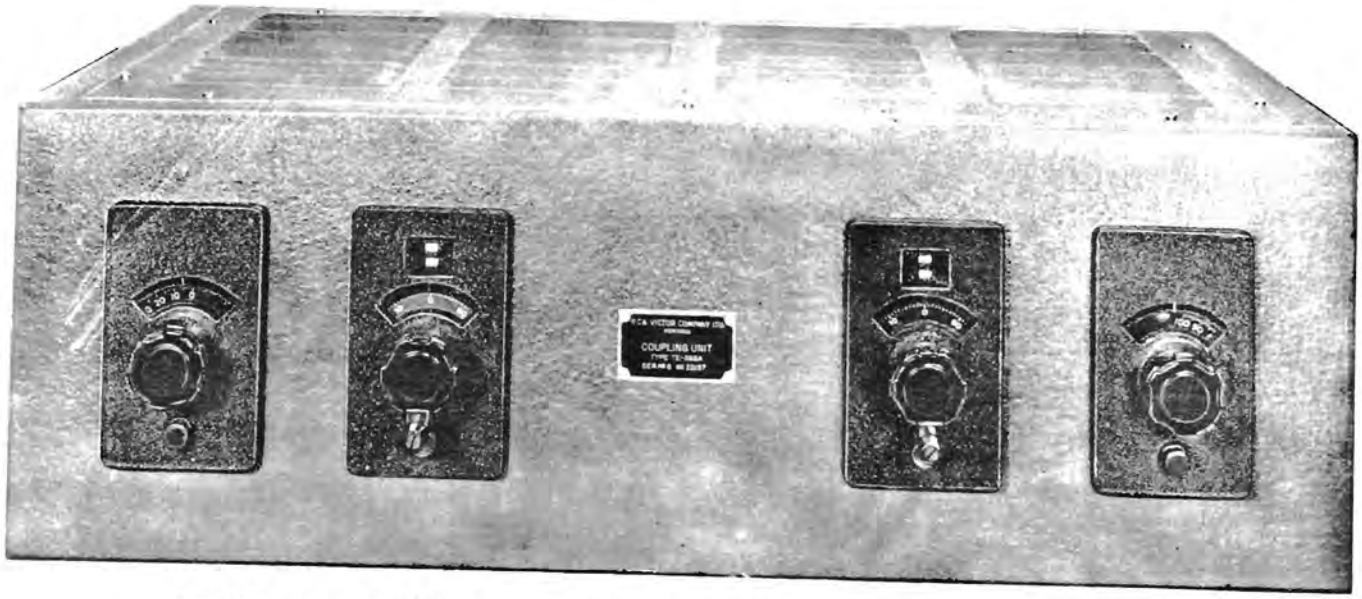
CRYSTAL CALIBRATED FREQUENCY METER EQUIPMENT. TE 149



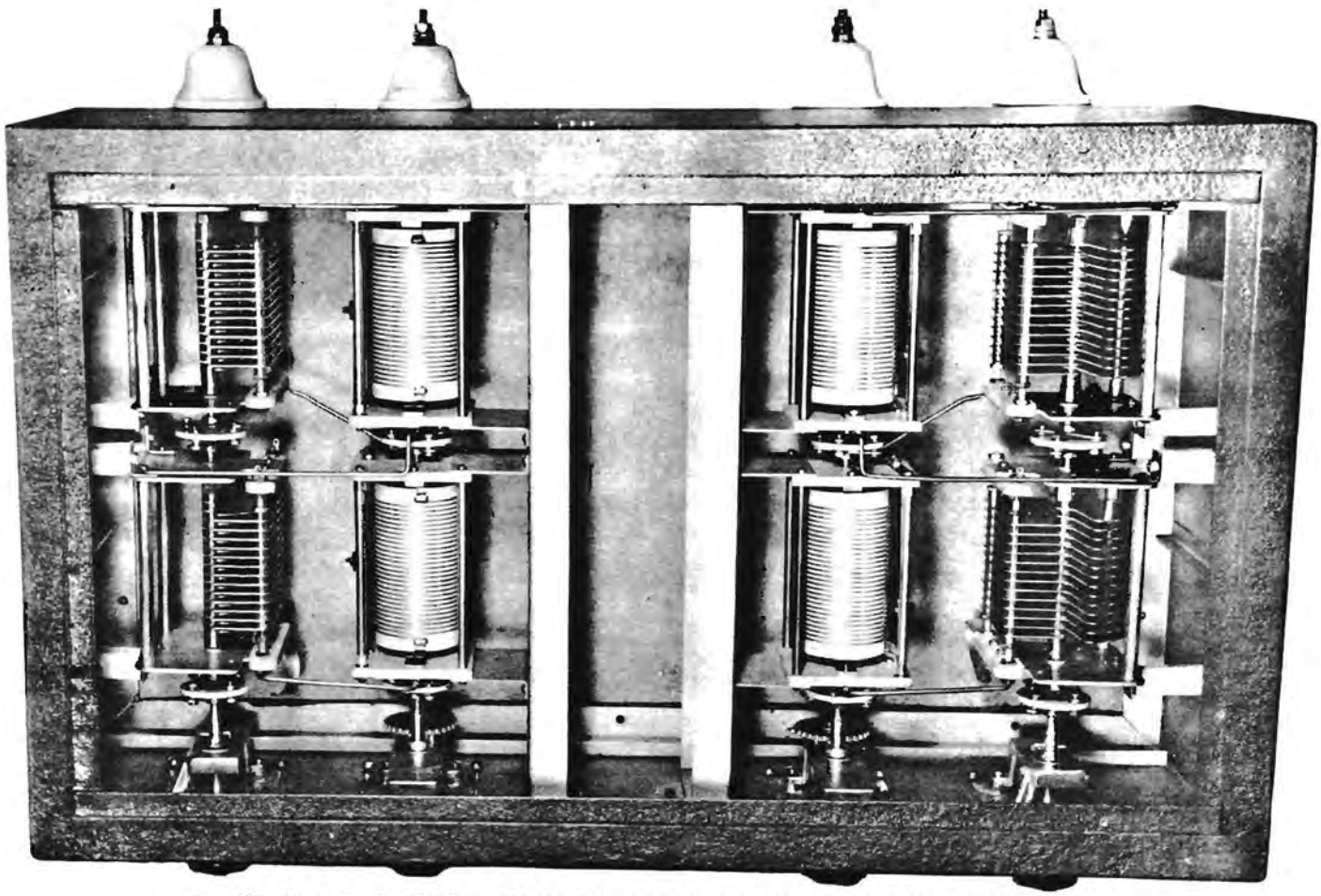
SPEECH-INVERTER. MI-7181.



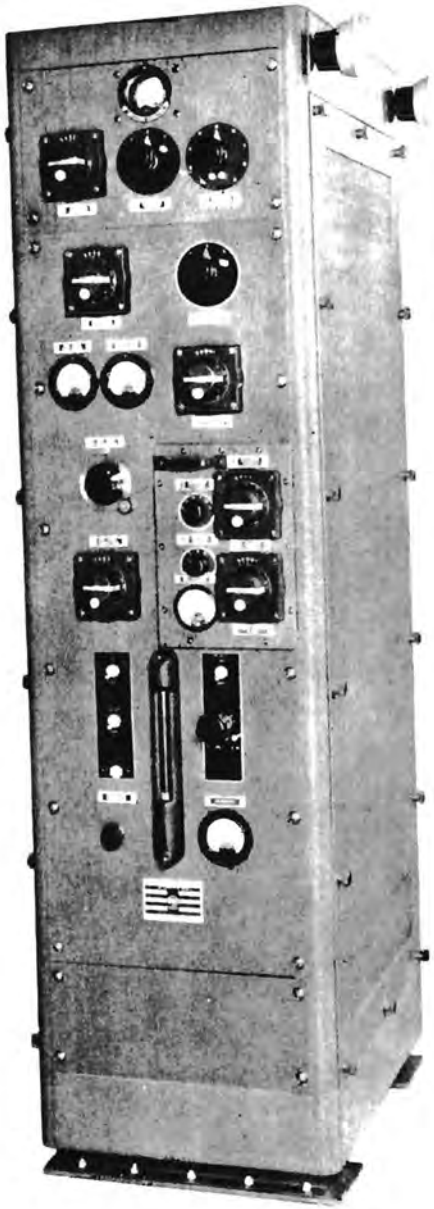
REAR OF EXCITER PORTION OF TE 147 50/100 KW 44/155 KC RADIO TELEGRAPH TRANSMITTER.



SPECIAL OUTPUT COUPLING UNIT (Single-end to Push-pull 2 Channels) FOR USE WITH AT3 TRANSMITTER. TE 366



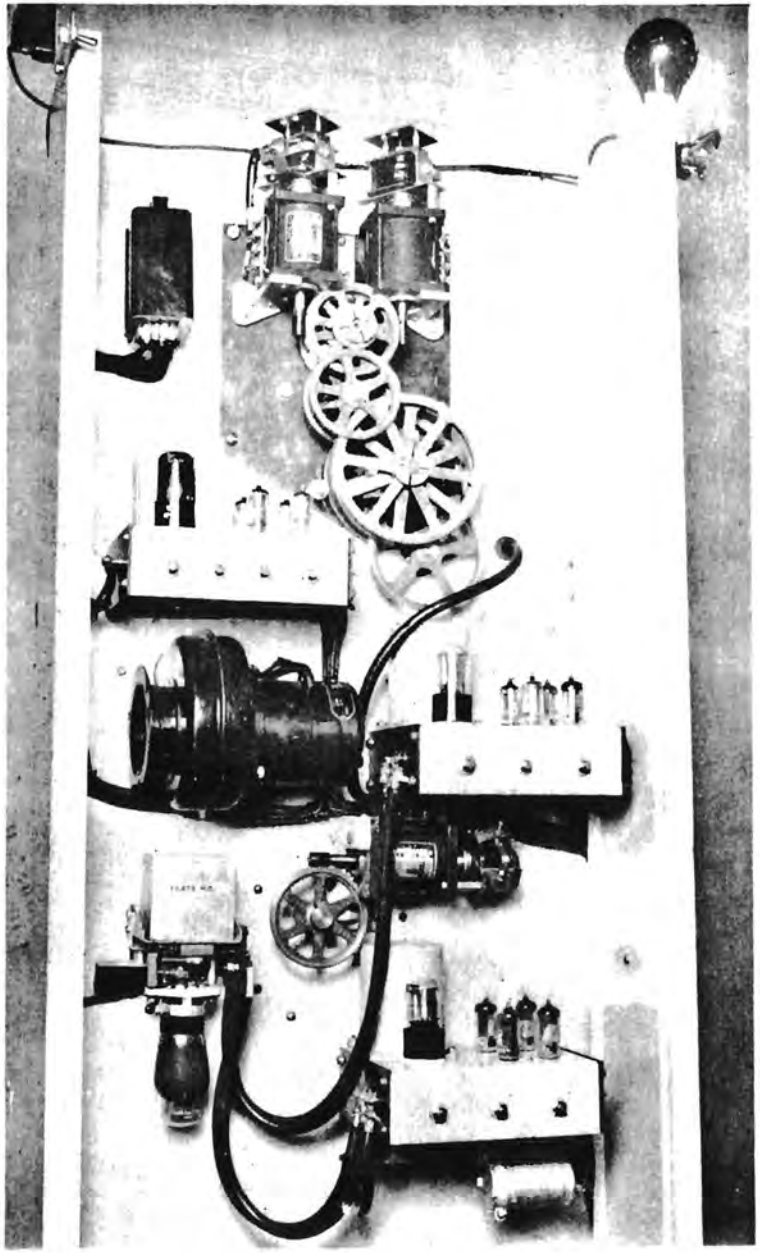
2-CHANNEL SINGLE-END TO PUSH-PULL LATTICE COUPLING UNIT FOR ATTACHMENT TO AT3 TRANSMITTER. TE 366



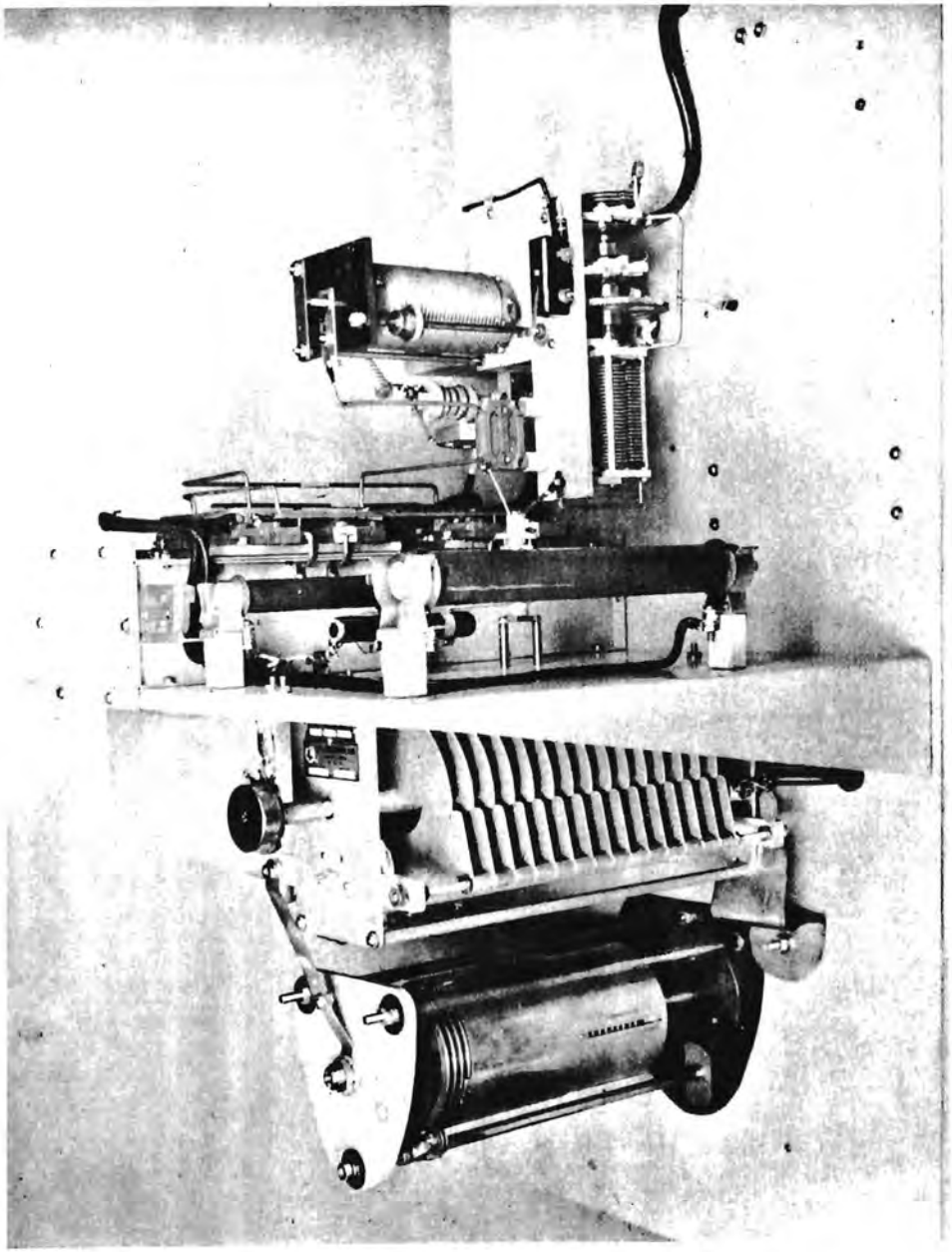
ET4336K H.F. GENERAL PURPOSE
TRANSMITTER. 250 W.

