

U. S. DEPARTMENT OF COMMERCE  
RADIO DIVISION

ANNUAL REPORT OF THE  
CHIEF OF RADIO DIVISION

TO THE

SECRETARY OF COMMERCE

FOR THE FISCAL YEAR ENDED JUNE 30, 1930

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U. S. DEPARTMENT OF COMMERCE

R. P. LAMONT, Secretary

RADIO DIVISION

W. D. TERRELL, Chief

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UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1930

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# RADIO DIVISION

DEPARTMENT OF COMMERCE,  
RADIO DIVISION,  
*Washington, July 1, 1930.*

The honorable the **SECRETARY OF COMMERCE.**

**DEAR MR. SECRETARY:** In response to your request I furnish the following condensed report of the work of the radio division during the past fiscal year, including references to related developments which have taken place during that period.

## LEGISLATION

In an act approved December 18, 1929, Congress extended the administrative control of the Federal Radio Commission over radio communication until such time as may otherwise be provided for by law.

Senate Joint Resolution 176 was introduced on May 12, 1930, providing for the transfer of the functions of the radio division of the Department of Commerce to the Federal Radio Commission. This resolution was passed by the Senate. A favorable report was made on the resolution by the Merchant Marine and Fisheries Committee of the House, but no further action has been taken on the measure.

House Joint Resolution 337 was introduced on May 19, 1930, and referred to the Committee on Merchant Marine and Fisheries. No report was made on the resolution by the committee. This resolution provided for the transfer of the functions of the radio division of the Department of Commerce to the Federal Radio Commission.

House bill 12948, transferring the functions of the Federal Radio Commission to the radio division of the Department of Commerce, was introduced June 13, 1930, and referred to the Committee on Merchant Marine and Fisheries.

On April 18, 1929, Senate bill 6 was introduced. This bill provides for the regulation of the transmission of intelligence by wire and wireless; the creation of a commission on communications to take over the present duties of the Federal Radio Commission, the radio division of the Department of Commerce, and related duties now under the jurisdiction of the Interstate Commerce Commission. This measure was referred to the Committee on Interstate Commerce, where extensive hearings were held. As a result of these hearings the provisions of this bill are now being revised.

## RADIO INSPECTION SERVICE

Although greater demands are made upon this service each year and the surveys require more time because of the larger and more complicated radio installations on ships, the percentage of inspections as compared with clearances has not diminished. In 1926

there were 13,009 clearances and 9,197 inspections. In 1929 there were 15,023 clearances and 10,715 inspections. In 1930 there were 15,595 clearances and 11,334 inspections. As the radio installations on the ships included in the above figures are required by law as a safeguard against loss of life, a larger percentage of inspections should be made. The estimates for the 1932 appropriation will provide for the establishment of inspection offices at the following ports: Miami, Fla.; Savannah, Ga.; San Juan, P. R.; and Galveston, Tex., from which ports a considerable number of ships are clearing without inspection. During the last fiscal year new offices were established at Portland, Oreg., and Denver, Colo. It was planned to establish new offices in Hawaii and Alaska this year, but this may not be possible because of the increasing work at existing offices.

Of the 2,173 American vessels equipped with radio, only about 10 per cent of them come under the provisions of existing law, the remaining 90 per cent, which are voluntarily equipped, should receive more inspectional attention. Inspections developed 382 defects in the radio installations on ships during the year and these were remedied before the vessels departed. During the previous year there were 335 such defects reported.

Examinations were given 5,363 applicants for commercial operators' licenses and 3,993 applicants for amateur operators' licenses as compared with 3,477 commercial operators and 3,173 amateur operators during the previous year. There were 1,287 inspections made of ship stations for license as compared with 1,102 the previous year. Inspection of land stations during the past two years increased from 1,154 to 1,897. Inspections were made of 251 amateur stations as compared with 229 the previous year.

Undoubtedly more attention should be given to the inspection of broadcasting and other stations on land. Such inspections would develop much information of value to the Federal Radio Commission to guide it in determining its action on applications for renewal licenses, hearings, etc. Many of the unlicensed stations reported to be in operation would be discovered during these inspections, and other violations might be detected. This extension of activity will necessitate increased personnel. It is obviously not possible to accomplish this with the present force, which has worked 10,003 hours overtime during the past year.

During the year 1929, 1,075 inspection trips were made and 372 cities visited, while in 1930, 1,577 inspection trips were made and 534 cities visited.

#### RADIO TEST CARS

#### PURCHASE OF ADDITIONAL CARS

Orders have been placed for two additional test cars for use in the Boston and Seattle districts. When they are delivered each district, with the exception of New York, will be supplied with a test car. As a result, much radio-inspection work which would be impossible of accomplishment can be performed expeditiously and efficiently. Some years ago almost all of the radio-inspection work was centered around the large seaports. To-day it extends to every city of importance and many of the small towns throughout the country. This wide distribution of activity necessarily requires a

larger force of inspectors, better traveling facilities, and transportation of more apparatus. The use of test cars materially aids in coping with the increasing demands made upon the division.

