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**RADIO MARKETS OF THE
WORLD, 1932**

BY
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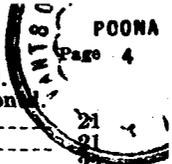
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FOREWORD

Radio is unique among commodities in a number of ways that have been pointed out by every speaker and writer who, during the past decade, has set forth with tongue or pen the magic word "radio." Though the repetition has not added to the sum of human knowledge, it has not detracted from the fact. It has, moreover, served a valuable purpose in emphasizing the great interest of all races of humanity in radio, explored the reasons for that interest, and maintained it by thorough investigation and suggestion of possible increase in benefits.

Radio has not suffered in the market places as greatly as have some other commodities during the recent times of commercial stress. Yet at the same time there are in effect exchange restrictions and customs duties in some countries that have retarded sales of American apparatus. In Europe there has grown up a campaign of restrictions serving to limit the markets for American radio products. These restrictions, customarily considered as a result of decreased commercial activities, perhaps have other sources. During the past three years American sets have enjoyed a rapidly growing demand in Europe, following nearly a decade of American concentration on less competitive markets. This alienation of domestic sales could hardly be looked upon benevolently by European manufacturers. While business conditions may well have served as the principal argument, vigorous attempts to curtail American competition by import restrictions were inevitable. These restrictions have been based largely on the enforcement of patent rights by European holders. The whole situation is still complicated in so far as it affects the sale of American apparatus, yet the information contained herein should prove of value to United States exporters.

United States radio exports totaled \$22,635,154 in 1931, compared with \$23,133,815 in 1930 and \$23,122,147 in 1929. Each of these three years more than doubled the exports during any year prior to 1929. The last year constitutes the second decrease recorded for any year as compared with the preceding year (1926 having shown a considerable drop under 1925) since the export of receiving equipment became a market factor.

This publication is the sixth issued by the Bureau of Foreign and Domestic Commerce reviewing foreign markets for radio apparatus. It is a compendium of information from numerous sources, particularly from field officers of the Departments of State and Commerce. In view of the rapidity of recent changes, and the impossibility of foretelling the result of many of them, it is possible that some of the information given herein may change before it becomes available to exporters, but those desiring the latest data on any market may address the electrical equipment division at any time.

FREDERICK M. FEIKER, *Director,*
Bureau of Foreign and Domestic Commerce.

AUGUST, 1932.

RADIO MARKETS OF THE WORLD, 1932

INTRODUCTION

The advancement of radio in all its several directions continues unabated. Because the general public is everywhere interested and affected, governments, schools, churches, commerce, and industry are seeking to establish its benefits on a progressively more stabilized basis. Public morale, upon which all social interests are constructed, is probably benefited more by radio than by any other finite development.

The stabilization of broadcasting services throughout the world has received considerable attention, and during the past year several governments have proposed major or minor changes in regulatory methods advanced with this end in view. Some such changes have been made. Stations have continued to increase in number and in power where these extensions add to the service. Invention and research have continued and have proved their worth, though the field for important improvements is narrowing. Atmospheric conditions and climatic limitations have been yielding to engineering, and the number of receiving sets in use continues its upward trend.

BROADCAST ORGANIZATION AND FINANCE

However flexible and tolerant broadcasting may be as to the uses it will serve and the restrictions it will survive, it is nevertheless subject to rigid economic laws, a fact which is often ignored. The cost of operating the stations, even at no profit and with free talent, is high, even under the most economic and efficient management. Wide variations in efficiency are inevitable, and any expression of the cost of operation is subject to exceptions and qualifications, yielding few statistical results. A computation based on experiences of American broadcasters for a past year was made by the electrical division of the United States Bureau of Foreign and Domestic Commerce (see Trade Promotion Series No. 109, Radio Markets of the World, 1930), the results of which are now obsolete, owing to changes in valuation and cost data. One American authority suggests for general results a probable annual expenditure for station operation alone, less talent, of an amount equivalent to the market value of an equivalent new transmitter.

Talent of the kind demanded by the listener does not volunteer its service gratis. The radio listener employs the same taste in using his set as he would in selecting a theater, concert hall, or lecture room for his personal attendance, creating in that act itself competition for the services of the acceptable artists—a competition in which the artist's fee is the principal question. Office expenses, copyright fees, and several other important items of expense further add to the costs.

DEVELOPMENT OF PRESENT POLICIES

The history of broadcasting reveals that stations were first operated for research purposes at the expense of manufacturers who saw therein some possible development of advantage in their businesses. The broadcasting station as a vehicle of good will toward the broadcaster and his business, whatever it might be, and of the sale of time to other business firms to help carry the expense, immediately developed. Shortly afterward came the broadcaster whose business was broadcasting for profit.

When the social possibilities of broadcasting became apparent many countries determined upon maintaining it as a public utility, particularly those where government ownership of communication services had previously been the rule. The use of broadcasting for advertising purposes was prohibited as much to avoid any possible sponsor dictation of programs as to eliminate advertising speeches, which, indeed, had not been developed anywhere beyond an embryonic stage at that time.

Having precluded self-support, it was next necessary to determine some other means by which broadcasting expenses could be paid. Two alternatives most readily suggested themselves, namely, governmental appropriation and assessment of listener fees. The latter method had the greatest appeal, since it placed the cost on the doorstep of the direct "beneficiary" of broadcasting. Thus was developed the license system of supporting broadcasting.

The administration of funds with the greatest efficiency called for a centralized responsibility, so monopoly systems were developed in many countries.

That some of these monopolies were vested in governments, some in quasi-governmental corporations, and some in private concessions has seemed to have had no effect on the service or markets. In fact, numerous governments have shifted their monopolies from one to another of these classifications without any apparent results in any of these respects. Monopoly operation alone seems to have had only one effect—program restraints.

NATIONAL AND REGIONAL MONOPOLIES

National monopoly was the original form, but the expedient of regional monopolies as a modification appeared at the same stage. Germany had and has 11 broadcasting areas, in which individual Government-controlled broadcasting corporations hold monopolies; Japan originally had a system which was perhaps the most thoroughly developed program ever adopted as a theory. The Empire was divided into large, high-power regions, and again into smaller low-power areas, each of which was open to concession. By this plan each spot in the country was theoretically within range of one high-power and one low-power station. The failure of the system was through lack of applicants for all but a few of the concessions. South Africa, with extremely "spotty" population, offered independent regional concessions, but as this did not encourage coverage of casting in sparsely settled regions, it was abandoned.

Radio clubs have been given special broadcasting status in Brazil and Sweden. In the former there is no broadcasting except by such clubs, each of which operates independently, while in Sweden the societies operate local stations in centers not covered by the monopoly.

TYPES OF NATIONAL CONTROL OF BROADCASTING

Some of the more important controlled systems, typical of each class of organization, are:

Canada (proposed system): Government chain of high-power stations; independent locals, both carrying advertising.

Brazil: Radio clubs, each station independent.

Peru: Government monopoly, operated under contract by private corporation for Government as principal.

Venezuela (abandoned system): Private concessionaire with monopoly of broadcasting, importing; manufacturing, and merchandising of receiving apparatus.

Austria: Government-controlled private national monopoly.

Belgium: Government-controlled monopoly; existing broadcasters continuing independent operation.

Denmark: Government monopoly.

Germany: Government ownership; Government-controlled regional corporate monopolies.

Italy: Private corporate monopoly.

Sweden: Private corporate monopoly high power; radio club locals.

United Kingdom: Government-controlled monopoly.

Japan (abandoned system): Contemporary high and low power regional monopolies.

Australia: Corporate monopoly high power; independent low power.

New Zealand: Government high power; independent low power.

Most countries with controlled systems will be found to operate under one or another of the plans outlined above. There are likewise many other possible combinations, any one of which may be pressed into service by one or another government.

Independent stations are usually promoted by business firms, though large percentages of other groups of operators are also listed. The variety of interests behind the stations in independent-operation countries are exemplified by those in the United States, and they include almost every cooperative activity of the populace. This is not surprising, in view of the fact that the activities having properly adaptive capabilities are world-wide in scope.

LICENSE FEES

Where listeners are called upon to pay the cost of broadcasting, the collections are usually specified as "license fees." The modes of collection vary, although the post office is almost universally the agency.

Effectively, the license fee includes both a license fee and a subscription to broadcasting. The whole must be paid before a license becomes valid, but the reason for the collection in most cases is to pay for the costs of broadcasting. The division of the receipts between license and subscription varies, in some countries the rate being dependent upon the actual cost of broadcasting. Italy, alone, designates the separation of these fees.

Canada, France, and some other countries assess a license fee or require registration of a set for statistical purposes only. In these cases the provision of broadcasting is entirely dissociated from any relation to the license fee or its payment.

The costs of collection are sometimes contemplated in fixing the license portion of the fee, but only for the mechanical operations of receiving fees and accounting. Law-enforcement costs are almost if

not quite invariably appropriated by the national government as ordinary police and court allowances.

The following table shows the license and other fees charged in various countries for licenses to operate receiving sets and subscriptions to program service:

LICENSE AND OTHER RECEIVING-SET FEES

[Amounts converted to United States dollars; owing to recent wide fluctuations in exchange these figures are approximates only]

Country	Inspection and installation fees	Annual license fee	Annual broadcasting subscription	Total	
				First year	Subsequent years
Bahamas		\$1.22		\$1.22	\$1.22
Barbados		(1)			
Bermudas		(1)			
British Honduras		5.00		5.00	5.00
Canada		2.00		2.00	2.00
Guatemala	\$5.00			5.00	
Trinidad and Tobago		* 2.43-4.87		2.43-4.87	2.43-4.87
Bolivia	1.70	12.28		13.98	12.28
Brazil	2.40			2.40	
Peru		4.00		4.00	4.00
Venezuela		11.58		11.58	11.58
Austria		* 3.39-10.16		3.39-10.16	3.39-10.16
Belgium	(1)	.65		.65	.65
Bulgaria		1.44		1.44	1.44
Czechoslovakia			\$3.60	3.60	3.60
Danrig		3.37		3.37	3.37
Denmark		2.68		2.68	2.68
Estonia		* 2.40-4.00		2.40-4.00	2.40-4.00
Finland		2.00		2.00	2.00
France		.39		.39	.39
Germany		5.71		5.71	5.71
Gibraltar		2.43		2.43	2.43
Greece		6.50		6.50	6.50
Hungary		5.40		5.40	5.40
Irish Free State		2.43		2.43	2.43
Italy		1.5	3.80	3.95	3.95
Latvia		4.83		4.83	4.83
Lithuania		10.00	1.20-6.00	11.20-16.00	11.20-16.00
Malta	2.67	2.43		5.10	2.43
Norway		5.36		5.36	5.36
Poland		3.36		3.36	3.36
Rumania			3.60	3.60	3.60
Spain		.97		.97	.97
Sweden	10.72	2.68		13.40	2.68
Switzerland	.60	3.00		3.60	3.00
United Kingdom		2.43		2.43	2.43
Yugoslavia		3.96		3.96	3.96
Turkey		4.76		4.76	4.76
Hong Kong		2.20		2.20	2.20
India		3.65		3.65	3.65
Japan (including Chosen and Kwantung)		.50	5.97	6.47	6.47
Syria	.96			.96	
Australia		* 4.25-5.84		4.25-5.84	4.25-5.84
New Zealand		7.29		7.29	7.29
Canary Islands		.97		.97	.97
Tunisia		.78		.78	.78
Union of South Africa		* 4.87-6.09	* 4.87-8.52	* 4.87-8.52	* 4.87-8.52

1 Required; no data as to cost.

2 Depending on number of tubes.

3 Depending on income of owner.

4 No charge for first 30 days to permit demonstration without penalty.

5 Depending on distance from main station.

BROADCAST SERVICES

COVERAGE UNDER MONOPOLY SCHEMES

Broadcasting companies have turned their attention more and more to the question of coverage—in most countries to systems of stations of higher power. Those operating under centralized monopoly control in each case have a definite objective in perfect service, but with a restricted choice of programs. In competitive countries the only centralized authority has but limited control, with little authority as to extensions of service other than of negative action on applications for license to broadcast. In this sense it may be said that the monopoly is an attempt to guarantee service, while the non-monopoly aim is to restrict overdevelopment and to direct the character of broadcasting.

Most of the monopoly coverage schemes are based on the theory that a station is equally effective in all directions for a given distance. A draughtsman's compass is used to plot on a map the smallest number of circles of the size dictated by the power chosen for stations that will completely cover the country. Adjustments in the form of low-power relay stations either are made in expectation of "blank spots" or left for experience to determine. That both programs and power may be wired to any such place is assumed, although it is to be noted that all monopoly countries which are completely covered have somewhat dense population in all parts and that all transmitters are located in or near cities of appropriate size.

The disadvantage of this method lies in the attendant lack of choice of programs. No effort is made to supply any choice, except in the United Kingdom, where the system being installed will present two programs from each center. Both, however, will be subject to monopoly dictation. The number of programs available to any given receiver can not be too great, except as receivable stations may interfere with each other; listeners are not unreasonable in preferring, as a whole, that even four or five widely varied types of programs be available to each receiver at all times during the broadcasting day. To guarantee such choice with a "plotted" system demands primarily that there be as many superimposed systems as there are to be available programs for each home.

It has not been evident that there is any appreciable variety in programs under any monopoly system. Not only the policies of the monopolies, but the limitation of centralized program judgment, preclude the differentiating characters.

Local programs, by and for a limited community, are of no less value than national or international programs. Failure to provide facilities for such communities as will take advantage of them means the retarding of an important phase of radio. It is particularly notable that the plan for Canadian reorganization of broadcasting on a nationalized basis provides for such low-power stations as may be needed for community purposes, as has been done in Australia as well as New Zealand. Sweden also recognizes the need for local outlets in its provisions for radio club stations, and the United Kingdom is proceeding on the theory that regional outlets will serve the same purpose.

GOVERNMENTAL AND PRIVATE MONOPOLIES COMPARED

There is little apparent difference in results between private and governmental monopolies, from the public point of view. Broadcasting organizations holding monopolies now range from private control of independent-station systems to full Government management and operation. The programs appear to be similar in acceptability and suffer alike from the major fault of the monopoly system—lack of listener's choice. The power of listener dictatorship of programs is shown by the fact that such programs are usually adapted to his demands, although the stronger the governmental participation in the broadcasting organization the more evident is the desire to "cultivate" the listener. A recently published observation of a well-known American radio speaker calls the monopoly system a service to students, the competitive system a service to citizens. Governmental monopolies therefore affect programs only in that they restrict popular programs to the minimum and supply in lieu thereof cultural features, usually in speech. Music, except popular novelty, is hardly affected by the form of control, but is perhaps in general better balanced as to the whole program under monopoly than under private control. There have been Government-controlled systems that were apparently abused by political, educational, and organized interests, but unless quickly reformed they have been short-lived.

Exporters may have faith that the listeners will present sufficient power under any method of broadcast control to develop the program system to their liking.

AGITATION FOR CHANGE IS UNIVERSAL

It seems to matter little what system is in operation or what the alternatives may be, agitation for alteration is universal. Perfection invariably appears to attend any except the system in use. In practice, however, there has been contrary experience. Improvement is possible, but years of progress in improvement are generally lost when a fundamental change is made. The difficulties arising from any method may be avoided by an alternative, but not without the development of other difficulties of comparable weight. Such difficulties have been faced by numerous countries in varying degrees.

The receiving license fee in a few countries relieves the listener from advertising but in its place substitutes restricted choice of programs. No method has been developed whereby national coverage with several programs can be supported even in the most densely populated countries by collectable license fees.

On the other hand, there is sufficient depreciation of radio advertising to warrant the assumption that it is subject to abuses regardless of the restrictions that may be placed upon it.

Attention likewise should be given to the coincidence by which those advertising countries which have not put superficial restrictions on the advertising have at once the most prosperous broadcasting systems and the greatest amount of money turnover in advertising. In all analyses, program quality can result only from a money turnover, regardless of æsthetic considerations of the primary purposes of those supervising the expenditures.

A point to be considered is that radio broadcasting is close to the general public, so intimate that any fault is brought directly to the attention of great numbers of people. It is human nature for the individual aware of a problem to devise a solution for it. There is hardly an individual who can not make at least one practical suggestion for the improvement of broadcasting, especially since radio is regulated by every national government.

Even the most closely controlled broadcasting system turns to listener response for guidance in program improvement. That this response is not necessarily from a cross section of listeners as a whole, and that the receptiveness of a listener for a given program depends as much or even more on his momentary moods than on his general taste or the quality of the program, is generally recognized. Here again the monopoly system proves more cumbersome than independent operation, inasmuch as there is less freedom for experiment.

DEVELOPMENT OF PROGRAMS

Nevertheless, the development of programs has progressed. There has been little of true novelty during the recent past. Talent adapted to radio has been fairly well mobilized and microphone personalities developed along all lines appearing suitable for radio in any given country.

International broadcasts have lost their novelty almost everywhere. Their interest now lies principally in the fact that they bring the personalities and arts of distant regions into the home. Further extensions will increase this service, but technical interest will be aroused only among persons interested in radio as a vocation.

In general, the broadcasters of the world have reached the stage where their efforts are practically limited to delivering programs of a fixed cycle, perfecting their presentation, and keeping pace more with a stable public demand than of developing along the line of novelty. The unique in present programs emphasizes technical radio less and the characteristics of talent and presentation more.

Improvement of programs has been not alone the more careful selection of program material, but a more complete correlation of material to the available talent.

THE TREND TOWARD STATION SPECIALIZATION

There is developing a tendency among stations and systems toward greater individual specialization in programs. It is impossible to forecast how far this tendency may progress. Unless it is halted for reasons not now apparent, its ultimate effect would be specialization on a limited number of program types. If this should occur, it would not be without precedent; editorial management policies of newspapers have resulted in the development of a number of characteristic types of papers, each appealing to readers of certain tastes more than to others, and competing on quality basis in the same field with the same stock in trade—the day's news. Similar identification of broadcasters does not appear impractical. The theory of the service thereby made available to listeners is that each may thereby tune in the station broadcasting the class of program most appropriate to his preference, knowing that there will be no change to a radically different type so long as he is willing to listen.

RECORDINGS

The development of recording, with improvement of quality and reduction of cost, has rendered valuable aid to the progress of broadcasting. The art of recording has progressed, increasing the faithfulness of the counterfeit, although the transmission of some types of percussion sounds and crescendos is yet to be guaranteed before the ultimate in reproduction will have been reached. For the small station, particularly where it is isolated, the "electrical transcription" is the only method of presenting quality talent in any variety, and numerous larger stations and systems are finding it useful.

Even though this method of providing programs does not participate in the primary advantage of radio—instantaneous audition of distant performances and happenings—the advantage of high-class talent at lower rates and of adaptability to time schedules enable many stations to give more satisfactory service with recordings.

ADVERTISING¹

Radio has continued to grow in importance as a medium for advertising. Most countries now have some advertising by radio, whether other means of radio support are provided or not. That it is effective is evidenced by its popularity with advertisers and by the fact that the per capita development of broadcasting facilities in each country is, in general, in direct ratio to the freedom of broadcasters to undertake advertising.

Methods vary considerably by countries, for several reasons. Sales promotion of any type must be adjusted to national characteristics, but in radio there is the added effect of legislation and regulation dealing with publicity. Limitations as to time consumed, the number of words, or the character of the advertisement are common. In Germany only German firms can use radio for this purpose. Spain limits publicity to five minutes of each hour, and the proposed national Canadian chain will use only 5 per cent of the program time—three minutes during each hour.

Fully sponsored programs are not employed in all advertising countries, nor are other practices universal. Those desiring to inform themselves of radio advertising possibilities should consult the bulletins noted at the head of this section.

CHAIN BROADCASTING

Chain broadcasting is enjoying growth in most foreign countries where stations are independently operated. The relay system has been well established in many countries for several years, and because of modifications there is now little to differentiate between the two systems as administered save that, as a rule, the control of time of relay stations is customarily vested in the management of the main station, while under the chain system the outlet station determines on its own account what its general or special connections with the chain shall be.

Relay stations primarily are simply additional transmitters which broadcast the same program simultaneously with the main station, and may even be controlled electrically from it. However, relays

¹ See Trade Information Bulletins on broadcast advertising listed on p. 111.

ordinarily have had studio facilities and have broadcast separate programs during certain days of each week.

Chain operation in the United States constitutes intermittent connection of each station with a "program supply" available throughout the broadcasting day, subject, of course, to variations. In other countries, however, other methods are employed. The new British relay system constitutes all stations with a full-time national program, usually originating in London. That each station of the new system has and is to have a secondary wave length for simultaneous broadcasting of regional programs does not enter into the chain development. Germany, developed upon the idea of regional programs, employs national hook-ups on special occasions.

Chains are evolving slowly in many countries, the rate being dependent upon the provision of interconnection facilities rather than upon any radio condition.

CLASSES OF STATIONS AND WAVE LENGTHS

The broadcasting services of the world are rapidly becoming diversified, there now being four classes of stations which cater to the recreational tastes of the public. Sound broadcasting is done on three wave bands, and television stations are increasing in numbers, though limited by the small number of people yet interested in television reception.

Short waves are now recognized as essential to satisfactory broadcasting over distances of tropical regions. Some middle-band broadcasting is done in such areas, but is not generally received satisfactorily. For ultra-long-distance reception short waves have proved their worth in all regions, and although present apparatus has not yet made reliable world-wide service possible, the adaptability of existing equipment indicates that improvement to that point is possible.

Ultra-long waves (1,340 to 1,875 meters) are allocated to broadcasting in but few countries outside Europe, and then only in isolated cases. In that Continent, however, this band is more popular because of its greater distance range, in addition to the advantage of removing some of the higher-powered stations from the middle band. It is usually allocated to a few stations with more pretentious power and program facilities.

Comparative ranges of the three classes of waves as used for broadcasting show that the ground wave has an increasing range in ratio to the wave length in meters, but that below 40 meters there is a dead zone or skip distance between the ground-wave limit and the sky-wave reflection which increases as the wave length decreases. The maximum distance is made by waves of from 30 to 40 meters in daytime and from 50 to 60 meters at night in winter. The minimum carrying waves are those of 214 meters, increasing with both longer and shorter wave lengths. The ultra-long band has a considerably higher distance range than the middle band and partakes somewhat of the same advantages over the middle band as do short waves.

Practically all broadcasting countries have medium-wave broadcasting (200-545 meters, 500-1,500 kilocycles). This is the only band designated by international conference solely for broadcasting, both the long and the short bands being allocated provisionally.

Television is not yet so widely established. Canada and the United States have a number of stations on a permanent basis, but in other countries such arrangements are generally on a temporary experimental plan.

Foreign broadcasting schedules have been the subject of a large number of inquiries to the Bureau of Foreign and Domestic Commerce during the past year. The instability of such data has rendered every effort to develop a world-wide schedule futile, but indications are that practically all broadcasters operate at least during the evening hours of each day and that the greater number are on a full-day schedule.

The electrical equipment division of the bureau issues from time to time lists showing the characteristics of all foreign radio broadcasting stations, including all stations which broadcast regular or frequent programs for popular reception, regardless of the official license category, concerning which any data are available. Copies may be obtained by addressing the electrical equipment division, Bureau of Foreign and Domestic Commerce, Washington, or from any district office of the bureau for 25 cents.

LEGISLATION AND REGULATION

The interests of the listener and financial integrity of the broadcaster, outlined elsewhere in this publication, are but two of the several matters which are necessarily considered in legislating for and regulating broadcasting.

It is inevitable that national, social, and political ethics be the primary test of all radio legislation. To prevent any abuse of the broadcasting privilege to the detriment of these ethics the basic radio laws of a country usually provide that the broadcaster of seditious or indecent matter is subject to the penalties of violating the radio laws as well as any other laws providing penalties for the same offense.

OVERCOMING INTERFERENCE AMONG STATIONS

Interference among stations of a given category with others of the same or other classes, and the special protection necessary to certain emergency services—these require a somewhat complicated code of legislation and regulation. International conferences, treaties in character, provide for the division of the radio spectrum among the various categories of stations, which the signatory countries agree shall not be violated to the detriment of properly assigned foreign stations. The assignments of wave lengths to individual stations within these bands are administered nationally. Each country further agrees that spark transmitters shall not be licensed, because of their capability of interfering with all services on many channels other than those used by the station in question. Distress traffic is given precedence through international regulation.

The distribution of channels among stations within the international categorical assignments is under the jurisdiction of national authorities. The Washington Conference of 1927 agreed that frequency should be adopted as the means of assigning and designating channels in lieu of wave length, but foreign compliance has not been popular. It is generally assumed that the public, acquainted with

wave length and its significance, would be confused by a change of official vocabulary beyond any advantage to be gained in agreeing the terminology of assignments with the unit of channel separation.

Interests opposed to broadcasting or to invested broadcasters or interests which would use radio for the furtherance of their own purposes regardless of contrary demands have promoted legislation and regulations in several countries. For example, press opposition to radio competition for advertising business has been responsible for some of the license systems adopted. However, the most important of such activities are those in which organizations designed for the promotion of special purposes assume their right to broadcasting to exceed that of other interests, with or without public agreement. There is no record of success in any other country of such a project not in agreement with the general public will.

ELIMINATION OF OTHER DISTURBANCES

Interference with broadcasting is not due to radio services alone, but is effected by all public utilities. That arising from radio sources may be controlled without difficulty, but any regulatory and equitable method of preventing other interference has proven difficult to devise and much more difficult to enforce. Interference caused by services within the control of public utilities, such as from trolleys and transmission lines, is reachable, but the most common causes—industrial motors, elevators, and household appliances, sign flashers, and the like—which have individual effect only in immediate localities, provide a problem which regulatory authorities have been unable to solve. Efforts have been made, but in no case has there been any effective campaign for the elimination of such disturbances except where taken up aggressively by the listeners in the immediate neighborhood. Properly, this is an activity for radio clubs, and it is evident that several of them have made progress in this connection.

Listeners' interests, aside from their program dictation, are centered in the degree of service available. Under monopoly systems the density of population of an area is given only superficial significance in developing a system of coverage, the intent usually being to provide service to all areas indiscriminately. Under the independent-station systems, however, the interests of the broadcasters are best served by locating the station in heavily populated centers, resulting in a tendency to concentrate in such centers all of the broadcasting service which the available channel facilities will accommodate. Radio regulation of several countries limits the degree to which these facilities may be used in such centers.

INTERNATIONAL CALL LETTERS

The identification of radio stations by means of a uniform type of signal was first provided for by an international conference in 1912, and though amended from time to time is still in effect fundamentally as originated. The signals adopted consist of from three to six letters, or of one or more letters and one or more numbers, the initial letters of which designate the nationality of the station.

Current assignments are as follows:

CA to CE	Chile.
CF to CK	Canada.
CL to CM	Cuba.
CN	Morocco.
CP	Bolivia.
CR	Portuguese colonies.
CS to CU	Portugal.
CV	Rumania.
CW to CX	Uruguay.
CZ	Morocco.
D	Germany.
EA to EH	Spain.
EI	Irish Free State.
EL	Liberia.
ES	Estonia.
ET	Ethiopia.
F	France and colonies.
G	United Kingdom.
HA	Hungary.
HB	Switzerland.
HC	Ecuador.
HH	Haiti.
HI	Dominican Republic.
HJ to HK	Colombia.
HR	Honduras.
HS	Siam.
I	Italy and colonies.
J	Japan.
K	United States.
LA to LN	Norway.
LO to LV	Argentina.
LZ	Bulgaria.
M	United Kingdom.
N	United States.
OA to OB	Peru.
OH	Finland.
OK	Czechoslovakia.
ON to OT	Belgium and colonies.
OU to OZ	Denmark.
PA to PI	Netherlands.
PJ	Curacao.
PK to PO	Netherland India.
PP to PY	Brazil.
PZ	Surinam.
RA to RQ	Russia.
RV	Persia.
RX	Panama.
RY	Lithuania.
SA to SM	Sweden.
SP to SR	Poland.
SU	Egypt.
SV to SZ	Greece.
TA to TC	Turkey.
TF	Iceland.
TG	Guatemala.
TI	Costa Rica.
TS	Saar Basin.
UH	Hedjaz.
UI to UK	Netherland India.
UL	Luxemburg.
UN	Yugoslavia.
UO	Austria.
VA to VG	Canada.
VH to VM	Australia.
VO	Newfoundland.
VP to VS	British colonies.

VT to VW	British India.
W	United States.
XA to XF	Mexico.
XG to XU	China.
YA	Afghanistan.
YH	New Hebrides.
YI	Iraq.
YL	Latvia.
YM	Danzig.
YN	Nicaragua.
YS	Salvador.
YV	Venezuela.
ZA	Albania.
ZK to ZM	New Zealand.
ZP	Paraguay.
ZS to ZU	Union of South Africa.

The sense of these conferences was that call letters within the prescribed groups be assigned to all radio stations, particularly those which were receivable internationally, and that they be used for identification at reasonably frequent intervals during each transmission. Most countries comply to a certain extent, but there are a number of notable exceptions. Several countries have a number of stations which do not use and apparently have not been assigned calls. In Germany no broadcasting station has a call. In certain other countries numerical calls are used without the identifying initials indicating the country of origin. In Canada, the sponsors of part-time station operation may be granted separate licenses with call letters differing from those of the physical station used by such sponsors. Outstanding examples are numerous stations operated by the Canadian National Railways under their own system of calls, each of the stations having an alternative call when operated by its owner. In the United States several consolidated stations maintain both or all previously used calls.