ET-4336 COMMUNICATIONS TRANSMITTER
2 TO 20 MC., 350 WATTS

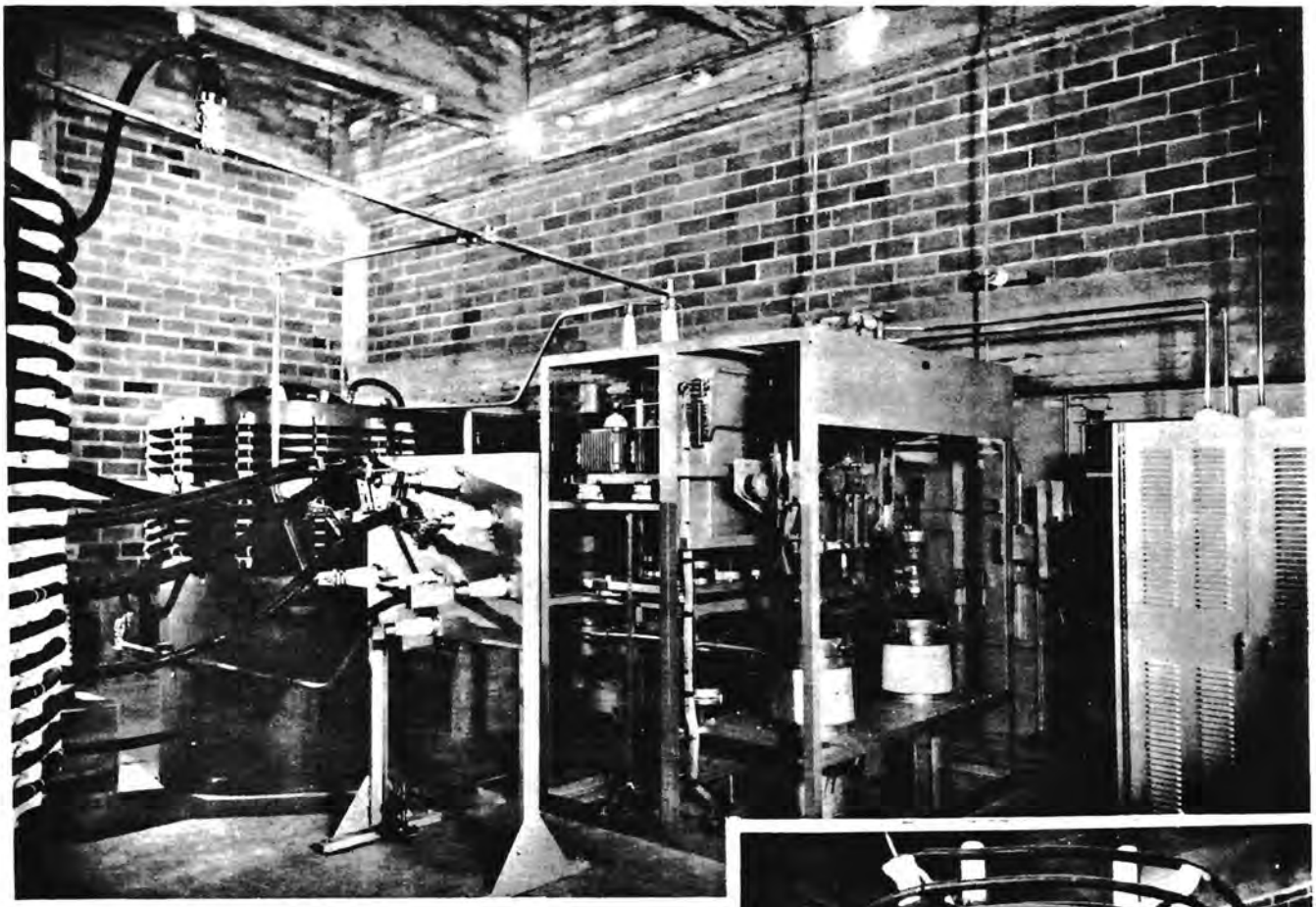
ET-4339 COMMUNICATIONS TRANSMITTER
1.7 TO 20 MC., 200 WATTS

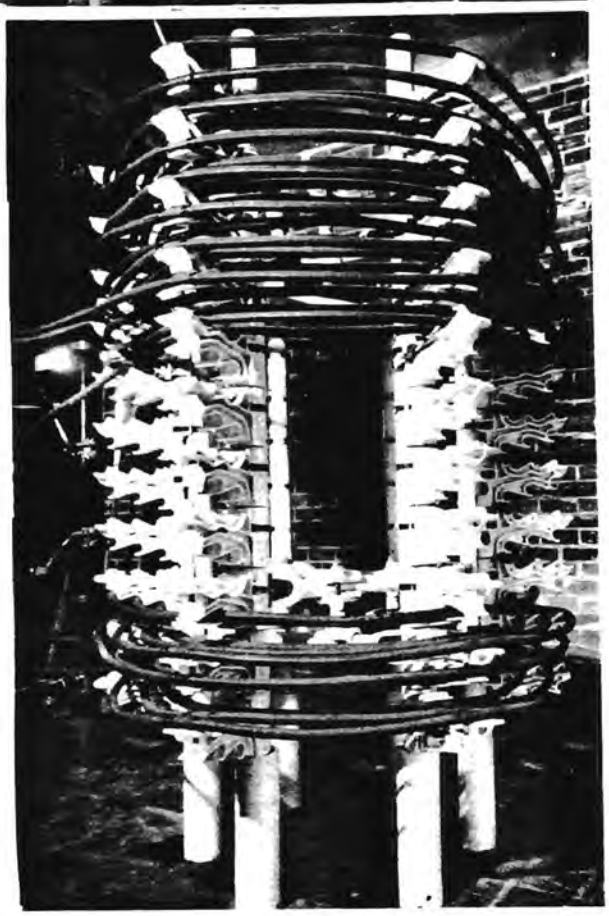


New automatic tuned transmitter. Crystal oscillator, IPA, and antenna tuning.

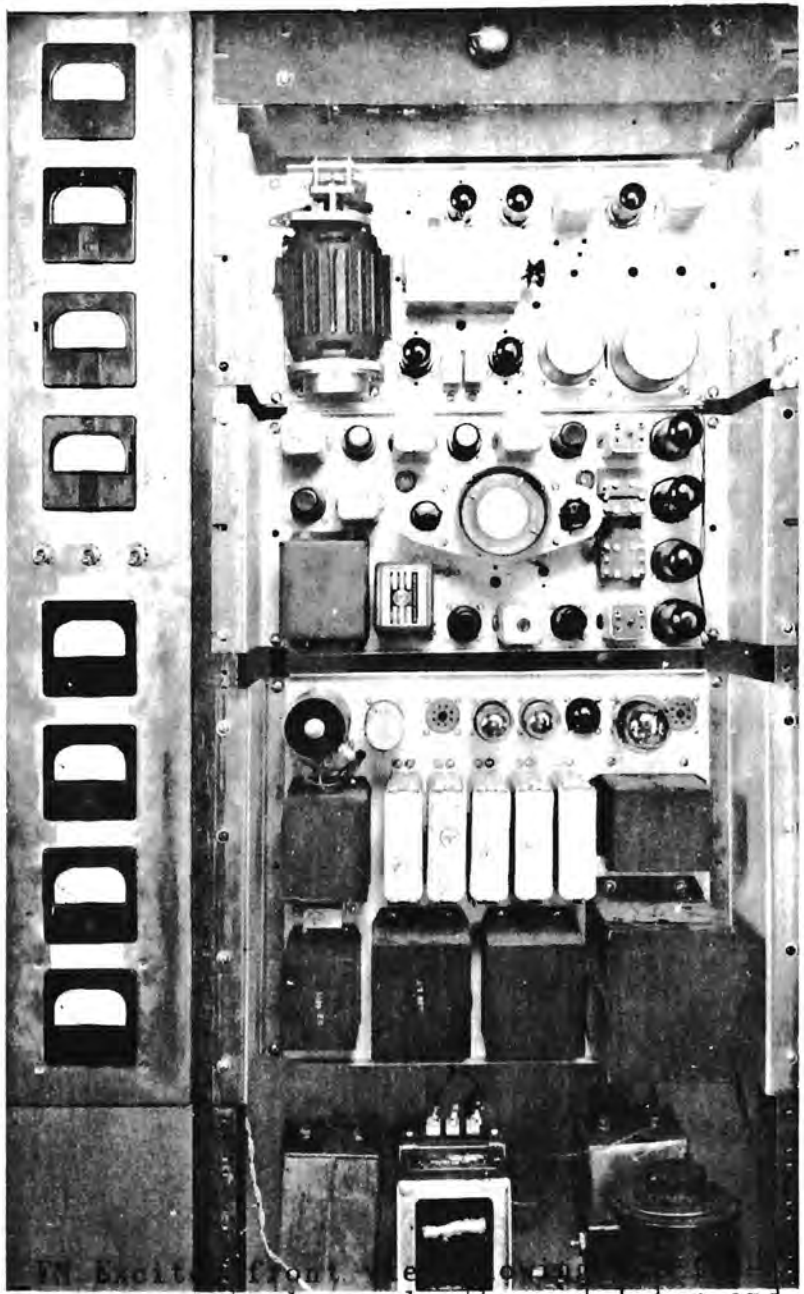


Capacitor and inductor units of automatic tuned stage.