#### MOBILE STANDARDS ON RADIO TEST CARS

Owing to the large number of broadcast and other stations sharing channels of operation throughout the United States, very serious heterodyne interference is constantly experienced. With many stations operating on the same channel, it is obviously not possible to make measurements of frequency at remote points on any of these stations. In order to handle such a situation, the six radio test cars in service are being equipped with mobile secondary standards of frequency. The cars will travel continually through the districts, measuring the frequencies of the stations that are of low power and are on heterodyne channels. In this way it is hoped to reduce materially the interference experienced on national and regional channels in the broadcast band, and to make sure that stations remain within their assignment.

It is expected that all of the mobile units will have been installed and will be in operation by November 1.

#### FIELD-STRENGTH WORK

The radio test cars are equipped with field-strength measuring apparatus. During the past year there were a number of field-strength studies made on radio broadcast and other types of transmitting stations. These studies were made to determine the reliable service area about the station and whether the station was using the amount of power authorized by the Federal Radio Commission. With this apparatus it is possible to measure the power of a transmitter without going to the station to make an inspection.

During the past year a number of studies were made with the field-strength sets on the test cars to determine the ratio of signal strength between harmonics and the assigned fundamental frequency. Several such studies were made for Government agencies to determine whether the transmitting apparatus they were planning to purchase complied with the specifications covering the amount of permissible harmonic energy radiated.

It is believed that if the power of broadcast stations were assigned on the basis of field-strength studies considerable good would result, and in many cases the power of stations might be increased or reduced with beneficial results to the public. During the coming fiscal year it is planned to survey many of the broadcast stations and to make measurements of parasitic radiations which are known to be causing serious interference with high-frequency stations.

#### MONITORING BROADCASTING STATIONS

Monitoring work during the past year has been confined almost entirely to broadcasting stations. The apparatus in use, which was designed and built by men in the service, has a limited frequency range which does not extend much above or below the broadcasting band—550 to 1,500 kilocycles. During the year 45,695 frequency measurements were made. Of this number 44,923 were of broadcasting

stations, 302 of stations other than broadcasting, and 470 of stations in foreign countries. The number of stations involved in these measurements were 380 broadcasting, 174 other than broadcasting, and 30 foreign stations. There were 1,020 measurements made showing deviations of 500 cycles or more from the frequency assigned to the stations. Of this number there were 344 measurements showing deviations from 1,000 cycles to 5,000 cycles, 16 measurements showing deviations from 5,000 cycles to 10,000 cycles, and 22 measurements showing 10,000 cycles or above. Last year 22,450 measurements were made and of this number there were 2,451 deviations of 500 cycles or more. This marked improvement in frequency stability is evidence of the efforts being made by station operators to improve the efficiency of their stations in this respect, together with the increased monitoring work done by the field force.

During the coming year the new monitoring apparatus will be in use. Then it will be possible to measure all the usable frequencies and a much greater number of stations. To get full benefit of this new apparatus and to meet the demands made for measurements of commercial and Government stations, a considerable increase in personnel is essential.

#### CONSTANT-FREQUENCY MONITORING STATION

For a number of years supervisors of radio have been seriously handicapped in the work of enforcing the radio-communication laws, and in many cases have been unable to carry out the requests of the Federal Radio Commission, due to the lack of proper apparatus, or due to the lack of apparatus capable of measuring the frequencies of transmitting stations with a high degree of accuracy. With the apparatus in use in the past there was always some doubt as to just what degree of accuracy of measurement was obtained, and it was difficult, if not impossible, for the various offices to check their measurements with one another. This condition led to a survey by the supervisor of radio at Detroit, Mich., of the methods used in making highly accurate frequency measurements. The views of many of the foremost radio engineers were obtained.

It was determined that the proper method to pursue in monitoring all classes of radio-transmitting stations in the United States and its possessions was to erect, somewhere in the approximate geographic center of the country, buildings in which to house the delicate frequency-measuring apparatus, and the sensitive radio receivers. It was essential that this site be well removed from manufacturing centers, telephone and telegraph lines, high-voltage transmission lines, and other possible sources of interference with reception. A site approximately 7 miles west of Grand Island, Nebr., comprising 50 acres of land in the form of a square, was finally obtained, without cost to the Government. The selection of this site was made only after careful investigation of reception conditions in the States of Kansas, Missouri, Nebraska, Iowa, and Illinois. At this location there is little or no man-made interference, and stations in foreign countries, as well as transmitting stations in continental United States, were regularly received without difficulty.

The 50-acre site selected is a quarter of a mile north of the Lincoln Highway, on level, sandy, prairie land. There are no telephone,

telegraph, railroads, power lines, or residences within 3 miles of the site.

In addition to the two buildings it was necessary to install a sewage-disposal system, a water-supply system, and an electric-light plant. Fear was felt that through use of local power lines interference from devices operating on the power line many miles away would be conducted onto the reservation and picked up by the receivers. In investigating many of the complaints in 1927 it was found that inductive interference on high-voltage power lines was frequently carried 75 or 100 miles. With a local power plant and the placing of all power and telephone cables underground adequate protection against this type of interference is assured and the station is entirely independent of any outside source of power.

