SEVENTEENTH ANNUAL REPORT

FEDERAL COMMUNICATIONS COMMISSION

FISCAL YEAR ENDED JUNE 30, 1951

(With introductory summary and notation of subsequent important developments)

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COMMISSIONERS

MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

(as of June 30, 1951)

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LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C.

To the Congress of the United States:

Pursuant to section 4 (k) of the Communications Act of 1934, as amended, there is herewith submitted the seventeenth annual report of the Federal Communications Commission.

Though this report concerns the Commission's activities for the fiscal year ended June 30, 1951, primarily, the introductory summary includes convenient reference to subsequent events up to the time of going to press.

This year, in particular, I cannot emphasize too strongly the fact that, because of reduced appropriations and consequent loss of manpower, the Commission cannot take care of its regular functions, not to mention duties added by the national defense program. Consequently there is a mounting backload of work in various categories which seriously affects the economy of the various communications industries and, in fact, the economy of the country generally.

Respectfully,

WAYNE COY, *Chairman.*

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INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR

GENERAL

Though television and other broadcast matters continued to monopolize popular interest, the seventeenth year of Federal Communications Commission operation witnessed even more significant developments in the safety and special radio field and a growing complexity of problems affecting both wire and radio common carriers. These nonbroadcast services are of equal concern to the public, since they help to protect life and property, aid commerce and industry, provide employment and other individual benefits, and involve the rates paid by users of telephone and telegraph communication.

Commission consideration of radio subjects ranged from continuing to seek room in the congested spectrum for new and expanding services to means of dealing with mounting interference, especially from noncommunication devices which radiate energy. Its regulation of common carrier facilities and operations extended from land wires to cable and radio adjuncts. Some of these matters had international as well as domestic implications. The Commission was called upon by the military and other agencies for further and increasing assistance in tying various types of communication facilities to the national defense program.

Because of reduced appropriations, and consequent loss of manpower, the Commission was hard pressed to take care of its growing normal workload, not to mention priority projects requiring immediate attention. Necessary curtailments were evidenced in some routine field operations, also in delays and backlogs in processing certain types of applications.

An idea of the Commission's present job is only partly reflected by the number of outstanding radio authorizations under its jurisdiction. These increased more than 100,000 during the year and now approximate 885,000. Moreover, it should be pointed out that some

radio operations cover the use of many transmitters. Consequently, the present number of such authorizations reflect the use of approximately 425,000 transmitters, of which more than 115,000 are fixed and nearly 310,000 are mobile.

At the year's end nonbroadcast radio authorizations approached 179,000 as compared with about 4,600 in broadcast. In addition, there were more than 700,000 authorizations for various classes of radio operators.

Applications received by the Commission during the year amounted to 268,000, which was 48,000 more than in the year previous. These figures do not include legal filings, periodic reports and tariff schedules. Common carriers filed some 21,000 tariff schedules and annual reports. More than 1,100,000 pieces of correspondence were received or sent by the Commission in that period.

Broadcast matters continued to account for about 90 percent of the Commission's hearings. There were 541 cases on its docket at the close of the year.

NATIONAL DEFENSE

The Commission gave increasing cooperation to Government agencies engaged in the national defense effort, and with organizations and other elements of industries affected. Specific activities are classified and, therefore, cannot be reported. However, it can be said in general that this work affects all types of electrical communication. It covers plans for the control of electronic emissions during possible air raids, monitoring for possible subversive radio activity, meeting needs of civil defense communication, authorizing expansion of communication circuits, aiding experimentation looking to war-time applications of radio, making special technical studies, and safeguarding facilities used for communication purposes.

During the year, the Commission created a Disaster Communications Service, to enable Government and non-Government stations to set up emergency communication; authorized non-Government stations to use Government frequencies in an emergency; reactivated the State Guard Radio Service, which affords radio facilities for State Guards in States where the National Guard has been called into Federal service; and liberalized the commercial operator rules to deal with the scarcity of certain operators, especially on board ships.

Its already established services include the Special Emergency Radio Service, which is concerned with the protection of life and property under emergency conditions; the Public Safety Radio Services, devoted to normal police, fire, forestry-conservation and highway protection; the Civil Air Patrol, a civilian adjunct of the Air Force; and the Amateur Radio Service, which has long provided regional

networks for emergency use and now has a military amateur radio system functioning with the military.

At the same time, the Commission continues to maintain regional disaster emergency coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, amateur radio operators, and State and municipal police organizations.

INTERNATIONAL

World communication matters continued to exact much time and attention of the Commission. In liaison with the Department of State, the Commission prepared for and participated in 20 international sessions during the year, meanwhile doing the preliminary work for a score of future scheduled meetings of this nature. These conferences, most of which are held abroad, involve consideration of overseas telegraph and telephone service, and utilization of air and sea radio navigational aids, as well as broadcast problems.

In the mounting world-wide use of radio, there must be mutual agreement between nations on allocating bands of frequencies for specific services, means for preventing interference by stations of one country with those of another and, in general, uniformity of operation to obtain the most practical and economical use of the limited radio spectrum. Common carrier traffic further requires agreement on rates and handling processes.

During the year, 14 amendments to national frequency allocations were made applicable by the Commission to the United States. There was the usual exchange of notifications of new station authorizations through international and regional correlating agencies. More than 400 cases of foreign radio interference affecting this country were handled by the Commission, which also prepared notices of treaty infractions to be sent to the nations concerned.

COMMON CARRIERS

The outstanding development with respect to all common carriers was the increase in volume of business enjoyed by them, together with the resulting improvement in profits. For the telephone industry, this was accompanied by a continuation of the rapid growth of the past several years, with over 1 billion dollars in facilities added during the year.

The Bell system reported an increase of 49 percent in net income for the calendar year 1950 over that for the previous year. Operating 82 percent of the 43 million telephones in this country, the Bell system now has more than 10 billion dollars gross invested in telephone facilities, and the investment of the entire telephone industry is estimated to be over 11½ billion dollars. Telephone calls handled

by the Bell system reached a record high of 51 billion, which produced revenues of over 3.2 billion dollars. Mobile radio telephone service to vehicles on land, inaugurated on a regular basis on July 1, 1949, is now in operation in more than 250 cities with service authorized to more than 26,000 mobile units.

On January 19, 1951, the Commission instituted an investigation to determine whether rates should be reduced for interstate and foreign telephone service furnished by the Bell system.

Domestic telegraph revenues during the calendar year 1950 were about 15 percent over those for 1949, resulting in profitable operations for the first time in several years. The benefits of improvements in facilities and operations, as well as a rigid economy program, were largely responsible for the improvement in Western Union earnings. It completed a program to mechanize large switching centers and made progress in installing other mechanical and operating improvements.

International telegraph carriers also benefited from the improvement in business. For the calendar year 1950, the gross operating revenues of the principal international telegraph carriers were 9.1 percent higher than in 1949. In the same year, net operating revenues before Federal income taxes were $4,900,000 as against $400,000 for 1949. International telegraph service was furnished directly to 82 foreign countries and United States Territories, and through them to nearly every other country. The volume of paid traffic amounted to 518 million words.

International radiotelephone service was furnished directly to 53 other nations and our own Territories, and directly or indirectly to a total of 88 foreign countries and United States possessions. The volume of such radiotelephone calls reached a new high of 744,650 in calendar year 1950, an increase of 13 percent over the previous year.

On February 21, 1951, the Commission adopted a decision granting two applications and denying another in the case of international radio-telegraph carriers seeking competing circuits to foreign points already served by direct circuits of another United States radiotelegraph carrier. The guiding policy adopted in this decision is that the Commission will authorize a competing direct radiotelegraph circuit if the applicant demonstrates that such competition is reasonably feasible. The carrier operating the original circuits appealed this decision to the courts.

SAFETY AND SPECIAL RADIO SERVICES

Radio services which are neither broadcast nor common carrier in nature are grouped in what is known as the Safety and Special Radio Services. Authorizations in this group totaled nearly 178,000 at the

close of fiscal 1951, which was an increase of more than 23,000 over the previous period. These authorizations represent the use of more than 392,000 transmitters, of which number 280,000 are portable or mobile.

The Safety and Special Radio Services are made up of some 40 different classes of radio stations operating on the land, on the sea and in the air.

Six types of aircraft and ground stations are covered in the aeronautical services, which had more than 34,000 authorizations for the use of about 3,200 fixed and 32,500 mobile transmitters. More than 25,000 of these stations were on aircraft.

Nearly 30,000 authorizations in the marine services reflected the use by half a dozen services of some 1,300 fixed and 28,000 mobile transmitters. Ship stations accounted for 25,500 transmitters and 1,400 radar installations.

Six classes of public safety stations held 9,100 authorizations for the operation of 6,500 fixed transmitters in conjunction with over 80,000 mobile units. The police service had the largest number—6,200 authorizations to link 4,300 fixed and 60,000 mobile tranmitters.

Almost 5,000 authorizations in the land transportation services denoted the utilization of radio by railroads, streetcars, buses, taxicabs, highway trucks, and automobile emergency vehicles. This group had approximately 3,700 fixed transmitters and 75,000 mobile units. The taxicab industry was the largest user, with 3,000 fixed stations directing the operation of 63,500 radio-equipped vehicles.

Eight classes of industrial stations had 9,500 authorizations involving the use of 6,500 fixed transmitters and 64,000 mobile units. The power and petroleum industries, with 7,400 authorizations, operated more than 55,000 transmitters.

The numerically largest individual radio service is that of the amateur. Nearly 89,000 self-styled "hams" held licenses and operated more than 90,000 amateur stations.

The past year saw the establishment of the Disaster Communications Service and the State Guard Radio Service, previously mentioned; Aeronautical Advisory Stations, for air-ground communication at small air fields; and two new classes of amateur licenses, including one for the beginner.

EXPERIMENTAL RADIO SERVICES

In promoting new uses for radio, the Commission authorizes three general classes of experimental operation. These stations engage in research, testing, and development of apparatus and techniques looking to the improvement of radio in general or the practicability of new services. At the close of the year there were more than 400 ex-

perimental authorizations, representing the use of some 200 fixed and 1,300 mobile transmitters.

BROADCAST

For the first time, broadcast revenues in the calendar year 1950 passed the half-billion mark. Broadcast profits of $59 million were more than double those of the previous year. AM and FM revenues of $444.5 million were the highest on record. TV revenues of $105.9 million tripled the 1949 figure. AM–FM profits of $68.2 million were about 30 percent over 1949, while TV's loss was reduced from $25.3 million to $9.2 million.

The fiscal TV year was marked by the Supreme Court, on May 28, 1951, upholding the Commission's adoption of the field sequential color system. This enabled such colorcasts to start on June 25.

Proceedings to augment and improve present television service entered their final phase—consideration of assignment of channels to individual communities on a national basis. This determination is necessary before the Commission can remove its present "freeze" on new TV station construction.

Meanwhile, 107 operating TV stations continued to bring video programs to 63 cities and metropolitan areas with a population of approximately 87,000,000 people in 43 States.

In the standard (AM) broadcast field, the difficult process of arriving at an international agreement regarding assignments and rules for the sharing of channels approached realization in the signing, on November 15, 1950, of the Third North American Regional Broadcasting Agreement (NARBA). This pact was awaiting Senate ratification at the close of the fiscal year.

The number of authorized AM broadcast stations in this country increased to 2,385, or 82 more than the previous year.

Commercial frequency modulation (FM) broadcast authorizations decreased to 659, a loss of 73 since the year previous. However, the number of licensed commercial FM stations rose from 493 to 534.

Authorizations for noncommercial educational FM broadcast stations increased from 82 to 95. In contrast to the deletions of regular FM broadcast operation, no noncommercial educational FM station having once started programming on the air has yet been deleted.

During the year the Commission amended certain rules to encourage facsimile broadcasting, but little interest was shown by FM broadcast licensees in providing this service.

The number of international broadcast stations in this country, which beam the "Voice of America" programs abroad for the Department of State, remained at 40.

Of the nearly 4,600 authorizations in the broadcast service, about 1,300 were for auxiliary services, such as remote pickup, studio-transmitter links, and developmental. Many auxiliary television stations were using microwave for pickup, studio-transmitter connections, and temporary intercity relay purposes.

The industry estimated that more than 102,000,000 broadcast receiving sets were in use, which was five-eighths of the total for 128 countries throughout the world. Of 42,520,000 occupied dwellings in the United States, 95 percent had one or more receivers.

Rule making during the year which affected broadcast services generally included arrangements to have licenses expire by groups of stations on a geographical basis; relaxation of main studio location requirements and also to permit dual city coverage; enabling Commission field offices to act on AM and FM station requests for temporary operation with operators of lesser grade than normally required; clarified requirements for the construction, marking, and lighting of antenna structure; and a policy to be followed in connection with violation by an applicant of laws of the United States other than the Communications Act, such as monopoly, restraint of trade, unfair competition and other matters.

COMMERCIAL RADIO OPERATORS

More than 612,000 commercial radio operator authorizations were outstanding. They covered various classes of radiotelephone and radiotelegraph operation. Approximately 83,000 new authorizations were issued during the year, which closed with a net gain of nearly 75,000.

To meet Government and industry need for operators, certain licensing requirements were relaxed. Means were set up whereby a radio operator could qualify for a radar endorsement on his license. An agreement was reached with Canada to permit citizens of either country to operate mobile stations across the border.

FIELD ENGINEERING AND MONITORING

The Commission's primary inspection, examination, enforcement, and engineering fact-finding activities continued to be exercised by its field engineering staff. Nine regional offices supervised this work through 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations.

As a result of more than 10,800 inspections of radio installations on domestic and foreign vessels, 5,800 deficiency notices were served. Some 1,500 broadcast station inspections brought 885 discrepancy notices. More than 13,500 inspections of other types of radio stations revealed over 3,700 discrepancies.

Commercial operator licenses issued in the field, as a result of examinations given in the field, exceeded 139,000, which was an increase of 38 percent over 1950.

More than 9,600 complaints required field investigation. Most of them concerned the technical operation of authorized stations and largely involved interference to TV reception. However, interference to existing services, though in smaller proportion, warranted important consideration. Also, 101 illegal radio operations were discovered and closed, which was 48 under the previous year's figure.

Nearly 2,500 major monitoring cases handled during the year further reflected the increase in interference complaints. Monitoring activities resulted in more than 8,800 violation notices being served on radio stations and operators, both domestic and foreign.

In the same period, the Commission's monitoring network was called into action on 168 occasions in aid of lost or disabled air and sea craft.

TECHNICAL RESEARCH

The Technical Research Division, which studies problems of wave propagation, operating standards, and kindred subjects, gave increased attention to the VHF and UHF part of the spectrum and collected and evaluated much data with respect to television. Other studies concerned FM and TV receiver radiation, and interference from restricted and incidental radiation devices.

In collecting information on radio propagation and atmospheric noise, the division maintained close liaison with the Central Radio Propagation Laboratory of the National Bureau of Standards. It also participated in technical studies incident to international conferences, and represented the Commission in coordinating radio research, standardization and instrumentation with Government and industrial organizations.

LABORATORY ACTIVITIES

The Commission's laboratory, near Laurel, Md., pursued technical studies to aid the Commission in allocating frequency bands and formulating standards and regulations for the operation of radio services in those bands.

One current activity is in connection with the prospective regulation of noncommunications equipment capable of emitting energy which can interfere with regular radio services. The use of industrial and other apparatus using radio-frequency energy has increased to such an extent that the power employed by this group exceeds the total transmitter power required by all forms of electrical communication.

The work of the laboratory is largely one of anticipating interfer-

ence problems and having remedial measures taken prior to the manufacture and distribution of a large number of units. Hence, it tests types of proposed new equipment for approval before the apparatus is marketed.

INTERFERENCE AND ANTENNA RULES

In seeking to minimize interference from industrial, scientific, and medical apparatus which come under part 18 of its rules, the Commission continued to work with manufacturers and distributors of such equipment in ironing out mutual problems. In this connection, it postponed the application of a new part of those rules governing welding apparatus employing radio frequency energy.

At the same time, by proposed rules and like cooperative effort, the Commission is tackling the problem of interference from other equipment which presently does not require licensing under part 15 of the rules dealing with restricted radiation devices. This is prompted by the growing number of "college campus" wired-broadcast circuits, industrial signalling, and communications systems, phone oscillators, garage door openers, remote control of model planes, and other like operations.

New rules (part 17) relating to the construction, marking and lighting of antennas became effective February 1, 1951. Worked out with Government and private aviation interests, they enable prospective applicants for radio stations to determine whether any proposed antenna structure will constitute an aeronautical hazard.

COMMISSION

There was no change in Commission membership during the year Commissioner George E. Sterling began a new term on July 1, 1950. Renominated on May 22, 1951, Chairman Coy was confirmed by the Senate on June 14, and on June 27 was sworn in for a 7-year term starting July 1.

The Commission continued to reorganize its staff on functional instead of professional lines. On May 1, 1951, a separate Broadcast Bureau was created. In the light of the establishment of this bureau, and of two other bureaus (Common Carrier and Safety and Special Radio Services) in 1950, the duties of the General Counsel, Chief Accountant and Chief Engineer were redefined as of May 2, 1951.