ENFORCEMENT OF BROADCAST REGULATIONS

The enforcement and interpretation of radio regulations is an element which can not be ignored in judging the world's radio markets. There are few countries where radio regulation is effective according to the apparent meaning of the original legislation. Interpretations arise within the legislatures. Other interpretations are made by the regulating bodies, as a result of ambiguities in legislative language or because of physical impossibility of fulfilling the requirements. In some countries special executive decrees exempt certain types of broadcasting from stringent control. Other factors developed by policy also affect the regulations themselves, causing many variations between the language of the law and the general practice.

Provisions for the confiscation of communication systems in the event of national crises are common to practically all countries. In some countries the authorities may so confiscate even though the occasion is not necessarily one of particular national importance. The private owner of a station, therefore, might be legally deprived of his license and property in the event of a local strike or riot, for example, without compensation or the right to reclaim the property even after the restoration of normal conditions. Regardless of moral considerations, the determination of the authorities as to the best interests of the country is the ruling factor.

EVASION OF LISTENERS' LICENSE FEES

Violations of receiving-set license laws are notoriously common, despite extreme efforts toward enforcement. The experience of the licensing countries has been that while the majority of the listeners comply with requirements if there is any definite attempt at enforcement, a large percentage will avoid payment until individually apprehended. Other listeners apply only when the apprehension of illegal set owners in their neighborhood has been accomplished. There seems to be a minor relation between the evasion of fees and the penalties involved, minor fines serving about as effectively as penalties that seem to be out of all proportion to the offense. Extreme penalties for failure to obtain radio set licenses are ordinarily common to countries emphasizing military training and national defense, the theory referring to the necessity of national control of communication systems in the event of war, and hence the necessity for information as to the location of all radio receiving sets available for use by enemy interests.

IMPORT RESTRICTIONS

Restrictions on the merchandising and importation of radio equipment as such are included in several radio laws, usually in connection with attempts to enforce the license laws through tracing the apparatus to the ultimate purchaser. Other restrictions on these activities, exclusive of ordinary import duties and business taxes, increased rapidly during the fall and winter of 1931-32. Not only American, but at least to a certain extent British, manufacturers have been incommoded by the restrictions. The method ordinarily employed has been to select a specific period of the past and assign to each exporting country a quota based on the percentages shown by imports from them during such period. In no case does American apparatus enjoy as large an allowance as was enjoyed during the periods just preceding the imposition of the restrictions.

CHARACTERISTICS OF RADIO REGULATION

The following data show the outstanding characteristics of radio regulation of the different countries, so far as they are covered in radio legislation. Interpretations and extra radio laws affecting them are not considered.

Broadcasting unrestricted (subject only to general license and laws for safeguarding of radio services and national interests in general, no monopoly or prohibition maintaining); receiving unrestricted (not subject to payment of any license or subscription fees, nor prohibited to residents generally); importing and merchandising unrestricted (subject only to general laws governing all commodities, no monopoly being granted):

Barbados.	Paraguay.	Italian Africa.
Cuba.	Surinam.	Kenya.
Dominican Republic.	Uruguay.	Liberia.
Greenland.	Portugal.	Mozambique.
Honduras.	Macao.	Northern Rhodesia.
Netherland West Indies.	Netherland India.	Southern Rhodesia.
United States.	Persia.	Spanish Africa.
British Guiana.	Angola.	Swaziland.
Falkland Islands.	British Somaliland.	Tanganyika.
French Guiana.	British West Africa.	Zanzibar.

Broadcasting and receiving unrestricted; importing or merchandising subject to restrictions: China; importing subject to permit.

Broadcasting, importing, and merchandising unrestricted; receiving restricted:

Bermuda, license required.	Estonia, annual license.
British Honduras, annual license.	Finland, annual license.
Canada, annual license. (See market review.)	France, annual license.
French West Indies, annual license.	Netherlands, registration, no fee.
Guatemala, installation permit.	Spain, annual license.
Jamaica, annual license.	Hong Kong, annual license.
Mexico, registration, no fee.	Iraq, annual license.
Miquelon and St. Pierre, annual license.	Palestine, annual license.
Nicaragua, annual license.	New Zealand, annual license.
Trinidad and Tobago, annual license.	Algeria, annual license.
Argentina, registration, no fee.	Canary Islands, annual license.
Bolivia, installation fee, annual license.	French Equatorial Africa, annual license.
Brazil, installation fee.	French Morocco, annual license.
Chile, registration, no fee.	Madagascar, annual license.
Belgium, installation fee, annual license.	Southwest Africa, annual license.
	Tunisia, annual license.

Importing and merchandising unrestricted; broadcasting and receiving restricted.

Bahamas, broadcasting prohibited, annual receiving license.
 Panama, broadcasting prohibited, installation fee.
 Peru, broadcasting Government monopoly, annual receiving license.
 Austria, broadcasting monopoly, annual receiving license.
 Bulgaria, broadcasting concessions, annual receiving license.
 Czechoslovakia, broadcasting monopoly, annual receiving license.
 Danzig, broadcasting monopoly, annual receiving license.
 Denmark, Government broadcasting monopoly, annual receiving license.
 Germany, broadcasting limited to corporations using Government stations, annual receiving license.
 Gibraltar, broadcasting prohibited, annual receiving license.
 Greece, broadcasting prohibited, annual receiving license.
 Italy, broadcasting monopoly, receiving license.
 Latvia, broadcasting monopoly, annual license.
 Lithuania, broadcasting monopoly, annual license.
 Malta, broadcasting prohibited, annual license.
 Norway, broadcasting concessions, annual license.
 Poland, broadcasting monopoly, annual license.
 Rumania, broadcasting monopoly, annual license.
 Sweden, modified broadcasting monopoly, installation fee, annual license.
 United Kingdom, broadcasting monopoly, annual license.
 Turkey, broadcasting monopoly, annual license.
 Hong Kong, broadcasting monopoly, annual license.
 Japan, broadcasting monopoly, annual license.
 Australia, modified broadcasting monopoly, annual license.
 New Zealand, modified broadcasting monopoly, annual license.
 Union of South Africa, broadcasting monopoly, annual license.

ENGINEERING DEVELOPMENTS

CONGESTION OF BROADCASTING CHANNELS

Of vital interest to American manufacturers at the present time are the possibilities of remedy for the growing congestion of broadcasting channels in North America. In 1927, when available channels were allocated between Canada and the United States, Mexico had but 15 stations, the most powerful being one of 2,000 watts. Developments were centered, with the population, about Mexico City. They offered no danger of creating interference with broadcasting in the northern countries, which could not be easily cared for by simple reallocation of a minimum number of stations.

However, during the past two years, Mexico has had not only a remarkable multiplication of stations, but the power of individual stations has been increased to include the greatest now used in the Western Hemisphere, with construction in progress which will give Mexico the most powerful station in the world.

The frequency division between the United States and Canada, established in all apparent safety as regarded Mexico, and the complete use of the entire available band in considering internal equity, ignored the unforeseen Mexican development. With that development, Mexican stations and authorities had no alternative but to use such frequencies as best served their needs, even though interference with American broadcasting was created thereby.

The result has been well publicized, and the purpose to be served by any remedy has been obvious—that some method of creating or clearing channels for Mexican use must be provided. Consideration of possible future needs of Cuba are also important, if not imperative.

Methods of correcting the difficulties are: (1) To broaden the present broadcasting band or allocate an additional band for the purpose, (2) to reduce the channel separation to permit a greater number of channels within the existing limits, or (3) to clear certain of the present channels and allocate them to Mexican use. The method must first be considered by an international conference and made possible through agreement. As the 1932 Madrid conference is imminent, these three possibilities are receiving the most attention, even though they are not necessarily the most favored. Besides the widening of the existing band, it has been pointed out that the second band used in Europe is available for broadcasting (160–224 kilocycles; 1,340–1,875 meters). The difficulties in regard to this method are more serious than in the case of widening of the band, inasmuch as it would be necessary first to displace important services equipped for those frequencies, especially aeronautical beacons.

The relinquishment of occupied channels by the United States is generally apprehended as detrimental to American radio and will doubtless be reserved as a final expedient. Reduction of channel separation to 9 kilocycles is deprecated by engineers, who decline to be responsible for satisfactory service on a separation which, they point out, has not proved particularly beneficial in Europe.

Questions of engineering develop in all of these possibilities except that to which the United States is least likely to accede.²

TELEVISION

Television remains in the laboratory, though interest continues to grow among those acquainted with the technical phases. Foreign television transmitters are increasing in number, notably in Canada, and Australian experiments indicate some progress in popularization.

The most recent announcement regarding television deals with a process of recording image impulses on a standard-type phonograph disk, with or without synchronous sound recording on the same record. While it is impossible to forecast its possibilities, this develop-

² Matters of the American policies in this connection are within the jurisdiction of the Department of State and the Federal Radio Commission, and statements made through the Bureau of Foreign and Domestic Commerce in thus describing developments involving such questions in reviewing foreign markets for apparatus are not to be interpreted as reflecting the official policies of these or other branches of the United States Government.

ment may prove an aid in popularizing television through simplifying the special equipment necessary.

The existing problems regarding television include: The capture and transmission of necessary detail to complete a picture and give sharpness to the image, a resulting object that can be viewed at the same time by several people in absolute comfort, and the need for keeping the cost of the receiving equipment within the means of the majority of the buying public.

Though there have not been any notable public advances in television itself during the past several months, the problem is receiving the usual assiduous attention, and occasional results in frequent minor improvements are not lacking. General public interest is everywhere dormant, but that it will readily respond to an ultimately satisfactory television receiver and service is assured by the universal acquaintance with sound broadcasting.

OTHER DEVELOPMENTS

In short waves, similarly, recent developments have been of a minor character, but for entirely different reasons. Short-wave broadcasting has been developed to the point of satisfactory results in all respects, and the only field remaining for research deals entirely with technical interests, in the design and operation of transmitters and the design alone of receivers. Short-wave reception has successfully passed the test of its appeal to those who are interested only in the services it renders, rather than its technical and experimental phases.

"Wired wireless," by which radio programs are wired into homes from central receiving stations or studios, has been growing in use in Europe, notable examples of this development occurring particularly in the United Kingdom, the Netherlands, and Switzerland. The system and its purpose is not unlike that used in this country and elsewhere in hotels and apartment houses, though in some cases the telephone is used as the reproducing device.

COMPETITIVE SET QUALITY

American receivers have long been considered the best for performance and for length of life. Special evidence of this has been developed during the past two years, since the increasing demand for the American products in European markets has forced domestic manufacturers to employ every expedient for the exclusion of American made receivers. The fact that no European set has ever been established in the American market is also significant.

Sets which will serve all the requirements of the listener—sensitive and selective for distance, clear and faithful reproduction that can be made either loud or soft at will, long life, with suitable cabinet designs for all homes—are demanded in all markets. The provision for short and long wave reception in the same set partially, but only partially, answers the demand for distance adaptation. Cabinets serving a secondary purpose have additional appeal in centers where small living quarters are the rule, as have small consoles, midgets, and other table models. Combination sets with recording apparatus as well as phonograph equipment are also being successfully marketed.

Definite information on the average age of receiving sets in use in any country is impossible to obtain. The battery sets now in use range from 3 to 10 years of age. Not only their age, but the fact that earlier manufacturing and designing methods precluded the building of great durability into the set and its units, suggests that the average date of manufacture of battery sets now in use is between 1926 and 1928. In Europe, where business conditions have been adverse since the World War, the average age of battery sets would perhaps be somewhat higher than for the world. Alternating-current sets doubtless find their average age fixed at between 18 months and 2 years throughout the world. Crystal sets, used to a much greater extent abroad than in North America, are of doubtful average age, but it is probably rather high.

Local dealers may be able to obtain satisfactory estimates of the number of sets of each type in use in a given area, and of their average age. Yet the local population and the broadcasting and dealer characteristics of each community will be found to have such effect that each should be judged by itself. Sales of tubes and the types demanded will, of course, give some information as to the tube sets in use.

RADIO PATENTS

Radio-receiving equipment is unique among manufactures experiencing great popular demand in that a great degree of that popularity has been attained while many of its fundamental features are subject to original patents. Though new patents have been and are being issued with considerable frequency, they effect improvements supplementing rather than supplanting the more elementary inventions.

The rapid popularization of radio has tended to give these patents great value, and at the same time has given impetus to the efforts of competitive interests to avoid or have invalidated their provisions. This is particularly so in Europe, where in recent years, and particularly the very recent past, the patent holders have indicated a tendency to revise their demands in the direction of severity. The desire of others to share in the profits of this industry has naturally been opposed to the monopolizing principle of patents. This has evolved into a general situation in which every possible loophole for obtaining invalidation of the patents is being sought.

The activities of the patent holders, whether designed as in some countries to monopolize the market, or to increase revenues from licenses under the patents, are necessarily opposed to the interests of American radio exporters. The enforcement of patents is of course within the legal rights of holders of such patents. Whether it is good business is a matter of opinion.

It is perhaps mere coincidence that the activities of patentees have been directly proportionate to American success in those markets. Prior to 1929, American participation in the central and northern European continental markets could not be considered general. Little attention had then been given by American manufacturers to meeting the demand for receivers capable of operating on the longer European waves, a fact which did not place their sets advantageously before the buying public.

During the past two years, however, the situation has been reversed. Long-wave sets are being built in the United States for European use, and have proved their worth. Whether it is considered that the appearance, tone, quality, life, price, or other factor may have supplied the reason, it is true that from the point of view of the European manufacturer, American products in the radio field were becoming alarmingly popular and successful.

In many markets license fees of acceptable amounts were demanded and arrangements made by which the importation of American sets might continue. Some such countries have been closed to further American makes, but those makes of receivers already licensed have been permitted to continue operations. Others have been definitely closed, the patent holders refusing definitely to grant any license under their letters.

The situations in the countries now outstanding because of patent developments are described by the following excerpts from reports. It is to be noted that the developments described in connection with Canada and the United Kingdom are not involved in the general European situation, as the organizations named as holding the continental patents do not operate in these countries.

CONTINENTAL EUROPE

AUSTRIA

From data submitted by American Commercial Attaché Gardner Richardson, Vienna

Austria is virtually a closed market for the sale of American radio sets. Telefunken of Germany and Philips of the Netherlands have been able to establish priority on the majority of radio patents in Austria, including many of those under which American sets are manufactured. Import permits are required for American sets brought into the country, and as these permits are issued only with the approval of the recognized patent holders, whose policy is to monopolize the market, it is impossible to obtain them.

BELGIUM

From data submitted by Assistant Trade Commissioner C. C. Frick, Brussels

Three concerns in Belgium are controlling patents, the Société Electro-Mecanique on loud-speakers, the Société Belge Radio Electrique on circuits owned by the international pool, and Philips on tubes. Philips did not undertake enforcement of its rights until December, 1931, but at that time undertook to establish its claims with demand for full satisfaction of royalties. Distributors of American sets organized to combat these claims early in 1932, when Philips demanded through its associate, the Société Belge Radio Electrique, that the importation of American sets be discontinued. Although business has continued, it has been somewhat demoralized because of threats made.

A result of proposals of the Government, made early in 1932, to increase duties on radio apparatus, was the organization of two groups of radio importers. Those handling American sets were first organized, followed by a similar association of importers of German

apparatus. Although it is not certain that these associations were especially instrumental, the proposed increase in duties on radio were not yet effective in August, 1932.

CZECHOSLOVAKIA

From data submitted by Commercial Attaché K. L. Rankin, Prague

After prosecuting patent claims rigidly through 1931, though avoiding any court test of their validity, the Philips and Telefunken interests announced in December, 1931, that no importations would be permitted after January 1, 1932, except of their own manufacture. Prior to this decision American sets had been attaining a rapidly growing popularity in this country.

DENMARK

From data submitted by Commercial Attaché C. B. Spofford, jr., Copenhagen

In 1924 certain American patents were registered in Denmark. In 1926 some 40 Danish radio manufacturers signed a contract agreeing to pay a license fee of $7\frac{1}{2}$ to 10 per cent of their net selling prices to the American patent holders. A patent pool was formed in Denmark in October, 1926, and the licensees of the pool decided to oppose the American patent holders. The Copenhagen municipal court decided in favor of the American interests. The appeal to the superior court was decided in favor of the Danish in 1930, the decision being upheld on appeal by the supreme court. Apparently, the contract when drawn was not made sufficiently definite.

FINLAND

From data submitted by Acting Commercial Attaché Frederick C. Sommer, Helsingfors

The existence of any active patent pool representatives in Finland is not evident. Threats of action have been made by the Philips company from Amsterdam by letter to various importers and dealers. It is not yet apparent, however, what developments may be expected.

FRANCE

From data submitted by Acting Commercial Attaché Daniel J. Reagan, Paris

French radio patents have been acquired by several firms, including among the most important the Compagnie Générale de Télégraphie Sans Fil and the Société Française des Procédés Thomson-Houston. These interests have thus far refused to grant licenses under their patents, and all, or practically all, of the distributors of American sets are being sued for infringement, with claims for heavy damages. The final settlement of technical lawsuits takes a number of years, so American radio sets can continue to be sold until a decision is rendered, although most French distributors are afraid to do so, except small firms which would have nothing to lose. Of course, under the present import quotas allowed, the sale of American radio sets is greatly curtailed.

GERMANY

From data submitted by Commercial Attaché H. Lawrence Groves, Berlin

The leading German manufacturer of radio sets, the Telefunken Aktiengesellschaft of Berlin, exercises a practical monopoly of the German radio market, through its control of the key patents for radio apparatus and accessories. Any importations are met with immediate court proceedings. As the Telefunken company consistently refuses to grant licenses, while having undisputed rights under its claimed patents, attempts to enter this market have always proved futile.

LITHUANIA

From data submitted by Consul General Hugh S. Fullerton, Kovno

The Philips company of the Netherlands claims to have exclusive rights in Lithuania on radio patents owned by the international pool. This company has arrangements for entering immediate suit in case of any importations of American sets. Should the question of patent rights hinge upon the pentode tube, it might be possible to avoid difficulties by arranging for local purchase of this tube. It is to be understood, however, that there has been no actual sale of American sets, and therefore no occasion for a court decision which would settle the matter.

NETHERLANDS

From data submitted by Commercial Attaché Jesse F. Van Wickel, The Hague, and Consul Egmont C. von Treschkow, Rotterdam

The Philips organization (N. V. Philips Gloeilampenfabriek) of Eindhoven is a member of the international radio patent pool and shares with Telefunken, of Germany, most of continental Europe in the distribution of rights by this pool.

This firm is the owner in several countries of about six key patents pertaining to the principles of radio circuits. It is said that it has owned these patents for several years, but only recently has it seriously undertaken to enforce its rights completely, though its policy has been to place rather onerous restrictions on importations. A large number of Dutch manufacturers have been building sets from Philips parts, and have used Philips circuits without molestation until a few months ago, when they were notified that the concern expected an accounting of fees due them on such manufactures. Pending resulting court action, a fee of 8 florins (\$3.20) was fixed temporarily in lieu of the 25 florins (\$10) demanded, and importations only of makes which had been offered prior to September 1, 1929, could be effected. Concurrently with the issuance of its demands, Philips announced appreciable price reductions. The opinion is that it is moving to sequester the market for its own products rather than to increase its income from license fees.

Most, if not all, American sets would, it is understood, infringe on the patents held by Philips, if imported into the Netherlands. A thorough investigation would be required before this point could be made clear regarding any given set, as Philips follows a policy of making no publication of the patents under its control. To facili-

tate investigations, the dealers have set up an organization, N. V. Investa, to make such research. One of its services has been the designing of a noninfringing circuit which the dealers use. No details regarding this circuit are available.

Any person offering to register a trade-mark in the Netherlands is considered the first user if there is no official record to the contrary. Actual use must be established within two years, the registration being valid for 20 years, provided that a registration is void if a period of three years elapses during which it is not used. The Netherlands is an adherent of the Berne International Patent and Trade-Mark Convention of 1911. Trade names must not be similar to any already established for any commodity to a degree likely to prove confusing.

NORWAY

From data submitted by Commercial Attaché Marquard H. Lund and Trade Commissioner Gudrun Carlson, Oslo

The Norwegian radio patent situation is much involved at the present time, since suits brought by the local agent of the patentees, which should clarify the situation, are now pending. Fear of legal complications is retarding dealers from attempting radio business. The question has been as to whether royalties paid in the United States (as to American sets) do not under Norwegian law constitute complete satisfaction of patent rights. Norwegian radio patents are claimed by Philips, of the Netherlands, as assignee of the actual owners for purposes of licensing in this country.

SWEDEN

From information submitted by Trade Commissioner Basil D. Dahl, Stockholm

The Patent Konsortiet for Rundradio, the radio patent pool, was established in April, 1931. The pool has a membership of Philips, Telefunken, Marconi, A. E. G., and several American companies and was formed to protect the patents in Sweden of these various companies. This applies only to sets, not covering tubes.

The pool licenses manufacturers and importers of sets, loud-speakers, and amplifiers at its discretion, charging manufacturers a fee of 2.5 crowns per socket, with a minimum of 7.5 crowns per set, fees for imported sets being double. Other fees are charged for separate loud-speakers. The pool requires a deposit of 1,200 crowns, this being the minimum allowable fee, the deposit being drawn upon for fees due so long as a balance remains.

Tubes are manufactured in Sweden, and Philips, Telefunken, and Marconi are prepared to bring suit in any case of importation. Importers of sets are permitted to handle no more than two makes of sets, and a total number of sets to be imported is decreed. No patent suit in connection with radio apparatus has ever been brought in Sweden.

SWITZERLAND

From data submitted by Assistant Trade Commissioner Henry E. Stebbins, Berne

Two European companies, Philips and Telefunken, have joined forces in Switzerland and are claimants to patents which, if valid, would prevent the unlicensed sale of most receiving sets. These two

companies have offered to license importers for 6 per cent of the list price or 10 per cent of the net price. The licensee must agree not to use American radio tubes, but equip his sets with either Philips or Telefunken tubes.

A number of Swiss agents of American radio manufacturers have formed an association called the Interessengemeinschaft des Schweiz, which has appointed an attorney to contest the claims of Philips. Several American firms have assured their agents of assistance in case of suit.

The Philips position has been strengthened, however, by the signature of agreements covering some dozen makes of American sets, under which certain license fees were paid in exchange for the right to sell without interference. Announcement that no further makes of American sets would be licensed was made on April 11, 1932.

As a result of these activities the Swiss market is effectively closed against American competition other than those under agreement, with no probability of relief before the expiration of the patents, except in the case of a successful attempt to break them down or to bring about a reversal of policy by their holders.

YUGOSLAVIA

From data submitted by Commercial Attaché Emil Kekich, Belgrade

An attorney in Zagreb, representing Telefunken, delivered orders in March, 1932, to representatives of certain American receivers that they must stop the sale of these sets within 48 hours. The action has had the usual result in demoralizing trade, though as yet the ultimate intent of the patentees or the possibility of their success can not be predicted.

UNITED KINGDOM

From data submitted by Trade Commissioner Floyd E. Sullivan, London

The London patent pool, which is composed of such firms as Marconi, Standard Telephones & Cables, the Gramophone Co., and British Thompson-Houston, has grouped these firms' patents for licensing purposes. While this pool has not been adverse to licensing the assembling of imported apparatus, it has refused licenses for importing complete sets. In responding to pressure from the manufacturers' association it has developed a more restrained policy in the matter of assembling, insisting that a "reasonable amount" of British material be used in the assembly.

Licenses also require that British tubes be used. This is a serious difficulty, as not only the arrangement of contacts but the actual operating characteristics of the tubes differ. The license fee of 5 shillings per socket has long maintained efforts by British manufacturers to obtain the greatest amount of service from a smaller number of tubes and a demand upon tube manufacturers for concentrated efforts at tube improvement in that direction.

Infringement suits are now pending. Adverse decisions may make it impossible to sell American sets unless actually manufactured in the United Kingdom. Among the patents affected are the screen grid, superheterodyne, and push-pull circuits, but an attempt to have the expiring battery-eliminator patents extended failed in December, 1931.

CANADA

From data submitted by Commercial Attaché Lynn W. Meekins, Ottawa, and Trade Commissioner Harvey A. Sweetser, Toronto

The Canadian patent situation is neither so complicated nor so indistinct as in continental Europe. The patents are controlled by Canadian Radio Patents (Ltd.), which owns some patents and has the administration of others under its control. It was incorporated in 1926 to simplify and centralize the machinery for licensing in the interests of both patentees and manufacturers. Among the patents under its control are the following: Regenerative or feed back, multiple-stage tuned-radio-frequency circuits with vacuum tubes, grid leak and condenser, and battery-eliminator circuits.

This organization issues licenses upon annual payment of \$10,000, the minimum royalty fee, against which are charged the following fees: 10 per cent of the manufacturer's invoice price of the chassis portion of the radio receiving sets licensed and sold, plus 10 per cent of a fixed nominal invoice valuation of \$10 for the cabinet portion of the set. The manufacturer's invoice price is fixed at not less than 50-10-5 per cent discount off the generally advertised Canadian selling price. Customary provisions for cancellation of license are made.

This corporation does not concern itself with patents on parts and accessories, such as tubes, speakers, batteries, etc.

Twenty-four licensees are operating under the patents of this concern, which is reluctant to extend further rights until there is an appreciable increase in the Canadian market.

RADIO RECEPTION ABROAD

LISTENER ORGANIZATIONS

It is the development of a listener class that makes the radio broadcast a possibility, and it is the will of the listeners as individuals that dictates the value of broadcasting. The expression of that will collectively has no important place in United States broadcasting, the listeners undertaking individual ways of informing broadcasters of their wishes. But abroad, radio-listener organizations are quite common. They are effective in many ways as their organization characteristics vary, and though it is not necessarily universal, the discussion of program matters is perhaps the nearest to a common practice among them.

Such organizations are sometimes officially recognized. Many of them operate broadcasting stations, and there are countries in which radio clubs alone may broadcast, with or without exceptions. Membership is sometimes compulsory to owners of receiving sets, constituting a means of collecting license fees and of organizing listeners themselves against the practice of avoiding the payment.

Even where the organizations have no status as part of the broadcasting system, interest often runs high, and the societies themselves serve as a vehicle not only for the interchange of notes among listeners, but also as a means of coordinating listener demands in regard to radio legislation and the conduct of broadcasting. Many societies have official organs which serve as important, if not the only, radio-listener publications in their fields.

There are few countries in which there are active national radio societies. Local clubs are autonomous units as a rule, and in cities of any size there are often several independent organizations. The most nearly universal motive for organizing, where the societies are not made necessary for the maintenance of broadcasting, appears to be interest in distant reception, even though the character of local programs may later receive more attention. Picking up distant and foreign stations, particularly those beyond the range of ordinarily good receivers, has a world-wide appeal. Organization offers not only opportunity to exchange information as to the selection and operation of apparatus, but for the pooling of resources for the maintenance of central receivers of exceptional sensitivity and selectivity.

While apparently some of the clubs conduct business by correspondence and publications, and hold no meetings, or meet in members' homes, some have permanent meeting places. Some pretend to no financial entity, some operate under endowment, and others conform to the usual organization practice of assessing dues against members. Transmitting amateurs and listeners are sometimes amalgamated into individual societies. Not a few are "lobbies," representing listeners as a class in legislative matters. Organizations of youthful enthusiasts and of adults are both common. Many maintain libraries, to which manufacturers' literature, especially if in the native language, is usually welcome.

The representatives of American radio exporters may find in the local radio clubs possibilities for merchandising efforts, which may take any of several forms. The permanent loan of equipment, free service on club-built assemblies, and other recognized methods of creating good will may be found applicable in special cases.

There is no known directory of radio clubs, such a publication being hardly feasible in view of the informality and instability of the great majority of these organizations. Exporters desiring to maintain relations with any organization should do so through local representatives. The clubs seldom undertake any merchandising efforts, except possibly in small parts, tubes, and the like, which they might handle on commission for some local dealer.

CHARACTERISTICS AFFECTING SALES OF SETS

The desire for distance attends the period of most intense interest in a receiving set, which is seldom other than the testing period of a new installation. It probably averages one season. Thereafter there is a general tendency to get the most entertainment from the set with the least trouble. Ultimately the owner tends to reach a stage where the one or two stations most easily tuned will be sampled, and if one has a satisfactory feature the dial is set for it and left until something

discordant with the listener's mood develops, when the set will be shut off or another station tried. When the listener reaches this stage he is not necessarily disinterested in the programs as a whole, but feels that reception requires too much attention in comparison to the benefits derived. Insurance against the type of program distasteful to him is possible only through the simultaneous broadcasting of a sufficient variety of programs as to give an almost unlimited choice.

National characteristics have an important direct effect on some markets entirely aside from the indirect indications of standard of living. Religion has been an important retarding factor in northern Africa among Mohammedans and Coptic Christians. Characteristic poverty places radio beyond the reach of the larger numbers of people in several oriental countries. Sufficient broadcasting service might develop markets in some such areas, but whether its establishment would be warranted by the market in the near future, is, in general, questionable.

Factors which are favorable are generally universal in scope and fail to bring about development only when retarding characteristics are excessively effective. The appreciation of musical entertainment is characteristic of all people. Curiosity as to people, their abilities, accomplishments, and reactions is usually in direct ratio to the degree of education, and radio serves both to maintain and satisfy this curiosity.

Commercial and political stability are the bases of higher living standards, and radio as well as other markets are aided in proportion to the degree of this stability.