To be assured of 24-hour reception every month in the year special antennæ were constructed for the reception of all radio stations operating between the frequencies of 60,000 and 10 kilocycles. These special antennæ were necessary so that measurements could be made when static during the summer season was especially severe, and when, with an ordinary type of antennæ it would be impossible to do frequency-measuring work. Four antennæ of the multiple-doublet type were erected on the reservation and cover the high-frequency bands. This type of antenna is especially directive. They were so arranged that two of them point to London, England, for use in the reception of high-frequency stations in eastern United States and Europe, and two similar antennæ are pointed to Porto Allegro, South America, for the interception of high-frequency stations in southern United States, Central America, West Indies, and South America.

For the reception of broadcast stations and other services operating within the intermediate-frequency bands, a special antenna of the directive type, known as a "Beverage" was erected. This antenna points to New York City and is intended to receive broadcast and other stations in the United States. Later it is hoped that a similar type of antenna can be erected pointing in a westerly direction to San Francisco for the interception of broadcasting and other stations on the west coast. In addition to the antennæ just described, four single doublets, one vertical, and one general purpose antennæ were constructed for general all-around reception. It was not intended that they would have any highly directive properties. These antennæ are for the interception of high-frequency stations. For the interception of signals on frequencies between 200 and 10 kilocycles two large loops, at right angles, 250 feet long and 40 feet high, on a side, were erected. With this loop it is intended that reception of low-frequency stations throughout the United States and the world will be possible.

All antennæ referred to above are suspended on 60-foot cedar poles, and all—excepting the loop and general-purpose antennæ—are located a considerable distance from the buildings, out in the open. Signals are brought from these antennæ to receivers through long, 4-wire transmission lines which have been especially constructed with great care and precision.

Temporary power facilities in the form of three 2-kilowatt Kohler lighting plants were arranged for with the airways division of the Bureau of Lighthouses. With this temporary power equipment in position for service, it was possible to begin the installation of the radio



receivers, storage batteries, standards of frequency, and other equipment. This work has been pressed as rapidly as possible, and the receiving equipment is now 80 per cent installed.

The apparatus installed consists of one standard of frequency having an accuracy of one part in a million, and one secondary standard having an accuracy of one part in a hundred thousand. In addition to these two standards there are, at the present time, a total of five receivers. Two of these receivers operate on a frequency of 30,000 to 1,500 kilocycles, two operate on frequencies from 1,500 to 100 kilocycles, and one receiver operates on frequencies from 100 to 10 kilocycles. With these receivers it will be possible to measure all of the usable radio frequencies in the spectrum.

During tests of the apparatus while being installed, over 300 broadcast stations were received, as well as a number of other services in continental United States. In addition to this, reception of stations in Chile, Canada, Cuba, Portugal, France, England, Philippine Islands, Hawaii, Argentine, Peru, Netherlands, Brazil, Panama, Costa Rica, Nova Scotia, Russia, and many other places in the world are regularly recorded.

The monitoring of stations operating on the frequencies which can be measured by this station will cover the following classes of service: Transoceanic; telegraph and telephone; marine, operating on high, low, and intermediate frequencies; marine coastal; aircraft; aircraft ground stations; various point-to-point services; broadcasting; amateur; television; and facsimile.

The two buildings are of brick and concrete construction, and were finished and finally accepted by the Government in March of this year. Efforts are being made to have the station in full operation by November 15, 1930.

### SECONDARY STANDARDS OF FREQUENCY

To supplement the frequency-measuring work to be done by the station at Grand Island, Nebr., nine secondary standards of frequency stations are being installed at the following places: Boston, Mass.; Baltimore, Md.; Atlanta, Ga.; New Orleans, La.; Los Angeles and San Francisco, Calif.; Portland, Oreg.; Chicago, Ill.; and Detroit, Mich. While these secondary standards of frequency will have neither the range nor the accuracy of the station at Grand Island, with them it will be possible to monitor or measure the frequency of many of the stations in those particular areas.

The apparatus at the office of the supervisors of radio at Boston, Chicago, and Baltimore are installed and in operation. The installations at Detroit, Atlanta, and New Orleans will be completed within the next 60 days, and by November 1 all of the secondary standard installations at the places enumerated above will be installed and in operation.

### RADIO FOR AVIATION

During the past year considerable thought has been given to types of radio apparatus suitable for use on airplanes and the qualifications which should be possessed by radio operators on planes.

Several of the air transport companies have established and operate their own two-way communication service between ground and

plane along their respective routes. Licenses have been issued to 66 aeronautical stations and construction permits have been issued for 23 more which will make 89 aeronautical stations in operation within a short time. Last year there were 97 planes equipped with apparatus not including planes of the Army and Navy. Now there are 215 planes so equipped.

In order that life may be properly safeguarded the radio apparatus on passenger-carrying planes should receive the same attention as is now given to the radio equipment on merchant vessels.

#### **RADIOBEACONS AND RADIO COMPASSES**

Installation of radiobeacons and radio compasses continues to increase. There are in operation now 26 radiobeacons on the Atlantic coast, 18 on the Pacific coast, 7 on the Gulf coast, and 29 on the coast of the Great Lakes, a total increase for the year of 15. In other countries there are a total of 80 beacons, as compared with 57 the previous year.