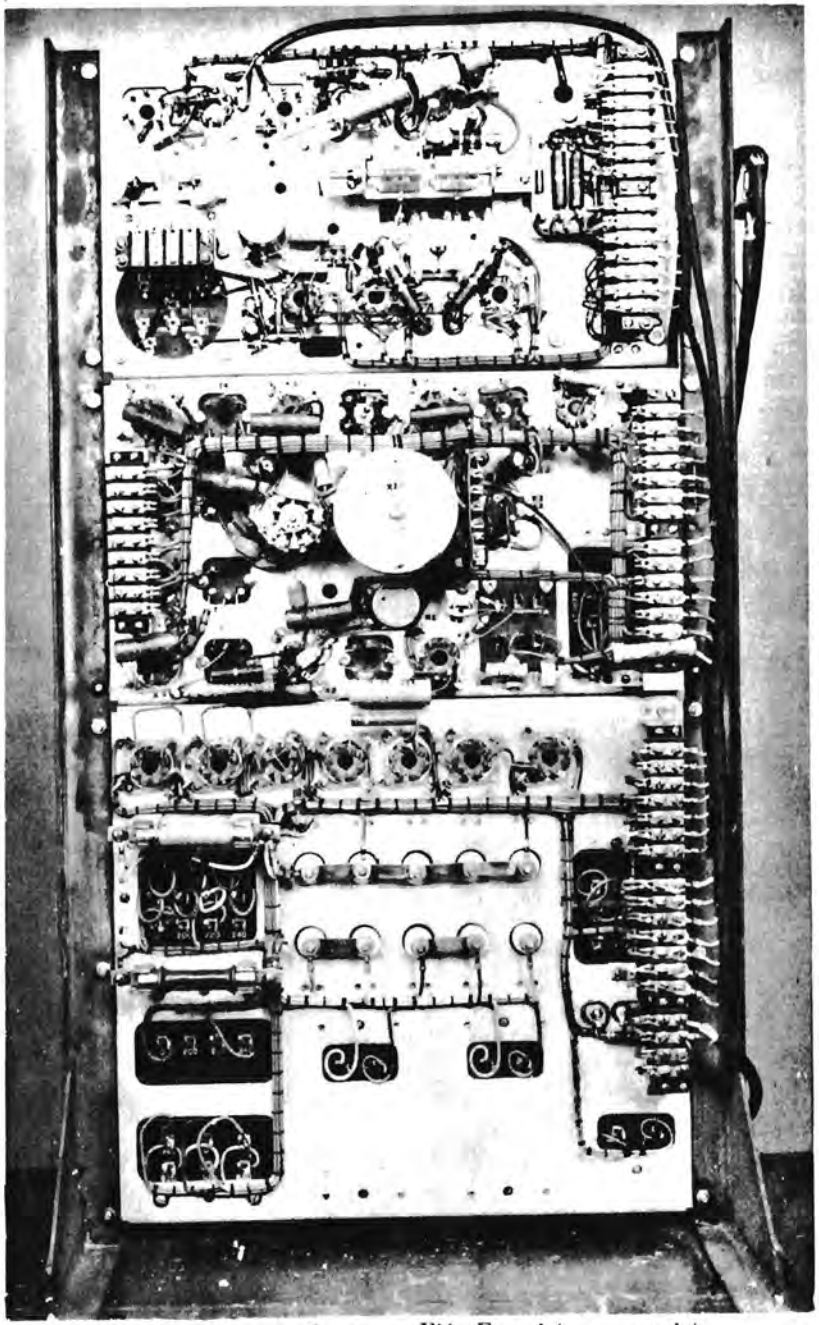




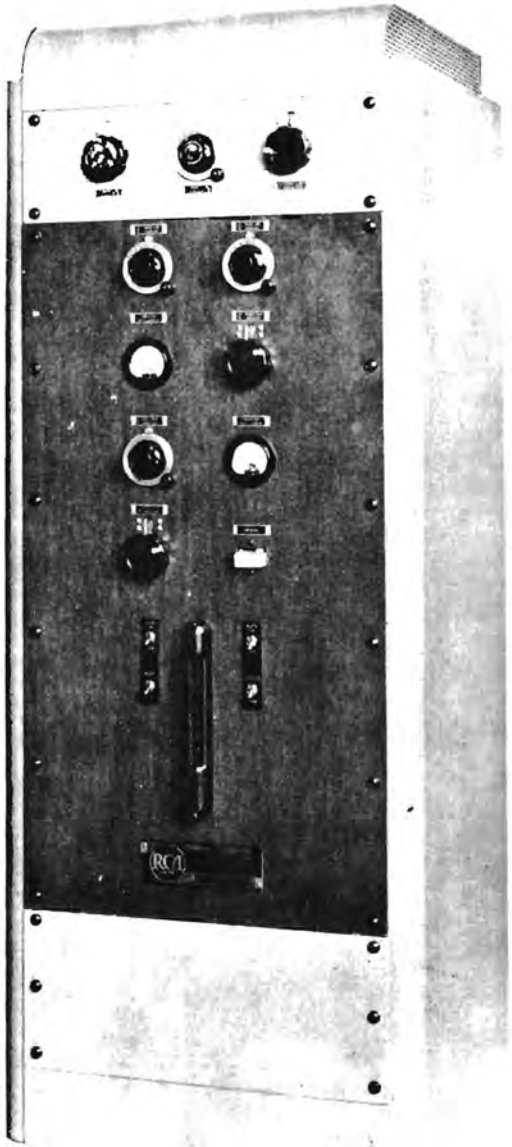
ANTENNA LOADING INDUCTANCE FOR TE 147
TRANSMITTER 50/100 KW 44-155 KC.



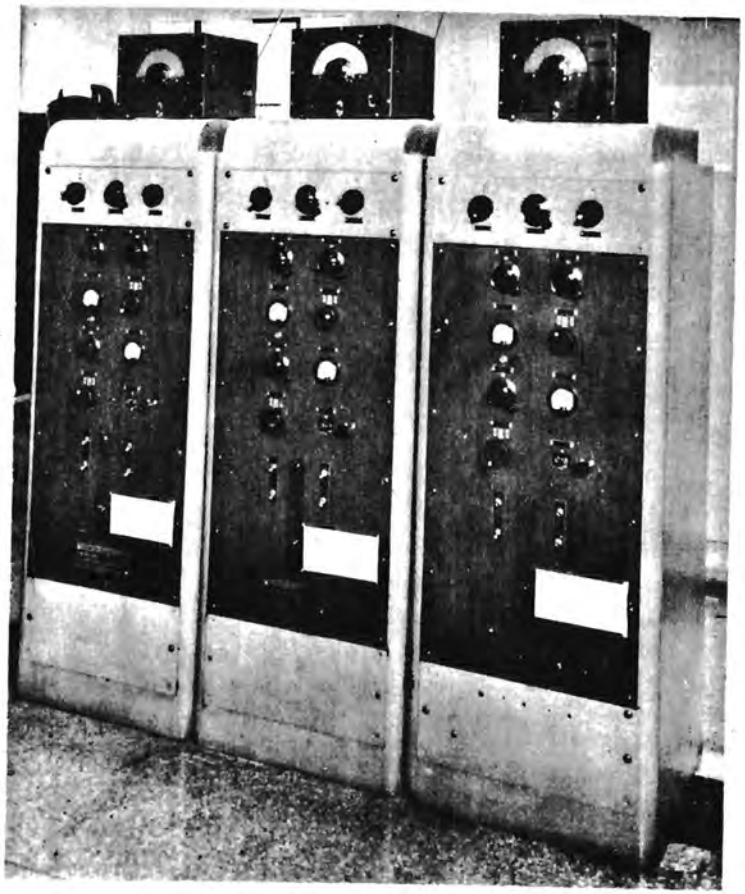
FM Exciter front view showing the frequency control panel, the modulator and doubler stage and power supply.



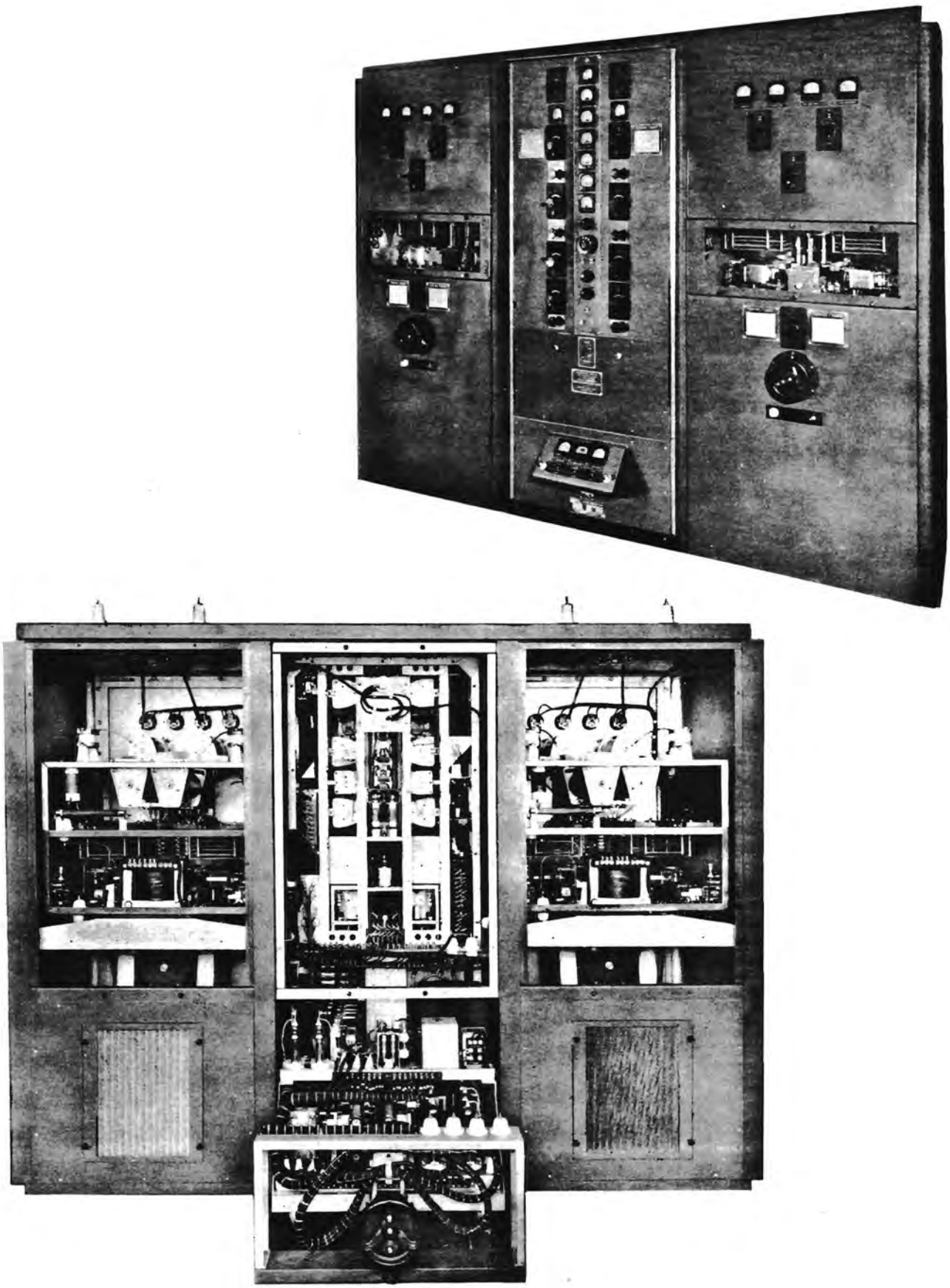
Rear view of new FM Exciter unit.



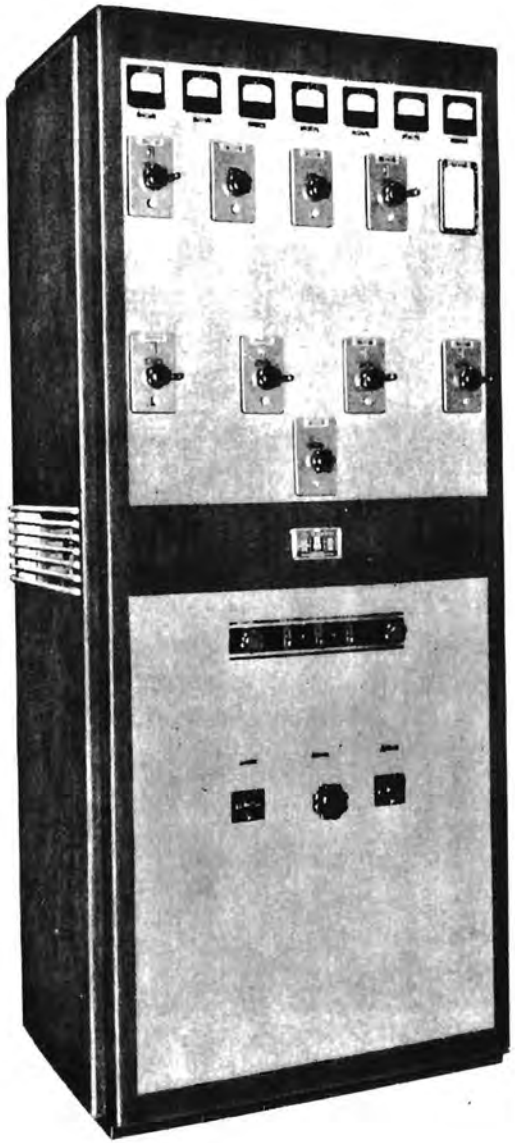
TYPE ET-4332A COMMUNICATIONS TRANSMITTER
250 WATTS, 2 TO 20 mc.



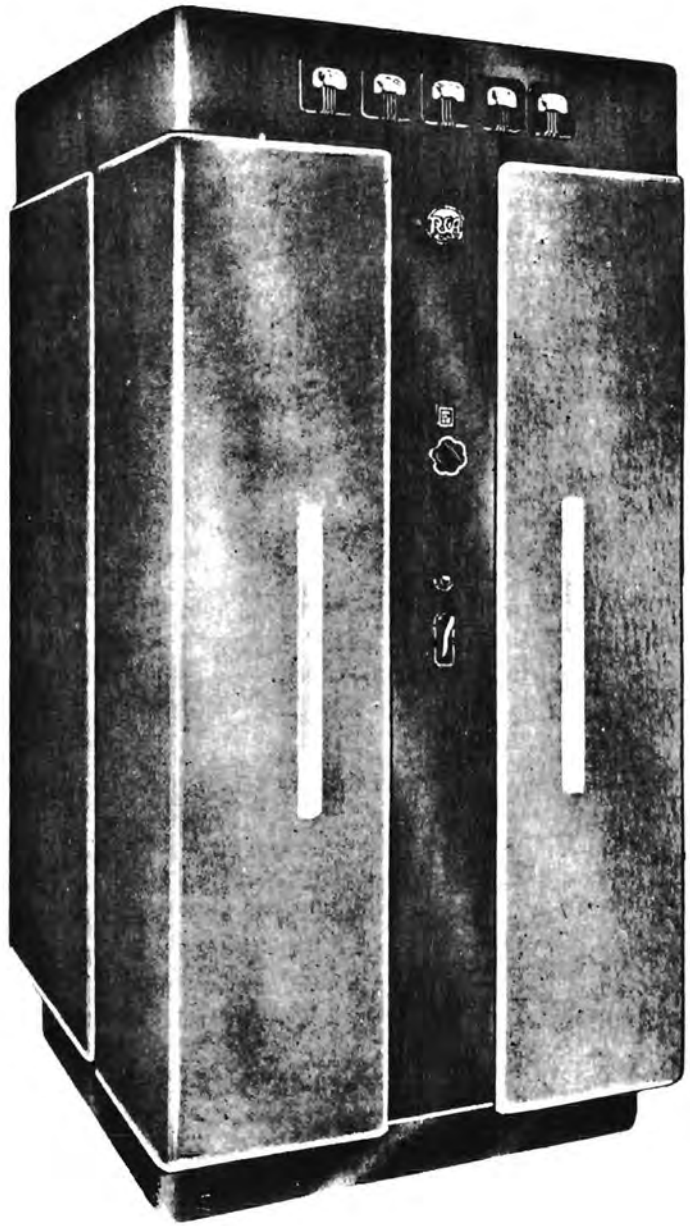
3 - RCA ET4332B
TRANSMITTERS INSTALLED
AT A COMMUNICATION STATION