If only the encouraging characteristics of any market were considered, there is no country which would be limited as a market except by the total population. The desire for living conditions represented by radio ownership exists or can be developed, with the exception of a few of the most extreme cases. Financial stringency among the populace is often exaggerated, even by the best informed, both as to existence of the fact and its importance in judging markets. A tendency to overlook markets because of generally low average purchasing power has always existed, yet the fallacy of this reasoning has been shown in recent developments in several countries. Sales efforts are not necessarily futile in any market because business is either momentarily or chronically slack. Some countries have been radio markets during "boom" periods where even reasonable effort may not have been necessary for a satisfactory business; it is unwise and unfair to compare the minor markets with these, as they can not under any conditions produce a proportionate demand. Cultivation of demand and availability of product are definitely necessary.

ESTIMATES OF RECEIVERS IN USE

Estimates show a total of approximately 32,000,000 receivers in use throughout the world at the end of the year 1931. Properly, for reasons to be shown here, the total may be anywhere between 30,-

000,000 and 40,000,000, with the greatest likelihood that it lies in the neighborhood of 35,000,000 to 37,000,000. Between 17,000,000 and 18,000,000 of these are installed in North America, less than 1,000,000 in South America, 16,500,000 in Europe and 1,000,000 in Asia (except Russia and Turkey in each continent), with some 500,000 in Russia and Turkey, 500,000 in Oceania, and less than 100,000 in Africa.

A statistically correct total for any country is not possible. Whether there has been any effort to account sets or not, each country has an element among set owners which is not subject to any calculation closer than a rough estimate. Available statistics are of two classes, license figures and estimates. Using the licenses issued as the number of sets in use in licensing countries, the estimate of 32,000,000 is derived, and it is the only total for which there is any statistical basis. The licenses issued, however, represent the total number of all permits valid at any time during the current fiscal year, and in some cases a single license is sufficient for several sets giving service in different places. The proportion of illegally operated sets in any licensing country is obviously a matter of conjecture, as are estimates of the total number in nonlicensing countries. The only exception is the United States, where there has been a complete official count.

Merchandising interests are the natural source of estimates of the number of sets in use, dealers being generally best informed as to local set distribution, though in many cases figures have emanated from what appeared to be more reliable sources. It is a peculiarity of trade estimates that they invariably appear among the highest figures developed for any country. Official figures are seldom encountered, and then they usually reflect the trade estimates. Radio organization estimates do not seem to have any invalidating characters, but they are seldom found, because of the scarcity of national radio organizations. Broadcasters estimate their immediate audiences, but overlapping station territory and the ignoring of higher-powered sets beyond the "effective range" of any station depreciate the value of these for determining any totals. Imported sets can be reexported, remain in dealers' hands, or be diverted to other uses than radio, or equipment may be classified as radio sets when not intended for broadcast reception. Hence such figures give no satisfactory indication of increase. Manufacturing and sales statistics are generally nonexistent or unobtainable, and subject to the same disabilities as import statistics.

The following table has been made up with due regard to the conditions maintaining in each country. With the exception of the final column, all figures emanate from the most reliable national sources available, as qualified by special notations. The final column, headed "Possible total," gives figures adjusted according to various market characteristics, which apparently should affect totals but the actual effect of which is conjectural. While these totals are doubtless nearer the actual total than the definite figures given in previous columns, their adjustment is warranted rather by lapse of time or estimates of illegally operated sets than by statistics.

RADIO RECEIVING SETS IN USE

Country	Character	Statistical date ¹	Total number	Possible total ² number
NORTH AMERICA				
Alaska.....	Estimate.....		1,500	2,500
Bahamas.....	do.....		350	³ 350
Barbados.....	do.....		250	³ 250
Bermuda.....	do.....		750	³ 750
British Honduras.....	do.....	January, 1932	75	³ 75
Canada.....	Licenses.....	do.....	571,898	600,000
Canal Zone.....	Estimate.....	do.....	400	400
Costa Rica.....	do.....	October, 1931	1,000	1,000
Cuba.....	do.....		35,000	75,000
Dominican Republic.....	do.....		1,300	1,500
French West Indies.....	do.....		150	250
Greenland.....	do.....		25	³ 25
Guatemala.....	do.....		250	³ 250
Haiti.....	do.....	October, 1931	400	400
Honduras.....	do.....	do.....	250	250
Jamaica.....	do.....		250	350
Mexico.....	do.....		100,000	⁴ 250,000
Miquelon and St. Pierre.....	do.....		100	100
Netherland West Indies.....	do.....		50	³ 50
Newfoundland and Labrador.....	Licenses.....	August, 1931	2,024	2,500
Nicaragua.....	Estimate.....		50	100
Panama.....	do.....	January, 1932	200	200
Puerto Rico.....	do.....		5,000	³ 5,000
Salvador.....	do.....	September, 1931	1,000	1,000
Trinidad and Tobago.....	do.....		40	100
United States.....	do.....	April, 1932	16,679,253	16,000,000
Virgin Islands.....	do.....		50	100
Total.....				16,942,500
SOUTH AMERICA				
Argentina.....	Estimate.....	August, 1931	400,000	500,000
Bolivia.....	do.....		100	250
Brazil.....	do.....	November, 1931	150,000	150,000
British Guiana.....	do.....		25	100
Chile.....	do.....	December, 1931	35,000	35,000
Colombia.....	do.....	do.....	12,000	12,000
Ecuador.....	do.....		150	250
Falkland Islands.....	do.....		16	25
French Guiana.....	do.....		8	25
Paraguay.....	do.....	August, 1931	300	350
Peru.....	Licenses.....	December, 1931	1,000	25,000
Surinam.....	Estimate.....		18	25
Uruguay.....	do.....	November, 1931	50,000	50,000
Venezuela.....	do.....	August, 1931	9,000	10,000
Total.....				783,025
EUROPE				
Albania.....	Estimate.....		12	12
Austria.....	Licenses.....	December, 1931	450,272	500,000
Azores.....	Estimate.....		20	100
Belgium.....	Licenses.....	December, 1931	199,000	275,000
Bulgaria.....	do.....	do.....	3,957	8,000
Czechoslovakia.....	do.....	January, 1932	397,591	500,000
Danzig.....	do.....	April, 1931	16,000	20,000
Denmark.....	do.....	December, 1931	476,214	500,000
Estonia.....	do.....	January, 1932	13,440	15,000
Finland.....	Estimate.....	do.....	110,000	110,000
France.....	do.....		2,000,000	³ 2,000,000
Germany.....	Licenses.....	December, 1931	3,980,852	4,500,000
Gibraltar.....	Estimate.....		150	150
Greece.....	do.....	December, 1931	5,000	5,000
Hungary.....	Licenses.....	do.....	317,600	325,000
Iceland.....	Estimate.....	March, 1931	3,500	³ 3,500
Irish Free State.....	Licenses.....	July, 1931	26,412	30,000
Italy.....	do.....	December, 1931	250,000	500,000
Latvia.....	do.....	November, 1931	41,910	50,000
Lithuania.....	do.....	December, 1931	11,528	23,500
Luxemburg.....	Estimate.....		2,000	³ 2,000
Madeira.....	do.....		180	³ 180

¹ Where no date is given no data are available later than figures for 1930.

² Including illegally operated sets according to the best estimates available, adjusted by estimate to Dec. 31, 1931.

³ Total evidently larger but no definite evidence upon which to estimate increase.

⁴ Adjustment based on increase of internal broadcasting facilities, with no consideration of developments at United States border.

RADIO RECEIVING SETS IN USE—Continued

Country	Character	Statistical date	Total number	Possible total number
EUROPE—continued				
Malta	Licenses	September, 1931	386	400
Netherlands	do	do	278,891	280,000
Norway	do	December, 1931	101,901	150,000
Poland	do	do	308,000	400,000
Portugal	Estimate	do	25,000	25,000
Rumania	Licenses	July, 1931	60,163	65,000
Spain	Estimate	do	550,000	750,000
Sweden	Licenses	December, 1931	550,000	600,000
Switzerland	do	do	149,000	160,000
United Kingdom	do	do	4,329,754	5,200,000
Yugoslavia	do	do	30,377	35,000
Total Europe, less European Russia and Turkey.				17,032,842
Russia	Licenses	January, 1931	554,000	¹ 554,000
Turkey	Estimate	do	7,500	10,000
Total, Russia and Turkey, European and Asiatic.				564,000
ASIA				
Asia Minor	Estimate	do	1,000	1,000
Ceylon	do	do	1,500	¹ 1,500
China	do	do	² 30,000	³ 30,000
Chosen	do	do	12,000	15,000
French India	do	November, 1930	1,000	1,250
French Indo-China	do	May, 1931	1,000	¹ 1,000
Hong Kong	do	October, 1931	1,800	¹ 1,800
India	Licenses	December, 1931	8,000	¹ 36,000
Japan	do	March, 1932	1,000,000	1,000,000
Kwantung	Estimate	October, 1931	5,000	5,000
Macao	do	do	40	50
Netherland India	Licenses	October, 1931	2,464	2,500
Philippines	Estimate	December, 1931	7,000	7,000
Siam	Licenses	do	13,218	15,000
Straits Settlements	Estimate	do	500	1,000
Total, Asia, except Asiatic Russia and Turkey.				1,118,100
OCEANIA				
American Samoa	Estimate	do	36	¹ 30
Australia	Licenses	February, 1932	347,555	400,000
British Oceania	Estimate	do	250	500
French Oceania	do	do	50	75
Guam	do	do	12	25
Hawaii	do	May, 1932	20,000	20,000
New Zealand	Licenses	February, 1932	75,351	85,000
Total				505,630
AFRICA				
Algeria	Estimate	do	10,000	25,000
Angola	do	do	100	250
Canary Islands	do	do	200	500
Egypt	do	do	4,000	10,000
French Morocco	do	do	3,000	5,000
Kenya	do	do	250	300
Madagascar	do	do	150	1,000
Mozambique	do	do	100	250
Tunisia	do	do	4,500	5,500
Union of South Africa	Licenses	December, 1931	26,025	80,000
Other Africa	Estimate	do	1,312	2,000
Total				99,800
Total, world				37,045,897

¹ Total evidently larger but no definite evidence upon which to estimate increase.

² Estimates from China are not for the country, but for isolated localities, and some of these do not include crystal sets. Upon the basis of available figures, totals as high as 1,000,000 might be predicated, but that given here is believed more nearly correct.

UNITED STATES LISTENERS

The figure used for the United States (16,679,253) is the estimate of "Radio Retailing," based on estimated increases over the returns of the 1930 decennial census. As for April 1, 1930, the Bureau of the Census reported a total of 12,078,345 sets, divided by States as follows:

State	Number of receivers ¹	Per cent of United States	Per cent of families owning sets
Alabama.....	56,491	0.5	9.5
Arizona.....	19,295	.2	18.1
Arkansas.....	40,248	.3	9.2
California.....	839,846	6.9	51.9
Colorado.....	101,376	.8	37.8
Connecticut.....	213,821	1.8	54.9
Delaware.....	27,183	.2	45.8
District of Columbia.....	67,880	.6	53.9
Florida.....	58,446	.5	15.5
Georgia.....	64,908	.5	9.9
Idaho.....	32,869	.3	30.3
Illinois.....	1,075,134	9.3	55.6
Indiana.....	351,540	2.9	41.6
Iowa.....	309,327	2.6	48.6
Kansas.....	488,055	4.1	38.8
Kentucky.....	111,542	.9	18.3
Louisiana.....	54,364	.4	11.2
Maine.....	77,803	.6	39.2
Maryland.....	165,465	1.4	42.9
Massachusetts.....	590,015	4.9	57.6
Michigan.....	599,196	5.0	50.6
Minnesota.....	287,850	2.4	47.3
Mississippi.....	25,475	.2	5.4
Missouri.....	352,252	2.9	37.4
Montana.....	43,809	.4	32.0
Nebraska.....	164,324	1.3	47.8
Nevada.....	7,869	.1	30.6
New Hampshire.....	53,111	.4	44.4
New Jersey.....	625,639	5.2	47.0
New Mexico.....	11,404	.1	11.5
New York.....	1,829,123	15.2	57.8
North Carolina.....	72,329	.6	11.2
North Dakota.....	59,352	.5	40.8
Ohio.....	810,767	6.7	47.7
Oklahoma.....	121,973	1.0	21.6
Oregon.....	116,299	1.0	43.5
Pennsylvania.....	1,076,770	8.9	43.5
Rhode Island.....	94,594	.8	57.1
South Carolina.....	28,007	.3	7.7
South Dakota.....	71,361	.6	44.2
Tennessee.....	86,229	.7	4.3
Texas.....	257,686	2.1	27.0
Utah.....	47,729	.4	41.1
Vermont.....	39,913	.3	44.6
Virginia.....	96,569	.8	18.2
Washington.....	180,229	1.5	42.3
West Virginia.....	87,469	.7	23.4
Wisconsin.....	364,425	3.0	51.1
Wyoming.....	19,482	.2	34.0

¹ The foregoing figures are taken or calculated from preliminary publications of the Bureau of the Census and are subject to minor corrections. Final census publications will carry corrected data.

CONCLUSIONS DRAWN FROM FOREIGN SET STATISTICS

The number of sets in use in each foreign country provides in itself a partial and unquestionable analysis of market factors. That there are neutral, favorable, and unfavorable characteristics is elementary, but as to what these characteristics may be no other guide serves so well as do receiver statistics.

Receiving license fees have had much attention as a discouraging market influence, but there is no indication that any reasonable fee

has been detrimental to the sale of sets. Countries where the purchasing power of the people has been generally low since the war have often proved fair to good markets. Censorship and broadcasting restricted to cheaper programs from financial causes have both existed concurrent with growing interest and demand.

Conditions which are usually contemporary with low rate and level of radio development are concentration of wealth, governmental restriction in the form of prohibition or of extraordinarily high license fees, failure of native programs to compare with receivable foreign programs, dumping inefficient apparatus in new markets, psychological adherence to low living standards, costly set upkeep, climatic conditions, and lack of broadcasting.

Favorable factors, aside from the existence of broadcasting, are generally the same throughout the world. Those of peculiar advantages center about the broadcasting, which has its greatest appeal when it is from a domestic station and compares favorably with any foreign programs receivable. The number of receivable native programs at a given time is also an important aid. Developments have been highest where the population is dominantly of European origin, especially English speaking, but that this is coincidental and hardly relative in fact is readily indicated. Some Spanish-speaking countries have developments well within the same range of intensity attained by English-speaking countries. The number of important countries speaking each of these languages renders any other result improbable. A native sport readily adapted to broadcasting, such as baseball and football in the United States and horse racing and football in the United Kingdom, is similarly more of an indication of the causes of development than a cause in itself.

CLIMATIC FACTORS AFFECTING RADIO

Tropical countries constitute the field of most of the recent pioneering developments, following the introduction of short-wave broadcasting. Markets in such countries are generally small, as compared with the more active temperate countries, because of numerically smaller populations living under European conditions.

From a radio standpoint, the tropical countries of the world fall into three geographical groups—Caribbean, African, and Australasian. The Caribbean group includes, roughly, Central America, the West Indies, and the north-coast countries of South America, as well as Ecuador and Peru. The African region includes practically all of that continent except the Union of South Africa, while the Australasian covers southern Asia, the East Indies, and other torrid insular groups.

In various parts of the areas so defined, waves of the medium 200–545 meter band are used, and successfully, but under certain restrictive influences. The season of good reception is short, and for a great part of the year any such reception is impossible. Medium-wave stations are not used for the purpose of covering any great amount of territory, but are rather local in characteristics. Long-distance medium-wave reception at any time is difficult. Short waves, on the other hand, permit not only of clearer reception at greater distances, but also are available to the receivers purchased for listening to foreign short-wave stations.

The Caribbean area has long been noted as the region where atmospheric disturbances are the worst in the world. Experiences with short waves in that area will undoubtedly prove the test by which the majority of future developments are to be proved. The African region divides roughly into the Congo and Sahara. In the Congo region there has been no radio development because of the lack of European population, though the equivalent east-coast area has a long and medium wave broadcaster and several listeners. The Sahara area, extending well into the North Temperate Zone, differs from other torrid regions in general in that it is dry, allowing more rapid changes in temperature and accompanying atmospheric disturbances, although the movement of such disturbances does not have the conductive aid of moist atmosphere. Long waves as well as short have been used successfully along the northern coastal strip, but this strip is set off from the desert area by the Atlas Mountains in the territory where broadcasting is carried on, and properly has a climate of its own.

The Australasian region is both mainland and insular, but has generally uniform atmospheric conditions of great heat and humidity. Long waves are used successfully in the less troublesome regions, but in Netherland India short waves are the standard practice. This is the first area of the world to undertake the development of short waves as a medium of all broadcasting, and in general has met with success. The primary impetus there was given by the desire to receive the world broadcasting station in the Netherlands, designed particularly to broadcast to all Dutch colonies.

WORLD CLIMATE AND RADIO SEASONS

The following table shows the principal climatic regions, with the reception characteristics for broadcast waves. The areas designated by an asterisk (*) are those where short waves promise the best results.

WORLD CLIMATE AND RADIO SEASONS

Countries	Summer	Winter	Range of mean temperatures ¹		Mean annual rainfall	Broadcast-wave reception season	
			Monthly	Annual		Possible	Best
NORTH AMERICA							
Alaska.....	Cool.....	Cold.....	° F. 10-60	° F. 0-50	Inches 0-80	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	50-80	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.....	(¹)	(¹)	70-80	0-60	do.....	do.....	Do.
Brazil.....	Hot.....	Hot and warm.	60-90	70-90	0-80	May-Oct.	Do.
Chile.....	(¹)	(¹)	30-70	40-70	0-80	Continuous...	Do.
Colombia*	Hot.....	Hot.....	70-100	80-90	80-120	Jan.-Mar.	Do.
Ecuador.....	do.....	Warm.....	70-90	70-90	0-80	Apr.-Oct.	Do.
Paraguay.....	do.....	do.....	60-90	70-80	10-40	Continuous...	May-Sept.

See footnotes at end of table.

WORLD CLIMATE AND RADIO SEASONS—Continued

Countries	Summer	Winter	Range of mean temperatures ¹		Mean annual rainfall	Broadcast-wave reception season	
			Monthly	Annual		Possible	Best
SOUTH AMERICA—CON.							
Peru.....	(?)	(?)	° F. 60-80	° F. 60-80	Inches 0-80	May-Oct.....	July-Sept.
Uruguay.....	Hot.....	Warm.....	50-90	60-90	20-60	Continuous.....	Apr.-Oct.
Venezuela*.....	do.....	Hot.....	70-100	80-90	40-100	Jan.-Mar.....	
EUROPE							
Balkan States.....	Hot and warm.	Cool and cold.	30-90	50-70	40-80	Sept.-May.....	Nov.-Feb.
Baltic States.....	Warm.....	Cold.....	10-70	30-50	10-40	Continuous.....	Sept.-May.
British Isles.....	do.....	Cool.....	30-70	40-60	40-60	do.....	Do.
Central States.....	do.....	do.....	20-80	40-80	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.-Feb.
OCEANIA							
Australia (except arid regions of the 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	0-160		
South Africa.....	do.....	Warm.....	50-90	60-90	20-80	Continuous.....	Apr.-Oct.

¹ Temperature zones of 10° 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 68° is given as having a range of from 40° to 70°. 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.

³ Varies widely.

SHIPPING SEASONS

Average shipping seasons for sets and tubes are shown by an analysis of 1928 and 1929 exports, as representing a period of normal seasonal fluctuation. The tables following show the results of this analysis, based on four divisions of the world, 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: Netherland India.

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.

The following table shows the relative seasonal demand for radio receivers and tubes shipped to the various zones from the United States, with figures for 1928 and 1929 used as a representative basis.

Period	Per cent to north zone	Per cent to north torrid zone	Per cent to south torrid zone	Per cent to south zone
RECEIVERS				
January-February	64	10	3	23
March-April	37	13	4	41
May-June	40	13	5	43
July-August	64	11	3	22
September-October	77	10	2	12
November-December	70	15	2	12
Yearly average	65	12	3	20
TUBES				
January-February	49	10	5	36
March-April	35	9	7	49
May-June	33	12	8	47
July-August	29	9	25	37
September-October	40	19	8	33
November-December	44	20	6	30
Yearly average	38	14	10	38

The percentage of the total sets shipped during each period to each zone was as follows:

Period	Per cent to north zone	Per cent to north torrid zone	Per cent to south torrid zone	Per cent to south zone
RECEIVERS				
Percentages shipped during—				
January-February	10	9	10	11
March-April	5	10	14	21
May-June	6	11	16	21
July-August	17	15	18	17
September-October	33	23	20	14
November-December	29	32	22	16
TUBES				
Percentages shipped during—				
January-February	17	10	7	13
March-April	14	10	11	19
May-June	14	14	13	20
July-August	12	10	41	16
September-October	18	24	15	15
November-December	25	32	13	17

EXPORT STATISTICS

United States exports of radio apparatus have totaled in excess of \$20,000,000 annually for the past three years for a grand total for 1929, 1930, and 1931 of \$69,000,000. This exceeds the total radio exports for the preceding 8-year period by more than half, the total for 1921 to 1928, inclusive, being less than \$40,000,000. During the last 11 years the total shipments have amounted to more than \$100,000,000. Approximately half of the totals for the last three years

have represented assembled receiving sets, 1931 showing the highest percentage with 65 per cent.

The value of radio exports for 1931 was as follows:

Country	Transmitting equipment	Receiving sets	Receiving tubes	Receiving set components	Loudspeakers	Other accessories	Total
EUROPE							
Austria	\$6,230	\$6,033	\$1,091	\$2,740	\$480	\$1,064	\$17,678
Azores and Madeira Islands		293	18	332			643
Belgium	642	431,103	47,068	51,536	51,350	7,069	689,497
Bulgaria		9,066	437	1,184	1,010	100	10,767
Czechoslovakia	460	26,746	1,016	1,536	1,012	216	30,986
Denmark	100	29,606	14,317	9,435	23,965	785	78,368
Estonia		383		93			476
Finland	110	4,563	201	1,163	100	52	6,186
France	6,074	763,488	121,554	90,661	176,202	26,427	1,184,406
Germany	14,788	26,424	1,542	16,069	39,908	69,231	170,592
Gibraltar		2,248	62		16		2,326
Greece		34,984	2,231	1,158	352	286	39,011
Hungary	77	5,742	516	691	185	3,984	11,065
Iceland		507	22	31	6		656
Irish Free State		6,889	100	246	97	18	7,350
Italy	55,334	785,917	211,563	138,046	44,342	4,117	1,239,249
Latvia		647	123	165	4		939
Lithuania	37	1,143	9				1,189
Malta, Goso, and Cyprus		17,623	1,115	949	996	78	20,762
Netherlands	5,500	7,695	17,631	67,066	12,622	918	111,453
Norway	724	49,498	1,207	1,319	1,529	390	54,637
Poland and Danzig	1,845	1,136	531	37	10	32	3,391
Portugal	715	96,345	9,920	14,626	3,151	273	125,030
Rumania		72,712	3,826	2,726	876		80,140
Soviet Russia in Europe	31,223	842	178	366		58	32,666
Spain	3,528	768,234	73,978	136,533	35,483	4,533	1,021,069
Sweden	393	13,435	3,271	4,363	1,451	142	23,055
Switzerland	1,378	908,777	78,501	36,688	15,899	1,448	1,132,691
United Kingdom	23,215	1,918,000	110,981	428,068	117,347	43,554	2,641,066
Yugoslavia and Albania	125	46,007	2,089	3,966	765	10	52,962
NORTH AMERICA							
Canada	64,384	1,562,845	99,306	1,063,503	170,401	220,995	4,071,934
British Honduras	319	5,485	698	989	212	1,243	8,946
Costa Rica	2,541	43,869	2,645	6,977	608	1,563	58,008
Guatemala	404	41,820	2,138	8,857	1,166	1,109	55,494
Honduras	3,244	20,785	1,630	1,818	341	1,421	29,230
Nicaragua	5,536	6,349	551	2,209	339	430	15,413
Panama	14,100	50,227	5,103	7,470	1,609	2,369	80,878
Salvador	82	36,553	3,966	2,908	1,319	11	45,339
Mexico	146,623	620,489	38,691	70,277	18,377	13,604	908,061
Miquelon and St. Pierre Islands	35	471	253	271	68	14	1,112
Newfoundland and Labrador	788	60,395	8,377	5,662	1,739	1,766	78,707
Bermudas	67	23,408	2,138	4,079	209	232	30,133
Barbados	40	2,043	49	4,472	213	18	2,536
Jamaica	598	22,602	2,213	4,805	537	1,843	32,698
Trinidad and Tobago	967	6,255	220	2,623	234	274	10,593
Other British West Indies	7,061	9,145	823	2,322	153	1,135	20,639
Cuba	4,347	237,554	38,063	33,153	5,908	8,857	327,822
Dominican Republic	2,572	22,082	1,129	5,731	535	1,173	33,222
Netherlands West Indies	309	24,215	1,046	2,831	362	618	29,891
French West Indies	51	1,481	104	1,337		138	3,111
Haiti, Republic of	11	7,587	806	743	37	80	9,064
Virgin Islands of United States	55	783	27	136	30	252	1,263
SOUTH AMERICA							
Argentina	22,344	1,710,757	318,734	273,771	60,276	34,998	2,420,890
Bolivia	611	6,974	663	1,442	192	23	9,506
Brazil	87,799	392,173	47,846	62,370	13,905	4,846	608,939
Chile	8,776	187,196	27,209	30,189	4,266	7,313	264,949
Colombia	28,399	38,692	6,742	13,117	1,587	3,808	92,345
Ecuador	5,361	7,342	498	4,443	307	356	18,307
British Guiana		2,630	305	1,448	355	581	5,419
Surinam	500	1,815	58	35	97	22	2,527
Paraguay		5,081	232	3,701	254	127	9,396
Peru	9,379	56,384	7,964	10,649	1,473	2,362	88,131
Uruguay	11,654	518,832	56,722	35,688	5,131	5,896	633,925
Venezuela	3,777	238,434	21,652	22,704	7,549	4,368	298,484
ASIA							
Aden		110					110
Arabia			12				12
British India	1,970	18,551	3,243	14,411	5,097	1,082	44,358
British Malaya	190	4,078	976	9,310	2,842	802	18,198

Country	Transmitting equipment	Receiving sets	Receiving tubes	Receiving set components	Loudspeakers	Other accessories	Total
ASIA—continued							
Ceylon.....		\$362		\$46		\$22	\$430
China.....	\$50,821	101,626	\$21,358	23,467	\$7,620	1,513	206,406
Java and Madura.....	3,923	7,781	969	4,469	2,494	1,699	21,315
Other Netherland India.....	5,284	599	355	3,920	30	28	10,116
French Indo-China.....		535					535
Hong Kong.....	1,506	24,896	4,076	11,223	3,761	1,586	47,048
Iraq.....		538		36			574
Japan.....	11,150	101,386	20,348	23,126	78,685	8,975	243,669
Kwantung.....		67,188	2,724	952	367	677	71,906
Palestine.....		13,221	534	306	54	125	14,242
Persia.....		79		43		10	132
Philippine Islands.....	93,162	266,698	27,325	20,005	5,445	8,728	421,363
Siam.....	22,437	7,326	896	4,801	559	1,286	37,306
Soviet Russia in Asia.....	15,942						15,942
Syria.....	324	10,737	577	415	177	33	12,263
Turkey.....		3,314	147	1,507		165	5,133
OCEANIA							
Australia.....	8,060	5,779	294,825	75,506	90,806	41,928	516,904
British Oceania.....		643	53	86	63	76	921
French Oceania.....	387	5,733	157	684	112	313	7,396
New Zealand.....	2,636	614,012	104,607	38,345	16,070	7,046	782,716
AFRICA							
Belgian Congo.....		208					208
British East Africa.....		2,854	313	654	80		3,901
Union of South Africa.....	1,101	618,766	30,823	53,821	10,393	5,622	720,626
Other British South Africa.....		5,142	330	394	15	173	6,064
Gold Coast.....	127	272	59	426	10		894
Nigeria.....						34	34
Other British West Africa.....				45			45
Egypt.....	20	84,653	7,351	3,456	2,712	781	98,973
Algeria and Tunisia.....		184,225	10,143	2,658	2,443	444	199,913
Other French Africa.....		291					291
Italian Africa.....		3,775	959	238	111	35	5,118
Liberia.....	435	38	1,162	102			1,737
Morocco.....		73,662	5,499	1,287	2,455	1,672	84,575
Mozambique.....		2,309	21	824	10		3,164
Canary Islands.....		10,652	910	831	627	124	13,144
Other Spanish Africa.....	8	14,263	2,187	1,269	2,546	20	20,293
Total, 1931.....	804,524	14,357,029	1,946,518	3,887,717	1,064,620	574,746	22,635,154
Total, 1929.....	1,940,483	9,775,655	1,997,409	4,419,381	2,289,491	2,699,728	23,122,147
Total, 1930.....	1,143,690	11,549,621	2,363,234	4,375,337	1,635,698	2,066,235	23,133,815

BROADCASTING STATIONS IN OPERATION

The following list includes all stations recorded in the files of the electrical equipment division of the Bureau of Foreign and Domestic Commerce as transmitting program matter for popular reception, regardless of the official category of the transmitter. While most of the stations are primarily classified as broadcasting stations, several hold other types of licenses. Stations which broadcast only on rare and irregular occasions, however, are not ordinarily included.

