

RADIO MARKETS OF THE WORLD, 1928-1929

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FOREWORD

The importance of foreign markets for radio equipment is attested by the value of United States exports. During the past seven calendar years over \$50,000,000 worth of American radio goods has been sent to foreign countries. In 1925 exports amounted to \$9,903,787; in 1926, \$8,749,453; and in 1927, \$9,182,414. In 1928 a new record was set, with exports valued at \$12,061,410.

This bulletin presents information as to the basic character of the various markets and will serve as a reliable guide for the exporter of radio goods. It covers all countries of the world and gives for each full information on the particular conditions that affect the use of radio apparatus, such as climate, topography, Government regulations, fees, broadcasting stations, etc. The bulletin is based on data obtained from various sources. In addition to reports from consular officers of the State Department and oversea representatives of the Department of Commerce, official reports of various foreign Governments and private publications, including trade journals and encyclopedic works, were consulted.

GENERAL CONSIDERATIONS

Following 12 years of laboratory study and intermittent experimental work, radio broadcasting has now had seven years of public development. During this time it has become a part of civilization exceeded in importance by few other contributors to the advancement of the human race. In almost every respect its field is broad and extensive. The influence on modern life exercised by the press, the pulpit, the school, the stage, and the lecture platform hardly exceeds that of radio. Those institutions are limited to their respective fields, and radio operates successfully in all of them.

This does not mean that radio replaces or even rivals those institutions. Much of the newspaper can not be broadcast, and the details of news items can not be given through the microphone. The style and length of the book and of the magazine story are entirely unsuited to broadcasting. The stage and lecture platform can never lose through radiovision the attraction of a personal appearance any more than through sound broadcasting. In education the recital is too fundamental to suppose the possibility of radio replacing the school. The pulpit in its capacity of presenting a message to the congregation can be broadcast successfully, but the church as a place of worship can not be replaced by the radio. The entire purpose which it can serve in these connections is only as a complement, but as a complement it has proved highly successful and valuable.

Recognizing these and many other advantages, with little attendant disadvantage to existing rights and privileges, most of the governments of the world have been unusual efforts toward encouraging the development of radio broadcasting and reception. There remain a very few governments which deny these privileges to the public. In only a few countries is political influence used to exploit radio for personal advantage; the censorship of programs operates almost universally to secure the use of radio to the best advantage of the listener.

Radio markets are as yet incapable of accurate measurement. The diversity of the conditions which affect the demand and variations in the importance of each condition are responsible for this and include such matters as climate, tastes, and desires of the people, religion, the form of government, educational opportunities and standards, business methods, wealth, density of population, race, standards of living, availability of broadcasting, language, recreational activities—the list could be extended indefinitely. Few of these conditions can be precisely defined, much less mathematically evaluated, but any or all of them may determine the position of the decimal point in transacting radio business. Statistics covering a few of these factors are available for only a few countries, and on scattered points, and where they agree between countries are seldom to be found parallel. The extent to which restrictive laws—as are all laws governing radio—are enforced and affect the market can not be ascertained. There is no such thing in these cases as a disinterested observer from whom a definite and unbiased opinion can be obtained.

MARKET CONDITIONS

Radio markets are constantly changing, and radio apparatus is one of the first commodities to respond to any change in economic conditions. The wide range of initial cost brings radio within the reach of nearly everyone, and any change in the purchasing power of any class is soon reflected in change in the demand for radio sets. An attempt has been made to indicate in this bulletin, so far as possible, the character of each market under a normal condition of prosperity, eliminating consideration of transitory conditions. Where reliable information for this comparison is lacking, current conditions and markets are considered.

The market conditions are being reported constantly by consular officers of the State Department and representatives of the Department of Commerce stationed in foreign countries, and these reports are published in various ways. This information is highly "perishable" and therefore is not suited to publication in this bulletin. Information as to current conditions will be found in Commerce Reports, the weekly foreign-trade journal of the Department of Commerce, and in Electrical Foreign Trade Notes, a mimeographed circular issued weekly.

DISTRIBUTION OF EXPORTS

The following table gives the results of an analysis of the distribution of receiving sets and tubes exported from the United States in 1927. For the purpose of this study, the world was divided into four

climatic zones, each country being considered as totally in that zone in which the preponderance of its population is to be found.

The climatic zones are based on mean annual temperature ranges, since the purpose of this analysis is to determine the time of year at which each market is at its best (winter) and the relation of actual shipping periods to such seasons. The north and south zones have a definite contrast of summer and winter seasons, regardless of the actual range of climate in other respects, while the torrid division for the greater part has less sharply defined seasons and a generally higher temperature range.

From the radio standpoint, the north zone has constant reception, with noticeably better results between October and March; the North Torrid Zone has satisfactory reception during longer or shorter periods extending more or less equally before and after the middle of December. The south zone experiences best reception from April to September but has satisfactory reception through seasons of graduated length before and after the middle of June. The year is divided into periods of two months to reduce the number of items requiring attention in scanning the table. The exports of sets and tubes are considered separately for each of the zones, by 2-month periods. Two calculations have been made, the first showing the percentage of the year's total to each zone for each 2-month period and the second the percentage of the total of the period taken by each zone.

The zones are defined as follows:

NORTH ZONE

North America: Canada, Greenland, Miquelon and St. Pierre Islands, Newfoundland and Labrador, Bermuda, Barbados.

Europe: All countries.

Asia: China, Japan, Kwantung, Palestine, Persia, Siam, Russia in Asia, Syria, Turkey.

NORTH TORRID ZONE

North America: Mexico, Central America, West Indies, except Bermuda and Barbados.

South America: Ecuador, Colombia, Venezuela, British Guiana, Surinam, French Guiana.

Asia: Aden, Arabia, India, British Malaya, Ceylon, French Indo-China, Hong Kong, Philippine Islands.

Africa: Egypt, Algeria, Tunisia, Morocco, Canary Islands.

SOUTH TORRID ZONE

South America: Bolivia, Brazil, Paraguay, Peru.

Asia: Netherlands East Indies.

Oceania: All except Australia and New Zealand.

Africa: All except Egypt, Algeria, Tunisia, Morocco, Canary Islands.

SOUTH ZONE

South America: Argentina, Chile, Falkland Islands, Uruguay.

Oceania: Australia, New Zealand.

RADIO SHIPPING SEASONS

[Based on United States exports for 1927]

Zone	Jan.- Feb.	Mar.- Apr.	May- June	July- Aug.	Sept.- Oct.	Nov.- Dec.
NORTH ZONE						
Sets:						
Per cent of year's exports.....	11	8	5	10	27	39
Per cent of period's exports.....	40	28	25	40	66	63
Tubes:						
Per cent of year's exports.....	12	19	12	11	19	27
Per cent of period's exports.....	35	37	22	23	40	53
NORTH TROPIC ZONE						
Sets:						
Per cent of year's exports.....	21	14	9	7	14	35
Per cent of period's exports.....	8	6	4	3	4	6
Tubes:						
Per cent of year's exports.....	16	31	8	11	18	16
Per cent of period's exports.....	12	16	4	6	11	8
SOUTH TROPIC ZONE						
Sets:						
Per cent of year's exports.....	10	16	11	23	20	20
Per cent of period's exports.....	3	5	4	8	4	3
Tubes:						
Per cent of year's exports.....	4	25	11	14	16	30
Per cent of period's exports.....	2	9	4	6	7	11
SOUTH ZONE						
Sets:						
Per cent of year's exports.....	16	20	17	15	12	20
Per cent of period's exports.....	49	61	70	49	25	28
Tubes:						
Per cent of year's exports.....	13	14	28	22	13	10
Per cent of period's exports.....	51	36	67	55	42	28
Per cent of year's exports:						
Sets.....	14	14	11	12	19	30
Tubes.....	12	16	19	17	16	18

Because only one year's figures were analyzed, the net results may vary to some extent from percentages based on several years' figures, inasmuch as exceptional purchases covered by a single percentage might exceed normal purchases for the same countries and periods during other years. Such purchases are not so likely to appear in the two commodity classes represented, but some evidence of such transactions is apparent. The annual cycle is clearly indicated by the results shown, however, and it would not be difficult to select the countries whose markets show a demand during off seasons in domestic trade.

GEOGRAPHICAL DATA

One of the most important factors to be considered in judging the world radio markets is the general information dealing with geography, geology, and climate. Of little importance in general marketing, except as transportation may be affected, these factors are of exceptional interest in determining the possibilities of radio reception and, therefore, of radio markets. "Spottiness" accounts for great differences in reception by sets which may be situated within sight of each other. Where only a few sets are in operation, the experience in operating them can not give a good basis for judging reception unless the particular situations are identically balanced at the average point for the entire area they are intended to represent. On the other hand, experience is the only guide to the quality of

reception, since radio engineering has not yet reached the point where it is possible to state in advance with certainty what results a given type of broadcasting station will give on a particular power or wave length in the chosen place. Analysis of climatic, geological, and other natural factors is impossible because of the lack of sufficiently detailed basic information as to how each item might affect transmission of radio waves.

The natural conditions as given in this publication are for the most part taken from encyclopedic works privately published, which have been checked with such official information as is available.

CLIMATE

Climate has a much greater effect on reception than is indicated under the general heading "Seasonal demand." The slightest change in temperature, moisture content of the air, or even wind, registers on a receiving set, while the same phenomena must be magnified many times to be perceived through human senses. In general, it has been shown by experience in all parts of the world that moist climates merely emphasize the temperature conditions. It is a matter of common knowledge that solar heat and the sun's rays are not friendly to radio waves. Winds, owing to their effect in changing temperature, although limited as to occurrence, are responsible for extreme local disturbances.

The more important data regarding the climates of various countries are shown in the following table.

CLIMATE AND RADIO SEASON

Countries	Summer	Winter	Range of mean temperatures ¹		Mean annual rainfall	Radio reception	
			Monthly	Annual		Possible	Best
NORTH AMERICA							
Alaska.....	Cool.....	Cold.....	-10-60	0-50	0-60	Continuous.....	Sept.-May.
Canada: South.....	Warm.....	do.....	0-80	40-70	10-80	do.....	Oct.-May.
Central America.....	Hot.....	Hot.....	60-100	80-90	20-120	Sept.-Mar.	Dec.-Jan.
Mexico.....	do.....	Cool.....	30-90	50-80	0-80	do.....	Nov.-Feb.
United States:							
North.....	Hot and warm.	Cold.....	20-90	50-70	20-60	Continuous.....	Oct.-May.
South.....	Hot.....	Cool.....	30-90	60-80	0-80	do.....	Nov.-May.
West Indies.....	do.....	Hot.....	70-100	70-90	20-80	Oct.-Mar.	Nov.-Jan.
SOUTH AMERICA							
Argentina.....	Hot.....	Cool.....	30-90	40-90	0-60	Continuous.....	Apr.-Sept.
Bolivia.....	(?)	(?)	70-80	0-60	do.....	do.....	Do.
Brazil.....	Hot.....	(Hot and warm.)	60-90	70-90	0-80	May-Oct.	Do.
Chile.....	(?)	(?)	30-70	40-70	0-80	Continuous.....	Do.
Colombia.....	Hot.....	Hot.....	70-100	80-90	80-120	do.....	Do.
Ecuador.....	do.....	Warm.....	70-90	70-90	0-80	Jan.-Mar.	Do.
Paraguay.....	do.....	do.....	60-90	70-80	10-40	Continuous.....	May-Sept.
Peru.....	(?)	(?)	60-80	60-80	0-80	Apr.-Oct.	July-Sept.
Uruguay.....	Hot.....	Warm.....	60-90	60-90	20-60	Continuous.....	Apr.-Oct.
Venezuela.....	do.....	Hot.....	70-100	80-90	40-100	Jan.-Mar.	

¹ Temperature zones of 10 degree variation were used in making up this table. The extremes of the zones encountered in each country are taken for the ranges. Thus, a point at which the monthly mean ranges from 43 to 63 degrees is given as having a range of from 40 to 70 degrees. Rainfall is similarly measured in 10-inch zones.

² Climatic variations are due mainly to altitudes along the tropical west coast of South America, the difference between seasons not being great. The very narrow coastal strip is hot throughout the year but includes only a very small percentage of the territory of these countries.

CLIMATE AND RADIO SEASON—Continued

Countries	Summer	Winter	Range of mean temperatures		Mean annual rainfall	Radio reception	
			Monthly	Annual		Possible	Best
EUROPE							
Balkan States.....	Hot and warm	Cool and cold.	° F. 30- 90	° F. 50-70	Inches 40- 80	Sept.-May....	Nov.-Feb.
Baltic States.....	Warm	Cold	10- 70	20-50	10- 40	Continuous....	Sept.-May.
British Isles.....	do	Cool	30- 70	40-60	40- 60	do	Do.
Central States.....	do	do	20- 80	40-60	10- 60	do	Do.
Latin Europe.....	Hot	do	30- 90	50-70	10- 80	Sept.-Jan....	Oct.-Apr.
Scandinavia.....	Warm	Cold	10- 70	10-50	10- 60	Continuous....	Sept.-May.
Russia.....	(?)	(?)	0- 80	20-60	0- 40	Sept.-May....	
ASIA							
China.....	Hot	Cool	10- 90	30-90	0- 80	Sept-May.....	Nov.-Feb.
Malay Peninsula.....	do	Warm	70- 90	70-90	80-120	Oct.-May.....	Dec.-Mar.
OCEANIA							
Australia (excepting arid regions of north.)	Hot.....	Warm....	40- 90	50-70	10- 80	Continuous....	Apr.-Sept.
AFRICA							
Algeria.....	Hot.....	Warm....	50-100	60-80	10- 30	Sept.-May....	Nov.-Apr.
Sahara.....	do	do	50-100	70-90	0- 20		
Sudan.....	do	Hot....	60- 90	70-90	0-100		
South Africa.....	do	Warm....	50- 90	60-90	20- 80	Continuous....	Apr.-Oct.

* Varies widely.

CLIMATE AND ENGINEERING

Climatic conditions have a deteriorating effect on many radio parts. This is particularly true as regards metals and insulating materials. Certain types of batteries are also prone to develop faults quickly in some climates. Exporters should make a study of the materials employed in their products, with a view to determining whether some slight change would render them more suitable for use in the countries where such difficulties are experienced. Two suggestions that have been made in hot countries with high humidity deal with insulation and the comparative value of aluminum and brass plates for condensers.

DISTANT RECEPTION

Reception of programs of distant stations remains one of the principal interests of those who can afford sets capable of giving this service. This is true in every country, whether local broadcasting is available or not. Such reception is now something of a matter of course with most set owners, while others have turned to short waves to simplify the effort, but the demand for receivers covering the broadcast band is still for selective tuners with a range of at least several hundred miles.

The matter of selectivity is, of course, dependent upon the existence of local broadcasting and the number of local stations there may be. Sets capable of sharp tuning would therefore have an additional selling point in such places as Europe, Australia, or the vicinity of such cities as Buenos Aires and Mexico City, where a large number of local stations are operating, while sets of less selectivity are not

suited to such places but might through other advantages be of better service in localities where interference is less.

RECEIVING SETS IN USE

The number of receiving sets in use in any country is a matter of conjecture. In countries where registration for a receiver or a license for its ownership or operation is required, statistics are sometimes published and provide a basic figure which may be employed in making estimates. There are, nevertheless, several countries which do not publish statistics, even though registration or license is required, and others which do not require registration or license.

One of the major questions in regard to licensing is the enforcement of the law. The percentage of unlicensed sets in any country where licenses are required is admittedly large. Sets may be easily concealed, and so may the necessary traffic to provide sets for those willing to conceal them after their purchase. These conditions arise, of course, in direct ratio to the cost of licenses and the rigor of the restrictions imposed. The number of sets so concealed throughout the world admittedly constitutes a fairly large proportion of the total. For this reason, licensing statistics do not give a complete total of the sets in use. Another reason of importance is that licenses generally cover sets and not their owners; the trial of two sets before buying calls for two licenses; the second license is also required where an older set is replaced by a new one during the year.

Estimates of the number of sets illegally operated appear to be entirely without basis, and in most countries this is most certainly so. In some others, where the attempts to enforce the law are carried on with less energy, it is entirely possible that authoritative estimates of such sets may be made, inasmuch as traffic and operation are not so carefully hidden. When such estimates are made they are generally based on parallel but unrelated statistics. In the absence of anything more reliable such estimates are of some service.

Where registration or licensing is not required, there is the disadvantage of inability to secure official statistics. Estimates, however, are more likely to be authoritative, but much depends upon their source. Those which have been accepted are in each case the ones which are believed to be from the most reliable of the sources considered. The British electrical press has provided several of the figures used, but since the origin of many of these is obscure, they have been accepted only in the absence of estimates made in the country under consideration. Consular officers of the State Department and representatives of the Department of Commerce in various countries provided most of the local estimates used, while members of the radio trades were another fruitful source.

There has been no lack of estimates so far as the number of sets in the United States is concerned. Most of those considered appear to have been based on conditions in a very limited part of the country. Where the New York area was considered as being representative of the entire country, estimates have run from 12,000,000 to 15,000,000. An important trade publication has based estimates for several years on reports from the trade, the latest estimate from this source being in the neighborhood of 10,000,000. The estimate appearing to be the most reasonable at the beginning of the 1928-29

season was 8,000,000. Early in the season a large broadcasting chain undertook a survey of the country east of the Rocky Mountains and, considering the average found in this area to be representative of the Western States as well, recently issued an estimate of 9,640,348, which appears to be the most reliable and authentic of all estimates so far studied.

In one or two cases the number of sets exported from the United States during one or more of the past three years shows exceptional incongruity when compared with the number of sets estimated to be in use, but in these cases the export figures have been disregarded, since it is not improbable that the sets imported have not been put into service; they might remain on the dealers' shelves, delivery might have been refused, they might have been reexported, or other diversion might have resulted, none of which would show in United States export statistics.

The following statement shows the number of receiving sets in use according to the most reliable figures as defined above.

North America:		South America—Contd.	
Alaska.....	550	Surinam.....	18
Bahamas.....	130	Uruguay.....	17,000
Barbados.....	250	Venezuela.....	2,000
Bermuda.....	350		
British Honduras.....	40	Total.....	847,903
Canada.....	230,000		
Canal Zone.....	500	Europe, except Russia and	
Costa Rica.....	250	Turkey:	
Cuba.....	25,000	Albania.....	6
Dominican Republic.....	550	Austria.....	325,000
French West Indies.....	3	Azores.....	150
Greenland.....	25	Belgium.....	62,500
Guatemala.....	250	Bulgaria.....	50
Haiti.....	750	Czechoslovakia.....	250,000
Honduras.....	37	Danzig.....	150
Jamaica.....	100	Denmark.....	215,000
Mexico.....	50,000	Estonia.....	13,908
Miquelon and St. Pierre.....	25	Finland.....	127,000
Netherlands West Indies.....	50	France.....	1,250,000
Newfoundland and Labrador.....	800	Germany.....	2,350,000
Nicaragua.....	20	Gibraltar.....	100
Panama.....	800	Greece.....	1,000
Porto Rico.....	5,000	Hungary.....	115,000
Salvador.....	250	Iceland.....	50
Trinidad and Tobago.....	35	Irish Free State.....	30,000
United States.....	9,640,348	Italy.....	250,000
Virgin Islands.....	50	Latvia.....	21,000
Total.....	9,956,163	Lithuania.....	9,407
		Luxemburg.....	1,500
South America:		Madeira.....	180
Argentina.....	530,500	Malta.....	250
Bolivia.....	25	Netherlands.....	150,000
Brazil.....	250,000	Norway.....	70,000
British Guiana.....	15	Poland.....	25,000
Chile.....	30,000	Portugal.....	2,500
Colombia.....	22	Rumania.....	17,000
Ecuador.....	150	Spain.....	25,000
Falkland Islands.....	15	Sweden.....	371,000
French Guiana.....	8	Switzerland.....	75,000
Paraguay.....	150	United Kingdom.....	2,511,736
Peru.....	18,000	Yugoslavia.....	2,500
		Total.....	8,221,985

Europe-Asia:		Africa:	
Russia.....	250,000	Algeria.....	5,150
Turkey.....	175	Angola.....	50
		Bautoland.....	10
Total.....	250,175	Bechuanaland.....	15
		Belgian Congo.....	6
Asia:		British Somaliland.....	5
Aden.....	5	British West Africa.....	50
Arabia.....	12	Canary Islands.....	200
Ceylon.....	1,500	Egypt.....	4,000
China.....	15,000	Ethiopia.....	2
Chosen.....	3,000	French Equatorial Africa.....	500
French India.....	50	French Morocco.....	400
French Indo-China.....	25	Italian Africa.....	250
Hong Kong.....	300	Kenya.....	100
India.....	3,600	Liberia.....	4
Iraq.....	21	Madagascar.....	14
Japan.....	550,000	Mozambique.....	18
Kwangtung.....	100	Northern Rhodesia.....	10
Macao.....	40	Southern Rhodesia.....	50
Netherland East Indies.....	100	Southwest Africa.....	50
Palestine.....	150	Spanish Africa.....	150
Persia.....	75	Swaziland.....	5
Philippine Islands.....	7,500	Tanganyika.....	10
Siam.....	12	Tunisia.....	650
Straits Settlements.....	150	Union of South Africa.....	130,000
Syria.....	13	Zanzibar.....	5
Total.....	581,653	Total.....	141,704
		Grand total.....	20,359,381
Oceania:			
American Samoa.....	11		
Australia.....	289,000		
British Oceania.....	250		
French Oceania.....	25		
Guam.....	12		
Hawaii.....	15,500		
New Zealand.....	55,000		
Total.....	359,798		

REGULATIONS

The regulations governing radio are of two classes, those adopted nationally and those provided by international convention.

International regulations are designed to promote efficiency of all kinds of radio communications by avoiding interference between stations of different countries and by promoting uniformity of practice to facilitate the use of radio in general.

Interference is eliminated by providing for the use of various wave bands for dissimilar purposes; thus much ship-to-shore and commercial code that might interfere on the broadcasting band through lack of international uniformity is eliminated, while a ship passing through foreign waters is assured of the same wave lengths for its communications which it would have in its home port. Contact is also possible in communications through wave-length control since it is known on what wave lengths the stations it is desired to address will be listening, whatever their nationality.

The control exercised over call letters is effective in avoiding confusion, for the identity of a station becomes positive when there

is no duplication of call letters between countries. International regulation specifies call groups to serve this purpose.

The types of apparatus to be used in various services are often affected, particularly since now-obsolete types have created considerable interference in the past. Under present arrangements these will be entirely withdrawn from use.

The field covered by these laws is being constantly expanded as new conditions arise and late developments give them wider latitude in such requirements. These purposes are made effective through national legislation in the signatory countries, usually forming the central structure of the national system of regulation.

WASHINGTON RADIO CONFERENCE

Effective January 1, 1929, the regulations of the Washington Radio Conference of 1927 make provision for international relations in the use of radio. These regulations define broadcasting as "a service carrying on the dissemination of radiotelephone communications intended to be received by the public, directly or through the intermediary of relay stations," and an amateur as "a person interested in radio technique solely with a personal aim and without pecuniary interest." No definition is given for broadcast listener, but since this class is naturally distinct from other radio amateurs as defined, no explanation is necessary where this term is used.

The regulations adopted by the Washington conference provide that the choice of apparatus and devices to be used by a station shall be unrestricted except by national regulations, provided the waves emitted comply with the regulations; that each country shall have entire freedom in the assignment of wave lengths and wave types, if no interference with stations in another country will result, but where such interference is to be expected, frequencies and wave types shall be assigned in accordance with the provisions of the regulations; that the wave lengths to be used for broadcasting shall be from 200 to 545 meters and from 1,340 to 1,875 meters, and that the call letters of all land stations shall be changed to 3-letter combinations. Four-letter calls are reserved for ship, and 5-letter calls for aircraft stations.

NATIONAL LEGISLATION

Perhaps the greatest contributing factor to radio development or lack of it lies in legislation, entirely aside from the effect of legislation on national or individual prosperity or upon other factors themselves directly or indirectly promoting or arresting radio progress.

The very nature of radio in its possibilities for uncensored communications requires close regulation. Radio operation is dependent upon an intricate organization of channels which must be recognized universally. The conduct of broadcasting is even more particular. Further, since a cut wire at any point over the distance between sender and receiver can not control wireless communications, and since such messages as are sent are not capable of control outside the originating station, a nation in time of war must have under its absolute control all transmitting stations, of whatever nature, within its territory. Beyond these primary purposes there is a great num-

but of other less important reasons why radio should be subjected to close control.

The necessity of exercising such strict supervision was fortunately recognized at an early date. National regulation and international convention became effective almost before their need was felt. This regulation comes under various heads and deals with radio subjects from wave lengths to call letters.

The degrees to which foreign radio broadcasting is regulated in the various countries are widely divergent. Absolute prohibition is maintained in a few countries, while at the opposite extreme utter freedom within the bounds of public convenience, interest, and necessity prevails.

In countries where monopolies have not been declared, any person or firm showing satisfactory general qualifications will usually be given permission to broadcast at its own expense. Licenses may be required for receiving sets in such countries, but the fees revert entirely to the Government.

The monopoly system of broadcasting has been growing in popularity in countries where receiving licenses in any form are required. Austria, Czechoslovakia, Germany, the Irish Free State, Italy, Poland, Sweden, the United Kingdom, Yugoslavia, Japan, Australia, and New Zealand are under the monopoly system, as well as Latvia, Peru, Venezuela, and several other countries where the demand for broadcasting permits is so limited that there has been no opposition to the monopoly system.

It is a peculiarity of broadcasting that it is subject to all of the regulations provided for other kinds of radio transmission and reception, in addition to many other specific regulations that govern broadcasting alone. Thus broadcasting may be prohibited—and the number of the reasons why equals the number of countries where it is prohibited—or it may be permitted under monopoly, held either by the government or by one or more private concessionaries, or it may be permitted to any number of citizens showing proper qualifications, which themselves may be of various kinds.

Reception may be prohibited, and this has been done in some countries in the past, although such rigid limitations are disappearing. It may be necessary to secure permission to receive, or at least to deliver a proper notification to a designated government agency that the set is installed. The unrestricted use of receiving sets is permitted in only a few countries, and one or two others add only such requirements as are outlined above.