On June 30, 1951, the number of persons employed by the Commission totaled 1,205, which was 80 less than the year previous. Approximately one-third of them were in the field, mostly engaged in engineering.

The Commission operated with an appropriation of $6,600,000. This was $129,345 under the 1950 figure.

Among legislative proposals made by the Commission during the year was one for the addition of a radio and wire fraud statute to the United States Criminal Code, and amendments to the Communications Act which would authorize the Commission to purchase land and construct buildings for monitoring and research purposes, provide reimbursement by the States for the salaries and expenses of Commission employees loaned as consultants or witnesses in common carrier State regulatory matters, and eliminate the requirement for first securing a construction permit in licensing certain types of radio facilities.

Of 24 cases involving the Commission in the Federal courts, the Commission was upheld in 11 (including 1 in the Supreme Court), was reversed in 1 (Court of Appeals), and 3 cases were dismissed or withdrawn. Three court injunctions were secured by the Commission against illegal radio operation.

2. SUBSEQUENT EVENTS

National Defense

On October 24 the President signed a bill (S. 537) which amended Section 606 (c) of the Communications Act, concerning emergency powers of the Chief Executive, to provide for the control of electromagnetic radiations which could serve as navigational aids to an enemy, and to prescribe penalties for violations. An Executive Order of December 10 empowered the Federal Communications Commission to draft and enforce regulations in this connection.

On December 19, the Commission proposed to establish a Radio Amateur Civil Emergency Service in which amateur radio stations and operators could provide radiocommunication for civil defense purposes during the present emergency.

COMMON CARRIERS

In a report and order issued August 24, 1951, the Commission found that Western Union needed additional revenues to meet company wage increases which became effective July 1 of that year. Accordingly, it permitted Western Union to revise rates for interstate message telegraph and money-order services which were expected to produce additional net annual revenue of approximately $9,800,000. The new rates went into effect September 1.

On August 17, the American Telephone & Telegraph Co. inaugurated telephone service over the final link in its coast-to-coast microwave system. On September 4, this system was used for a special Nation-wide telecast of the Japanese peace treaty session at San Francisco, and was placed in commercial TV relay operation on Sep-

tember 28. This is the first transcontinental radio relay system and the largest facility of its kind in existence.

On July 11, the Commission concluded that, with respect to utilization of the band 470–500 megacycles, the needs of television broadcasting were greater than those of the common carrier mobile service and, in consequence, it added that band to the proposed new TV channels. Common carriers were invited to consider alternative means of deriving additional channels, such as effecting adjacent channel assignments on closer frequency separations, use of improved operational techniques such as single side band transmission and multiplexing, and geographic sharing of frequencies assigned to other services.

Test of a "Telemeter" subscriber television system was authorized by the Commission on October 10 under conditions which previously prescribed for tests of the "Phonovision" and "Skiatron" systems.

On October 17, the Commission proposed a revised plan for apportioning local telephone exchange costs between intrastate and interstate telephone service which would have important effects on local and long distance telephone rates. These contemplated changes in the separations procedures were accepted the following day by the National Association of Railroad and Utilities Commissioners (NARUC) in convention at Charleston, S. C., and then transmitted by the latter to State utilities commissions for their individual action. The effect of the revision is to transfer to interstate operations of the Bell System about $90 million of exchange plant book cost and $22½ million of associated annual expense (now charged to intrastate operations). This change reduces the Bell System's revenue requirements applicable to state operations and increases its interstate long distance service revenue requirements. Because of the resulting substantial reduction in the level of Bell's interstate earnings, the Commission, on November 21, thereafter, postponed indefinitely its pending investigation of the Bell System's rates for interstate and foreign communication services (docket 9889), in order to observe the effects on Bell's operating results of the separations revision and of rate adjustments proposed to be made by Bell in interstate rates in order to compensate, in part, for the reduction in its rate of interstate earnings.

The Commercial Pacific Cable Co., on November 15, received permanent authority to cease its transpacific cable operations because of radiotelegraph competition, age and condition of the cables, and cost of maintenance. On the following November 22 commercial radiotelephone service between the continental United States and the Island of Guam was opened by the American Telephone and Tele-

graph Co., on the mainland, and RCA Communications, Inc., on Guam.

Trail of long distance telephone dialing started on November 10 when a call was made from Englewood, N. J., to Alameda, Calif.

During July and August, the Commission prescribed depreciation rates for the Northwestern Bell, Illinois Bell, Ohio Bell, and Southwestern Bell telephone companies, effecting a net reduction of more than $2,500,000 annually in such charges of those four companies collectively.

SAFETY AND SPECIAL RADIO SERVICES

Use of mobile relay stations in the industrial and railroad radio services was authorized by the Commission on August 15, 1951, effective September 24 for those therein showing a special need for this type of communication.

Previously, on July 5, the Commission proposed to amend its rules to permit microwave operation in the Low-Power Industrial Radio Service, for mobile communication similar to that in other industrial radio services.

On July 18 the Commission referred to the Joint Technical Advisory Committee (JTAC), for study and comment, questions of further reduction of separation of frequencies in the 152–162 and 450–460 megacycle bands used for land mobile operation, and the relative merits of FM and AM for such operation.

On July 11, the Commission proposed to permit the use of the frequency 122.8 megacycles for private aircraft engaged in civil-defense activities, and to allow unattended operation of radio-beacon stations in the 200–400-kilocycle band.

An Industrial Radiolocation Service, to be used primarily in geographical, geological, and geophysical activities, was authorized by the Commission on December 19, to become effective February 1, 1952.

BROADCAST

Television.—Because of the great length of time that oral hearing would consume, and in view of the urgent need for lifting the television "freeze" at the earliest practicable date, the Commission on July 13, 1951, proposed to adopt, in principle, a form of written hearing urged by the National Association of Radio and Television Broadcasters and others to deal with the final phase of the TV proceedings—the proposed assignment of TV channels to individual communities. As the result of a formal prehearing conference on July 20, in which more than 200 parties participated, the Commission on July 25 canceled further oral hearings and prescribed a procedure whereby written statements and written replies would be filed by

geographic groups between August 27 and November 26, after which time the Commission hoped to prepare its final report (dockets 8736 et al.).

Pursuant to a fifth report in the TV proceedings, released July 26, many existing TV stations were able to increase their power under specified conditions and subject to the ultimate determination of these television matters.

The Commission, on September 26, postponed until February 25, 1952, the start of its hearing on the allocation of frequencies and the promulgation of rules and regulations for a proposed theater television service (docket 9552).

July 1, which marked the tenth anniversary of commercial TV broadcasting, saw 107 stations on the air and 415 applications for new stations pending. The 108th TV station started operating on September 30. As of November 1, the number of TV sets in use in the United States was estimated by the industry to be in excess of 14½ million.

The first transcontinental television program was sent on September 4 when President Truman opened the Japanese peace treaty conference at San Francisco. It was carried over the telephone company's coast-to-coast microwave relay system (see common carriers). The first two-way cross-country TV relay took place on September 23, and regular transcontinental telecast service began on September 28.

Because of the materials shortage, a National Production Authority order of November 20 prohibited the manufacture of color TV sets or attachments, but permitted the manufacture of color TV equipment for experimental, defense, industrial, and certain hospital and educational uses.

A "Code of Practices for Television Broadcasters" was adopted by the Television Board of the National Association of Radio and Television Broadcasters on December 6.

A United States agreement with Mexico respecting the assignment of channels for TV stations along the border, to preclude interference and otherwise mutually protect operation, was announced by the Department of State on October 26, and on November 11 was made a subject of Commission procedure.

Frequency modulation.—On July 13, the Commission announced that it is "not considering the deletion of the FM band or any part of it" or "allocating the FM band or any part of it to any other service", adding:

> The approximately 700 stations now operating in the FM band is real testimony to the strength of the service, particularly when one considers that many manufacturers do not make sets and none of them have carried on continuously aggressive sales campaigns. In almost every area in the country there is an unfilled demand for FM receivers.

General.—By actions on August 8 and 27, the Commission designated for consolidated hearing, to start January 15, 1952, various applications involving Paramount, DuMont, and Balaban & Katz interests, including a proposed merger of the American Broadcasting Co. and United Paramount Theaters, Inc. (dockets 10031 et al.).

On July 15, the Commission finalized rule-making to relax temporarily operator requirements for AM and FM broadcast stations in individual cases, effective September 1.

The Commission, on October 26, announced a policy to be followed in processing applications in conformity with the new North American Regional Broadcasting Agreement (NARBA).

AMATEURS

The new novice class of amateur radio operator authorization became available July 2, 1951. In the first week, 500 out of 600 applicants qualified. Their ages ranged from 12 to 86 years, the average being about 25.

On July 16, the Commission reminded amateurs that those who have filed timely applications for renewal of licenses may continue operating their stations beyond the normal expiration date pending receipt of Commission notification of action on their renewal applications.

CHAPTER I—GENERAL

1. AUTHORITY

The Federal Communications Commission operates under the authority of the Communications Act of 1934, as amended.

That statute coordinated in the Commission broadcast regulatory functions previously exercised by the Federal Radio Commission; supervision of certain telephone and telegraph operations formerly vested in the Interstate Commerce Commission; jurisdiction over Government telegraph rates which had been under the Post Office Department, and some powers of the Department of State with respect to licensing ocean cables. It also gave the Commission additional powers, including supervision of rates of interstate and international common carriers, and domestic administration of international agreements relating to wire and radio communication.

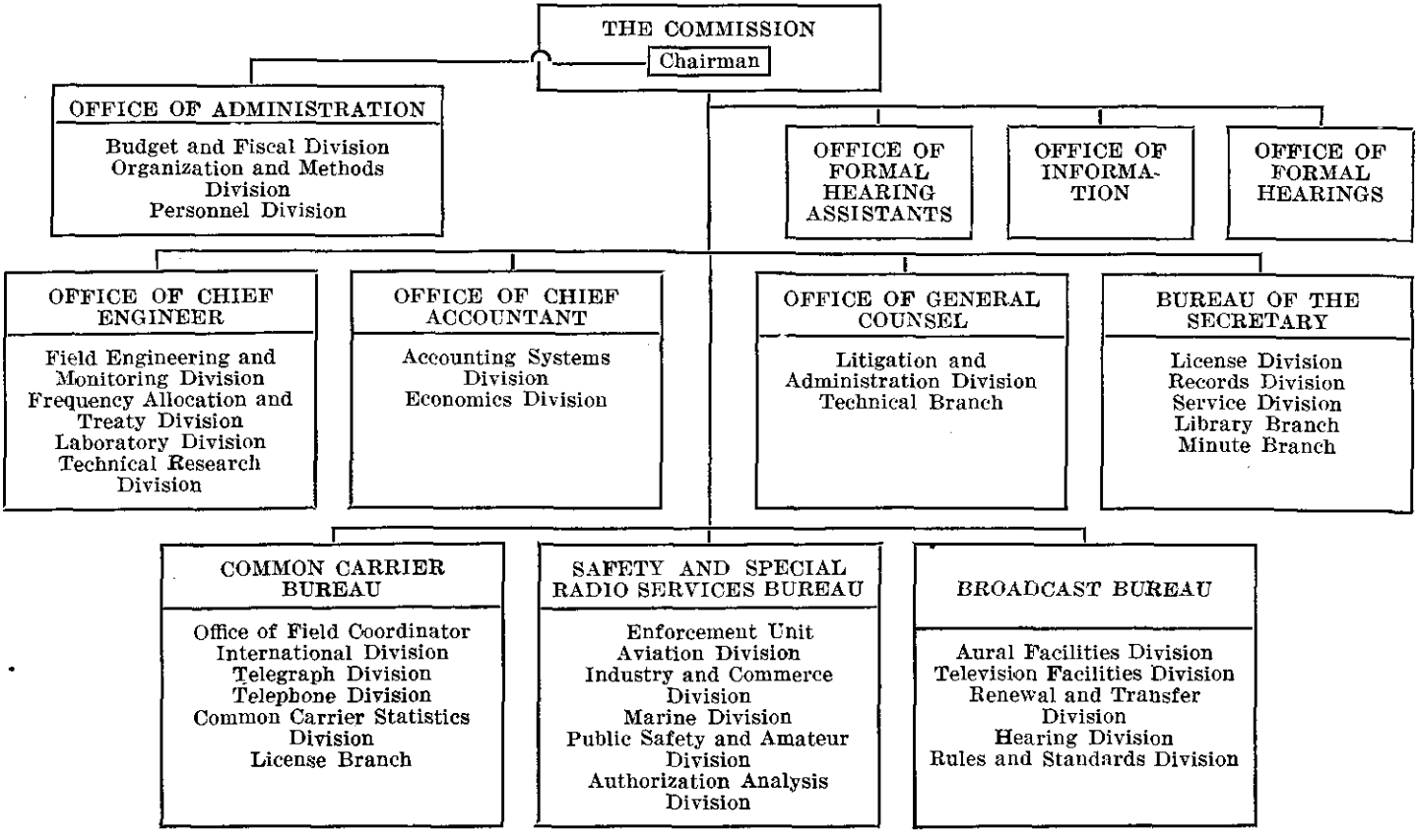
2. COMMUNICATIONS ACT OF 1934

Title I of the Communications Act defines the purposes of the statute, the terms and duties of the Commissioners, and confers general powers.

Title II of the act embodies provisions applicable to common carriers engaged in interstate and foreign communication by wire and radio.

FEDERAL COMMUNICATIONS COMMISSION

ORGANIZATION CHART



Title III contains provisions relating to radio and is divided into two parts. Part I deals with radio licensing and regulation. Part II pertains to use of radio on board certain ocean-going ships.

Title IV contains procedural and administrative provisions.

Title V deals with penalties and forfeitures for violators.

Title VI prohibits unauthorized interception and publication of communications and confers certain powers upon the President in event of war or other national emergency.

The authority of the Commission under the act extends to United States Territories and possessions, but not to the Canal Zone.

The act limits licensing by the Commission to citizens of the United States. It further denies the license privilege to corporations of which any officer or director is an alien, or of which more than one-fifth of the capital stock is owned or controlled by foreign interests.

Communication facilities operated by the Federal Government are not under Commission jurisdiction.

3. FEDERAL COMMUNICATIONS COMMISSION

As an independent Federal agency established by Congress, the Commission reports directly to Congress.

It is composed of seven Commissioners appointed by the President, subject to confirmation by the Senate. The Chairman is designated by the President. Not more than four Commissioners can be members of the same political party. The normal term of a Commissioner is 7 years with the termination dates so staggered that not more than one Commissioner's term expires in any year.

4. FUNCTIONS

The Commission is, in general, charged with regulating interstate and international communication by telephone and telegraph, and broadcast and other forms of radio services.

Its duties fall into three major categories—those affecting common carrier services (telephone and telegraph by means of radio and wire, including submarine cable); those dealing with nonbroadcast radio services (safety and special); and those relating to broadcast (program) services.

Commission regulation involves supervision of rates and services of common carriers subject to its jurisdiction; allocation of radio frequencies; licensing of non-Government radio stations and radio operators; promoting safety through the use of radio on land, water, and in the air; encouraging more effective and widespread utilization of radio; participating in the formulation and domestic administration of wire and radio provisions of treaties and other international agreements to which the United States is a party; and helping co-

ordinate the many forms of electrical communication with the national security effort.

These regulatory functions include the establishment and enforcement of rules and regulations, and engineering standards, and making and carrying out policies to meet expansion and developments in this field. In so doing, the Commission must conform to the Administrative Procedure Act which prescribes uniform rule-making practices for Federal agencies to follow.

No fee or charge of any kind is exacted by the Commission in connection with its licensing and regulatory functions.

5. COMMISSIONERS

The Commissioners function as a unit, directly supervising all activities of the Commission, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the Commission staff. (See accompanying organization chart.)

Since June 2, 1949, the Chairman has, pursuant to Commission authorization, exercised additional administrative responsibilities. The Office of Administration is directly responsible to and aids the Chairman in discharging these added duties.

Since the same date, the Office of Formal Hearing Assistants, comprising a special legal and technical group, has assisted the Commission as a body in matters pertaining to hearings.

Because of the mounting workload and growing complexity of problems requiring policy consideration, provision was made in early fiscal 1950 for an attorney adviser to each Commissioner.

Chairman Wayne Coy was, on May 22, 1951, renominated by the President and confirmed by the Senate on June 14 for a 7-year term, starting July 1, 1951. On July 1, 1950, Commissioner George E. Sterling began a new term under Presidential reappointment. An Executive order of December 21, 1950, exempted Commissioner Paul A. Walker from compulsory retirement for age during his present term. (A list of the Commissioners and their terms is contained in the front part of this report.)

6. STAFF ORGANIZATION

During the year the Commission continued to reorganize its staff on functional instead of professional lines.