FOREIGN RADIO BROADCASTING STATIONS
NORTH AMERICA

Location, city, province, (suburb) ¹	Call	Frequency in kilocycles	Wave length in meters	Power in watts
CANADA				
Brandon, Manitoba	CKX	540	556	500
Brantford, Ontario	VE10BQ	1,200	250	5
Calgary, Alberta	CFAC	690	435	500
Do	CJCY	690	435	500
Calgary, Alberta (Strathmore)	CFCN	965	305	10,000
Calgary, Alberta	VE9CA	6,030 11,860	49.8 24.9	-----
Do	VE9CG	6,110	49.1	-----
Canora, Saskatchewan	VE10BU	1,200	250	15
Charlottetown, Prince Edward Island	CFCY	580	517	500
Do	CHCK	960	313	100
Do	VE9EH	6,080	49.3	-----
Chatham, Ontario	CFCO	1,210	248	250
Chilliwack, British Columbia	CHWK	665	451	100
Cobalt, Ontario	CKMC	1,210	248	100
Edmonton, Ontario (Oliver)	CJCA	745	403	500
Do	CHMA	580	517	250
Do	CKUA	580	517	500
Fleming, Saskatchewan	CJRW	665	451	500
Fort William, Ontario (Fort Arthur)	CKPR	890	337	50
Fredericton, New Brunswick	CFNB	1,210	248	50
Glace Bay, Nova Scotia	VAS	685	438	2,000
Halifax, Nova Scotia	CHNS-CNRH	815	368	500
Do	VE9CF	6,060	49.6	-----
Hamilton, Ontario	CHML	890	341	{ 500 50
Hamilton, Ontario (Fruitland)	{ CKOC-CHCS- CKTB }	1,010	297	{ 1,000 500
Kamloops, British Columbia	CFJC	1,120	268	100
Kelowna, British Columbia	CKOV	1,200	250	100
Kingston, Ontario	CFRC	930	323	{ 250 50
Lethbridge, Alberta	CJOC	1,120	268	100
London, Ontario (Strathburn)	CJGC-CNRL	910	330	5,000
London, Ontario ⁴	VE9AU	2,004-2,100	150-143	-----
Do ⁴	VE9CI	2,710	109	-----
Moncton, New Brunswick	CNRA	630	476	500
Mont Joli, Quebec ⁴	VE9ED	2,850-2,950	106-102	-----
Montreal, Quebec	CFCF	1,030	291	500
Montreal, Quebec (St. Hyacinthe)	CKAC-CHYC- CNRM	730	411	5,000
Montreal, Quebec ⁴	VE9AF	2,850-2,950	105-102	-----
Do	VE9BA	6,130 11,705 15,190	48.9 25.6 19.8	-----
Do	VE9DN	6,005 9,580 11,895 6,005	50.0 31.3 25.2 50.0	-----
Montreal, Quebec (Drummondville)	VE9DR	9,555 11,780	31.4 25.5	-----
Montreal, Quebec (Mount Royal) ⁴	VE9DS	2,100-2,200	142-136	-----
Montreal, Quebec ⁴	VE9EC	2,004-2,100	150-143	-----
Middlechurch, Manitoba	VE9CL	6,150	48.8	-----
Do	VE9JR	11,720	25.6	-----
Moose Jaw, Saskatchewan	CJRM	665	451	500
Do	VE10AB	1,200	250	25
North Bay, Ontario	CFCH	930	323	100
Ottawa, Ontario	CKCO	890	337	100
Ottawa, Ontario (Chateau Laurier)	CNRO	600	500	500
Frescott, Ontario	CFLC	915	328	100
Freston, Ontario	CKPC	880	341	50
Prince Albert, Saskatchewan	VE10BL	1,200	250	25
Quebec, Quebec	CHRC-CKCI	645	465	100
Do	CKCV-CNRQ	880	341	50
Red Deer, Alberta	CKLC-CNRD	840	357	1,000
Regina, Saskatchewan (Pilot Butte)	CHWC	960	313	500
Regina, Saskatchewan	CKCK-CJBR- CNRN	960	313	500
St. John, New Brunswick (Fort Howe)	CFBO	890	337	500
St. John, New Brunswick	VE9BJ	6,090	49.3	-----
Saskatoon, Saskatchewan	CFQC-CNRS	910	330	500
Do ⁴	VE9AR	2,850-2,950	105-102	-----

¹ Parenthetic notations refer only to the stations definitely so indicated.

² Day.

³ Night.

⁴ Television station.

FOREIGN RADIO BROADCASTING STATIONS—Continued
NORTH AMERICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
CANADA—continued				
Stratford, Ontario.....	VE10AK	1,200	250	10
Summerside, Prince Edward Island.....	CHGS	1,120	268	500
Sydney, Nova Scotia.....	CJCB	1,850	341	50
Toronto, Ontario.....	CFCA-CNRT	1,120	268	500
Do.....	CFCL-CKCL	580	517	500
Do.....	CFRB-CNRX	690	435	4,000
Toronto, Ontario (Bowmanville).....	CKQW-CJBC- CPRV.	840	357	5,000
Toronto, Ontario (Hillcrest Park).....	CKNC	960	312	500
Toronto, Ontario (Bowmanville).....	VE9GW	6,095 11,810 24,380	49.2 25.4 12.3	28
Toronto Ontario *	VE9RM	2,004-2,100	150-143	-----
Trail, British Columbia.....	VE10AT	1,155	260	25
Vancouver, British Columbia.....	CKFC	730	411	50
Vancouver, British Columbia (Sea Island).....	CJOR	1,210	248	500
Vancouver, British Columbia.....	CKCD-CHLS	730	411	100
Do.....	CKMO	730	411	100
Do.....	CKWX	730	411	100
Vancouver, British Columbia (Lulu Island).....	CNRV	1,030	291	500
Vancouver, British Columbia *	VE9BZ	2,750-2,850	109-105	-----
Do.....	VE9CS	6,070	49.4	50
Victoria, British Columbia.....	CFCT	630	476	50
Waterloo, Ontario.....	CKCR	645	465	100
Windsor, Ontario.....	CKOK	540	555	5,000
Wingham, Ontario.....	VE10BP	1,200	250	30
Winnipeg, Manitoba (Prov. Agric. College).....	CKY-CNRW	780	385	5,000
Wolfville, Nova Scotia.....	CKIC	1,010	297	50
Do.....	VE9CX	6,015	50	-----
Yorkton, Saskatchewan.....	CJGX	630	476	500
COSTA RICA				
San Jose.....	TITV	999	300	-----
Do.....	TITR	1,350 11,790	222 25.4	-----
Do.....	TISO	600	500	-----
Do.....	TIGP	666	450	-----
Do.....	TIFB	714	420	-----
Do.....	TICR	911 20,000	329 15	75
Do.....	TIC	882	340	15
San Jose (Heredia).....	TI4NRH	9,672 14,000	315 19.9	75
CUBA				
Caibarien.....	CMHD	915	316	250
Camaguey.....	CMJC	1,382	217	75
Do.....	CMJE	856	350	20
Do.....	CMJF	930	322	225
Do.....	CMJG	1,050	286	50
Do.....	CMJL	960	312	50
Cardenas.....	CMGE	1,375	218	30
Ciego de Avila.....	CMJH	1,017	295	15
Do.....	CMJI	1,260	238	5
Cienfuegos.....	CMHJ	1,125	267	40
Do.....	CM6DW	7,300	41	10
Colon.....	CMGA	834	360	100
Guanabacoa.....	CMCG	1,395	215	30
Quantanamo.....	CMKJ	1,300	231	20
Habana.....	CMBC	965	311	150
Do.....	CMBD	965	311	150
Do.....	CMBG	1,070	280	225
Do.....	CMBI	1,444	206	30
Do.....	CMBL	1,444	206	20
Do.....	CMBN	1,444	206	30
Do.....	CMBR	1,500	200	15
Do.....	CMBS	790	380	150
Do.....	CMBT	790	380	150
Do.....	CMBY	1,235	243	350
Do.....	CMBZ	1,010	297	150
Do.....	CMC	840	357	500
Do.....	CMCA	1,235	243	150
Do.....	CMCB	1,070	280	150
Do.....	CMCD	925	324	250
Do.....	CMCF	890	337	250
Do.....	CMCH	1,395	215	20

* Television station.

FOREIGN RADIO BROADCASTING STATIONS—Continued

NORTH AMERICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
CUBA—continued				
Habana.....	CMCJ.....	630	476	250
Do.....	CMCQ.....	1,140	263	600
Do.....	CMCR.....	1,345	223	150
Do.....	CMCU.....	1,270	236	150
Do.....	CMCW.....	1,270	236	150
Do.....	CMCY.....	1,345	223	50
Do.....	CMDB.....	1,395	215	40
Do.....	CMDD.....	1,010	297	250
Do.....	CMK.....	730	411	3,150
Do.....	CMQ.....	630	476	250
Do.....	CMW.....	588	510	1,400
Do.....	CMX.....	890	337	500
Do.....	CM2LA.....	10,013	30	
Do.....	CM2MK.....	7,184	41.8	
		9,362	32	100
Marianao.....	CMBQ.....	1,500	200	50
Do.....	CMBW.....	1,140	263	150
Do.....	CMCM.....	1,395	215	15
Do.....	CMCN.....	925	324	250
Do.....	CMAF-CMCI.....	660	454	500
		6,060	49.5	
Matanzas.....	CMGB.....	1,205	249	7.5
Do.....	CMGC.....	820	366	30
Do.....	CMGF.....	987	316	50
Do.....	CMGH.....	1,040	288	150
Pinar del Rio.....	CMAB.....	1,249	240	20
Santa Clara.....	CMHI.....	1,030	291	30
Santiago de Cuba.....	CMKC.....	1,034	290	150
Trinidad.....	CMHC.....	790	379	250
DOMINICAN REPUBLIC				
Santo Domingo.....	HLK.....	1,180	254	15,000
Do.....	HIX.....	625	475	1,000
EL SALVADOR				
San Salvador.....	RUS.....	664	452	500
GUATEMALA				
Guatemala City.....	TGW.....	1,320	227	250
		7,300	41.4	
Do.....	TGX.....	14,300	21.4	150
		13,200	22.7	50
HAITI				
Port au Prince.....	HHK.....	920	326	1,000
HONDURAS				
San Pedro Sula.....	JRL.....	1,350	222	7.5
		1,379	219	
Tegucigalpa.....	HRB.....	6,005	50	2,300
		6,170	48.6	
MEXICO				
Aguascalientes.....	XFC.....	805	373	350
Chihuahua.....	XEFI.....	1,000	300	100
Do.....	XFF.....	915	325	250
Ciudad Juarez.....	XEJ.....	1,000	300	100
Do.....	XEQ.....	750	400	5,000
Guadalajara.....	XEA.....	1,000	300	100
Jalapa.....	XETC.....	1,000	300	100
Merida.....	XEFC.....	1,050	286	10
Do.....	XEY.....	1,000	300	100
		5,867	51.2	
Mexico City.....	XDA.....	6,818	44	
		9,375	32	20,000
		11,763	25.5	
		14,630	20.5	
Do.....	XEB.....	1,030	291	1,000
Do.....	XEFA.....	1,250	240	250
Do.....	XEG.....	1,360	221	100
Do.....	XEK.....	990	303	100

FOREIGN RADIO BROADCASTING STATIONS—Continued

NORTH AMERICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
MEXICO—continued				
Mexico City.....	XEM.....	1,300	231	250
Do.....	XEN.....	711	422	1,000
Do.....	XEO.....	940	319	5,000
Do.....	XETA.....	1,140	263	500
Do.....	XETQ.....	1,230	244	100
Do.....	XETR.....	610	491	1,000
Do.....	XETY.....	1,300	231	2,000
Do.....	XETZ.....	1,500	200	100
Mexico City (Hacienda de Coapa)	XEW.....	910	329	5,000
Mexico City.....	XEX.....	1,210	248	500
Do.....	XEZ.....	780	386	500
Do.....	XFD.....	6,667 9,091 11,111	45 33 27	50
Do.....	XFG.....	638	470	2,000
Do.....	XFH.....			250
Do.....	XFI.....	818	367	1,000
Do.....	XFX.....	860	349	500
Monterrey.....	XEFB.....	1,270	236	50
Do.....	XEH.....	1,132	265	1,000
Do.....	XET.....	690	435	500
Morelia.....	XEI.....	1,000	300	100
Nuevo Laredo.....	XEFE.....	1,000	300	100
Do.....	XEP.....	1,400	214	200
Do.....	X26A.....	7,616	40.7	
Oaxaca.....	XEE.....	1,000	300	100
Puebla.....	XEV.....	1,000	300	100
Queretaro.....	XEFS.....	1,000	300	40
Reynosa.....	XED.....	965	311	10,000
Saltillo.....	XEL.....	1,000	300	10
Tampico.....	XES.....	890	337	500
Tia Juana.....	XEFD.....	1,020	294	300
Tehuacan.....	XEC.....	1,000	300	50
Torreón.....	XETB.....	1,380	217	125
Do.....	XETG.....	1,000	300	100
Vera Cruz.....	XETF.....	680	476	500
Do.....	XEU.....	1,000	300	100
Villa Acuña.....	XER.....	735	408	80,000
NEWFOUNDLAND				
Bell Island.....	VOGT.....	890	335	
St. Johns.....	VONA.....	950	316	
Do.....	VOWR.....	675	444	500
Do.....	VOX.....	1,400	220	
Do.....	VO8A.....	6,800	44	7.5
Do.....	VO8RA.....	950	316	25

SOUTH AMERICA

ARGENTINA				
Azul.....	LU9.....	1,470	204	50
Bahia Blanca.....	LU2.....	800	375	500
Buenos Aires (Ciudadela).....	LP4.....	670	448	1,000
Buenos Aires (Banfield).....	LP6.....	590	509	1,500
Buenos Aires (Florida).....	LR1.....	790	380	500
Do.....	LR2.....	910	330	5,500
Buenos Aires (Ciudadela).....	LR3.....	950	316	7,500
Buenos Aires (Rivadavia).....	LR4.....	990	303	10,000
Buenos Aires (Florida).....	LR5.....	830	361	1,600
Buenos Aires (Ciudadela).....	LR6.....	870	345	2,100
Buenos Aires (Olivos).....	LR7.....	750	400	1,000
Buenos Aires (Florida).....	LR8.....	1,150	261	3,000
Do.....	LR9.....	1,090	291	5,000
Buenos Aires.....	LSOR.....	6,810	30.6	
Do.....	LSX.....	10,382	28.9	20,000
Buenos Aires (Nunez).....	LS1.....	710	423	5,000
Buenos Aires (Florida).....	LS2.....	1,190	252	5,500
Buenos Aires (Rivadavia).....	LS5.....	1,110	270	5,000
Buenos Aires (Ciudadela).....	LS6.....	1,350	222	1,500
Buenos Aires (Matanza).....	LS8.....	1,230	244	2,000
Buenos Aires (Vicente Lopez).....	LS9.....	1,270	236	3,500
Buenos Aires (Rivadavia).....	LU3.....	680	476	4,500
Cordoba.....	LV2.....	920	328	500
Do.....	LV3.....	620	484	350

FOREIGN RADIO BROADCASTING STATIONS—Continued
SOUTH AMERICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
ARGENTINA—continued				
La Plata.....	LP9.....	1,430	210	1,500
Las Heras.....	LV10.....	860	349	350
Mar del Plata.....	LU6.....	1,380	217	50
Mendoza.....	LT4.....	700	395	170
Do.....	LV10.....			
Punta Alta.....	LU7.....	1,280	234	200
Rosario.....	LT1.....	780	385	4,500
Do.....	LT3.....	1,080	278	250
Do.....	LT8.....	840	357	350
Do.....	LT9.....	1,050	283	100
Salta.....	LV9.....	900	333	500
San Juan.....	LV1.....	730	411	1,500
Do.....	LV5.....	1,120	268	500
Santa Fe.....	LT10.....	1,390	216	100
Tucuman.....	LV7.....	820	366	200
BOLIVIA				
La Paz.....	CPX.....	1,350	226	1,000
BRAZIL				
Amparo.....	PRAM.....	638	470	50
Bahia.....	PRAH.....	674	445	50
Bello Horizonte.....	PRAQ.....	1,090	275	
Campinas.....		1,170	256	20
Curitiba.....	PRAN.....	882	340	50
Franca.....	PRAZ.....	1,110	270	50
Juiz de Fora.....	PRAJ.....	857	350	200
Mogy das Cruzes.....	PRAY.....	1,000	300	50
Para.....	PRAF.....	842	356	250
Pelotas.....	PRAD.....	920	326	50
Pernambuco.....	PRAP.....	706	425	3,000
Porto Alegre.....	PRAG.....	706	425	3,000
Ribeirao Preto.....	PRAI.....	1,070	280	10
Rio de Janeiro.....	PRAA.....	750	400	1,000
Do.....	PRAB.....	937	320	500
Do.....	PRAC.....	857	350	500
Do.....	PRAK.....	1,153	260	1,000
Do.....	PRAJ.....	1,384	220	1,000
Santos.....	PRAS.....	887	338	1,000
Sao Paulo.....	PRAE.....	815	368	1,000
Do.....	PRAR.....	1,006	298	500
BRITISH GUIANA				
Georgetown.....	VRY.....	6,722	44.6	200
CHILE				
Antofagasta.....				
Los Andes.....	CMAP.....	9,338	32	100
Magallanes.....				
Do.....				
Rancagua.....	CMAS.....	1,239	242	10
Do.....	CMBA.....	1,388	216	10
Do.....	CMBC.....	1,448	207	10
Santiago.....	CMAA.....	1,304	230	20
Do.....	CMAB.....	625	480	1,000
Do.....	CMAC.....	833	360	1,000
Do.....	CMAE.....	862	348	100
Do.....	CMAF.....	717	418	100
Do.....	CMAH.....	1,158	259	100
Do.....	CMAI.....	681	440	1,000
Do.....	CMAK.....	1,200	250	100
Do.....	CMAQ.....	1,110	270	100
Do.....	CMAR.....	923	325	100
Do.....	CMAZ.....	750	400	1,000
Do.....	CMBE.....	1,016	285	250
Do.....	CMBF.....	1,304	230	20
Do.....	CMBJ.....	1,344	223	20
Do.....	CMBQ.....	1,027	292	20
Valparaiso.....	CMAJ.....	785	382	50
Do.....	CMAJ.....	1,249	240	50
Do.....	CMAT.....	1,153	260	20
Do.....	CMBH.....	869	345	20
Do.....		1,045	287	20

FOREIGN RADIO BROADCASTING STATIONS—Continued

SOUTH AMERICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
COLOMBIA				
Barranquilla	HKA	6,160	48.7	50
Do	HKD	5,937	50.5	50
Bogota	HKF	7,527	39.7	50
Do	HKM	6,663	45	50
Do	HKU	7,225	41.5	20
Call	HKJ	7,259	41.3	15
Do	HKK	12,499	25	15
Do		5,170	58	15
Do	HKS	7,313	41	15
Manizales	HKT	7,139	42	25
Medellin	HKN	11,712	25.6	50
Tunja	HKB	7,180	41.8	50
ECUADOR				
El Prado	HC	7,538	39.8	50
Quito	HCJB	7,500 15,000	40 20	-----
PARAGUAY				
Asuncion	ZP1	1,135	264	1,000
Do	ZP3	1,000	300	285
Do	ZP4	1,275	235	150
Do	ZP5	1,465	205	150
PERU				
Arequipa	OA6U	1,764	170	20
Lima	OAX	790	380	1,500
Do	OA4M	1,428	210	12
URUGUAY				
Montevideo	CX6	650	462	1,000
Do	CX10	730	411	1,000
Do	CX12	770	390	500
Do	CX14	810	370	1,000
Do	CX16	850	353	-----
Do	CX18	890	337	250
Do	CX20	930	323	2,000
Do	CX22	970	309	250
Do	CX24	1,010	297	1,000
Do	CX26	1,050	286	2,000
Do	CX30	1,130	266	250
Do	CX32	1,170	256	200
Do	CX34	1,210	248	500
Do	CX36	1,250	240	250
Do	CX38	1,290	233	100
Do	CX40	1,330	226	100
Do	CX42	1,370	219	500
Do	CX44	1,410	213	20
Do	CX46	1,450	207	100
Do	CX48	1,490	201	50
Paysandu	CW40	1,340	224	30
Do	CW44	1,420	211	30
Salto	CW32	1,180	254	50
Do	CW34	1,220	246	50
Do	CW36	1,260	238	30
Do	CW38	1,300	231	30
Tucumanbo	CW30	1,140	263	-----
Do	CW46	1,460	206	20
VENEZUELA				
Caracas	YV1BC	960	312	-----
Do	YV2BC	6,061	49.5	400
Maracaibo (Bella Vista)	YV1BMO	6,128	48.9	250
Valencia	YV4BV	11,700	25.6	-----

EUROPE

AUSTRIA				
Graz		851	353	7,000
Innsbruck		1,058	284	500
Klagenfurt		662	453	500
Linz-an-der-Donau		1,220	246	500
Vienna		581	516	15,000

FOREIGN RADIO BROADCASTING STATIONS—Continued

EUROPE—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
BELGIUM				
Antwerp.....	ON4EB	1,455	206	50
Brussels.....	ON4GT	1,375	213	100
Do.....	ON4RB	589	508	3,000
Do.....	ON4RC	1,448	207	100
Brussels (Schaerboek).....	ON4FO	1,219	246	100
Chatelineau.....	ON4CE	1,388	216	200
Dampremy.....	ON4FG	1,455	206	25
Ghent.....	ON4RG	1,219	246	400
Liège.....	ON4RW	1,219	246	200
Ottomont.....	ON4EX	1,388	216	100
Valthem.....		887	338	15,000
Verviers.....	QN4CE	1,455	206	100
BULGARIA				
Sofia.....				800
CZECHOSLOVAKIA				
Bratislava.....	OKR	1,075	279	14,000
Brno.....	OKB	878	342	36,000
Kosice.....	OKK	1,023	294	2,600
Prague.....	OKIMPI	5,169	58	2,000
Moravska-Ostrava.....		1,137	264	11,000
Prague (Strasnice).....	OKP	614	489	120,000
DANZIG				
Danzig.....	PTB	662	250	1,500
DENMARK				
Copenhagen (Skamlebeck).....	OIO-OXZ	6,057	49.5	500
		9,488	31.6	
		15,300	19.6	
Copenhagen (Axelborg).....		1,067	281	1,000
Kallundborg.....		1,183	260	7,500
Soro.....		309	971	2,000
ESTONIA				
Tallinn.....		1,013	296	10,000
Do.....		250	1,200	100
Tartu.....		735	408	2,200
FINLAND				
Abo.....		1,220	246	
Bjorneborg.....		1,220	246	1,500
Helsingfors.....		835	358	10,000
Jakobstad.....		1,220	246	750
Lahdi.....		167	1,796	40,000
Tammerfors.....				1,000
Viborg.....		1,031	291	750
FRANCE				
Angers.....		1,091	275	250
Beaune.....		1,364	220	1,500
Biarritz.....		1,515	198	250
Bordeaux.....		985	305	5,000
Do.....		986	304	1,500
Caen.....		1,080	278	200
Comamp.....				
Grenoble.....		914	328	1,500
Lille.....		1,132	265	500
Limoges.....		1,022	293	500
Lyon.....	YR	1,030	291	500
		7,463	40.2	
Lyon (La Doua).....	YN	644	466	3,000
Mont de Marsan.....		750	400	250
Marseille.....		950	316	500
Montpellier.....		1,049	286	200
Nice (Juan les Pins).....		1,219	248	250
Nimes.....		1,250	240	500
Paris (Eiffel Tower).....	FL	6,124	49	40,000
Paris (Les Essarts le Roi).....		174	1,725	13,500
Paris.....	FPTT	901	331	500
Do.....	FPTT	671	448	1,000
Do.....	FSGC	825	368	1,500
Do.....	"Radio Vitus"	4,262	61	2,000
		968	310	
		7,317	41	
Pontoise.....	FYA	11,808	25.6	
		11,809	25.2	
		15,235	19.7	

FOREIGN RADIO BROADCASTING STATIONS—Continued

EUROPE—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
FRANCE—continued				
Rennes.....		1,103	272	1,500
Rheims.....		777	386	500
St. Etienne.....		1,364	220	250
Strasbourg (Brumath).....	SPTT	867	345	6,000
Toulon.....		1,200	250	500
Toulouse.....	MRD	1,175	255	1,500
Do.....		780	385	8,000
GERMANY				
Aix la Chapelle.....		1,319	227	300
Augsburg.....		536	560	300
Berlin (Witzleben).....		716	419	1,700
Berlin (Zeesen).....		1,635	184	35,000
Berlin (Zeesen).....		9,560	31.4	30,000
Berlin (Magdeburger Platz).....		1,058	284	600
Bremen.....		950	316	300
Breslau.....		923	325	1,700
Cologne.....		1,319	227	1,700
Dresden.....		941	319	300
Flensburg.....		1,373	219	600
Frankfort.....		770	390	1,700
Freiburg.....		527	569	300
Gleitwitz.....		1,157	259	5,600
Hamburg.....		806	372	1,700
Hanover.....		530	566	300
Hellsburg.....		1,085	277	60,000
Kaiserslautern.....		1,112	270	300
Kassel.....		1,220	246	300
Kiel.....		1,292	232	300
Konigsberg.....		1,085	277	1,700
Langenberg.....		635	473	17,000
Leipzig.....		1,184	253	2,300
Magdeburg.....		1,058	284	600
Muenster.....		1,319	227	600
Munich.....		563	533	1,700
Nuremberg.....		1,256	239	2,300
Stettin.....		1,058	284	600
Stuttgart (Muehlacker).....		833	360	60,000
Trier.....		1,184	253	2,300
HUNGARY				
Budapest (Csepel).....	HAC	1,430	210	1,200
Budapest (Lakihegy).....	HAL	545	550	20,000
Szekesvehervar.....	HAT	9,125	32.9	-----
ICELAND				
Reykjavik.....	TFA	1,200	250	500
Do.....	TFU	250	1,200	21,000
IRISH FREE STATE				
Cork.....	6CK	1,337	224	1,400
Dublin.....	2RN	725	413	1,500
ITALY				
Bari.....	IIBA			
Bolzano.....	IIBZ	815	368	1,000
Firenze.....	IFI	598	502	20,000
Genoa.....	IGE	959	313	10,000
Milan.....	IMI	905	332	7,000
Naples.....	INA	941	319	1,500
Palermo.....	IPA	572	522	3,000
Rome.....	I1AX	6,667	45	-----
Do.....	IRO	680	441	50,000
Do.....	I2RO	3,750	80	-----
Do.....	I2RO	11,810	25.4	14,000
Trieste.....	I1TR	1,211	248	10,000
Turin.....	ITO	1,096	274	7,000
LATVIA				
Riga.....	YLZ	571	525	15,000
Do.....		1,510	199	10,000
LITHUANIA				
Kovno.....		150	1,935	7,000

FOREIGN RADIO BROADCASTING STATIONS—Continued
EUROPE—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
LUXEMBURG				
Luxemburg.....	LOAA.....	1,344	223	10,000
NETHERLANDS				
Amsterdam (Hilversum).....	PFBI.....	1,013	296	} 7,000
Do.....	PCJ.....	160	1,875	
Amsterdam (Huizen).....	PHI.....	9,590	31.3	} 40,000
Do.....	PH9.....	17,775	16.9	
Bloemendaal.....		1,013	296	
Scheveningen.....	PCF.....	160	1,875	
The Hague.....		1,220	246	2,000
		280	1,071	350
		1,000	300	
NORWAY				
Aalesund.....	LKA.....	671	447	350
Bergen.....	LEB.....	824	364	1,000
Bodo.....	LKC.....	662	453	500
Fredrikstad.....	LEF.....	815	368	700
Hamar.....	LEH.....	536	560	700
Kristiansand.....	LEK.....	1,274	236	500
Notodden.....	LEN.....	671	447	50
Oslo.....	LKO.....	1,083	27	60,000
Porsgrund.....	LKP.....	662	453	700
Rjukan.....	LKR.....	671	447	180
Stavanger.....	LKS.....	1,247	241	500
Tromsøe.....	LKM.....	662	453	110
Trondelag.....	LET.....	606	493	1,200
POLAND				
Katowice.....		734	409	10,000
Krakow.....		950	313	1,500
Lwow.....		779	385	16,000
		896	335	
Poznan.....		9,836	30.5	} 1,500
		1,098	27.3	
Warsaw (Rassyn).....		203	1,412	25,000
Wilna.....		779	385	16,000
PORTUGAL				
Lisbon.....	CT1AA.....	1,056	284	} 2,000
Do.....	CT1AN.....	6,995	42.9	
Do.....	CT1BO.....	1,066	284	10
Do.....	CT1BP.....	10,710	28	150
Do.....	CT1BP.....	1,275	233	50
Do.....	CT1BM.....	1,066	284	50
Do.....	CT1DH.....	962	315	10
Do.....	CT1DS.....	1,056	284	10
Do.....	CT1EB.....	1,056	284	50
Do.....	CT1GK.....	1,062	282	50
Do.....	CT1GL.....	885	338	150
Oporto.....	PRP1.....	1,249	240	500
Do.....	CS1RS.....	1,448	207	1,000
RUMANIA				
Bucharest.....		759	394	12,000
Do.....	YO1.....	13,960	21.5	
SPAIN				
Almeria.....	EAJ18.....	1,195	251	200
Barcelona (Mount Tibidabo).....	EAJ1.....	860	349	7,500
Barcelona.....	EAR25.....	6,124	42	
Do.....	EAJ15.....	1,195	251	300
Madrid.....	EAJ2.....	708	424	750
Do.....	EAJ7.....	708	424	1,500
Do.....	EAM.....	9,772	30.7	
Do.....	EAR125.....	6,976	43	
Do.....	EAR125.....	7,025	42.7	
Oviedo.....	EAJ19.....	1,119	268	30
San Sebastian.....	EAJ8.....	662	453	1,000
Seville.....	EAJ5.....	815	368	1,000
Valencia.....		1,127	256	750
SWEDEN				
Boden.....	SBE.....	1,200	250	600
Boras.....	SCA.....	1,301	229	150
Eskilstuna.....	SCB.....	1,220	246	200
Falun.....	SCC.....	932	332	500

* Day.