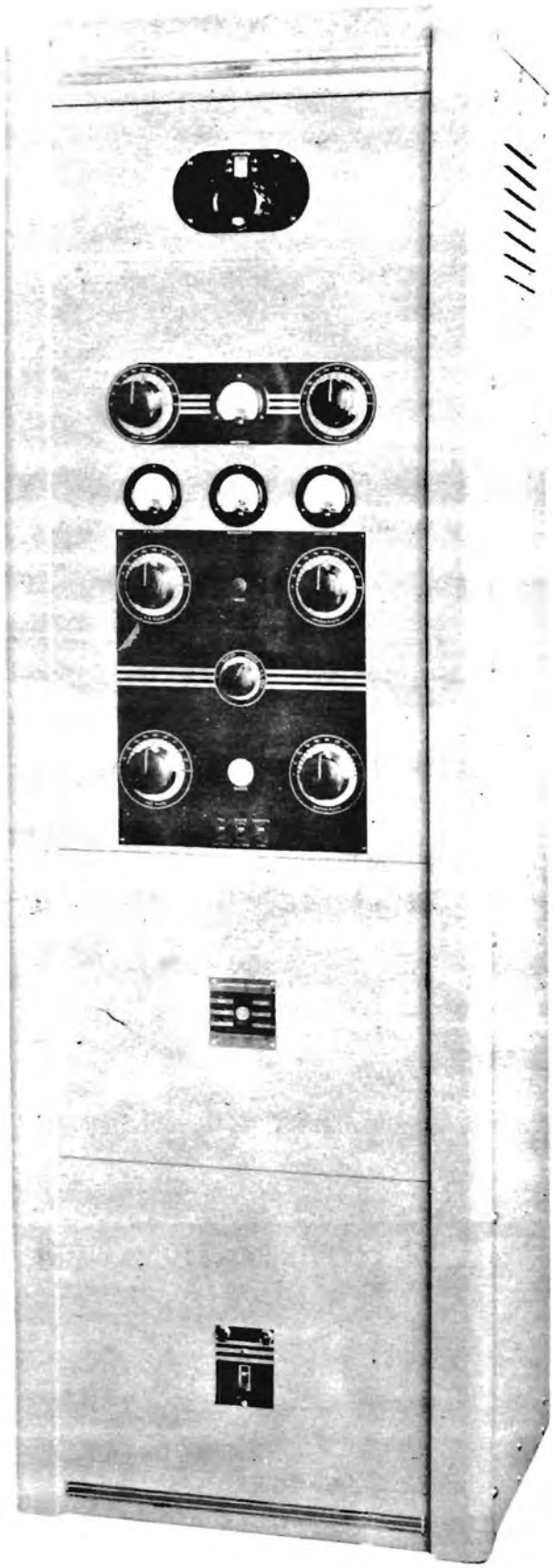
2-CHANNEL 5 KW 2.5/20 MC GENERAL
COMMUNICATION TRANSMITTER. TE 308-C



ET-4331 COMMUNICATIONS TRANSMITTER
1 KW, 3 TO 20 mc.

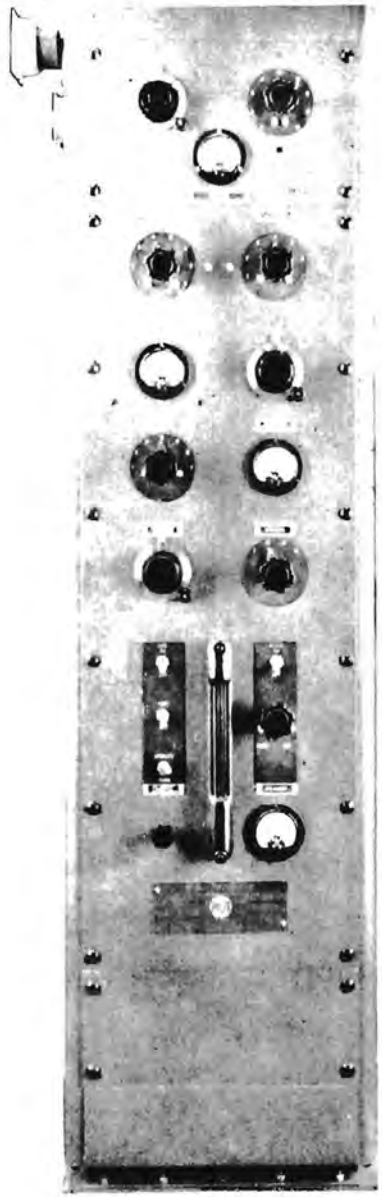


250 WATT, FM TRANSMITTER

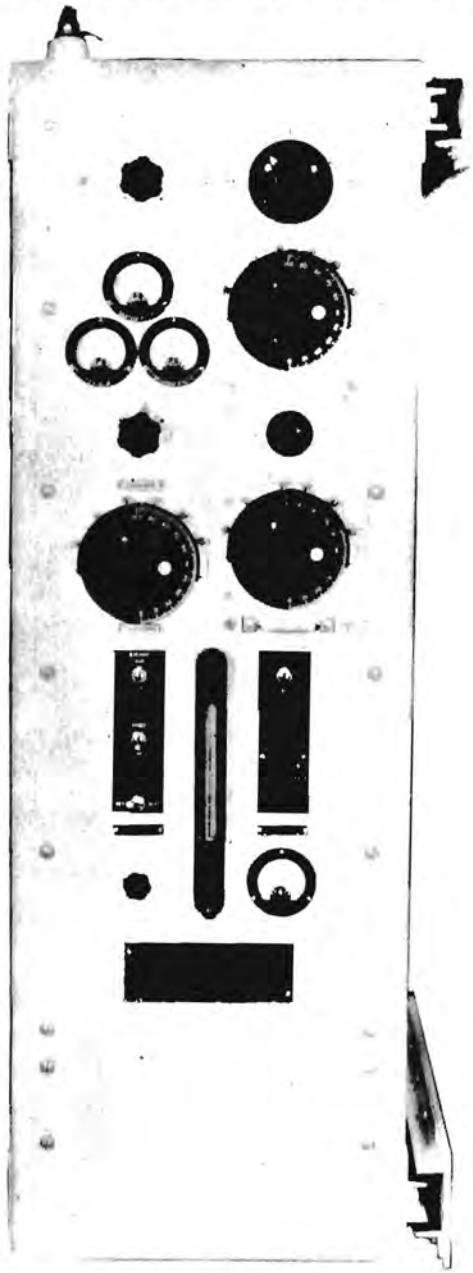


150 WATT GENERAL PURPOSE AMATEUR TRANSMITTER. ET4334.

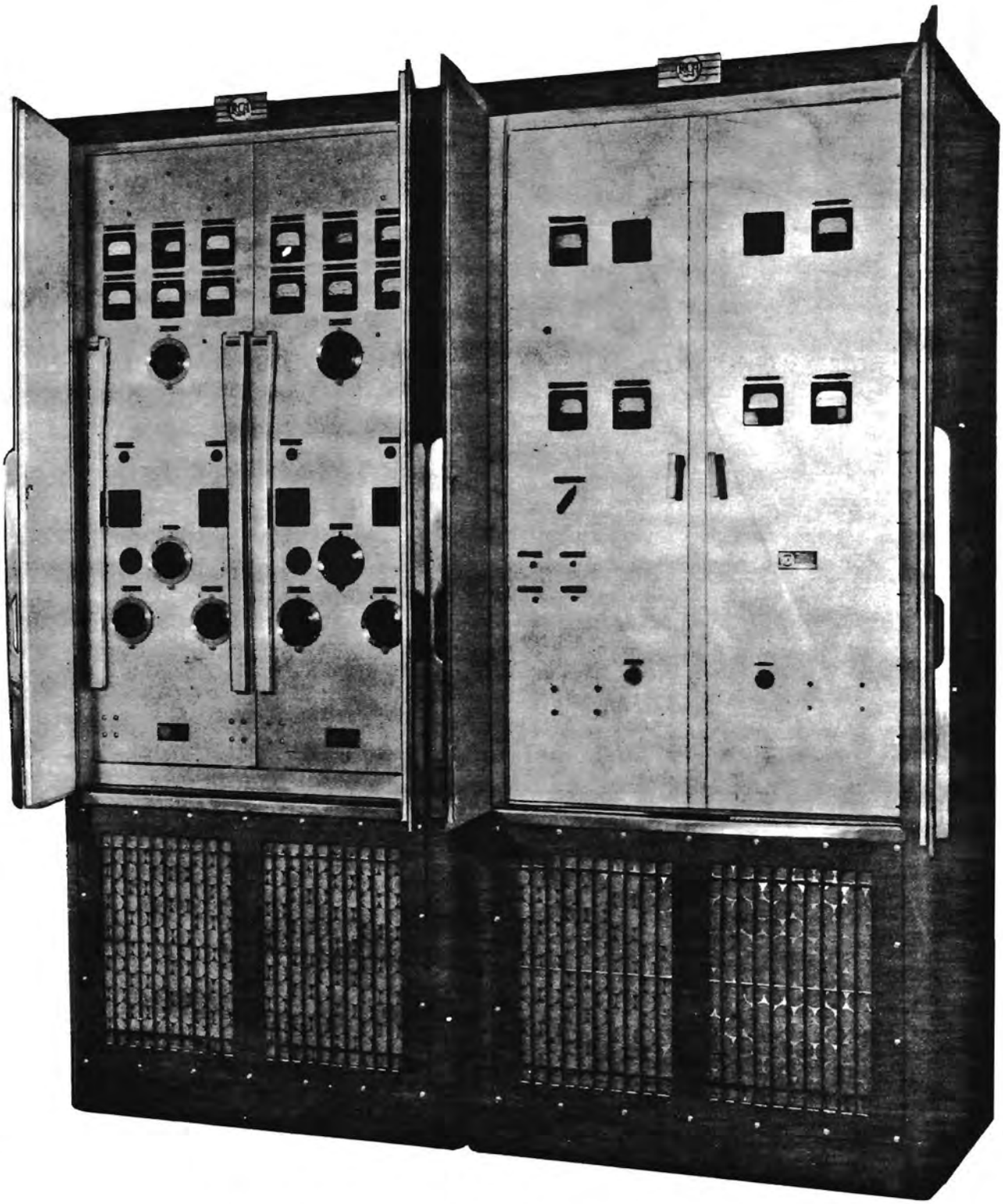
CUSTOM - DESIGNED TRANSMITTER
(250 Watt) FOR MOBILE AND MARINE USE.



250 WATT LF TRANSMITTER FOR
GENERAL COMMUNICATION. ET4335LF



250 WATT GENERAL PURPOSE
COMMUNICATION TRANSMITTER. ET4336G.



HIGH FREQUENCY TELEPHONE AND TELEGRAPH
TRANSMITTER AVT-22B 2-1/2 KW OR 5 KW

X - COMMUNICATION RECEIVERS

★ ★ ★

X - COMMUNICATION RECEIVERS

1. POINT TO POINT DELUXE DIVERSITY RECEIVING EQUIPMENT (3-24 mc)

In the later twenties RCA Communications, Inc., with their world wide MHF radio circuits, felt the need for a deluxe radio receiver to combat the fading and the interference already appearing in the 3-24 mc frequency range. Work was started to develop such an equipment and the new deluxe receiver was put into commercial service in 1931, incorporating advanced theories including *"space diversity"* and variable selectivity. This receiver still is recognized as a standard of comparison. Our military, as well as that of our allies, have eagerly consumed our entire output during the war.

2. AR88-CR91-ER88 RECEIVERS

With the success achieved by the deluxe diversity, it was decided in 1939 to develop a communications receiver for general application which would include all the desirable electrical and mechanical features possible from a theoretical standpoint as well as a design which would lend itself to mass production with the economy of price resulting thereby. Combining the technique learned in the production of millions of home receivers, experience with previous communication receivers and the advice of the U. S. Army and Navy, as well as RCA Communications, has resulted in the AR88 family of receivers. They are physically rugged, electrically stable to the extreme and possess superior selectivity and sensitivity. Their acceptance has been wide. A very large number of these units have been produced to date.

This group includes the following:

AR88 - 2-1/2 watt audio output 550 kc to 30,000 kc
ER88 - 550 kc to 30,000 kc but with 10 watts audio output
CR91 - 2-1/2 watt audio 75 - 550 kc 1500 - 30,000 kc
DR89 - 550 - 30,000 kc diversity receiver including 3AR88.

With the availability of such a receiver as the AR88, it was natural that three of these be combined with a tone keyer to form a simpler diversity than the original deluxe model. Excellent results have been realized as the military branches of the allied governments become more familiar with the advantages and performance of this simple equipment. An adaptor unit to permit reception of frequency shift signals with this receiver is now being developed.

3. CR10 - 2000 - 20,000 KC FIXED FREQUENCY RECEIVERS

With the anticipated expansion of international aviation and the improvement of radio technique to the point where radio circuits are considered in the same light as land telephone lines with the same class of operating personnel being used, a demand has been created for a receiver to be set permanently on one frequency with no operator adjustments being required. The CR_{10}, now in development, will answer this need and provide either telephone or telegraph reception and control from a local or remote point over a two-wire line. Diversity operation on telephone will also be possible by connecting two or three of these receivers together.