By orders of May 2, 1951, the Commission redefined the duties of the Offices of General Counsel, Chief Accountant and Chief Engineer which (on April 3, 1950) had been established as major staff units. The effect was that, as of June 4, they have the major responsibilities here listed:

Office of General Counsel.—(1) Advise and represent the Commission in matters of litigation; (2) advise and represent the Commission, and coordinate and make recommendations to the Commission on proposed legislation and international agreements with which the Commission is concerned; (3) interpret the statutes, international agreements and international regulations affecting the Commission; (4) prepare and make recommendations and interpretations concerning procedural rules of general applicability; review all rules for consistency with other rules, uniformity, and legal sufficiency; (5) conduct research in legal matters as directed by the Commission; (6) in conjunction with the Chief Engineer, participate in, render advice to the Commission, and coordinate the staff work with respect to general frequency allocation proceedings and other proceedings not within the jurisdiction of any bureau, and render advice with respect to rule-making matters and proceedings affecting more than one bureau; (7) perform all legal functions with respect to (*a*) international broadcast stations; (*b*) rules, establishment of technical standards, encouragement, authorization and regulation of experimentation in the electronic arts or the incidental use of them for general research and scientific purposes; provided, that experimentation which has the primary purpose of improving the established classes of services shall continue to be handled by the bureau responsible under the rules for the administration of such services, and provided that nothing herein shall affect the Field Engineering and Monitoring Division's inspection functions; (*c*) restricted and incidental radiation devices, including the conduct of studies of uses of such devices by industry and the general public with a view toward eliminating interference to established services, including the development and promulgation of rules, the testing and type approval of equipment, the review of complaints of interference to established radio services, and such other activities as are necessary in carrying out responsibilities in connection with this function; and (*d*) regulation of commercial radio operators, including the development and promulgation of rules and regulations governing the licensing of radio operators, maintaining examination requirements on a current basis, reviewing citations with respect to commercial operators, and such other matters necessary to the carrying out of this function; (8) in other matters (*a*) maintain liaison with other agencies of Government; (*b*) provide representation for the Commission on Commission-wide and interdepartmental committees; and (*c*) deal with members of the public and of the industries concerned; (9) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended; and (10) perform such other duties as may be assigned or referred by the Commission.

The Office of General Counsel functions with a Litigation and Administration Division and a Technical Branch.

Office of Chief Accountant.—(1) Recommend the accounting principles which shall be observed; (2) conduct research in and advise the Commission on economic matters to be considered in policy determinations; (3) advise the Commission and its bureaus regarding accounting, economic, and statistical matters; (4) maintain liaison with other agencies of Government on common-carrier matters; (5) provide representation for the Commission on Commission-wide and interdepartmental committees; (6) deal with members of the public and of the industries concerned; (7) perform such other duties as may be assigned or referred by the Commission; (8) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended.

The Accounting Systems Division, under the Chief Accountant, (1) recommends the formulation, revision, and amendment, in collaboration with the Common Carrier Bureau, of the (*a*) Commission's Uniform Systems of Accounts, (*b*) regulations for the preservation of records, (*c*) reporting requirements and related rules and regulations; (2) recommends the formulation, revision, and amendment, in collaboration with the Broadcast Bureau, of the forms of financial and statistical reports required to be filed with the Commission, and related rules and regulations; (3) interprets the (*a*) Commission's Uniform Systems of Accounts, (*b*) regulations for the preservation of records, (*c*) reporting requirements and related rules and regulations; (4) participates in activities and work of the National Association of Railroad and Utilities Commissioners' Committee on Accounts and Statistics; corresponds with members on accounting matters of mutual concern; and prepares for and participates in periodic conferences.

The Economics Division, under the Chief Accountant, (1) conducts economic research activities: (*a*) prepares and compiles economic data and coordinates the compilation of regular economic reports to the Commission on condition and status of the industries subject to the Commission's jurisdiction; (*b*) studies the social and economic factors affecting the public demand with respect to communications; (*c*) prepares studies, or suggests studies to the bureaus, in order to provide an over-all view of the structure and operations of the communications industries, for the assistance of the Commission, the industry, and the public; (*d*) serves as a clearing house for the staff on sources for obtaining pertinent economic data within the Commission and available from governmental and private organizations; (2) provides statistical consultation and economic information service: (*a*) reviews and advises the bureaus on content and form of statistical schedules

required by the Commission of communications companies and of statistical reports prepared by the Commission; (*b*) provides technical advice and assistance to the staff and the Commission on statistical aspects of questionnaires, sampling, industry economic trends, national economic trends and statistical methods; (*c*) reviews statistical reports and prepares digests to inform the Commission on basic industry developments; (*d*) serves as Commission representative on interagency statistical projects.

Office of Chief Engineer.—(1) Advise the Commission and the various bureaus on matters of applied technical research; (2) advise and represent the Commission on the allocation of radio frequencies including international agreements pertaining to frequency allocations; (3) collaborate with the bureaus in the formulation of standards of engineering practice and the rules and regulations related thereto, and advise the Commission on such matters; (4) in conjunction with the General Counsel, participate in, render advice to the Commission, and coordinate the staff work with respect to general frequency allocation proceedings and other proceedings not within the jurisdiction of any bureau, and render advice with respect to rule-making matters and proceedings affecting more than one bureau; (5) perform all engineering functions with respect to (*a*) international broadcast stations; (*b*) rules, establishment of technical standards, encouragement, authorization and regulation of experimentation in the electronic arts or the incidental use of them for general research and scientific purposes; provided, that experimentation which has the primary purpose of improving the established classes of services shall continue to be handled by the bureau responsible under the rules for the administration of such services, and provided that nothing herein shall affect the Field Engineering and Monitoring Division's inspection functions; (*c*) restricted and incidental radiation devices, including the conduct of studies of uses of such devices by industry and the general public with a view toward eliminating interference to established services, including the development and promulgation of rules, the testing and type approval of equipment, the review of complaints of interference to established radio services, and such other activities as are necessary in carrying out responsibilities in connection with this function; and (*d*) regulation of commercial radio operators, including the development and promulgation of rules and regulations governing the licensing of radio operators, maintaining examination requirements on a current basis, reviewing citations with respect to commercial operators, and such other matters necessary to the carrying out of this function; (6) in other matters (*a*) maintain liaison with other agencies of Government; (*b*) provide representation for the Commission on Commission-wide and interdepartmental committees;

and (c) deal with members of the public and of the industries concerned; (7) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended; and (8) perform such other duties as may be assigned or referred by the Commission.

The Field Engineering and Monitoring Division, Technical Research Division, Frequency Allocation and Treaty Division, and Laboratory Division are retained in the Office of the Chief Engineer.

By action of May 1, 1951, also effective June 4, the Commission created a separate Broadcast Bureau to unify work pertaining to radio broadcasting which had previously been handled by various legal, accounting and engineering units, and transferred their personnel to the new bureau. The latter's functions are:

Broadcast Bureau.—Assist, advise, and make recommendations to the Commission with respect to the development of a regulatory program for the radio-broadcast services and be responsible for the performance of any work, function, or activities to carry out that program in accordance with applicable statutes, international agreements, rules and regulations, and policies of the Commission, except insofar as functions are specifically delegated to other bureaus or staff offices of the Commission; and, specifically (1) examine applications in the radio-broadcast services and make recommendations to the Commission thereon; (2) participate in hearings involving applications, rule making, and other matters which pertain to the radio-broadcast services; (3) make recommendations to the Commission concerning the promulgation of rules and standards in the radio-broadcast services; (4) participate in international conferences with respect to radio-broadcast services; (5) study frequency requirements in the radio-broadcast services and make recommendations with respect to the allocation of frequencies and the drafting of frequency assignment plans in such services; (6) confer with Government and industry groups interested in the problems of radio-broadcast services; (7) study and establish technical requirements for equipment in the radio-broadcast services in accordance with standards established by the Commission; (8) perform all other functions or activities essential to carrying out the above duties and responsibilities; (9) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended.

In addition to its Office of the Chief, the Broadcast Bureau functions with five divisions as follows:

Aural Facilities Division, which exercises responsibility with respect to the standard (AM) and frequency modulation (FM) broadcast services.

Television Facilities Division, which administers to the TV and auxiliary broadcast services.

Renewal and Transfer Division, which handles applications for renewals of licenses, transfer of control and assignment of licenses or construction permits and enforces applicable statutes, rules, and regulations and orders of the Commission.

Hearing Division, which deals with applications which have been designated for hearing and revocation of licenses or construction permits in the broadcast services. (The duties of this division are apart from the work of the Commission's Office of Formal Hearings, in which hearing examiners function pursuant to the provisions of the Administrative Procedure Act, and that of the Office of Formal Hearing Assistants, which directly serves the Commission.)

Rules and Standards Division, which is concerned with the development or revision of rules and standards, international conferences, and special projects in the radio-broadcast services.

The License Division in the Office of the Secretary issues broadcast licenses upon approval of the Broadcast Bureau.

Creation of the Broadcast Bureau is the result of a survey undertaken by the Commission on November 9, 1950. It is the third of a series of self-instituted organization studies by the Commission. The two preceding surveys resulted in the establishment of two unified bureaus—the *Common Carrier Bureau*, which began operations on April 3, 1950, and the *Safety and Special Radio Services Bureau*, which started functioning July 31 of the same year. (Duties of these bureaus were detailed in the 1950 annual report.) On June 21, 1951, the Commission awarded a contract to McKinsey & Co., management consultants, to conduct two remaining management surveys—i. e., the Field Engineering and Monitoring Division and miscellaneous staff offices not covered by the previous reorganization. These actions follow out Commission policy, adopted in 1949, of reorganizing its operating staff on functional instead of professional lines.

On December 18, 1950, the Commission changed the name of its State-Local Government and Amateur Division of the Safety and Special Radio Services Bureau to the Public Safety and Amateur Division in that same bureau.

The *Bureau of the Secretary* is under the Secretary of the Commission, who is custodian of the Commission's official records, processes correspondence and official papers, signs instruments of authorization for the Commission, and has certain service functions.

The Office of Administration is headed by the Executive Officer who, under the supervision and direction of the Chairman, reviews in cooperation with other staff units the programs and procedures of the

Commission, and plans, coordinates and manages Commission activities relating to personnel, budget, and planning.

The *Office of Formal Hearings* (which was established May 28, 1947, as the Hearing Division and renamed December 15, 1949) consists of hearing examiners, functioning pursuant to the Administrative Procedure Act, who conduct hearings, hold prehearing conferences, act on motions and petitions and prepare initial decisions containing detailed findings and conclusions. Initial decisions take the place of and serve the same purpose as proposed decisions, which were issued by the Commission prior to June 2, 1949.

The *Office of Formal Hearing Assistants* is a separate unit, responsible directly to the Commission. It reviews initial decisions and exceptions thereto, prepares summaries to assist the Commission during oral argument and drafts, pursuant to Commission direction, final decisions and orders dealing with petitions for reconsideration or rehearing.

The *Office of Information* releases public announcements by the Commission and is contact point for the press and public in the matter of general information relating to Commission activities.

An organization chart of the Commission, as of June 30, 1951, appears as a separate page of this report.

7. PERSONNEL

As of June 30, 1951, the number of persons employed by the Commission totaled 1,205, which was 80 less than the year previous. Approximately one-third of all its employees were in the field. Personnel distribution was as follows:

Office or bureau	Washington	Field	Total
Commissioners	35	0	35
Formal hearing assistants	6	0	6
Formal hearings	17	0	17
Information	4	0	4
Administration	40	0	40
Secretary	161	0	161
General counsel	22	2	24
Chief accountant	25	0	25
Chief engineer	133	380	513
Common carrier	95	32	127
Safety and special	130	0	130
Broadcast	123	0	123
Total	791	414	1,205

8. APPROPRIATIONS AND EXPENDITURES

The Commission operated with an appropriation of $6,600,000 for the 1951 fiscal year. This was $129,345 less than the year previous. A breakdown of 1951 income and expenditures follows:

Appropriation		*Expenditures*	
Regular appropriation (salaries and expenses)	$6,625,000	Personal services	$5,908,513
Savings under sec. 1214	25,000	Travel	85,439
		Transportation of things	20,351
		Communication services	151,063
Total funds available	6,600,000	Rents and utilities	60,412
		Printing and reproduction	33,807
		Other contractual services	91,784
		Supplies and materials	136,505
		Equipment	111,821
		Refunds, awards, and indemnities	123
		Total obligations	6,599,818
		Savings, unobligated balance	182
		Total	6,600,000

The appropriation and expenditures were authorized by Public Law 759, Eighty-first Congress, approved September 6, 1950.

9. LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeals (under Public Law 901, 81st Cong., effective, except for pending litigation, on January 28, 1951) over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 24 cases in which the Commission was a party in the Federal courts. Of this total, nine were instituted during the fiscal year—four in the Court of Appeals for the District of Columbia Circuit, and five in district courts. The other 15 cases were pending at the beginning of the fiscal year.

The Supreme Court upheld the Commission in the one case brought before it on appeal from a three-judge district court decision affirming the Commission. In the Court of Appeals for the District of Columbia Circuit, the Commission was sustained in five cases and reversed in one case, two cases were dismissed by agreement of the parties, and one case was dismissed for failure to prosecute. In the district courts,

one complaint against the Commission was withdrawn, one decision was issued affirming the Commission (later affirmed by the Supreme Court), and three interlocutory injunctions were secured by the Commission against the illegal operation of radio equipment. (One of these cases was later dismissed by stipulation.)

As of June 30, 1951, five cases were pending in the Court of Appeals for the District of Columbia Circuit, and five cases were pending in United States district courts.

The status of litigation for the fiscal year may be tabulated as follows:

Court	Total	*Decisions* affirming Commission	*Decisions* reversing or remanding case	Dismissed by agreement of parties	Cases pending June 30, 1951
Supreme Court	1	1	0	0	0
Court of Appeals for District of Columbia Circuit	14	6	1	2	5
District courts	[1] 9	[2] 4	0	[3] 1	5
Total	24	11	1	3	10

[1] One of these cases was later affirmed by the Supreme Court.
[2] The district court affirmed the Commission in 1 of these cases, and was later sustained by the Supreme Court. Interlocutory injunctions were secured by the Commission in 3 of these cases. The injunction was made final in 1, and 1 was later dismissed by stipulation. The fourth case is therefore technically pending and is listed as pending.
[3] This case, which was brought to secure an injunction against Commission action, was withdrawn.

The following cases decided during the fiscal year were of particular interest:

1. In *Radio Corporation of America, et al.* v. *United States*, 341 U. S. 412, 71 Sup. Ct. 806 (1951), the Supreme Court upheld the Commission's establishment of the first engineering standards for color television. After an extensive hearing the Commission had adopted standards for color television based on the field sequential system proposed by the Columbia Broadcasting System, Inc., and rejected the Radio Corp. of America's dot sequential system. Over the contention of RCA that the Commission's action exceeded its power and was not based on substantial evidence, the court affirmed the decision of the District Court for the Northern District of Illinois (95 F. Supp. 660), granting summary judgment for the Commission. The court held that the Commission had authority to adopt a single, exclusive set of standards, and that the record supported its rejection of the RCA system and the adoption of the CBS system as worthy of acceptance for public use. (There is further discussion of color television in the chapter on Radio Broadcast Services.)

2. In *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission*, 342 U. S. App. D. C. 830, F. 2d — (1951), the Commission had granted a construction permit for a new standard broadcast

station in Cleveland, Ohio, to Cleveland Broadcasting, Inc., and had denied the mutually exclusive application of the appellant for the same facilities. The Commission, after a comparative hearing, had found both applicants financially and otherwise qualified, and had made the grant on the basis of the superiority of Cleveland Broadcasting with respect to local residence of stockholders, degree of integration of ownership and management, and diversification of control of the media of mass communications, concluding that both applicants had meritorious and similar program proposals and that the elements with respect to which Cleveland Broadcasting was superior outweighed appellant's greater broadcasting experience and the somewhat more efficient use of the frequency it proposed. The Court of Appeals held that the Commission had properly determined that it must consider all of the points of difference between the applicants, that its findings were supported by the record, and that its judgment as to which applicant would better serve the public interest was based on reasonable grounds.

3. In *Huntington Broadcasting Co.* v. *Federal Communications Commission*, — U. S. App. D. C. —, 192 F., 2d 33 (1951), the Commission had granted the application of Coast Radio Broadcasting Corp. for a construction permit for a new standard broadcast station to be located in Los Angeles, and had denied the mutually exclusive application of Huntington Broadcasting Co. for a new station in the city of Huntington Park, an independent municipality which is an integral part of the Los Angeles metropolitan district. The Commission based its decision on the ground that since both applicants had applied for regional stations which would serve substantially all of the Los Angeles metropolitan district they were to be judged on their comparative qualifications to serve this area, rather than on the basis of whether Huntington Park had a greater need for a new station than the city of Los Angeles, and the further finding that Coast Radio was better qualified to serve the entire area in the public interest. The Court of Appeals sustained the Commission's position and held that the Commission had correctly determined "that the choice was not as to which of the two communities showed the greater need for a new station, but was rather which of two applicants would better serve the one large community which both desired to cover." The court also held that the Commission had properly chosen Coast Radio on the basis of the greater local residence of its stockholders and its proposed greater integration of ownership and management.