Radiocompasses are now in use on 832 commercial vessels under the United States flag, an increase of 114 during the year, and on United States Government vessels there are now 436 as compared with 375 last year, making a total of 1,268 on vessels of the United States. There are 2,285 foreign vessels so equipped as compared with 1,942 last year.

#### **AUTOMATIC ALARM SIGNAL DEVICE**

During the year 755 inspections were made of vessels equipped with automatic alarms which are being used on foreign vessels, mostly British. Reports were made to the division that the device had responded 1,210 times to signals not intended to actuate the apparatus.

Last year the Coast Guard purchased two sets of this apparatus. Arrangements are being made to install one of these sets on a vessel on the Great Lakes where it can best be subjected to practical tests to determine its efficiency.

The Radiomarine Corporation is developing an alarm device which it is hoped will be ready for practical tests on the Great Lakes before this year's navigation season closes.

#### **RADIO COMMUNICATION**

During the year there has developed an increased demand for additional radiotelephone facilities both for international communication between this country and Europe and for communication with ships. The latter is a new service which, according to present indications, will grow to a considerable extent. Large ocean liners are now being equipped with radiotelephone apparatus as an additional convenience for the ocean traveler. Such equipment provides a means for conversation from ship to ship or ship to home or office on land.

#### **POLICE RADIO**

There is an increasing realization of the value of radio as used in connection with police work, both State and municipal. New York

City obtained a limited commercial station license in 1920 which authorized emergency communication with the police-patrol boat. Since early in 1922 the Pennsylvania State Police Department has made use of radio for quick point-to-point contact and later broadcasting police information. The Detroit Police Department used a broadcasting station as early as 1922. Since 1925 Dallas, Tex., has used a broadcasting station for contact with both the police and fire departments. In 1929 there were 12 police-broadcasting stations. There are now 20 such stations licensed; construction permits have been issued for 25 more, and 3 applications for construction permits are pending.

#### AMATEURS

After 18 months' operation under the restricted wave bands imposed by the Washington treaty of 1927, the amateurs are operating as satisfactorily as could be hoped for, considering the great number of amateur stations in these narrow bands. This is due, for the most part, to improved technical methods and apparatus devised particularly to meet the new conditions. Amateurs show increasing technical skill. Amateur voice transmission on high frequencies was given impetus by the opening of the band from 14,100 to 14,300 kilocycles for telephony as well as telegraphy. Numerous stations have effected satisfactory international telephony. Many of the better radiotelegraph stations have been in communication with upwards of 70 countries. There is an increasing interest in the investigation of the communication possibilities of the ultrahigh frequencies above 28,000 kilocycles.

Amateurs of the United States have long been noted for their excellent self-policing. In this connection it is interesting to note the establishment of an organized nation-wide, standard-frequency system to make available to amateurs, both in this country and abroad, calibration signals of known frequency, to aid amateur stations in keeping within their allotted bands. Three stations, transmitting on regular schedules, have been set up in laboratories at South Dartmouth, Mass., Elgin, Ill., and Los Angeles, Calif. The Elgin and Los Angeles installations are equipped with secondary-frequency standards checked by the Bureau of Standards; the South Dartmouth installation possesses a primary standard. The American Radio Relay League states that all transmissions are accurate to more than 0.01 per cent; measurements of the South Dartmouth transmissions indicate an accuracy for that station of approximately 0.001 per cent. This standard-frequency system is part of a program instituted by the league for an increased appreciation of frequency precision and accuracy of control by amateur operators; its good effects are already apparent.

Amateur cooperation with expeditions continued on an increased scale; there were also additional instances of cooperation with civil authorities in local storm emergencies. The pursuit of amateur radio continues to constitute a valuable training school for skilled radio personnel for industry and the art generally. The amateurs' record of public service, their spirit of cooperation, and their demonstrated national value have continued to justify the policy of this Government toward them.

During the year there was an increase of 2,165 amateur stations. This is the largest year's increase since 1922. Last year there were 16,829 licensed amateur radio stations. There are now 18,994. In 1920 there were 5,719 amateur stations.

### PERSONNEL

The division's personnel is inadequate to perform promptly and completely the duties imposed upon it. For the next fiscal year a larger appropriation is being requested to remedy this condition. In the field force there are 9 supervisors, 68 inspectors, and 57 clerks assigned to 20 offices. Estimates for next year contemplate the employment of 9 supervisors, 121 inspectors, and 75 clerks, and the establishment of 6 additional offices.

### INTERNATIONAL CONFERENCES

The International Radiotelegraph Convention of Washington, 1927, established an international technical consultative committee for radio communications for the purpose of studying technical and related questions having reference to these communications. Its function is limited to giving opinions on the questions submitted by the participating administrations or private enterprises and to which it has given study. The first meeting of this committee was held at The Hague, Netherlands, in September, 1929, and was attended by representatives of the United States. Preparations are being made to submit proposals for consideration at the next conference to be held at Copenhagen, Denmark, May 26 to June 6, 1931.

The International Radiotelegraph Bureau at Berne, Switzerland, has notified all administrations to prepare propositions concerning the International Radiotelegraph Convention and the two sets of regulations (general and additional) annexed thereto, in preparation for the conference to be held in Madrid, Spain, in 1932.