* Night.

FOREIGN RADIO BROADCASTING STATIONS—Continued

EUROPE—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
SWEDEN—continued				
Gavle.....	SCE.....	1,470	204	200
Goteborg.....	SBB.....	932	322	10,000
Halmstad.....	SCE.....	1,391	216	200
Halsingborg.....	SCG.....	1,301	231	200
Horby.....	SBH.....	1,166	257	10,000
Hudiksvall.....	SCF.....	1,112	270	150
Jonkoping.....	SOH.....	1,490	202	250
Kalmar.....	SCL.....	1,220	246	200
Karlskrona.....	SCJ.....	1,530	196	200
Karlstad.....	SCK.....	1,373	218	250
Kiruna.....	SCL.....	1,220	246	200
Kristinehamn.....	SCM.....	1,480	203	250
Malmberget.....	SCN.....	689	436	250
Malmo.....	SBC.....	1,301	231	600
Motala.....	SBG.....	222	1,348	30,000
Norrkoping.....	SCO.....	1,112	270	250
Orebro.....	SCV.....	1,265	237	200
Ornskoeldsvik.....	SCW.....	1,373	218	200
Ostersund.....	SBF.....	770	390	600
Saffle.....	SCP.....	1,220	246	400
Stockholm (Spanga).....	SBA.....	689	435	75,000
Sundsvall.....	SBD.....	554	542	10,000
Trollhattan.....	SCQ.....	1,112	266	250
Uddevalla.....	SCR.....	1,058	296	50
Umea.....	SCS.....	1,301	231	20
Uppsala.....	SCT.....	662	453	150
Varberg.....	SCU.....	1,058	283	300
SWITZERLAND				
Basel.....		244	1,229	500
Berne.....		742	404	500
Beromunster.....		653	459	60,000
Geneva (Lancy).....		760	395	1,200
Sottens.....		743	406	25,000
UNITED KINGDOM				
Aberdeen.....	G2BD.....	1,040	288	1,000
Belfast.....	G2BE.....	1,238	242	1,000
Bournemouth.....	G4BM.....	1,040	288	1,000
Cardiff.....	G5WA.....	968	310	1,000
Chelmsford.....		11,750	25.5	12,000
Daventry.....	G5GB.....	626	479	25,000
Do.....	G5XX.....	193	1,554	30,000
Dundee.....	G2DE.....	1,040	288	130
Edinburgh.....	G2EH.....	1,040	288	350
Glasgow.....	G5SC.....	797	376	1,000
London (Brookman's Park).....	G2LO.....	843	356	50,000
		1,147	262	
Manchester (Moorside Edge).....		625	479	50,000
		995	302	
Newcastle.....	G5NO.....	1,040	288	1,000
Plymouth.....	G5PY.....	1,040	288	130
Sheffield.....	G6FL.....	1,040	288	160
Swansea.....	G5SX.....	1,040	288	130
VATICAN CITY				
Vatican City.....	HVJ.....	5,965	50.3	10,000
		15,112	19.8	
YUGOSLAVIA				
Belgrade.....		696	431	2,500
		10,000	30	
Ljubljana.....		527	569	3,000
Zagreb.....		977	307	700
RUSSIA (EUROPEAN AND ASIATIC)				
Achkabad.....	RW19.....	334	896	4,000
Alma Ata.....	RW60.....	310	968	10,000
Archangelsk.....	RW36.....	770	390	10,000
Armavir.....	RV50.....	857	571	1,000
Artemovsk.....	RV26.....	811	370	1,200
Astrakhan.....	RW35.....	435	690	1,000
Baku.....	RW8.....	238	1,261	10,000
Do.....	RW43.....	238	1,261	1,200

FOREIGN RADIO BROADCASTING STATIONS—Continued

EUROPE—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
RUSSIA—continued				
Bogorodsk	BAB	750	400	700
Dnepropetrovsk	RW30	511	587	4,000
Erivan	RV21	243	875	4,000
Gomel	RW40	621	483	1,200
Groznyi	RW23	676	444	1,200
Imeni Pop	RV58	273	1,100	8,000
Irkutsk	RW14	188	1,600	10,000
Ivanovo Vosnesensk	RW31	614	497	1,200
Kazan	RW17	551	545	1,000
Khabarovsk	RW54	4,273	70.2	20,000
Do		1,063	285	500
Kharkov	RW4	320	938	16,000
Do	RW20	704	426	4,000
Kiev	RW9	368	815	10,000
Koursk	RA34	521	575	1,000
Krasnodar	RW33	650	462	1,000
Leningrad	RW3	300	1,000	20,000
Do	RV36	856	350	1,200
Leningrad (Kolpino)	RW53	300	1,000	100,000
Makhatch Kala	RW27	796	377	1,000
Minak	RW10	429	700	4,000
Do	RW62	6,420	46.7	100
Moscow	RW1	303	1,481	100,000
Do	RW2	417	730	20,000
Do	RW37	793	379	1,000
Do	RW38	5,515	54.4	300
Do	RW39	793	379	300
Do	RW49	230	1,304	100,000
Do	RW58	269	1,117	40,000
Do		273	1,100	
Do	RW59	6,000	50	20,000
Do	RW61	51,724	5.8	750
Nalchik	RW51	748	401	1,200
Nizhni Novgorod	RW42	394	741	4,000
Nikolaev	RV43	820	366	—
Novorossiisk	RA33	1,117	268	4,000
Novosibirsk	RW6	238	1,280	4,000
Odessa	RW13	668	450	4,000
Omsk	RW44	472	636	1,200
Orenburg	RW45	462	650	1,000
Oufa	RW22	444	675	2,000
Penza	RW56	640	469	1,200
Petravpavlovsk	RW46	687	437	1,200
Petrozavodsk	RW29	469	640	1,200
Platigorsk	RW24	865	347	1,200
Pokrovsk	RW55	730	411	1,000
Rostov on Don	RW12	354	849	4,000
Do		271	1,106	4,000
Samara	RW16	522	575	1,200
Samarkand	RW18	343	875	2,000
Saratov	RA32	714	420	200
Sevastopol	RA9	375	800	250
Simferopol	RW52	630	476	4,000
Smolensk	RW24	531	565	2,000
Stalino	RW26	370	810	1,200
Stavropol	RW32	608	493	1,200
Stchelkovo	RV49	320	937	—
Sverdlovsk	RW5	364	825	36,000
Do	RV63	541	554	—
Tashkent	RW11	256	1,170	25,000
Do	RW47	421	712	2,000
Tiflis	RW7	280	1,071	10,000
Tiraspol	RW57	838	358	4,000
Tomsk	RW48	645	465	1,200
Tver	RA44	435	690	1,200
Ulyanovsk	RA51	600	500	20
Veliki Oustug	RW41	560	535	1,200
Vladivostok	RW28	636	472	300
Vologda	RA41	343	875	1,200
Voronezh	RW25	386	778	3,000
TURKEY (EUROPEAN AND ASIATIC)				
Angora	TAE	153	1,958	7,000
Istanbul (Osmanieh)		250	1,200	5,000

FOREIGN RADIO BROADCASTING STATIONS—Continued

ASIA

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
BRITISH MALAYA				
Johore Bharu.....	VS3AB	7,055	42.5	
Kuala Lumpur.....				
Singapore.....	VS1AB	7,260	41.3	
CEYLON				
Colombo.....		600	500	1,750
CHINA				
Hangchow.....	XGY	977	307	750
Harbin.....	COHB	674	445	1,000
Mukden.....	COMK	731	410	2,000
Nanking.....	XGZ	1,071	290	500
		6,000	50	500
Peiping.....	XOPP	910	330	100
Shanghai.....	RUOK	1,440	206	250
Do.....	XGNE	1,070	280	50
Do.....	XGT	1,150	258	100
Do.....	XGAN	930	323	100
Do.....	XGKW	1,162	260	15
Do.....	XGX	812	370	50
Do.....	XCBL	1,180	255	250
Tientsin.....	XOL	625	480	500
FRENCH INDO-CHINA				
Haiphong.....		3,446	87	2,500
Saigon.....	FZG	13,010	25	
Do.....	FZR	12,010	20.5	
Saigon (Chi Hoa).....	F31CD	840	358	12,000
		6,119	49.1	
HONG KONG				
Victoria.....	ZBW	845	355	1,500
INDIA				
Bombay.....	VUB	840	357	3,000
		6,114	49.1	
Calcutta.....	VUC	810	370	3,000
		11,870	25.3	
Lahore.....	VUL	882	340	100
Madras.....	VUM	770	390	200
JAPAN				
Dairen, Manchuria.....	JQAK	760	395	1,000
Fukuoka.....	JOLK	680	441	500
Hiroshima.....	JOFK	850	353	10,000
Kanazawa.....	JOJK	710	423	300
Keijo, Chosen.....	JODK	690	435	1,000
Kokura.....	JOSK	741	408	1,000
Kumamoto.....	JOJK	790	380	10,000
Nagano.....	JONK	635	472	500
Nagoya.....	JOCK	810	370	10,000
Niigata.....	JOQK	625	480	500
Okayama.....	JOJK	700	429	500
Osaka.....	JOBK	750	400	10,000
Sapporo.....	JOIK	830	361	10,000
Sendai.....	JOHK	770	390	10,000
Shidzuoka.....	JOPK	778	386	500
Taihoku, Taiwan.....	JFAK	670	448	10,000
Tokyo.....	JOAK	590	508	10,000
		870	345	
NETHERLAND INDIA				
Bandoeng, Java.....	PLE	9,410	31.9	30
		18,860	15.9	
Do.....	IBR	5,170	58	1,000
Batavia, Java.....	PK1AA	3,998	77.5	500
Djokjakarta, Java.....	PK2AF	5,996	50	500
Makassar, Celebes.....	PK6KZ	11,993	25	500
Malabar, Java.....	PLF	17,640	17	
Palembang, Sumatra.....	PK4PA	59,964	5	240
Semarang, Java.....	PK2AG	7,890	38	
Surabaya, Java.....	PK3AN	6,040	49.7	
Do.....	PK3CH	6,662	45	250
Do.....		2,142	140	500

FOREIGN RADIO BROADCASTING STATIONS—Continued

ASIA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
NETHERLAND INDIA—continued				
Tandjong Priok, Java.....		6,045	49.6	
		9,579	31.3	
		15,336	19.6	
SIAM				
Bangkok.....	HSP1	8,766	350	2,500
Do.....	HSP2	7,300	41	2,500
		9,600	31.6	
Bangkok (Sala Daeng).....	HS7PJ	810	370	
		923	325	
Bangkok.....	HSP3	938	320	
Bangkok (Sala Daeng).....	HS2PJ	10,167	29.5	500
Do.....	HS11PJ	882	340	400

OCEANIA

AUSTRALIA				
Adelaide.....	VK5AD	720	417	300
Do.....	VK5CL	1,310	229	1,000
Do.....	VK5DN	960	312	100
Do.....	VK5KA	1,200	250	200
Albury.....	VK2AY	1,320	227	50
		1,480	203	
Albury (Corowa).....	VK2CO	1,559	536	7,500
Ballarat.....	VK3BA	1,303	231	50
Bendigo (Sydney Station).....	VK3BO	1,970	309	200
		1,450	207	
Brisbane.....	VK4BC	1,580	341	600
Do.....	VK4BK	1,145	262	200
Do.....	VK4QG	1,280	233	2,500
Broken Hill.....	VK2XL	1,365	220	50
Canberra (Kingston).....	VK2CA	1,050	286	50
Geelong.....	VK3GL	1,400	214	50
Goulburn.....	VK2GN			
		1,330	226	50
Gunnedah.....	VK2MO	1,500	200	
Hamilton.....	VK3HA	1,010	297	200
Hobart.....	VK7HO	890	337	50
Do.....	VK7ZL	1,160	259	
Kalgoorlie.....	VK6KG	580	517	600
		1,220	246	100
Lanceston.....	VK7LA	1,080	278	200
		1,100	273	
Lismore.....	VK2XN	1,340	224	50
Mackay.....	VK4MK	1,190	252	100
Melbourne.....	VK3AK	1,500	200	50
Do.....	VK3AR	610	492	1,000
Do.....	VK3DB	1,180	257	100
Melbourne (Carlton).....	VK3KZ	1,350	222	200
Melbourne.....	VK3LO	800	375	1,000
Do.....	VK3ME	9,369	32	
Do.....	VK3UZ	9,500	31.6	
Do.....	VK3UZ	930	323	100
Do.....	VK3YB	8,520	34	
		1,145	262	25
Moss Vale.....	VK2MV	1,220	246	50
		1,460	205	
Newcastle.....	VK2HD	1,110	270	200
Do.....	VK2KO	1,415	212	200
Do.....	VK2NC	1,245	241	2,000
Perth.....	VK6ML	1,010	297	300
Do.....	VK6FR	1,135	264	
Do.....	VK6WF	880	341	200
Rockhampton.....	VK4RK	690	435	1,000
Swan Hill.....	VK3SH	910	330	2,000
Sydney.....	VK2BL	1,080	278	50
Do.....	VK2CH	855	351	1,000
Do.....	VK2CH	9,235	32.5	
Do.....	VK2FC	865	451	
Do.....	VK2FC	10,520	28.5	1,000
Do.....	VK2GB	950	316	600
Do.....	VK2KY	1,070	280	300

FOREIGN RADIO BROADCASTING STATIONS—Continued

OCEANIA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
AUSTRALIA—continued				
Sydney.....	VK2ME.....	{ 9,590 10,527 16,330	{ 31.3 28.5 18.4	-----
Do.....	VK2SM.....			
Do.....	VK2UE.....	1,025	293	50
Do.....	VK2UW.....	1,125	267	100
Toowoomba.....	VK4GR.....	1,000	300	50
Townsville.....	VK4TO.....	1,170	256	200
Trafalgar.....	VK3TR.....	1,260	234	50
Wangaratta.....	VK3WR.....	1,260	238	50
Wollongong.....	VK2WL.....	1,435	209	50
FIJI				
Suva.....	VPD.....	14,420	20.8	-----
NEW ZEALAND				
Auckland.....	ZL1YA.....	910	329	500
Do.....	ZL1ZB.....	1,090	275	18
Do.....	ZL1ZJ.....	1,320	227	26
Do.....	ZL1ZQ.....	1,190	252	13
Do.....	ZL1ZR.....	1,090	275	40
Christchurch.....	ZL3YA.....	980	306	500
Do.....	ZL3ZC.....	{ 1,200 6,000	{ 250 50	{ 250
Dannevirke.....	ZL2ZU.....	1,100	273	7.5
Dunedin.....	ZL4YA.....	640	461	500
Do.....	ZL4ZB.....	1,060	279	20
Do.....	ZL4ZL.....	1,220	246	180
Do.....	ZL4ZM.....	1,060	278	45
Do.....	ZL4ZO.....	1,060	278	30
Ekatehuana.....	ZL2ZE.....	1,210	248	5
Gisborne.....	ZL2ZJ.....	1,150	260	20
Do.....	ZL2ZM.....	1,147	261	110
Greymouth.....	ZL3ZR.....	820	366	20
Hamilton.....	ZL1ZH.....	630	476	50
Hastings.....	ZL2ZI.....	1,330	226	15
Do.....	ZL2ZL.....	1,330	226	15
Invercargill.....	ZL4ZI.....	1,160	259	8
Manurewa.....	ZL1ZM.....	1,210	248	10
Masterton.....	ZL2ZD.....	1,180	254	2.5
Napier.....	ZL2ZH.....	1,260	238	15
New Plymouth.....	ZL2YB.....	1,230	244	100
North Invercargill.....	ZL4ZP.....	1,160	259	16
Palmerston North.....	ZL2ZF.....	1,050	286	150
Do.....	ZL2ZO.....	1,120	268	10
Wairoa.....	ZL2ZP.....	820	366	4
Wanganui.....	ZL2ZK.....	600	500	120
Wellington.....	ZLW.....	10,990	27.3	-----
Do.....	ZL2XX.....	4,776	62.8	-----
Do.....	ZL2YA.....	720	416	5,000
Do.....	ZL2ZR.....	600	500	150
Do.....	ZL2ZW.....	1,280	234	40
Do.....		1,120	268	40
SAMOA				
Apia.....	ZL5ZA.....	940	319	5

AFRICA

ALGERIA				
Algiers.....		824	364	2,400
Do.....	F8KR.....	6,667	45	200
CANARY ISLANDS				
Las Palmas.....	EAR5.....	1,071	290	500
Teneriffe.....	EAR58.....	7,211	41.6	500
EGYPT				
Cairo.....	SUS.....	9,110	32.8	-----
Do.....		710	422	500
Do.....		780	280	300

FOREIGN RADIO BROADCASTING STATIONS—Continued

AFRICA—Continued

Location, city, province, (suburb)	Call	Frequency in kilocycles	Wave length in meters	Power in watts
EGYPT—continued				
Alexandria.....		780	250	200
Do.....		1,060	280	500
Port Said.....		1,060	280	500
KENYA				
Nairobi.....	VQ7LO.....	750 6,000 6,134 9,616	400 50 48.9 31.2	1,000
MADAGASCAR				
Tananarive.....		5,552	54	500
MOROCCO				
Casablanca.....	AIN.....	5,879	51	
Do.....	CNO.....	963	305	25
Do.....	F8MC.....	6,875 10,710	43.6 28	
Rabat.....		774 6,877	416 43.6	2,000
Do.....		12,830	23.4	6,000
Do.....		9,300	32.2	6
TUNISIA				
Tunis.....	TUA.....	1,275	235	500
UNION OF SOUTH AFRICA				
Bloemfontaine.....	ZTB.....	688	510	750
Cape Town.....	ZTC.....	810	370	1,000
Durban.....	ZTD.....	731	410	1,000
Johannesburg (Maraisburg).....	ZTJ.....	667	450	15,000
Pretoria.....	ZTP.....	6,068 1,000	49.6 300	5,000 50

RADIO MARKETS BY COUNTRIES

NOTE.—The languages given are those in which broadcasting is done, or in the absence of local broadcasting, the language in which broadcasting should be most successful. This is not necessarily the commercial language or the mother tongue of the country. This statement is deemed important in view of the fact that a certain amount of confusion has arisen in the past where differentiation has not been made.

Acknowledgments naming certain officers of the Departments of State and Commerce indicate that complete special reports revising data for this publication have been submitted. It is impossible to similarly recognize all officers and publications whose reports and contents have contributed to revisions contained herein, because of the large number of such reports and articles reviewed for each country. A general acknowledgment is therefore due here to all foreign offices of the Bureau of Foreign and Domestic Commerce, and of the Consular Service of the State Department, practically all of which have transmitted information in their more general reports.

NORTH AMERICA

BAHAMAS

Language, English ; area, 4,404 square miles ; population, 54,836

The development of radio in the Bahamas is steadily increasing. The climate is poor for reception, being warm and damp, with hot summers and cool winters. From October to April conditions are said to be good, but during the remainder of the year there is considerable trouble from atmospherics.

Broadcasting is prohibited. Receiving licenses are issued upon payment of a fee of 5 shillings, required annually. No other restrictions are imposed. Some 350 receiving sets are in use, 4, 5, and 6 tube battery sets predominating, though an increasing number of socket power sets are used. Nassau, with 16,000 population, has the majority of these. Most of the sets are of American origin, though some British sets have been installed. One American 6-tube set is reported to regularly receive stations as far west as Chicago, being powered by storage battery and B eliminator.

Only Nassau has central-station electric service, which is 110 volts, 60-cycle alternating current. Because of the climatic difficulties, short-wave sets and adapters are increasing in popularity, though it is reported that reception of short-wave broadcasts from Europe is not entirely satisfactory.

BARBADOS

Language, English ; area, 166 square miles ; population, 198,336

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 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.

The law governing radio was adopted on December 3, 1925, placing the controlling authority with the governor-in-executive-committee. Licenses are required for broadcasting, receiving, and importing, with a penalty of not exceeding £100 for violations. No broad-

casting stations are operating in Barbados, the nearest ones being in the United States, Cuba, Haiti, Dominican Republic, and Puerto 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-volt, 50-cycle alternating current. Some short-wave sets are in operation.

BERMUDAS

Language, English; area, 19 square miles; population, 21,987

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. About one-third of the population is white. 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. Receiving sets are said to number 750. Most of these were purchased from American sources and are of the better quality. The cheaper sets do not meet the requirements of conditions existing in Bermuda. Few alternating current or short-wave sets have been installed. Where central-station electric service is available, 100-volt, 60-cycle alternating current is provided.

CANADA

Language, English; area, 3,684,723 square miles; population, 9,796,800

Only a few countries of the world precede Canada for progress in radio development, 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.

Canada has warm summers, winters being cool in the southern areas and cold through the north. Radio reception is good at all times of the year throughout all Provinces, only slight static interference being encountered from heat during the summer. The use of receiving sets is restricted only by the assessment of an annual license fee of \$2, increased early in 1932 from \$1.

Since the inception of broadcasting, Canadian radio has been operated under a strictly competitive system. Now a new system has been proposed. Under this system there would be a nationally operated chain of high-powered stations, supplemented by inde-

pendent locals. The national chain would carry advertising, the messages to consume no more than 5 per cent of the feature period, and the independent locals would operate as before. The administration of radio laws is vested in the Department of Marine and Fisheries, at Ottawa.

Estimates of illegally operated sets are usually fixed at 20 per cent. Nearly 600,000 licenses were issued during the fiscal year 1931-32, only one-fourth of them being renewed during the first two months (April and May) of the new year. Alternating-current sets are popular, and short-wave sets are becoming numerous, especially in the more isolated districts of the north. Central-station electric service is usually 110-volt, 60-cycle 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 and by the growth of a considerable independent industry. This overcomes the difficulty arising from the high duty on radio apparatus and the sales tax on imported goods required by Canadian law. This tendency has been apparent in recent years in the trend of American radio exports to Canada. That country, nevertheless, remains the best market for American radio apparatus.

Because of the tendency that has become particularly apparent since 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. (See p. 24 for details regarding the control of patents and royalty fees required in Canada.)

The Government-controlled Canadian National Railways have developed the use of radio on trains to the extreme. Broadcasting stations throughout the railway's service area are operated as a chain to provide programs primarily for reception on the various trans-continental trains. This development is the subject of considerable interest from an engineering point of view and is the most intensive example of such use of radio in the world.

COSTA RICA

Language, Spanish; area, 23,005 square miles; population, 471,521

Costa Rica has shown an increase in radio facilities during the past year that is little less than phenomenal. The number of broadcasters increased from two to eight.

Agriculture is the principal industry in the Republic. The most important 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, but is impossible during the summer months.

It is estimated that about 1,000 sets are in use, all except 15 or 20 being American. Crystal sets are very few in number, and about

75 per cent are of socket-power types. Importations are now almost totally of socket-power sets. Local assembly is the rule in the case of approximately half the importations. Central-station service is preponderantly 110-volt, 60-cycle alternating current, but there is some variation in regard to many of the smaller plants.

CUBA

Language, Spanish; area, 44,164 square miles; population, 3,418,033

Cuba, the largest island of the West Indies, has much the greatest degree of radio development, broadcast reception having proved especially popular with Cubans. Although at no time has there been any spectacular development, a steady advance has been maintained, and recent price reductions and set improvements have done much to maintain demand in recent months. Further increase in the future is clearly indicated by the steady promotion of radio that has maintained in the past. The principal cities of the island are Habana, Camaguey, Cienfuegos, Santiago, and Matanzas. The three topographical regions are the eastern mountain, the central plain and the western hill areas. 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 the number of families having any surplus for luxuries is very few. 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, and reception is marred by static at all times.

Permits are required for broadcasting. Receiving is allowed without restriction.

Broadcasting stations throughout the island number 60, about half the total being in Habana. Stations in the United States are received regularly, as well as those in Puerto Rico, Haiti, and other Caribbean countries. The reception of distant stations is popular, and highly selective sets are preferred. Since Cuban stations cover the entire dial, international reception is somewhat hampered, while climatic conditions prevent such reception except in winter; for this reason the operating channels of six frequently received American stations have been protected in Cuban allocations. This is the only known case of internal assignment of channels to any specific foreign stations.

No recent estimate of the sets in use has been made, but earlier progress warrants a supposition that this figure may be in the neighborhood of 75,000.

Most of the sets in use are of American origin, while a number have been constructed locally from American parts. A number of Dutch sets are also sold at low prices. Alternating-current sets have proved popular among the classes able to afford the investment and are now sold almost to the complete exclusion of battery sets. The current supplied by central stations varies widely, with 110-volt, 60-cycle alternating current slowly taking predominance. There is also considerable 220-volt, 60-cycle alternating current. Both these voltages are used in Habana. Short-wave reception is also popular, but among a much smaller class.

DOMINICAN REPUBLIC

Language, Spanish; area, 19,325 square miles; population, 897,405

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 Puerto Rico.

The Republic occupies the eastern half of 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 in summer and winter. Radio reception is fair from October to March, but very poor the rest of the year.

No radio regulations have been reported. There are two broadcasting stations at Santo Domingo. Stations at Port au Prince, Haiti, San Juan, Puerto Rico, and in Cuba and the United States are received. Estimates place the number of receiving sets in use at 1,500, mostly of American manufacture. Short-wave sets have proved particularly popular, and some alternating-current sets are in use. The largest cities have central-station service of 110 volts, 60 cycles.

FRENCH WEST INDIES

Language, French; area, 1,073 square miles; population, 474,268

Radio equipment in the French West Indies (Guadeloupe, Martinique, etc.) is practically nonexistent. 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 10 francs annually. There is no broadcasting, programs from stations in various Caribbean countries being received with more or less success. About 250 receiving sets are in use, 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 radio stations in Paris. The lighting current in Fort de France and Lamentin is 110 volts direct, but it is not well maintained in either place.

GREENLAND

Language, Danish; area, 46,740 square miles; population, 14,355

Very little is known about radio in Greenland. 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 probably are able to serve this purpose equally well. All sales would be through Danish houses.

GUATEMALA

Language, Spanish; area, 42,353 square miles; population, 2,119,165

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. 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 through 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; during the remainder of the year results are poor.

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

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, with varying frequencies in alternating current. Short-wave sets have been introduced quite successfully.

HAITI

Language, French; area, 10,204 square miles; population, 2,300,200

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 purchase radio equipment. The Government encourages radio reception, but the market remains somewhat unresponsive.

One-tenth of the population is white. 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, Puerto Rico, Cuba, and the southeastern part of the United States are received. It is estimated that 400 receiving sets are in use, but a greater number is not improbable. Almost all are of American manufacture. 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. A combination short and long wave receiver is the most popular type. Short-wave reception is commonly demanded, and short-wave adapters are sold.

HONDURAS

Language, Spanish; area, 46,332 square miles; population, 773,408

Honduras does not have any great radio development, although broadcasting is popular among a small class of the people. The principal cities are Tegucigalpa, Comayagua, and La Esperanza. The country consists of a broad central plateau with wide coastal plains. The climate of the coast is hot, but the plateaus are cool. Rainfall is abundant. Static is bad most of the year, reception being possible only during the wet season, from September to March. No radio regulations have been adopted. A short-wave broadcasting station was opened in Tegucigalpa in 1929, followed by a middle-wave station at San Pedro Sula. Stations in Salvador, Guatemala, and Costa Rica are received with fair success, with intermittent reception from Panaman, Mexican, Cuban, and United States stations. Nearly all of the 250 sets in use are of United States manufacture. The use of alternating-current and of short-wave sets has not been reported. Lighting current is usually 110 volts, 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; area, 4,450 square miles; population, 858,188

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. Approximately 15,000 of the population 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. 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 350 receiving sets are in use, according to a recent report. These are about evenly divided between British and American manufacture. Short-wave sets have practically displaced all others because of static conditions. The best service is obtained from 3, 5, and 7 tube models. 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 in various parts of the island.

MEXICO

Language, Spanish; area, 760,200 square miles; population, 14,308,753

Radio in Mexico enjoys an increasing popularity, and development, which had always been steady, has shown a notable recent increase. The climate and other conditions do not interfere with good reception sufficiently to discourage 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. Mexico City, Guadalajara, and Puebla are among the principal cities. The interior is mainly a high table-land broken by mountains, while 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 are granted only to Mexican citizens. 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. Registration of receiving sets is required.

There has been a considerable development of broadcasting facilities in Mexico, especially during the past year. Besides a generally increased internal broadcasting system, high-power stations near the United States border have appeared. Two such are operating, and a third under construction. Mexican broadcasters total 50. Stations in all parts of North America are received in various parts of the Republic.

The number of receiving sets in use was estimated at from 50,000 to 100,000 some years ago. A much larger figure appears to be warranted at the present time. More than 90 per cent are of American origin. Several other countries are represented, and there is a small but growing radio-manufacturing industry in Mexico.