Most countries provide that the listener shall pay some fee. Installation fees, annual license fees, and subscription fees are common; these may be collected by the government or by the broadcaster and in either case may be shared with the other agency. They vary from 5 cents to \$18 per year and may or may not be expected to pay the cost of broadcasting.

OUTSTANDING CHARACTERISTICS OF RADIO REGULATIONS

The following table shows the outstanding characteristics of the radio regulations of the different countries, in so far as they relate to the administration of broadcasting stations:

RADIO BROADCASTING REGULATIONS OF FOREIGN COUNTRIES

Country	Stations may be owned by—	Stations may be operated by—	Broadcasting is supported by—
Algeria.....	Citizen.....	Citizen.....	Broadcaster.
Argentina.....	do.....	do.....	Do.
Australia:			
High-power class.....	(1)	(1)	Listeners.
Low-power class.....	Citizen.....	Citizen.....	Broadcaster.
Austria.....	Concession.....	Concession.....	Listeners.
Belgium.....	Citizen.....	Citizen.....	Do.
Bolivia.....	do.....	do.....	Broadcaster.
Brazil.....	do.....	do.....	Do.
Canada.....	do.....	do.....	Do.
Canary Islands.....	do.....	do.....	Do.
Ceylon.....	Government.....	Government.....	Listeners.
Chile.....	Citizen.....	Citizen.....	Broadcaster.
China.....	do.....	do.....	Do.
Chosen.....	Concession.....	Concession.....	Listeners.
Costa Rica.....	Government.....	Government.....	Do.
Cuba.....	Citizen.....	Citizen.....	Broadcaster.
Czechoslovakia.....	Concession.....	Concession.....	Listeners.
Denmark.....	Government.....	Government.....	Do.
Egypt.....	Citizen.....	Citizen.....	Broadcaster.
Estonia.....	Government.....	Government.....	Listeners.
Finland.....	Citizen.....	Citizen.....	Do.
France.....	do.....	do.....	Broadcaster.
Germany.....	Government.....	Concession.....	Listeners.
Haiti.....	do.....	Government.....	Government.
Hong Kong.....	do.....	do.....	Do.
Hungary.....	Citizen.....	Citizen.....	Listeners.
India.....	do.....	do.....	Broadcaster.
Irish Free State.....	Government.....	Government.....	Listeners.
Italy.....	Concession.....	Concession.....	Do.
Japan.....	do.....	do.....	Do.
Kwantung.....	Government.....	Government.....	Government.
Lithuania.....	do.....	do.....	Listeners.
Mexico.....	Citizen.....	Citizen.....	Broadcaster.
Morocco.....	do.....	do.....	Do.
Netherlands.....	do.....	do.....	Not reported.
Netherland East Indies.....	do.....	do.....	Broadcaster.
New Zealand.....	Concession.....	Concession.....	Listeners.
Norway.....	Citizen.....	Citizen.....	Do.
Paraguay.....	do.....	do.....	Broadcaster.
Peru.....	Government.....	Concession.....	Listeners.
Poland.....	Concession.....	do.....	Do.
Salvador.....	Government.....	Government.....	Do.
South Africa.....	Concession.....	Concession.....	Do.
Spain.....	Citizen.....	Citizen.....	Broadcaster.
Straits Settlements.....	do.....	do.....	Do.
Sweden:			
Main stations.....	Concession.....	Concession.....	Listeners.
Low-power class.....	Radio clubs.....	Radio clubs.....	Broadcaster.
Switzerland.....	Citizen.....	Citizen.....	Not reported.
Tunisia.....	Government.....	Government.....	Government.
United Kingdom.....	do.....	do.....	Listeners.
United States.....	Citizen.....	Citizen.....	Broadcaster.
Uruguay.....	do.....	do.....	Do.
Venezuela.....	Concession.....	Concession.....	Listeners.

¹ The Australian Government is preparing to take over the operation of all stations of the high-power class. It is expected that this plan will be in effect by July 1, 1929.

NOTE.—Regulations of countries not shown have not been recently reported. "Citizen" is used to indicate "any citizen or organization controlled by domestic interests." "Concession" indicates a concern selected to construct or operate a station already specified, as opposed to authorization of a concern to construct or operate a station of its own selection.

FINANCING BROADCASTING

Regulations provide for the financing of broadcasting, either by inclusion or by omission. The cost may be borne by the broadcaster who uses radio as a good-will adjunct to another business or operates in radio as an avocation; it may be borne by an advertiser or advertisers through fees for direct advertisements; it may be paid by the listeners through any of the multifarious systems previously indicated; or it may be provided through some form of government subsidy.

The question of paying the costs of broadcasting requires early attention in setting up a broadcasting system. The importance of this question is readily recognized when it is remembered that a system once adopted can not be discarded without trouble.

BRITISH AND AMERICAN VIEWS

Many reasons, pro and con, have been advanced regarding the adoption of each system in use. A conservative British publication recently became highly jubilant over the abandonment of a broadcasting station in the United States. This station had been employed as a good-will adjunct to a department store, and the owners decided that the results in their particular case did not warrant the continuation of broadcasting, considering the general desirability of reducing the whole number of stations in the country. In the opinion of the British publication, this was positive evidence of the uneconomic character of the American broadcasting system, and that a review of conditions would certainly show that broadcasting had no place in American commerce and would soon be abandoned as a business practice. The prophesy was made that the system followed in the United Kingdom would be adopted ultimately.

In similar vein, Americans deprecate the British system of licensing receivers, considering that submission to taxation of sets above customary personal property taxes is in some sense an invasion of citizens' rights, that broadcast wave lengths are the property of the people as a whole and should be employed only in the service of the people, and that since business men are willing to pay the costs of broadcasting they should be allowed the privilege.

The methods of radio financing, while of prime importance in understanding the character of the market, do not in themselves have more than a superficial effect on the market.

FINANCING METHODS

When the costs of broadcasting are assigned to the broadcaster, he usually obtains as his return the use of a given channel for broadcasting a limited amount of commercial publicity, either for himself or for a paying clientele. Few countries permit advertising of a commercial nature; in the remainder the cost is, therefore, put on the government, or the listener.

Radio advertising falls into two classes in administration; these have been termed "direct" and "indirect," although these terms no longer serve as descriptive of the methods. Direct advertising is arranged by the sale of a limited amount of the station's time, usually five minutes out of each hour, during which period there is no restraint upon the advertising broadcast. The remaining 55 minutes is occupied by concerts, speeches, and other program material furnished by the station. Under indirect advertising the station sells the entire hour, and the advertiser is called upon to furnish the program material broadcast. Between numbers, advertising matter is given. From the listeners' point of view, direct advertising provides 55 minutes of uninterrupted programs, while indirect advertising provides 30 to 60 minutes of program, depending upon the taste of the broadcaster.

Another source of revenue is the government. The methods by which it may be interested in broadcast financing are numerous. It may be, and often is, the owner of one or more, or all, of the broadcasting stations in the country. If there is no provision for receiving licenses, these stations are operated entirely by public funds. If there is a licensing system, some income accrues to the stations, with deficits or surpluses usually liquidated with the general treasury. Few governments contribute toward the support of broadcasting stations not owned by them.

Receiving licenses have been adopted by the greatest number of countries as a means of financing broadcasting. The licensing idea takes many different forms, and the fees are collected in many ways, while several instances are noted where licenses are required only for statistical purposes, the revenue being utilized to defray a part of the cost of issuing licenses and apprehending operators of unlicensed sets.

The license fee is usually an annual charge but may be monthly, quarterly, or semiannual. Collections may be made by the government or by the broadcaster. Subscription fees are different from license fees only in that the collection is invariably made by the broadcaster. In most countries the governments retain or collect appreciable portions of license fees to defray the cost of their connected activities and of police expenses connected with collections, and the broadcasters are allowed the remainder.

An installation fee is sometimes collected when a set is first obtained. This fee is usually strictly a government collection and often is the only charge made.

The following table shows the license and other fees charged in various countries for receiving sets:

LICENSE AND OTHER RECEIVING-SET CHARGES

(Amounts converted to United States dollars at current exchange)

Countries	Inspection and installation fee	Annual license fee	Annual broadcasting subscription	Total fees first year	Total fees subsequent years
Belgium.....	(¹)	(²)		(³)	(⁴)
Czechoslovakia.....		\$3.55		33.5	\$3.55
Danzig.....		3.85		35	3.35
France.....		.65		.65	.65
Germany.....		5.70		.70	5.70
Gibraltar.....		2.45		2.45	2.45
Hungary.....		.45		.45	.45
Irish Free State.....		2.45		2.45	2.45
Italy.....		.15	\$5.05	6.20	5.05
Latvia.....	\$1.95-87.70	4.65		6.60	2.33
Lithuania.....		13.00		1.00	13.00
Malta.....	5.10	2.45		.55	2.45
Norway.....		5.35		.85	5.35
Poland.....	.55			.85	
Rumania.....			1.20-1.50	1.20-1.50	1.20-1.50
Spain.....		.70		.70	.70
Sweden.....	10.75	2.70		13.45	2.70
Switzerland.....	.60	2.30		2.90	2.30
Turkey.....		13.20		12.30	13.20
United Kingdom.....		2.45		2.45	2.45
Yugoslavia.....		4.25		4.25	4.25
Canada.....		1.00		1.00	1.00
Panama.....	2.50			2.50	2.50
Trinidad and Tobago.....		2.40-4.80		2.40-4.80	2.40-4.80
Bahamas.....		1.20		1.20	1.20
British Honduras.....		5.00		5.00	5.00

¹ \$1.25 for each tube socket.

² Amount not available.

LICENSE AND OTHER RECEIVING-SET CHARGES—Continued

Countries	Inspection and installation fee	Annual license fee	Annual broadcasting subscription	Total fees first year	Total fees subsequent years
Guatemala.....	\$5.00			\$5.00	
Salvador.....	(*)	\$18.00		20.50-35.50	\$18.00
Bolivia.....	1.70	12.30		14.00	12.80
Brazil.....	2.40			2.40	
India.....		3.85		3.85	5.85
Japan.....		.90	88.10	9.00	9.00
Kwantung.....		.90		.90	.90
Straits Settlements.....		2.85		2.85	2.85
Netherland East Indies.....		10.05		10.05	10.05
Australia.....		5.85		5.85	5.85
New Zealand.....		7.30		7.30	7.30
Algeria.....		.05		.05	.05
Canary Islands.....	82-8.15			.82-8.15	
Madagascar.....		.05		.05	.05
Morocco.....		.05		.05	.05
Tunisia.....		1.00		1.00	1.00
Union of South Africa.....		1.25	1.60-8.75	3.85-10.00	3.85-10.00

* Application for permit, \$2.50; installation, if made by government, \$15.

BROADCASTING SERVICE

Broadcasting service, with few exceptions, is available in every inhabited region of the world. One can now hear the latest news, popular music, as well as the opera and sports, from all parts of the world—from such widely separated cities as Berlin, Nairobi, Johannesburg, Paris, Sydney, and Pittsburgh, with the use of short waves, as easily as though such cities were but a few hundred miles distant. World-wide broadcasting is now a fact.

One billion people live within constant receiving distance of broadcasting stations. The source of the population figures used to arrive at this result gives the world population as 1,748,000,000. The number of receiving sets in use is over 20,000,000, practically all of them being within the areas where reception of at least one station is certain. With an average of five members to each family, 100,000,000 people are equipped with receiving facilities, or 10 per cent of the total population in these zones. To put radios in all their homes, 200,000,000 sets would be required. With broadcasting facilities provided throughout the world, nearly 350,000,000 sets would be required. These figures, of course, must be greatly modified by factors representing purchasing power, personal desires, and many other considerations before they give any indication of the potential markets. The number of receiving sets in the world has increased by 33½ per cent in two years, but the rate of increase is becoming slower each year. This is the usual experience in marketing any commodity and should not be taken as an indication that the radio market is falling off, but rather that each successive total requires greatly increased numerical values to equal any given rate.

The following list of foreign radio-broadcasting stations includes all stations outside the United States and its possessions which transmit programs for popular reception on broadcast wave lengths, as listed in the files of the electrical equipment division. Included are a number of short-wave stations, some of which transmit on short waves only and some on short and broadcast waves simultaneously.

NORTH AMERICA

Country and city	Call	Wave length <i>Meters</i>	Power <i>Watts</i>	Country and city	Call	Wave length <i>Meters</i>	Power
CANADA							
Rowmanville.....	CKQW	312.3	900	CANAL ZONE			
Bramford.....	CFGC	266.9	50	Bahoa.....		252.0	1,000
Burnaby.....	CFYC	410.7	600			252.0	
Calgary.....	CFAC	424.5	500			250.0	50
Do.....	CNRC			Calbarlen..	CMRFV	250.0	60
Do.....	CNRC	424.5	1,800	Do.....	CMRFV	252.0	250
Do.....	CJCB	424.5	250	Cannaguey..	CMFOT	182.0	10
Do.....	CFCA			Do.....	CMFOT	182.0	5
Charlottetown	CHWV	312.3	100	Do.....	CMFOT	250.0	50
Chilliwack.....	CFWV	247.8	5	Cannajuan..	CMAYR	200.0	20
Cobalt.....	CKMC	247.8	3	Ciego de Avila	CMYBR	253.6	20
Do.....	CHCV			Do.....	CMYFU	200.0	15
Edmonton.....	CNRE	316.9	250	Do.....	CMYFU	200.0	15
Do.....	CHMA	518.9	500	Cienfuegos..	CMOFY	192.0	15
Do.....	CJCA	518.9	500	Coton.....	CMOFY	200.0	200
Do.....	CKUA	518.9	500	Guantanamo	CMSEV	340.0	100
Frederickton	CFNB	247.8	25	Havana.....	CMIAZ	346.0	500
Hallifax.....	CHNL	322.4	100	Do.....	CMG	347.0	600
Hamilton.....	CHML	340.7	50	Do.....	CMG	347.0	10
Do.....	CHOB	340.7	100	Do.....	CMZAB	200.0	10
Do.....	CHOC	340.7	100	Do.....	CMZAB	341.0	75
Ironore Falls.	CFCH	496.7	250	Do.....	CMZAR	254.0	30
Kamloops.....	CFHC	267.7	15	Do.....	CMZOP	243.8	200
Kingston.....	CFIC	291.1	1,000	Do.....	CMZOP	243.8	10
Do.....	CFIC	297.7	20	Do.....	CMZOP	243.8	15
Do.....	CFIC	297.7	200	Do.....	CMZOP	300.0	15
London.....	CFIC	323.5	50	Do.....	CMZOP	300.0	15
Midland.....	CKPR	267.7	50	Do.....	CMZOP	328.0	60
Montreal.....	CNRA	475.9	500	Havana.....	CM20H	211.0	10
Do.....	CFCF	410.7	1,050	Do.....	CM20H	270.0	10
Do.....	CFYC	410.7	750	Do.....	CM20W	228.0	100
Do.....	CFYC	410.7	1,200	Do.....	CM20W	261.0	160
Do.....	CFYC	410.7	1,200	Do.....	CM20W	293.0	200
Do.....	CNRM			Do.....	CM20W	293.0	10
Do.....	CKLO	410.7	50	Do.....	CM20X	252.0	20
Do.....	CNRM	280.9	50	Hershey.....	CM23G	252.0	15
Ottawa.....	CNRO	494.5	100	Marlando...	CM23G	252.0	15
Do.....	CFNO	264.5	50	Do.....	CM23F	252.0	15
Do.....	CFNO	264.5	50	Do.....	CM23F	252.0	15
Fresnost.....	CKPC	247.9	100	Do.....	CM23M	274.0	50 1/4
Do.....	CKPC	247.9	100	Do.....	CM25W	274.0	50 1/4
Quebec.....	CKCQ	340.7	25	Nuevitas.....	CM7NM	294.0	10
Do.....	CKCI	340.7	25	Sagua la Grande	CM8EG	200.0	10
Do.....	CKOV	340.7	50	Santi Spiritus	CM8EP	280.0	20
Do.....	CNRO	340.7	25	Santa Clara	CM8MN	210.0	20
Do.....	CKLC	340.7	25	Santiago.....	CM8EG	200.0	30
Do.....	CKLC	340.7	25	Do.....	CM8BY	150.0	30
Red Deer.....	CFOR	356.9	1,000	Do.....	CM8KW	250.0	15
Begina.....	CFOR	356.9	1,000	Tuinuoh....	CM8KW	368.0	100
Do.....	CKCK	312.3	15				
Do.....	CNRR	312.3	500	DOMINGAN REPUBLIC			
Do.....	CNRR	312.3	500	Santo Domingo		450.0	
St. George.....	CJER	257.7	25				
St. Hyacinthe	CKOR	312.3	50	GUATEMALA			
Saskatoon.....	CKRH	312.3	50	Guatemala..		310.0	1,000
Do.....	CNRR	323.5	500				
Do.....	CHUC	323.5	500	HAITI			
Do.....	CJWC	323.5	250	Port au Prince	HHK	361.2	1,000
Do.....	CJWC	323.5	250	MEXICO			
Scarborough	CKOW	291.1	500	Chihuahua..	XFF	325.0	250
Do.....	CKCX	291.1	500	Guadalajara	XFA	240.0	100
Sea Island.....	CFOR	291.1	50	Jalapa.....	XPC	475.0	500
Summerside..	CHGB	297.7	25	Lerdo.....	XES	250.0	250
Do.....	CFCA			Merida.....	XEV	548.6	100
Toronto.....	CKSM	356.9	500	Mexico City	XEB	450.0	1,000
Do.....	CNRT	356.9	500	Do.....	XEN	410.0	1,000
Do.....	CHGC	366.9	500	Do.....	XEX	325.0	500
Do.....	CKNC	366.9	500	Do.....	XFA	0-14.0	50
Do.....	CJBC	366.9	600	Do.....	XFG	43-43.0	50
Do.....	CHGC	297.7	50	Do.....	XFO	470.0	2,000
Vancouver...	CFCO	410.7	10	Do.....	XFL	507.0	1,000
Do.....	CKCB	410.7	1,000	Do.....	XFX	357.0	1,500
Do.....	CFHO			Do.....	XGI	44.0	
Do.....	CKFC	410.7	50	Monterrey..	XEH	311.0	100
Do.....	CKWX	410.7	10	Morilla.....	XEP	300.0	100
Do.....	CNRY	291.1	500	Oaxaca.....	XEF	263.0	100
Victoria.....	CFCT	322.5	500	Puebla.....	XEE	312.0	100
Vancouver...	CKY	394.4	500	SALVADOR			
Yarktown.....	CJGX	475.9	500	Salvador....	AZM	452	500

SOUTH AMERICA

Country and city	Call	Wave length	Power	Country and city	Call	Wave length	Power
ARGENTINA				BRAZIL—continued			
Buenos Aires	B2	Meters 275.0	Watts 100	Sao Paulo	SQAK	Meters 350.0	10
Do	D3	253.3	100	Sorocaba		425.0	
Do	LOJ	270.0	1,000	CHILE			
Do	LOL	226.0	2,000	Antofagasta	CMAO		
Do	LON	210.0	5,000	Concepcion	CMAJ	345.0	1,800
Do	LOO	253.0	1,000	Santiago	CMAD	230.0	1,000
Do	LOQ	261.8	3,000	Do	CMAE	280.0	100
Do	LOR	344.8	1,000	Tacna	CMAF	550.0	200
Do	LOS	291.2	5,000	Talcahuano			
Do	LOT	400.0	1,000	Temuco	CMAK	245.0	100
Do	LOV	361.5	1,000	Valparaiso		400.0	50
Do	LOW	303.0	1,000	PARAGUAY			
Do	LOX	380.0	1,000	Asuncion			12
Do	LOY	315.2	1,000	PERU			
Do	LOZ	330.0	1,000	Lima	OAX	260.0	1,500
Cordoba	H5	275.0	100	URUGUAY			
Do	H6	250.0	20	Montevideo	CWOA	428.4	1,000
La Plata	LOP	425.0	1,000	Do	CWOF	300.0	100
Mendoza	LOU	380.0	500	Do	CWOG	250.0	10
Do	M6	348.0	10	Do	CWOH	800.0	50
Rosario	F2	270.0	100	Do	CWOK	280.0	50
Santa Fe	F1	279.0	20	Do	CWOL	272.0	100
BOLIVIA				Do	CWOM	265.5	20
La Paz		175.0	50	Do	CWON	255.5	200
Do		300.0	50	Do	CWOO	294.0	50
BRAZIL				Do	CWOR	350.0	500
Bahia	SKV	600.0	50	Do	CWOB	380.0	500
Do	SQBE	24.0		Do	CWOW		500
Curytiba	SQAF	340.0	8	Salta	CWOJ	272.0	50
Juis de Fora	SQAY	380.0	200	Do	CWOJ	250.0	10
Para		34.0		VENEZUELA			
Pernambuco		310.0	300	Caracas	AYRE	375.0	1,000
Porto Alegre							
Rio de Janeiro	SQAA	400.0	2,000				
Do	SQAB	310.0	500				
Do	SQAJ	260.0	500				
Santos	SCAI	280.0	10				
Sao Paulo	SCBO	225.4	1,000				
Do	SQAG	350.0	1,000				

EUROPE

AUSTRIA				DENMARK			
Graz		365.8	500	Copenhagen	D7RL	42.12	
Innsbruck		294.1	500	Do	D7MK	84.25	
Klagenfurt		272.7	500	Do		32.05	
Linz		254.2	500	Kalundborg		337.0	500
Vienna	ORV	517.2	14,000	Soro		1,535.0	7,500
Do	EATH	37.0				1,183.8	1,500
Do	OHKZ	70.0		ESTONIA			
BELGIUM				Tallinn		1,200.0	100
Antwerp		265.5	100	Do		408.0	700
Brussels	BAV	508.5	1,500	FINLAND			
Do		230.0		Blorneborg (Porl)		254.2	100
Ghent		275.0		Helsingfors (Helsinki)		500.0	1,000
Liège		205.0	100	Do		240.0	2,000
Do		294.1	100	Jakobstad (Pietersaarkil)		275.0	200
CZECHOSLOVAKIA				Jyvaskyla		297.0	200
Bratislava	OKR	300.0	500	Lahtis		1,525.0	40,000
Brunn	OKB	441.2	2,400	Do		318.0	180
Kosice	OKK	293.0	2,000	TAMMERE			
Prague	OKP	384.9	5,000	Tammerfors (Tampere)		400.0	250
DANKIG							
Danzig		272.7					

EUROPE—Continued

Country and city	Call	Wave length		Power	Country and city	Call	Wave length		Power	
		Meters	Watts				Meters	Watts		
FRANCE										
Agon	ZB D	297.0 { 30.76	500		IRISH FREE STATE					
Bamboul		181.0			Cork	6CK	Meters	Watts		
Biarritz		198.0			Dublin	2RN	403.0	1,000		
Bordeaux		419.0	1,500				319.1	1,500		
Chateaux-Thierry					ITALY					
Feamp.		201.0			Genoa		400.0	6,000		
Lille		267.3			Mercato-Saisano	IMI	316.8	200		
Limoges		283.0			Milan	INA	833.8	7,000		
Lyon	YN	490.0	1,000		Naples	IRO	449.0	1,500		
Do	YR	461.2	5,000		Do	ILAX	45.0	3,000		
Maraille		307.0	1,000		LATVIA					
Mont de Marsan		390.0	300		Riga	KCX	596.3	2,000		
Montpellier		223.0	200		LITHUANIA					
Nancy		16.5								
Nice		248.0			Kovno		2,000.0	2,000		
Nîmes		240.0			LUXEMBURG					
Nogent-sur-Saône	FRA V	90.0			Luxemburg	LOAA	217.4	250		
Pacy	FL	1,500.0 { 3.00	20,000		NETHERLANDS					
Do	FPTT	488.0	1,000		De Bilt	PCFF	1,100.0			
Do	F8GC	349.81	500		Elversum	HDO	1,083.9	1,000		
Do		340.9	500		Do	FCJT	81.2			
Do		1,750.0	8,000		Do		1,840.0			
Do		508.87	260		Hulsen		1,840.0			
Reims		294.0	1,500		Koowijk		194.0	25,000		
Strasbourg		221.2			Schevelingen		1,875.0			
Toulouse	MRD	290.0	1,000		NORWAY					
Do		390.6	2,000		Bergen		370.4	1,500		
GERMANY										
Augsburg		560.0	700		Do	LOGN	80.0			
Berlin		438.9	600		Oalo		370	1,500		
Do	AFT	2,900	8,000		Potsdam		404.0	1,000		
Do		566	2,000		Slavanger		277.6	1,500		
Bremen		292.1	4,000		Tromsø		243.9	1,000		
Do		2,520.0	700		POLAND					
Dobertz	APK	57.65	700		Katowice		422.0	2,000		
Do		67.65	700		Krakow		422.0	1,500		
Do		271.2	700		Polnan		270.3	1,500		
Do		448.6	750		Warsaw		1,111.1	8,000		
Do		428.6	1,500		PORTUGAL					
Frankfurt-on-Main		577.0	4,000		Lisbon	PIAA	303.0	600		
Freiburg		260.0	700		Do					
Hannover		394.7	4,000		SPAIN					
Kaiserlautern		204.1	4,000		Almeria	EALJ	220.0	1,000		
Kassel		272.7	700		Bayona	EALJ	244.8	1,000		
Kiel		254.2	700		Bilbao	EALJ	422.0	1,000		
Königsberg		326.7	4,000		Do	EALJ	403.0	1,000		
Langenberg		468.6	8,000		Cadix	EALJ	230.0	1,000		
Leipzig		361.8	4,000		Cartagena	EALJ	426.0	1,500		
Münster		241.9	1,500		Madrid	EALJ	378.0	1,500		
Munich		533.7	4,000		Do	EALJ	381.7	1,200		
Neuen	AGC	17.2			Do	EAM	261.0	100		
Do	AGJ	66.7	750		Malaga	EAM	261.0	200		
Nürnberg		303.0	700		Oviedo	EALJ	260.4	300		
Saarbrück		281.0	700		Salamanca	EALJ	501.0	500		
Stettin		236.2	4,000		San Sebastian	EALJ	267.0	2,000		
Stuttgart		374.7	4,000		Seville	EALJ	434.8	600		
HUNGARY										
Budapest	MTI	535.6	2,000							
Do	MTJ	1,040.0	12,000							
Do	MTS									
ICELAND										
Akureyri	Q29H	192.0	500							
Reykjavik		333.3								

EUROPE—Continued

Country and city	Call	Wave length	Power		Country and city	Call	Wave length	Power
			Meters	Watts				
SWEDEN								
Boden.....	SASE	1,181.0	100	SWITZERLAND—contd. Geneva..... Leuvenne..... Zurich..... Do..... UNITED KINGDOM Aberdeen..... Bellfast..... Birmingham..... BT..... Bournemouth..... Cardiff..... BWA..... Caterham..... Daverny..... DXK..... Do..... Dundee..... Dunfermline..... Edinburgh..... Edinburgh..... Glasgow..... Hull..... Leeds, Bradford..... Liverpool..... London..... Manchester..... Newcastle..... Newcastle..... Nottingham..... Plymouth..... Reading..... Sheff. on Trent..... Swansea.....	600	Watts		
Borns.....	SMYB	280.8	160		700.0	HBI	700.0	500
Falun.....	SMUC	280.8	600		800.0	HB2	800.0	800
Falun.....	SMUC	280.8	400		800.0	H9XD	800.0	1,500
Falun.....	SMZK	281.3	560		85,32.0		85,32.0	1,500
Gävle.....	SMXF	204.1	200		600.0		600.0	1,500
Göteborg.....	SASB	415.1	600		200			
Halmstad.....	SMSE	215.8	200		600.0	2BD	600.0	1,500
Helsingborg.....	SMYK	228.0	200		600.0	2FE	306.1	1,500
Hörby.....	SASC	260.9	20		150	5IT	324.1	1,500
Huddersvall.....	SMBL	272.7	150		250	6BM	491.8	1,500
Jönköpings.....	SMZD	201.8	250		250	6WA	353.0	1,500
Kalmar.....	SMBW	254.2	200		200	2NM	27.5	1,500
Karlsborg.....	SAS	52.5	200		200	2XX	1,000.0	10,000
Karlsborg.....	SMBSM	160.0	200		200	49W	24.0	200
Karlsborg.....	SMXG	222.5	200		200	2DE	294.0	200
Kiruna.....	SMTG	228.1	400		600	2FE	288.5	500
Kristinehamn.....	SMTY	252.7	250		250	5CO	405.4	1,500
Luleå.....	SMXO	400.0	250		250	6KH	294.0	200
Malmö.....	SABG	1,280.0	20,000	20,000			600	
Norrköping.....	SMVV	278.2	250	250	2LS	277.8	200	
Örebro.....	SMVI	236.2	200	200			200	
Örnkölsdåvik.....	SMZA	222.2	200	600	6JY	282.1	3,000	
Östergård.....	SASF	722.0	600	600	2LO	261.4	1,500	
Säde.....	SMFB	221.1	400	384.8	2ZY	281.4	1,500	
Stockholm.....	SABD	444.6	1,000	212.5	2NO	212.5	200	
Stockholm.....	SABD	444.6	400	478.2	6NY	478.2	200	
Trollhättan.....	SMYQ	278.8	400	200	6BY	404.7	200	
Uddevalla.....	SMZP	254.1	600	200	6BY	200	200	
Umeå.....	SMZB	228.0	200	200	6BT	224.0	200	
Uppsala.....	SMRM	600.0	150	200	6BX	294.0	200	
Varberg.....	SMBO	297.0	300	200			200	
SWITZERLAND								
Basel.....	HB8	1,000.0	200					100
Berns.....		411, 32.0	1,530		Zagreb.....			