### INTERNATIONAL RADIO ACCOUNTING

The activities of the accounting section of the radio division in the settlement for international radio tolls during the fiscal year may be summarized as follows:

Number of accounts handled:	
On hand July 1, 1929.....	756
Received during year.....	924
Total.....	1,680
Settled and cleared.....	1,111
Accounts on hand and unsettled June 30, 1930.....	569
Financial operations required to complete activities summarized:	
Cash balance July 1, 1929.....	\$44,519.81
Collections during fiscal year of 1930.....	83,343.26
Total.....	127,863.07
Disbursements during fiscal year of 1930.....	86,912.24
Cash balance, June 30, 1930.....	40,950.83

It will be noted that while there was a decrease of 176 in the number of accounts received during 1930 over 1929, there was an increase of 66 in the number of accounts settled and cleared. Certain countries agreed to combine into single documents accounts which formerly, without advantage, had been rendered separately. During earlier years, delinquent administrations frequently rendered accounts covering as many as 18 or 20 months, but now accounts are submitted with sufficient regularity to assure that the maximum number of accounts received from one country at no time exceeds 12 during the year, or one for each month's traffic. The increase in the number of accounts settled and cleared is due to improved methods which made it possible to adjust all accounts of long standing. Of the 569 unsettled accounts on hand, 330 are ready for settlement and will have been cleared from the records by August 30, 1930.

Very truly yours,

W. D. TERRELL,  
*Chief Radio Division.*

## STATISTICAL TABLES

Submitted below are statistics covering the division's work.

### SCOPE OF WORK

The following table shows the inspection and licensing work performed yearly from 1914 to 1930, inclusive, and the number of persons employed in the field force:

June 30—	American vessels equipped with radio	Inspections of American and foreign vessels		Frequency measurements of American and foreign stations	Licenses issued			Total field force
		Voluntary equipment	Compulsory equipment		Commercial operators	Amateur stations	Amateur operators	
1914.....	555		6,484		339	2,137	1,172	20
1915.....	585		6,152		1,653	3,547	3,067	26
1916.....	604	1,111	7,236		1,278	4,942	4,199	28
1917.....	836	1,034	7,137		1,682	3,741	3,303	28
1918.....	1,478	1,434	5,575		1,616			29
1919.....	2,312	954	5,160		1,645			27
1920.....	2,808	1,170	5,419		4,652	5,719	6,103	25-45
1921.....	2,978	514	5,591		2,722	7,351	6,207	26
1922.....	2,773	869	6,071		3,136	9,525	8,920	35
1923.....	2,723	1,124	6,933		2,860	7,821	9,908	53
1924.....	2,741	1,577	7,727		3,370	8,205	9,545	53
1925.....	1,901	1,339	8,603		3,215	10,074	8,293	62
1926.....	1,954	1,583	9,197		3,398	8,037	8,140	65
1927.....	2,092	1,405	9,330		3,463	7,123	7,275	63
1928.....	2,166	1,659	9,093		3,816	12,386	8,369	78
1929.....	2,213	2,520	10,715	22,450	3,798	12,646	9,490	95
1930.....	2,173	3,026	11,334	45,695	5,255	18,402	11,541	131

### DETAILED WORK

The following statement shows the details of the work performed during the past fiscal year compared with 1929 and the total number of licensed and Government radio stations:

Work of service	1929	1930
Clearances of American and foreign vessels required by law to be equipped with radio.....	15,023	15,595
Inspections of radio equipment on American and foreign vessels required by law to be equipped with radio.....	10,715	11,334
Inspections of radio equipment on voluntarily equipped vessels.....	2,520	3,026
American ship radio stations inspected for license.....	1,102	1,287
Land stations inspected.....	1,154	445
Broadcasting stations inspected.....		1,452
Amateur stations inspected.....	229	251
Amateur stations licensed.....	12,646	18,402
Frequency measurements of American and foreign stations.....	22,450	45,695
Commercial operators examined.....	3,477	5,363
Commercial operators licensed.....	3,798	5,255
Amateur operators examined.....	3,173	3,993
Amateur operators licensed.....	9,490	11,541
Defects found upon inspection of ship radio stations where clearance would have been in violation of law.....	335	382
Licensed and Government radio stations: <sup>1</sup>		
American vessels equipped with radio.....	2,213	2,173
Experimental, relay broadcasting, visual broadcasting, and technical and training-school stations.....	228	391
Commercial land stations <sup>2</sup> .....	446	463
Broadcasting stations <sup>3</sup> .....	614	612
Commercial aircraft stations.....	97	215
Geophysical stations <sup>4</sup> .....	106	119
Amateur stations.....	16,829	18,994
Government land stations.....	369	387
Government ship stations.....	1,211	1,161

## OPERATORS LICENSED

The following table shows the number of radio operators licensed during the past two years:

Class and grade	1929	1930	Total
Commercial extra first class.....	19	16	35
Commercial first class.....	2,080		
Commercial second class.....	1,471		
Broadcast class.....	113		
Phone class.....	115		
Amateur extra first grade.....	72		
Amateur first grade.....	5,058		
Amateur (temporary).....	4,360		
Total.....			