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

When installment sales are contemplated it is well to investigate the Mexican law.³ Suspension of title transfer until payments are completed is not legal, nor are chattel mortgages.

MIQUELON AND ST. PIERRE

Language, French; area, 93 square miles; population, 3,918

The development of radio in Miquelon and St. Pierre has been slow, since there is no broadcasting in French available except 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 10-franc annual license fee is collected from the owner of each receiving set. About 100 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.

³ Vide: The Journal of Radio Law, vol. 1, No. 2, July, 1931, The Mexican Broadcasting Situation, by Arthur W. Scharfeld. Chicago, Northwestern University Press.

NETHERLAND WEST INDIES

Language, Dutch; area, 403 square miles; population, 58,931

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 programs in the broadcast band in the Dutch language. The weather is hot throughout the year, and radio reception is 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. 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 Sea and Gulf of Mexico can be received occasionally during the best seasons. There are no restrictions upon receivers. Some 50 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; area, 165,000 square miles; population, 267,330

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 market is small but active. The principal city is St. Johns, in Newfoundland. The surface is generally flat; the summers are cool and the winters long and cold. Reception is good only during the winter, because of interference from the aurora borealis.

There are six broadcasting stations in Newfoundland, while stations in Canada, the United States, and Europe are easily received. There are some 2,500 receivers in Newfoundland and 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 at 110-volt, 60-cycle alternating current. There is no electric service in Labrador. Short-wave reception (up to 50 meters) has been found good at most times. It should grow in popularity.

NICARAGUA

Language, Spanish; area, 49,200 square miles; population, 638,119

The climate of Nicaragua is generally poor for radio, and static is very bad. The principal cities are Bluefields, Corinto, and Managua. The eastern section is a table-land, the remainder of the country being mountainous. 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 during the dry season.

Receiving licenses are necessary, but there are no other special requirements. The country has no broadcasting stations, depending on San Jose, Guatemala City, and San Salvador for programs. A contract for the provision of broadcasting within the Republic was negotiated, but as it carried a monopoly on the importation and sale of radio equipment, which violated the national constitution, it was later canceled. Receivers number 100. There does not appear to be any alternating-current or short-wave sets in use. Most central stations provide service at 110-volt, 60-cycle alternating current, but there are some important variations.

PANAMA

Language, Spanish; area, 33,667 square miles; population, 442,522

The following is a report of American Commercial Attaché R. A. Martin, Panama City, submitted under date of January 29, 1932:

There are approximately 600 radio receiving sets of all types in the Republic of Panama, and these include some 400 in the Canal Zone. All of these are private sets and have nothing to do with either the United States Army or Navy.

According to treaties with the Republic of Panama the control of all radio communication is placed in the hands of the United States Navy. The treaty also prohibits the use of transmitting sets by individuals. However, the Navy has allowed the operation of three commercial transmitters in the Republic of Panama, and their traffic is limited to station-to-station traffic, and they are not permitted to handle any shore-to-ship or ship-to-shore traffic, which traffic is handled exclusively by the United States Navy radio stations. Consequently, there are no regular broadcasting stations in the Republic. Occasionally one of the naval stations broadcasts special programs.

Permits are required both by the Republic of Panama and the Canal Zone for the operation of receiving sets. The installation must be inspected by the electrical division, and no obsolete regenerative sets are allowed within a radius of 2 miles of any Army or Navy station. The inspection of the radio installation is similar to that required by the Board of Fire Underwriters in the United States.

Short-wave communication is possible in the Republic and the Canal Zone throughout the entire year, but the reception is much better in the dry season—January, February, and March. Long-wave reception, namely, the so-called broadcast band in the United States, is best during the dry season and is very poor during the rainy season on the Pacific coast, where the static is much more severe than on the Atlantic coast. This condition prevails throughout the entire year. During the dry season long-wave reception is very satisfactory; programs are received from practically all of the larger broadcasting stations in the United States, Mexico, Canada, and the Republics of Central America and the West Indies. Long-wave reception from the south includes all of the South American Republics which have broadcasting stations using a power of at least 500 watts. Very little interference is experienced on any of these programs.

There are still many battery receiving sets in use in Panama and the Canal Zone, but these are rapidly being replaced by the newer types of electrical sets. The use of short-wave adapters and short-wave converters is quite universal, but the more zealous radio fans have purchased receivers which are capable of receiving both long and short wave broadcasts. This class of radio fans, of course, is the best prospect for the sale of modern up-to-date all-wave receivers.

The influence of technical magazines on the recent purchases of modern equipment is great. While there are only a few news agencies which handle radio magazines, the supply is usually exhausted a very few days after they are placed on sale. Many fans rely entirely on information obtained in these magazines for their future purchases. Many subscribe to the weekly and monthly radio publications of the United States.

Very nearly all of the standard-set manufacturers are represented either in Panama or in the Canal Zone. However, there are no intensive sale campaigns. Usually a new set is sold as a result of the new buyer having listened to programs over a receiving set of a friend.

There is one unfortunate feature in the Republic of Panama and in the Canal Zone which governs the kind of receiving sets purchased and that is the difference of the frequencies in Panama and in the Canal Zone. With the exception of one city, all of the commercial lighting current is 110 volts, 60 cycles, the exception being one city which employs 110 volts, 50 cycles. The current in the entire Canal Zone is 110 volts, 25 cycles. These differences, of course, call for two entirely different receivers as far as the power side is concerned.

Dampness and insects are the chief enemies of all receivers in this locality, and consequently, any receiver not protected lasts but a few months without extensive repairs. The insect problem has never been solved for any equipment in this locality and can be partially ignored in the design of radio cabinets. Experience has shown that mahogany resists the attacks of termites better than any wood known.

Receiving sets, to give the best satisfaction in Panama and the Canal Zone, should include the following specifications: An all-wave set without plug-in coils; the resistors, choke coils, and transformers should be impregnated to resist moisture. The best compound for this is the combination of beeswax and resin. Of course, all air should be excluded during the process of impregnation. The set should be of a high-frequency type and should be protected against corrosion. All screws, nuts, and bolts should be made either of brass, bronze, or some other similar corrosive-resisting material. Platings of all types last but a few months in this locality and should not be used.

There is undoubtedly a good market in Panama and the Canal Zone for modern, up-to-date sets described as above. Nearly all of the present set owners are potential purchasers of new equipment. Unfortunately, the servicing side of radio in this locality is very poor and it is nearly impossible to have a set repaired once it has broken down. In Panama there are but two houses rendering complete service and but one on the Atlantic side. The equipment of these houses for servicing is antiquated and does not include oscillators or provision for testing the newer tubes.

SALVADOR

Language, Spanish; area, 7,225 square miles; population, 1,610,000

(Data revised by Consul A. E. Carleton, San Salvador)

Salvador has a comparatively high degree of radio development, 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, though recent deductions in prices have stimulated the market to a considerable extent. 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 during this period and reception on broadcast waves is possible only between November and March.

Broadcasting is a monopoly of the Government. Receiving is limited 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. It is reported that the licensing regulation is not enforced. 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 1,000. Nearly all are American, current imports being about 98 per cent from this source. Alternating-current receivers are now standard, battery and direct-current sets being no longer in great demand. Lighting service is mostly 110-volt, 60-cycle, alternating current. Popularity has swung to short waves, since reception on this band is much better than on broadcast waves; it is estimated that some 100 such sets are now in use.

TRINIDAD AND TOBAGO

Language, English; area, 1,976 square miles; population, 381,753

There is no great degree of radio development in the British islands of Trinidad and Tobago as compared with other English-speaking countries, since they are situated in a part of the Caribbean subject to extreme static and at a distance from broadcasting stations using the English language.

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.

License fees are charged, varying according to the number of tubes in the receiver, from 10 shillings to £1 annually. No other regulations are in force.

The only satisfactory reception is from Caracas, Venezuela, with some programs coming from Cuba, Puerto Rico, Haiti, and the United States. Some 100 receiving installations have been made. Locally assembled sets of British parts are most numerous. Alternating-current sets have not yet been introduced, except in possible

isolated instances. Short-wave programs are received, but not many people have the proper equipment. A small market for short-wave apparatus, particularly adapters, might be developed. The use of long-wave sets has been practically abandoned. Where central-station service is available, the current is alternating, 110 volts, 60 cycles.

SOUTH AMERICA

ARGENTINA

Language, Spanish; area, 1,153,418 square miles; population, 10,904,022

Argentina leads all South American countries in radio development. 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 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. Buenos Aires is the principal city; Rosario and Cordoba have populations in excess of 100,000, and there are several other important municipalities.

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 through the year, especially from April to September.

Radio is controlled by the Government through the Minister of Marine and the Minister of the Interior. Broadcasting is permitted freely, permits costing only a 1-peso stamp tax on the application. Advertising is employed for revenue. Receiving sets are not under any special restrictions. There are no exceptional restrictions on importing, manufacturing, or merchandising.

There are 39 broadcasting stations in the Republic, about half of them being in and near Buenos Aires. Additional service is provided by stations in Uruguay and Brazil to the northeast and Chile to the west. Small areas receive Bolivian and Paraguayan stations.

The true estimate of the number of sets in use is difficult to obtain, those from the more reliable sources ranging from 400,000 to 1,000,000. American sets are the most popular and are in the majority, but many Argentine, British, and German sets are also in use. Argentinians insist upon late-model receivers. The demand is for approximately the same types of sets as are most used in the United States. The use of short-wave reception has shown advancement.

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.

BOLIVIA

Language, Spanish; area, 506,467 square miles; population, 2,952,139

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 principal cities are La Paz, Cochabamba, Potosi, Sucre, 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 Director General of the Ministry of Communications. Licenses are granted, without monopoly, for only 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.

There is one broadcasting station, in La Paz. Some reception from Chilean and Peruvian stations is accomplished. But 100 to 250 receiving sets are in use in Bolivia, 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 cycles alternating current are found in various combinations.

BRAZIL

Language, Portuguese; area, 3,285,319 square miles; population, 39,163,855

Brazil, because of its size and extent of its coast line, variety of economic activities, and distribution of population, will undoubtedly experience great development of radio facilities 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 the concentration of wealth restricts the number of set owners considerably. Broadcasting facilities have developed slowly, this perhaps being the most important factor which has heretofore retarded the growth of the market. Rio de Janeiro, Sao Paulo, Pernambuco, Bahia, and Para, all seaports, are the principal cities.

The radio region of Brazil includes only the 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, and there is a prevalence of atmospherics almost always in an annoying degree. 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 should be protected against this condition, especially the metal parts and transformers. The use of

brass and bronze in preference to aluminum and nickel is highly desirable. 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 (\$2.40 in United States currency). No annual charge is made. Sets are subject to Government inspection.

Brazil has 21 broadcasting stations scattered along the coast from the mouth of the Amazon to the Uruguayan border, the bulk of them being in the south. Two of these are short-wave transmitters. The southern area also receives Uruguayan and Argentine stations. A recent estimate places the number of receiving sets at from 150,000 to 175,000, mostly crystal, approximately 4,000 of which are registered. American sets are in the majority and greatly outsell European products, though German, French, British, and Italian sets are popular in certain sections settled by immigrants of those nationalities. Current of 110, 120, and 220 volts, both alternating and direct, 50 and 60 cycle frequency, is supplied in various combinations. Rio de Janeiro has 110-volt, 50-cycle alternating current for lighting. Short-wave receivers are becoming popular, and it is possible that they will prove more popular than long-wave sets.

BRITISH GUIANA

Language, English; area, 89,480 square miles; population, 299,839

Radio has had little development in British Guiana. Less than 100 receiving sets are in use, mostly British. A short-wave broadcasting station was opened in May, 1929, but there is no indication that the market for radio sets has been greatly stimulated by it. All seasons are hot and static is 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-volt, 60-cycle alternating current.

CHILE

Language, Spanish; area, 281,820 square miles; population, 4,364,395

Chile is one of the foremost countries of South America in radio development, but because of the concentration of wealth, promotion has been slow. Particularly in Santiago there is a great amount of cross interference between broadcasting stations, and throughout the more heavily populated regions 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 extreme width of less than 120 miles and a length of 2,800 miles. Practically all of the population lives 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 greatly.

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, but no tax or fee is assessed. Twenty-seven broadcasting stations are operating in Chile, all being in the twin cities of Santiago and Valparaiso. 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 35,000, about 90 per cent being of American origin and the remainder mostly British and German. Several alternating-current sets have been placed in service and appear to be satisfactory, but they are useful only in the cities. Many important markets still require battery sets. Lighting current is usually supplied at 110 volts, 60 cycles, or 220 volts, 50 cycles, alternating. Short-wave reception is not popular among Chileans, though several foreigners have this equipment.

COLOMBIA

Language, Spanish; area, 482,400 square miles; population, 8,000,000

(Data revised by Acting Commercial Attaché H. P. McGowan, Bogota)

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 bad most of the year in all sections.

Colombia has 12 broadcasting stations, opened since 1929, several being short-wave. It has been estimated that between 8,000 and 12,000 receiving sets are in use in Colombia, mostly of American origin. Alternating-current sets are used in growing numbers. Lighting service varies considerably between cities. There is no prevailing combination. Bogota has 150-volt, 60-cycle alternating current. Colombia presents a limited market for radio receivers. Among the reasons why radio has not been more popular might be mentioned the high delivered cost of sets and climatic obstacles to good reception. Only about 10 per cent of the people have buying power sufficient to purchase imported luxuries.

ECUADOR

Language, Spanish; area, 118,627 square miles; population, 1,500,000

Ecuador has in the past shown little progress in radio. However, there has recently been a general improvement, and the number of sets is increasing. Most of the population is of Indian or Negro blood. The principal cities are Guayaquil, Quito, Cuenca. The entire country is mountainous. The climate is poor for radio, the country being crossed by the Equator. Reception is best from June to September.

Only members of established radio clubs are permitted to own receivers or to broadcast, though it does not appear that the stations in Quito and El Prado are so controlled. Some 250 receiving sets are in use, largely American, with some British and German sets.

Short-wave reception has met with some success, only short-wave sets at present being sold. There do not appear to be any alternating-current receivers in use. Central-station service is mostly 110-volt, 60-cycle alternating current, but 120 volts is also common, as are frequencies of 40 and 50 cycles.

FALKLAND ISLANDS

Language, English; area, 4,618 square miles; population, 3,510

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. From 15 to 25 receiving sets are in service, all being of British origin. There is no broadcasting in the islands, and South American stations are received only with difficulty.

FRENCH GUIANA

Language, French; area, 32,000 square miles; population, 44,202

Not more than 25 sets are in use in French Guiana, all of French manufacture. 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; area, 172,000 square miles; population, 791,469

Interest in broadcast reception in Paraguay has not been great. While there are several factors apparently contributing to this condition, the experiences in other similar countries suggest that the principal and perhaps only retarding factor is the lack of sufficient native broadcasting. With the recent establishment of several small stations in Asuncion, a greater interest may be expected in the future.

The principal city of Paraguay 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 350 receiving sets have been installed. These were purchased through Argentine sources and are of varying origins. One broadcasting station has operated for more than three years in Asuncion, three others having recently opened. Several Argentine stations are received. No regulations have been adopted, since radio has been little known.

Central-station service is mostly 200-volt, 50-cycle 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; area, 533,916 square miles; population, 5,500,000

(Data revised by Commercial Attaché Merwin L. Bohan, Lima)

The Peruvian market for American radio apparatus has shown a steady increase since 1926, culminating in a radical expansion in 1931. In its early stages radio business was restricted, due to the establishment in 1925 of a monopoly of broadcasting and the sale of

radio supplies. Failure of the concession to pay, however, resulted in broadcasting becoming a Government monopoly and merchandising being opened to general trading. The market is, however, limited in total capacity to purchase.

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.

Estimates of the number of sets in use vary from 5,000 to 70,000, fees being collected in 1931 for 1,000. Most estimates approximate 25,000. Most sets are American, some Dutch and German being sold. British, Swedish, and Dutch tubes and sets are also being marketed. There are three broadcasting stations, two being in Lima. During the summer months (December to March) stations in the United States, and from June to September, from Argentina, can be received with fair success. Present sales are almost exclusively socket-power types, particularly midget models. Central stations provide 110-volt, 60-cycle alternating current at Lima, but elsewhere both voltage and frequency vary. Short-wave sets are popular, particularly those with changeable coils to work both short and long waves. Short-wave reception of European stations is especially popular.

SURINAM

Language, Dutch; area, 54,291 square miles; population, 142,896

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 is probably about 25, 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; area, 72,153 square miles; population, 1,762,451

Uruguay has displayed exceptional interest in radio. 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.

The surface of Uruguay 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 50,000 receiving sets are estimated to be in use. American sets are most popular and in the greatest number, but a number of British and German sets are also in service.

There are 28 broadcasting stations in Uruguay, nearly all 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 popular. Central-station service is generally at 220-volt, 50-cycle alternating current and 220-volt direct current.

VENEZUELA

Language, Spanish ; area, 393,976 square miles ; population, 3,026,818

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 principal cities are 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, which at one time granted a monopoly giving the concessionaire the sole right to broadcast and to manufacture, import, and sell radio apparatus, but this was recently revoked. At present it is necessary to secure a permit from the Ministry of Interior prior to placing the order for each importation. It is understood that these permits are freely granted. Receiving licenses cost 5 bolivars per month, the proceeds going for the support of broadcasting. From 9,000 to 10,000 receiving sets have been installed. Nearly all are of American origin, though British and Dutch sets are also to be found. No detailed data as to types of sets in use are available.

Four broadcasting stations are now operating, three on short waves. Short-wave reception has interested an appreciable part of the listeners. It is thought that alternating-current receivers will be preferred to battery types by future purchasers. Central-station service in Caracas is 190-volt, 25 and 50 cycle alternating current. Elsewhere 110-volt, 60-cycle alternating current is general.

EUROPE

During 1931 American radio equipment reached new heights of popularity throughout Europe, partly because of the special efforts of American manufacturers and exporters, but particularly because of the attention to special requirements of the markets and the comparison of price and quality. There was also evidence of considerable success based on prompt, thorough fulfillment of guaranties without charge to purchasers.

The year, however, brought forth frantic efforts on the part of European manufacturers to conserve the market from this invasion. Every expedient—except direct competition, which has failed—has been brought to bear. Quota imposition on imports, prorated according to the experience of years when American goods were not so well known, has been utilized in several countries. Patent claims are being most aggressively prosecuted, though reluctance of patent

holders to have cases actually tried in courts in some countries has been noted by some observers. Since the legal aspects of all such cases have apparently been carefully studied, it is not probable that the campaign can be so well combated on legal grounds. Efforts leading to a revision of quota bases, or the failure of European manufacturers to improve quality—and to sell quality at prices comparable to those of American equipment—may result in a popular demand for revision of quotas on a 1931 basis to meet present conditions.

There is also effective in some countries a temporary prohibition against dealing in foreign exchange, as a means of discouraging importing. These measures are of an emergency character and therefore will be abrogated whenever general economic conditions in each such country become normal.

ALBANIA

Language, Albanian; area, 17,374 square miles; population, 831,877

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. A broadcasting station in Tirana has been reported. Yugoslavian and Italian stations are most easily received. Only 12 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; area, 32,369 square miles; population, 6,526,661

Austria, despite restrictions, has had a high degree of radio development, particularly during the past five years. 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.

The capital and largest city, Vienna, has 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 to the Oesterreichischer Radioverkehrs Aktiengesellschaft (Ravag), 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 broadcasting and receiving, importing, manufacturing, and merchandising. Persons holding a regular license may import radio equipment, but all others must secure a special

license for that purpose. Receiving licenses cost 2 schillings (\$0.28 in United States currency) per month, but if the licensee's annual income exceeds 8,400 schillings the fee is 6 schillings per month. Records of all sales must be kept; these 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.

The number of receivers licensed during 1931 was 450,272. Practically all are of Austrian manufacture. American receivers are practically excluded by patent restrictions. A number of Austrian manufacturers produce radio sets in conjunction with electrical appliances. Tubes are imported from the Netherlands and Germany in considerable quantities.

Austria has five stations, of which one is a short-wave transmitter. Stations outside Vienna pick up Vienna programs by means of underground cable connections. Programs from several neighboring countries are received, language making those from Germany particularly valuable.

The demand is almost exclusively for socket-power sets. Both 110 and 220 volt alternating current is general, 42 and 50 cycles predominating. Short-wave reception is common only to a few enthusiasts. There is little short-wave broadcasting in Europe, and the hours of American broadcasts are inconvenient. A number of crystal sets are sold. Sets selling at more than \$50 do not move readily.

Imports of radio apparatus into Austria are limited at the present time, and patent holders are active in maintaining their position.

AZORES

Language, Portuguese; area, 922 square miles; population, 242,613

Although the Azores are situated a great distance from broadcasting of any kind and have comparatively poor reception conditions, radio has proved popular, and a number of sets have been installed. The Azores, lying about 900 miles off the coast of Portugal, are politically part of the Portuguese Republic. 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 100. Many receivers 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 and Flemish; area, 11,752 square miles; population, 7,923,077

The demand for receiving sets in Belgium has been considerably increased during recent years. Sales have been restricted to families with incomes in the middle and upper classes. American portable and automobile sets are popular, though the market for the latter is not large.

Brussels, Antwerp, Liege, Ghent, and Mechlin are the principal cities. The climate is similar to that of England. The mean annual temperature is 50.6° F., the mean maximum being 57.2°, and the mean minimum 44°. 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. The annual license fee is 60 francs, or \$1.68, for a tube set, and 20 francs (\$0.56) for a crystal set.

The establishment of a nationalized broadcasting system was predicated through the statement, in 1931, of the principle that all communications are royal monopolies. However, as several private broadcasters were operating, a policy was adopted permitting the existing stations to continue, but prohibiting further additions and prohibiting the continued broadcasting of advertising. Developments arising from this situation are expected to result in new legislation.

Besides the 12 broadcasting stations in Belgium, those in the United Kingdom, France, Germany, the Netherlands, and other countries are received. Statistics indicate that 199,000 licensed installations were in service July 31, 1931, with an estimated 75,000 illegally operated.⁴ French, Belgian, British, and German sets predominate, but American sets are becoming popular. There is a considerable business in assembling sets from imported parts, some of which originate in the United States. There is a certain demand for alternating-current receivers, and short-wave sets and adapters are also popular. The most usual central-station service characteristics are 110, 130, and 220 volts, 50 cycles, alternating current, and 110 and 220 volts direct.

BULGARIA

Language, Bulgarian; area, 39,824 square miles; population, 5,596,800

Bulgaria has developed during the past year from a discouraging market to one of some proportions. Some 3,957 sets were licensed December 31, 1931. Most of these were European, though American sets enjoy a growing reputation.

All means of communication such as railways, telephones, telegraphs, and wireless stations are monopolies of the Government. Broadcasting is done by an organization of listeners, "Rodno Radio." The Government proposes to grant this organization half of the receipts from listeners' licenses and to erect a new, higher-powered station for its use.

The summers are hot and the winters cool. Radio reception is good throughout the year. Radio is administered by the Ministry

⁴ Of the licenses issued, 14,000 were for crystal sets.

of Posts and Railways. Receiving licenses costing 500 leva (\$3.60) for tube sets and 200 leva (\$1.44) for crystal sets per year for private homes are required. For other places the fee ranges up to 15,000 leva (\$110) per year. The penalty for operating a receiving set without a permit is solitary confinement for a period not exceeding one year and a fine of up to 5,000 leva, but it was estimated that on December 31, 1931, some 8,000 sets were in use, about half of which were licensed. Bulgaria has one broadcasting station, opened recently in Sofia. Reception from neighboring countries is easily accomplished, but language difficulties prevent it from being particularly desirable.

CZECHOSLOVAKIA

Language, Czech, German, and Slovak, and some Hungarian and Ruthenian; area, 54,195 square miles; population, 14,523,186

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. A program of installation of receiving sets in schools is being prosecuted. The climate is good for 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 last few years will continue for some time.

Czechoslovak patents are claimed by the Dutch and German Philips and Telefunken concerns, which have undertaken to debar all American goods from the market by withholding licenses, though European manufacturers are to be granted access. Customhouse seizures have been made, but there is no information that any court has rendered an opinion on the validity of the patents.

Radio broadcasting is under the Ministry of Posts and Telegraphs, which controls the company having the broadcasting concession. Theoretically individual concessions may be granted to other companies, but none has ever been favorably received. Broadcasting is supported by subscription collected from receiving-set owners. This subscription is 10 crowns (\$0.30 in United States currency) per month after the first month, for which no fee is assessed. Licenses are granted to Czechoslovak citizens and to the nationals of other countries which grant the same or greater privileges to Czechoslovak 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 500,000, 397,591 of which were licensed January 31, 1932. Crystal sets are efficient in most parts of the country and constitute a large proportion of the total in use. Domestic manufacturers supply most of the needs of the market, but some German makes are popular.

Six broadcasting stations are scattered through the country, while Austrian, German, Polish, Hungarian, and other stations are easily received. One of the two in Prague broadcasts on short waves.

Alternating-current receivers are becoming popular, as is equipment for short-wave reception. Both 110 and 200 volt lighting service is provided, mostly at 50 cycles.

DANZIG

Language, German; area, 754 square miles; population, 386,000

(Data revised by Consul C. Warwick Perkins, Danzig)

The Free City of Danzig has displayed a great interest in radio, and developments have been comparatively great. Danzig is situated on the Baltic between the Polish "corridor" and Prussia. Its climate is favorable to radio reception, being best from September to May, although there is considerable difficulty from ship-wireless interference.

Receiving is permitted under license. Some market for sets limited to 700 meters is thus created. A fee of 2½ gulden per month (about 49 cents in United States currency) is charged for licenses.

Broadcasting is a monopoly of the post-office department. A station is operating in Danzig, in conjunction with the German system. Stations in the Baltic States, Poland, Germany, and the Scandinavian countries are received. It is estimated that 20,000 receiving sets are in use, practically all German.

DENMARK

Language, Danish; area, 17,110 square miles; population, 3,434,555

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.

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 a state monopoly and is supported by the listeners through the medium of a 10-crown annual license fee and a subsidy amounting to approximately one-third of the license fee receipts in 1931. A surplus in excess of this subsidy, however, was realized. No restrictions, excepting the license requirements, have been imposed on the owners of receiving sets. Manufacturing, importing, and merchandising are permitted without restraint.

Four stations are recorded as operating in Denmark. One of these employs short waves. Additional service is obtained from Norwegian, Swedish, German, and British stations.

Receiving sets in use to the number of 476,214 have been licensed; about one-half of these are crystal sets. Domestic manufacturers supply most of the demand. British sets are also popular, and a

number of American sets are in use. Socket-power receivers are becoming increasingly popular, about 90 per cent of sales being of this type. Short-wave reception likewise is arousing considerable interest. Central-station service is mostly at 220-volt, 50-cycle alternating current.

ESTONIA

Language, Estonian; area, 18,355 square miles; population, 1,110,538

The development of radio in Estonia has been remarkable, considering the difficulties. 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. However, late in 1931 the importation of radio equipment became a Government monopoly.

Estonia is a flat country, bordered by Soviet 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 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. An annual fee of 9 Eestikrona (\$2.40 in United States currency) for crystal sets, 12 Eestikrona (\$3.20) for 1-tube and 2-tube sets, and 15 Eestikrona (\$4) for larger tube sets are assessed. The charge, however, is based on the antenna, and two or more sets on one antenna may be legally used under one license, provided the license covers the set which would pay the highest tax. Two broadcasting stations are operating in Tallinn, and one in Tartu, 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 seem to be in fair demand. The preponderance of central-station service is provided at 220-volt, 50-cycle alternating current.

Licensing statistics show that 13,440 receiving sets were in use in January, 1932. One-third were crystal sets. About 6,000 of these are tube sets, only 200 being of the socket-power type. Crystal sets account for approximately 8,500. There is no definite estimate covering illegally operated receivers. Consumption is estimated at about 2,000 sets annually. About 60 per cent of the demand now is for socket-power sets. Dutch, German, and British receivers dominate the market. Table models, with separate loud-speakers, are most in use. Very few short-wave sets have been installed.

FINLAND

Language, Finnish; area, 149,641 square miles; population, 3,582,406

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. The principal cities are Helsingfors (Helsinki), Abo (Turku), Tammerfors (Tampere), Viborg (Vipuri), Wasa (Waasa), Uleaborg (Oulu), Kuopio, and Bjorneborg (Pori). The name given in parenthesis 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° F. 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 seven stations scattered through the populous areas. Swedish, Soviet, and Baltic stations are also received satisfactorily. The reception of broadcasts from Soviet stations in restaurants and other public places has been prohibited because many of the talks so broadcast have been directed against the Finnish Government and administration.

A receiving license fee of 100 Finnish marks (\$2.50 in United States currency) per calendar year is required. Some 110,000 receiving sets were licensed in November, 1931. About 35 per cent comprise crystal sets. Germany supplies most of the market, with Dutch, Swedish, British, and American sets used in fairly large numbers. Finnish manufacturers produce little more than 1,000 sets annually. Alternating-current receivers are now demanded by urban purchasers, this demand now exceeding that for battery sets. All European programs are available on long waves, and the time that American short-wave programs are receivable begins at midnight or after. Short-wave reception has not made much progress. Lighting service at 220 volts, 50 cycles, is provided in most places, but some variation is noted. Helsingfors has 120-volt direct current.

FRANCE

Language, French; area, 212,659 square miles; population, 40,745,874

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 receivers, 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 serv-

ice, for the Government chain of stations has provided a foundation for the broadcasting system which serves the entire country.