EUROPE—ASIA

Country and city	Call	Wave length	Power		Country and city	Call	Wave length	Power
			Meters	Watts				
RUSSIA								
Armenia.....	RA47	720.0	200	RUSSIA—continued. Petrozavlovsk..... Petrozavlovsk..... Rector-on-Don..... Samara..... Saratov..... Simleensk..... Do..... Stalino..... Stavropol..... Sverdlovsk..... Tashkent..... Tiflis..... Tomsk..... Tver..... Ulyanovsk..... Vel' Ostyak..... Volgda..... Vladivostok..... Voronezh..... TURKEY Angora..... Osmanië.....	250.0	45		
Armenia.....	RA56	700.0	1,000		RA64	250.0	2,000	
Asiatskhan.....	RA45	700.0	1,000		RA46	750.0	2,000	
Baku.....	RA45	700.0	4,000		RA47	820.0	4,000	
Bogrodsk.....	RA48	525.0	1,000		RA48	800.0	200	
Dnepropetrovsk.....	RA49	630.0	1,000		RA49	820.0	200	
Erivan.....	RA39	1,025.0	1,200		RA49	150.0	600	
Gomel.....	RA67	1,100.0	1,500		RA49	150.0	600	
Irkutsk.....	RA7	475.0	4,000		RA49	150.0	600	
Ivanovo-Vornessensk.....	RA49	1,700.0	4,000		RA49	150.0	600	
Khar'kov.....	RA49	475.0	4,000		RA49	150.0	600	
Kiev.....	RA45	776.0	1,200		RA49	150.0	600	
Kourak.....	RA34	575.0	1,000		RA49	150.0	600	
Krasnodar.....	RA38	513.0	1,000		RA49	150.0	600	
Leningrad.....	RA42	1,000.0	10,000		RA49	150.0	600	
Do.....	RA49	150.0	350		RA49	150.0	600	
Mitnuk.....	RA18	860.0	1,200		RA49	150.0	600	
Moscow.....	RA1	1,450.0	40,000		RA49	150.0	600	
Do.....	RA1	450.0	40,000		RA49	150.0	600	
Do.....	RA1	1,571.0	300		RA49	150.0	600	
Do.....	RA7	1,971.0	300	RA49	150.0	600		
Nalchik.....	RA17	1,840.0	1,600	RA49	150.0	600		
Nizhni-Novgorod.....	RA12	1,117.0	4,000	RA49	150.0	600		
Novosibirsk.....	RA42	1,971.0	1,200	RA49	150.0	600		
Odessa.....	RA40	971.0	1,200	RA49	150.0	600		
Orenburg.....	RA29	640.0	1,000	RA49	150.0	600		

ASIA

Country and city	Call	Wave length	Power	Country and city	Call	Wave length	Power
CEYLON				INDIA—continued			
Colombo	-----	Meters 800.0	Watts 1,500	Calcutta	7CA	Meters 370.4	Watts 1,000
CHINA				Rangoon	2HZ	350.0	40
Harbin	COHB	445.0	-----	JAPAN			
Mukden	COMK	425.0	2,000	Hirodo	JHBB	37.5	-----
Shanghai	-----	342.0	250	Hiroshima	JOPK	353.0	-----
Do	-----	342.0	250	Kumamoto	JOJK	380.0	2,000
Do	-----	342.0	250	Nagoya	JOCK	360.0	1,000
Tientsin	XOL	480.0	500	Osaka	JOBK	385.0	1,000
Do	GEC	280.0	50	Taipei	JFAB	32.5	-----
CHOSSEN				Tokyo	JOAK	375.0	1,000
Seoul	JODK	357.0	1,000	KWANTUNG			
FRENCH INDO CHINA				Dairen	JQAK	385.0	5,000
Haiphong	-----	87.0	2,500	NETHERLAND EAST INDIES			
HONG KONG				Bandoeng	ANE	310	8
Victoria	GOW	300.0	1,500	Batavia	JFC	15.93	-----
INDIA				Malabar	ANH	31.25	40
Bombay	2AX	320.0	50	Surabaya	-----	140.0	500
Do	2FV	387.0	100	Do	-----	175.0	-----
Do	7BY	357.1	3,000	STRAITS SETTLEMENTS			
Madras	2GR	400.0	200	Singapore	1BE	330.0	100

OCEANIA

AUSTRALIA				AUSTRALIA—CON.			
Adelaide	5CL	392.0	1,000	Sydney	2BE	325.0	20
Do	5DN	313.0	100	Do	2BL	353.0	1,000
Bathurst	2MK	-----	-----	Do	2FC	442.0	2,000
Brisbane	4CM	278.0	50	Do	2GB	328.0	1,500
Do	4MB	237.0	250	Do	2KY	280.0	300
Do	4QG	385.0	1,000	Do	2UE	297.0	80
Hobart	7ZL	525.0	3,000	Do	2WA	462.0	100
Melbourne	3AR	484.0	320	Toowoomba	4OR	294.0	20
Do	3LO	371.0	1,000	NEW ZEALAND			
Do	3UZ	319.0	20	Auckland	1YA	420.0	500
Do	3WR	303.0	20	Christchurch	3AC	400.0	500
Mildura	3EO	286.0	20	Dunedin	4YA	380.0	110
Newcastle	2HD	288.0	20	Palmerston	2ZF	280.0	-----
Northbridge	3UW	263.0	100	Wellington	2YK	285.0	80
Perth	6WF	1,250.0	1,000	AFRICA			
Rockhampton	4RN	323.0	100	ALGERIA			

AFRICA

ALGERIA				MOROCCO			
Algiers	-----	310.0	100	Casablanca	CNO	305.0	25
Do	8DB	310.0	100	Do	AIN	51.0	-----
CANARY ISLANDS				Rabat	-----	416.0	-----
Las Palmas	EAR5	250.0	200	TUNISIA			
Do	-----	350.0	-----	Carthage	TNU	1,850.0	-----
EGYPT				Constantine	8KR	42.5	-----
Cairo	8RE	265.0	-----	Tunis	TUA	45.0	100
KENTA				UNION OF SOUTH AFRICA			
Nairobi	7LO	400.0	-----	Cape Town	-----	372.0	1,200
Do	-----	31.5	-----	Durban	-----	398.0	1,200
MOROCCO				Johannesburg	JB	32.0	900
Algiers	-----	310.0	100	Pretoria	-----	443.5	-----
Do	8DB	310.0	100	-----	-----	323.0	-----

PROGRAMS

The demand of individuals is alone responsible for the growth of broadcaster's desire for results. Parallel cases are noted in the in considering the purchasing of a receiver, and, for the most part, entertainment is the principal use to which the set is put throughout its life.

Programs the world over have a striking similarity. Inquiries made personally of a Hollander, an Argentinian, and an American recently returned from the Far East, all visitors to the electrical division of the Bureau of Foreign and Domestic Commerce, as to the kind of program material used in those countries elicited a response in each case that the broadcasts were "just the same." In the frantic search for "fresh" material program directors in every country are searching the musical files of all nations for music and musical effects not already worn threadbare through repetition in numberless preceding programs. The competition between broadcasters is at a higher pitch because of the fact that results are obscure, making necessary the expenditure of every effort to attain such highly meritorious programs that no doubt lingers as to their reception.

News bulletins, time signals, market prices, educational programs, and cooking and agricultural advice take but a small portion of the total broadcasting time of stations and unless rigidly limited, a much smaller proportion of the total receiving time. Reception of the first two items is usually welcomed because of their value to the listener. The remainder are of interest to distinct minorities. Their broadcasting is attended by more or less permanent loss of the majority of a station's listeners. This is not necessarily true in regions where prices of a single product or conditions in one industry determine the living conditions of the entire population. However, in these places there is the added advantage of few such items to be broadcast and resulting short time required to give the information.

Since news flashes have obtained a definite place in the typical program in the United States, there remains but one point in which a difference is to be noted; that lies in the fact that several foreign governments employ the radio as well as the press for publishing official communications to the public.

Good will appears to be generated in inverse ratio to the length of time spent in advertising broadcasting, so that programs of stations operating under this system of financing call for a particularly fine adjustment to serve the desired ends and to please both advertiser and listener. In some countries the lack of interest in broadcasting can be traced directly to unnecessary time consumed in broadcasting advertising. This defeats both purposes of radio advertising, since it does not satisfy the listener's desire for entertainment nor the broadcaster's desire for results. Parallel cases are not noted in the United States, where certain stations and certain programs are meticulously avoided by those who would otherwise be continued among their listeners.

The importance of proper programs and attractive features is hardly to be overestimated in dealing with radio markets. Exporters working with and through their distributors to improve programs can do much to improve the markets by better pleasing

the present owners of sets and, through them, enlarging the field of prospects.

CALL LETTERS

The service regulations of the international radiotelegraphic conventions of 1912 and 1927 provide that call letters of stations in the international system must be formed of a group of three letters for land stations. This regulation was adopted at Washington in 1927, with the specification that it shall be made effective in all cases within one year of January 1, 1929. The initial letters of the calls are to designate the nationality of the station, these being assigned according to the following statement. There is considerable variation from the assignments existing previous to the Washington conference.

CAA-CEZ	Chile.	PPA-PYZ	Brazil.
CFA-CKZ	Canada.	PZA-PZZ	Surinam.
CLZ-CMZ	Cuba.	Q	Abbreviations.
CNA-CNZ	Morocco.	RAA-RQZ	Russia.
CPA-CPZ	Bolivia.	RVA-RVZ	Persia.
CRA-CRZ	Portuguese colonies.	RXA-RXZ	Panama.
CSA-CUZ	Portugal.	RYA-RYZ	Lithuania.
CVA-CVZ	Rumania.	SAA-SMZ	Sweden.
CWA-CXZ	Uruguay.	SPA-SRZ	Poland.
CZA-CZZ	Monaco.	SUA-SUZ	Egypt.
D	Germany.	SVA-SZZ	Greece.
EEA-EHZ	Spain.	TAA-TCZ	Turkey.
EIA-EIZ	Ireland.	TFA-TFZ	Iceland.
ELA-ELZ	Liberia.	TGA-TGZ	Guatemala.
ESA-ESZ	Estonia.	TIA-TIZ	Costa Rica.
ETA-ETZ	Ethiopia.	TSA-TSZ	Saar Basin.
F	France, colonies, etc.	UHA-UHZ	Hedjaz.
G	United Kingdom.	UIA-UKZ	Netherland East Indies.
HAA-HAZ	Hungary.	ULA-ULZ	Luxemburg.
HBA-HBZ	Switzerland.	UNA-UNZ	Yugoslavia.
HCA-HCZ	Ecuador.	UOA-UOZ	Austria.
HHA-HHZ	Haiti.	VAA-VGZ	Canada.
HIA-HIZ	Dominican Republic.	VHA-VMZ	Australia.
HJA-HKZ	Colombia.	VOA-VOZ	Newfoundland.
HRA-HRZ	Honduras.	VPA-VSZ	British colonies, etc.
HSA-HSZ	Siam.	VTA-VWZ	British India.
I	Italy and colonies.	W	United States.
J	Japan.	XAA-XFZ	Mexico.
K	United States.	XGA-XUZ	China.
LAA-LNZ	Norway.	YAA-YAZ	Afghanistan.
LOA-LVZ	Argentina.	YHA-YHZ	New Hebrides.
LZA-LZZ	Bulgaria.	YIA-YIZ	Iraq.
M	United Kingdom.	YLA-YLZ	Latvia.
N	United States.	YMA-YMZ	Danzig.
OAA-OBZ	Peru.	YNA-YNZ	Nicaragua.
OHA-OHZ	Finland.	YSA-YSZ	Salvador.
OKA-OKZ	Czechoslovakia.	YVA-YVZ	Venezuela.
ONA-OTZ	Belgium and colonies.	ZAA-ZAZ	Albania.
OUA-OZZ	Denmark.	ZKA-ZMZ	New Zealand.
PAA-PIZ	Netherlands.	ZPA-ZPZ	Paraguay.
PJA-PJZ	Curacao.	ZSA-ZUZ	Union of South Africa.
PKA-POZ	Netherland East India.		

In addition to these assignments, each country has available a series of calls made up of letters and numbers, the initial letters agreeing with the assignments to that country under the international assignments of all-letter calls. In the past, some countries have assigned calls out of this group to broadcasting stations. Whether

they will change under the new regulations depends upon the interpretation they will put on them.

WAVE LENGTHS

Sets for use in the Western Hemisphere may be restricted to the 200-600-meter wave band, but those to be employed elsewhere, particularly Europe, may need some revision to be capable of receiving on the higher wave lengths in use. A large number of stations employ waves between 600 and 3,000 meters; under the terms of the Washington conference it is recommended to these countries that such stations be included in a band between 1,200 and 1,800 meters, or reduced to the 200-545-meter band, before the end of 1929. A set capable of reaching from 200 to 2,000 meters would perhaps be the best for sale in Europe after the proposed changes are made. Several foreign countries outside of Europe employ longer waves for broadcasting.

Short waves are showing a significant advance in popularity. With modern short-wave sets, and adapters employing broadcast receivers, distant reception has become more important. Evidence of this fact is presented by the demand for long-range sets and the total disappearance of demand for strictly local receivers.

LEADING MARKETS

Comparing 1928 with 1925, the preceding record year in American radio exports, the markets show a greatly varying degree of response to conditions. Of the 25 leading countries in 1925, 18 appear among the 25 leaders in 1928.

Canada led in 1925 with \$3,682,929, 37 per cent of the total, and in 1928 with \$5,264,642, 44 per cent. In 1925 its lead over the country ranking second was \$1,466,394, and in 1928 it had a lead of \$3,750,949 over the second country. The net increase in value was \$1,581,713, or 23 per cent.

Japan appeared second in 1925 with \$2,216,535, 23 per cent of the total, but the overstocked condition under which the Japanese market has operated since it was first opened up practically destroyed its 1928 value and Japan dropped to eighth place. The radio exports to Japan amounted to only \$267,253 in 1928, which was only 12 per cent of the 1925 figure and less than 3 per cent of United States radio exports.

Australia, which in 1925 took \$675,483 (7 per cent) of American radio exports, in 1928 took \$1,179,450 (9 per cent), an increase of \$503,967 (75 per cent), holding its relative position in third place.

The United Kingdom likewise remained in its former position, ranking fourth, but the 1925 exports to that country amounted to \$644,916, or 7 per cent of total exports, while the 1928 value was but \$460,003, or 4 per cent. The decrease was \$184,913, or 29 per cent. Actions at law by patent holders are held responsible.

Argentina advanced from fifth place with \$408,593 (4 per cent) to second place with \$1,513,693 (13 per cent). The money increase amounted to \$1,105,100, or 271 per cent. The promise which has been held out by the Argentine market since the beginning of radio broadcasting is being realized.

Brazil advanced from sixth to fifth place, with \$358,156 and \$432,524, respectively, a gain of \$74,368, or 21 per cent. This is another promising market, but the climatic conditions prevent a rapid increase in demand.

Mexico, seventh in 1925, dropped to tenth place in 1928, with \$272,135 and \$224,255 for the respective years. The money loss amounted to \$47,880, or 18 per cent. Spain was eighth in 1925, with \$230,265, and thirteenth in 1928, with \$171,325. The loss was \$58,940, or 26 per cent.

The Netherlands, ninth in 1925, dropped to twelfth in 1928. The value increased, however, from \$138,695 to \$209,199, a gain of \$70,504, or 51 per cent. Chile, from eleventh with \$113,671, dropped to seventeenth with \$77,604, a loss in value of \$36,067, or 32 per cent. The Philippine Islands took \$109,030 in 1925, ranking twelfth, and in 1928 dropped to fifteenth, but shipments increased by \$11,307 to \$120,337, a gain of 10 per cent.

New Zealand was thirteenth in 1925 with \$98,265; in 1928 it was seventh with \$286,711, a net increase of \$188,446, or 192 per cent. Clearing up of patent difficulties which brought broadcasting to a standstill for several months in 1925 and 1926 is believed responsible.

Cuba, fourteenth in 1925 with \$84,087, by taking \$222,391 in 1928 advanced to eleventh place, an increase of \$138,304, or 166 per cent. This market should continue to show increases. Uruguay, sixteenth in 1925, was ninth in 1928, with values of \$55,307 and \$244,309, respectively, an increase of \$189,002, or 291 per cent. Italy purchased \$53,071 in 1925, ranking seventeenth, and \$337,285 in 1928, advancing to sixth place, with an increase of 535 per cent. France, which was nineteenth in 1925 with \$38,661, was twentieth in 1928 with \$62,890, an increase of \$24,229, or 63 per cent.

Denmark advanced from twenty-fourth place in 1925 to nineteenth in 1928, when it took \$72,884 worth, an increase of \$44,539, or 157 per cent. China, twenty-fifth in 1925 with \$24,364, took \$152,277 in 1928, advancing to fourteenth place with an increase of \$127,913, or 525 per cent.

Seven countries which appeared among the leading 25 in 1925 did not rank in this group in 1928. Sweden ranked tenth in 1925, taking \$122,451, but in 1928 took but \$19,248. Czechoslovakia, fifteenth with \$71,813 in 1925, purchased but \$18,760 in 1928. Norway, which in 1925 purchased \$52,092, ranking eighteenth, bought but \$4,318 in 1928. Salvador, twentieth in 1925 with \$37,354, Peru, twenty-first with \$34,394, British India, twenty-second with \$29,941, and Russia in Europe, twenty-third with \$28,491, dropped respectively to \$9,976, \$13,914, \$15,440, and \$3,088.

The seven countries which replaced these were: Sixteenth, Germany; eighteenth, Colombia; twenty-first, Belgium; twenty-second, British South Africa; twenty-third, Dominican Republic; twenty-fourth, Switzerland; and twenty-fifth, Newfoundland and Labrador. Germany with \$22,975 ranked twenty-sixth in 1925, and in 1928 took \$105,338; Colombia took \$12,742 in 1925 and \$74,022 in 1928; Belgium took \$18,524 in 1925 and \$55,066 in 1928; British South Africa took \$20,334 in 1925 and \$53,950 in 1928; the Dominican Republic took \$9,360 in 1925 and \$49,325 in 1928; Switzerland took \$10,227 in 1925 and \$42,259 in 1928; while Newfoundland and Labrador took \$20,204 in 1925 and \$25,664 in 1928.

The total increase in 1928 over 1925 amounted to \$2,157,623, or 22 per cent.

During the last three years, during which United States radio exports have been divided into five classes, our exports to foreign countries were as follows:

UNITED STATES EXPORTS OF RADIO APPARATUS

Country of destination	1926	1927	1928	Country of destination	1926	1927	1928
TRANSMITTING SETS AND PARTS				RECEIVING SETS			
Belgium	\$9,222	\$317		Austria	\$1,786	\$209	\$817
Czechoslovakia		475	\$807	Azores and Madeira Islands	75	52	51
Denmark	33			Belgium	1,995	1,103	2,015
France	1,902	329	287	Bulgaria	1,264	1,263	484
Germany	1,144	8,932	32,236	Czechoslovakia	1,524	2,802	8,177
Italy	50,152	3,119	8,087	Denmark	15,818	13,672	8,466
Netherlands	423	2,220	1,618	Estonia	1,180	1,471	485
Norway	59			Finland	4,048	5,232	6,065
Poland and Danzig		1,744	5,896	France	6,158	4,841	4,990
Portugal		70		Germany	5,892	6,833	7,147
Russia in Europe	9,429	5,745	1,318	Gibraltar			45
Spain	156	4,349	1,098	Greece	785	3,064	1,177
Sweden	200	106	381	Hungary	170		543
United Kingdom	8,647	34,499	26,403	Iceland	165		78
Canada	15,263	30,141	255,434	Irish Free State	307	626	709
British Honduras	38	600	12	Italy	39,887	65,489	171,555
Costa Rica		411	4,337	Latvia	78	44	
Guatemala	26		75	Lithuania	50	35	
Honduras	21,220	21,545	34	Malta, Gozo, and Cyprus	510	45	51
Nicaragua	250	196	281	Netherlands	6,882	1,001	7,083
Panama	320	1,825	3,193	Norway	11,195	3,804	961
Salvador	60		15	Poland and Danzig	1,614	580	460
Mexico	21,293	3,523	8,377	Portugal	4,845	4,333	5,302
Newfoundland and Labrador	480	174	360	Rumania	2,142	3,292	2,145
Barbados		13		Russia in Europe	258	5,183	845
Jamaica	50		159	Spain	76,191	71,559	100,051
Trinidad and Tobago	124			Sweden	17,988	9,588	3,584
Other British West Indies		568	676	Switzerland	3,026	24,441	10,647
Cuba	3,777	21,877	13,825	Turkey in Europe	100	296	
Dominican Republic				United Kingdom	55,375	34,256	21,150
Netherlands West Indies	896	29,011	25,426	Yugoslavia and Albania	130	323	190
Haiti	22,427	853	117	Canada	1,237,898	1,128,898	2,449,666
Argentina	75,826	51,014	99,454	British Honduras	549	760	482
Bolivia			4,660	Costa Rica	1,305	1,848	4,370
Brazil	11,403	18,271	101,420	Guatemala	5,302	1,941	4,007
Chile	13,136	2,172	216	Honduras	2,354	1,263	2,465
Colombia	14,060	24,100		Nicaragua	1,024	195	2,145
Ecuador		39	1,000	Panama	4,032	2,853	2,328
Peru		109	38	Salvador	17,202	3,385	6,781
Uruguay	15,203	26,131	1,108	Mexico	73,170	63,013	147,513
Venezuela	13,368	2,932	8,945	Miquelon and St. Pierre Islands			25
British India	365		19	Newfoundland and Labrador	7,157	15,637	12,575
British Malaya	15	23		Bermudas	2,948	1,666	6,164
Ceylon			78	Barbados	153	128	248
China	2,459	34,262	47,239	Jamaica	3,275	3,162	3,826
Netherlands East Indies			5,845	Trinidad and Tobago	1,673	349	1,370
Hong Kong	84		2,174	Other British West Indies	2,515	3,468	7,548
Japan	163,317	55,874	41,053	Cuba	41,813	17,452	110,325
Philippine Islands	7,609	15,142	24,859	Dominican Republic	3,304	3,310	12,590
Siam			8,975	Netherlands West Indies			802
Russia in Asia	60,657			Haiti	2,851	4,335	1,217
Australia	5,608	3,995	6,244	Virgin Islands of United States	446		137
British Oceania		72	22	Argentina	283,202	453,475	482,371
French Oceania	259			Bolivia	701	2,129	2,799
New Zealand	18,975	2,498	700	Brazil	80,061	91,640	99,028
British South Africa		67		Chile	16,718	15,005	33,197
Liberia		3,903		Colombia	5,095	2,441	12,689
Mozambique			33	Ecuador	1,332	267	3,171
				British Guiana	40	260	182
Total	555,640	401,100	788,728				