## FIELD ACTIVITIES

Following is a statement, by districts, of the work performed during the past fiscal year compared with the previous year:

Place of inspection (city or town)	Stations inspected						Frequency measurements												
	Ship, under act	Ship, voluntary equipment	Ship for license	Land	Broadcast	Amateur	U. S. broadcast			U. S. other than broadcast			Foreign						
							Measurements	Stations deviating	Deviations	Measurements	Stations deviating	Deviations	Measurements	Stations deviating	Deviations				
<b>First district:</b>																			
Boston, Mass.....	1,232	172	106	2	1	3	2,798	48	84	57	27	30	6	7	8				
Outside Boston office.....		13	12	16	51	30	4,109	32	51	99	34	39	82	11	12				
Total, 1930.....	1,232	185	118	18	52	33	6,907	80	135	156	61	69	88	18	20				
Total, 1929.....	1,313	75	57	14	( <sup>1</sup> )	44	( <sup>1</sup> )			( <sup>1</sup> )		( <sup>1</sup> )	( <sup>1</sup> )						
<b>Second district:</b>																			
New York, N. Y.....	3,868	347	389	14	23	2	8,307	383	458	9	7	9	1	1	1				
Outside New York office.....	296	59	60	8	24														
Total, 1930.....	4,164	406	449	22	47	2	8,307	383	458	9	7	9	1	1	1				
Total, 1929.....	3,813	458	439	5	( <sup>1</sup> )	21	( <sup>1</sup> )			( <sup>1</sup> )		( <sup>1</sup> )	( <sup>1</sup> )						
<b>Third district:</b>																			
Baltimore, Md.....	448	25	9	1	11	3	4,536	70	89				143	53	87				
Outside Baltimore office.....				10	30	6													
Philadelphia, Pa.....	531	10	5	5	88	8													
Outside Philadelphia office.....	7	1	3	6	27	12													
Norfolk, Va.....	748	12	9	1	4	3													
Outside Norfolk office.....					2														
Total, 1930.....	1,734	48	26	23	162	32	4,536	70	89				143	53	87				
Total, 1929.....	1,539	80	49	21	( <sup>1</sup> )	20	( <sup>1</sup> )			( <sup>1</sup> )		( <sup>1</sup> )	( <sup>1</sup> )						
<b>Fourth district:</b>																			
Atlanta, Ga.....					5		1,086	45	71	1	1	1	11	7	12				
Outside Atlanta office.....	2			6	47	6	42	3	4										
Total, 1930.....	2			6	52	6	1,128	48	75	1	1	1	11	7	12				
Total, 1929.....	46	4		41	( <sup>1</sup> )		( <sup>1</sup> )			( <sup>1</sup> )		( <sup>1</sup> )	( <sup>1</sup> )						

<sup>1</sup> Included in land for 1929.

<sup>1</sup> Only total figures by districts for stations of all classes compiled for 1929, which shows 22,450 measurements and 2,451 deviations.