The principal cities of France 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.

On January 16, 1932, an announcement appeared in the *Journal Officiel* dated January 7, to the effect that quotas had been placed upon the importation into France on radio sets and tubes, retroactive to January 1. This announcement came, so to speak, out of a clear sky. Quotas were apparently based upon 70 per cent of the average imports from the different countries for the years 1930 and 1931. The United States was allotted 16.6 metric tons per month for the first quarter of the year 1932, the Netherlands 79.2 tons, Germany 50 tons, United Kingdom 4.6 tons, and others, 3.7 tons. In percentages this gave Netherlands 51 per cent, Germany 33 per cent, United States 11 per cent, and United Kingdom 3 per cent.

During 1931 the average monthly imports showed Germany having 43 per cent, Netherlands 31 per cent, United States 19 per cent, and United Kingdom 3.3 per cent, but actually during the last three months of the year the United States was the leading supplier. Vigorous protests were presented, but without avail, at that time.

Quotas on tubes gave Netherlands 6 tons per month (40 per cent of the total allowed), Germany 2 tons (13 per cent), United States 1.7 tons (11 per cent), United Kingdom 3.4 tons (21 per cent), and others 1.9 tons (15 per cent).

Goods shipped up to and including January 27, 1932, were permitted to enter France, to be applied to the quotas set, and sets and tubes were sent in such numbers as to exhaust the American quotas for the first half year.

On March 31, 1932, the *Journal Officiel* announced quotas for the second quarter year. Previously the American quota on sets for the first quarter had been raised from 49.8 tons (16.6 per month) to 63 tons. But such a quantity of American sets had been admitted that only 20 tons were allotted for the second quarter to the United States. Then late in May negotiations were successfully concluded raising the American quota on sets from 63 to 75 tons for the third quarter year, about a 20 per cent increase. The quota on tubes was likewise raised from 5.1 to 7.35 tons, a 40 per cent advance. Again imports from the United States have been so heavy as to cut into the third quarter's quota, so that allotted imports will probably not amount to the 75 tons permitted.

Broadcasting is permitted to 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, most of the stations are owned by the Government, and rigid control is exercised over other stations. There are 31 stations well distributed over France, broadcasting on short waves, including five which use two or more waves. It is stated that foreign programs are preferred to the French. Various areas receive broadcasts from all parts of Europe.

Receiving-set owners are assessed 10 francs annually, the receipt serving as a license. 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 2,000,000 receivers to be in use. Domestic manufacturers supply nearly all of the demand, with British, German, Swiss, and American sets used in small numbers. French equipment is also exported in considerable quantities to Belgium, Spain, Great Britain, and Italy. South American markets are also receiving considerable attention.

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.

GERMANY

Language, German; area, 180,976 square miles; population, 62,348,782

Germany has a well-advanced development of radio. The broadcasting system sponsored by the Government includes stations in all parts of the Republic and is so organized and distributed as to form what is perhaps the best and most economical "single coverage" system in the world.

There are 45 cities in the Republic 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 Government, 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.

Under a program of reorganization of the broadcasting systems, relay stations are to be discontinued and main stations replaced with others of higher power. New high-powered stations are operating at Heilsburg, Breslau, Leipzig, and Stuttgart.

There are 31 broadcasting stations in Germany. Four short-wave stations are in operation, one using simultaneous long waves. Reception is satisfactorily accomplished from all parts of Europe, Germany being the geographical center of broadcasting on the 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 geographic distribution of broadcasting stations makes cheap sets quite satisfactory. Rigid control of patents by the Telefunken company is exercised.

Receiving licenses are granted freely to all applicants except Russians, Poles, and Slovaks. A fee of 24 marks (\$5.71 in United States currency) per year is enacted, 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. The Government retains 52 per cent of the receipts, the remainder going to the broadcasters. The unemployed are exempt from payment, which is on a month-by-month basis.

Receiving-set license statistics show some 3,980,852 authorized installations, while additional numbers, variously estimated, are operated without authority. Nearly all of the sets are of German origin, but American and British 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; area, 2 square miles; population, 18,061

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.

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 was estimated some time ago that about 150 receivers were 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; area, 49,022 square miles; population, 6,200,000

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

Greece has hot summers and cold winters; the rainfall is great in some sections. Radio reception is good only from November to February. Athens, Saloniki, Patras, and Corfu are the principal cities.

Broadcasting has been designated as a monopoly, but as no satisfactory arrangements have been consummated there is no broadcasting as yet, though it is expected that a station will be put into operation sometime in 1932. The station is to be Government owned, the

concessionaire to derive revenue from advertising. One hour daily is reserved for Government use. Reception is permitted, under certain restrictions, to Greek citizens, but is prohibited to foreigners. Licenses are required, for which 500 drachmas (\$6.50 in United States currency) must be contributed for the benefit of the navy.

Recent estimates indicate about 5,000 receivers to be in use, mostly in the neighborhood of Athens. Less than half of these are licensed. These are of various origin, particularly American, British, and German.

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

HUNGARY

Language, Magyar; area, 35,901 square miles; population, 8,868,273

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. Owing to the country's 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 principal cities are Budapest, Szeged, and Debrecen. 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 through a broadcasting corporation. Stations are supported by proceeds from license fees. Licenses for receiving are issued to all applicants and cost 2½ pengos (45 cents) per month 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.

Two of the three broadcasting stations operating are at Budapest. A contract has been let for a new high-powered station and for four relays, which should be in operation by the end of 1932. The commercial station at Szekesvehevar serves for short-wave exchange of programs internationally. Considerable dependence is placed on stations in neighboring countries.

Hungary has about 325,000 receivers in use, principally of German and Dutch origin. American sets are preferred, but are too costly when adapted to the high European wave band. 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. Socket-power sets have almost completely supplanted battery sets in sales.

ICELAND

Language, Icelandic; area, 39,709 square miles; population, 103,317

Radio has been popular in Iceland 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.

All but a very few of the inhabitants live in Reykjavik, the chief 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, both at Reykjavik. The number of receivers in use is estimated at about 3,500. These are largely of German manufacture. Alternating-current receivers have not yet been introduced. Short-wave reception is popular. Scandinavian and North American stations are also received.

IRISH FREE STATE

Language, Gaelic and English; area, 26,592 square miles; population, 2,972,802

Radio is very popular in the Irish Free State. Annual sales of receivers are now said to total about \$500,000. 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 principal cities of the Free State 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 of Dublin is 50° F., and the annual 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. A new station of 60,000 watts is projected for construction at Moydrum, Athlone, County Westmeath, in about the center of the Free State.

Licensed sets number 26,412. There has been no recent increase in numbers, but a gradual replacement of crystal sets accounts for much of the demand. British sets predominate, but large numbers of American and German receivers are used.

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

ITALY

Language, Italian; area, 119,744 square miles; population, 40,796,000

Italy has shown an increasing rate of broadcast development during the past few years. Formerly 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.

For the protection of a domestic industry, Italy has employed both restrictions and high tariffs, which effectively restrict imports of sets from the United States. Parts and incomplete units of sets are less rigidly barred, however. The tariff is based on weight, and the advantage, therefore, lies with the set of lightest construction. Cabinets for radio are assessed at the same rate as sets.

The principal cities are Milan (Milano), Naples (Napoli), Rome (Roma), Turin (Torino), Palermo, and Genoa (Genova). 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 Ente Italian per le audizione Radiofoniche (E. I. A. R.), 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. Listeners are required to pay 80 lire (about \$4.22) per annum for this service, but receivers employed for commercial purposes are assessed at varying rates, sometimes as high as 1,500 lire (\$80) per annum. The payment may be made annually or semiannually. The search of homes and other places for illegally operated sets is authorized. Advertising, rigidly limited to 40 minutes a day, is broadcast, usually in the form of brief announcements scattered through the program.

Italy has 12 broadcasting stations, including two short-wave transmitters, and a certain amount of broadcasting service from neighboring countries. The Government is discussing a proposal to install public receivers in some 500—and ultimately all—villages and outlying districts to make the national programs available to all residents. The beneficiaries would be asked, but not required, to contribute to a fund for the extension of this service.

No set may be installed unless approved by the Ministry of Communications. Samples of 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 500,000 sets are reported to be in service, for half of which license fees have been paid. A majority are of Italian manufacture, but many American, French, and German sets are in use. Alternating-current sets are being sold almost to the complete exclusion of battery sets. The voltage and frequency of stations vary considerably. Short-wave reception is popular to a certain degree, but because of the lack of short-wave broadcasts in the Italian language it has a limited field.

LATVIA

Language, Lettish; area, 40,856 square miles; population, 1,870,520

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 Government has adopted an attitude of general encouragement.

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. However, there is considerable interference along the coast from ship stations. The country is mainly a low plain.

The post and telegraph administration controls radiobroadcasting through a monopoly. Receiving subscriptions are assessed, from 1 (\$0.19) to 10 (\$1.93) lats per month, the fee for receivers in homes being 2 lats (\$0.38). The unemployed are allowed four months' grace, but others must pay for each month before its last day. The fee is reduced by 50 per cent for the months of June, July, and August. No fees are assessed against blind persons, disabled veterans, and educational institutions and asylums. A higher rate is assessed on sets to be used commercially. Regenerative sets are prohibited, and Government inspection of each installation is 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. A revised list of importable radio apparatus was issued December 9, 1931, including—

- Receiving sets of six tubes or more (exclusive of rectifiers).
- Public-address amplifiers (special permit required).
- Radio tubes, photoelectric cells, rectifier tubes, and safety bulbs.
- Audio transformers.
- High resistances, potentiometers (over 1,000 ohms), rheostats (over 1 ampere).
- Insulators.
- Crystals.
- Dials, buttons, clips, plugs, sockets, and cord tips.
- Television sets and parts (special permit required).

Under a quota arrangement, American equipment is effectively restricted in Latvia.

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

The number of sets licensed totals 41,910. About 70 per cent are crystal receivers. Domestic sets predominate. Alternating-current receivers have supplanted battery-type sets so far as the demand for new sets is concerned. Lighting-current supply is mostly 220 volts, 50 cycles.

LITHUANIA

Language, Lithuanian; area, 20,550 square miles; population, 2,011,173

(Data revised by Consul Hugh S. Fullerton, Kovno)

The development of radiobroadcast 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. Since the population is largely of foreign nationality, broadcasting in all neighboring countries has considerable value in Lithuania. The principal cities are Kovno and Memel. The country is an undulating plain. The climate is temperate and favorable to radio reception through the year, especially from September to May. Radio is administered by the post, telegraph, and telephone administration of the Ministry of Communications. Receiving licenses are issued through the postal system; the cost for sets in homes ranges from 12 lits (\$1.20) for crystal sets in rural areas to 60 lits (\$6) for tube sets in urban centers, and for commercial establishments, 120 to 900 lits (\$12 to \$90) per year. A 2-lit stamp tax is paid on the original application. Ten per cent of the collections is retained by the general government, 90 per cent being allocated to broadcasting. There is no monopoly, but private interests have not applied for permits to broadcast.

The charges for the registration and stamping of radio apparatus are:

	Lits		Lits
Tube receivers, per tube.....	5	Loud-speakers.....	10
Crystal sets.....	5	Block condenser.....	.50
Tubes.....	1	Variable condenser.....	3
Headsets.....	3	B batteries of less than 100 volts..	2

Importation and sale are also subject to license. All American equipment must bear post and telegraph administration stamps.

The only broadcasting station is at Kovno, owned by the postal administration and operated under lease by the Ministry of Education. Stations in Russia, Finland, Estonia, Latvia, Germany, and the Scandinavian countries are received.

On January 1, 1932, 11,526 sets were licensed, 4,249 of which were tube sets. An additional 12,000 sets, mostly German, are estimated to be operating without permit. There are a few American sets. 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 practice only of amateurs.

The Philips Co. of Holland, claiming disposition of basic radio patents in Lithuania, has threatened action, but Lithuanian dealers protest that the international agreement as to the disposal of these patents is invalid under Lithuanian law. It is understood, however, that the pentode tube patent held by Philips as owners thereof might be upheld by the courts.

LUXEMBURG

Language, German; area, 999 square miles; population, 285,524

The development of radio is fairly well advanced. There are some 2,000 receiving sets in operation. One broadcasting station in the city of Luxemburg is in service, and programs from all neighboring countries are received. A 200,000-watt station at Junglinster, 18 miles from Luxemburg, was scheduled for opening early in 1932, under a 35-year monopoly.

MADEIRA

Language, Portuguese; area, 314 square miles; population, 179,002

The climate in Madeira is very poor for reception, static difficulties being 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; area, 122 square miles; population, 212,528

Radio has attained a fair degree of popularity in this Mediterranean island. The chief city is Valetta. The surface is generally low and undulating. The summers are 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 licensed on September 31, 1931, numbered 386. 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; area, 13,205 square miles; population, 7,625,938

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. Although there is considerable interference from ship stations operating in code, satisfactory reception is easy to accomplish. 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. The principal cities are Amsterdam, The Hague, Rotterdam, and Utrecht. The surface is low and flat.

Postal authorities must be notified of the installation of a set, but no fees are collected. Broadcasting is supported mainly by voluntary subscriptions from listeners.

Seven broadcasting stations are operating in the Netherlands, two broadcasting on short waves. Programs from German, Belgian, French, and British stations are received regularly. Alternating-current receivers are rapidly supplanting battery sets.

Some 280,000 receiving sets have been reported. British, Netherlands, French, and German sets are used in about equal numbers.

The Dutch Philips Co., which controls the principal radio patents, has recently become very active in protecting its rights. Several suits were instituted against parties claimed to be infringing without license, and it is understood that the practice of licensing is to be discontinued. In this event the Dutch market will be strictly under monopoly, and further importation of sets and equipment made impossible. Lighting service is usually at 220-volt, 50-cycle alternating current. Short-wave reception is unusually popular.

In connection with the Philips activities, the following is quoted from a report of American Consul Egmont C. von Tresckow, at Rotterdam:

The full name of the Philips organization is the N. V. Philips Gloeilampenfabriek (Philips Incandescent Lamp Factory Incorporated) located at Eindhoven, Netherlands. It employs something like 10,000 hands at the plant at Eindhoven, about 2,000 hands in other factories in this country that are subsidiaries to Philips, and approximately 5,000 employees outside the Netherlands in branch factories. Production includes all sorts of radio sets and equipment, as well as lamp bulbs and sundry other items. Philips also constructs and erects radio stations.

This firm is the owner of about six so-called key patents, either Dutch or American, pertaining to the principles of radio circuits. It is said that it has been in possession of the patents for many years and has made use of the rights connected therewith only recently.

The Philips patent situation.—There are many thousands of radio manufacturers and assemblers in the Netherlands—principally assemblers making up sets of their own for retailing purposes from circuit diagrams—who are constantly in touch with Philips for parts or complete sets and who have had and still have the closest cooperation of Philips. Nearly all radio firms in the Netherlands sell for Philips, either as sales agents or distributors or buy outright. Until recently these firms have not had to pay for using or employing in their own sets the patented circuits.

Some time ago Messrs. Philips requested their customers to pay a certain amount for each set built incorporating circuits on which Philips held the patent or patents. This request met with stormy protests and led to court proceedings between Philips and the Netherlands Association of Radio Dealers. The proceedings reached a stage where all manufacturers and assemblers were obliged to pay Philips the 8 florins (\$3.20) for every set made pending the court decision.

It was also arranged that pending the decision of the court no radio sets may be imported into the Netherlands that were not imported prior to September 1, 1929. This amounts to an embargo on all radio sets manufactured outside the Netherlands, including the

United States. The imports of radio parts and loud-speakers were not and are still not affected by this ruling, which is still in force.

It is stated that this proceeding of Philips was solely to protect or raise the total of their sales, since at the same time they requested other manufacturers and dealers to pay a license fee they lowered their own sales prices. As competition between radio dealers in the Netherlands is very keen, they could not possibly afford to pay a license fee as high as \$10 per set—originally demanded—and retain their former sales prices.

Investigation of patents.—It is believed that American sets imported into the Netherlands would infringe either on patents held by Philips or on patents accorded to allied American firms, with whom Philips have an agreement for the exchange and use of patents belonging to both parties.

As Philips do not publish the names, dates, and titles of these patents, it would be, in some cases, necessary for the intending exporter to make sure that his sets could be imported without legal action by Philips, as it is almost certain that Philips will not grant a license to a firm importing sets much cheaper than theirs.

In such case the American exporter can request the desired information from the N. V. Investa, 254 Ceintuurbaan, Amsterdam, Netherlands, which will investigate all circuit drawings submitted for a fee of at least \$20. Additional expenses are not made before receipt of confirmation orders from the party concerned. The N. V. Investa is a corporation operating, in connection with the Netherland Association of Radio Dealers, as a patent investigation office and for the purpose of otherwise assisting its members.

The N. V. Investa has also worked out a circuit that does not infringe on any patents registered in this country, and all members of the association can and do make use of this working plan thereby obviating any use of circuits that are the property of Philips.

NORWAY

Language, Norwegian; area, 124,964 square miles; population, 2,649,775

(Data revised by American Vice Consul George M. Abbott, Oslo)

The development of broadcast reception in Norway has been good, although until the last two years very little progress had been made. 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.

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 about 16 inches in the interior.

The control of radio broadcasting is vested in the telegraph authorities. Broadcasting concessions for each part of Norway are granted to private broadcasting companies, which receive 16 crowns

for each receiving license issued within their respective areas. Most of the stations in operation are owned by the Royal Board of Telegraphs, programs being dictated by a council composed of representatives of cultural institutions, the telephone and telegraph services, and the private stations. Proposals for early reorganization of broadcasting under the Government Ministry of Church and Education and under the Norwegian press are being discussed, both subject to considerable opposition from listeners. The small amount of advertising now permitted will probably be prohibited. It is not entirely certain, however, that the original concession will not be renewed. The receiving-license fee of 20 crowns (\$5.36) per year is collected from receiving-set owners, 80 per cent of the proceeds being used to defray broadcasting expenses. A special Government authorization is required to import radio apparatus, and a 10 per cent sales tax is imposed upon such apparatus. This tax is divided in the same manner as the license fees—20 per cent to the Government and 80 per cent to the broadcasters.

Thirteen broadcasting stations are operating in Norway, one using short waves. Good reception from Swedish, Danish, and other European stations is usual.

Over 100,000 receiving sets have been licensed, and it is estimated that an additional 30,000 to 60,000 are illegally operated. Norwegian manufacturers supply a large part of the demand, while Dutch and German sets are also used in considerable numbers. American sets are becoming increasingly popular. Alternating-current receivers are in common use, and the number is constantly increasing. Lighting service is usually 220 volts, 50 cycles. There is also some 220-volt direct current. Short-wave reception is popular.

Norwegian radio patents have been generally open to license, but under terms which the Norwegian merchants have insisted were too onerous. One plan is a minimum of 1,000 kroner per year, payable in advance, for a 10 per cent of sale-price fee, with the alternative of 7½ per cent with a minimum of 3,000 kroner, half payable in advance. The contract offered includes a surrender of any right to test the validity of the patents in any court.

POLAND

Language, Polish; area, 149,140 square miles; population, 30,212,962

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. The principal cities are Warsaw, Lwow, Lodz, and Cracow. The surface is entirely of plains.

Poland has several radio manufacturers, which are mainly dependent upon foreign parts. A trade-restriction measure effective January 1, 1932, has caused considerable difficulty to these manufacturers through limiting their supplies of these materials, particularly those from the United States. Agitation for revision of the legislation on the part of radio manufacturers is expected to have some favorable effect.

Radiobroadcasting is administered by the Post Office Department. A broadcasting monopoly has been granted the Polish Radio Co., two-fifths of the stock being held by the state treasury. A license fee of 36 zloty (\$4.03) per year is required for amateur receiving sets, the monopoly receiving 85 per cent of the proceeds to maintain broadcasting.

Poland has six broadcasting stations and receives Soviet, German, Austrian, and other European broadcasts.

Licensing statistics place the number of receivers at 308,000 on December 31, 1931, of which about 80 per cent are crystal. About 100,000 unlicensed sets are estimated to be in use. Polish sets are in the greatest number, with some German, British, and American in use. Over 20 manufacturers are now producing radio equipment in Poland. 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.

While Poland has given considerable attention to Soviet Russian broadcasts of what it terms "anti-Polish" propoganda, no effort is made to interfere with any reception of Russian stations. It is also notable that Germany finds Polish broadcasts objectionable as pre-Polish propoganda sources. Irrespective of the merits of this situation, it is exemplary of the scrutinizing of radiobroadcasting as a vehicle for propoganda that is now being given in central Europe.

PORTUGAL

Language, Portuguese; area, 35,490 square miles; population, 6,196,020
(Data corrected by Assistant Trade Commissioner Fred E. Hubblem, Lisbon)

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 Libson, and it is expected that at least a few years will pass before developments will reach a stage comparable to other European countries. 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 on the ownership and operation of receivers, but a 2 per cent tax is collected by the customs authorities in addition to tariff charges. Advertising is prohibited. Some 20,000 receivers are in service. These are of British, German, and American origin. The 12 broadcasting stations are amateurs who rely almost entirely on phonograph records for their programs. The Government, however, has opened bids for a 20,000-watt transmitter, capable of expansion to 80,000 watts, to be in operation by the spring of 1933. Dealers believe this will greatly stimulate the market, especially for small-tube receivers and crystal sets. Reception of Spanish programs is usual, but no reception outside of Lisbon and its vicinity has been satisfactory.

Some alternating-current receivers are in use. Short-wave reception has a limited popularity. Lighting service is generally of 220 volts direct current, and 110 and 220 volts, 42 cycle, alternating current.

The installation of American radio sets on the fast trains between Lisbon and Oporto, dating from September, 1931, has resulted in much favorable publicity.

RUMANIA

Language, Rumanian; area, 122,282 square miles; population, 17,393,149

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 circumstances 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.

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 annual rainfall is 25 inches.

Broadcasting is a monopoly, granted to the Societa de Difuziune Radio Pelefonica din Romania, supported by subscriptions costing 600 lei (\$3.60) for tube sets and 300 lei (\$1.80) for crystal receivers. A special permit by the Home Office is required of foreigners. Regenerative sets are prohibited.

A broadcasting station was opened in Bucharest on September 15, 1929, a short-wave station being constructed later. Satisfactory reception from Austrian, Czechoslovak, and Hungarian stations is possible.

Estimates give the number of receiving sets at 25,000. German sets predominate, with a limited number of French, British, and American. The American product is preferred in the higher-priced field. Alternating-current sets are proving most popular in the cities. Sales of battery and crystal sets are also increasing. Characteristics of lighting service vary widely. Short-wave reception is little known except among amateurs.

A special broadcast educational program for the Rumanian Army, involving the installation of receiving sets in all barracks, was instituted some 18 months ago.

SOVIET RUSSIA

Language, Russian; area, 8,144,228 square miles; population, 147,013,600

The extent of Soviet Russia's radio development is little known. The climate is excellent for reception, but the purchasing power of the people generally is so low that there is little response to the many gestures of the Government designed to encourage the use of receiving sets. It is apparent that a large proportion of those in use are the property of local organizations and municipalities, operating loud-speakers in public places.

Observers report that at some centers there is unusual interest in radio broadcasts and that the gregarious instincts of the Russian serve to make the receiving set a center of attraction during all leisure hours. Despite the effect of the control of the Soviet Government upon programs, such as are broadcast receive approbation of the populace in at least the observed industrial centers.

The use of Russian broadcasting stations for the dissemination of propaganda to other European countries constitutes an excellent example of the flexibility of broadcasting, and the acceptance of these programs for recreation by the Russian people, of the adaptability of individuals to the kind of programs offered. That radio is so used is neither surprising nor particularly vicious. While Finland, Estonia, Germany, and other northern European countries find in receivable Russian broadcasts matter dangerous to them as States, Italy, among others, classes those reaching that country as "innocuous."

Information from Russian sources has given estimates of from 500,000 to 1,500,000 sets in use, the latest estimate being 554,000. Most of these are owned by organizations. Seventy-seven broadcasting stations are operating, according to the best information available, scattered throughout all of the Soviet Union. In various sections European, Chinese, and Japanese stations are received. It has been claimed that several Russian stations operate on power in excess of 100,000 watts. This is probable, but that the rating is antenna measurement is not fully authenticated by any available data.

SPAIN

Language, Spanish; area, 190,050 square miles; population, 21,763,147

Spanish radio developments have been moderately fast, with the republican 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 well-scattered stations of the broadcasting structure provide service throughout the country. 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.

Programs are subject to control, and advertising must not exceed five minutes of each hour. Regulations are not rigidly enforced in any respect. Receiving licenses are required and foreigners must obtain special permits. Licenses for sets in homes cost 5 pesetas and in public places 50 pesetas. There are no restrictions on importing, merchandising, and manufacturing, except a requirement that salesmen be licensed.

Spain has 13 scattered broadcasting stations. The programs have not been particularly satisfactory, a condition increasing the proportionate demand for American sets, as these represent the quality

necessary for clear reception of foreign programs. These are received from French, Italian, Portuguese, and other European stations. About 80 per cent of the receipts of broadcasters are from advertisers, and the remainder from contributions by listeners and various subsidies of local governments and organizations.

An estimate recently made gives the number of receivers as 550,000, about 85 per cent of which are cheap tube sets or crystals. About 45 per cent of the high-grade sets sold are American, with an equivalent proportion from Germany. The latter country also supplies some 80 per cent of the low-priced sets. Alternating-current receivers are now demanded by purchasers. Lighting currents are at considerable variation but are mainly 110 or 220 volts, 50 or 60 cycles. There is considerable direct current, and good sets for this power should be introduced successfully. Reports indicate that the majority of the direct-current sets now used are not satisfactory. Short-wave reception is popular.

SWEDEN

Language, Swedish; area, 173,157 square miles; population, 6,087,923

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. 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. 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° 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, which also owns all broadcasting stations. An operating monopoly has been granted to a corporation known as Radiojans, but transmitting licenses are freely issued to amateur societies. The monopoly has provided facilities for the rebroadcasting of the programs of its stations by clubs. Sweden now has 31 broadcasting stations scattered through the country, one operating on short wave. 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 (\$2.68) per year. Manufacturing, importing, and merchandising are not subject to any exceptional restrictions.

Licenses have been issued for approximately 550,000 receiving sets, with an additional number, not estimated, operated unlawfully. Swedish manufacturers supply a large part of the market, with large

numbers of German and Dutch sets in use. The use of alternating-current receivers in Sweden is advancing rapidly, there being but little demand for battery sets. Lighting service in most sections is at 127 or 220 volts. Short-wave sets and adapters are used to a limited extent.

SWITZERLAND

Language, French, German, and Italian; area, 15,976 square miles; population, 3,987,000

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.

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 control of the Federal department of posts and railways. Five Government-owned stations are now operating, programs originating in studios maintained by the seven regional radio clubs represented in the Société Suisse de Radiodiffusion (Schweizensche Rundspruchgesellschaft). Two are main stations, three being relays. 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 15 francs (\$3), of which the Government retains 20 per cent and the remainder is paid to the broadcasters. No special restrictions are imposed on manufacturers, importers, and merchants.

Licenses have been issued for 149,000 sets, mostly of Swiss and German origin. The trading is so highly competitive that dealers are reluctant to handle American sets unless stocks and repair parts are obtainable in some European free port. The frequent appearance of new models prevents the dealers from profitably carrying more than minimum stocks. Imports of American radio apparatus in 1931 represented a 500 per cent increase over 1930, and were almost entirely of receiving sets.

A large portion of the sets in use are crystal type, but their sale has fallen off greatly during the past year. Broadcasting societies are organized under Federal registration to operate the stations. Advertising is specifically forbidden. Six broadcasting stations are operating in Switzerland; stations in France, Germany, Austria, and other neighboring countries are also received. Two of the Swiss stations broadcast on short waves. Alternating-current receivers have attained great popularity. Either 110 or 220 volts, alternating current, is available in every city. Short-wave receivers are generally known but little in demand or use.

The Dutch Philips and German Telefunken concerns claim the Swiss radio patents. Most of the sets licensed in the past have been American.

TURKEY

Language, Turkish, English, and French; area, 282,627 square miles; population, 13,640,810

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

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

Radio is under the control of the administration of posts, telegraphs, and telephones. Broadcasting and the sales distribution and installation of receiving sets are a monopoly granted to the Société Anonyme Turque de Telephonie Sans Fil. Before purchasing receivers, prospective listeners must obtain permits from the company, which also serves as a license for one year, costing 10 Turkish pounds (\$4.76). Renewals are at the same rate. Sets must be available for Government inspection at all times and are subject to confiscation without warning, explanation, or indemnity.

About 7,500 receivers were estimated to be in service some years ago, some 50 per cent being German and 25 per cent French. Turkey has two broadcasting stations, at Osmanie, near Istanbul, and at Ankara. The former was shut down in January, 1930, because of financial difficulties, but resumption of service is expected. Some of the higher powered European stations are received, but there are no other near-by broadcasting stations.

Socket-power sets have attained considerable popularity. Short-wave reception has a limited clientele, but is particularly interesting to that class. Electric service in Istanbul is 50-cycle alternating, some 110 and some 220 volts.

Turkey is one of the countries adopting the quota system of restricting imports to eliminate an unfavorable balance of trade, radio being one of the commodities affected.

UNITED KINGDOM

Language, English; area, 94,284 square miles; population, 44,173,704

The United Kingdom is one of the countries showing the greatest degree of radio development in the world. 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. In the field of broadcasting and in all wireless activities 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. Radio sales in 1931 amounted to some £30,000,000.