UNITED STATES EXPORTS OF RADIO APPARATUS—Continued

Country of destination	1926	1927	1928	Country of destination	1926	1927	1928
RECEIVING SETS—continued				TUBES—continued			
French Guiana			8310	Salvador	\$1,822	\$472	\$780
Paraguay	8147	822	196	Mexico	8,297	7,880	17,787
Peru	2,995	8,416	3,241	Miquelon and St. Pierre Islands		12	
Uruguay	26,403	111,830	148,883	Newfoundland and Labrador	1,808	1,600	1,664
Venezuela	26,928	1,200	1,879	Bermuda	512	183	657
British India	6,632	22,574	8,454	Barbados			171
British Malaya	898	185	485	Jamaica	52	748	443
Ceylon	542	630	223	Trinidad and Tobago		36	110
China	15,257	20,978	34,379	Other British West Indies		77	1,260
Java and Madura	414	214	657	Cuba	13,045	19,551	23,890
Other Netherland East Indies	60	613	188	Dominican Republic	5,040	225	4,456
Hong Kong	2,058	690	440	Netherland West Indies		809	497
Iraq		164		French West Indies			30
Japan	82,802	15,478	29,640	Haiti	822	1,017	262
Kwangtung	391	435		Virgin Islands of United States	27		
Palestine	350	86	150	Argentina	79,689	117,287	128,615
Philippine Islands	27,817	20,093	52,808	Bolivia	14	804	279
Siam		55	2,154	Brazil	33,150	56,012	69,142
Russia in Asia		95		Chile	8,901	11,598	17,200
Syria	60	10		Colombia	261	10,249	16,555
Turkey in Asia	184	32		Ecuador	33	139	563
Australia	205,617	429,631	849,414	British Guiana		23	19
British Oceania	1,151	1,191	596	Paraguay	43	68	
French Oceania	280	852	1,180	Peru	684	1,840	1,890
New Zealand	819,272	229,312	112,619	Uruguay	7,007	19,734	25,904
British South Africa	16,425	15,667	25,147	Venezuela	3,693	3,781	3,286
Egypt	800	403	183	British India	913	554	1,866
Algeria and Tunisia		40		British Malaya	12	276	808
Liberia	164	164	115	Ceylon	5,311	39	
Morocco		78	618	China	8,877	22,927	33,178
Mozambique	28		651	Java and Madura	1,125	1,050	145
Other Portuguese Africa		89		Other Netherland East Indies			124
Canary Islands	1,601	392	95	Hong Kong	697	167	128
Other Spanish Africa		158	231	Japan	194,951	95,283	74,918
Total	2,673,676	2,961,301	4,548,826	Kwangtung	126		
TUBES				Philippine Islands	14,673	39,039	18,708
Austria	526	1,235	2,237	Russia in Asia			3,445
Azores and Madeira Islands			175	Siam			1,423
Belgium	5,447	9,287	23,918	Syria		21	
Bulgaria		125	357	Australia	221,608	267,036	178,634
Czechoslovakia	1,276	4,285	2,836	British Oceania	73	239	11
Denmark	1,621	7,569	10,559	French Oceania		139	198
Estonia	203		1,727	New Zealand	53,955	75,186	46,937
Finland	287	278	833	British East Africa		315	
France	3,800	4,420	8,551	British South Africa	4,649	3,630	3,573
Germany	4,885	2,967	1,576	British West Africa			58
Greece	76	430		Egypt	20	15	
Hungary	128	874	1,257	Liberia		1,600	
Iceland			33	Morocco			49
Irish Free State		185		Mozambique			62
Italy	7,520	11,528	38,179	Canary Islands	203	44	110
Latvia			172	Other Spanish Africa		10	51
Malta, Goso, and Cyprus			229	Total	867,631	1,004,337	1,017,660
Netherlands	2,199	970	1,632	RECEIVING-SET COMPONENTS			
Norway	2,809	1,234	786	Austria	1,002	1,771	1,674
Poland and Danzig	162	683	739	Azores and Madeira Islands		49	
Portugal	68	1,324	1,938	Belgium	3,111	4,184	24,285
Rumania	196	412	592	Bulgaria			108
Russia in Europe	148	1,329	320	Czechoslovakia	9,415	8,818	3,904
Spain	11,763	18,229	21,708	Denmark	25,565	24,601	22,242
Sweden	3,167	1,137	1,980	Estonia		32	60
Switzerland	312	8,081	10,211	Finland	1,978	5,035	8,742
United Kingdom	34,089	11,056	22,256	France	8,175	3,653	17,388
Yugoslavia and Albania		47		Germany	7,794	5,821	14,606
Canada	114,068	145,041	173,843	Greece	22	1,786	819
British Honduras	46	82	222	Hungary	87	851	143
Costa Rica	154	1,795	1,836	Iceland	199		
Guatemala	685	306	1,268				
Honduras	669	1,004	925				
Nicaragua	574	215	1,171				
Panama	2,328	5,629	5,218				

UNITED STATES EXPORTS OF RADIO APPARATUS—Continued

Country of destination	1926	1927	1928	Country of destination	1926	1927	1928
RECEIVING-SET COMPONENTS—con.				RECEIVING-SET COMPONENTS—con.			
Irish Free State	\$4,081	\$2,403	\$1,028	British South Africa	\$4,250	\$4,468	\$6,986
Italy	8,752	20,240	58,483	Egypt	682	206	847
Latvia	163		473	Liberia	115	20	78
Lithuania		83		Mozambique			1,618
Malta, Goso, and Cyprus	322		37	Canary Islands	428	168	311
Netherlands	85,979	71,205	148,412	Total	2,016,466	2,805,721	3,054,810
Norway	5,714	2,789	637	RECEIVING-SET ACCESSORIES			
Poland and Danzig	1,177	15,015		Austria	618	460	867
Portugal	2,074	2,202	2,456	Azores and Madeira Islands		81	
Rumania	5,614	3,460	583	Belgium	5,509	2,645	4,847
Russia in Europe	341	607	799	Bulgaria		291	288
Spain	37,304	43,854	32,392	Czechoslovakia	14,946	6,611	3,084
Sweden	17,055	7,801	5,157	Denmark	60,338	24,786	31,317
Switzerland	1,593	3,686	9,490	Estonia	650		119
Turkey in Europe	27	26		Finland	2,189	3,212	4,827
United Kingdom	238,055	120,907	185,623	France	11,870	17,325	31,674
Yugoslavia and Albania		20		Germany	17,748	11,954	49,871
Canada	500,427	635,671	1,280,602	Gibraltar			22
British Honduras	203	54	61	Greece	1,491	1,875	239
Costa Rica	920	624	1,604	Hungary	735	338	2,105
Guatemala	1,147	1,072	723	Iceland			74
Honduras	2,223	829	1,407	Irish Free State	94	220	26
Nicaragua	799	444	1,188	Italy	10,895	24,423	60,981
Panama	4,939	6,994	6,216	Latvia	210	17	
Salvador	3,857	563	944	Malta, Goso, and Cyprus		226	265
Mexico	23,861	29,771	14,653	Netherlands	59,674	55,692	60,554
Newfoundland and Labrador	2,149	1,443	2,911	Norway	7,697	1,735	1,944
Bermudas	337	1,063	2,631	Poland and Danzig	180	1,011	1,184
Barbados	131	621	773	Portugal	1,056	1,352	1,938
Jamaica	822	1,209	1,941	Rumania	684	746	488
Trinidad and Tobago	143	896	1,899	Russia in Europe	654	410	106
Other British West Indies	670	970	1,794	Spain	29,900	14,610	18,082
Cuba	12,510	14,281	36,412	Sweden	18,063	16,903	8,182
Dominican Republic	1,237	2,236	3,318	Switzerland	2,756	4,828	11,878
Netherland West Indies	43	1,115	1,994	Turkey in Europe		188	
French West Indies			87	United Kingdom	125,313	64,780	224,671
Haiti	670	1,635	1,186	Yugoslavia and Albania		28	42
Virgin Islands		99	188	Canada	1,010,987	1,224,147	1,105,097
Argentina	194,296	481,852	553,335	British Honduras		249	171
Bolivia	843	364	1,565	Costa Rica	1,999	1,627	3,067
Brazil	102,947	134,224	69,456	Guatemala	2,452	2,229	3,516
Chile	5,097	10,542	11,814	Honduras	4,288	7,547	1,484
Colombia	2,564	8,958	12,021	Nicaragua	1,208	1,601	2,097
Ecuador	237	562	432	Panama	6,585	6,191	6,471
British Guiana	130	224	1,630	Salvador	4,199	802	4,477
Surinam		69	88	Mexico	51,062	33,978	25,923
Paraguay	166	218	254	Miquelon and St. Pierre Islands		8	61
Peru	2,071	5,088	6,325	Newfoundland and Labrador	2,221	4,401	7,954
Uruguay	15,288	33,541	37,674	Bermudas	302	787	2,060
Venezuela	3,611	10,899	2,575	Barbados	239	120	249
Arabia			360	Jamaica	341	875	2,279
British India	2,188	5,038	3,747	Trinidad and Tobago	127	681	1,856
British Malaya	442		733	Other British West Indies	2,205	533	1,248
Ceylon	356	319	5,237	Cuba	24,696	26,699	37,870
China	9,734	2,572	14,725	Dominican Republic	10,254	907	3,786
Java and Madura	3,284	2,095	1,705	Netherland West Indies	15	496	573
Other Netherland East Indies	668	696	794	French West Indies			95
Hong Kong	1,572	6,650	4,801	Haiti	1,628	1,783	827
Japan	107,806	53,368	55,549	Virgin Islands	16		
Kwantung	632		777	Argentina	113,542	123,956	225,218
Palestine			125	Bolivia	572	186	812
Philippine Islands	5,880	10,089	8,657	Brazil	57,071	66,207	73,480
Russia in Asia	500	2,025		Chile	10,723	10,799	15,377
Slam		76	640				
Turkey in Asia	13		99				
Australia	391,668	843,119	230,902				
British Oceania	3,574	2,858	348				
French Oceania	144	89	289				
New Zealand	122,296	126,830	77,799				

UNITED STATES EXPORTS OF RADIO APPARATUS—Continued

Country of destination	1926	1927	1928	Country of destination	1926	1927	1928
RECEIVING-SET ACCESSORIES—CON.				RECEIVING-SET ACCESSORIES—CON.			
Colombia.....	\$1,706	\$2,577	\$9,157	Syria.....		\$3	
Ecuador.....	1,460	77	1,017	Turkey in Asia.....		191	
British Guiana.....	37	33	228	Other Asia.....		79	
Surinam.....		104	10	Australia.....	\$419,444	457,949	\$405,266
Paraguay.....	248	117	319	British Oceania.....	12,801	904	458
Peru.....	2,350	1,705	2,320	French Oceania.....		1,003	549
Uruguay.....	7,685	29,839	31,238	New Zealand.....	112,724	100,215	48,756
Venezuela.....	13,185	4,418	1,041	British East Africa.....			36
British India.....	1,994	1,075	1,654	British South Africa.....	5,043	7,417	19,673
British Malaya.....	220	4	471	British West Africa.....	16	30	65
Ceylon.....	259	35	60	Egypt.....	667	235	46
China.....	23,330	11,964	22,798	Algeria and Tunisia.....			10
Java and Madura.....	1,538	4,239	2,239	Liberia.....		2,478	1,581
Other Netherland East Indies.....		2,060	1,089	Morocco.....	56	49	404
Hong Kong.....	3,149	897	3,786	Mozambique.....	42		42
India.....	83	19		Other Portuguese Africa.....			33
Japan.....	168,765	84,705	61,683	Canary Islands.....	498	65	174
Kwangtung.....	670	112	120	Other Spanish Africa.....		19	
Philippine Islands.....	12,990	9,646	15,303				
Russia in Asia.....		84	100				
Siam.....			127	Total.....	2,481,040	2,509,946	2,670,967

NORTH AMERICA

ALASKA

Language, English

Radio development in Alaska is limited only by the small population of the Territory. The number of isolated communities makes this means of entertainment and communication of news particularly valuable.

Alaska has a total area of 600,000 square miles, only a small part of which is inhabited, and a population of about 70,000. The principal cities are Juneau, Fairbanks, Nome, Skagway, and Sitka. The entire southern coast, where the population is concentrated, is mountainous. The climate is moderate, with cool summers and cold winters, and there is abundant rainfall in the mountainous sections. Reception is good throughout the year.

The regulations governing radio in Alaska are those adopted for the United States proper. Broadcasting is permitted only to American citizens. There is no restraint on the ownership or operation of receiving sets.

There are broadcasting stations in Anchorage, Juneau, and Ketchikan. Stations in western Canada and northwestern United States are received. Short-wave reception is popular. Recent estimates place the number of receiving sets in use at 550. These sets are principally of American manufacture purchased through dealers in Alaska or direct by mail.

The Alaskan market is principally for long-range sets; some crystal and short-range tube sets can be used in the vicinity of the broadcasting stations. There are central stations in Anchorage, Cordova, Curry, Douglas, Doyhof, Fairbanks, Humpback Creek, Hyder, Juneau, Ketchikan, Nome, Petersburg, Seward, Sitka, Skagway, Valdez, and Wrangell. With the exception of Nome and Sitka,

the service is 110 volts, alternating current, Nome having 120 and Sitka 100 volts; the frequency of all stations is 60 cycles.

BAHAMAS

Language, English

The development of radio in the Bahamas is somewhat limited, although not so much so as is generally the case in the smaller islands of North America in the Atlantic ocean and the Caribbean sea.

The Bahamas consist of 29 inhabited islands and numerous keys, with an area of 4,500 square miles and a population of 55,000. The climate is poor for radio, being warm and damp, with hot summers and cool winters. Static is bad most of the year, reception being possible only between December and March.

Broadcasting is prohibited. Receiving licenses are issued annually upon payment of a fee of 5 shillings. No other restrictions are imposed. Some 130 receiving sets are in use. Most of these are of American origin, although some British sets have been installed. Only Nassau has central-station service, which is of 110 volts, alternating current. A few socket-power sets are in use; short-wave sets are also popular among a limited part of the population.

BARBADOS

Language, English

In common with other English-speaking parts of North America, Barbados presents a radio development of a higher order than the general conditions would indicate. There is evidence that development will continue.

The area of Barbados is 166 square miles and the population 200,000. The principal cities are Bridgetown and Speightstown. The climate is poor for reception; the summers are hot and the winters warm, and static is bad at all seasons. Reception is possible only from December to March.

There are no regulations governing broadcasting or broadcast reception. No broadcasting stations are operating in Barbados, the nearest ones being in the United States, Cuba, and Porto Rico. The number of receiving sets in use is estimated at 250. Very few, if any, alternating-current receivers are in use. The lighting plant at Bridgetown gives service at 110 volts, 50 cycles, alternating current. Some short-wave sets have been put into operation.

BERMUDA

Language, English

Bermuda is one of the most advanced of the smaller colonial possessions of the British Empire in respect to radio. While conditions in this part of the world are not entirely satisfactory for reception, development has been comparatively rapid, and the number of sets in use is constantly increasing.

The colony has an area of 20 square miles and a population of 25,000. Hamilton is the only city; almost the entire population of the colony is included in this urban district. Some 350 small coral islands, only 20 of which are occupied, make up the group.

The weather is hot throughout the year, but radio reception is fairly good from October to March. Reception is subject to fading, static, and interference from a Government wireless station at all times.

The only regulations are those specified for communicating stations, under which it has been ruled that receiving-set owners must secure licenses.

There is no broadcasting in Bermuda, the nearest stations being those in the United States. Nearly 350 receiving sets are said to be in use. Most of these were purchased from American sources; a number of British sets are also in use. Few alternating-current or short-wave sets have been installed. Where central-station service is available, 100 volts, 60 cycles, alternating current is provided.

BRITISH HONDURAS

Language, English

The development of radio in British Honduras has not been great, since the conditions affecting reception are not of the best.

The population of the colony is about 45,000, the area being about 8,500 square miles. The capital and principal city is Belize. The surface of the country is divided into coastal plains and mountainous interior. The climate is poor for radio reception, being hot throughout the year.

Receiving licenses costing \$5 per year are required; no type of set is prohibited.

There is no local broadcasting, but the stations in Guatemala, Salvador, and Mexico are received, as well as some in the United States when conditions are particularly favorable. Only 40 receiving sets are in use, according to estimates. Practically all of these are of British origin. Only Belize and Corozal have central-station service, 110 volts direct current being supplied in both places, so that alternating-current sets can not be used. It is not known whether short-wave sets have been introduced.

CANADA

Language, English

Only a few countries of the world precede Canada in point of progress in radio developments, all being countries of appreciably greater population. The conditions affecting development are almost identical with those in the United States, to which this development is comparable. In some respects, such as climate, Canadian conditions are more advantageous than our own. In the populous southern section broadcast reception is very popular, while in the more sparsely settled northern areas radio has provided a highly valuable means of entertainment and news communication.

The area of the Dominion is about 3,750,000 square miles, most of the 9,000,000 inhabitants dwelling in the southern one-third of the country. As in the United States, the greater part of the population is settled in the eastern half of the more temperate strip.

Canada has warm summers, winters being cool in the more heavily populated southern areas and cold through the north. Radio recep-

tion is good at all times of the year throughout, slight static interference being encountered from heat during the summer.

There are no exceptional regulations governing broadcasting or reception, except the requirement of an annual license for receivers costing \$1 per year. Broadcasting by more than one station in any city at one time is discouraged by assigning identical wave length to all stations in or near that city, with particular exceptions made by the Department of Marine and Fisheries.

Canada has broadcasting stations in all populated parts of the country and, in addition, the service of the stations in the United States. About 230,000 receiving licenses have been issued. There are no estimates covering unlicensed sets, but the number is very small. Alternating-current sets are popular, and, especially for use in the more isolated districts of the north, short-wave sets are becoming numerous. Central-station service is usually 110 volts, 60 cycles, alternating current.

Formerly nearly all of the receiving equipment used in Canada was of American manufacture, but there has been a strong impetus given to Canadian radio manufacturing by the establishment of numerous branch factories in Canada by American firms. This overcomes the difficulties arising from the high duty on radio apparatus and the sales tax on imported goods required by Canadian law. This tendency has been apparent of recent years in the trend of American radio exports to Canada. That country, nevertheless, remains the best market for American radio apparatus, and in 1928 set a new record in the proportion of American radio exports purchased, and the total itself was considerably higher than in any previous year.

Because of the tendency that has become particularly apparent during 1928 in all radio-manufacturing countries for the owners of radio patents to exercise more strictly their rights under those patents, the marketing of equipment in Canada should follow only after a study of the situation in regard to patents under which the merchandise is manufactured. Licensing in the United States is not sufficient in some cases to overcome the difficulties.

CANAL ZONE

Language, English

Radio development in the Panama Canal Zone is limited by several important factors, but reception has nevertheless proved popular, and indicated developments are greater than is to be expected from a review of general conditions. The number of Americans situated there in connection with the defense and operation of the canal is responsible for a great part of this development.

The Canal Zone has a population of about 75,000. The principal cities are Colon and Balboa. The strip is mountainous, the climate being generally hot and damp. The rainy season lasts from April to December, and reception is impossible during this period. The mean annual temperature averages 80° F.; all seasons are hot.

Broadcasting is allowed only by permit, since it might interfere with the necessary official communications. Receiving is allowed without restraint.

It is reported that a broadcasting station has recently been opened at Balboa by a radio club. San Jose, Costa Rica, has a station which can be received without great difficulty most of the time, while stations in Salvador, Guatemala, Mexico, Cuba, and the United States are sometimes received.

It has been recently estimated that some 500 receiving sets are in use in the zone. These are almost exclusively of American manufacture. It is uncertain as to what popularity alternating-current sets may have, while short-wave reception appears to have only limited success. Central-station service throughout the zone is supplied at 110 volts, 60 cycles, alternating current.

COSTA RICA

Language, Spanish

Costa Rica has shown considerable interest in broadcasting, and the resulting developments are of a reasonably well-advanced nature, although general conditions are not such as to encourage any expectation of great developments. The experience of Costa Rica should prove of value in advancing radio throughout Central America.

The area of Costa Rica is about 23,000 square miles and the population about 500,000. The principal cities are San Jose, Port Limon, and Heredia. The country is mountainous, with plains on the coast. The climate, as in the rest of Central America, is poor for radio, being hot at all seasons. Reception is fair from November to March. No reception is possible during the summer months.

No regulations in regard to radio have been adopted. While not specifically prohibited, broadcasting is not permitted except in the single case of the Government station.

A broadcasting station, the gift of the Mexican Government, is operated at San Jose. Balboa, Guatemala, and Salvador may be received with more or less success. Estimates of up to 700 sets installed have been made, but it is believed that about 250 is a more nearly accurate figure. Most of these sets are of American manufacture, but a fair number of British and German sets are also in use. Only one or two alternating-current sets have been installed, and about the same number of short-wave sets. Central-station service is preponderately 110 volts, 60 cycles, alternating current, but there is some variation in regard to many of the smaller plants.

CUBA

Language, Spanish

Cuba, the largest island of the West Indies, has much the greatest degree of radio development. Radio has proved especially popular to Cubans, as is indicated by the development of amateur broadcasts such as are prohibited in most countries but which supply a certain amount of radio entertainment in various parts of the island. Although at no time has there been any spectacular development, advancement has been steady and maintained at a comparatively high rate. Further increase in the future is clearly indicated in the steady promotion of radio in the past.

Cuba has an area of 45,000 square miles and a population of 3,500,000. The principal cities are Habana, Camaguey, Cienfuegos, Santiago, and Mutanzas. The island is composed of three regions—the eastern mountains, the central plains, and the western hills. The climate is fair for radio except in summer, reception being good from November to March. The mean annual temperature at Habana is 77° F. Both summers and winters are classed as hot.

The local purchasing power depends almost entirely upon the market price for raw sugar and, to a lesser extent, that for tobacco. When prices are high there is a great influx of money, but when prices are low there is no money for luxuries.

Permits are required for broadcasting and for amateur transmitting, but since amateurs are licensed to operate in the broadcast wave band and are permitted to transmit music and other entertainment numbers, by far the greatest amount of the broadcasting is done by amateurs under these conditions. Receiving is permitted without restriction.

There are 42 stations scattered throughout Cuba providing broadcast programs, with greater or less regularity, either as amateurs or as broadcasters. Stations in the United States are received regularly, as well as those in Porto Rico, Haiti, and other Caribbean countries.

Recent estimates indicate that some 25,000 receiving sets are in service in Cuba. Most of these sets are of American origin, while a number have been constructed locally from American parts. Alternating-current sets have proved popular among the classes able to afford the investment necessitated. The current supplied by central stations varies widely, no one voltage or frequency predominating. Short-wave reception is also popular, but among a much smaller class.

DOMINICAN REPUBLIC

Language, Spanish

Radio conditions in the Dominican Republic have not warranted any particularly great development. While there has been some advance, it is not comparable with that in Haiti, Cuba, or Porto Rico. A broadcasting station was recently established, however, and the developments in the near future should be sufficient to place the Dominican Republic among the better-than-average countries of the Antilles.

The Republic has an area of 20,000 square miles and a population of about 1,000,000. It occupies roughly half the island of San Domingo, or Haiti, the Haitian Republic covering the remainder. The surface consists mainly of plains, bordered along the Atlantic coast by low mountains, with high mountains in the center of the island. The southern coast is arid. The climate is hot, both summer and winter. Radio reception is fair from October to March.

No radio regulations have been reported. The only broadcasting station is at Santo Domingo; stations at Port au Prince (Haiti), San Juan (Porto Rico), and in Cuba and the United States are received. Estimates place the number of receiving sets in use at 550, mostly of American manufacture. Short-wave sets have proved par-

ticularly popular, and some alternating-current sets are in use. The larger cities have central-station service of 110 volts, 60 cycles.

FRENCH WEST INDIES

Language, French

Radio equipment in the French West Indies is practically non-existent. The total area of these islands is 1,073 square miles and the population about 544,000. In common with other parts of the West Indies, the climate is always hot and radio reception accordingly poor.

No radio regulations have been issued, but under the general French law receiving sets are licensed at a cost of 1 franc annually. There is no broadcasting, programs from stations in various parts of Caribbean countries being received with more or less success. Only three receiving sets have been reported, all of French manufacture. While it would be necessary to lay all of the groundwork, it is not improbable that a number of short-wave sets might be sold, particularly in view of the short-wave broadcasts from the Eiffel Tower in Paris. Alternating-current sets have not been introduced. One of the principal central stations provides 230 volts, the other 120. Whether this is alternating or direct, and if alternating, what frequency, is not known.

GREENLAND

Language, Danish

Very little is known about radio in Greenland. The communities are not large and are isolated to such an extent that little information can be obtained, but it is apparent that radio developments are not great. A rumor that a broadcasting station is operating in Greenland has not been authenticated. About 25 receiving sets have been reported in use. Short-wave sets might be sold to a certain extent for the purpose of keeping in touch with Denmark, although sets limited to the broadcast band might be able to serve this purpose equally well. All sales would be through Danish houses.

GUATEMALA

Language, Spanish

Radio has proved particularly popular in Guatemala, even though the field is limited by natural conditions and the concentration of wealth in the hands of a small part of the population. Greater future developments are indicated.

Guatemala has an area of about 42,000 square miles and a population of nearly 2,500,000. About 20 per cent of the people are of the white race. Guatemala, Quezaltenango, Coban, and Totonicapan are the principal cities. The country is mountainous and has a very poor climate for radio. It is hot in the coastal lowlands and warm in the mountains throughout the year. The mean annual temperature ranges in different sections from 70 to 80° F., and the rainfall is heavy. Static is very bad. There is no reception from April to August, but it is fair from November to early February; the remainder of the year there are very poor results.

Owners of receiving sets are required to pay a \$5 installation fee, and merchants must notify the Government of all sales of radio apparatus. Besides a broadcasting station at Guatemala City, there are stations in Salvador, Costa Rica, Panama Canal Zone, and Mexico which may be received with more or less regularity. Installations of receiving sets now number about 250, practically all American, with a few German.

A few short-wave sets have been placed in service and appear to be giving satisfaction. Alternating-current receivers have not been purchased in any number. In Guatemala City the central-station service is provided at 110 volts, 60 cycles, but elsewhere various voltages are used, including 100, 125, 200, 220, and 250, some direct current, and varying frequencies in alternating current.

HAITI

Language, French

Haiti, the only French-speaking Republic in North America, has an exceptionally high degree of radio development, considering the general conditions and the limited number of people who could be expected to afford the purchase of radio equipment. The Government is furnishing active encouragement.