4. In *City of Jacksonville, Jacksonville, Fla.* v. *Federal Communications Commission*, — U. S. App. D. C. —, — F. 2d (1951), the Commission had denied the city of Jacksonville a first extension of its construction permit for a new television station in Jacksonville, Fla.,

because the permittee had failed to proceed diligently to construct the station and had not been prevented from completing construction, and having the station ready for operation, within the authorized time by causes beyond its control or other matters sufficient to justify an extension. Over arguments by appellant that the Commission had unfairly discriminated against it and that the record did not support the Commission's conclusions, the Court of Appeals sustained the Commission in a per curiam opinion. This case therefore upheld the Commission's standard of judging applicants for extensions of construction permits by their conduct during the period of time the construction permit is in effect.

5. In *Easton Publishing Co.* v. *Federal Communications Commission*, — U. S. App. D. C. —, 185 F. 2d 987 (1950), writs of mandamus and prohibition were sought by Easton Publishing Co. and Allentown Broadcasting Corp. to prevent the Commission from reopening the record and holding a further hearing in a case where the Court of Appeals had previously remanded the matter to the Commission to make findings upon the comparative needs of two communities (from which there were mutually exclusive applicants) for new radio service and the relative abilities of the applicants to serve the greater need. The court denied the writs, holding that the Commission is the body charged by Congress with the duty of applying the statutory criteria of the public convenience, interest or necessity, and that the Commission might, in the exercise of this duty, conclude that the original record did not contain sufficient information for a proper determination of the issues before it. Arguments that the further hearing might in certain respects be erroneously conducted were rejected as a basis for the writs. The court held that such alleged errors might be the subject of review upon an appeal from any subsequent Commission decision but could not be the basis for preventing the Commission from holding the further hearing.

6. *In Radio Station WOW, Inc.* v. *Federal Communications Commission*, —, U. S. App. D. C. —, 184 F. 2d 257 (1950), the Commission had granted the application of Star Broadcasting Co. for a new station on the same frequency as station WOW, after a hearing in which WOW did not seek to participate, upon the testimony and representations of Star, which were based on the ground conductivity maps in the Commission's Standards of Good Engineering Practice Concerning Standard Broadcast Stations, that objectionable interference would not be caused to WOW. The ground conductivities shown in the standards are rebuttable, but accepted by the Commission in the absence of contrary evidence. Upon discovering a year later that the operation of the Star station actually caused objectionable interference to station WOW, the latter filed a petition, based on actual

measurements allegedly showing such interference, requesting the Commission to require Star to show cause why its license should not be modified to eliminate the interference. It also petitioned that Star's application for renewal of license be set for hearing. Both petitions were denied by the Commission, and WOW appealed each denial under section 402 (b) of the Communications Act.

The Court of Appeals held that it had no jurisdiction of the appeal from denial of the appellant's petition for a show-cause order why Star's license should not be modified since section 402 (b) (1) affords jurisdiction only upon an appeal by a licensee from denial of an application for modification of its own license. However, the court held that it had jurisdiction of the other appeal under section 402 (b) (2) since WOW was aggrieved and adversely affected by grant of Star's renewal application. Since section 307 (d) of the Communications Act provides that action of the Commission with reference to renewal applications "shall be limited to and governed by the same considerations and practice which affect the granting of original applications", the court held that matters as to which bona fide error was originally made are open for reconsideration where renewal applications are up for consideration. The Commission was, therefore, in error in not granting WOW a hearing in respect to Star's renewal application, and its order was reversed and the matter remanded to the Commission.

7. *In United States* v. *Yonkers Cabinet Corporation* (U. S. D. C., S. D. N. Y.), the Commission secured a preliminary injunction, after hearing, restraining the defendant from operating electronic heating equipment which, as a result of incidental radiations, was causing interference to radio reception of the United States Coast Guard, in violation of the Communications Act and the Commission's rules. On July 10, 1951, this injunction was made permanent, the defendant being in default.

10. LEGISLATION

During the fiscal year Congress enacted one law which directly affected the Commission. This was Public Law 901 of the Eighty-first Congress, which was finally approved on December 29, 1950, becoming effective 30 days thereafter, which had been introduced by Mr. Hobbs as H. R. 5487. This new law provides that appeals from final orders of the Commission, made reviewable in accordance with the provisions of section 402 (a) of the Communications Act, shall be taken to the United States Circuit Court of Appeals of the appropriate circuits or to the United States Court of Appeals for the District of Columbia Circuit, and that subsequent appeals to the Supreme Court shall be upon writs of certiorari. This changed the previous

procedure for section 402 (a) cases, which provided for review by a specially constituted three-judge United States District Court, with subsequent direct appeal to the Supreme Court as a matter of right. The Commission presented extensive testimony on this legislation before the Judiciary Committees of both the House and the Senate, and amendments offered by the Commission were incorporated in the bill as it was finally enacted.

Various proposals were also submitted to the Bureau of the Budget as part of the Commission's legislative program. These proposals included (1) an amendment to section 4 (g) of the Communications Act, which would authorize the Commission to purchase land and construct buildings to be used for monitoring and research purposes; (2) the addition of a radio and wire fraud statute to the United States Criminal Code; (3) an amendment to section 410 (b) of the Communications Act to provide for reimbursement to the Commission by the States for the salary and expenses of Commission employees when they are made available to State commissions to act as consultants or witnesses in common carrier regulatory matters pending before such commissions; and (4) an amendment to section 319 of the Communications Act, which would simplify the procedure for securing licenses to operate certain types of radio facilities by eliminating the requirement of first securing a construction permit from the Commission, as is presently required.

The Commission's proposal with respect to authorizing purchasing of land for monitoring and research activities has been included as one of the provisions of S. 658, introduced by Senator McFarland, which passed the Senate on February 5, 1951. The proposal was also introduced by Mr. Crosser as H. R. 1760, which passed the House on February 19, 1951. H. R. 1760 also passed the Senate on March 12, 1951, but only after it had been extensively amended, and no final action on the bill had been taken by Congress.

Mr. Celler introduced the Commission's proposal for a radio fraud statute as H. R. 2948, and the bill passed the House on June 4, 1951, after Committee hearings at which the Commission presented testimony. This proposal also constituted one of the provisions of S. 658.

Mr. Crosser introduced the Commission's proposals to amend sections 410 (b) and 319 of the Communications Act in the House as H. R. 1729 and H. R. 2794, respectively. No action had been taken on either of these bills.

Congress considered numerous other bills which directly or indirectly affected the Commission and on which it submitted comments to Congress. The most important of those was S. 658, introduced by Senator McFarland, which would amend the Communications Act in numerous important respects and make substantial changes in the

Commission's organization and procedure. This bill was passed by the Senate on February 5, 1951, and members of the Commission presented extensive testimony at hearings before the House Committee on Interstate and Foreign Commerce. S. 1379 and H. R. 4240, introduced by Senator Johnson (Colo.) and Mr. Mansfield, respectively, would amend section 315 of the Communications Act with respect to providing equal radio-broadcasting facilities for candidates for public office. S. 537, the so-called electromagnetic radiation control bill, also introduced by Senator Johnson, contains provisions for the greater security and defense of the United States against attack. A member of the Commission presented testimony on this bill before a Senate committee. H. R. 4309, introduced by Mr. Rogers of Florida, would amend sections 2 (b) and 221 (b) of the Communications Act so as to make specific reference to certain telephone services utilizing radio.

There were a number of bills and resolutions introduced at the close of the Eighty-first Congress and in the Eighty-second Congress dealing with the allocation of television frequencies and television programming, with particular emphasis on the use of television for noncommercial educational programs. The Special Senate Committee to Investigate Organized Crime in Interstate Commerce introduced three bills (S. 1563, 1564, and S. 1624) which are intended to place restrictions on the use of communications facilities for interstate transmission of gambling information. The Chairman of the Commission presented extensive testimony before the Special Senate Crime Committee with respect to the problems with which these bills are concerned.

In addition to drafting numerous legislative proposals, presenting testimony before various congressional committees and commenting extensively on the legislation discussed above, the Commission prepared reports and comments for the Congress and the Bureau of the Budget on more than 30 proposed bills which concerned the functions and duties of the Commission.

11. NATIONAL DEFENSE

Regulation of interstate and foreign communication by wire and radio to aid the national defense, as well as promote the safety of life and property in general, is among the stated purposes of the Commission under section 1 of the Communications Act. In event of war, or public peril or disaster, or other national emergency, special powers relating to such communication are conferred upon the President by section 606 of that act.

The Commission is, in effect, the established medium for executing the national communications policy. Thus, in carrying out the pro-

visions of the act, it is to a large extent responsible for coordinating Government and private activities in the communications field.

Because the Interdepartment Radio Advisory Committee (IRAC) assigns frequencies for the President to Government stations and the Federal Communications Commission assigns frequencies to non-Government stations, there must be mutual understanding and working arrangements. The importance of radio for quick contact with overseas points and the increased use of land, water, and air mobile radio by the military and industry, amid changing scenes which add to interference and other problems, are of common concern to Government and non-Government services.

The role of the Commission in national defense has multiplied since the President on December 15, 1950, declared a state of national emergency. Because of their classified nature, emphasized by section 4 of the Communications Act which specifically authorizes the Commission to withhold publication of information affecting the national security, the Commission is unable to detail publicly its activities in the current defense program. However, in general, it can be reported that the Commission is cooperating closely with the armed services and other Government agencies engaged in such work, and with organizations and other elements of industries affected.

The defense effort requires work which cuts across many fields that are regulated by the Commission. Radio, already essential to the sea and air navigation, land transportation, public communication, protection of life and property, and industrial processes and services, has taken on additional civilian and military significance in the present emergency.

Because electronic emissions can be used to guide enemy aircraft and air missiles, it is necessary to render these signals useless for navigational purposes by any foe and yet have radio continue to play its important part in mass and specialized communication.

Accordingly, the Commission has been called upon by the National Security Council, National Resources Planning Board, Central Intelligence Agency, Civil Defense Administration, Department of Defense, Department of State, National Production Authority, and other military and civilian agencies to work on numerous national defense projects affecting all types of electrical communication.

They cover highly technical plans for the control of electronic emissions during possible air raids, monitoring for subversive radio activity, meeting needs for civil defense communication, authorizing expansion of communication circuits, aiding experimentation with war-time applications of radio, making special technical studies, and safeguarding plants used for communication purposes. Particular

Government cooperation on military and civilian defense plans is effected through the IRAC (previously mentioned) and the Telecommunications Coordinating Committee.

On November 24, 1950, the Commission announced:

> The Federal Communications Commission in cooperation with the Department of Defense and the radio industry is studying the use of radio in event of war. In connection with this study, experiments are being conducted with new uses of radio. In furtherance of this work, the Commission, from time to time, will issue national defense-emergency authorizations pursuant to the provisions of section 2.407 of the Commission's Rules and Regulations authorizing special experimental operations by existing stations. National security requires that these authorizations be classified and not be made public. Stations directly affected by the experimental operations will be informed as fully as possible consistent with security regulations.

Mounting use of radio by the Army, Navy, Air Force, Civil Aeronautics Administration, and private industry has intensified the interference problem. One task of the Commission is to locate the sources of interference and to see that corrective measures are taken to protect vital overseas and domestic radio communication. In addition to policing the spectrum on a 24-hour basis, its monitoring service is providing direction-finding service to an increasing number of lost or disabled planes and ships.

Effective and rapid communication between Federal, State, and local civil defense organizations require the establishment of emergency networks, local communication systems, air-raid warning systems, and the pooling of equipment, services, and operators.

In the common carrier field, the Commission processes classified applications to provide the military organizations with new telephone and telegraph facilities. It also acts on applications by international communication companies to serve new foreign points during the emergency. Since the Armed Forces lease telephone and telegraph facilities, they consult the Commission about available circuits and often request help in establishing additional circuits.

In opening up new radio services and augmenting existing facilities, the Commission has to find and allocate frequencies for their use in an already crowded spectrum, write the rules to govern their functioning under present conditions, license their operation, and monitor their performance in a technical sense.

During the fiscal year the Commission announced the creation of a Disaster Communications Service, which enables Government and non-Government stations to engage in emergency communication; new rules to permit non-Government stations to use Government frequencies in an emergency; reactivation of a State Guard Radio Service, affording radio facilities for State Guards in States where the National Guard has been called into Federal service; and liberalization of com-

mercial operator rules because of the scarcity of certain operators, especially on board ships. More information about these subjects will be found elsewhere in this report.

Its already established services include the Special Emergency Radio Service, which is concerned with public safety and the protection of life and property under emergency conditions; the Public Safety Radio Services, devoted to normal police, fire, forestry-conservation and highway protection; the Civil Air Patrol, a civilian auxiliary of the Air Force; and the Amateur Radio Service, which has long provided regional networks for emergency use and now has a military amateur radio system operating in conjunction with the Army and Air Force.

At the same time, the Commission continues to maintain regional disaster emergency coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, amateur radio operators, and State and municipal police organizations.

12. HEARINGS

When the Commission is not satisfied that the public interest warrants a grant of an application on the basis of the information contained in the application, or when there is more than one applicant for the same facilities, a hearing must be ordered. The great majority of the Commission's hearings concern broadcast matters.

Applications in hearing may be disposed of in three ways—by a decision after hearing; by removing from the docket and granting when the application has been amended to eliminate the issues which necessitated a hearing; or, by dismissal of the application at the request of the applicant.

Docket statistics for the 1951 fiscal year follow:

Class	Pending June 30, 1950	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1951
Broadcast:					
AM	342	197	170	109	260
FM	16	3	7	5	7
TV	181	1	0	3	179
Other	6	3	2	2	5
Safety and special	16	19	20	4	11
Common carrier	27	73	25	6	69
Joint and general	7	9	4	2	10
Total	595	305	228	131	541

13. LICENSES AND OTHER AUTHORIZATIONS

At the close of the year the Commission had more than 885,000 licenses and other authorizations outstanding. This was a net increase of more than 100,000 over the number for the previous year.

There were 39 times as many nonbroadcast radio authorizations (nearly 179,000) as there were broadcast authorizations (nearly 4,600). However, the largest group comprised commercial radio operators (over 612,000).

Radio station authorizations, collectively, represented the use of some 425,000 transmitters, of which number more than 115,000 were fixed and nearly 310,000 were mobile.

14. APPLICATIONS AND OTHER FILINGS

During the year the Commission received approximately 268,000 applications of all kinds, which was 48,000 more than in 1950. Of this total, over 150,000 concerned radio operators, 108,000 others were in the nonbroadcast services, 5,700 concerned broadcast, and nearly 4,000 were from common carriers.

These figures do not include legal filings, periodic reports, or tariff schedules. Common carrier and holding companies filed more than 19,100 tariffs and nearly 2,100 annual reports requiring Commission attention. There was a reduction in international tariff filings of 2,000 under the previous year, due to international conferences and rate changes which have taken place.

15. CORRESPONDENCE, RELEASES, AND PUBLICATIONS

Nearly 1,115,000 pieces of correspondence in the form of letters, telegrams, etc., were received or dispatched through the Commission's Mail and Files Branch during the year. Of this number, about 780,000 were incoming and 335,000 were outgoing.

The Commission's regulatory and administrative procedure required the issuance, during the same period, of mimeographed public notices, orders, decisions, opinions, and rule-making. These necessitated the use of nearly 56,000 stencils, 9,128,000 sheets of paper, and more than 14,380,000 impressions. The Commission issues no "press releases".

The Commission makes no public distribution of its printed publications. The latter are processed by the Government Printing Office and are sold by the Superintendent of Documents. A list of those currently available appears in the appendix to this report.

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CHAPTER II—COMMON CARRIERS

1. REGULATION

Interstate and foreign communication by telegraph and telephone—whether by wire, ocean cable, or radio—is subject to Commission regulation.

The Communications Act, among other things, requires that every subject common carrier furnish service upon reasonable request and at reasonable charges. No carrier may add or acquire facilities, or curtail or discontinue service, without Commission approval. All charges, practices, classifications, and regulations in connection with interstate and foreign communication service must be just and reasonable and nondiscriminatory. To implement this requirement, the common carriers concerned file tariff schedules with the Commission, and those schedules are subject to Commission review and regulation.

Rates for interstate telephone and telegraph services, as well as rates for such services between the United States and foreign and overseas points, are regulated by the Commission, which also reviews the adequacy and quality of these services.

The Commission is further empowered to prescribe the forms of records and accounts kept by these carriers. Under this authority, it has established uniform systems of accounts for them to follow.

The Commission is required by law to approve construction of new lines and extensions or supplementations of lines of common carriers engaged in interstate communcations where such lines are to be used for or in connection with interstate service, before any such construction may be undertaken. Further the Commission regulates the interlocking of officers and directors of subject common carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. The Commission also passes upon applications of such telephone and telegraph carriers for authority to merge or consolidate.

Common carrier wire service which is purely intrastate in character is not, in general, subject to Commission jurisdiction. However, operation of common carrier radio facilities come under provisions of the act which require the licensing of all radio transmitters.

The Commission receives applications to land or operate submarine cables connecting the United States with other countries, and advises the President with respect to the granting of such licenses, after receiving the approval of the Secretary of State.

2. DOMESTIC TELEPHONE

GENERAL

The annual reports of the Commission have for the past several years emphasized the rapid development and expansion of the domestic telephone industry since World War II. The addition of facilities and public demand for service continued at a rapid pace during fiscal 1951.