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 license fees. The programs are primarily educational, and have been severely criticized by the listeners interested in the use of radio for entertainment.

A revision of the broadcasting system is in progress. When completed, five regional stations will serve the whole island of Great Britain, each broadcasting two programs on separate wave lengths. One program will be a "chain" broadcast from all stations while the other will be local. Regional stations at Brookman's Park, about 17 miles from London, and at Moorside Edge (midland regional) are in operation. London listeners complain that because of the high power twin programs interfere not only with each other but "blanket" outside reception. There were 20 broadcasting stations in the United Kingdom prior to the beginning of construction on the new high-powered stations. Six have been discontinued and others are to be closed as the project is advanced. 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) a year. 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 products by granting 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 refuse to renew agreements. They found the additional discounts insufficient to repay them for the business lost through their failure to handle imported apparatus. Early in 1932, however, a new agreement was signed by which the manufacturers agreed to sell only to signatory wholesalers, who in return agreed to sell only to established retailers and to sell no radio apparatus except those of manufacturers signing the agreement. Retailers will be supplied only upon their agreement to maintain list prices in resale. There seems to be no safeguard against "bootlegging," an evil that has attended similar efforts in the past and caused their disintegration.

The number of licensed sets in service totaled 4,329,754 on December 31, 1931. Official estimates of illegally operated sets range about 20 per cent. Nearly all of the needs of the British market are supplied by some 2,000 domestic manufacturers, but German and American sets are used in large numbers, with some of French, Italian, Swedish, or other manufacture. The practice of American distributors in assuming responsibility for the condition of apparatus as delivered has contributed to the favorable attitude toward American equipment.

Alternating-current receivers, known as mains sets (equivalent to "socket power") are attaining popularity. Only about 30 per cent of the homes are wired for electricity, however. Lighting service is almost universally 220-volt, 50-cycle 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; area, 96,134 square miles; population, 12,017,323

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.

The country for the most part is mountainous and the climate temperate, rather similar to our middle Atlantic States. Reception is good from September to May.

Permits are required for broadcasting stations. Nothing except music may be broadcast. Private persons may not establish broadcasting stations. The permission of the Ministry of Posts and Telegraphs is required before a receiving set may be installed. A license fee of 25 dinars (33 cents) per month is charged, 60 per cent of the proceeds being paid over to the broadcasters. 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 30,377 receivers licensed, nearly all of German or Dutch origin. American sets are known, and those in use give great satisfaction, though the prices are too high for the general market. These sets are all constructed for the long waves used in Europe. There are three broadcasting stations 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 not common.

ASIA

ASIA MINOR

Country	Language	Area, in square miles	Population
Aden.....	Arabic.....	9,080	54,923
Arabia.....	do.....	1,200,000	7,000,000
Iraq.....	do.....	143,240	3,000,000
Palestine.....	Arabic and French.....	900	852,268
Persia.....	Arabic.....	628,000	10,000,000
Syria.....	do.....	60,000	2,981,863

There has been little radio development in Asia Minor, except as to Asiatic Turkey. The hot climate and Mohammedan influence have been the principal retarding factors. It has been rumored that a short-wave station was being erected in Persia, but no authentic information is available.

Most of these countries are protectorates of France or England, a condition which of itself should offer assurance of developments as soon as engineering succeeds in overcoming climatic drawbacks and a sufficient populace is found receptive to broadcasting. In the past the few sets reported have been found to be almost entirely in the hands of resident officials who had brought them among personal effects when taking up stations in Asia Minor. Their experi-

ences have not been unduly promising, the season during which reception of European stations is possible being short and unsatisfactory. Russian broadcasting is frequently received. The few short-wave sets put into service have proved satisfactory. In Syria perpetual receiving licenses are issued on payment of 5 Syrian gold piasters (\$0.96). Iraq also has a licensing system.

CEYLON

Language, English; area, 25,332 square miles; population, 5,009,502

Considering the adverse climate and the limited number of people able to afford the investment necessary to obtain radio service, Ceylon has 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. 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. American sets are not used to any extent. The station at Colombo and those in India are received regularly. Short-wave reception has a certain limited field. Alternating-current sets are required for Colombo, but battery sets are needed in all other places.

CHINA

Southern China, and of course the interior, have not experienced any radio development except in the immediate vicinity of Hong Kong, and in that area the Europeans have been about the only participants. The northern areas, however, including American and European developments in Shanghai, and Chinese in cities within several hundred miles, have shown a much more progressive interest in broadcasting. This area includes the southern parts of Manchuria, particularly Mukden. The Japanese invasion was followed by the closing of many stations, as a matter of course. One of those at Mukden was burned. Other stations were used by the Japanese for communication purposes other than broadcasting of public programs.

Shanghai, Hankow, and Peiping have populations in excess of 1,000,000 each. The country's surface consists mainly of plains along the coast, with mountainous regions in several sections. The climate is generally hot and the humidity high. Reception is generally poor.

In addition to Chinese stations, service is obtained from Japan, Chosen, Kwantung, and Siberia.

Radio regulations do not impose any exceptional restrictions on broadcasters or owners of receiving sets. Importers, however, are required to submit complete and highly detailed information regarding each shipment of radio equipment to local authorities. The Ministry of Military Administration determines whether an import permit will be issued. On subsequent applications, the final disposition of the preceding shipment must also be stated. A fee of \$10 and a \$2 stamp must be paid with the application.

Under the conditions maintaining even in normal times it is impossible to obtain a satisfactory estimate of the number of receiving sets in use in China. Estimates for many centers are vague, or subject to exceptions, invalidating them for any general use. It is possible that the number might approach 1,000,000, in view of the large number of crystal sets used, but even that figure does not represent a reliable estimate. That of 30,000 is in keeping with most of the local estimates available.

The sets in use originated in various countries. The United States, Germany, the United Kingdom, the Netherlands, and Japan are the principal suppliers through the port of Shanghai.

CHOSEN

Language, Japanese; area, 84,738 square miles; population, 19,519,927

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.

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 nonregenerative 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 old estimate giving the number of receivers as 12,000 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; area, 196 square miles; Population, 273,081

Most of the radio development in French India may be traced to the progress in British India. The markets in these areas are generally among the French population. About 1,250 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 reception poor.

FRENCH INDO-CHINA

Language, French; area, 265,004 square miles; population, 19,844,181

Radio developments in French Indo-China have been very slow, and there is little promise of early development. The climate is poor for radio reception. The use of receiving sets is prohibited, 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. An estimate

indicates that about 1,000 sets are in service. Nearly all are of French manufacture. Four broadcasting stations were operating, but one in Saigon has been closed, as the local government has been unable to continue a subsidy of 100,000 piasters upon which it was operating. Reception from Singapore, Manila, and other cities is unsatisfactory.

HONG KONG

Language, English; area, 391 square miles; population, 662,950

Hong Kong has had little development of radio. There has recently been constructed a new station, however, and it is believed that more interest will follow.

Americans and Europeans number about 10,000. The principal city is Victoria. The island is a rugged ridge of granite, broken by narrow valleys. 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. This station formerly sent out only storm warnings and other meteorological data, but in the fall of 1928 it was reconstructed and its activities reorganized on a general broadcasting basis.

A receiving license is required, costing 10 Hong Kong dollars per year (\$4.40 in United States currency), and dealers are taxed 75 Hong Kong dollars (\$33) per year, the proceeds being allocated to the support of broadcasting. Licensed receivers number 1,800, with a number of unlicensed sets also in use. A reward of 10 Hong Kong dollars is offered for the apprehension of "pirates," but there is apparently no lessening of the practice. Sets are principally British, though some are American. Socket-power receivers have not proven to be completely satisfactory. Short-wave sets are becoming common.

INDIA

Language, English; area, 1,805,332 square miles; population, 318,885,980

(Data revised by Assistant Trade Commissioner Paul L. Hopper, Calcutta)

British India has had considerable difficulty in building up a great radio public. The principal cities are Calcutta, Bombay, Madras, Hyderabad, Rangoon, and Delhi. The great central part of India 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.

The broadcasting stations at Calcutta and Bombay, established by the Indian Broadcasting Co., were taken over by the Government when the company found it impossible to continue profitable operation. Because of continued losses the Government considered closing the stations in 1930. This project was abandoned, however, the receipts from import duties on receivers as well as the income from receiving licenses being available to defray the expenses of their operation, in addition to direct income from advertising, which is now permitted. The stations at Lahore and Madras appear to be amply endowed for continued operation.

Radio is under the control of the director general of posts and telegraphs. Receiving licenses are issued to all applicants. These cost 10 rupees (\$3.65 per year), of which the broadcasting company receives 8. Import permits are required.

Estimates of the number of receivers in use range from 25,000 to 50,000, but licenses are outstanding for only about 8,000. These are mostly British. About half the Indian radio imports are from the United Kingdom. The Netherlands averaged 44 per cent and the United States 10 per cent during the last fiscal year. It is the general belief that American sets are not properly insulated for the Indian climate, while the Dutch product is credited with being properly adapted. A few alternating-current sets are in use and appear to have given satisfactory results, but battery sets are still in demand, as much of India is as yet without electric service. Short-wave sets are popular in the interior and among a certain class of listeners in the population centers.

JAPAN

Language, Japanese; area, 148,756 square miles; population, 59,138,000

Japan leads all Asiatic countries in radio development. In the early days of radio 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 as serious as in some other countries, and a large proportion of the population is able to purchase receivers. 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-powered 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 75 sen per annum to the Government and a subscription fee of 75 sen per month to the broadcasters. These fees were reduced April 1, 1932, from 1 yen. 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 16 broadcasters, with 4 others under construction.

The number of licensed receiving sets is estimated at more than 1,000,000. Japanese manufacturers have supplied a large number of these. Formerly they imported parts, but these, too, are of local manufacture at present. The import market now is for material for the manufacture of parts. Alternating-current receivers have superseded battery types, about 50 per cent of the tube sets in use now being of the first kind. Short-wave reception has aroused considerable interest, and it is reported that the Government is encouraging the erection of a short-wave broadcasting station, though it still declines to license short-wave receivers. Dairen and Seoul stations are received.

According to William S. Dowd, assistant commercial attaché at Tokyo, plans are now being made to increase the facilities for radio-communication between Japan and Manchuria. The station in Japan known as the Hirano wireless station in Osaka is to add two transmitters and one receiving set. These plans are based on a request for the Department of Communication to supply 100,000 yen for this purpose. The officials in charge are taking the matter up with the government of the Kwantung Leased Territory and with the new Government of Manchuria. Consideration is now being given to locations for stations at Mukden, Changchun, and Harbin. This service when made effective will provide for handling radiograms, for wireless, telephone, and telephoto service.

KWANTUNG

Language, Japanese; area, 1,305 square miles; population, 1,056,076

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.

Sets in use number some 5,000, being Japanese, American, and British in origin. One broadcasting station at Dairen is operating. Chinese, Japanese, Siberian, and Korean stations are also received. So far as is known no alternating-current or short-wave sets are in use.

MACAO

Language, Portuguese; area, 4 square miles; population, 74,668

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

It was estimated some time ago that about 40 sets were 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, but one or two short-wave receivers are installed.

NETHERLAND INDIA

Language, Dutch; area, 733,642 square miles; population, 49,534,618

Radio in Netherland India is not greatly advanced, owing to the late introduction of satisfactory apparatus. The climate is hot and damp, but there is some radio reception. Receiving licenses cost \$3.20 per year. Ten broadcasting stations, all operating on short

waves, are scattered through the islands. Their services are supplemented by reception from southern continental Asia and the Philippine Islands. A broadcasting monopoly is favored, though it has not yet been put into effect. Developments have been entirely in short waves for local as well as long-distance reception. The short-wave broadcasts from the Netherlands are the programs most appreciated.

Approximately 2,500 receivers have been installed. These are principally Dutch, but American and German equipment is sold in fair quantities. American sets have not generally proved to be properly constructed for the climatic conditions of the East Indies. Socket-power sets are not popular, since current characteristics, where electricity is available, vary greatly.

SIAM

Language, Siamese; area, 200,148 square miles; population, 9,831,000

(Data revised by Assistant Trade Commissioner Joe D. Walstrom, Bangkok)

Radio development was at first slow in Siam, but recently thousands of persons have acquired an interest in reception. Two-thirds of the population 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, except in the mountains and some other sections.

Broadcasting was prohibited until recently because of the unsatisfactory service obtained from equipment which had been tried out, but this restriction has now been lifted, and several broadcasting stations have been established by the royal post and telegram department. Licenses are required for importing radio equipment. Receiving licenses are issued, costing 50 satangs (\$0.22) per year for crystal, 2 baht (\$0.88) for broadcast-wave and 3 baht (\$1.32) for short-wave tube sets. On December 31, 1931, 13,218 sets were licensed, about 80 per cent being crystal. Supplies are principally German, British, and American, in order. Some alternating-current sets are in use in Bangkok, where the service is 110 volt, alternating, with frequencies of both 50 and 60 cycles. Combination long-wave and short-wave sets are most popular.

STRAITS SETTLEMENTS

Language, English and native dialects; area, 1,600 square miles; population, 937,099

Radio is popular to a certain extent in the Straits Settlements, but since the popularity is restricted to the whites, only a limited stage of advancement has been noted. The climate is poor for radio, being hot and damp. Half the population is concentrated in Singapore. There are but 20,000 Europeans. A broadcasting station was installed in Singapore in November, 1926, but was closed in 1927. At the present time it is understood that short-wave stations in Singapore and Johore are giving broadcast service. Stations in India, the Philippines, and Netherland India are received. Receiving licenses are required. About 500 sets were in use some time ago,

mostly of British make. So far as is known, alternating-current sets are in use. Only short-wave sets can be sold, since satisfactory long-wave reception is impossible.

A regulation effective as of January 1, 1932, reads as follows: "The station shall not be used or allowed to be used in such manner as to cause interference with the working of other stations. In particular, reaction must not be used to such an extent as to energize any neighboring aerial, and the use of a regenerative detector valve not preceded by a high-frequency screened grid stage is forbidden."

OCEANIA

AUSTRALIA

Language, English; area, 2,974,581 square miles; population, 5,495,734

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 broadcast to communicate entertainment and news throughout the Commonwealth. Of the total population, 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 low power. There is no restriction as to the number or location of low-powered stations except as to the avoidance of actual congestion. 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 had been made for these stations to be taken over by the Federal Government at the expiration of the contract with the Australian Broadcasting Co., which operates this class of stations, on June 30, 1932, though the contract may be extended for an additional year. A proposal to create a commission to operate a Federal chain of stations on a commercial basis has also been advanced. Australian broadcasters have been notified by phonograph companies that the broadcasting of their records will not be permitted in the future, which may have some effect but is not expected to retard broadcasting service to any serious extent.

Australia has 54 broadcasting stations scattered throughout the populated areas. Three of these use double waves, one short, and one middle. The Australians take great interest in short-wave broadcasts from American stations. New Zealand is commonly received in eastern Australia.

An annual receiving license, costing 17s. 6d. or 24s., depending on the distance of the receiver from the principal stations, is required. The licensed receivers numbered 347,555 in February, 1932, while varying estimates agree that the number of illegally operated re-

ceivers is large. American sets were formerly most popular and in the majority. In 1927 the domestic radio-manufacturing industry became established and by November, 1929, had grown to such proportions that a high tariff was applied to radio products. Early in 1930 a general increase and restriction on imports was applied. Locally assembled American sets are being produced in numbers. American tubes are said to have displaced British makes from most of the market. Australian interests, however, are entering into the manufacture of tubes, and will doubtless be given protection.

BRITISH OCEANIA

Language, English; area, 28,365 square miles; population, 480,357

British Oceania, consisting of scattered islands and groups throughout the South Pacific, shows a combined radio development of no mean proportions. Radio has proved particularly popular among the whites stationed in more or less isolated islands for Government or trading purposes. Hot weather is usual in all parts of British Oceania at all seasons.

It is estimated that from 250 to 500 receivers are in use. Nearly all are of British origin. A new short-wave telephone transmitting station at Suva in the Fiji Islands has been broadcasting music, speeches, and church services on occasion for several months. Regular broadcasting from Australia, New Zealand, Hawaii, and elsewhere is received. Short-wave sets are the most popular.

FRENCH OCEANIA

Language, French; area, 1,520 square miles; population, 31,655

French Oceania has had little radio development. Nearly all of the present demand is for short-wave receivers by European residents.

All seasons are hot, with poor reception. Between 50 and 75 sets are in use. French makes only are represented. No French broadcasting is available, but Hawaiian, Australian, and New Zealand stations, all broadcasting in the English language, are received.

NEW ZEALAND

Language, English; area, 103,862 square miles; population, 1,407,165

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 a number of broadcasting 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 since been a steady increase in the number of receivers in use.

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 during the

winter months from April to September. Broadcasting is closely supervised by the Government. Receiving licenses are required, costing 30s. per year. Regenerative sets are prohibited.

The Dominion has 35 broadcasting stations, of which 4 are owned and operated by the Government. Formerly these stations, which are supported by receiving-license fees, were under the control of private concessionaire but were taken over by the Government late in 1931. The remaining 31 are operated by private interests, such as organizations, merchants, and broadcasting companies. The stations are scattered throughout the islands.

Broadcasters of New Zealand have recently been notified by the principal distributors of phonograph records that their products could no longer be used for broadcasting purposes. It is the general opinion that this warning is preliminary to a demand for royalty payments. Some of the smaller suppliers of records are not parties to the movement, and the broadcasters are inclined to believe that records already in their possession could be used without penalty. Since this source of program is vital to practically all of the smaller stations, and a considerable amount of the broadcasting of even the high-power monopoly stations are so produced, such demands are certain to have a serious effect on New Zealand broadcasting, unless arrangements on a basis of what the broadcasters consider a reasonable royalty fee can be agreed upon.

Though New Zealand is the field of an intense "buy British" campaign, American radio products are well established in the market and are especially popular with the buying classes.

AFRICA

ALGERIA

Language, French and Arabic; area, 222,180 square miles; population, 5,992,770

The development of radio in Algeria has been restricted mainly to the French residents, among whom there has been an appreciable increase in its use. Radio provides immediate 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 over 10,000. French products predominated. Alternating-current receivers have met with little success. Short waves have a certain popularity as a means of better reception from France. A broadcasting station is operating in Algiers.

The market has been changing in respect to the types of sets acceptable, price considerations now having less effect and quality being more in demand.

French manufacturers are undertaking the enforcement of patent rights in Algeria concurrent with their similar efforts in France proper. Inasmuch as French apparatus has been entirely incapable of competing in the Algerian market, this action will doubtless be carried to the extreme. Dealers in German apparatus have not yet been required to stop its sale.

ANGOLA

Language, Portuguese; area, 484,800 square miles; population, 2,481,956

Angola has not seen any great development in radio. The class to be interested are the Portuguese, and there is no Portuguese broadcasting nearer than Portugal or Brazil. Summers are hot and win-

ters warm. Reception is poor. The only stations which may be received regularly are those in the Union of South Africa. About 100 receiving installations were estimated some time ago, mostly representing British and American makes. There are no alternating-current or short-wave sets, so far as can be ascertained.

CANARY ISLANDS

Language, Spanish; area, 2,807 square miles; population, 481,555

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.

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 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.

Two broadcasting stations are operating, while conditions are occasionally favorable for receiving from Spain.

The number of receivers installed was estimated at 200 in 1930. A large part of these are of American manufacture. Various European makes are also represented. Alternating-current sets have not been put into use. Interest is now centered on short waves, because of atmospheric conditions and more varied reception.

EGYPT

Language, Arabic; area, 347,840 square miles; population, 14,168,756

Radio has been limited in Egypt by the government's failure to provide regulations for broadcasting, but it has proved very popular. European broadcasting is regularly received and has brought about a high rate of development. It is expected that the establishment of an officially recognized broadcasting station or system would greatly improve the situation.

The populated section of the country is the Nile Valley, especially the delta region. The climate is fair for radio, and reception is good from November to May.

Five broadcasting stations are reported, in Alexandria, Cairo, and Port Said. No receiving license fees are collected.

About 4,000 receivers were in service two years ago, no more recent estimate being available, though it is known that there has been a great increase. British sets are the most popular, French and American also being used extensively. A small number of alternating-current receivers has been put into use. Short-wave reception has been popular.

FRENCH MOROCCO

Language, French; area, 213,000 square miles; population, 4,229,146

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.

A broadcasting station is operating at Rabat, while Algerian, French, and Spanish stations are also received. Two of the stations use short waves, one operating on a double wave. There are from 3,000 to 5,000 receivers in use, largely French. There are a few alternating current sets in use, but the service is not satisfactory. The current at Casablanca is 110 volts, 50 cycles, but there is much variation in other localities. Short waves have proved valuable in the French-controlled areas of Africa, and short-wave sets are constantly becoming more numerous.

KENYA

Language, Arabic; area, 245,000 square miles; population, 2,575,789

Kenya has not exhibited especially great interest in radio. One station is established at Nairobi. The summers are hot and winters warm, resulting in poor reception from distant stations. The number of sets in use is estimated at 250, nearly all British. 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 Nairobi station may be received by short-wave sets.

MADAGASCAR

Language, French; area, 225,707 square miles; population, 3,598,728

Radio has not had any great development in Madagascar but is gaining in popularity. Several short-wave stations which may be used for broadcasting are now contemplated.

The principal cities are Antananarivo 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.

A broadcasting station was placed in service at Antananarivo on April 29, 1931, and is the only station broadcasting in any language other than English in Africa, except on the Mediterranean coast. This station operates on short waves. Additional stations have been planned. South and East African broadcasts can be received on short waves.

About 150 receiving sets were reported to be in use prior to the installation of the Antananarivo station. These are French, brought from France chiefly 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; area, 428,132 square miles; population, 3,160,500

Reception in Mozambique has not been great. Only a small per cent of the population 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 100 receivers were installed by 1930, 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.

TUNISIA

Language, French; area, 50,000 square miles; population, 2,159,758

The French and other Europeans in Tunisia have shown considerable interest in radio, and developments are comparatively well advanced. Though the climate is not 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.

The only broadcasting station now operating in Tunisia is in the city of Tunis. French broadcasts from Algeria, Morocco, and France are received, as well as other European stations. Receiving licenses are required, costing 20 francs per year. An old estimate indicates that about 4,500 sets were in service. The majority are French, the remainder of various makes. American sets have enjoyed an increasing popularity. Short-wave reception is meeting with considerable success and is arousing such interest that long and short wave combination sets are in greatest demand.

UNION OF SOUTH AFRICA

Language, English and Dutch; area, 472,347 square miles; population, 6,928,580

Radio in the Union of South Africa has shown considerable development. The Government has taken a great interest in promoting the use of broadcasting. The whites are particularly enthusiastic, and, while the financial end of broadcasting has proved a difficult problem, it is apparent that progress will continue. Radio dealers have agreed to contribute 10 per cent of their net profits in radio toward the cost of broadcasting and to include the cost of the license in the sale price of each set, giving a voucher for which the broadcasting company exchanges a license. Meanwhile, the Government has under consideration the abolition of licenses and using instead a 25 per cent import tax, most of which would be paid over to the broadcasters. Some newspapers have opposed radio, however, considering it a competitor in the field of advertising, with resulting friction that has somewhat retarded its development.

The principal cities are Johannesburg, Cape Town, Durban, Pretoria, Port Elizabeth, and Benoni. About 1,500,000 of the population are white. 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.

Five broadcasting stations are now operating in the Union of South Africa. One of these uses double waves to provide short-wave transmission. While reception from Europe and the Americas is frequently accomplished, it is not very satisfactory. Receiving-set own-

ers are subjected to the payment of license fees ranging from £1 for sets situated over 250 miles from the nearest broadcasting station to £1 15s. for sets under 100 miles. The intermediate charge is £1 5s. Higher rates are provided for sets used elsewhere than in homes.

The licensed receivers in service December 31, 1931, totaled 26,025, while an almost equal number of unlicensed sets is said to be in use. 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.

OTHER AFRICA (MINOR STATES)

In addition to the countries and colonies of more importance from a radio standpoint, Africa includes a large number of States in which developments are not only rigidly limited but in which conditions are such as to yield little promise for the future. While European domination is common to all Africa, these States generally have but a very small European population. The climate is such as to give little benefit from such broadcasting stations as exist, and distances, as well, interfere with any possible satisfactory reception. Natives, living under primeval conditions, a large majority scarcely aware of European existence, are characteristic of the vast interior, in which most of these "States" are situated. Others, more prone to civilization, are characteristically poverty stricken, sparsely settled, the people nomadic, or for other reasons placed beyond any possible radio development.

Africa's broadcasting is provided by stations on the Mediterranean coast, in Kenya (inland from the mid-eastern coast), and in the more temperate southern tip, where lie the Union of South Africa and the island of Madagascar. Thus only parts of the coastal fringe of the north, east, and south are within reach of reasonable broadcasting service. There is nothing receivable along the west coast or in the interior, except by the use of high power and short waves. Among the areas so restricted as radio markets are the following:

Country	Language	Area, in square miles	Population
Basutoland.....	Native dialects.....	11, 716	515, 781
Bechuanaland.....	Native and English.....	275, 000	154, 983
Belgian Congo.....	Native and French.....	909, 654	8, 500, 000
British Somaliland.....	Arabic.....	68, 000	347, 000
British West Africa.....	do.....	493, 628	22, 681, 696
Ethiopia.....	Amharic.....	350, 000	10, 000, 000
French Equatorial Africa.....	Arabic.....	982, 049	2, 845, 936
Italian Africa.....	do.....	879, 435	2, 200, 000
Liberia.....	English.....	36, 834	1, 500, 000
Northern Rhodesia.....	do.....	291, 000	1, 154, 624
Southern Rhodesia.....	do.....	148, 575	573, 647
Southwest Africa.....	German.....	322, 000	227, 739
Spanish Africa.....	Spanish.....	140, 000	960, 000
Swaziland.....	Native dialects.....	5, 678	117, 877
Tanganyika.....	Arabic.....	373, 494	4, 123, 493
Zanzibar.....	do.....	1, 020	215, 879

It is estimated that some 1,500 or 2,000 receivers are used in these areas. There is some talk of establishing a rebroadcasting station at Accra, Gold Coast.

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. This division is prepared to furnish lists of foreign firms and to give special information on those whose general qualifications are satisfactory. This information is supplied to bona fide American firms at a nominal 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. 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 Tariffs Division of the Bureau of Foreign and Domestic Commerce.

BRANCH OFFICES OF THE BUREAU

The Bureau of Foreign and Domestic Commerce maintains about 70 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 to be taken up direct 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

Government publications on radio subjects are covered in a special price list which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., without charge. Some publications of interest are:

Broadcast Advertising in Latin America. Trade Information Bulletin No. 771. 10 cents.

Broadcast Advertising in Europe. Trade Information Bulletin No. 787. 10 cents.

Broadcast Advertising in Asia, Africa, Australia, and Oceania. Trade Information Bulletin No. 799. 10 cents.

Radio Broadcast Stations in the United States (January 1, 1932). Federal Radio Commission. Annual. 15 cents.

Federal Radio Commission Rules and Regulations (loose-leaf sheets only). 45 cents.

Commercial and Government Radio Stations of the United States (June 30, 1931). Annual. 20 cents.

Amateur Radio Stations of the United States. Annual. 35 cents.

Radio Service Bulletin (monthly corrections to Commercial and Government Radio Stations). 5 cents per copy, 25 cents per year.

Merchandising Problems of Radio Retailers in 1930. Trade Information Bulletin No. 778. 10 cents.

These publications may be obtained from the Superintendent of Documents for the prices quoted.

UNITED STATES GOVERNMENT RADIO SERVICES

Inquirers for radio data of various types will find that responses are expedited by addressing the office to which the special phase of the subject most nearly relates, though a communication involving data not available in the office addressed will be properly forwarded for attention.

The following list shows the general types of inquiries received by the Bureau of Foreign and Domestic Commerce and indicates the offices to which they are forwarded:

Foreign markets for apparatus, foreign broadcasting, and related questions: Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington.

Foreign telephone, telegraph, and radio communication services: Transportation Division, Bureau of Foreign and Domestic Commerce, Washington.

Foreign advertising, printed, billboard, or radio: Specialties Division, Bureau of Foreign and Domestic Commerce, Washington.

United States radio stations, license procedure, applications, and open facilities: Federal Radio Commission, Washington.

Patents and inventions: Patent Office, Washington.

Testing and calibration of instruments and devices, and scientific research: Bureau of Standards, Washington.

Distribution of stocks and sales of radio apparatus, United States: Census of Distribution, Census Bureau, Washington.

Broadcasts of weather reports: Weather Bureau, Washington.

Broadcasts of farm and home information: Radio Division, Department of Agriculture, Washington.

Military radio equipment: Chief Signal Officer, War Department, Washington.

Naval radio equipment and time signal broadcasts: Chief of Naval Communications, Navy Department, Washington.

Educational broadcasting methods: Office of Education, Interior Department, Washington.

International conferences, treaties, and agreements: Treaty Division, State Department, Washington.

Aeronautical radiobeacons: Airways Division, Department of Commerce, Washington.

Coast Guard radio: Coast Guard, Washington.

Government publications (printed): Superintendent of Documents, Government Printing Office, Washington.

Many of the foregoing offices are represented by offices in principal cities throughout the United States, which are listed in the local city and telephone directories. Most such offices are prepared to give immediate service to inquirers by mail, in person, or by telephone.

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