Place of inspection (city or town)	Stations inspected						Frequency measurements										
	Ship, under act	Ship, voluntary equipment	Ship for license	Land	Broadcast	Amateur	U. S. broadcast			U. S. other than broadcast			Foreign				
							Measurements	Stations deviating	Deviations	Measurements	Stations deviating	Deviations	Measurements	Stations deviating	Deviations		
<b>Fifth district:</b>																	
New Orleans, La.....	607	95	85	5	18		2,899	93	112						9	5	5
Outside New Orleans office.....	14	51	41	27	97	14	122										
Dallas, Tex.....				3	9		2,328	119	194						1	1	1
Outside Dallas office.....				3	66	11											
Total, 1930.....	621	146	126	38	190	25	5,349	212	306					10	6	6	
Total, 1929.....	599	183	142	175	(1)	29	(2)		(3)					(4)			
<b>Sixth district:</b>																	
San Francisco, Calif.....	1,439	638	271	18	49	1	5,588	56	75	117	21	41	43	14	15		
Outside San Francisco office.....	3	21	14	91	97	12											
Los Angeles, Calif.....					8	7	846	39	50								
Outside Los Angeles office.....	379	40	15	8	33	10											
Total, 1930.....	1,821	699	300	117	187	30	6,434	95	125	117	21	41	43	14	15		
Total, 1929.....	1,530	437	159	125	(1)	2	(2)		(3)				(4)				
<b>Seventh district:</b>																	
Seattle, Wash.....	668	771	175	15	71	7	4,927	86	145	10	7	7	159	106	114		
Outside Seattle office.....	9	35	10	13	70	7											
Portland, Oreg. <sup>1</sup> .....	62	137	12	3	20	5	1,437	75	124					9	7	8	
Total, 1930.....	739	943	197	31	161	19	6,364	161	269	10	7	7	168	113	122		
Total, 1929.....	579	240	59	144	(1)	8	(2)		(3)				(4)				
<b>Eighth district:</b>																	
Detroit, Mich.....	413	215	8	14	10	1	1,208	39	50					2	2	2	
Outside Detroit office.....				24	43	12											
Buffalo, N. Y.....	120	98	12	17	21												
Outside Buffalo office.....					27												
Total, 1930.....	533	313	20	55	106	13	1,208	39	50					2	2	2	
Total, 1929.....	616	566	44	156	(1)	26	(2)		(3)				(4)				
<b>Ninth district:</b>																	
Chicago, Ill.....	459	133	18	17	27	1	4,132	70	111	9	3	3	1				
Outside Chicago office.....				18	166	16	16	8	3								
St. Paul, Minn.....					1												
Outside St. Paul office.....				42	80	33											
Duluth, Minn.....	29	99	15	13													
Outside Duluth office.....		54	18	6	4	1											
Kansas City, Mo.....				12	49	3	180	1	2								
Outside Kansas City office.....				7	97	6											
Denver, Colo.....				16	37	14	362							3			
Outside Denver office.....				3	36	17											
Total, 1930.....	488	286	51	135	496	91	4,690	74	116	9	3	3	4				
Total, 1929.....	680	477	153	473	(1)	79	(2)		(3)				(4)				
<b>SUMMARY</b>																	
First district.....	1,232	185	118	18	52	33	6,907	80	135	156	61	69	88	18	20		
Second district.....	4,164	406	449	22	47	2	8,307	383	458	9	7	9	1	1	1		
Third district.....	1,734	48	26	23	162	32	4,536	70	89				143	53	87		
Fourth district.....	2			6	52	6	1,128	48	75	1	1	1	11	7	12		
Fifth district.....	621	146	126	38	189	25	5,349	212	306				10	6	6		
Sixth district.....	1,821	699	300	117	187	30	6,434	95	125	117	21	41	43	14	15		
Seventh district.....	739	943	197	31	161	19	6,364	161	269	10	7	7	168	113	122		
Eighth district.....	533	313	20	55	106	13	1,208	39	50				2	2	2		
Ninth district.....	488	286	51	135	496	91	4,690	74	116	9	3	3	4				
Grand total, 1930.....	11,334	3,026	1,287	445	1,452	251	44,923	1,162	1,623	302	100	130	470	214	265		
Grand total, 1929.....	10,715	2,520	1,102	1,154	(1)	29											

<sup>1</sup> Included in land for 1929.

<sup>2</sup> Only total figures by districts for stations of all classes compiled for 1929, which shows 22,450 measurements and 2,451 deviations.

<sup>3</sup> Opened in March, 1930.



Place of examination (city or town)	Amateur stations licensed	Operators examined					Operators licensed									
		Commercial				Amateur	Commercial				Amateur					
		Extra, first	First	Second	Broadcast	Phone	Extra, first	First	Extra, first	First	Second	Broadcast	Phone	Extra, first	First	Temporary
<b>First district:</b>																
Boston, Mass.	1,740	123	252	22	6	7	235	116	219	18	14	6	731	341		
Outside Boston office				2		2	35									
Total, 1930	1,740	123	252	24	6	9	270	116	219	18	14	6	731	341		
Total, 1929	1,465	3	159	70	11	(1)	13	316	3	145	112	11	(1)	8	604	311
<b>Second district: New York, N. Y.</b>																
	1,890	1	668	394	32	6	12	557	11	551	460	17	6	6	849	104
Total, 1930	1,890	1	668	394	32	6	12	557	11	551	460	17	6	6	849	104
Total, 1929	1,397	3	418	158	16	(1)	10	374	5	533	221	14	(1)	7	607	60
<b>Third district:</b>																
Baltimore, Md.	1,292		35	51	10	1	1	33		65	77	7			417	160
Outside Baltimore office			1				2	44								
Philadelphia, Pa.			37	89	13	2	12	142		79	89	10	2	10	120	
Outside Philadelphia office								18								
Norfolk, Va.			11	18	10			9		27	31	8			26	
Outside Norfolk office								12								
Washington, D. C.			7	44	19		2	57		18	33	14		2	63	
Total, 1930	1,292		91	202	52	3	17	315		189	230	39	2	12	626	160
Total, 1929	1,138	1	167	79	20	(1)	13	233	4	214	117	17	(1)	6	478	93
<b>Fourth district:</b>																
Atlanta, Ga.	835		25	28	38		6	33		44	101	29	4	8	174	446
Outside Atlanta office			31	84	30	4	11	158								
Total, 1930	835		56	112	68	4	17	191		44	101	29	4	8	174	446
Total, 1929	659		35	38	28	(1)	10	84		43	35	17	(1)	9	112	320
<b>Fifth district:</b>																
New Orleans, La.	1,044		68	198	14	1	1	45		250	358	41	7	4	231	546
Outside New Orleans office			26	108	57	2	3	134								
Dallas, Tex.				35	24	2	2	33		11	39	31	3	4	83	
Outside Dallas office			5	28	34	1	4	70								
Total, 1930	1,044		99	369	129	6	10	282		261	397	72	10	8	314	546
Total, 1929	832		245	198	42	(1)	7	152	1	281	208	23	(1)	5	179	475
<b>Sixth district:</b>																
San Francisco, Calif.	3,392	1	352	129	17	104	9	181	5	325	222	18	148	15	860	424
Outside San Francisco office			2	2	5	48	6	63								
Los Angeles, Calif.			130	123	24	81	11	233		112	141	16	71	10	318	1
Outside Los Angeles office			12	14			2	46								
Total, 1930	3,392	1	496	268	46	233	28	523	5	437	363	34	219	25	1,178	425
Total, 1929	881	2	295	153	35	(1)	35	427	5	416	240	32	(1)	19	1,047	370
<b>Seventh district:</b>																
Seattle, Wash.	1,097		157	133	34	15	1	97		161	178	40	10	2	351	255
Outside Seattle office			26	73	18	2	5	131								
Portland, Oreg. <sup>1</sup>				8	1		1	4			5	1		1	4	
Total, 1930	1,097		183	214	53	17	7	232		161	183	41	10	3	355	255
Total, 1929	940		168	167	19	(1)	5	232		167	150	24	(1)	2	331	230
<b>Eighth district:</b>																
Detroit, Mich.	2,876		15	141	46	20	3	102		51	181	34	22	6	606	1,351
Outside Detroit office			3	18	15		9	180								
Buffalo, N. Y.	165		11	43	35		4	21		24	43	24		11	170	42
Outside Buffalo office				16	6		9	171								
Total, 1930	3,041		29	218	102	20	25	474		75	224	58	22	17	776	1,393
Total, 1929	1,976		118	127	55	(1)	23	420	1	110	147	38	(1)	9	554	1,058
<b>Ninth district:</b>																
Chicago, Ill.	4,071		34	298	88	28	9	250		64	280	62	33	29	931	1,470
Outside Chicago office			2	24	30	1	33	367								
St. Paul, Minn.			3	30	28	1		38		8	19	12	1		48	
Outside St. Paul office								13								