In the 1950 calendar year, the Bell system alone expended nearly 900 million dollars for new plant, bringing its total gross plant at the end of that year to more than 10 billion dollars, a net increase of about 669 million dollars as compared with 1949. The non-Bell, or so-called independent telephone companies, also made substantial additions to plant. As of December 31, 1950, the investment in telephone plant of the independent industry was estimated by the United States Independent Telephone Association to be approximately 1.2 billion dollars, an increase of about 133 million dollars during that year. Thus, the total gross telephone plant investment of the telephone industry in the United States was estimated to be approximately 11.5 billion dollars as of December 31, 1950.

More than 43 million telephones were in service in the United States at the end of 1950, over 35.3 million of which were operated by Bell system companies and approximately 7.7 million by the independents. This is double the number of telephones in service prior to World War II and 15 million more than 5 years ago. The number of telephones in the Bell system, which operates about 82 percent of the telephones in this country, was increased by approximately 1,900,000 telephones during the calendar year 1950. Unfilled orders for telephone service held by the Bell system approximated 800,000 on December 31, 1950.

Telephone conversations handled by the Bell system again reached a new record high, increasing from 44 to approximately 46 billion local and toll calls for the calendar year 1950 over 1949. Toll accounted for approximately 2 billion calls, which is about the same figure reported for 1949. However, it is significant to note that ex-

tensive increases in so-called extended area service have resulted in many calls for relatively short distances, previously classified as toll, now being classified as local. In addition, the volume of Teletypewriter Exchange Service calls increased approximately 15 percent in the Bell system for 1950.

Operating revenues for the Bell system reached $3,261,528,000 for 1950, an increase of almost 13 percent from the previous year's operating revenue of $2,893,273,000. The high level of operations also produced increased earnings, with the Bell system reporting net income of 359 million dollars for the year ended December 31, 1950, an increase of 49 percent over the net income of the previous year. Bell system earnings amounted to $12.58 per share of AT&T stock in 1950, the highest per share earnings in any year since 1929.

The continued expansion of the Bell system is illustrated in the following tabulation:

Calendar year	Number of telephones	Plant investment	Revenues	Employees
1940	17,483,981	$4,701,177,364	$1,174,322,517	275,317
1945	22,445,519	5,702,056,557	1,930,889,452	387,300
1946	25,709,458	6,294,419,079	2,093,664,941	496,438
1947	28,506,795	7,348,802,865	2,224,582,932	524,120
1948	31,364,493	8,618,842,204	2,624,827,067	546,723
1949	33,388,258	9,432,749,584	2,893,273,356	515,854
1950	35,343,440	10,101,521,562	3,261,528,032	523,251

The dial conversion program of the Bell system continued during calendar 1950, resulting in an increase in dial operated telephones in the system from 73 percent at the end of 1949 to 76 percent on December 31, 1950. Extended area service, permitting subscribers to dial their calls to nearby communities, was expanded to the point that this service was available to 3.5 million telephone users at the close of 1950. The operator toll dialing program discussed in the Commission's previous annual report was also extended, more than one-third of all toll and long-distance calls now being dialed straight through to the distant telephone by the operator. In addition, the Bell system announced that subscriber toll dialing would be inaugurated during the calendar year 1951 at three exchanges in the Englewood, N. J., area, which will permit subscribers in those exchanges to dial their own long-distance calls through to the distant telephone without the assistance of a toll operator. Substantial additions to the Bell system intercity television transmission network were also made during fiscal 1951.

DOMESTIC TELEPHONE SERVICES

Construction of facilities.—As previously indicated, the telephone industry continued to construct new facilities for the expansion,

replacement, and modernization of exchange and toll plant, expending, as it did in 1949, over a billion dollars for these purposes. Most of these expenditures were for central-office equipment, buildings, exchange lines, and station apparatus. However, the number of authorizations requested for the construction, lease, or acquisition, and operation of wire and cable toll facilities (including installations of carrier equipment) for use in connection with interstate and foreign telephone and special services and the total amounts involved, increased substantially in fiscal 1951 compared to fiscal 1950. During fiscal 1950, 161 such applications were received by the Commission, involving estimated expenditures of over 19 million dollars. Two hundred and thirty-five such applications were received during fiscal 1951 with estimated equipment and construction costs totaling 59 million dollars. The Commission granted 240 of these applications (including 10 held over from fiscal 1950) during fiscal 1951. It is estimated that the total construction thus authorized will cost nearly 46 million dollars.

The annual blanket application of AT&T and certain of its associated companies for the calendar year 1951 requested authority for long lines construction estimated to cost $33,893,000. Of that amount, $16,107,000 was authorized during fiscal 1951. The following table shows the estimated cost and amounts of wire and cable construction authorized by the Commission since 1943.

Fiscal year	Projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	$9,582,239	574.8		7,968
1945	210	70,091,140	2,378.3	7,902	2,963
1946	239	78,896,450	3,193.8	16,580	12,261
1947	289	126,325,771	5,587.7	23,490	15,976
1948	348	127,162,499	2,637.5	46,080	16,373
1949	313	38,638,919	1,370.5	1,323	7,278
1950	141	13,230,678	399.3		3,491
1951	218	45,795,686	957.1	2,704	5,461

During fiscal 1951, the Commission also received applications from Bell system companies for authority to construct nine major microwave radio relay projects for toll telephone and television intercity relay services. The estimated equipment and construction costs involved are over 14 million dollars. As of June 30, 1951, the Commission had granted authority for six of these projects, representing estimated expenditures of almost $6,500,000. Prior to fiscal 1951, the Commission had granted the Bell system authority for 17 microwave radio relay construction projects (including the transcontinental system) with estimated equipment and construction costs totaling over 49 million dollars.

In this connection, it is significant to note that the Bell system estimates that by the end of 1953 about half of its broad-band channels will be on microwave radio relay systems, the balance being on coaxial cable systems. In the past, microwave systems have been used by the Bell system primarily for television intercity relaying, with only occasional and emergency use for telephone service. However, such systems will be utilized extensively in the future for long haul telephone and telegraph (TWX) services, as well as for television program transmission.

At the end of fiscal 1951, the Bell system had over 20 million miles of toll message circuits in operation, 570,000 of which were added during that fiscal year. Two-thirds of the increased mileage was obtained by means of carrier systems. Authorizations for the construction of 2,742 miles of coaxial units were granted by the Commission during fiscal 1951, including 2,000 miles requested during fiscal 1950. (It was erroneously reported in the Commission's sixteenth annual report that no authorizations for coaxial construction were requested during 1950.) Requests for authorizations to construct an additional 3,352 miles were received in fiscal 1951 and were pending at the close of that period.

Discontinuance, reduction, or impairment of service.—During fiscal 1951 the Commission granted five applications for authority to discontinue telephone service, including one held over from fiscal 1950, and two applications for emergency authority resulting from storm damage. Three applications for discontinuance of toll service were pending at the close of fiscal 1951. Two applications received from miscellaneous [nontelephone] companies to discontinue domestic public land mobile radio service in Boston, Mass., and in San Luis Obispo, Calif., were also granted.

The joint application filed during fiscal year 1949 by Western Union to discontinue its public message toll, private line, and program telephone service; by the AT&T and certain Bell system companies to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada (docket 9235) was, after extensive formal proceedings, granted by the Commission in April 1951.

Channels for TV program transmission.—Bell system intercity video transmission facilities have been extended during the past 3 years to interconnect 43 cities in the eastern half of the United States, including cities as far south as Atlanta, Jacksonville, and Birmingham, and as far west as Omaha and Kansas City. In addition, the Omaha-San Francisco microwave radio relay system was nearing com-

pletion at the end of fiscal 1951, and was to be in operation for both telephone and television transmission services by September 1951, thus completing the transcontinental radio relay system. As of June 30, 1951, the Bell system had in operation over 18,500 channel miles of video channels, about half of which were on coaxial cable and half on radio relay systems.

In spite of the extensive development of intercity video transmission facilities during the past few years there are still insufficient common carrier channels to meet the requirements of the rapidly growing and expanding network television broadcasting industry for service. This has created several problems requiring the attention of the Commission.

In docket 9806, the Commission designated for hearing a complaint filed by Allen B. DuMont Laboratories, Inc., against the Bell system companies in connection with the allocation by them of the usage of Bell system channels among customers for video transmission service, where insufficient channels are available to meet all requests for service. In docket 9816, on petition of American Broadcasting Co., the Commission ordered an investigation into the lawfulness of the tariffs of the Bell system companies providing for allocation of usage of video channels and the allocations made pursuant thereto, and designated the matter for hearing concurrently with the proceedings in docket 9806.

A series of conferences among representatives of the national television broadcasting network, A T & T, and members of the Commission's staff resulted in agreement among the network customers on a plan for allocation designed to reconcile conflicting requirements of the networks for service, in advance of the placing of orders with the common carriers. Hearings in dockets 9806 and 9816 were, therefore, postponed pending observation of the results of operation of the plan.

In the sixteenth annual report, reference was made to an investigation (docket 9539) to determine whether or not it is necessary or desirable in the public interest to require interconnection of the video transmission channels of the Bell system companies with existing and proposed video transmission channels of Western Union. An initial decision issued by a hearing examiner on January 11, 1950, held generally that such interconnection is not necessary or desirable in the public interest. Oral argument was to be heard by the Commission en banc on July 16, 1951.

In an effort to alleviate problems arising from the insufficiency of common carrier intercity video channels, the Commission has been authorizing private intercity relaying by TV broadcasters utilizing microwave frequencies, assigned primarily for television studio-to-transmitter links and television remote pickup facilities, on an interim

basis pending availability of adequate common carrier channels. Six such private relay systems are currently in operation.

Speed of service.—The speed of service on telephone toll calls is a measure of the time interval from the appearance of the recording signal at the toll board to the start of conversation or, in the case of person-to-person calls, to a report of delay in reaching the desired party, excluding calls encountering such a report of delay as "busy" or "don't answer" at the called station. The average speed of service required to complete toll calls on the Bell system was 1.8 minutes during June 1951 as compared to 1.6 and 1.7 minutes during the same periods in 1950 and 1949, respectively. The increase in the number of toll circuits, the increased use of toll dialing equipment, and the continuing conversion of manual exchanges to dial operation have had important effects in maintaining substantially the same quality of service despite a marked increase in telephone toll traffic loads.

Foreign attachment cases.—An initial decision on the complaint of *Hush-A-Phone Corp., et al.* v. *American Telephone & Telegraph Co., et al.* (docket 9189), which attacked the lawfulness of the so-called foreign attachment provisions of the defendants' tariffs insofar as they were construed to prohibit the telephone subscriber's use of the Hush-A-Phone device in connection with interstate and foreign telephone service, was issued on February 16, 1951. It proposed to deny the relief requested and to dismiss and terminate the proceeding, upon the basis of findings and conclusions sustaining the lawfulness of the tariffs as applied to Hush-A-Phone. Exceptions were taken and oral argument will be heard in the near future.

Concurrent hearings in *Jordaphone Corporation of America, et al.* v. *American Telephone & Telegraph Co., et al.* (docket 9383), and *In the Matter of the Use of Telephone Answering Devices in Connection With Interstate and Foreign Telephone Service* (docket 9701), both involving the lawfulness of the foreign attachment provisions as applied to the use of automatic telephone-answering devices in connection with interstate and foreign telephone service, were concluded on March 28, 1951. The matter was awaiting issuance of an initial decision by a hearing examiner.

Domestic Public Land Mobile Radio Service.—This service provides communication facilities for hire, primarily between fixed points and mobile units on land. Secondarily, the service is afforded to vessels and remote fixed points. Under some circumstances, a non-telephonic signaling service is offered. The service is of two general classes; that furnished by land line telephone common carriers interconnected with the land line telephone system; and that furnished by others than the land line telephone companies and which do not provide direct connection with the land line telephone system.

The service was established on a regular basis as of July 1, 1949, and has shown continuous growth and public acceptance. During the fiscal year, the telephone companies (Bell system and independent) extended this service so as to make it available in 163 cities (in 38 States, the District of Columbia, and Territory of Hawaii). Service to 17,208 mobile units was authorized. Service was provided by nontelephone company licensees in 152 cities (in 35 States, the District of Columbia, and Territory of Hawaii). The latter group was authorized to provide service to an aggregate of 8,966 mobile units.

As part of a plan to meet the problem of providing additional frequencies for this service so as to make it available to a larger number of subscribers, the Commission determined two pertinent proceedings commenced in the previous fiscal year.

One of these (docket 9648) involved the establishment of a policy of effecting adjacent channel assignments (60 kilocycles separation) between miscellaneous (nontelephone company) carriers, in lieu of the former practice of making assignments on an alternate channel basis (120-kilocycle separation). Thus, the number of channels available to the miscellaneous licensees was doubled. A similar step had, some time previously, been undertaken by the telephone company licensees.

The second matter (dockets 8736 et al.) was considered in connection with the proposed establishment of television broadcasting facilities in the ultra high frequency portion of the spectrum. In this proceeding the Commission considered a petition of Bell Telephone Laboratories, Inc., requesting the allocation of approximately 40 megacycles of frequency space between 400 and 500 megacycles for the development of a broad band multichannel system of public mobile operation from which there might be derived as many as 150 additional 2-way communications channels. Specifically, the Commission considered whether the band 470–500 megacycles could be allocated to such use.

Continuing study was given to the development of a sound policy relative to the provision of service to vessels through the land mobile radio facilities. In this connection, particular attention is being given to the need for such communication facilities on certain inland waterways, including the Hudson River-Erie Canal and the Mississippi, Ohio, and Illinois Rivers.

Because of the relatively limited number of frequencies available to mobile telephone service and the large number of applicants for such frequencies in certain areas, resulting in mutually conflicting applications, it was necessary to hold hearings in a number of cases to determine which, if any, of the applicants should be selected for grants. During the fiscal year hearings were held to consider non-

telephone company mobile telephone service applications in the New York City area (dockets 9761 et al.), Chicago area (dockets 9837 et al.), Los Angeles area (dockets 9723 et al.), and the Dallas-Fort Worth area (dockets 9844 et al.). Decisions had not been issued on these cases by the close of the year. Similar proceedings scheduled for the Houston area (dockets 9779 et al.) were canceled as a result of the applicants deleting their conflicting applications, thereby enabling a grant of the resultant requests.

Hearings were held with respect to conflicting applications for the single frequency available to one-way signalling service in Washington, D. C. (dockets 9825 et al.), and Los Angeles (dockets 9847 et al.). These cases were awaiting initial decisions at the close of the year. A similar hearing scheduled for Chicago (dockets 9845 et al.) was continued when one of the parties withdrew, and disposition of a petition by the remaining party requesting a grant of its application was pending.

At the end of the fiscal year the only case designated for hearing in this service and not yet tried related to conflicting applications in the St. Paul-Minneapolis area (dockets 9882 et al.).

Theater television.—Toward the close of the fiscal year substantial interest developed in the use of theater television portrayals of certain sporting events, principally boxing. The transmission of these programs from the point of origin to the subscribing theaters was accomplished by using facilities of the communications common carriers. Scheduled formal hearing proceedings involve issues which, among others, relate to the use of common carrier facilities for theater TV.

Rural Subscriber and Short Haul Toll Radiotelephone Service.—These services, which are designed to provide short distance service in areas where rugged terrain, etc., make it impractical to construct wire lines, continued to be expanded.

Radiocommunication service in Territories (except Alaska).—Mutual Telephone Co. of Hawaii filed a petition requesting, in substance, that the Commission give attention to the special communication problem of that Territory and recognize that existing frequency allocations which are tailored to meet the specific requirements of operations within the continental United States should not be applied to the Territories and possessions. An appropriate study has been undertaken.

Coastal and Alaskan Services.—Coastal and Alaskan radiocommunications, though largely authorized on a common-carrier basis, are discussed in a separate chapter on Safety and Special Radio Services because of their close relationship to radio aids for the safety of life and property.

RATES AND TARIFFS

Rate schedules.—At the close of the year, 261 telephone carriers had tariffs and concurrences on file with the Commission, an increase of 29 over the previous year. New carriers in the Domestic Public Land Mobile Radio Service accounted largely for the increase. During the year a total of 15,919 tariff publications establishing new rates or modifying rates, regulations, practices, and classifications of services were filed. Of these, 40 were rejected for failure to comply with the Commission's rules, and 63 were suspended pending further investigation.

Special permissions.—Eleven applications for special permission to make changes in tariffs to become effective on less than statutory notice, or involving waiver of certain rule requirements, were received. Of these, nine were granted and two denied.

Charges "based on cost".—The tariffs of the telephone carriers provide in many instances that when special types of facilities are furnished to meet the service needs of certain customers, the charges will be based upon the costs involved. During the year much progress was made in eliminating such situations by publishing specific charges for many types of special equipment.

"Other line" charges.—Previous annual reports made reference to the number of interstate message toll telephone routes between points within the United States where the service over the portion of the route provided by an independent telephone company was charged for on an "other line" basis. In 1944 there were approximately 1,000 such routes, but through continued efforts of the companies to eliminate such situations there are now only 17 routes on which "other line" charges apply.