4. CR11 - 550 - 30,000 KC GENERAL COVERAGE RECEIVERS

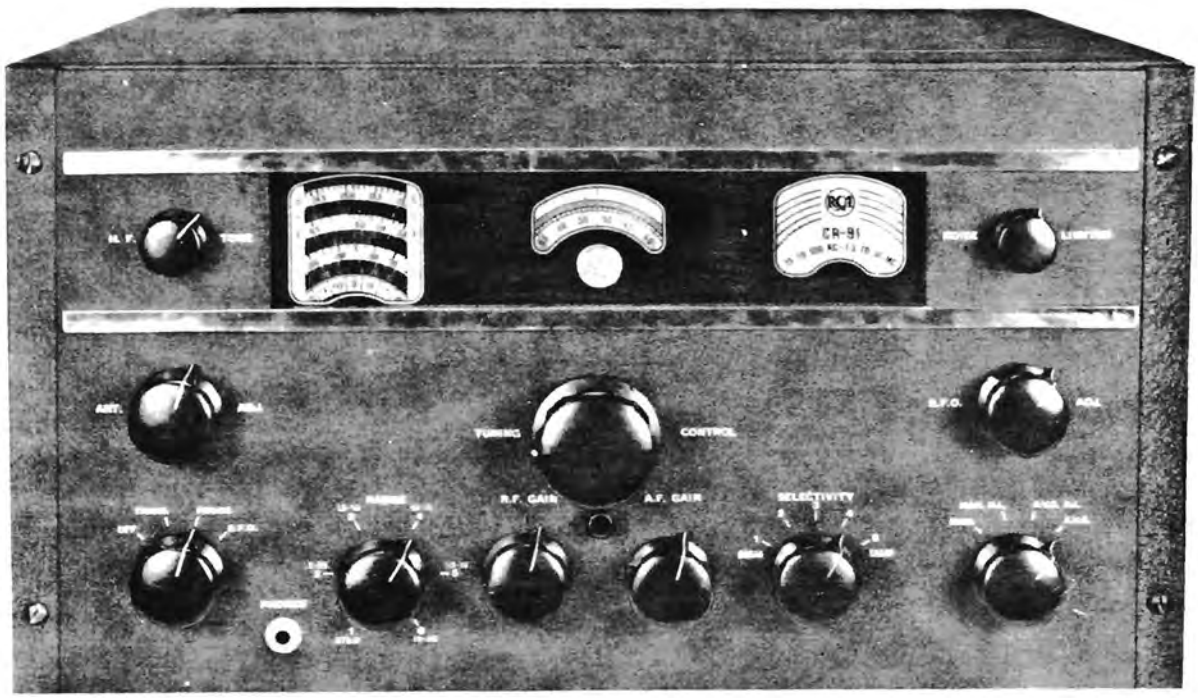
In 1938 RCA developed the AR_{77} general communications receiver for sale to the amateur market. Commercial services found its electrical performance so excellent that we are now planning a modified version which will expressly meet the needs of the commercial user. Certain features desirable only to the amateur will be eliminated, the result being a low priced receiver of superior performance designed expressly for the commercial user interested in the maximum performance with the minimum of expense.

5. CRX - 100 - 200 MC FIXED FREQUENCY RECEIVERS

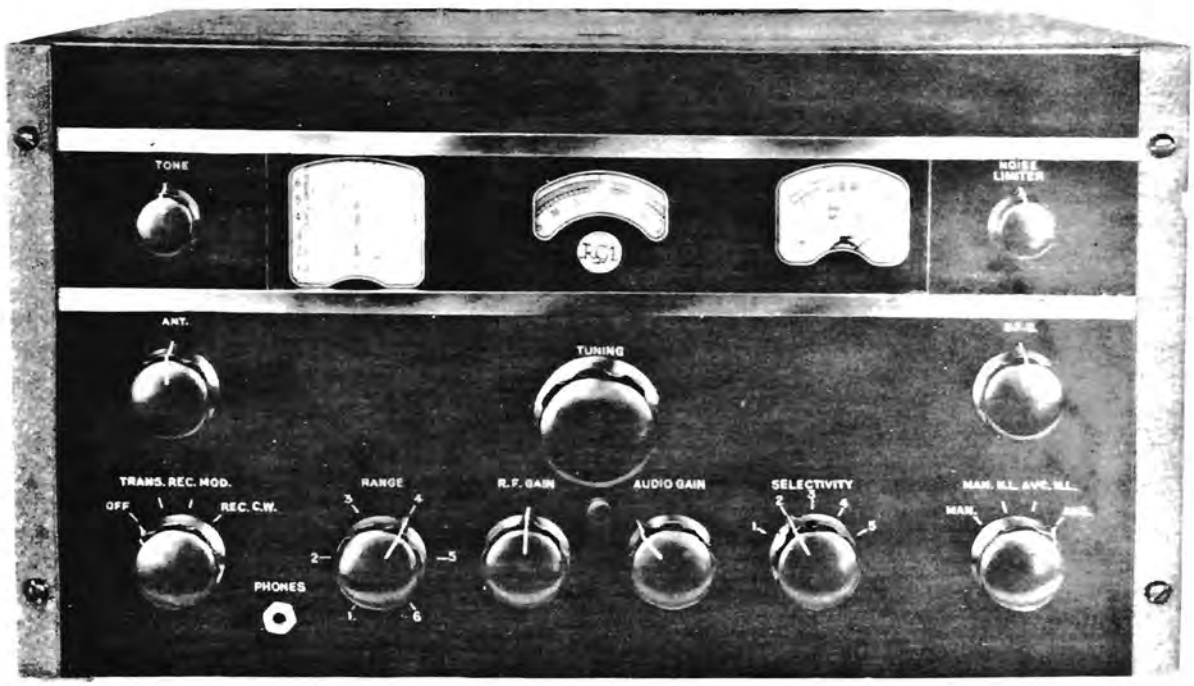
All indications point to increased usage of the 100- 200 mc frequencies in plane-to-ground communications. To provide the assurance of constant monitoring of certain channels in this range with the minimum of operator adjustment, a fixed frequency receiver will be required. As it is now planned, this receiver will be similar in operation to the CR_{10} but for telephone only, and on this different frequency range. Operation and control will be possible from either a local or remote point over a two-wire line.

6. CRX - 25 - 250 MC GENERAL COVERAGE RECEIVERS

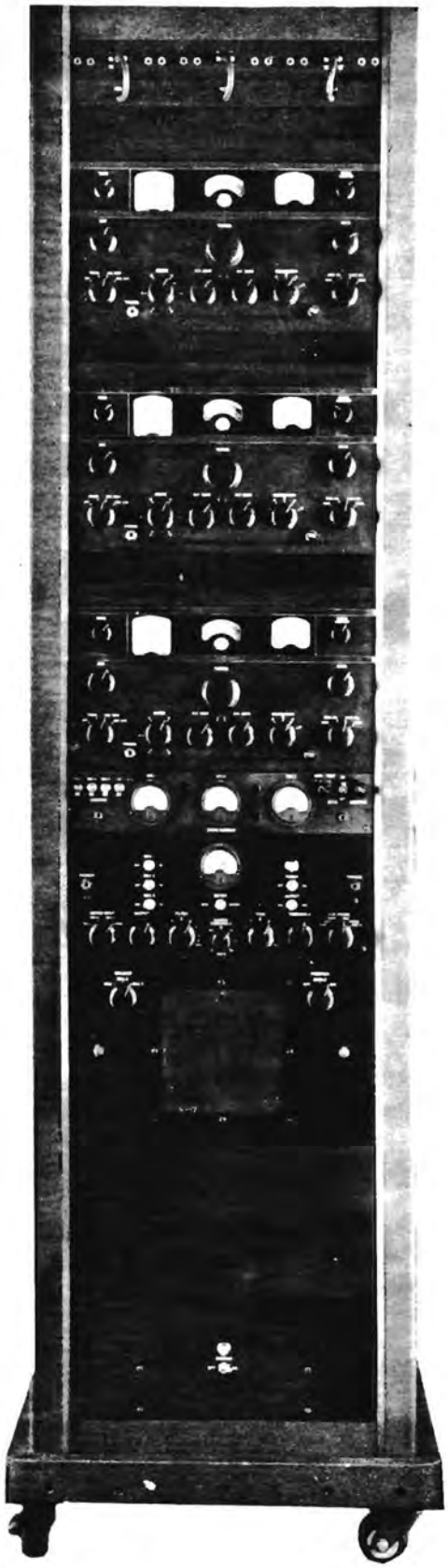
The post war era will see a greatly expanded use of these frequencies by various services. With all primary circuits using untunable fixed frequency receivers, there will be a great need for a *"stand by"* general coverage receiver in every station as well as laboratory and service point. Since these frequencies will include both AM and FM narrow and wide band, this receiver must accommodate both.



RADIO COMMUNICATIONS RECEIVER 75 KC TO 550 KC AND 1.5 TO 30 MC. CR91



RADIO COMMUNICATION RECEIVER. AR88. 550 KC TO 30,000 KC.



3 CHANNEL DIVERSITY RECEIVING SYSTEM WITH TONE KEYER. DR89

XI - AVIATION RADIO

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XI - AVIATION RADIO

The role of RCA in aviation radio is best implied in the fact that at the present time over half of our entire output from all our factories is for equipment to be used in connection with aviation. RCA has in the past specialized in military aviation radio, and as a consequence was in a position to take a prominent place in the development and supply of the complicated and important forms of apparatus required for the prosecution of the War. In several cases RCA developments and designs were manufactured by other companies because we had not the manufacturing capacity to handle all the fruits of our research and engineering. In these matters we have trained and guided other companies, our nominal competitors, in their production.

RCA has for several years maintained flight laboratories with several aircraft for experimentation and test of equipment and systems. The present location of our flight laboratories is at Wings Field, Pennsylvania, where four RCA-owned aircraft are constantly in use, as well as chartered or loaned aircraft for special purposes.

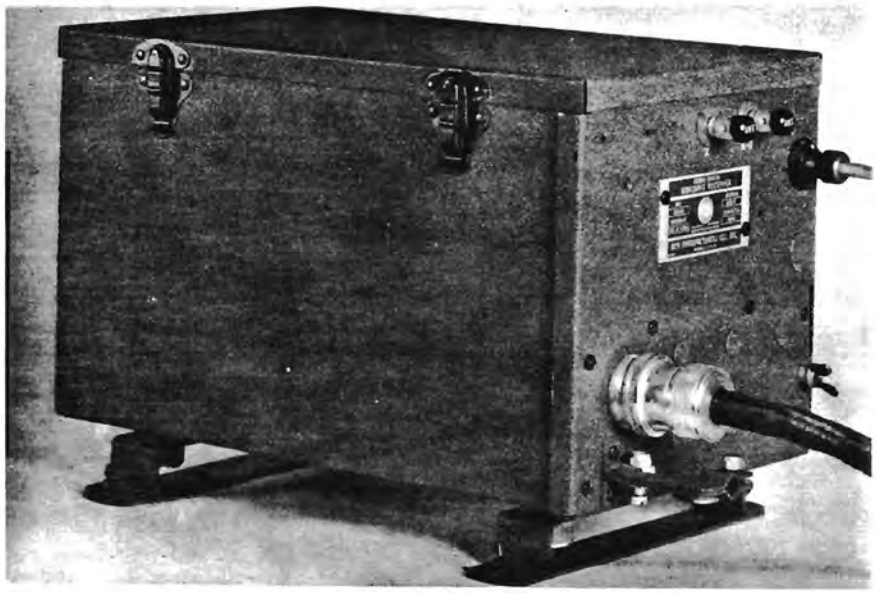
In the last four years, RCA has entered the field of civil aviation with new designs of equipment for airways navigation based on the current North American system. Extensive experience has been had with almost all forms of secret military navigational systems, some of which are now being considered for adoption internationally for post-war world-wide airways. Our plans for the future include the design and production of all types of radio facilities for long range and short range navigation, airport traffic control and air-ground communication following the specifications now under international consideration for such purposes. It is of interest to note that the RCA VHF omni-directional radio range, developed and proposed in 1937, is now under consideration as a navigational facility for international use and its development is currently being pursued by the U. S. Civil Aeronautics Administration for this purpose.

We also contemplate taking an important part in the supplying of instrument landing equipment for airports now that specifications for these facilities are quite well stabilized. We expect to start the design of instrument landing equipment in the near future.

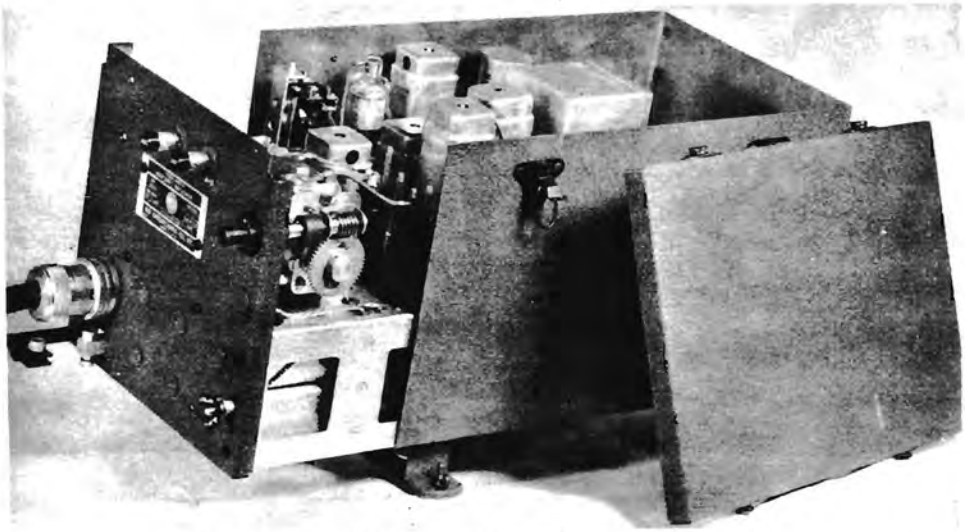
Our Airborne equipment program for the post-war period is already planned to include all the types required for use in conjunction with the new international airways facilities for navigation and communication for long-range and short-range operations, and for large and small aircraft.

Our future international plans include also the engineering consulting and supervisory services necessary to assist other nations to provide airways radio facilities in accordance with the standards specified by international agreement.

The program outlined above will advance as rapidly as standardization of specifications internationally takes place, and will involve a large amount of engineering work before it is complete. With but a few exceptions, the new facilities will employ new frequency allocations and techniques for civil aviation, all of which require new equipment designs. It will take several years to execute this whole program, but its urgency will insure its active prosecution. We are maintaining close contact with international progress in system standardization as well as the developments carried out for this purpose by the various Governments.