The area of the Republic is 10,000 square miles and the population about 2,500,000, of which one-tenth are whites. The principal cities are Port au Prince, Cape Haitien, and Gonaives. Almost all of the territory is mountainous, and the climate very poor for radio. Reception is possible only between October and April. Hot weather maintains at all seasons.

Broadcasting is a Government monopoly, one station being installed at Port au Prince for educational purposes. There is no restriction on the ownership or operation of receiving sets. Stations in the Dominican Republic, Porto Rico, Cuba, and the southeastern part of the United States are received. It is estimated that 750 receiving sets are in use, but a greater number is not improbable. Almost all are of American manufacture. Short-wave sets have some popularity, but this is restricted somewhat because broadcasting in the broadcast wave band is readily available. Alternating-current sets have been introduced, but their success is not yet fully known. Most central-station service is 110 volts, 60 cycles, alternating current.

HONDURAS

Language, Spanish

Honduras does not have any great radio development, although broadcasting is proving popular among a small class of the population. The Republic has an area of 46,000 square miles and a population of about 700,000. The principal cities are Tegucigalpa, Comayagua, and La Esperanza. The country consists of a broad central plateau with wide coastal plains. The coast is hot, but the plateau is cool. Rainfall is abundant. Static is bad most of the year, reception being possible only from November to March. No radio regulations have been adopted. There is no broadcasting, but stations in Salvador, Guatemala, and Costa Rica are received with fair success, and

sometimes Colon and Mexican, Cuban, and American stations. Some 37 receiving sets are in use, nearly all of American manufacture. The use of alternating-current sets and of short-wave sets has not been reported. Lighting voltage is usually 110, but variations in the case of several communities, some of them important, are noted. The frequency in the case of the 110-volt stations is generally 60 cycles.

JAMAICA

Language, English

Jamaica has a greater development than seems warranted by the conditions existing there, which probably may be explained by the fact that the population is English speaking, and reception of American stations is good.

The area of Jamaica is about 4,500 square miles and the population about 900,000, some 15,000 of whom are white. The purchasing power is generally low. Kingston, Port Antonio, Spanish Town, and Montego Bay are the principal cities. The surface is generally mountainous, only about one-sixth of the territory being flat. The climate is tropical except in the highlands, where it is more temperate. Because of static, reception is impossible except between October and March, and then is satisfactory only after 10 p. m.

No regulations governing radio have been issued, but a license on each receiving set is required. There is no broadcasting; stations in Cuba, the United States, and the Caribbean countries are depended upon for programs. About 100 receiving sets are in use, according to a recent report. These are about evenly divided between British and American manufacture. Short-wave sets have not yet attained a high degree of popularity but should find a reasonably good market. Alternating-current sets in use have not proved entirely satisfactory because of static conditions. Central-station service is provided at 110 volts, 25 and 40 cycles, and at other voltages and frequencies not specified, in various parts of the island.

MEXICO

Language, Spanish

Radio in Mexico enjoys an increasing popularity, and development has been steady. While not of the best the climate and other conditions do not interfere with a sufficient amount of good reception to warrant the purchase of receiving sets by a comparatively large part of the population. Unity of language and nationality gives a greater value to broadcasting in distant parts of the country; in other parts of Latin North America no station has this advantage at any great distance.

The area of Mexico is roughly 750,000 square miles and the population about 15,000,000. Mexico City, Guadalajara, and Puebla are among the principal cities. The interior is mainly a high table-land broken by mountains. The coasts are bordered by plains. The central and northern table-land has a moderate climate, but the coasts and southern areas are tropical. The rainy season extends from May to October, and static is bad in all sections during that season. Reception becomes fair in all parts of the country during

November, extending to February in the south, and April in the north.

Broadcasting is administered through the Department of Communications and Public Works. Permits to broadcast are required, and the Government reserves the right of censorship. Broadcasting is supported by the owners and operators of the stations. There is no monopoly, while many of the stations are operated by Government Departments the majority are privately owned. Licenses are required for receiving sets.

Mexico has 19 broadcasting stations, 8 being in Mexico City. Northern Mexico and the Gulf coast receive American stations easily. To the southeast, Central American stations are picked up. More distant stations provide occasional reception.

The number of receiving sets in use is estimated at 50,000. The majority are of American origin, while a number of German sets are in service. Several other countries are represented in smaller numbers.

Alternating-current sets are at present most in demand. While 110 volts, 60 cycles, alternating current is general, characteristics vary so greatly that particular information should be secured. Short-wave reception is popular among a small part of the population but in general is considered the property of experimenters.

MIQUELON AND ST. PIERRE

Language, French

The development of radio in Miquelon and St. Pierre is extremely limited, since there is no broadcasting in French available except such as may be received from the French-speaking stations in Quebec. No regulations are in force except such as have been adopted in France for all colonies. Under these regulations, a 1-franc annual license fee is collected from the owner of each receiving set. There is no broadcasting on the islands, but stations in Canada and the United States are being received. About 25 receiving installations have been made. Most of these sets are of French origin. No alternating-current sets are yet in use. Short-wave reception has aroused some interest.

NETHERLAND WEST INDIES

Language, Dutch

The Netherland West Indies lie in the poorest part of the Caribbean for radio reception, and the development has been correspondingly small. There is a further disadvantage in the lack of broadcasting in the Dutch language.

The area of the group is 400 square miles, of which 210 are represented by the island of Curaco. The population of the group is about 55,000. The weather is hot throughout the year, and radio reception is very poor at all times, although some success is attained between October and February.

Through lack of development, there has been no incentive to the drawing up of a code of radio regulations. The use of receiving sets is therefore unrestricted.

There is no broadcasting in the island and none sufficiently near to give really satisfactory service. The station at Caracas, Venezuela, and some of those along the northern part of the Caribbean and Gulf of Mexico can be received occasionally during the best seasons. Some 50 receiving sets are in use. These are various in origin, including American, British, Dutch, French, and German. Short-wave reception should prove popular, since there is a large station in the Netherlands broadcasting on short waves primarily for the benefit of Netherland colonies. No information as to the present status of short-wave reception is available. Alternating-current sets have not been introduced. Curacao has lighting service at 110 volts, 60 cycles, alternating current.

NEWFOUNDLAND AND LABRADOR

Language, English

Newfoundland and Labrador show a comparatively high rate of radio development, considering the distance from broadcasting stations. The climate and the availability of programs from Canadian and American stations have made it possible for the people to satisfy their unusual interest in radio.

The colony has an area of 150,000 square miles and a population of 285,000. The principal city is St. Johns. The surface is generally flat; the summers are cool and the winters long and cold. Reception is good throughout the year.

There is no broadcasting in Newfoundland, but stations in Canada and the United States are easily received. There are some 760 receivers in Newfoundland itself, and about 50 in Labrador. Practically all are of Canadian or American manufacture.

Alternating-current sets have aroused considerable interest, although only a few have been placed in service. Lighting service in Newfoundland is uniformly 110 volts, 60 cycles, alternating current. The climate and ease of reception on broadcast waves for considerable distances have prevented any great development in the short-wave field.

NICARAGUA

Language, Spanish

Nicaragua has an area of 50,000 square miles and a population of 650,000. The principal cities are Bluefields, Corinto, and Managua. The eastern section is a "table-land," the remainder of the country being mountainous. The climate is generally poor for radio, and static is very bad. The climate of the table-land, however, is more moderate than that of the coast, and reception is therefore a little better. Reception is possible only from November to March, which is the dry season.

Receiving licenses are required, but there are no other special requirements.

The country has no broadcasting stations, depending on San Jose, Guatemala City, and San Salvador for programs. There do not appear to be any alternating-current or short-wave sets in use. Most central stations provide service at 110 volts, 60 cycles, alternating current, but there are some important variations.

PANAMA

Language, Spanish

Radio has been retarded in the Republic of Panama by a number of highly important conditions, but it has nevertheless proved popular, and there is every indication that the future will show an even greater development. The people generally have shown an extreme interest in radio, and the correction or abolition of any of the retarding conditions is certain to show some favorable results.

The Republic has an area of 32,000 square miles and a population of 450,000. The capital and principal city is Panama. The western portion of the country is flat and the eastern is mountainous. The climate of the plains is hot and damp, the mean annual temperatures of various sections averaging 80° F. Static is usually very bad. Reception is possible only from December to April.

Broadcasting is prohibited under a treaty between the United States and Panama dealing with the defense of the canal. Receiving permits, costing \$2.50, are required.

Broadcasting from stations in the Canal Zone, Salvador, Guatemala, and Costa Rica is received. The Republic is reported to have some 800 receiving sets installed. Most of them are of American manufacture, with a small percentage of German and other European sets.

A few alternating-current sets are reported to be in use. Lighting current is mostly 110 volts, 60 cycles, alternating, but some variations are noted. Short-wave reception is successfully accomplished by a small part of those interested in radio, but the interest has not yet spread to any great extent.

PORTO RICO

Language, English

Porto Rico is not large but has a degree of radio advancement that is exceptional in the West Indies. The climate, although not of the best for radio, is better than in most parts of Latin North America, while the American influence directly felt in the island serves to promote radio much beyond the point it would otherwise attain.

The area of the island is 3,500 square miles, and the population about 1,500,000, two-thirds of whom are white. The principal cities are San Juan, Ponce, and Mayaguez. The island is mountainous except for narrow plains along the northern and southern coasts.

Radio regulations adopted for the United States automatically cover Porto Rico. There is one broadcasting station, situated at San Juan. The number of receiving sets has been estimated at 5,000, practically all of American manufacture. Alternating-current sets seem to be attaining a status of popularity. Short-wave reception is extending its influence. Central-station service of 110 volts, 60 cycles, alternating current is general; the principal exception is Arecibo, where 90 volts at the same frequency is supplied.

SALVADOR

Language, Spanish

Salvador has a comparatively high degree of radio advancement, since its situation on the west coast of Central America gives it a

variety of conditions favorable to reception. Radio is popular, but the ownership of sets is restricted to a small class of the population.

The Republic has an area of 13,000 square miles and a population of 1,680,000. The principal cities are San Salvador, Santa Ana, and San Miguel. Plains extend along the coast, the interior being a plateau; the region is volcanic. The climate is hot, and the rainy season extends from May to October. Static is very bad, although reception is fair from November to April.

Broadcasting is a monopoly of the Government. Receiving is permitted only to Salvadorians; foreigners will be issued permits if they renounce their right to present claims through diplomatic channels. The following rates are fixed by decree: Application for permit, 5 colons; installation of receiving set, if made by the Government, 30 colons; monthly payment, 3 colons. Regenerative sets are prohibited. Importing, manufacturing, and merchandising are Government monopolies, but concessions are granted.

There is one broadcasting station at San Salvador; stations in the United States, Cuba, and Mexico are sometimes received, while the stations in Guatemala, Costa Rica, and the Canal Zone are easily picked up. Estimates place the number of receiving sets installed at 250. Nearly all are American, and most of the rest are German. Alternating-current receivers have not yet been fully tested in this market; short-wave sets are popular but have only a limited field of interest. Lighting service is mostly 110 volts, 60 cycles, alternating current, but many stations provide 220-volt direct current, and alternating current is supplied in various combinations of 110 and 220 volts with frequencies of 50 and 60 cycles.

TRINIDAD AND TOBAGO

Language, English

There is no great degree of radio development in the British colony of Trinidad and Tobago as compared with other English-speaking countries, since it is situated in a part of the Caribbean subject to extreme difficulties in reception and distant from broadcasting stations using the English language.

The area of these two islands totals about 2,000 square miles, and the population 350,000, about one-seventh being Europeans. The principal cities are Port of Spain and San Fernando. The surface is low and flat, with mountains rimming the north and south coasts of Trinidad. The climate is very poor for radio, static being bad at all times.

License fees are charged, varying according to the number of tubes in receiver to be used, from 10 shillings to £1 annually. No exceptional regulations other than as regards receiving licenses are in force.

The only satisfactory reception is from Caracas, Venezuela, with some programs coming from Cuba, Porto Rico, Haiti, and the United States. Some 35 receiving installations have been made, practically all of British sets. Alternating-current sets have not yet been introduced, except in possible isolated instances. Short-wave reception is popular, but not many people have provided themselves with this equipment. Where central-station service is available, the current is alternating, 110 volts, 60 cycles.

VIRGIN ISLANDS

Language, English

The Virgin Islands have no great radio development, but among the limited number able to purchase receiving sets it is proving very popular. Greater development in future years appears probable. There are no broadcasting stations in the islands, and reception from those bordering the Caribbean and the Gulf of Mexico is far from perfect, although sometimes satisfactory. It is estimated that some 50 receiving sets are employed in the islands, all of American origin. There are but two central stations in the islands, neither of which provides alternating current, so there is no market for alternating-current sets. Short-wave reception is still confined to amateur circles.

SOUTH AMERICA

ARGENTINA

Language, Spanish

Argentina leads all South American countries in radio developments and ranks fourth among the countries of the world. Aside from Chile and Uruguay, no other South American country has the climatic advantages enjoyed by Argentina, while various other characteristics of the country aid in the promotion of the use of radio. The people, while concentrated in a limited part of the country's area, are scattered through that area to an extent which makes radio as a means of entertainment and news dissemination particularly advantageous.

Argentina has an area of 1,150,000 square miles and a population of about 10,000,000. Buenos Aires is the principal city; Rosario and Cordoba have populations in excess of 100,000, and there are several other cities of importance.

The country consists of a great prairie, bounded on the east by the Atlantic coast and on the west by the Andes Mountains. The climate is temperate in the north and cold in the south. At Buenos Aires the mean annual temperature is 63° F. Radio reception is good throughout the year, especially from April to September.

Radio is controlled by the Government through the Chief of Naval Communications. Broadcasting is permitted freely, permits costing only a 1-peso stamp tax on the application. Receiving sets may be installed by anyone, the only requirement being that the Chief of Naval Communications be advised of the installation. There are no exceptional restrictions on importing, manufacturing, or merchandising.

There are 22 broadcasting stations in the Republic, of which 15 are in Buenos Aires. Additional service in the vicinity of Buenos Aires is provided by stations in Montevideo, in the northeastern part of the country by some Brazilian stations, and in the west by Chilean stations. Small areas receive Bolivian and Paraguayan stations.

A reliable estimate of the number of sets in use is difficult to obtain, but those from the more reliable sources indicate that the number is about 525,000. American sets are the most popular and are in the majority, but many Argentine, British, and German sets are also in use.

Alternating-current sets are finding increased popularity in Argentina. By far the greatest number of towns and cities are provided with 220-volt direct-current service, and the others have various voltages and frequencies. Buenos Aires has 225 volts, 25 and 50 cycles. The standard American voltage of 110 is rare. The use of short-wave reception has shown advancement.

BOLIVIA

Language, Spanish

The development of radio in Bolivia is limited by the small proportion of whites, and the general lack of desire on the part of the Indians for any of the advantages of civilization.

The Republic has an area of approximately 790,000 square miles, some 100,000 square miles of which are in dispute with other countries. The population is almost 3,000,000. The principal cities are La Paz, Cochabamba, Potosi, Suere, and Oruro. The eastern section consists of plains, the western of mountains. The climate is good for radio, the mean annual temperature at various altitudes ranging from 50° to 74° F. The rainy season lasts from December to May, 75 inches of rain falling in the lowlands. The best season for radio reception is from April to September.

Radio broadcasting is under the control of the Ministry of Communications, Director General of Telegraphs. Licenses are granted, without any monopoly, only for the gratuitous broadcasting of entertainment. Five minutes of each hour may be employed for the broadcasting of advertising matter. Stations are licensed to operate certain hours daily.

Receiving licenses will be granted to all applicants. An initial registration fee of 5 bolivianos (\$1.70) and an annual license fee of 36 bolivianos (\$12.25) are charged.

Three broadcasting stations have been reported, all in La Paz. Some reception from Chilean stations and from Lima, Peru, is accomplished. The number of receiving sets in use in Bolivia is about 25, of various origins. Alternating-current receivers have not yet been introduced, and little headway has been made in the introduction of short-wave sets and adapters. The lighting service in La Paz is 120 volts, 50 cycles, while elsewhere 110 or 220 volts, direct current, and 25, 50, and 60 cycle alternating current are found in various combinations.

BRAZIL

Language, Portuguese

Brazil, because of its size and extent of its coast line, variety of economic activities, and distribution of population, will undoubtedly have great development of radio in the future. The great variance in climate tends to increase advancement in the southern part far beyond the north, in proportion to the population, which itself is largely concentrated in the southern localities. The people are occupied in a number of ways, including agriculture, forestry, and manufacturing, but wealth is concentrated sufficiently to restrict the number of set owners considerably.

Brazil has an area of 3,286,000 square miles and a population of about 30,000,000. Rio de Janeiro, Sao Paulo, Pernambuco, Bahia, and Para, all seaports, are the principal cities.

The radio region of Brazil includes only the truly coastal strip. The interior is generally heavily forested and sparsely settled. In the list of States in which receiving sets are licensed, only two interior ones are included, and these two are only short distances from the coast. Further references to the "north," "middle," and "south" will mean those sections of the coastal strip.

In the north there are the usual atmospheric disturbances of the Tropics. There is also some interference from marine telegraphs and shore stations. Climatic conditions improve southward, but even the extreme south is subtropical. Sao Paulo and Rio de Janeiro, the radio centers of Brazil, lie in latitudes comparable to that of Cuba. The average humidity is high throughout the radio regions of Brazil. Sets and parts should be protected against this condition, especially metal parts and transformers. The use of brass and bronze in preference to aluminum and nickel is highly desirable, and only enameled wire should be installed.

Radio is administered by the Department of Public Works and Transportation, the Department of Marine, and the Department of War. Concessions for the establishment of broadcasting stations are required. There is no monopoly. Receiving is permitted on registration, the fee for which is 20 milreis. No annual charge is made. Sets are subject to Government inspection.

Brazil has 15 broadcasting stations scattered along the coast from the mouth of the Amazon to the Uruguayan border, the bulk of them being in the south. The southern area also receives Uruguayan and Argentinian stations. A recent estimate places the number of receiving sets at 250,000. American sets are in the majority, but German, French, British, and Italian sets are most popular in certain sections settled by immigrants of those nationalities. Voltages of 110, 120, and 220, both alternating and direct current, 50 and 60 cycle frequency, are supplied in various combinations.

BRITISH GUIANA

Language, English

Radio has had practically no development in British Guiana. Only about 15 receiving sets are in use, mostly British. The only available broadcasting is from Caracas, Venezuela, and this not particularly satisfactory because of language difficulties and climatic conditions. All seasons are hot and static bad. Reception is possible only between November and February. There are no alternating-current sets, and not more than one or two short-wave receivers in the colony. The only central station supplies 110 volts, 60 cycles, alternating current.

CHILE

Language, Spanish

Chile is one of the foremost countries of South America in radio development, but because of the concentration of wealth promotion has been slow. It does not appear that any discouraging factors

exist aside from the problem of purchasing power, although considerable difficulty from static has been reported from some localities. Climatically, Chile extends through warm, cool, and cold regions, the latter extending to uninhabited regions of frigid temperatures.

The Republic has an area of 290,000 square miles, an extreme width of less than 120 miles, and a length of 2,800 miles. The population is about 4,000,000, practically all in the northern and central parts. Santiago, Valparaiso, Concepcion, and Antofagasta are the principal cities. The country comprises the western slope of the lower Andes Mountains and the narrow coastal plain. The climate varies considerably, owing to the wide ranges of both altitude and latitude. The mean annual temperature at Iquique is 64° F., at Valparaiso, 59°, and at Ancud, 53°. The rainfall varies extremely.

Radio is controlled by the Ministry of Marine. The only regulations affecting broadcasting are those requiring registration and the ordinary precautions for the safety of the State and the protection of public morals. Registration of receiving sets is required.

Eight broadcasting stations are scattered through the length of Chile as far southward as the more heavily settled areas extend. Broadcasting from Lima, Peru, and Buenos Aires, Argentina, is sometimes received, but not with sufficient regularity to be entirely satisfactory.

The number of receiving sets in use has been estimated at 30,000, principally American, with some British and German sets. Several alternating-current sets have been placed in service and appear to be satisfactory. Lighting current is usually supplied at 110 volts, 60 cycles, or 220 volts, 50 cycles, alternating. Short-wave reception is popular.

COLOMBIA

Language, Spanish

Radio developments have been greatly discouraged by climatic conditions in Colombia to the point that there has been practically no progress made. Colombia has an area of about 500,000 square miles and a population of 7,250,000. The principal cities are Bogota, Cartagena, and Barranquilla. The country is generally mountainous. The climate is tropical to the extreme in the lowlands. Static is very bad most of the year in all sections, and no satisfactory reception has been reported. The only reception that is accomplished takes place during January, February, and March.

Colombia has no broadcasting stations, and broadcasts from Venezuela, Costa Rica, and the United States are not satisfactorily received. It has been estimated that 22 receiving sets are in use in Colombia, mostly of American origin. Alternating-current sets are not used. Lighting-service characteristics vary considerably between cities. There is no prevailing combination. Short-wave reception has had greater success than reception in the broadcast band.

ECUADOR

Language, Spanish

Ecuador has in the past shown little progress in radio, but the slight advance has been steady, and the Republic is now showing a more general improvement in radio development. The number of

sets is increasing slowly, but regular increases are noted. The Republic, crossed by the Equator, has an area of 118,000 square miles and a population of 2,000,000, most of which is of Indian or Negro blood. The principal cities are Guayaquil, Quito, and Cuenca. The entire country is mountainous. The climate is poor for radio.

Broadcasting has been declared a monopoly. The concession was granted in 1925. Stations in Guayaquil and Quito were planned, but these have not yet been built. No restrictions on the ownership of receiving sets have been reported, but it is apparent that a license fee is to be charged to support broadcasting. Reception from Lima, Peru, the nearest station, is not exceptionally good. A recent estimate indicates that some 150 receiving sets are in use, largely American, with some British and German sets. There do not appear to be any alternating-current receivers in use. Central-station service is mostly 110 volts, 60 cycles, alternating current, but 120 volts is also common, as are frequencies of 40 and 50 cycles. Short-wave reception has met with some success.

FALKLAND ISLANDS

Language, English

Because of the great distance from any broadcasting, and that in Spanish, the British Falkland Islands have shown little radio progress. The population is small. Summers are warm and winters cool, reception being poor. About 15 receiving sets are in service. All of these are of British origin. There is no broadcasting in the islands, and South American stations are received only with difficulty.

FRENCH GUIANA

Language, French

Practically no radio progress has been made in French Guiana. About eight sets are in use, all French. No broadcasting is available for satisfactory reception. All seasons are hot. The only central station provides direct current only, so alternating-current sets can not be used. Short-wave reception has not been developed.

PARAGUAY

Language, Spanish

Paraguay has an area of a little less than 200,000 square miles and a population of about 800,000. The principal city is Asuncion. The country is mainly flat. Reception is best from May to September, but from November to March it is seldom possible. Summers are hot and winters warm, with poor receiving conditions.

About 150 receiving sets have been installed. These were purchased through Argentine sources and are of varying origins. One broadcasting station has operated for more than two years in Asuncion, and several Argentine stations are received. There have been no regulations adopted, since radio has been little known.

Central-station service is mostly 220 volts, 50 cycles, alternating current. Alternating-current receivers have not been introduced, nor are short-wave sets in evidence outside the class interested in "tinkering" with radio.

PERU

Language, Spanish

Peru has shown great interest in radio developments, and the country has advanced in this respect beyond some other South American countries where the conditions are more favorable. The difficulties arising from broadcasting conditions and the agreements which the Government entered into to secure broadcasting facilities have somewhat retarded progress, but the general popularity of radio has not been seriously checked by these drawbacks.

The area of Peru is about 535,000 square miles and the population about 5,500,000. The principal cities are Lima, Arequipa, and Callao. The surface is rugged and mountainous except for a narrow coastal strip. Climatic conditions are not conducive to good reception. The best reception is between July and September. Fair reception may be had from May to October.

A monopoly was granted which reserved to the grantee the sole right to broadcast and to deal in radio apparatus. This firm collected license fees from the owners of receiving sets. Being controlled by British interests, it preferred to sell British goods, but since the terms of its concession required that 40 per cent of the material sold be purchased in the United States, the imports were so divided. The buying public, however, demanded American apparatus. After the first American quota had been exhausted and only British materials remained for sale, considerable discontent with the arrangement was shown. Discontent was fomented by dealers who had been unable to make terms with the broadcasting company for the retailing of the apparatus. The Government revoked the concession and in its stead placed the concessionaire in charge of broadcasting, which became a function of the Government.

Some 18,000 receiving sets are in service, about equally divided between American and British. The only station broadcasting in Peru is at Lima. No foreign stations can be satisfactorily received. Very few alternating-current receivers have been put into service. Central stations provide 110-volt 60-cycle alternating current at Lima, but elsewhere both voltage and frequency vary. Short-wave sets are fairly popular.

SURINAM

Language, Dutch

Radio development in Surinam has been almost negligible, and it is to be doubted that the future will show any great improvement. The number of receiving sets has been reported as 18, of various origins. Broadcasting is not available in any satisfactory form. Caracas, Venezuela, and sometimes stations in northern Brazil and the West Indies can be picked up. Hot weather maintains throughout the year. Neither alternating-current nor short-wave receivers have been introduced.

URUGUAY

Language, Spanish

Uruguay has displayed exceptional interest in radio, and developments there have been much beyond what was to be expected from

the existing conditions. The number of receiving sets is increasing rapidly, while broadcasting stations have been opened up in appreciable numbers. Most of the development has been restricted to the Montevideo area, which has the only concentration of population. Further developments appear certain.

Uruguay has an area of less than 75,000 square miles and a population of 1,750,000. The surface is hilly and the climate good for radio, the best season being from April to October.

Radio is under the control of the division of radio communication service. There are no exceptional restrictions on broadcasting. Receiving is freely permitted.

About 17,000 receiving sets are estimated to be in use. American sets are the most popular and in the greatest number, but a number of British and German sets are also in service.

There are now 14 broadcasting stations in Uruguay, all but two being in Montevideo; Argentine and Brazilian stations are received regularly.

Alternating-current receivers are in use and have generally proved satisfactory. Short-wave reception from the United States is very popular. Central-station service is generally 220 volts, 50 cycles, alternating current, and 220 volts, direct current.