Unlawful use of telephone facilities.—Last year's annual report noted the complaint of Harry and Bertha Katz against the American Telephone & Telegraph Co. and the Chesapeake & Potomac Telephone Co. alleging the unlawfulness of the Bell system companies' tariff regulations which provide for discontinuance of telephone service upon notification to the telephone company by a law enforcement official that the service is being or will be used for an unlawful purpose. On November 3, 1950, an initial decision was issued upholding the lawfulness of this tariff regulation. Complainants filed exceptions and oral argument was held before the Commission on May 4, 1951. The matter was awaiting a final decision by the Commission.

Investigation of Bell system rates.—In the calendar year 1950 the Bell system telephone companies experienced a substantial rise in their level of earnings from interstate and foreign communication services as an outgrowth of the increases in traffic volumes and revenues result-

ing from the high level of business activity combined with the Bell system's continued program of plant additions and station installations. In the light of these developments and the questions posed as to the reasonableness of the Bell system's rates and earnings levels, the Commission on January 19, 1951, ordered an investigation into the interstate and foreign rates and charges of the Bell system companies, and directed the Bell system to show cause why, on the basis of the companies' current level of earnings as reported to the Commission, their rates should not be reduced pending conclusion of the proceedings of investigation (docket 9889).

Although the hearings in this proceeding were initially scheduled to begin on April 16, 1951, the Commission, on February 14, 1951, upon consideration of questions raised by State regulatory commissions through the National Association of Railroad and Utilities Commissioners with respect to the reasonableness of the procedures used by the Bell system companies to separate plant investment and expenses between State and interstate services, postponed the dates for answer and hearing in order to permit time within which the Commission, jointly with the NARUC, could consider such questions, and within which the Commission could observe trends in revenues and expenses (see discussion of Separations, following).

Separations.—In August 1950, the NARUC urged the Commission to abstain from taking any action looking toward a reduction in interstate message toll telephone rates until a further joint review could be made by the NARUC and FCC of the reasonableness of the procedures used by the Bell system companies to separate telephone plant investment and expenses between State and interstate telephone services. It was pointed out by the States that intrastate toll rates were already much higher than interstate rates for toll service involving equivalent distances; that this disparity presented a serious question as to the reasonableness of the results of the separations procedures; that Bell system applications for further increases in intrastate toll rates were pending in many States; and that interstate toll rate reductions would aggravate the existing disparity materially.

In September 1950, Commission staff members met with representatives of State commissions to consider a specific proposal advanced by the former for modification of the separations procedures applicable to the allocation between State and interstate toll services of interexchange toll line plant investment and related expenses of the associated companies of the Bell system. It was estimated that adoption of this proposal would have the effect, system-wide, of transferring approximately $200,000,000 in book cost of interexchange toll line plant and $20,000,000 in associated expenses annually, from State to interstate operations and would thereby reduce the revenue require-

ments of the associated companies applicable to intrastate operations and increase the requirements applicable to interstate operations. This, it was asserted, would relieve the disparity to the extent of making possible reductions in the amounts of, or preventing, further intrastate toll rate increases; or, in some cases, enabling some downward adjustments in existing State toll rates.

The Commission rejected the proposal in a letter to the NARUC, dated October 18, 1950, in which it concluded that the proposal was arbitrary and unreasonable as a method of cost allocation, and that it conflicted with existing statutory pattern of rate regulation.

In recognition of the position of the States on the matter of separations, the Commission on February 14, 1951, following the institution of its investigation of Bell system rates (previously discussed), advised the NARUC as to its willingness to explore further with States other possible changes in the separations procedures. These further studies, which are still in progress, have not as yet provided any fundamental changes in the procedures which would materially benefit the States from the standpoint of reducing the revenue requirement burden applicable to State toll services.

Toll rate study.—At the close of fiscal 1951, a cooperative committee consisting of staff members of this Commission and State commissions was completing a report on its 2-year study of the problem presented by the disparities in rates for State and interstate message toll telephone services. The report includes a comprehensive collection and analysis of available data relating to the development and technical and economic aspects of toll rates in the United States. It is believed that the report will be of substantial benefit to telephone regulatory commissions in their consideration of toll rate changes and in dealing with the toll rate disparity problem.

As an outgrowth of this joint study, representatives of the Commission and the several States embarked upon a new study to determine the possibility of devising a plan looking toward the establishment and maintenance of uniform toll telephone rates for all toll services in the United States, including the need for appropriate enabling legislation. At the close of the fiscal year, the joint committee was engaged in obtaining data essential to this effort.

State telephone rate cases.—Assistance in State telephone rate cases was rendered to a number of States and municipalities in response to their requests. Owing to budget and staff limitations, the Commission generally had to limit its assistance to the furnishing of advice, consultation and information on subjects of mutual interest, including earnings, depreciation rates, pension accrual rates, and separations procedures.

OTHER REGULATORY MATTERS

Depreciation.—Substantial progress was made during the year in conducting studies and developing information necessary for the Commission to prescribe annual rates of depreciation for telephone companies subject to the Communications Act. On the basis of such studies completed during the year, the Commission, pursuant to the requirements of section 220 (b) of the act, prescribed annual depreciation rates for the following companies of the Bell system: the Chesapeake & Potomac Telephone Co. of West Virginia, Bell Telephone Co. of Pennsylvania, New York Telephone Co., Diamond State Telephone Co., which operates in Delaware, and for each of the operating areas (five States) served by the New England Telephone & Telegraph Co. The Commission also prescribed depreciation rates for the Westerly Automatic Telephone Co., a relatively small subsidiary of New England Telephone & Telegraph Co. In addition, the Commission prescribed revised rates in place of certain of the rates previously prescribed for Southern Bell and Michigan Bell companies. The prescribed rates resulted in annual depreciation charges amounting to $90,402,800 and represented a total reduction of $7,258,200, or 7.5 percent in the annual charges based on the depreciation rates in effect prior to the Commission action.

To date the Commission has prescribed depreciation rates for 12 Bell system companies including the Long Lines Department of AT&T, out of a total of 23 companies within the system, thus effecting a total reduction of $17,310,000, or 7.8 percent in depreciation charges on an annual basis. Studies necessary for prescribing depreciation rates have been completed for five additional Bell companies and one of these companies—the Pacific Telephone & Telegraph Co.—has adopted the new rates on its own initiative. Formal prescription of the Pacific company depreciation rates was deferred due to the desire of certain of the State commissions in the company's territory to make further analyses of the underlying data.

Depreciation expense charges of telephone companies continued to increase in spite of the substantial reductions in depreciation rates. During the 12 months ending April 30, 1951, these expense charges in the case of 23 Bell companies amounted to over $362,500,000, an increase of $33,900,000 or 10.3 percent over the charges for the previous 12 months. This increase is attributed principally to the vast expansion in telephone plant facilities.

A comprehensive study was conducted during the year as to the depreciation reserve requirement of the Long Lines Department of AT&T. This study has not yet been completed. A similar study was completed during the year with respect to the Southern Bell Tele-

phone & Telegraph Co. This study was undertaken several years ago at the request of the Southeastern Association of Railroad and Utilities Commissioners in order to allocate the company's depreciation reserve among the nine States served by it, and so that the regulatory commissions of those States may have information for making determinations of the rate base in their respective areas.

NARUC Committee on Depreciation.—The Commission continued its participation in the activities of this committee, which is composed of staff members of State and Federal regulatory commissions. Its function is to initiate studies and to consider problems that may be submitted to it in connection with the accounting, engineering, and economic aspects of depreciation for public utilities. During the year, the committee completed a report on "Remaining Life Basis of Accounting for Depreciation", and has a report on "A Review of Progress in Depreciation" covering, among other matters, a digest of important court and regulatory commission decisions issued since 1943. The Commission furnished a substantial portion of the data included in these two documents.

NARUC Committee on Accounts and Statistics.—The function of this committee is to participate in the formulation of uniform systems of accounts, annual report forms, preservation of records and related accounting regulations, as well as amendments to, and interpretations of, such regulations in order to foster progress in these phases of regulatory activity and promote uniformity in rules and regulations that may be recommended for adoption by the various State and Federal regulatory agencies. During fiscal 1951, staff members of the FCC participated actively in the work of several subcommittees designated to conduct special studies. An item of direct interest to this Commission, being studied currently by one subcommittee of this committee, is the matter of developing improved regulations with respect to the establishment and maintenance of continuing property records by large telephone companies.

Continuing property records.—Detailed studies are being made of the Bell system continuing property records plans and procedures in connection with the consideration of appropriate revision of the requirements prescribed in part 31 of the Commission's rules. Substantially improved reliability of the rate base and the depreciation base, more accurate mortality studies and resulting depreciation rates, and reduction of administrative costs through improved records procedures, are among the principal objectives of these studies.

Pensions and relief.—For the Bell system, including manufacturing and research activities, pension and other benefit costs amounted to about $175,000,000 during the calendar year 1950. This excludes social security taxes which amounted to approximately $24,000,000. Due to (*a*) the substantial amount of pension costs, (*b*) the frequent

revision of pension accrual rates, and (*c*) the complexity of the actuarial methods and procedures involved in the development of the pension accrual rates, the pension problems have required detailed and continued study and review by the Commission.

Preservation of records.—On August 16, 1950, the Commission adopted a complete revision of its rules for the preservation of records by telephone carriers (part 45). These new rules were designed to assure adequate retention of records needed in regulation of these companies, to improve records-management procedures, and to provide reasonable retention periods for records currently maintained by the several carriers. Recognition was given to such modern record-preservation practices as microfilming, use of tabulating cards, humidified storage, etc.

Restatement of plant accounts on basis of original cost.—Although the restatement of telephone plant accounts on basis of original cost is well advanced with respect to the Bell system companies, there remain a few substantial items among Bell system companies and several items among non-Bell companies where final adjustment of their accounts in this respect has not been effected. Certain of these items are receiving current consideration and an attempt is being made to further the completion of these adjustments as rapidly as is possible. Several current acquisitions of plant (including mergers of smaller companies) at original cost were handled during fiscal 1951.

Annual report Form M (applicable to class A and class B telephone companies).—A complete revision of this report form was drafted during the fiscal year. Final action by the Commission was awaiting the receipt of comments from interested parties.

Annual report Form L (applicable to nontelephone company common carriers operating in the Domestic Public Land Mobile Radio Service).—During the year a brief form of annual report applicable to these small carriers was promulgated by the Commission. This form permits such carriers to file condensed information in lieu of the previous requirements for filing much more detailed information on forms that were designed primarily for the use of wire telephone companies.

Monthly report form for class A telephone companies.—During the year the monthly report form required to be filed by telephone companies having annual operating revenues exceeding $250,000 was simplified in some respects.

Uniform system of accounts for telephone companies.—The uniform systems of accounts for telephone companies were amended during fiscal 1951 as follows:

The Commission revised its rules with respect to the classification of telephone companies so as to provide that only telephone com-

panies having annual operating revenues exceeding $250,000 (formerly $100,000) shall keep the more detailed accounts required for class A telephone companies, permit companies having annual operating revenues exceeding $100,000 (formerly $50,000) but not exceeding $250,000 to keep the less detailed accounts prescribed for class B telephone companies; permit companies having annual operating revenues exceeding $50,000 (formerly $25,000) but not exceeding $100,000 to keep the condensed classifications prescribed for class C telephone companies; and not require further compliance with the uniform accounting rules of the Commission by companies having annual revenues of $50,000 or less.

The Commission's rules were further modified to reduce accounting and reporting requirements with respect to relatively small acquisitions of plant by telephone companies.

Monthly telephone statistics.—To better serve the needs of regulatory commissions, as well as other interested groups, the Commission's published report of monthly operating statistics was revised. The new report uses fewer carriers and presents separate data for important segments of the industry.

3. DOMESTIC TELEGRAPH

GENERAL

The improvement in the financial condition of The Western Union Telegraph Co. that became apparent, starting in March 1950, continued throughout the fiscal year. Revenues and traffic volume continued to rise, and although the downward trend of operating expenses was halted, monthly net income reported during the fiscal year exceeded that reported for each month of the previous fiscal year.

For the calendar year 1950 Western Union reported net income from all communications operations of $7,320,000 as compared with a loss of $4,495,000 in the previous year. The improvement was made even after providing $2,500,000 for income taxes in 1950 for which there was no liability in the previous year. Income taxes for 1950 would have been $2,000,000 higher had the company not had the benefit of net operating loss carry-overs of prior years. For the first 6 months of 1951, $3,863,000 of net income from system operations has been reported, with $2,536,000 provided for payment of income taxes. In December 1950 the company declared a $2 dividend per share, the first dividend payment since 1945, except in 1948 when $1 was paid, and in each of the first two quarters of 1951 dividends were declared at the annual rate of $2 per share.

As the fiscal year drew to a close, Western Union was faced with the necessity of increasing its land line employees' wages, effective July 1, 1951, in an amount estimated to add $11,900,000 to its annual

operating expenses. To offset, in part, this increase in wage costs, the company filed revised tariff schedules for interstate communication services to become effective June 1 and July 1, 1951, which were designed to add $7,431,000 annually to operating revenues. These revised tariffs were suspended by the Commission and a hearing and investigation, on the Commission's own motion, into the charges, classifications, regulations, and practices for and in connection with interstate telegraph service of Western Union was instituted. The company proposed to make similar changes in its rates for intrastate services which would provide $4,303,000 in additional revenues. Additional wage increases have been agreed to by Western Union to become effective September 1, 1951, subject to the approval of the Wage Stabilization Board, which it is estimated would add $3,511,000 to the company's annual expenses.

During the year, the Commission's staff cooperated with the President's Communications Policy Board in connection with the board's study of domestic telegraph problems. The staff furnished various data requested by the board.

SERVICES AND FACILITIES

Speed of service.—The quality of domestic telegraph service rendered by Western Union during fiscal 1951, as measured by speed of service, did not improve appreciably on an over-all basis; i. e., origin to destination, when compared with the preceding fiscal period. Speed of service declined during the June–December period. This may have been due to an increase in volume of messages which occurred during that period. However, a sharp improvement occurred during the last half of fiscal 1951. Western Union is required under the Commission's rules to conduct daily speed of service studies at its 25 largest offices and to report monthly summaries to the Commission. To the extent possible, the Commission makes spot-checks of speed of service at other locations and makes investigations of deterioration in service wherever indicated. The following table compares the average speed of service in minutes reported for fiscal years 1950 and 1951:

	Average speed in minutes	
	1950	1951
Origin to destination:		
Delivered by—		
Telephone	41	41.2
Messenger	46	45.4
Private tie-line	37	37.9
Office relay drag	9.9	8.7

Western Union modernization program.—Western Union's plan for modernizing its facilities and operations, announced in 1945, is well advanced. The program provides for reperforator switching installations at 15 locations, more economical methods of providing intercity telegraph channels, and improvements in pickup and delivery service.

The most important phase of this program, the construction of reperforator switching offices for the relaying of telegrams, was completed during 1950 when Portland, Oreg., was converted to this type of operation. The company plans to install reperforator equipment for the terminal handling of telegrams in New York City, Chicago, and Washington, and it is expected that construction at New York City will be started before 1952. The modernization program to date represents capital expenditures of some $50 million with an estimated $30 million to be spent in future years. Estimated savings in operating expenses resulting from this program to date amount to about $30 million on an annual basis.

The microwave radio relay system constructed by Western Union between New York, Washington, and Pittsburgh and the link between New York and Philadelphia continued to function with only minor interruptions. It reports certain improvements made to the system during the fiscal year which have resulted in increased capacity and greater circuit stability. No further progress has been made toward extending the system to other areas of the country since the last report.

Hearings in docket 9539, regarding the need for interconnection of Western Union and Bell facilities for intercity video transmission, were concluded during the fiscal year. The hearing examiner's initial decision, issued in January 1950, concluded that such interconnection was not necessary or desirable. Oral argument has been held in the matter but the final decision has not been issued.

Western Union is continuing its development of facsimile devices for the handling of telegrams. More than 3,000 small machines, called Desk-Fax, are now in operation on customers' premises in 12 cities for the transmission of messages locally, thus eliminating other means of pickup and delivery. An additional 4,000 are planned for installation soon.

A facsimile machine capable of transmitting pictorial, typed or printed matter at high speed has been developed in the company's laboratory. It would be usable primarily on long-distance circuits. A speed of 1,200 words of typewritten matter or 3,000 words of newsprint can be transmitted to a distant point per minute by this machine.

Construction of wire facilities.—During the year the Commission received eight applications from Western Union covering wire tele-

graph construction and extensions. One such application was carried over from the preceding year, making a total of nine. Six applications were granted and three were pending at the year's end. Those granted covered the leasing by Western Union of 256,074 telegraph channel miles of line at an annual rental of $380,403, and the construction of 117,957 telegraph channel miles of line and associated equipment at a cost of $3,134,690.

Discontinuance, reduction, or impairment of service.—During the year 941 applications for reduction in hours of service or closure of public telegraph offices were filed. In addition, 231 such applications were pending at the beginning of the year. Most of these requests were made by Western Union. Of the total, 984 applications were granted, 25 were withdrawn, 1 denied, 6 were dismissed for lack of jurisdiction, and 156 were pending. Generally, where hours were reduced or offices closed, alternate service was made available. Four applications filed by Western Union for authority to discontinue long-distance telephone toll service were granted.