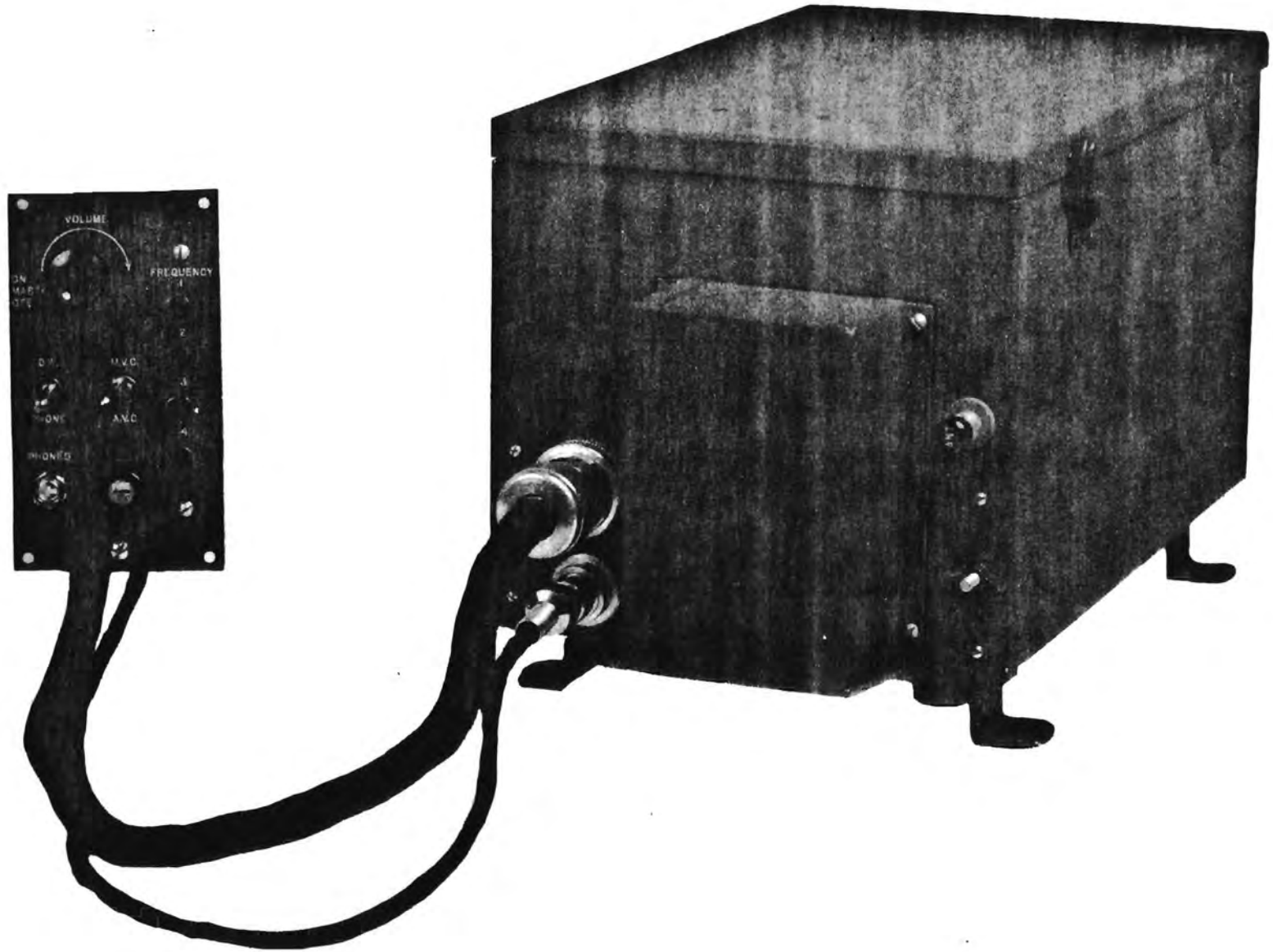


AIRCRAFT RECEIVER UNIT MODEL AVR-7H

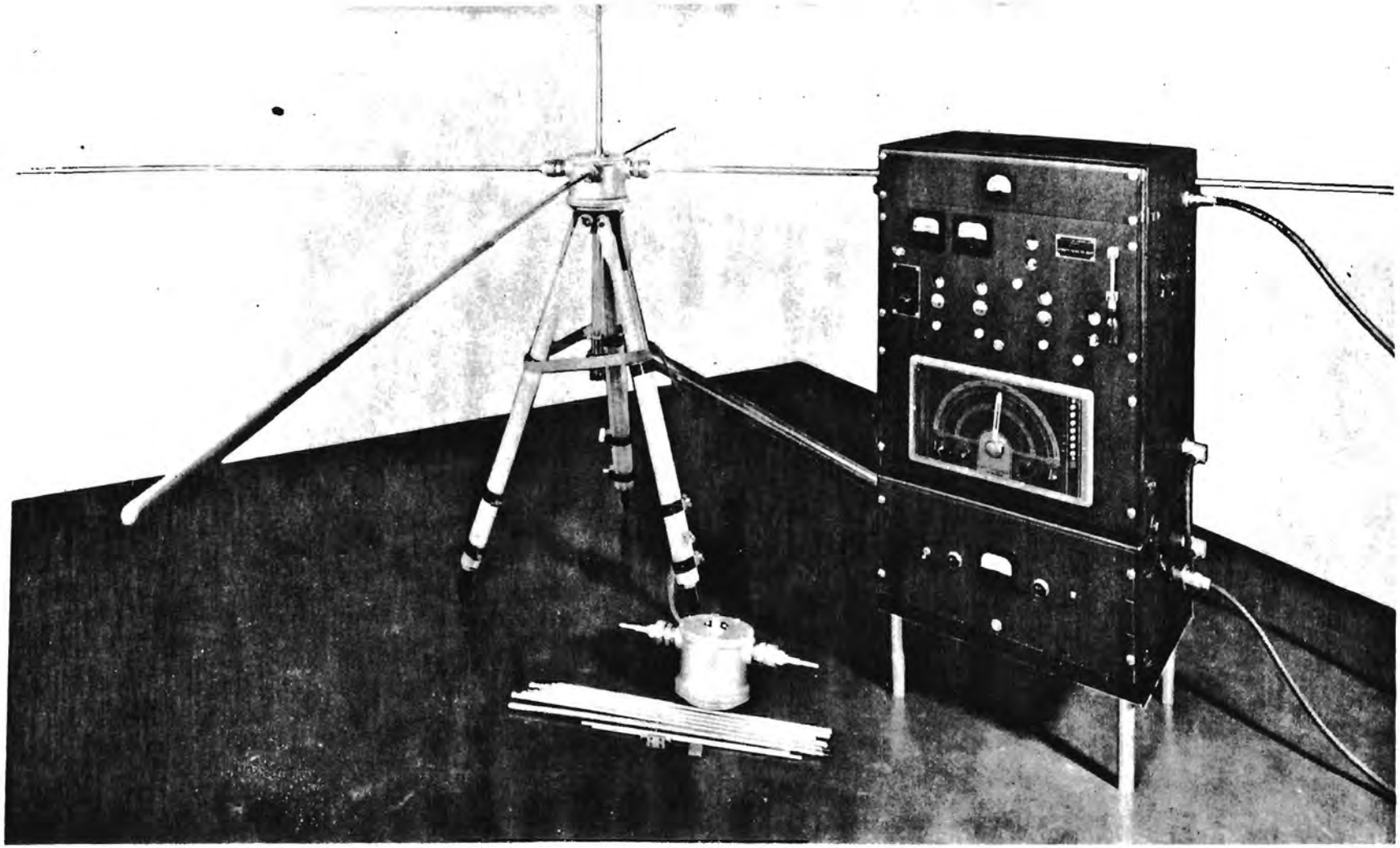


SHOWING CASE ASSEMBLY OF AVR-7H

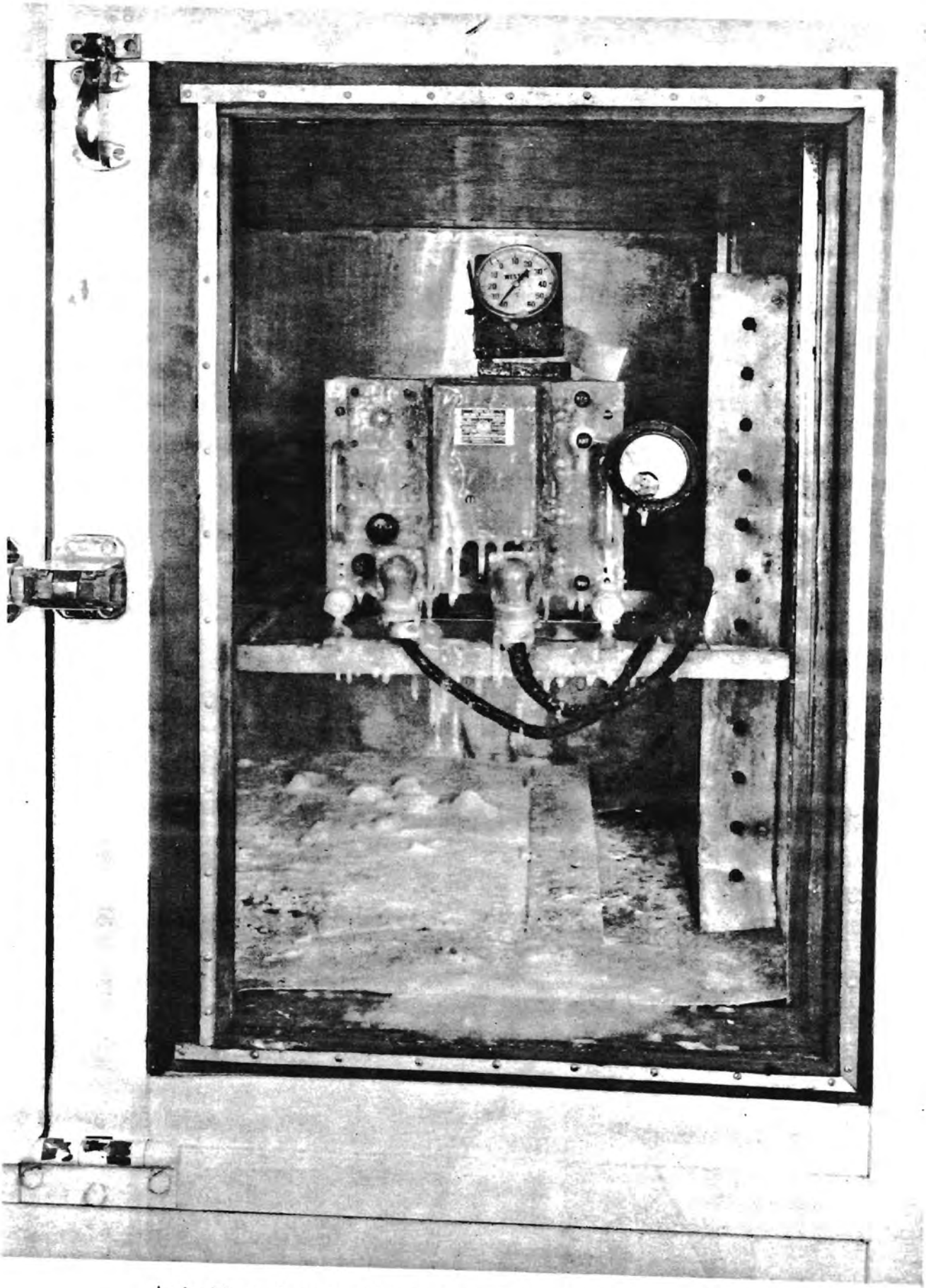
AIRCRAFT RECEIVER COMPLETE WITH CONTROL PANEL AND CABLES AVR-7H



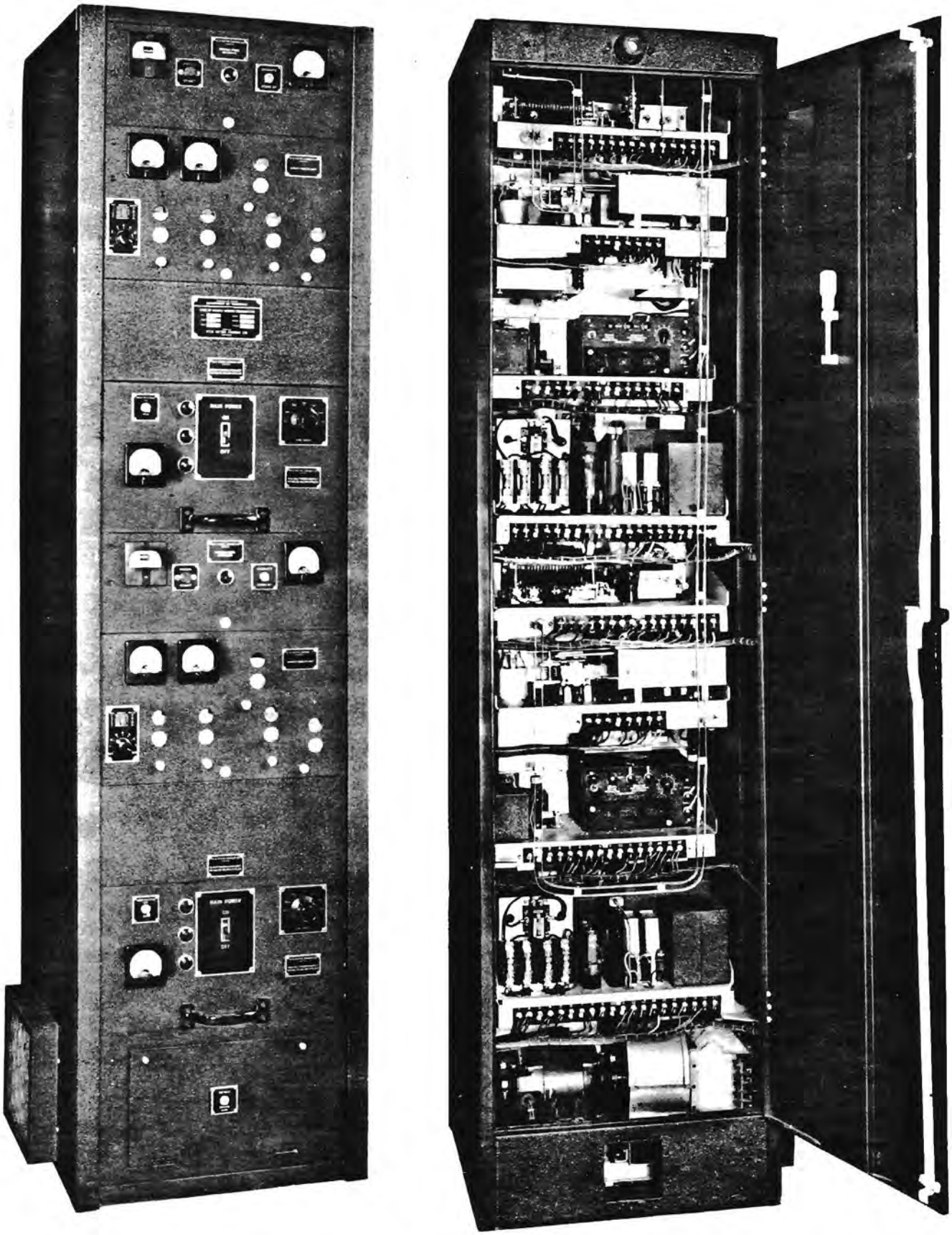
AIRCRAFT RADIO RECEIVER FOR COMMERCIAL AIRCRAFT. AVR24