VENEZUELA

Language, Spanish

Radio developments in Venezuela have not been as great as they might have been because of the number of factors retarding the increase of the number of listeners. Climatic conditions are not of the best, and the high receiving license fee would appear to be prohibitive. The concentration of wealth, however, prevents the license fee from restricting the number of listeners, as those who can afford receiving sets can easily afford this fee.

The area is about 400,000 square miles and the population about 3,000,000, the principal cities being Caracas and Maracaibo. With the exception of the Orinoco Valley, the country is mountainous. The climate is hot and the humidity is high; radio reception from distances is poor.

Radio is regulated by the ministry of the interior. A monopoly was granted which gave the concessionaire the sole right to broadcast and to manufacture, import, and sell radio apparatus, but this was recently revoked and the importation of radio apparatus temporarily prohibited. Receiving licenses cost \$5 per month, the proceeds going for the support of broadcasting. About 2,000 receiving installations have been made. Nearly all of these are of American origin.

Venezuela has a broadcasting station that has been operating since May, 1926, at Caracas. No other stations can be satisfactorily received.

Alternating-current receivers have not generally proved popular. Short-wave reception has interested a limited part of the listeners. Central-station service in Caracas is 190 volts, 25 and 50 cycles, alternating current. Elsewhere 110 volts, 60 cycles, alternating current is general.

EUROPE

ALBANIA

Language, Albanian

Albania has few conditions which would encourage the development of radio. Summers are hot and winters cool. Reception is good only from October to May. No broadcasting stations are operating in Albania. Yugoslavian and Italian stations are most easily received. Only six receivers have been reported in service, all of German origin. No use of alternating-current or short-wave receivers has been reported.

AUSTRIA

Language, German

Austria, despite restrictions, has a high degree of radio development. The climate is good for radio, and, although there is a considerable concentration of wealth, the poorer classes are generally able to afford small receivers. The license fee somewhat restricts this development, however. The populace generally is greatly interested, and broadcasting service from the several Austrian stations and those in neighboring countries using the German language provides a plentiful choice of programs for Austrian reception.

Austria has an area of 32,000 square miles and a population of 6,500,000. The capital and largest city is Vienna, with a population of about 2,000,000. The country is for the most part mountainous, and the climate is extremely varied, owing to the differences in altitude. The mean annual temperature at Vienna is 40° F. The summers are warm and the winters cold. Radio reception is good in most sections, the season of best reception being from October to March.

A broadcasting monopoly has been granted in the Oesterreichischer Radioverkehrs Aktiengesellschaft, a broadcasting company. This company is controlled by the State, which owns 60 per cent of the stock. Its activities are supported by the proceeds from receiving license fees, the amount of which depends upon the use to which the set is to be put and the income of the licensee.

Control over all activities is maintained through a system of licenses which include not only broadcasting and receiving, but importing, manufacturing, and merchandising as well. In addition to the license, importers must secure special permits covering each shipment. Records of all sales must be kept and are subject to inspection at any time. Merchants are held liable for sales made to persons not licensed to possess radio apparatus. In addition to duty, there is a 5.5 per cent turnover tax which is collected by the customs authorities.

An estimate of the number of receivers, licensed and unlicensed, places the figure at 325,000. Practically all are of Austrian and German manufacture, but a number from various other countries are also in use.

Austria has seven stations, of which three are in Vienna. Broadcasting from several neighboring countries is received, language making that from Germany particularly valuable.

Alternating-current sets are showing increased popularity. Short-wave reception is also arousing considerable interest. Both 110 and 220 volts central-station services are general, 42 and 50 cycles predominating.

AZORES

Language, Portuguese

Although the Azores are situated a great distance from broadcasting of any kind and have comparatively poor reception conditions for receiving over this distance, radio has proved popular, and a number of sets have been installed.

The Azores are a group of islands lying about 900 miles off the coast of Portugal and are politically part of the Portuguese Republic. The total area of the group is 922 square miles, of which 300 square miles is accounted for by St. Michaels, the largest of the islands. The total population is about 260,000. Being of volcanic origin, these islands are mountainous and rugged. The climate is warm and equable; frost is unknown, the temperature ranging from 50° to 73.5° F. Radio reception is fair in any season and is best from September to April.

There are no restrictions on the use of receiving sets.

According to a recent estimate, radio installations number about 150. A large percentage of these are of American origin, but the majority appear to be British. No broadcasting has been done in the Azores, but stations in Spain and Portugal are received without great difficulty. The wave lengths of stations received range from 200 to 3,000 meters.

Only one or two alternating-current receivers are in use, battery sets appearing to give better service at the distances over which receivers must be capable of operating. There is no information as to the use of short-wave sets or adapters, but they should be popular for use under prevailing conditions.

BELGIUM

Language, French

Belgium has a high degree of radio development, but it has been retarded by a number of factors. Postwar financial conditions have at times practically abolished the business of radio dealers, but the popularity of broadcasting has served to restore it as soon as prospective purchasers were able to afford the investment. Developments in the construction of broadcasting stations have been much slower, but this is largely made up by the great number of high-powered stations in neighboring countries.

The area of Belgium is about 12,000 square miles and the population 8,000,000. Brussels, Antwerp, Liege, Ghent, and Mechlin are the principal cities. The northern portion consists of lowlands, which slope to a plateau in the south. The climate is conducive to good radio reception, being similar to that of England. The mean annual temperature is 50.6° F., the mean maximum being 57.2° and the mean minimum 44°. The average annual rainfall is 28.4 inches, but varies considerable in different regions, ranging from 27 to 40 inches a year. Radio reception is good at all times except

during the months of June, July, and August, and it is fair even then.

Regulations require that an installation fee and a receiving license fee be paid by owners of receiving sets. Regenerative sets are prohibited. No exceptional restrictions on importing, merchandising, or manufacturing are imposed.

Besides six broadcasting stations in Belgium, those in the United Kingdom, France, Germany, the Netherlands, and other countries are received. The licensing statistics and estimates as to the number of receivers illegally operated indicate that 62,500 installations are in service. French, Belgian, British, and German sets predominate. There is a certain demand for alternating-current receivers. Short-wave sets and adapters are also popular. The prevailing central-station service characteristics are 220 volts, 50 cycles, alternating current.

BULGARIA

Language, Bulgarian

Radio has been discouraged in Bulgaria to the point that there is practically no development. There is yet no indication of any appreciable advancement during the next few years. All means of communication, such as railways, telephones, telegraphs, and wireless stations, are monopolies of the Government, which will not permit the private construction or operation of radio broadcasting or receiving stations. There is, therefore, no market for apparatus in Bulgaria. Most of the few sets in operation have been brought in by members of the diplomatic corps. The summers are hot and the winters cool. Radio reception is good throughout the year. About 50 sets have been installed, mostly Austrian and German. Bulgaria has no broadcasting. Reception from neighboring countries is easily accomplished, but language difficulties prevent it from being particularly desirable.

CZECHOSLOVAKIA

Language, Czech and regional dialects

Czechoslovakia has a high degree of radio development. The Government early adopted an encouraging attitude, and as a result the broadcasting structure is one of the best in the world. The people have found radio interesting and the programs desirable, with the result that a great number of receiving sets have been installed. The climate is good for radio reception, and the national wealth is so distributed that few people are unable to afford receivers. It is expected that the high rate of advancement that has been carried on for the past several years will continue for some time.

Czechoslovakia has an area of 55,000 square miles and a population of 13,600,000, one-half being Czechs, one-fourth Slovaks, and one-sixth Germans. The principal cities are Prague and Brunn.

Radio broadcasting is under the Ministry of Posts and Telegraphs, which controls the monopoly having the broadcasting concession. Broadcasting is supported by subscription collected from receiving-set owners. This subscription is 10 crowns (\$0.30) per month. Licenses are granted to Czechoslovak citizens and to the nationals of other countries which grant the same or greater privileges to Czecho-

slovak citizens. Importing is prohibited except under license, which is granted for 5 per cent of the value of the shipment. Duty is collected in addition.

Receiving sets in use number about 250,000. Domestic manufacturers supply most of the needs of the market, but some German makes are popular.

Four broadcasting stations are scattered through the country, while Austrian, German, Polish, Hungarian, and other stations are easily received.

Alternating-current receivers are becoming popular, as is equipment for short-wave reception. Both 110 and 220 volt lighting service is provided, mostly at 50 cycles.

DANZIG

Language, German

The Free City of Danzig has displayed a great interest in radio and developments have been comparatively great. The climate is excellent for reception, although as an important part Danzig has considerable difficulty from ship-wireless interference.

The Free City has an area of 754 square miles and a population of about 400,000. It is situated on the Baltic between the Polish "corridor" and Prussia. Its climate is favorable to radio reception, being best from September to May.

Receiving is permitted under license, special permits being required for sets capable of receiving over 700 meters. Some market for sets limited to 700 meters is thus created. A fee of 2½ zloty per month is charged for licenses. A luxury tax of 10 per cent is levied on receiving sets.

Although broadcasting is forbidden by law, a recently constructed broadcasting station is said to be operating in Danzig. Stations in the Baltic States, Poland, Germany, and the Scandinavian countries are received. It is estimated that 150 receiving sets are in use, practically all German.

DENMARK

Language, Danish

Interest in radio broadcasting has been high in Denmark, and developments have been encouraged by the Government. The distribution of wealth is such as to enable almost every family desiring radio to purchase a receiver. The climate is excellent for reception, and, although there are no neighboring countries employing the Danish language, the similarity of other Scandinavian tongues to Danish and the custom of educating children in German have increased the popularity of foreign stations received in Denmark.

Denmark consists of the Peninsula of Jutland and several islands, the total area being about 17,000 square miles. The population is about 3,500,000. Copenhagen, Aarhus, Odense, and Aalborg are the principal cities. About 57 per cent of the population is rural. The territory is low and undulating. The climate is in general cold and inclement, though somewhat mild in the southern islands. The mean annual temperature at Copenhagen is 46.8° F. and the rainfall 21 inches. Radio reception is good throughout the year but is best from September to May.

Radio is governed by the State Radio Council. Broadcasting is supported by the proceeds from license fees. No restrictions, excepting the license requirements, have been imposed on the owners of receiving sets. Manufacturing, importing, and merchandising are permitted without restraint.

Five stations are recorded as operating in Denmark. Additional service is obtained from Norwegian, Swedish, German, and British stations.

Receiving sets in use are estimated to number 215,000. Domestic and German manufacturers supply most of the demand, while British sets are also popular, and a number of American sets are in use. Alternating-current receivers are becoming increasingly popular. Short-wave reception likewise is arousing considerable interest. Central-station service is mostly 220 volts, 50 cycles, alternating current.

ESTONIA

Language, Estonian

The development of radio in Estonia has been especially high, considering the difficulties under which promotion labors in this country. Reception conditions are excellent, but the distribution of wealth is not such as to make it possible for every family to afford radio receivers. The people have become particularly interested in radio, however, and any improvement in general conditions is almost certain to result in increased use of radio. Perhaps the greatest aid in the promotion of radio activities has been the encouraging attitude of the Government.

Estonia is a flat country bordered by Russia and Lithuania. It lies east of the Baltic Sea and South of the Gulf of Finland. The capital and principal city is Tallinn, formerly Reval. The population is slightly over 1,000,000 and the area about 18,500 square miles. The language of the country is Estonian, but German and Russian are universally used and understood. The mass of the people are of the peasant class, without high standards of comfort, but the percentage of illiteracy is very low.

The climate is variable, the winters being severe and the summers hot and dry. Radio reception is good throughout the year, especially from September to May. Permits to install receiving sets are required. Two broadcasting stations are operating in Tallinn, while Finnish, Latvian, Lithuanian, Russian, Polish, German, and Scandinavian stations are received. Alternating-current receivers are attaining a certain degree of popularity. Short-wave sets have been introduced for some time and seems to be in fair demand. The preponderance of central-station service is provided at 220 volts, 50 cycles, alternating current.

Licensing statistics show that 14,000 receiving sets are in use. There is no estimate covering illegally operated receivers. German sets are in the majority, and American sets are used to a fair extent.

FINLAND

Language, Finnish

The development of radio broadcasting and receiving is well advanced in Finland. The population appears to be greatly interested,

and the Government has done much to promote broadcasting. The climate is exceptionally good for receiving, and the distribution of wealth appears to be sufficiently extensive to permit all interested people to purchase suitable receivers. The distribution of broadcasting stations is likewise such as to be conducive to good service.

Finland has an area of about 33,000 square miles and a population of 3,500,000, 65 per cent of which is rural. The principal cities are Helsingfors (Helsinki), Abo (Turku), Tammerfors (Tampere), Viborg (Viipuri), Wasa (Waasa), Uleaborg (Oulu), Kuopio, and Bjorneborg (Pori). The name given in parentheses in each case is the Finnish name, the Swedish being given first. The country consists of low plains, broken by occasional low hills and ridges. Nearly 80 per cent of the total area is forest and 12 per cent lakes. The winters are severe, the summers hot and dry. Finland has a more temperate climate than any other country in the same latitude, the mean annual temperature being 34° and the average annual rainfall 14 inches, although at Helsingfors it is about 20 inches. Radio reception is good during all seasons with noticeable improvement during fall and winter.

Broadcasting is provided by eight stations scattered through the populous areas. Swedish, Russian, and Baltic stations are also received satisfactorily.

Some 127,000 receiving sets have been licensed. Germany supplied most of these, with Swedish, British, and American sets used in fairly large numbers. Alternating-current receivers are being marketed with some success. Short-wave reception is popular. Lighting service at 220 volts, 50 cycles, is provided in most places, but some variation is noted.

FRANCE

Language, French

France is one of the most advanced countries in the world in respect to use of radio. The climate is good for receiving. The people are especially interested in radio, and while there have been financial difficulties preventing a large percentage of the people from investing in radio, the large population and the fairly even distribution of wealth have promoted the use of radio beyond the proportions maintaining in other countries under similar circumstances. The Government has interested itself in promoting broadcast service, and the Government chain of broadcasting stations has provided a foundation for the broadcasting system which serves the entire country.

The area of France is about 213,000 square miles, the population being about 41,000,000. The principal cities are Paris, Marseille, Lyon, Bordeaux, Lille, and Strasbourg. The surface generally is flat, but there are border mountain ranges on all of the frontiers except the Belgian and German.

The climate of the different sections varies widely. In the south radio reception is good only during a limited season, while in the north, reception is always good except during the hottest part of the summer. The best reception at Paris is from September to May. Paris has 150 rainy days a year, the total precipitation amounting to about 24 inches. The mean annual temperature is about 50° F.

Broadcasting is permitted by French citizens only. Permits are granted sparingly, apparently to prevent congestion and to guarantee

the placing of permits in the hands of organizations qualified to present the best programs.

Broadcasting is supported by the organizations operating the stations. While there is no monopoly, the majority of the stations are owned by the Government through the Ministry of Posts, Telegraphs, and Telephones. There are 28 broadcasting stations well distributed over France. Various areas receive broadcasts from all parts of Europe.

A receiving license fee of 1 franc per year is charged French citizens. Regulations stipulate that foreigners shall pay 10 francs per year, but this requirement is often passed in particular cases. A luxury tax of 12 per cent on sets costing more than 500 francs and on parts costing more than 50 francs was instituted in January, 1926.

Receiving-set license statistics are not made public, but various estimates indicate some 1,250,000 receivers to be in use. French manufacturers supply nearly all of the demand, with American, German, British, and Italian sets used in small numbers.

Alternating-current receivers have been introduced with moderate success. Short-wave receivers are not exceptionally popular. Central stations in France show little uniformity in current characteristics, no particular combinations prevailing.

GERMANY

Language, German

Germany has a well-advanced development of radio. The broadcasting system, sponsored by the Government, includes stations in all parts of the Republic, and additional ones are being opened regularly. The purchasing power of the people is generally good, and most families are able to afford a set capable of receiving some one or more of the national stations. The climate is good for receiving, being generally the same as in the southern part of Canada. The people have taken a great interest in radio and have installed receivers in great numbers.

Germany has an area of 181,000 square miles and a population of over 62,500,000. There are 45 cities with populations in excess of 100,000, Berlin and Hamburg both running into millions. The central and southern portions of the country are mountainous.

The climate is temperate and uniform. In the lowlands the mean annual temperature varies from 49° to 52° F. Rainfall is greatest in the Harz Mountains, where the precipitation often exceeds 45 inches per year. The average for the plains regions is 20 inches. Radio reception is generally good, the season of best reception being from September to May.

Radio broadcasting is under the control of the postal authorities, which owns the equipment of all stations. Broadcasting is done by corporations, which have monopolies in each section of the country. These corporations are supported from the proceeds of license fees.

The number of broadcasting stations in Germany is 30. Reception is satisfactorily accomplished from all parts of Europe, Germany being the geographical center of broadcasting on that continent.

Cheap labor permits German manufacturers to supply the domestic market with sets at very low prices, which reacts unfavorably upon

the demand for imported apparatus. The good distribution of broadcasting stations makes cheap sets quite satisfactory.

Receiving licenses are granted freely to all applicants except Russians, Poles, and Slovaks. A fee of 24 marks (\$5.71) per year is exacted, for which a person is entitled to own and operate as many receiving sets as desired, provided not more than one is in use at any one time.

Receiving-set licenses statistics show some 2,350,000 authorized, while an additional number, variously estimated, are operated without authority. Nearly all of the sets in use are of German origin, but American, British, and French sets are also in use. Alternating-current receivers are popular, as are short-wave receivers and adapters. Central-station service is about evenly divided between 110 and 220 volts, mostly 60-cycle alternating current.

GIBRALTAR

Language, English

Radio has been restricted in Gibraltar by a number of conditions, including the great amount of interference from ship stations and the land stations on the Rock. The climate is highly conducive to static. The people generally are interested in broadcast reception, and any improvement in receivers which will permit the reception of Continental stations through the interference should prove popular.

Gibraltar is a peninsula of 2 square miles, being about $2\frac{1}{2}$ miles long and three-fourths mile wide. The north end borders on Spain, the peninsula having nearly 6 miles of coast line. The population is about 22,000, the British military garrison numbering about 6,500.

There is no broadcasting in Gibraltar, stations in Spain being most easily received. Reception from the United Kingdom is not unusual. Receiving is permitted without any restrictions except for a 10-shilling license fee collected each year. It is estimated that about 100 receivers are in use in Gibraltar. All of these are believed to be of British origin. Alternating-current receivers are practically useless. Short-wave receivers and adapters are becoming increasingly popular.

GREECE

Language, Greek

The restrictive attitude of the Government, maintained until 1926, has limited the development of radio in Greece to a minimum. The climate is not especially good for reception, and the people are not greatly interested in broadcast reception.

Greece is a country that is much broken up, owing to the fact that it consists of a range of partially submerged mountains. The population is about 6,000,000 and the area 50,000 square miles. Athens, Saloniki, Patras, and Corfu are the principal cities. Greece has very hot summers and very cold winters; the rainfall is great in some sections. Radio reception is good only from November to February.

Broadcasting is prohibited, but the Government has indicated its intention of creating a broadcasting monopoly as soon as the necessary arrangements can be made. Reception is permitted, under cer-

tain restrictions, to Greek citizens but is prohibited to foreigners. Licenses are required.

Recent estimates indicate about 1,000 receivers to be in use. These are of various origin, particularly American, British, and German.

Greece has no broadcasting, nor is there any in neighboring countries, except the Osmanie station in Turkey, which is at some distance.

Alternating-current receivers have been introduced but have not yet made much headway. Short-wave reception is not exceptionally popular, as no short-wave broadcasts in Greek are available.

HUNGARY

Language, Magyar

While the ownership of receiving sets in Hungary is limited to a proportionately small part of the population, broadcast reception has proved popular and a large number of receivers have been installed. The Government has passively encouraged the use of radio. The climate is good for reception, and, owing to its position, it is believed that stations in a greater number of countries can be picked up on a given set in Hungary than in any other country. The people are generally interested, and improvement in individual purchasing power of the poorer classes would be almost certain to result in an increased sale of less expensive sets.

The area of Hungary is slightly over 35,000 square miles and the population over 8,000,000. The principal cities are Budapest, Szezedin, and Pressburg. The surface is mostly flat, though mountains occur in some of the areas adjacent to frontiers. The climate is mild, the summers being warm and the winters cold. There is great variation, however, between different sections.

Radio is under the control of the postal administration, which holds a monopoly on broadcasting. Stations are supported by proceeds from license fees. Licenses for receiving are issued to all applicants and cost 2½ pengos (45 cents) per year when the set is to be used only for amateur receiving. Higher fees are charged for sets to be used for business purposes. Government inspection and supervision of all sets is required. Manufacturing, importing, and merchandising of radio apparatus are subject to permits issued by the Ministry of Commerce and are under the supervision of the postal authorities.

The only broadcasting stations, three in number, are in Budapest. Considerable dependence is placed on stations in neighboring countries.

Hungary has about 115,000 receivers in use, principally of German origin. A certain popularity is being attained by alternating-current receivers. Short-wave reception is also arousing interest. Central-station service is provided in 110 and 220 volts, with variations of frequency, mostly 50 and 60 cycles.

ICELAND

Language, Icelandic

Though somewhat isolated by distance, radio is popular in Iceland and has been ever since the installation of the first sets demonstrated the feasibility of receiving programs broadcast in Denmark, the

United Kingdom, and other countries. Since then developments have been fairly rapid.

The area of Iceland is about 40,000 square miles, about one-sixth of which is inhabited. The population is 95,000, all but a very few of the inhabitants living in Reykjavik, the only city. The surface is mainly ice-covered plateaus, with numerous lakes and crater basins. Glaciers cover about 5,000 square miles. There are a number of active volcanoes.

Iceland has two broadcasting stations, at Reykjavik and Akureyri. Scandinavian and North American stations are also received.

The number of receivers in use is estimated at about 50. These are largely of German manufacture. Alternating-current receivers have not yet been introduced. Short-wave reception is popular.

IRISH FREE STATE

Language, Gaelic and English

Radio is very popular in the Irish Free State. The attitude of the Government has been one of great encouragement. The climate is exceptionally favorable to broadcast reception, and although there is some interference from ship stations operating in code in the areas near the coast, such interference is at a minimum. There is little difficulty from static.

The Irish Free State occupies about 26,500 square miles and has a population of about 3,000,000. The principal cities are Dublin, Cork, Limerick, and Waterford. The Free State is an undulating plain broken toward the north and west by groups of low hills. A large portion of the total area is occupied by lakes.

The mean annual temperature at Dublin is 50° F., and the rainfall is 40 inches. The season of best reception continues from September to May, but reception is good during the remaining three months.

Broadcasting is a Government monopoly and is supported by licenses. The receiving regulations are very moderate. Licenses are required, however, these costing 10 shillings (\$2.43) a year, as in the United Kingdom. There are no exceptional restrictions on manufacturing, importing, or merchandising. The two stations in the Free State and those in the United Kingdom provide satisfactory broadcasting services.

Licensed and unlicensed sets are estimated to number about 30,000. British sets predominate, but American and German sets are used in large numbers.

Alternating-current receivers have aroused a great degree of interest. The prevailing current characteristics are 220 volts, 50 cycles, alternating.

ITALY

Language, Italian

Italy has shown increased rate of broadcast development during the past few years, after being very slow to get started. The restrictions and prohibitions imposed by the Government, although intended only for the protection of broadcasters and the service in general, served to arrest development, while the several charges made against the owners of receiving sets were such as to eliminate a large number of people who otherwise would have been prospective purchasers of receivers.

This condition no longer exists to the same degree, so that Italy is rapidly becoming one of the leading countries of Europe in broadcast development.

The area of Italy is 119,700 square miles and the population about 40,000,000. The principal cities are Milan, Naples, Rome, Turin, Palermo, and Genoa. The country has a central mountain range, which slopes to plains along each coast, the southern portion being almost entirely plains.

The climate is generally warm. Temperatures and rainfall vary for different regions, since both latitudes and altitudes vary greatly. At Rome the radio-receiving season extends from November to June.

Radio broadcasting is under the control of the Ministry of Communication. A monopoly for broadcasting has been granted to the *Unione Radiofonica Italiana*, a corporation organized for that purpose. Licenses costing 3 lire (15 cents) per year are required for the operation of receiving sets, the proceeds accruing to the national treasury. Subscriptions to broadcasting service are compulsory, the funds received being used for the purpose of supporting broadcasting stations and providing programs. Amateurs are required to pay 96 lire (about \$5) per annum for this service. Receivers employed for commercial purposes are assessed at varying rates, sometimes as high as 2,000 lire (\$105) per annum.

Italy has five broadcasting stations and a certain amount of broadcasting service from neighboring countries.

No set may be installed unless approved by the Ministry of Communications. Samples of manufactured sets may be deposited by manufacturers and importers as a check against adherence to types, in lieu of individual inspection of sets, which is otherwise required. A sales tax is assessed at the following rates: Tubes, 6 lire (\$0.32); crystal sets, 12 lire (\$0.65); loud speakers, 24 lire (\$1.25); tube sets, 53 lire (\$2.80).

Some 250,000 sets are reported to be in service. A majority are of Italian manufacture, but large numbers of American, French, and German sets are in use. Alternating-current sets are being introduced with fair success. The voltage and frequency of central stations varies considerably. Short-wave reception is popular to a certain degree but, because of the lack of short-wave broadcasts in Italian, has a limited field.

LATVIA

Language, Lettish

The development of radio in Latvia has been at a rather high rate. The people are interested in radio, and though the purchasing power of a majority of the population is too low to enable them to afford receivers, the remainder are in sufficient number to make a comparatively good market. The climate is excellent for broadcast reception, and the Government has adopted an attitude of general encouragement. There is considerable interference along the coasts from ship stations.

Latvia has an area of 25,400 square miles and a population of nearly 2,000,000. The principal cities are Riga, Libau, Dvinsk, Mitau, and Windau. The climate is similar to that of New York State, and

radio reception is good, being best from September to May. The country is mainly a low plain.

The Post and Telegraph Administration controls radio broadcasting through a monopoly. Receiving licenses are required, an initial payment of from 10 to 40 lats (\$1.93 to \$7.72) being collected, the annual fee being 24 lats (\$4.63). A higher rate is assessed on sets to be used commercially. Regenerative sets are prohibited, and Government inspection of each installation required. Fundamentally, manufacturing, importing, and merchandising are Government monopolies, although concessions are made. Only such apparatus as does not compete with Latvian manufacturers may be imported.