The Commission on April 9, 1951, issued its final decision and certificate in docket 9235 granting the joint application filed by Western Union, to discontinue its public message toll, private line, and program telephone service; by the American Telephone & Telegraph Co. and certain Bell system companies, for authority to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada, for authority to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada.

On February 21, 1951, the Commission adopted a memorandum opinion in which it concluded that public convenience and necessity did not require that conditions providing for the protection of adversely affected employees be attached to certificates or authorizations for the discontinuance, reduction, or impairment of service by communications carriers. Accordingly, the Commission refused to initiate rule-making procedures to provide for the attachment of such conditions to service curtailment authorizations and, on March 28, 1951, terminated jurisdiction which it had reserved to consider the question of employee protection in connection with such applications.

The Commission reviewed its policies regarding applications filed by Western Union for authority under section 214 of the act to discontinue, reduce, or impair telegraph service and adopted the following principal changes in connection therewith: Amended part 63 of the rules relating to extension of lines and discontinuance of service so as to provide that, where experimental expansions in service are made for a temporary period of not more than 6 months, carriers will

not be required to file applications for authority to reduce service to its original status, but will notify the Commission in such cases (docket 9750); adopted conditions, to be attached to future authorizations permitting Western Union to convert company-operated offices to class 9 or class 11 agency-operated offices, which require supervision by the company of such agencies in accordance with certain minimum requirements; and amended part 63 of the rules to make certain deletions and changes in connection with information required in applications for authority to curtail service (docket 9750).

RATES AND TARIFFS

Rate schedules.—At the end of the year, 44 domestic telegraph carriers had tariffs or concurrences on file with the Commission. During the year, they filed 1,229 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences.

Special permissions.—Thirty-five applications for special permission to make changes in tariffs or file new tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were granted and one such application was denied.

Western Union domestic rates.—By order of May 23, 1951, the Commission, on its own motion, suspended the operation of revised tariff schedules filed by Western Union to become effective June 1 and July 1, 1951, containing certain new and increased rates for interstate message telegraph, money order and miscellaneous services. The order instituted an investigation into the lawfulness of these rates and provided for a hearing thereon (docket 9980). This hearing was in progress at the close of the year.

Reperforator switching equipment charges.—Western Union filed revised tariff schedules, effective May 1, 1951, establishing new and increased installation charges and monthly rates for special installations of reperforator switching center equipment for use with leased teleprinter circuit facilities. The company estimated that the increased rates would produce additional annual revenue in the amount of about $645,000, representing an increase of 63.3 percent in switching equipment charges or about 15.7 percent in total charges. The new and increased rates replaced the former installation charges and monthly rates which were established in 1943 (and last revised in March 1948) for switching center equipment employing the old "plug-and-jack" system. The increased charges, according to the company, were designed primarily to give effect to current labor and material costs in connection with push-button switching installations.

OTHER REGULATORY MATTERS

Relief and pensions.—During the fiscal year, Western Union made a fundamental change in the pension plan applicable to the large majority of its employees, as a result of new contracts negotiated with organizations representing the employees. The principal feature of the pension plan modification was the extension of coverage to the class of employees whose employment with the company started after December 31, 1936.

Reclassification of plant accounts.—Studies by the Commission's staff directed toward analysis of methods and procedures applied, verification of accounting performed, and entries recorded in connection with Western Union's reclassification of its plant and equipment on basis of original cost, were still in progress at the end of the year. These studies are concerned mainly with the necessity of additional adjustments to the original cost determinations or improprieties in plant accounting procedures.

Continuing property records.—Studies necessary for the verification of the form and contents of Western Union's continuing property records and for the evaluation of the effectiveness of continuing property record procedures were continued. As an aid in the maintenance of its continuing property records, the company compiled an 11-volume Master List of Units of Property, which can be used to provide the cost of each of the basic units of plant in service.

Uniform system of accounts.—During fiscal 1951, the operating revenue accounts prescribed in part 35 of the Commission's rules were further revised so as to provide a single account for recording Government message revenue derived from international messages, previously separated between United States and foreign governments.

Preservation of records.—On August 16, 1950, the Commission adopted a complete revision of its rules for the preservation of records by telegraph carriers (part 46). These new rules were designed to improve records-management procedures and to provide reasonable retention periods for records currently maintained by the several carriers. The immediate effect upon Western Union was the release of considerable storage space previously used for records which were no longer required to be retained, or for which microfilm copies were permitted to be substituted.

4. INTERNATIONAL TELEGRAPH AND TELEPHONE

GENERAL

During the calendar year 1950, for the first time in 5 years, the downward trend in the volume of international telegraph traffic handled by

United States cable and radiotelegraph carriers was reversed. Thus, in 1950 these carriers handled a total of 518,523,407 paid words, an increase of 1.02 percent over the 513,175,244 paid words handled in 1949.

The gain apparently resulted, in part, from the general up-trend in business that began in the late spring of 1950, the effects of which were felt in international telegraph traffic beginning with June of that year. Statistics for the first half of 1950 indicate a traffic volume of 241,326,193 paid words, a decrease of 7.1 percent from the traffic volume of 259,888,149 paid words handled in the first half of 1949. Traffic volume for the last half of 1950, however, increased sufficiently to offset this decrease and to bring 1950 totals above those for the year 1949. Thus, in the last half of 1950 the carriers handled 277,097,214 paid words, an increase of 9.4 percent over the last half of 1949 volume of 253,287,095 paid words.

Revenues from message traffic accruing to the international telegraph carriers in 1950 amounted to $35,938,680, an increase of 7.04 percent over 1949 revenues of $33,573,499.

As was the case in 1949, the volume of international radiotelephone calls as well as revenues therefrom showed considerable increases over the figures for the previous year. The chargeable calls in 1950 reached 744,650, an increase of 13.1 percent over 1949. In the same period revenues (including land line charges) were $8,197,736, an increase of 13.9 percent over the previous year.

INTERNATIONAL SERVICE

Telegraph circuits.—Eighty-two foreign countries and United States territorial possessions were served by United States radiotelegraph carriers, either by direct radiotelegraph circuits or via the Tangier, North Africa, relay stations. Of this number, 71 were served via direct circuits and 11 via Tangier. In addition, a number of countries in the Far East, which were not reached by these means, were served by relay stations operated by United States carriers at Manila in the Philippine Islands. Connections with the facilities of foreign carriers made possible communication with most other points in the world. As in previous years, the United States radiotelegraph carriers continued to transmit program material originating with the United Nations and the Department of State to various foreign countries.

Telephone circuits.—Radiotelephone message toll service was in effect with 88 foreign countries and our territorial possessions. Of this number, 53 countries were served directly while the rest were served through connecting carriers. The Bell system companies provided program transmission service to 58 foreign countries and private line service was available to 9 foreign countries.

Applications.—During the fiscal year, licensees in the international fixed public service filed a total of 425 applications for authorizations for additional frequencies, additional transmitters, and additional points of communication, as well as applications for renewal of current licenses and temporary authorizations. Because of difficulties in obtaining clearance for their use, action upon a number of current applications for additional frequencies has been delayed. Otherwise, the Commission acted on approximately the same number of applications as had been filed in the current fiscal year. Licensees in the radiotelegraph service accounted for 362 of these applications while the balance was filed by licensees in the radiotelephone service.

In addition, the Commission received and acted upon some 50 miscellaneous applications by international communications carriers. These included requests for authorizations to hold interlocking directorates in two or more companies, authorizations to decrease or discontinue service, and authorization to extend wire lines.

Frequencies.—The increased crowding of the spectrum has made it extremely difficult to obtain additional frequency assignments for commercial companies operating in the international fixed public service. This was particularly apparent at the close of the year in connection with pending applications for three new radiotelephone and two new radiotelegraph circuits in the Pacific area.

Docket cases.—In the sixteenth annual report reference was made to the applications of Mackay Radio & Telegraph Co. for authority to communicate with Portugal, Surinam, and The Netherlands (docket 8777). This proceeding involved the question of whether, and under what circumstances, the Commission would authorize a second direct radiotelegraph circuit to countries already served directly by one radiotelegraph carrier. On February 21, 1951, the Commission adopted its decision in this matter wherein it stated that in those instances where there is only one direct radiotelegraph circuit to a point, it would authorize a second competing direct radiotelegraph circuit only if the applicant demonstrated that such competition is reasonably feasible. Applying this standard and considering the volume of traffic to the points at issue in that proceeding, the Commission concluded that competition between direct radiotelegraph circuits was reasonably feasible in the case of Portugal and The Netherlands, but that it was not reasonably feasible with respect to Surinam. At the end of the fiscal year, an appeal in this case filed by RCA Communications, Inc., was pending in the United States Court of Appeals for the District of Columbia. This court, on March 23, 1951, denied RCAC's petition for a stay of the Commission's report and order pending decision on the appeal.

The previous annual report also referred to docket 9638 involving applications of Globe Wireless, Ltd., for construction permits to move certain of its transmitters to stations of Press Wireless, Inc. This proceeding was terminated upon a petition by Globe to the effect that it did not wish to pursue its applications.

The sixteenth annual report noted a Commission investigation into the acceptance and delivery regulations and practices of all international and marine carriers (docket 9433). The particular practices at issue were those involving the direct acceptance and delivery by such carriers of international and marine traffic originating in or destined to hinterland points in the United States by telephone, TWX, mail or otherwise (other than by means of domestic telegraph land line) at the request or option and expense of the user. On November 14, 1950, the Commission adopted its decision in this matter, concluding that these practices were proper. However, it was found that in those cases where such acceptance and delivery practices were engaged in without appropriate tariffs being on file with the Commission, such practices were in violation of the Communications Act, and it was ordered that appropriate tariffs be filed.

The International Bank for Reconstruction and Development and the International Monetary Fund, in a complaint filed against certain United States telegraph carriers (docket 9362), presented for determination by the Commission the question of whether these agencies should be accorded the same rates for their outbound official telegraph communications as those accorded to certain other governments or other international organizations for similar communications. Hearings on this matter were concluded in February 1951, and the case is now awaiting the issuance of an initial decision by the hearing examiner.

Hearings in docket 9292 were completed during the latter part of 1950. This proceeding concerns complaints involving the legality of certain agreements between Western Union on the one hand, and Globe Wireless, Ltd., and Tropical Radio Telegraph Co. on the other hand, for the exchange of specified international telegraph traffic. On June 27, 1951, a hearing examiner's initial decision held that the aforementioned agreements were illegal. The parties to the proceeding have been allowed until August 20, 1951 to file exceptions to this decision and to request oral argument.

Equipment and operating techniques.—Modernization of equipment continued with the addition of four new transmitters and the deletion of two existing transmitters at fixed public international radiotelephone stations. In the radiotelegraph service, 10 new transmitters were added and 5 were deleted.

In the radiotelephone service, two of the new transmitters installed near Miami, Fla., were of a new single channel single sideband type. This new equipment which is less complex than the usual multichannel single sideband types, is also less costly and of lower power. Hence, it is particularly well suited to operation over the shorter circuits operated from Miami. Spectrum space occupancy per channel is approximately one-half that required by conventional double sideband transmissions.

In the telegraph service, authority has been granted to transmit a composite emission consisting of frequency shift keying combined with keyed tone modulations and providing up to four channels of communication on a single frequency assignment.

Operations in the international control service formerly utilizing frequencies in the VHF range (principally 152–162-megacycle band) have been, with one exception, discontinued and circuits between transmitting and receiving stations and message centers formerly operated on these frequencies have been transferred to wire lines. This change was made pursuant to the presently effective table of frequency allocations which does not provide for international control operation in the VHF bands. Licensees have indicated interest in establishing control operations on regularly allocated frequencies in the UHF range, but up to the present time only two stations are being operated in that range on an experimental basis.

International merger.—During the past year the Commission maintained on a current basis, certain studies and records which are used in its regulatory activities and which would be of primary importance in the relation to the question of a merger of international telegraph carriers and facilities. The data involved include information with respect to the operations, plant, traffic volumes, revenues and finances of the various international telegraph carriers.

As was stated in the previous annual report, the Commission cooperated with and furnished detailed information to the President's Communication Policy Board with respect to this problem. That board concluded its studies which, among other things, included the question of merger, and on February 16, 1951, submitted its report to the President. With respect to the question of merger, this report entitled, "The Telecommunication—A Program for Progress", stated (p. 16):

> We find no imperative reasons calling for a merger of these companies; we conclude, on the contrary, that the recent improvements encourage a continuation of their present individual status * * *. While we believe that the national interest does not at this time require the repeal of existing prohibitions against merger, we recognize that changing conditions may provide compelling reasons for a merger later on. If so, the anticipation of them by adequate study and legislation will be essential * * *.

INTERNATIONAL CONFERENCES

International Administrative Telephone and Telegraph Conference, Paris, 1949.—In the sixteenth annual report, the major provisions of the telegraph regulations as revised at the Paris 1949 conference were set forth. These regulations, with certain qualifying reservations and declarations, were ratified by the United States Senate on August 9, 1950. They were then signed by the President, deposited with the International Telecommunication Union and proclaimed as effective by the President on November 20, 1950. The changes in regulations and traffic classifications, as well as the principles of rate unification provided for in these revised regulations, were reflected in the tariffs filed by United States cable and radiotelegraph carriers effective July 1, 1950.

Other conferences.—During the latter part of 1950, the Commission, after consulting with various interested parties, prepared its views with respect to certain problems which had been assigned for study to the International Telegraph Consultative Committee (CCIT). They were sent to the Department of State which forwarded them to the Secretary General of the ITU as the views of the United States Government. In March 1951, a meeting was held in Geneva of the various study groups of the CCIT to consider the views expressed by the various member governments on the problems assigned to CCIT for study. The United States was represented at this meeting by staff members of the Department of State and the Commission. The various groups adopted recommendations and resolutions on such matters as the technical phases of operation, revision of certain parts of the Telegraph Regulations, the handling of aeronautical traffic and the rates to be charged therefor, etc. These resolutions and recommendations are to be forwarded for further study by member governments and appropriate action at the next plenary session of the CCIT.

RATES AND TARIFFS

Rate schedules.—At the end of the fiscal year, 105 international cable and radiotelegraph carriers had 160 tariffs and 89 concurrences on file with the Commission. During that year these carriers filed 1,938 tariff publications establishing or changing rates, regulations, practices, or classifications of service.

Special tariff permissions.—The Commission received and acted upon 59 applications filed by international cable and radiotelegraph carriers wherein special permission was requested to make changes in existing tariff schedules or to establish new schedules on less than the regular 30-day statutory notice.

Contract filings.—The international and marine telegraph carriers filed approximately 300 new contracts, 600 amendments to existing contracts, and 120 reports of negotiations with other carriers or with

foreign administrations. In addition, and primarily as a result of the changes in the Telegraph Regulations effective July 1, 1950, the various international telegraph carriers filed 2,133 statements showing revisions in the division of charges for telegraph messages exchanged between these companies and their overseas correspondents.

Elimination of special Government rates.—As has been set forth more fully in the previous annual report, the Commission in its Fourth Interim Report in docket 8230, authorized the international telegraph carriers to eliminate special governmental rates under certain specified conditions. By July 1, 1950, such reduced rates had been eliminated for traffic between the United States and 30 foreign and overseas points. Since that time, such reduced rates have also been eliminated with respect to 50 additional foreign points including certain countries in the British Commonwealth.

Distribution of unrouted international traffic.—In the past year the Commission has given active consideration to various problems which have arisen in connection with the interpretation and administration of the formula which sets forth the manner in which Western Union shall distribute unrouted outbound international traffic filed at its offices, among the various international telegraph carriers. The views of the international telegraph carriers with respect to the manner in which they feel this formula should be revised have been solicited. In addition, the carriers have been requested to supply pertinent traffic data which would indicate the manner in which traffic is actually being handled under the present formula. As was noted in the sixteenth annual report, the Commission has pending before it a complaint (docket 9369) wherein it is alleged that Western Union has erroneously interpreted the formula and engaged in traffic practices which are contrary to the provisions thereof. By order dated November 22, 1950, the Commission set this complaint for hearing.

Marine rate case.—During 1950 the Commission received requests from marine radiotelegraph companies for rate relief. At the same time, Western Union, which originates and terminates much of the marine traffic, also advised the Commission that it desired to revise its land-line charges for handling this traffic. This proposed revision also made provision for establishing uniform division of charges with the various marine carriers. On March 14, 1951, the Commission adopted an order instituting an investigation (docket 9915) into the matter of handling marine traffic for coast station and land-line charges as well as the legality of the divisions between Western Union and the marine carriers.

The Commission had pending before it a formal complaint by Tropical Radio Telegraph Co. against Western Union (docket 9822), wherein it was charged that Western Union had failed to comply with the provisions of the formula for the distribution of outbound marine

traffic in its division of tolls for marine traffic. Since this complaint involved issues which were similar to those before the Commission in its general marine investigation, the Commission consolidated this complaint with the proceedings in docket 9915. Hearings in this consolidated proceeding, begun in June 1951, were continuing at the end of the fiscal year.