<sup>1</sup> Included in broadcast for 1929.<sup>1</sup> Opened in March, 1930.

Place of examination (city or town)	A amateur stations licensed	Operators examined					Operators licensed									
							Commercial				Amateur					
		Extra, first	First	Second	Broadcast	Phone	Extra, first	First	Extra, first	First	Second	Broadcast	Phone	Extra, first	First	Temporary
Ninth district—Continued.																
Duluth, Minn.			5	16	7			9		5	7	1				19
Outside Duluth office								16								
Kansas City, Mo.		4	40	41	1	1		42	17	48	26	9	13	222		
Outside Kansas City office			9	28	17			202								
Denver, Colo.			5	14	31	1	3	22	4	11	21	5	2	49		
Outside Denver office								5								
Total, 1930	4,071	62	450	242	32	60	964		98	365	122	48	44	1,269	1,470	
Total, 1929	3,368	1	252	314	80	(1)	24	795	171	241	52	(1)	7	1,146	1,443	
<b>SUMMARY</b>																
First district	1,740	123	252	24	6	9	270		116	219	18	14	6	731	341	
Second district	1,890	1	668	394	32	6	12	557	11	551	460	17	6	849	104	
Third district	1,292		91	202	52	3	17	315		189	230	39	2	12	626	
Fourth district	835		56	112	68	4	17	191		44	101	29	4	8	174	
Fifth district	1,044		99	369	129	6	10	282		261	397	72	10	8	314	
Sixth district	3,392	1	496	268	46	233	28	523	5	437	363	34	219	25	1,178	
Seventh district	1,097		183	214	53	17	7	232		161	183	41	10	3	355	
Eighth district	3,041		29	218	102	20	25	474		75	224	58	22	17	776	
Ninth district	4,071		62	450	242	32	60	964		98	365	122	48	44	1,269	
Grand total, 1930	18,402	2	1,807	2,479	748	327	185	3,808	16	1,932	2,542	430	335	129	6,272	
Grand total, 1929	12,646	10	1,857	1,304	306	(1)	140	3,033	19	2,080	1,471	228	(1)	72	5,058	

<sup>1</sup> Included in broadcast for 1929.

### COST OF RADIO SERVICE

The following statement shows the detailed expenditures of the radio service for 1930 and the appropriation and proposed allotment for the fiscal year 1931.

	1930	1931		1930	1931
Salaries:			General expenses—Con.		
District of Columbia	\$57,875	\$59,112	Rents	\$21,990	\$23,591
Field	269,789	314,240	Office supplies and stationery	2,699	3,500
Total	327,664	373,352	Communications	4,202	3,850
General expenses:			Miscellaneous expenses	6,082	2,545
Travel and subsistence	28,557	19,500	Total	432,848	473,830
Furniture and fixtures, office	4,419	3,500	Transferred to F. R. C.	25,000	
Test cars and equipment	19,772	9,800	Unobligated balance	2,152	
Motor vehicles	676		Reserve		28,542
Technical instruments and supplies	16,787	34,192	Total appropriations	1,460,000	1,502,372

<sup>1</sup> In addition to the regular amount appropriated for 1930, \$460,000, by act of Congress \$50,000 was made available for the purchase of a site and for the construction of a constant-frequency monitoring radio station at Grand Island, Nebr. \$48,400.43 of the \$50,000 has been expended.

<sup>2</sup> \$2,372 is Brookhart Act effective July 3, 1930.