There is one broadcasting station at Riga. Additional service is provided by stations in Lithuania, Estonia, Russia, Finland, Sweden, Poland, Germany, and Danzig.

The number of sets licensed October 1, 1928, was 21,000. German sets predominate. Alternating-current receivers have not been used to any extent. Lighting-current supply is mostly 220 volts, 50 cycles. Short waves are popular, but only among those interested as amateurs rather than the main body of broadcast listeners.

LITHUANIA

Language, Lithuanian

The development of radio broadcast and reception in Lithuania is well advanced. The people generally are deeply interested in radio, even though only a small part of the population is able to afford receiving sets. The Government encourages the use of radio and the climate is excellent for receiving. Since the population is largely of foreign nationality, broadcasting in all neighboring countries has considerable value in Lithuania.

Lithuania has a population of 4,500,000 and an area of about 21,500 square miles. The principal cities are Kovno, Memel, Vilna, Grodno, and Suwalki. The country is an undulating plain. The climate is temperate and very favorable to radio reception throughout the year, especially from September to May. Reception is permitted under a system of licenses. The cost amounts to about \$13 per year, of which \$10 is the fixed cost of the license.

The only broadcasting station is at Kovno. Stations in Russia, Finland, Estonia, Latvia, Germany, and the Scandinavian countries are received.

It is estimated that some 6,400 receiving sets are in use, mostly German, although some American sets are also in use. One or two alternating-current receivers have been put into service. Lighting service is principally 220 volts 50 cycles. Short-wave reception is still the property of amateurs.

LUXEMBURG

Language, German

The Grand Duchy of Luxemburg has an area of 999 square miles and a population of 268,885. The development of radio is fairly well advanced. There are some 1,500 receiving sets in operation. One broadcasting station in the city of Luxemburg is in service, and programs from all neighboring countries are received. No alternating-current receivers or short-wave sets have been reported.

MADEIRA

Language, Portuguese

The climate in Madeira is very poor for reception, static difficulties having been the principal retarding agency. The people are interested in radio, however, and a number of receivers have been installed. Future developments should show increased advancement. Estimates place the number of sets in use at 180. It is understood that these are nearly all British and American. There is no broadcasting in Madeira, nor none particularly satisfactory within reasonable receiving distance.

MALTA

Language, English

Radio has attained a fair degree of popularity in Malta. The island has an area of 122 square miles and a population of about 225,000. The chief city is Valetta. The surface is generally low and undulating, with the summers hot and the winters mild. Radio reception is fair from November to March.

Broadcasting is prohibited. Reception is subject to permit from the lieutenant governor and to the payment of a license fee of 21 shillings for the first year and 10 shillings each subsequent year. There are no special restrictions on manufacturing, importing, or merchandising.

Receiving sets number about 250. None of these is of the alternating-current type so far as can be learned. Short-wave sets are popular, and this popularity is increasing.

NETHERLANDS

Language, Dutch

The development of radio broadcasting and reception has been rapid since it was first introduced into the Netherlands. The Government has been active in encouraging its use. The people are interested in radio, and the general distribution of wealth has enabled almost everyone to purchase a receiver. The climate is very good for reception, and, although there is considerable interference from ship stations operating in code, satisfactory reception is easy to accomplish.

The Netherlands has an area of over 13,000 square miles and a population of about 7,500,000. The principal cities are Amsterdam, The Hague, Rotterdam, and Utrecht. The surface is low and flat. The climate tends toward great extremes and is moist, the mean annual rainfall being about 28 inches. Reception is good from September to May and fair during the summer.

Regulations similar to those in effect in the United Kingdom are under discussion. Under these regulations a company will hold an exclusive broadcasting concession and will derive its income from a portion of the license fees to be charged. At present it is required that the postal authorities be notified of the installation of a set, but no fees are collected.

Six broadcasting stations are operating in the Netherlands, while programs from German, Belgian, French, and British stations are received regularly. Alternating-current receivers are being intro-

duced with success. Lighting service is usually 220 volts, 50 cycles, alternating current. Short-wave reception is unusually popular.

Some 150,000 receiving sets are in use. British, Netherland, French, and German sets are used in about equal numbers.

NORWAY

Language, Norwegian

The development of broadcast reception in Norway has been good, although until the past two years very little progress has been made. The climate is of the best for radio reception, and there is little in the way of mineral deposits to interfere with good reception. The Government has actively promoted the use of radio, and the people generally appear to be interested. The individual purchasing power and distribution of wealth are such that almost every family desiring to do so is able to purchase a receiving set.

Norway has an area of 125,000 square miles and a population of about 2,750,000. The principal cities are Oslo, Bergen, Stavanger, Drammen, and Trondhjem. The surface is mountainous and broken by numerous valleys and fjords. The climate is tempered by the Gulf Stream, but the central and eastern portions have extremely cold winters. Radio reception, good throughout the year, is best from September to May. Rainfall ranges from 40 to 70 inches in the coastal regions and is about 16 inches in the interior.

The control of radio broadcasting is vested in the telegraph authorities. The use of radio by amateurs is prohibited, and all of the stations at present operating are owned by the Government, although no monopoly has been declared. A license fee of 20 crowns (\$5.36) per year is collected from receiving-set owners, the proceeds being used to defray broadcasting expenses. A special Government authorization is required to import radio apparatus.

Seven broadcasting stations are operating in Norway. Good reception from Swedish, Danish, and other European stations is usual.

Over 65,000 receiving sets have been licensed, and it is estimated that an additional 5,000 are illegally operated. American sets are popular. Norwegian manufacturers supply a large part of the demand, while British, Swedish, and German sets are also used in considerable numbers. Alternating-current receivers are in common use in some urban sections. Lighting service is usually 220 volts, 50 cycles. Short-wave reception is popular.

POLAND

Language, Polish

The climate of Poland is good for radio reception throughout the year, and considerable progress has been made in bringing about increased interest in radio. The Government encourages its use, and the people have displayed more than ordinary interest in it. It is expected that developments of the next few years will show a considerable increase in the demand for receiving sets.

Poland has an area of nearly 150,000 square miles and a population of 30,000,000. The principal cities are Warsaw, Levow, Lodz, and Krakow. The surface is entirely of plains. The climate is very good

for radio reception, there being no season during which reception is seriously affected.

Radio broadcasting is administered by the Post Office Department. A broadcasting monopoly has been granted to the Polish Radio Co., two-fifths of the stock being held by the State Treasury. A registration fee of 30 zloty (\$3.36) per year is proposed for amateur receiving sets. The present fee is 5 zloty (\$0.55).

Poland has five broadcasting stations and receives Russian, German, Austrian, and other European broadcasts.

Estimates place the number of receivers at 25,000. German sets are in the greatest number, with some British and American in use. Some alternating-current sets have been sold. Various types of lighting service are provided. Short-wave reception is popular among a limited part of the listeners.

PORTUGAL

Language, Portuguese

Portugal has a poor climate for radio reception, together with further difficulties provided through mineral deposits over which transmission is difficult. Little interest has been aroused except in the vicinity of Lisbon, and it is expected that at least a few years will pass before developments will reach a stage comparable to other European countries.

The area of Portugal is about 35,000 square miles and the population 6,000,000. The principal cities are Lisbon, Oporto, Setubal, and Braga. The country is mountainous, with widely varying climatic characteristics within comparatively small areas, but it is generally hot in the south and cool in the north and very damp throughout. Reception is never very good in any section and is possible only between November and April. Ore deposits are thought to hinder reception seriously in the vicinity of Oporto.

There are no particular restrictions, but a 2 per cent tax is collected by the customs authorities in addition to tariff charges.

Some 2,500 receivers are in service. These are of British, German, and American origin.

The only broadcasting stations are two in Lisbon. Reception of Spanish programs is usual, but no reception outside of Lisbon and its vicinity is satisfactory.

So far as is known, no alternating-current receivers are in use. Lighting-service voltages and frequencies vary considerably. Short-wave reception has but a very limited popularity.

RUMANIA

Language, Rumanian

Broadcast reception in Rumania has been of little interest to the public, owing to the attitude of the Government and generally poor receiving conditions. The conditions under which the Government limited the use of radio have been largely overcome, and there now appears to be a hope for greater future developments. In general the situation is such as maintained in most countries during the early days of broadcasting.

Rumania has an area of approximately 114,000 square miles and a population of nearly 18,000,000. The capital and principal city is Bucharest. The country is largely a sloping plain, with temperature ranges from zero to over 100° F., the mean annual temperature at Bucharest being 50° F. The rainfall is 25 inches.

Broadcasting is supported by subscriptions, varying from 200 to 250 lei (\$1.20 to \$1.50 at current exchange), depending upon the size of the set. A special permit by the Home Office is required of foreigners. Regenerative sets are prohibited.

Rumania has had no broadcasting but for some time has been considering the erection of a station in Bucharest and additional stations in Czernowitz, Cluj, Oradea Mare, Arad, Brasov, Timisoara, Jassy, Craiova, and Constantza. Satisfactory reception from Austrian, Czechoslovakian, and Hungarian stations is possible.

Estimates give the number of receiving-set installations at 17,000. German sets predominate, with a limited number of French, British, and American. Alternating-current sets have not yet been successfully introduced. Characteristics of lighting service vary widely. Short-wave reception is little known.

SPAIN

Language, Spanish

Spanish radio developments have been moderately fast, with the Government interested in furthering the use of radio. The climate is good, though not exceptionally so; distant stations are rarely heard, but local service suffers little. There is a great interest on the part of the people, but the purchasing power is largely concentrated in the cities, the rural populace seldom being able to afford such luxuries. The well-scattered stations of the broadcasting set-up provide service through the country.

Spain has an area of 195,000 square miles and a population of about 22,000,000. The principal cities are Madrid, Barcelona, Valencia, Seville, Malaga, Mercia, Saragossa, Cartagena, and Bilbao. The country is mainly a plateau, broken in some parts by mountains, with narrow coastal plains. The climate is hot and dry in the south and temperate in the north. Radio reception is fair from October until April.

Regulations in regard to broadcasting are liberal. Receiving licenses are required, and foreigners must obtain special permits. There are no restrictions on importing, merchandising, and manufacturing, except a requirement that salesmen be licensed.

Spain has 14 scattered broadcasting stations, giving satisfactory service. Programs from French, Italian, Portuguese, and other European stations are received, but the Spanish broadcasts appear to be the most popular.

An estimate recently made gives the number of receivers as 75,000. American sets predominate, with French and German rivaling domestic manufacturers for second place. Alternating-current receivers have been introduced with fair success. Lighting voltages are at considerable variation but are mainly 110 or 220 volts, 50 or 60 cycles. Short-wave reception is popular.

SWEDEN

Language, Swedish

It has been said that the greatest interest in radio has been taken in Sweden. The statistics bear out this statement, no other country except the United States showing a greater per capita development, while a consideration of the average purchasing power in each country serves to place Sweden in advance of the United States under this consideration. The Government has been especially active in the promotion of broadcasting and reception, as a result of which an excellent broadcasting system has been built up throughout the country. Sweden has perhaps the best climate for radio reception in the world.

Sweden has an area of 175,000 square miles and a population of 6,000,000. The principal cities are Stockholm, Goteborg, Malmo, Norrkoping, and Halsingborg. The country has forested highlands in the north, lowlands and lakes in the central parts, and agricultural plains in the south. The climate is mild, owing to the Gulf Stream. The mean February temperature is 25° F., and the August mean is 62° F., at Stockholm. The air in that vicinity is damp, and fogs are frequent; the mean annual rainfall ranges from 18 to 20 inches. Radio reception is good throughout the year, especially from September to May.

Radio is under the control of the Telegraph Administration. A broadcasting monopoly has been granted to a corporation known as "Radiojans," but transmitting licenses are freely issued to amateurs, and the monopoly has provided facilities for the rebroadcasting of the programs of its stations by amateurs and radio clubs. Sweden now has 31 broadcasting stations scattered throughout the country. Broadcasts from neighboring countries are received readily, but are not so popular as the Swedish programs.

Permits to install receiving sets are issued at the rate of 40 crowns (\$10.72), while receiving licenses cost 10 crowns (\$2.68) per year. Manufacturing, importing, and merchandising are not subject to any exceptional restrictions.

Licenses have been issued for 365,000 receiving sets, with an additional number, not estimated, operated unlawfully. Swedish manufacturers supply a large part of the market, with large numbers of German, British, and American sets in use. The use of alternating-current receivers in Sweden is advancing rapidly. Lighting service varies largely between 110 and 220 volts. Short-wave sets and adapters are said to sell fairly well.

SWITZERLAND

Language, French and German

The topography of Switzerland is such as to render radio broadcasting and reception difficult on ordinary types of inexpensive apparatus. The climate, however, is very good, somewhat reducing the deleterious effect of the topography. The people generally appear to be interested, and the Government has aided considerably by permitting freely the establishment of broadcasting stations and installation of receiving sets, so long as the service itself did not suffer thereby.

Switzerland has an area of 16,000 square miles and a population of nearly 4,000,000. The principal cities are Zurich, Geneva, Basel, Lausanne, Berne, and St. Gall. Owing to its mountainous character, Switzerland has a wide variety of climate. Radio reception is good in all altitudes from September to May and in the lower portions throughout the year.

Radio is under the administration of the central telegraph office of the Postal Administration. Broadcasting by other than Swiss citizens is prohibited. Stations are supported by the proceeds from license fees after the Government has deducted 25 per cent.

Permits to operate receiving sets are granted to Swiss citizens only. A preliminary Government inspection of the installation, costing 3 francs (\$0.60), is required, the annual assessment being 12 francs (\$2.32). No special restrictions are imposed on manufacturers, importers, and merchants.

Reliable estimates give the number of sets as 75,000, mostly of Swiss and German origin. Six broadcasting stations are operating in Switzerland, besides the stations in France, Germany, Austria, and other neighboring countries. Alternating-current receivers have been introduced and are in use in a number of homes. Either 110 or 220 volts, alternating current, is available in every city. Short-wave receivers are popular to a certain extent.

UNITED KINGDOM

Language, English

The United Kingdom is one of the countries showing the greatest degree of radio development in the world. Next to the United States, it has been the most active in development of radio, not only at home but abroad, and in its home development has amply justified the early recognition of the value of Marconi's invention which it granted after other countries had passed it by. Not only in the field of broadcasting but in all respects wireless activities have been greatly advanced in the United Kingdom. The people are highly interested much more in the service than in the means of providing that service; a condition which indicates a solid basis for further advancement. The climate is excellent for radio reception, and the broadcasting system, designed for proper service in all parts of the kingdom, has proved the most satisfactory of any monopoly system yet adopted.

The total land area of the United Kingdom which includes all of the British Isles except the Irish Free State, is about 95,000 square miles and the population 45,000,000. The principal cities are London, Glasgow, Liverpool, Manchester, Birmingham, Sheffield, Leeds, Belfast, and Edinburgh. The surface of the land generally is low and undulating, broken by occasional hilly areas.

Radio is controlled by a monopoly vested in the British Broadcasting Corporation, a division of the Post Office Department. Its activities are supported by the proceeds from the license fees.

There are 21 broadcasting stations in the United Kingdom, one of which, at Hull, operates only on special occasions, another being a short-wave station. The two stations in the Irish Free State and several on the Continent are also received.

Receiving licenses are issued to all applicants and cost 10 shillings (\$2.43) per annum. There are no other restrictions on the ownership

and operation of sets, nor on importing, manufacturing, or merchandising. The British manufacturing industry, however, has attempted to limit the sale of imported apparatus by contracting with dealers to grant additional discounts to those dealers who do not handle any imported radio apparatus. This method was tried for over a year and proved so unpopular with most dealers that they refused to renew agreements. They found the additional discounts insufficient to repay them for the business lost through their failure to handle imported apparatus.

An estimate of 2,500,000 is given as the number of sets, licensed and unlicensed, in service. Nearly all of the needs of the British market are supplied by British manufacturers, but German and American sets are used in large numbers, and some of French, Italian, Swedish, or other manufacture.

Alternating current-receivers, known as "mains sets" (equivalent to "socket-power"), are attaining a great deal of popularity. Lighting service is almost universally 220 volts, 50 cycles, alternating current, and under plans now approaching completion, so far as the more important districts are concerned, will be uniformly so. Short-wave reception is very popular.

YUGOSLAVIA

Language, Slavic tongues and German

Radio developments in Yugoslavia have been slow, with few conditions especially encouraging. The people have a low purchasing power and are not generally interested in such advantages as are provided by radio.

Yugoslavia has an area of 96,000 square miles and a population of 12,000,000. The principal cities are Belgrade and Zagreb. The country for the most part is mountainous. The climate is temperate, rather similar to our Middle Atlantic States, and fair for radio. Reception is good from September to May.

Permits are required for broadcasting stations. Nothing except music may be broadcast. Private persons may not install broadcasting stations or other sending sets. The permission of the Ministry of Posts and Telegraphs is required before a receiving set may be installed. Theoretically, foreigners may not obtain this permission, although exceptions are made. In applying for a permit to install a receiving set, the individual must describe his set in detail and indicate the room in which it may be found. Permits may be revoked at any time.

Yugoslavia has some 2,500 receivers in use, nearly all of German origin. There is only one broadcasting station in the country, but good reception from neighboring countries is reported. Some alternating-current sets are in use and are proving satisfactory. Short-wave reception is growing in popularity.

RUSSIA

Language, Russian

The extent of Russia's radio development is little known, but apparently includes only such development as the immense population would promote. The climate is excellent for reception, but the pur-

chasing power of the people generally is so low that there is little response to the many gestures of the Government designed to encourage the spread of the use of receiving sets. It is apparent that a large proportion of these in use are the property of local organizations and municipalities, operating loud speakers in public places.

Practically all of Russia has warm summers and cold winters. The northern coast has cool summers, while a large part of the southern territory has hot summers.

A news release emanating from the National Bureau of Information states that 200,000 receiving sets are in use. Claim is made that these are nearly all of Russian manufacture. There are 45 Russian stations listed in the files of the electrical equipment division, scattered throughout Russia and Asiatic Russia. In various sections European, Chinese, and Japanese stations are received.

TURKEY

Language, Turkish, English, and French

Turkey's radio development is now in only the primary stage and can not yet be said to indicate the country's capacity.

The principal cities of Turkey are Constantinople, with a population of 1,000,000 (the only city having over 60,000), Smyrna, Angora, and Adrianople. The surface of the country is undulating and largely mountainous, with a moderate climate. The mean January temperature at Constantinople is 43° F., and July, 73° F. Rainfall is abundant on the coasts, but the interior is dry. The summers are short and hot and the winters long and cold. Radio reception is best from October to April.

Radio is under the control of the Administration of Posts, Telegraphs, and Telephones. Broadcasting is a monopoly granted to French interests. Receiving is permitted under license, but the licenses have been made difficult to obtain and are costly. Sets must be available for Government inspection at all times and are subject to confiscation without warning, explanation, or indemnity.

About 175 receivers are in service, largely of British, French, and American manufacture. Turkey has but one broadcasting station, at Osmanie, near Constantinople. Some of the higher-powered European stations are received, but there are no near-by broadcasting stations other than Osmanie.

A few socket-power sets have been put into service, apparently all of the alternating-current type. Short-wave reception has a limited clientele, but is particularly interesting to that class.

ASIA

ADEN

Language, Arabic

The British Protectorate of Aden has practically no radio development. It is hot at all seasons, and radio reception is difficult, particularly over the distance now necessary. Aden has no broadcasting, but is dependent upon occasional reception from distant stations, none of which can be picked up for satisfactory reception. Only five receivers have been installed. These are in the possession of Ameri-

cans and Europeans who took them among household effects when going to Aden.

ARABIA

Language, Arabic

Arabia has no great radio development, owing principally to the very poor climate and the absence of broadcasting. Twelve sets are reported in use, all the property of Europeans and Americans stationed temporarily in Arabia. Summers are hot and winters warm, graduating to cool in the northwestern part. Reception is difficult at all seasons, but the distance from broadcasting is mainly responsible. The nearest broadcasting stations are those at Bombay, Osmanie, and Cairo, none coming in with satisfactory clearness or volume.

CEYLON

Language, English

Considering the adverse climate and the limited number of people able to afford the investment necessary to obtain radio service, Ceylon has an advanced radio development. The Government encourages its use, and operates the only broadcasting station on the island. The people able to afford sets are generally interested, finding that it serves the particular needs very satisfactorily. Ceylon has an area of 25,000 square miles and a population of about 5,000,000. The principal city is Colombo. The climate is hot and damp, and generally poor for radio. The regulations governing radio are similar to those of India, although Ceylon is a separate colony of the British Empire. Some 1,500 receiving installations have been made. Both British and American sets are popular. The station at Colombo and those in India are received regularly. While it is understood that one or two alternating-current receivers are in use, the success met with is not known. Short-wave reception has a certain limited field.

CHINA

Language, Chinese

Radio developments in China have been seriously retarded by the attitude of the Government, which has recently been abandoned in favor of a policy of encouragement and assistance. The Chinese themselves show little interest, but popularity among certain classes is growing perceptibly. The foreigners are nearly all of classes to find radio popular and to install receiving sets.

The area of China is slightly over 4,000,000 square miles and the population 440,000,000. Shanghai, Hangkow, and Peking have populations in excess of 1,000,000 each. The surface is mainly plains along the coast, with mountainous regions in several sections. The climate is generally hot and the humidity high. Reception is generally poor.

China now has seven broadcasting stations, while service is also obtained from Japan, Chosen, Kwangtung, and Siberia.

Radio regulations have been issued which do not impose any exceptional restrictions on broadcasters or owners of radio-receiving sets.

The more recent estimates indicate that about 15,000 receivers have been installed. These originated in various countries, principally

the United States, Japan, England, France, and Germany. Alternating-current sets are in use only in exceptional cases. Short-wave receivers are not popular.

CHOSEN

Language, Japanese

The development of radio in Chosen has been much greater than would be expected from a review of the conditions obtaining in the country. Although wealth is highly concentrated, there are numerous families able to afford the purchase of receivers, and a large proportion of these have installed them.

Chosen, formerly Korea, has an area of 85,000 square miles and a population of over 18,000,000. The principal city is Keijofu (Seoul), which has a population of 250,000. The climate is generally moderate but the summers are hot and rainy. The mean annual rainfall is 36 inches, most of which falls in July. Reception is good from September to May.

Radio in Chosen is administered through the Japanese Government Bureau of Communications, since this is a Japanese possession. Japanese regulations are in force, limiting receiving sets to non-regenerative types not capable of receiving on wave lengths of over 400 meters.

There is one broadcasting station at Seoul; in addition, stations in Japan, Kwantung, China, and Siberia are received.

An estimate giving the number of receivers as 3,000 has been reported. American and Japanese receivers are the most popular. Neither alternating-current nor short-wave sets are in use.

FRENCH INDIA

Language, French

Most of the radio development in French India may be traced to the developments in British India. The markets in these areas are generally among the French population. About 50 sets are in use, all French. French India has no broadcasting, reception being from stations in British India and Ceylon only. All seasons are hot and radio reception poor.

FRENCH INDO-CHINA

Language, French

Radio developments in French Indo-China have been very slow, and there is little promise of early development. It has an area of about 285,000 square miles and a population of over 20,000,000. The climate is very poor for radio reception, but a few sets are in use by Government officials entitled to exception from the prohibition. Practically all of the population is Asiatic and not especially interested in modern innovations. About 25 sets are in service, nearly all of French manufacture. There is no local broadcasting, while reception from Singapore, Manila, and other cities is unsatisfactory.

HONG KONG

Language, English

Hong Kong has had little development of radio, and broadcasting stations previously operating there were abandoned for lack of reason for continued operation. There has recently been constructed a

new station, however, and it is believed that a greater development will take place.

Hong Kong has an area of 32 square miles and a population of 682,000, Americans and Europeans numbering about 10,000. The principal city is Victoria. The island is a rugged ridge of granite, broken by narrow valleys, and reception is very poor. Hong Kong is in the typhoon belt and has a rainy season from March to May. From November to March it is comparatively cool, at which time radio reception is fair.

Hong Kong has had a broadcasting station at Victoria since April, 1927. Until recently this station broadcast only storm warnings and other meteorological data, but in the fall of 1928 was reconstructed and its activities reorganized to a general broadcasting basis.

Receivers installed number about 300, principally British, with some American sets. It is not known whether alternating-current sets have been introduced or not. A few short-wave sets have been installed but have had little success.

INDIA

Language, English

British India has had considerable difficulty in building up a great radio public, but, although problems of a major nature still exist, a steady basic progress is to be noted. The Government encourages the activities of those desiring to further developments but has found it difficult to interest other than resident British in radio.

British India has an area of slightly over 1,000,000 square miles and a population of nearly 250,000,000. The principal cities are Calcutta, Bombay, Madras, Hyderabad, Rangoon, and Delhi. The great central part is a plateau, surrounded by low strips along the coasts and by plains in the north, which are bordered by the Himalaya Mountains. Humidity and temperature are high except during the period from November to January. Radio reception is good from November to May in most sections.

Radio is under the control of the Director General of Posts and Telegraphs. A company which is to have a monopoly on broadcasting is being organized; meanwhile, various interests control the broadcasting stations in operation. Six stations are broadcasting in India, while reception is possible from other countries in southern Asia.

Receiving licenses are issued to all applicants. These cost 10 rupees (\$3.65) per year. Import permits are required.

The total number of receivers is about 3,600. These are largely British, with a large number of American. A few alternating-current sets are in use and appear to have given satisfactory results. Short-wave sets also have a limited popularity.

IRAQ

Language, Arabic

There has been practically no development of radio in Iraq, owing to the adverse climate and the distance from broadcasting. The weather is hot at all seasons and radio reception correspondingly poor.

Iraq has no broadcasting, but infrequent reception from European stations is possible. About 21 sets have been put into use by Americans and Europeans who took them when going to Iraq for a longer or shorter period.

JAPAN

Language, Japanese

Japan is the leading country of Asia in radio development. Before any developments were permitted, the Government made a thorough study of broadcasting and its uses, so that the earliest developments were based on a carefully thought-out plan. This has never been changed in its essentials, and under it progress has been rapid. The climate is good, and the people are interested to a great extent. While wealth is somewhat concentrated, this condition is not so serious as in some other countries, and a large proportion of the population is able to purchase receivers.