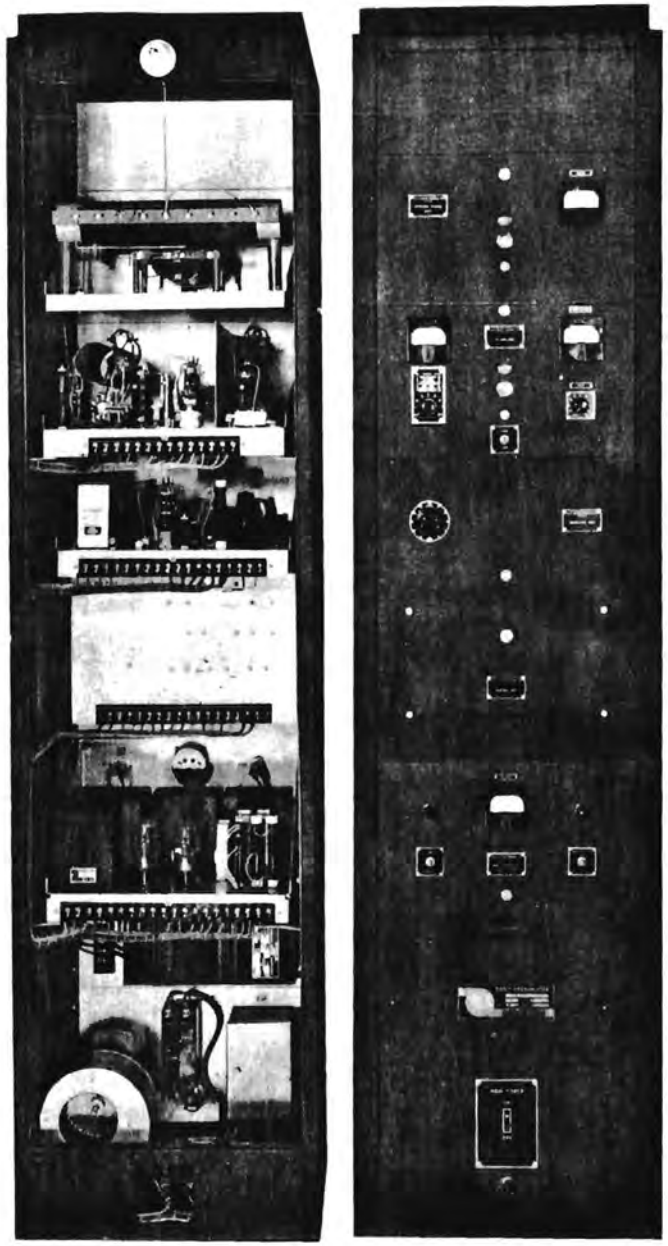
PORTABLE 10-WATT 75 MC. RADIO TRANSMITTER AND
ANTENNA FOR AIRWAYS MARKER SITE-SURVEYING



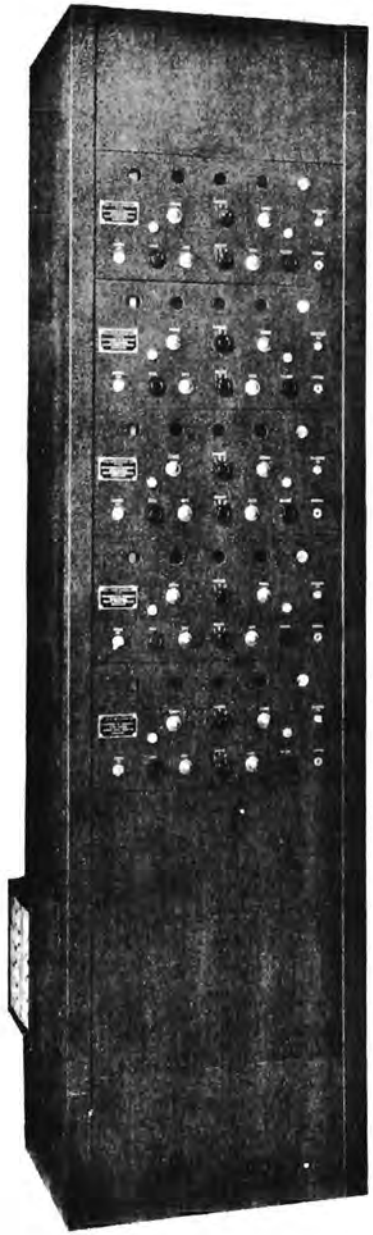
Aviation transmitter being tested at -40° C.



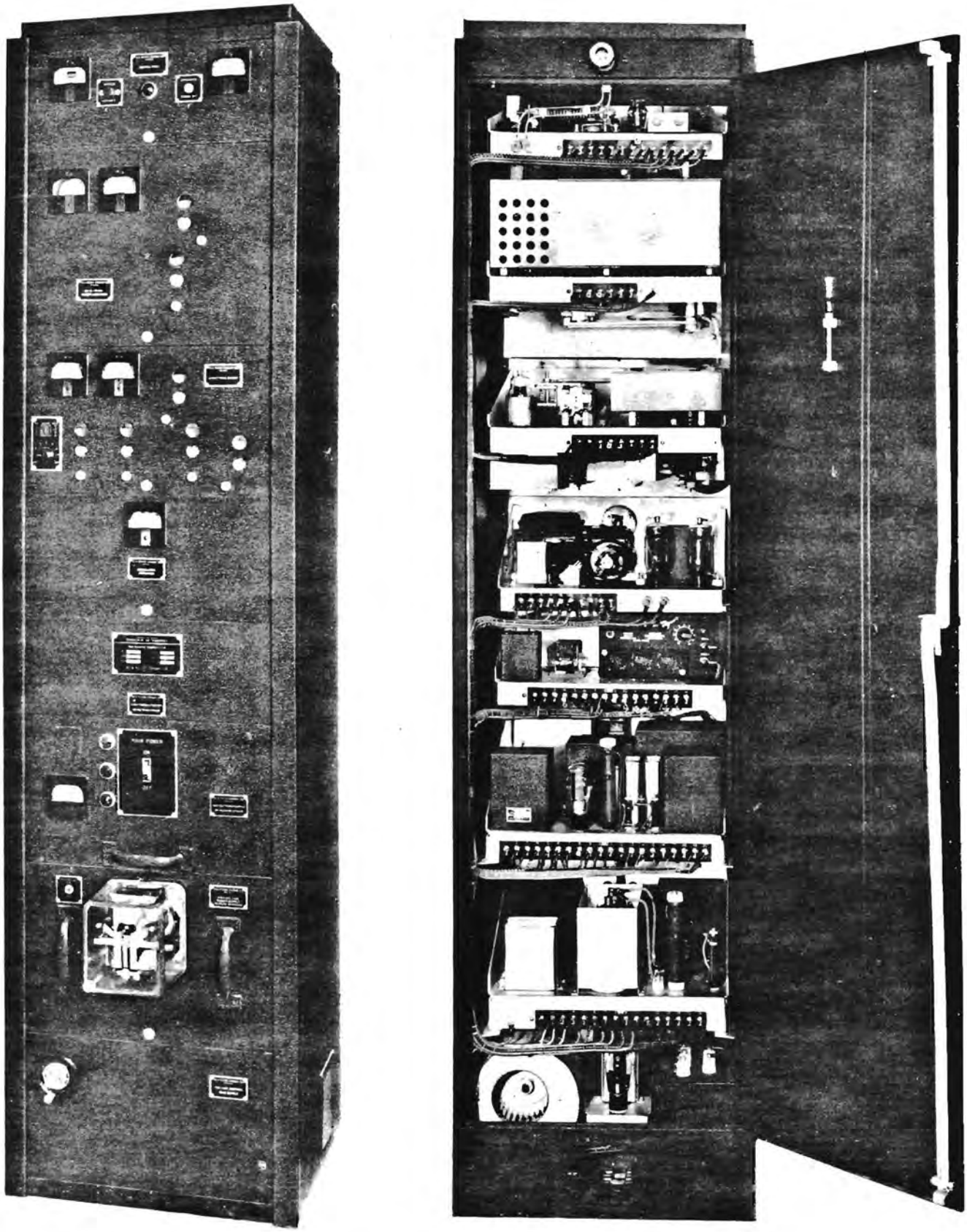
CONE OF SILENCE MARKER TRANSMITTER FOR AIRWAYS USE. TE 113



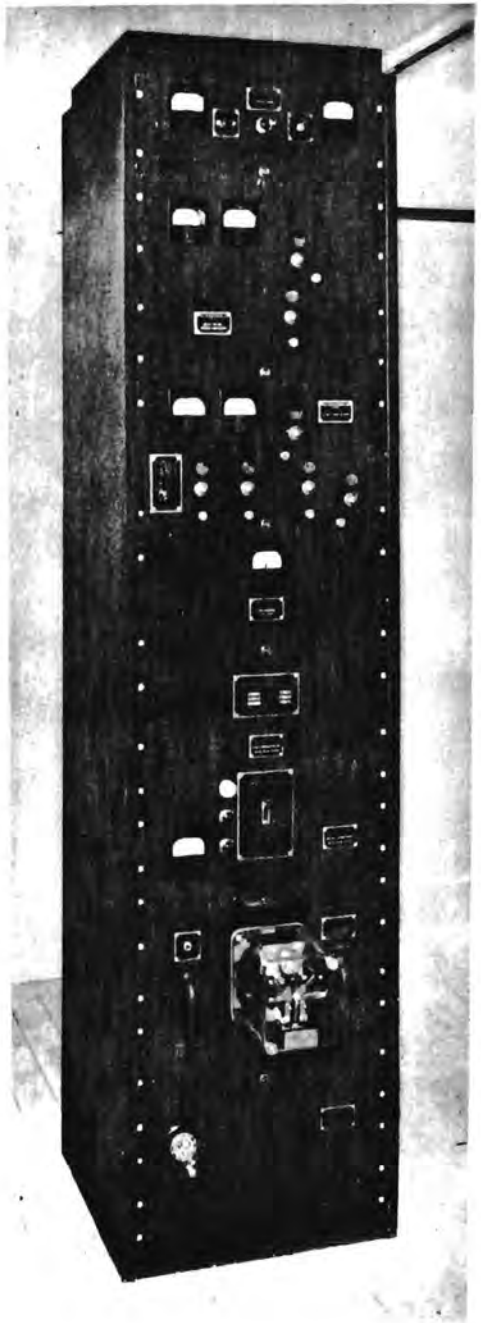
REAR AND FRONT VIEWS OF TE 141A.
AIRPORT TRAFFIC CONTROL TRANSMITTER.