Japan has an area of nearly 150,000 square miles and a population of 60,000,000. The principal cities are Tokyo, Kobe, Osaka, Kyoto, and Nagoya. The surface of the country is generally mountainous, being of volcanic origin. The climate is good for radio, although warm and damp. Reception is fair throughout the year and good from September to May.

Radio broadcasting is controlled by the Bureau of Communications, broadcasting permits being issued only to Japanese citizens. Each station licensed has a partial monopoly within certain bounds. Stations are divided into two groups according to their power. Low-powered stations have monopolies in certain small areas, while high-powered stations have monopolies in a large area, which may include several of the areas assigned to local stations. In theory, this would restrict the number of stations which might be received at any point to one high and one low powered station, if all of the stations provided for were operating.

Broadcasting is supported from license fees. Receiving sets may be operated upon payment of the license fee of 2 yen per annum and a subscription fee of 1½ yen per month. Permits to install are required, and only sets approved by the Bureau of Communications may be used. Manufacturers and importers may deposit a sample set, the approval of which will serve for all additional sets of the same type so long as none of the specifications is changed. Wave lengths of from 150 to 400 meters only may be used.

Japan has seven broadcasters, while Siberian and Chinese stations and those in Dairen and Seoul are received.

The number of receiving sets is estimated at about 550,000. Japanese manufacturers have supplied a large number of these. American sets are the most popular, and British are used to some extent. Alternating-current receivers have not yet been sold in any numbers. Short-wave reception has aroused considerable interest.

KWANTUNG

Language, Japanese

There has been a fair degree of radio progress in Kwantung, even though there is but a small portion of the population with sufficient

wealth to purchase receivers. Kwantung has hot summers and cold winters, with fair summer and good winter reception.

About 100 sets have been put into use, Japanese, American, and British in origin. One broadcasting station at Dairen is operating, and Shinese, Japanese, Siberian, and Korean stations are received. So far as is known no alternating-current or short-wave sets are in use.

MACAO

Language, Portuguese

Little radio development has been noted in Macao, although the number of listeners appears to be growing slowly but steadily. Summers are hot and winters warm, with comparatively poor reception throughout the year.

About 40 sets are now installed, purchased in all parts of the world. There is no broadcasting, but reception from Hong Kong and, to a lesser extent, from Chinese and Japanese stations is satisfactory. No alternating-current sets are in use. One or two short-wave receivers are giving little service.

NETHERLAND EAST INDIES

Language, Dutch

Radio in the Netherland East Indies is not greatly advanced, owing to the lateness of the introduction of satisfactory apparatus. The total land area of the Netherland East Indies is about 750,000 square miles and the population about 50,000,000. Batavia, the principal city, has a population of 300,000. The group consists of volcanic islands, some of which are very large. The principal island is Java. The climate is hot and damp, but there is some radio reception of a satisfactory character. There are no exceptional restrictions on the use of radio. Broadcasting stations number five, scattered through the archipelago, with additional service from southern continental Asia and the Philippine Islands. Only some 100 receivers have been installed. These were purchased in the Netherlands and represent various European makes, or from American sources.

PALESTINE

Language, Arabic and French

Several attempts to popularize radio in Palestine have been made, and each has proved successful to a certain small extent, but on the whole developments have not warranted the efforts made. The conditions existing are not such as to bring about any great development until broadcasting stations have been established nearer than at present. Summers are hot and winters warm. Reception is poor most of the year and never particularly good.

Palestine has no broadcasting, but Cairo, Osmanie, and the larger European stations are received. Estimates place the number of receiving sets installed at 150. These are largely French, with some American, British, and German. No alternating-current or short-wave receivers are known.

PERSIA

Language, Arabic

The climate and the purchasing power of the people have prevented any development of radio in Persia. The summers are hot and winters cool; reception is never exceptionally good, being almost impossible during the summer. About 75 sets of various origins are in use, owned by foreigners. Persia has no broadcasting but is dependent upon stations at Bombay, Osmania, and in Russia, all more than 1,000 miles distant. No alternating-current or short-wave sets have been reported.

PHILIPPINE ISLANDS

Language, English

Radio developments in the Philippine Islands have been extensive. The people are interested, and while considerations of purchasing power prevent great numbers from taking more than an abstract interest in radio, there is extensive demand for cheaper sets on the part of those who are able to overcome this difficulty to some extent. The large number of Americans situated there, especially the military establishment, have provided a separate development of no mean proportions.

The area of the Philippine Islands is about 115,000 square miles and the population 8,000,000. The principal city is Manila. The Philippine Archipelago includes some 3,000 volcanic islands, of which 342 are inhabited. The larger islands have some flat areas. The climate is very hot and damp, but radio reception is fair. The stormy season lasts from July to September. Radio reception is best from November to April.

The Philippines are not subject to American radio regulations. Broadcasting is permitted only to American and Philippine citizens and firms. There are no restrictions on receiving, importing, manufacturing, or merchandising.

The Philippine Islands have three broadcasting stations, all at Manila. Reception from Japan, Singapore, and the Netherland East Indies is frequent but not altogether satisfactory.

A recent estimate indicates that about 7,500 receiving sets are in service. Nearly all are of American origin, but British and German sets are frequently seen. The few alternating-current sets which have been put into service appear to have given satisfactory reception. Short-wave sets are also popular.

SIAM

Language, Chinese

Siam has practically no radio development. It has an area of over 200,000 square miles and a population of nearly 10,000,000, two-thirds of which are Siamese. The principal city is Bangkok, which has a population of about 750,000. The northern portion of the country is mountainous, the central part is a plateau, and the southern part is covered by plains. There are also numerous islands off the coast. The general climate is fair for radio, but not in the mountains and in some other sections.

Broadcasting is prohibited. Receiving is nominally allowed under special permits; these permits, however, are not issued. The sets owned represent the property of the governing class and number 12. The origins of these are various. There is no broadcasting, and reception from China, India, and Singapore is not entirely satisfactory. No alternating-current or short-wave sets are in use.

STRAITS SETTLEMENTS

Language, English

Radio is popular to a certain extent in the Straits Settlements, but since the popularity is restricted to the whites, and these are not in sufficient number to provide much progress themselves, only a limited stage of advancement has been noted. The climate is poor for radio, being hot and damp. The area of the Straits Settlements is about 1,500 square miles and the population about 1,000,000, of whom 475,000 live in Singapore. A broadcasting station has been operating in Singapore since November, 1926. Stations in India, the Philippines, and the Netherland East Indies are received. About 150 sets are in use, mostly British. So far as is known, alternating-current sets are not in use. Short-wave sets and adapters have been used satisfactorily, and some demand might be created.

SYRIA

Language, Arabic

Radio has not yet been introduced successfully in Syria. The weather is hot in summer and cool in winter, and reception is generally poor.

Some 13 sets have been installed by owners who purchased them prior to going to Syria. There is no broadcasting, reception from Russia and from Osmanie, Turkey, being depended upon.

OCEANIA

AMERICAN SAMOA

Language, English

There is little development of radio in American Samoa, although a number of Americans stationed on the island have taken an interest in it. All seasons are hot, with poor receiving conditions resulting. Only 11 sets are in use, all believed to be of American origin. There is no broadcasting. Stations in Australia, California, Hawaii, and New Zealand are received.

AUSTRALIA

Language, English

Australia is one of the leading countries of the world in the matter of radio development. Progress there has been exceptionally steady and has attained a high point. The people are deeply interested, and the Government has gone to great lengths in encouraging the use of broadcasts to communicate entertainment and news throughout the Commonwealth. The climate is good for reception in the more densely populated parts of the country.

Australia has an area of about 3,000,000 square miles and a population of 6,000,000. Of this total, 43 per cent are resident of the six capital cities. The principal cities are Sydney, Melbourne, Adelaide, and Brisbane.

Radio developments have been confined to the south coast and the southern part of the eastern and western coasts, these being the more thickly populated areas. The climate of this section is good for radio reception, the best season being from April to September.

Broadcasting is under the control of the Postmaster General. Stations are divided into two categories, those of high and those of low power. There is no restriction as to the number or location of low-powered stations, but high power is permitted to only one station in each of the States, except Victoria and New South Wales, each of which may have two. These stations are more strictly administered than those of low power and participate in the proceeds from receiving-license fees. Arrangements have been made for these stations to be taken over by the Federal Government.

Australia has 24 broadcasting stations and takes a great interest in short-wave broadcasts from American stations. New Zealand is commonly received in eastern Australia.

An annual receiving license, costing 24 shillings, is required. The licensed receivers numbered 1,289,000 in December, 1928, while varying estimates agree that the number of illegally operated receivers is large. American sets are most popular and are in the majority; British are also numerous. A few German sets are in use.

BRITISH OCEANIA

Language, English

British Oceania, consisting of scattered islands and groups throughout the South Pacific, shows a combined radio development of no mean proportions when the probabilities of such places are considered. Radio has proved particularly popular among those stationed in more or less isolated islands by the Government or by trading companies. Hot weather is usual in all parts of British Oceania at all seasons.

It is estimated that some 250 receivers are in use. Nearly all are of British origin. The only broadcasting available is such as may be received from Australia, New Zealand, and Hawaii, and elsewhere. Short-wave sets are the most popular.

FRENCH OCEANIA

Language, French

French Oceania has a little radio development, this being mainly among the French stationed on the various islands for various purposes. Nearly all of the present demand is for short-wave sets.

All seasons are hot, with poor reception. About 25 sets are in use. French makes only are represented. No French broadcasting is available, but Hawaiian, Australian, and New Zealand stations are received.

GUAM

Language, English

Guam presents little opportunity for radio development, but the Naval Establishment has provided a field which is pretty well supplied. All parts of the year are hot, with bad atmospheric conditions. Twelve sets are understood to be in operation, all of American manufacture. Broadcasting from Australia, New Zealand, and Hawaii is received. Short-wave sets are the most popular.

HAWAII

Language, English

Hawaii shows an exceptional degree of radio development, probably accounted for by the great proportion of wealthy population.

The climate is not of the best, but the absence of station interference is sufficient to overcome this difficulty. The people are generally deeply interested in radio.

There are two broadcasting stations in Honolulu. California, British Columbia, Mexico, and Australia are received.

Hawaii is subject to the same regulations as the other States and Territories of the United States.

Estimates put the number of receivers in Hawaii at 15,500. American and homemade sets are used exclusively.

NEW ZEALAND

Language, English

New Zealand has a rapidly increasing development of radio broadcasting and reception, but the conditions have been such that the rate of progress is not an accurate indication of the basic development of the country. Soon after broadcasting was introduced in the world, New Zealand had an increasing number of broadcasters and receiving sets, but difficulties arose through patent rights, and for more than a year there was no broadcasting in the islands. Subsequent resumption of broadcasting stimulated developments in the receiving field, and there has been since then a steady increase in the number of receivers in use.

The area of New Zealand is about 100,000 square miles and the population 1,500,000. The principal cities are Auckland, Wellington, Christchurch, and Dunedin. The eastern slopes of the two main islands are plains, the western portions being volcanic mountains. The climate is mild, but rainfall is abundant. Radio reception is good, especially between April and September. Broadcasting is closely supervised by the government. Receiving licenses are required, costing 30 shillings per year. Regenerative sets are prohibited.

Five broadcasting stations are operating in the principal cities. Australian broadcasts are also received.

Some 55,000 receivers are in use in New Zealand, nearly all of British manufacture.

AFRICA**ALGERIA**

Language, French

The development of radio in Algeria has been restricted mainly to the French, but among these there has been an appreciable increase in its use. They are interested, and radio provides contact with France which otherwise is impossible. The native population is not interested. Hot summers and cool winters are the rule. Static is bad, especially during the summer. The total number of sets is estimated at 5,150. French products predominate. Alternating-current receivers have met with little success. Short waves have a certain popularity as a means of better reception from France.

ANGOLA

Language, Portuguese

Angola has not had any great progress in the development of radio. The class to be interested are the Portuguese, and there is no Portuguese broadcasting nearer than Portugal or Brazil. Summers are hot and winters warm. Reception is poor. The only stations which may be received regularly are those in the Union of South Africa. About 50 receiving installations have been made, mostly representing British and American makes. There are no alternating-current or short-wave sets, so far as can be ascertained.

BASUTOLAND

Language, native dialects

Radio developments have been very limited in the native State of Basutoland. Summers are warm and winters cool, with corresponding receiving conditions. The broadcasting in the Union of South Africa is received. Not over 10 sets are in use. These are understood to be of British manufacture. Alternating-current receivers have not yet been introduced. One or two of the receivers in use have been equipped for short-wave reception.

BECHUANALAND

Language, English

There are only a few whites in Bechuanaland, and the number of receiving sets is accordingly restricted. Estimates indicate only 15 installed, mostly British. The stations of the Union of South Africa are received regularly.

BELGIAN CONGO

Language, French

Developments in radio in Belgian Congo are limited to the high-powered sets maintained on the coast for reception of European broadcasters. All seasons are hot, and reception is correspondingly poor. There is no near-by broadcasting. But six sets are in service, all probably of Belgian origin. Short-wave receivers should be sat-

isfactory for use in the Congo, but no information as to their use is available.

BRITISH SOMALILAND

Language, Arabic

There is practically no development of radio in British Somaliland. The entire year is hot, and static is bad. Only five installations have been made, all of British sets. The only near-by broadcasting station is that at Nariobi, Kenya.

BRITISH WEST AFRICA

Language, English

The scattered colonies of British West Africa show little progress in the development of radio. All of British West Africa lies within the zone where all seasons are hot, and static conditions are correspondingly bad. No broadcasting stations are operating in West Africa, the more powerful European stations being depended upon for what reception is possible. Altogether, some 50 sets are reported in use, and it is believed that only British makes are represented. No alternating-current sets are in use anywhere in British West Africa. Short-wave receivers are popular and are used at many points to keep in touch with the United Kingdom.

CANARY ISLANDS

Language, Spanish

The people of the Canary Islands have shown a great interest in radio, but developments have been limited by the low-purchasing power of the people and the lack of sufficiently powerful broadcasting stations to serve the entire group.

The area of the Canary Islands is about 3,000 square miles, and the population nearly 500,000. This group of islands is of volcanic origin and includes seven large inhabited islands and many islets. Radio reception is good from November to April.

Radio is controlled through the Director General of Communications. Broadcasting is permitted to Spanish citizens, and licenses are issued on the payment of a license fee. Receiving installations require permits costing 5 to 50 pesetas, according to the use to which the set is to be put. A special type of permit is provided for foreigners.

One broadcasting station is operating, while conditions are occasionally favorable for receiving from Spain.

The number of receivers installed is estimated at 200. A large part of these are of American manufacture. Various European makes are also represented. Alternating-current sets have not been put into use. A few short-wave sets and adapters have been purchased.

EGYPT

Language, Arabic

Radio has been limited in Egypt by the Government's failure to provide for broadcasting—but has proved very popular. European

broadcasting is found sufficient to bring about a high rate of development. It is expected that the establishment of an officially recognized broadcasting station would greatly improve the situation.

The area of Egypt is 385,000 square miles and the population 14,000,000. The populated section of the country is in the Nile Valley, especially the delta region. The climate is fair for radio, and reception is good from November to May.

An amateur has been intermittently broadcasting in Cairo. European broadcasts, particularly from Osmania, are received.

About 4,000 receivers are in service. British sets are the most popular, French and American also being used extensively. A small number of alternating-current receivers have been put into use. Short-wave reception has been very popular.

ETHIOPIA

Language, Arabic

Ethiopia has the smallest degree of radio development of any country in the world. Summers are hot, winters are warm, and reception is poor throughout the year. There is no broadcasting nearer than Cairo, Egypt.

FRENCH EQUATORIAL AFRICA

Language, Arabic

French Equatorial Africa, aside from the coasts, is principally desert, and little of the area is involved in radio developments. In the vicinity of St. Louis, Senegal, there has been an appreciable amount of progress made.

Summers are hot; winters are warm in the north and hot in the south. Reception is poor throughout the year.

There is little reception, the more powerful stations of Europe providing what service is available.

Some 500 receiving installations have been made. Most of these sets are French. Some short-wave sets have been put into service to receive from stations in northern Africa and France. Sets for this purpose might find a good demand.

FRENCH MOROCCO

Language, French

There is a considerable degree of radio development in French Morocco among the French and other Europeans there, but little interest has been aroused among the native Moroccans. It appears that the ability to keep in direct touch with Europe is the principal motive. Summers are hot and winters cool. Reception is good during winter, but poor in the summer.

Three broadcasting stations are operating, while Algerian, French, and Spanish stations are also received. There are about 400 receivers in use, largely French. There are no alternating-current sets in use. Short waves have proved valuable in the French-controlled areas of Africa, and short-wave sets are constantly becoming more numerous.

ITALIAN AFRICA

Language, Arabic

The scattered colonies of Italy in Africa have shown little interest in radio, there being little in their characteristics to encourage any great developments. The climate is generally poor for radio, and the people interested, few in number, while the distance from broadcasting limits the field. In all of Italian Africa summers are hot and winters hot or warm, with poor radio reception.

There is no broadcasting in Italian Africa. Tripoli receives Italian stations and other European broadcasts. Estimates indicate that a total of about 250 sets are in use. Most of them are Italian, and a number of British manufacture. Short-wave reception has a certain degree of popularity, since by this means programs from Rome can be picked up.

KENYA

Language, Arabic

Kenya has not exhibited especially great interest in radio, but with the establishment of the new broadcasting station greater developments are expected. The summers are hot and winters warm, with resultingly poor reception from distant stations.

A broadcasting station has recently been opened in Kenya; previous service was very unsatisfactory. The number of sets in use is estimated at 100, nearly all British. As yet alternating-current sets have not been introduced. Short-wave reception is becoming popular more rapidly than reception in the broadcast wave band, because stations in Johannesburg and England as well as the new local station may be received through the former medium.

LIBERIA

Language, English

There has been as yet no development of radio in Liberia. Summers and winters are both hot, with poor reception resulting. Only four receivers have been installed, three of them being American. The broadcasting from European stations is depended upon for programs. Alternating-current receivers are not used.

MADAGASCAR

Language, French

Radio has not had any great development in Madagascar.

Madagascar has an area of 236,000 square miles and a population of 3,500,000, about 20,000 of whom are Europeans. The principal cities are Tananarive and Tamatave. In general the island is a plateau; there are several extinct volcanoes. The climate is tropical. From June to November it is cool and dry; during the remainder of the year rain is frequent and the temperature high.

The only broadcasting available for average sets is that from South African stations, although some of the more powerful receivers pick up European programs. French regulations are in force.

About 14 receiving sets are reported to be in use. These are French, brought from France by officials assigned to posts in

Madagascar. No alternating-current sets are in use. Some experimentation with the use of short waves for picking up Eiffel Tower programs has been carried out with success.

MOZAMBIQUE

Language, Portuguese

The development of radio-broadcast reception in Mozambique has not been great. The area of Portuguese East Africa is 425,000 square miles and the population 3,700,000, of which only a small per cent are Europeans. The principal cities are Lourenco Marques and Beira. The country is mainly mountainous. The rainy season lasts from November to March. The coasts are hot, but the highlands are temperate. The Chief of Posts and Telegraphs has authority over all radio-broadcasting activities.

About 18 receivers have been installed, representing various European and American makes. The only broadcasting available is that from the Union of South Africa and Kenya, all of which is in English. Alternating-current receivers are as yet unknown. Short-wave reception is not particularly popular, inasmuch as there are no short-wave broadcasts in the Portuguese language.

NORTHERN RHODESIA

Language, English

The distance from broadcasting has hindered the development of radio in Northern Rhodesia. All seasons are hot, with poor reception conditions. There are only 10 sets in the colony, mostly British. Stations in Kenya and in the Union of South Africa are received. No alternating-current sets are used. Short-wave reception is arousing some interest since the commencement of short-wave broadcasts from Johannesburg and Nairobi.

SOUTHERN RHODESIA

Language, English

Southern Rhodesia has shown a great interest in radio, and the developments have been limited only by the distance from broadcasting stations and the expense of the types of sets necessary. Summers are hot and winters warm, reception being very poor.

About 50 receiving sets have been installed. Many are British, and a few American. Programs are received from stations in the Union of South Africa and Kenya. Short-wave reception is becoming increasingly popular since the inauguration of broadcasting on these waves by Nairobi and Johannesburg.

SOUTH WEST AFRICA

Language, German

Interest in radio is growing in South West Africa, but, because of the distance of broadcasting, little has been accomplished as yet. The Government is generally interested in its development, but the small proportion of white population will probably limit advancement for some years. All seasons are warm, with reception fair

throughout the year. Receiving installations number 50, principally British. Reception is possible only from stations in the Union of South Africa. Alternating-current sets are practically unknown. Short-wave reception is becoming popular.

SPANISH AFRICA

Language, Spanish

Aside from the Canary Islands, there has been little progress made by radio in Spanish Africa. Although radio is popular among the few whites, conditions are not favorable to its promotion, the distance from broadcasting stations in all cases being the principal retarding factor. In all of Spanish Africa summers are hot and winters warm, with poor reception.

There is no broadcasting in any part of Spanish Africa, aside from the Canary Islands. Rio de Oro and Spanish Morocco, as well as the Canary Islands and French Africa, receive broadcasts from Spain.

The total number of sets in use is estimated at 150, including several American and various European types. Neither alternating-current nor short-wave receivers have been introduced.

SWAZILAND

Language, native dialects

There is no radio development in Swaziland. Summers are hot and winters warm, reception being poor at all seasons. Only five receivers have been installed, all believed to be British. Broadcasting from South African stations is received.

TANGANYIKA

Language, Arabic

Radio development in Tanganyika has been limited to a considerable extent by the distance from broadcasting, but the establishment of the new broadcasting station in Kenya is expected to improve this condition. It is hot at all seasons, with poor reception. About 10 receiving installations are in service, mostly British. Broadcasting from Kenya provides satisfactory reception.

TUNISIA

Language, French

The French and other Europeans in Tunisia have shown considerable interest in radio, and developments are comparatively well advanced. Though the climate is not of the best, reception from France is easily accomplished, while the broadcasters in Tunisia provide programs of local interest. Summers are hot and winters warm. Static is bad throughout the year.

Three broadcasting stations are operating in Tunisia, and French broadcasts from Algeria, Morocco, and France are received, as well as other European stations. A recent estimate indicates that about 650 sets are in service. The majority are French, the remainder of various makes. Short-wave reception is meeting with considerable success and is arousing some interest.

UNION OF SOUTH AFRICA

Language, English and Dutch

The development of radio in the Union of South Africa has been brought to a high point. The Government has taken a great interest and has gone to considerable lengths to promote the use of broadcasting. The whites are particularly enthusiastic, and while the financial end of broadcasting has proven a difficult problem, it is apparent that progress will continue. Newspapers have taken an adverse position, however, considering radio a competitor in the field of advertising, with resulting friction that has somewhat retarded radio.

The Union of South Africa has a total area of about 475,000 square mile and a population of about 7,000,000 about 1,500,000 being white. The principal cities are Johannesburg, Cape Town, Durban, Pretoria, Port Elizabeth, and Benoni. The country for the most part consists of plains. Radio reception is always good and is best from June to August.

The Postmaster General has supervision over radio matters. Broadcasting is a regional monopoly, each station being licensed to operate exclusively within a certain territory for a period of five years.

Four broadcasting stations are now operating in the Union of South Africa, and, while reception from Europe and the Americas is frequently accomplished, it is not very satisfactory.

Receiving-set owners are subjected to the payment of both license fees and broadcast subscriptions. The licenses cost 5 shillings per year, while the subscriptions vary from 6 shillings 6 pence to 35 shillings, depending upon the distance from the broadcasting stations. Higher scales are in effect for sets to be used for commercial purposes.

Recent estimates indicate that the licensed and unlicensed receivers in service have a total of about 130,000. British sets predominate, but American makes are popular and a large number are in use.

Some interest in alternating-current sets has been aroused. Short-wave reception has been popular for several years, particularly among the exceptionally large class of amateurs.

ZANZIBAR

Language, Arabic

There has been practically no promotion of radio in Zanzibar. Five receivers are in use, all British. The only programs satisfactorily received are from Kenya. All seasons are hot, with poor reception.

SERVICES OF THE BUREAU OF FOREIGN AND DOMESTIC
COMMERCE

CHOOSING REPRESENTATIVES

In the selection of representatives in foreign countries it is recommended that the Commercial Intelligence Division of the Bureau of Foreign and Domestic Commerce be consulted. That division is prepared to furnish lists of foreign firms and to give special information on those chosen. This information is supplied to bona fide American firms without charge.

IMPORT DUTIES

The importation of radio apparatus into various countries is subject to a wide variety of tariffs and import restrictions. These not only vary between countries, but the laws of countries are constantly undergoing change, while new interpretations also strongly affect the rate of duty on various articles. For these reasons, it is not feasible to include tariff rates in this publication, but such data will be provided to American exporters upon request addressed to the Foreign Trade Division of the Bureau of Foreign and Domestic Commerce.

BRANCH OFFICES OF THE BUREAU

The Bureau of Foreign and Domestic Commerce maintains 30 branch offices in commercial centers throughout the United States, through which all of the services of the bureau are extended to American business men. While most of the problems that arise can be satisfactorily handled by correspondence, it is recommended that more difficult questions be taken up personally with the nearest branch office. Through personal contact the managers and foreign-trade secretaries of these offices are able to give better service in the solution of such problems, while at the same time the exporter becomes more familiar with the ways in which the bureau can be of service.

PUBLICATIONS

The Bureau of Foreign and Domestic Commerce has issued a catalogue of publications which lists and describes the publications of the bureau for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., or by district offices of the bureau. This catalogue will be supplied upon request.

The electrical-equipment division has prepared a number of studies of particular markets for electrical goods, including radio apparatus. These studies have been issued as Trade Information Bulletins as follows: No. 487, Australia; 496, Brazil; 505, Japan; 508, Peru; 511, Colombia and Venezuela; 512, India; 515, Chile; 519, Mexico; 526, Southern Wales; 531, Irish Free State; 535, Argentina; 553, United Kingdom; 563, Central America; 565, Germany; 573, Belgium and the Netherlands; and 596, Spain. These bulletins are sold at a uniform price of 10 cents.