5-CHANNEL REMOTE-CONTROLLED
AIRPORT TRAFFIC CONTROL RECEIVER. TE 141C

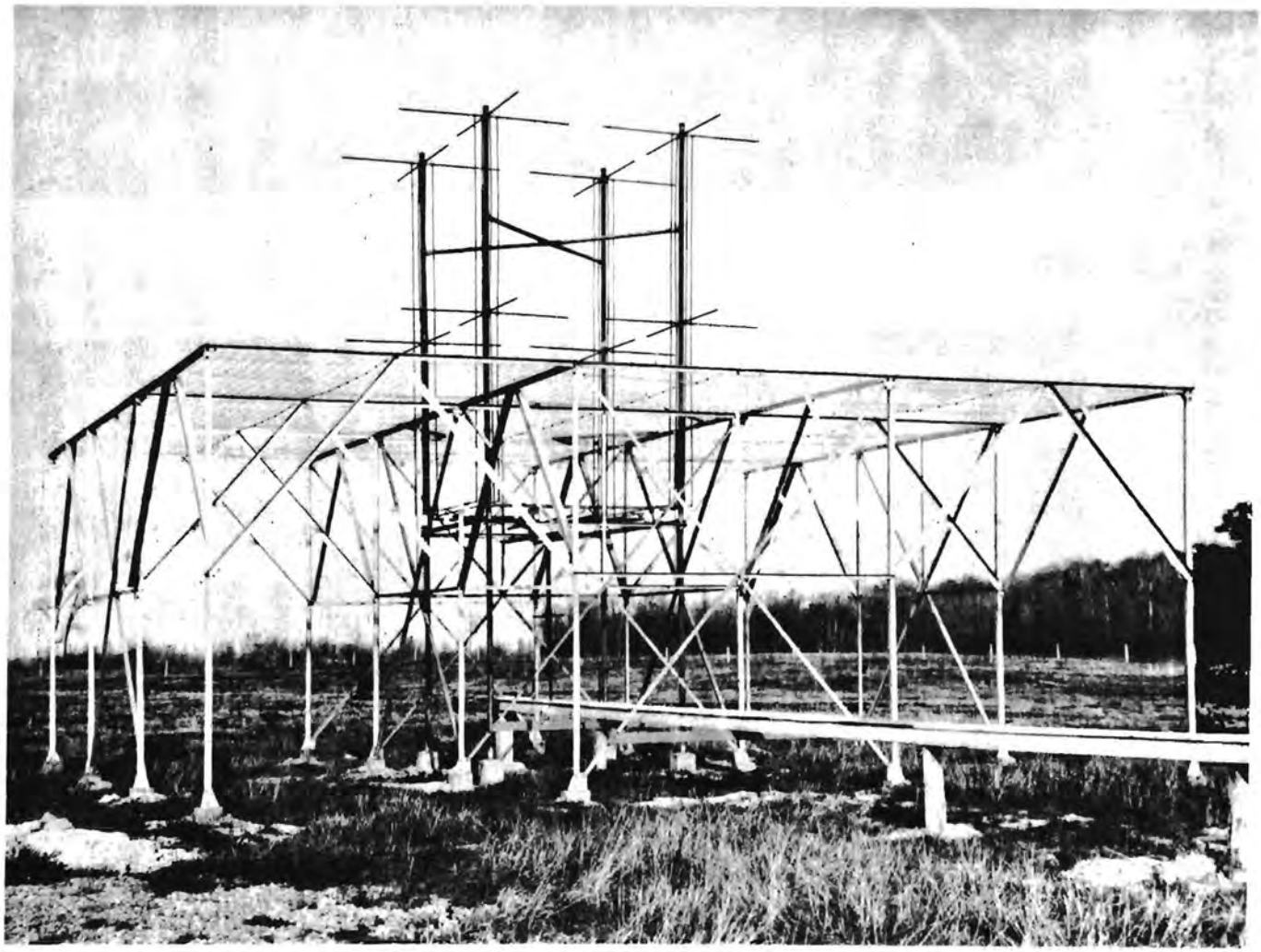


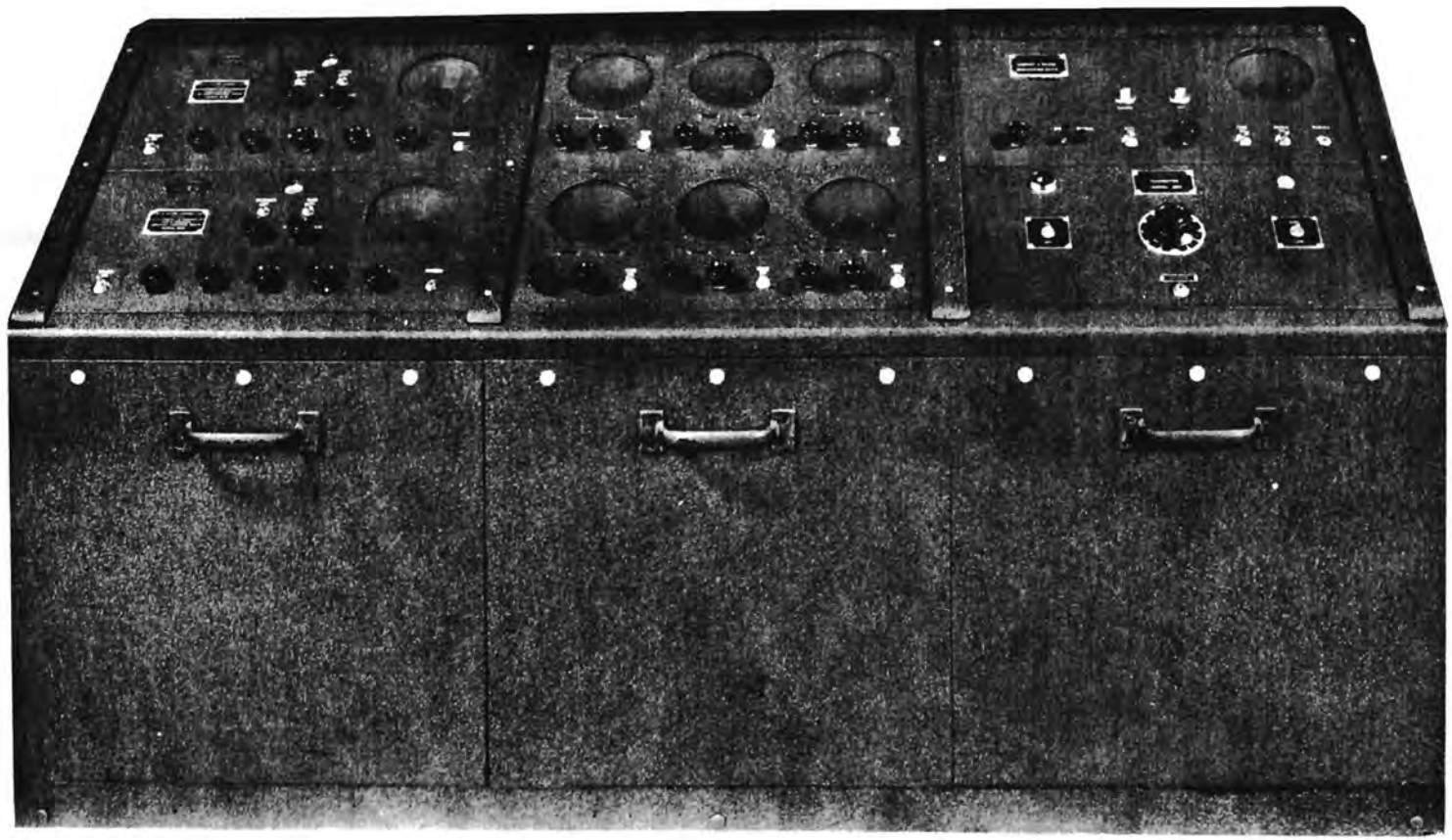
FAN MARKER TRANSMITTER 100 WATTS
75 MC. FOR USE ON AIRWAYS. TE 114



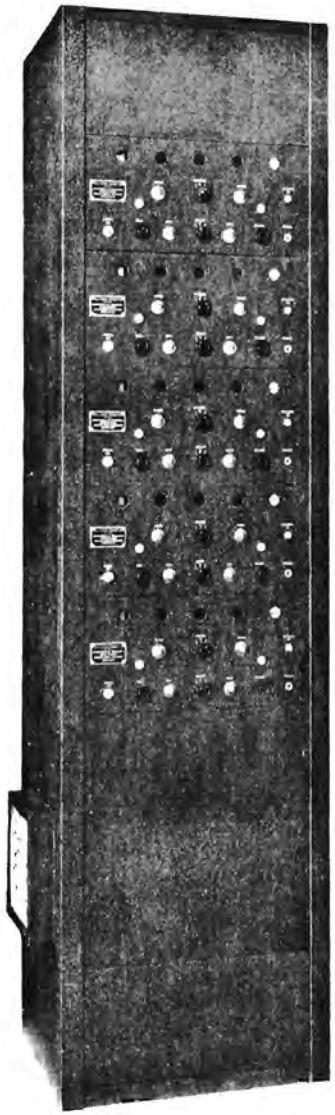
TE114
FAN-MARKER TRANSMITTER
AS USED ON CANADIAN
AIRWAYS

CONE MARKER ANTENNA
SYSTEM FOR AIRWAYS
POSITION MARKING

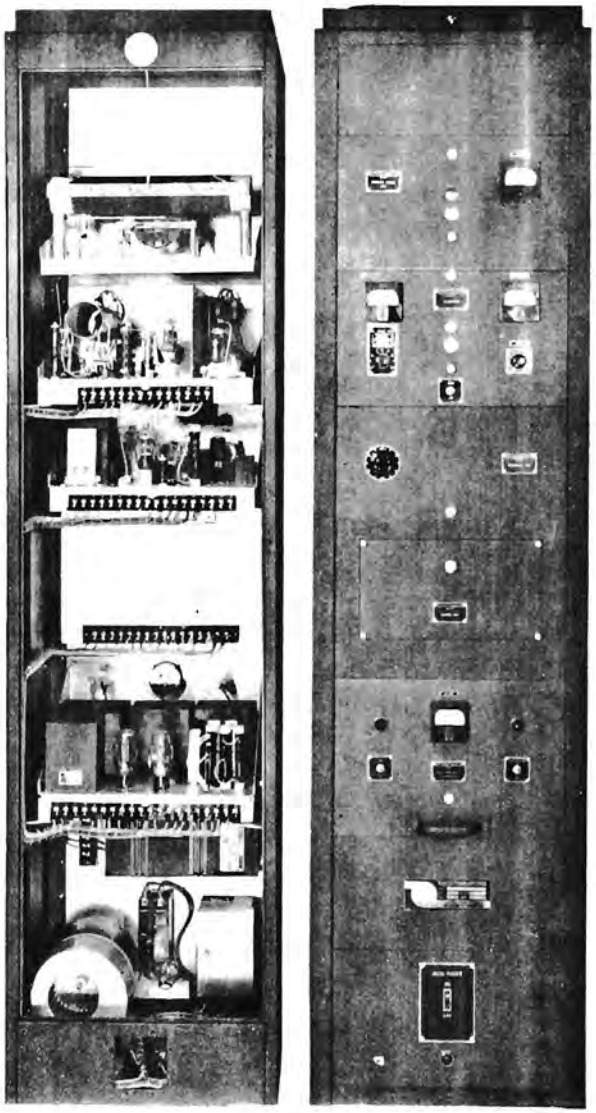




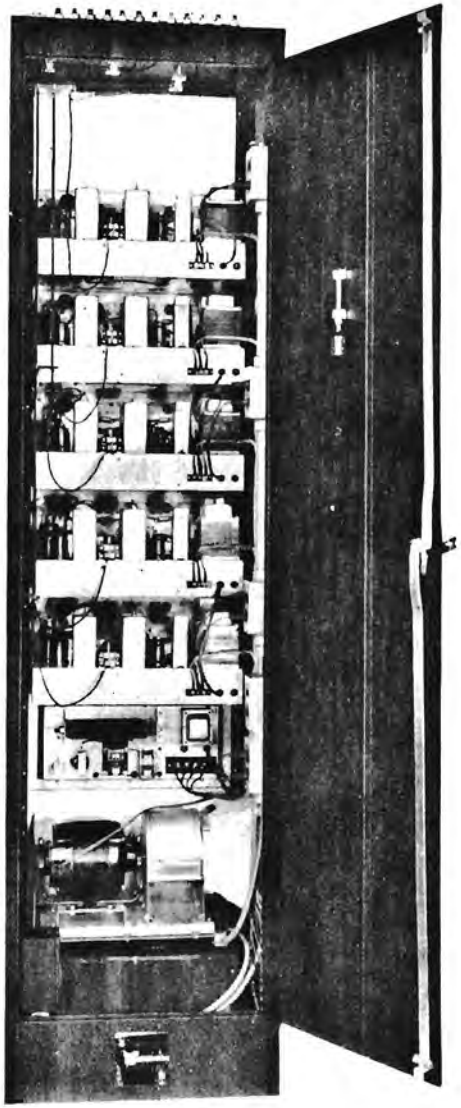
SUPERVISORY CONSOLE FOR TE 141 AIRPORT TRAFFIC CONTROL SYSTEM AS INSTALLED IN AIRPORT CONTROL TOWER.



TE141 B
MULTI-CHANNEL AIRPORT
TRAFFIC CONTROL RECEIVER
(Remote Controlled)



FRONT AND REAR VIEWS OF
TE141 A AIRPORT TRAFFIC
CONTROL TRANSMITTER

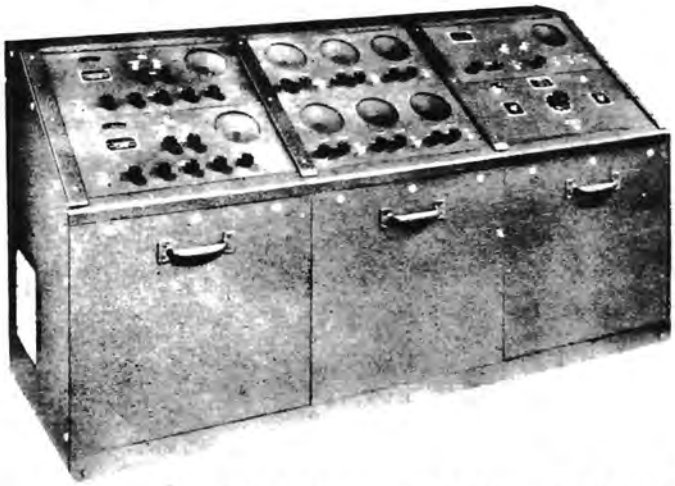


REAR VIEW OF TE141 B
MULTI-FREQ. AIRPORT
TRAFFIC CONTROL RECEIVER

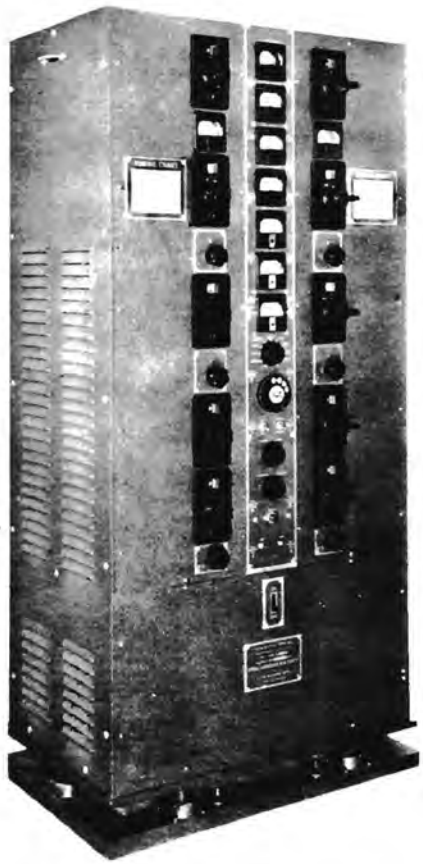
1 - TE141A AIRPORT TRAFFIC CONTROL TRANSMITTER AND

2 - AT3 COMMUNICATIONS TRANSMITTER FOR SERVICE AT AN AIRWAYS COMMUNICATION STATION

REMOTE CONTROL UNIT FOR AT3 TRANSMITTER



SUPERVISORY CONTROL CONSOLE TE141 E FOR AIRPORT TRAFFIC CONTROL SYSTEM AS USED IN AIRPORT CONTROL TOWER



RCA AT3 GENERAL COMMUNICATION 300 W 2 CHANNEL HF TRANSMITTER