International rate case.—As was noted in the previous annual report, the Commission has issued four interim reports in docket 8230 and a final report in this proceeding is still pending. During fiscal 1951 the international telegraph carriers enjoyed increased revenues and profits partly because of the increase in traffic resulting from the disturbed world situation and partly because of the changes in traffic classifications resulting from the revised Telegraph Regulations. The Commission is maintaining close watch of these operations. However, because of the aforementioned situation, the Commission has not taken final action in this proceeding.

OTHER REGULATORY MATTERS

Depreciation.—Studies to determine the reasonableness of annual depreciation rates and charges, and the recorded depreciation reserves, and to determine the propriety of the depreciation practices of the international telegraph carriers, were continued. Considerable progress was made on such studies with respect to four major international carriers and, pending completion of these studies, tentative approval was given to the proposals of these carriers to effect changes in their annual depreciation accrual rates, as well as in certain of their depreciation practices.

Continuing property records.—Verification of the form and contents of continuing property records and evaluation of the effectiveness of continuing property records procedures of radiotelegraph and ocean cable carriers were continued. The four carriers that had not completely fulfilled the requirement to establish and maintain continuing property records at the beginning of fiscal 1951 still have not attained this objective, although considerable progress has been made.

Pensions and relief.—The Commission pursued its general studies of the carriers' pension arrangements. Six of the carriers introduced changes in their pension plans during fiscal 1951 and these changes were analyzed, particularly to determine their effect upon operating expenses.

Reclassification of plant.—Except for certain adjustments applicable to four of the carriers and which are now under study, the plant of the international radiotelegraph and ocean-cable carriers has been reclassified in accordance with the respective uniform systems of accounts.

Uniform system of accounts for radiotelegraph carriers; part 35 (uniform system of accounts for wire-telegraph and ocean cable carriers).—Parts 34 and 35 of the Commission's rules were further amended during fiscal 1951 so as to provide a single account in each of the message-revenue groups (Domestic, Transoceanic, and Marine) for recording Government message revenue derived from international messages.

During the year, part 34 (uniform system of accounts for radiotelegraph carriers) of the Commission's rules was further amended to reflect changes in retirement units occasioned by plant developments in recent years.

Preservation of records.—Revised rules for the preservation of records of telephone carriers, part 45, and international telegraph carriers, part 46, were adopted during fiscal 1951. They were designed to recognize modern methods of record keeping, improve procedures for management of records, and provide for adequate retention of records needed in the Commission's regulation of these carriers.

5. STATISTICS

TELEPHONE CARRIERS

Reports were filed on an annual basis by 221 common carriers and 25 controlling companies for the calendar year 1950. Among the reports received from common carriers were 102 from telephone carriers and 95 from carriers engaged in rendering mobile radiotelephone service. Financial and operating data concerning telephone carriers for the year 1950 as compared with 1949 are shown in the following table:

Telephone carriers [1]

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$9,986,086,460	$10,704,134,171	7.19
Depreciation and amoritization reserves	$2,796,221,835	$2,980,061,346	6.57
Net investment in plant and equipment	$7,189,864,625	$7,724,072,825	7.43
Local service revenues	$1,801,126,866	$2,058,311,931	14.28
Toll service revenues	$1,126,496,490	$1,245,351,804	10.55
Total operating revenues	$3,057,361,047	$3,445,154,483	12.68
Operating expenses	$2,368,493,780	$2,464,080,999	4.04
Taxes	$366,731,809	$526,043,113	43.44
Net operating income after all taxes	$322,135,485	$455,030,671	41.25
Net income	$252,325,062	$371,592,086	47.27
Dividends declared	$234,294,968	$269,770,556	15.14
Company telephones:			
Business	11,294,574	11,775,231	4.26
Residence	24,658,635	26,269,563	6.53
Average number of calls originating per month:			
Local [2]	5,086,975,778	5,443,998,555	([3])
Toll [2]	179,346,751	176,285,442	([3])
Number of employees at end of October	559,979	565,105	.92
Male	195,524	196,996	.75
Female	364,455	368,109	1.00
Total compensation for the year	$1,754,640,079	$1,798,193,394	2.48

[1] Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1950, due to enlargement of numerous local calling areas.

BUSINESS AND RESIDENCE TELEPHONES BY STATES

There were 43,003,800 telephones in the continental United States of which 30,067,000 are located in residences, and 12,936,800 in business establishments. The number of telephones, arranged by States, are shown on the following table. The figures were compiled on the basis of partly estimated data as of January 1, 1951, furnished by the American Telephone & Telegraph Co.

State	Business	Residence	Total
Alabama	119,100	304,700	423,800
Arizona	59,800	100,600	160,400
Arkansas	80,300	172,900	253,200
California	1,293,200	2,517,900	3,811,100
Colorado	137,100	303,900	441,000
Connecticut	217,700	569,500	787,200
Delaware	35,900	82,200	118,100
District of Columbia	222,600	266,400	489,000
Florida	265,400	381,600	647,000
Georgia	178,000	399,400	577,400
Idaho	39,800	100,700	140,500
Illinois	972,200	2,067,400	3,039,600
Indiana	286,000	866,000	1,152,000
Iowa	167,700	656,700	824,400
Kansas	135,200	459,000	594,200
Kentucky	124,700	336,300	461,000
Louisiana	153,400	363,100	516,500
Maine	57,600	173,400	231,000
Maryland	192,600	469,400	662,000
Massachusetts	464,400	1,122,500	1,586,900
Michigan	528,300	1,508,800	2,037,100
Minnesota	222,000	681,800	903,800
Mississippi	68,100	158,700	226,800
Missouri	333,100	817,500	1,150,600
Montana	44,300	102,300	146,600
Nebraska	96,300	304,500	400,800
Nevada	20,700	28,700	49,400
New Hampshire	37,200	112,400	149,600
New Jersey	474,800	1,170,500	1,645,300
New Mexico	49,800	67,400	117,200
New York	1,992,200	3,498,500	5,490,700
North Carolina	161,400	377,800	539,200
North Dakota	31,400	94,400	125,800
Ohio	661,200	1,952,700	2,613,900
Oklahoma	167,300	405,300	572,600
Oregon	131,900	306,300	438,200
Pennsylvania	848,500	2,303,600	3,152,100
Rhode Island	70,100	171,100	241,200
South Carolina	75,600	174,400	250,000
South Dakota	35,800	118,400	154,200
Tennessee	175,500	458,700	634,200
Texas	603,800	1,275,800	1,879,600
Utah	57,500	141,800	199,300
Vermont	24,300	71,800	96,100
Virginia	213,500	474,500	688,000
Washington	222,600	536,500	759,100
West Virginia	96,400	260,900	357,300
Wisconsin	265,500	726,100	991,600
Wyoming	25,000	52,200	77,200
United States	12,936,800	30,067,000	43,003,800

LAND-LINE TELEGRAPH

Annual reports containing statistical data for the calendar year 1950 were received from 24 wire-telegraph, ocean-cable, and radio-telegraph carriers. Financial and operating data compiled from reports received from the Western Union concerning land-line operations for the calendar year 1950 in comparison with 1949 are contained in the tabulation shown below. The figures pertaining to its

cable operations are included in another table relating to ocean-cable carriers.

The Western Union Telegraph Co.[1]

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$306,316,463	$294,451,126	(3.87)
Depreciation and amortization reserves	$133,978,693	$128,226,700	(4.29)
Net investment in plant and equipment	$172,337,770	$166,224,426	(3.55)
Message revenues	$146,353,375	$151,389,344	3.44
Total operating revenues	$171,393,408	$177,993,880	3.85
Operating expenses, depreciation, and other operating revenue deductions	$173,504,919	$167,279,568	(3.59)
Net operating revenues	($2,111,511)	$10,714,312	
Income taxes		$2,950,000	
Net income	($3,468,249)	$7,352,472	
Dividends declared		$2,458,972	
Revenue messages handled	[2] 182,069,952	[2] 182,994,799	.51
Number of employees at end of October	41,660	40,482	(2.83)
Total compensation for the year	$125,871,207	$116,936,815	(7.10)

[1] Represents data for land line operations. Figures covering cable are included in another table.
[2] Includes domestic transmission of transoceanic and marine messages (about 8,467,000 in 1949 and about 8,462,000 in 1950).

RADIOTELEGRAPH AND OCEAN-CABLE CARRIERS

The accompanying tables contain financial and operating data tabulated from the annual reports filed by radiotelegraph and cable carriers rendering international service. The returns are applicable to the calendar year 1950 as compared with 1949.

Radiotelegraph carriers

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$38,042,579	$38,885,097	2.21
Depreciation and amortization reserves	$18,207,637	$18,845,689	3.50
Net investment in plant and equipment	$19,834,942	$20,039,408	1.03
Message revenues:			
Domestic [1]	$1,542,098	$1,743,566	13.06
Transoceanic	$17,530,051	$19,223,350	9.66
Marine	$1,294,873	$1,271,847	(1.78)
Total operating revenues	$23,440,539	$25,683,717	9.57
Operating expenses, depreciation, and other operating revenue deductions	$22,696,908	$22,962,711	1.17
Net operating revenues	$743,631	$2,721,006	265.91
Income taxes	$500,989	$853,515	70.37
Net income	$430,506	$2,373,280	451.28
Dividends declared	$5,000	$7,500	50.00
Revenue messages handled:			
Domestic [2]	52,784	52,886	.19
Transoceanic	9,588,339	9,938,645	3.65
Marine	920,044	895,347	(2.68)
Number of employees at end of October	5,483	5,264	(3.99)
Total compensation for the year	$18,231,825	$18,208,915	(.13)

[1] Includes revenues from the domestic transmission of transoceanic and marine messages and revenues from domestic classification messages (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean cable carriers (including cable operations of The Western Union Telegraph Co.)

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$96, 289, 405	$97, 283, 249	1. 03
Depreciation and amortization reserves	$64, 688, 089	$63, 910, 819	(1. 20)
Net investment in plant and equipment	$31, 600, 716	$33, 372, 430	5. 61
Message revenues:			
Domestic [1]	$344, 224	$157, 521	(54. 24)
Transoceanic	$20, 389, 931	$20, 073, 604	(1. 55)
Total operating revenues	$2o, 154, 138	$24, 649, 414	6. 46
Operating expenses, depreciation, and other operating revenue deductions	$22, 169, 301	$21, 250, 647	(4. 14)
Net operating revenues	$984, 837	$3, 398, 767	245. 11
Income taxes	$117, 888	$708, 112	500. 67
Net income	$187, 916	$2, 165, 793	1, 052. 53
Dividends declared	$353, 468	$883, 670	150. 00
Revenue messages handled:			
Domestic [2]	217, 691	41, 168	(81. 09)
Transoceanic	10, 172, 458	9, 856, 802	(3. 10)
Number of employees at end of October	5, 667	5, 495	(3. 04)
Total compensation for the year	$13, 036, 719	$12, 030, 892	(7. 72)

[1] Includes revenues from the domestic transmission of transoceanic messages and revenues from domestic classification messages (primarily Canadian).
[2] Represents domestic classification messages (primarily Canadian).

INTERNATIONAL TELEGRAPH TRAFFIC

The reports received from cable and radiotelegraph carriers indicate that 518, 523,407 paid words were handled during the calendar year 1950. The outbound traffic amounted to 263,769,025 words during the year, and inbound 254,754,382 words. The following table shows an analysis of the traffic handled between the United States and the principal countries of the world.

International telegraph (radio and cable) traffic, 1950

Country	Number of words	
	Outbound from the United States	Inbound to the United States
EUROPE, AFRICA AND THE NEAR EAST		
Algeria	194,885	123,601
Arabia	812,572	717,943
Austria	1,594,727	1,754,623
Belgian Congo	328,658	287,128
Belgium	5,696,414	4,991,545
British East Africa	238,991	209,720
British West Africa	222,759	262,260
Czechoslovakia	1,071,945	1,551,571
Denmark	1,889,900	1,273,545
Egypt	1,706,590	1,411,603
Ethiopia	211,627	125,424
Finland	481,242	520,938
France	21,276,721	13,242,532
Germany	8,178,185	9,140,448
Greece	2,274,555	2,030,168
Hungary	372,697	340,619
Iceland	286,330	228,450
Iran	955,583	964,466
Iraq	191,609	230,518
Ireland	878,545	1,138,497
Israel	3,119,363	3,300,726
Italy	9,383,346	7,884,526
Lebanon	804,923	793,641
Liberia	624,952	483,833
Luxembourg	*125,994*	*112,401*
Morocco—French	362,062	250,667
Morocco—Tangier	684,078	711,996
Netherlands	6,481,231	6,166,073
Norway	2,658,759	1,837,863
Persian Gulf	303,344	308,710
Poland	559,671	442,175
Portugal	1,322,788	952,618
Roumania	155,389	160,784
Spain	3,108,853	2,290,040
Sweden	3,466,261	3,001,991
Switzerland	7,488,197	5,654,025
Syria	302,132	229,120
Transjordania	278,101	101,426
Trieste, Free Territory of	175,622	156,923
Turkey	1,084,336	776,866
Union of South Africa	2,222,858	2,388,860
U. S. S. R.	6,449,812	2,875,859
United Kingdom	47,878,197	45,600,817
Yugoslavia	1,009,097	890,940
All other places	1,432,253	2,710,680
Total	150,346,064	130,629,059
WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA:		
Argentina	7,218,013	7,891,759
Bahamas	602,020	728,786
Bermuda	851,722	945,690
Bolivia	777,448	769,976
Brazil	9,805,710	10,710,842
British Guiana	160,850	122,609
British Honduras	101,271	141,102
British West Indies [1]	234,249	167,205
WEST INDIES, CENTRAL, NORTH AND SOUTH AMERICA—continued		
Canada	6,556,018	7,807,742
Canal Zone	466,833	549,898
Chile	2,152,150	2,302,168
Colombia	4,421,289	4,306,818
Costa Rica	776,158	625,089
Cuba	6,878,907	8,959,965
Dominican Republic	1,252,611	1,224,669
Ecuador	1,245,901	828,355
Guatemala	*1,228,613*	1,279,713
Haiti	802,905	745,985
Honduras	638,416	559,828
Jamaica	611,595	466,120
Mexico	1,806,081	1,430,707
Netherlands West Indies	1,108,359	1,193,185
Nicaragua	876,985	606,709
Panama	1,195,188	919,452
Paraguay	386,423	215,673
Peru	1,943,859	1,665,251
Puerto Rico	3,453,318	3,081,208
Salvador	790,711	601,555
Surinam	127,381	128,040
Trinidad	508,740	373,689
Uruguay	1,940,774	1,710,343
Venezuela	6,608,106	7,098,960
Virgin Islands	223,923	216,767
All other places	316,740	56,055
Total	68,069,267	71,031,913
ASIA AND OCEANIA		
Afghanistan	172,527	105,431
Australia	3,411,301	3,006,914
Ceylon	579,594	425,526
China (excluding Hongkong)	2,532,469	1,910,132
Formosa	955,707	1,171,854
French Indochina	429,808	474,665
Guam	338,345	414,696
Hawaii	4,565,941	4,130,643
Hongkong	3,960,762	3,643,281
India	5,317,275	4,882,699
Indonesia	2,136,639	2,099,920
Japan	9,097,160	15,258,805
Korea	278,295	928,045
Malay States	*1,201,266*	*1,274,797*
New Zealand	863,047	831,757
Okinawa	255,897	618,786
Pakistan	1,675,038	1,686,929
Philippines	5,032,642	6,834,119
Society Islands	132,567	131,201
Thailand (Siam)	1,259,087	1,237,477
All other places	487,630	204,545
Total	44,682,997	51,272,222
Unknown destination or origin	670,697	1,821,188
Grand total	263,769,026	254,754,382

[1] Points not listed separately.

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CHAPTER III—SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL

Most of the nonbroadcast radio services are grouped in what is known as the Safety and Special Radio Services. They comprise a broad field of radio utilization by commerce, industry, and Government and represent by far the greatest number of radio station licenses issued by the Commission.

The services fall into four categories:

Safety services.—Aeronautical, Marine, Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.

Land transportation services.—Railroad, Urban Transit, Intercity Bus, Highway Truck, Taxicab, Automobile Emergency, and Citizens.

Industrial services.—Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, Low-power Industrial, and Agriculture.

Amateur and disaster services.

These services are continuously expanding, as indicated in the statistical tables at the end of this chapter. This trend necessarily will continue, even though no new uses of radio are authorized, since the licenses are not exclusive but are granted for shared use of frequencies on the basis of the applicant's membership in an eligible group. Thus, the licensing and regulatory problems grow more complex from year to year as more and more radio stations are fitted into the available

spectrum space. Likewise, the function of enforcement and maintenance of a satisfactory level of compliance has become increasingly difficult with the rapid development of these services since World War II to a total approaching 200,000 stations.

2. MARINE RADIO SERVICES

GENERAL

The Marine Radio Services involve the use of radio for the safety, navigation, and general communication needs of shipping interests, both commercial and noncommercial. Of radio's many applications for safety purposes, none is older or more widely known than communication by ships as an aid to the safety of life and property at sea. Through such use, radio has proved itself of inestimable assistance in effecting rescues and averting disasters. The normal radio installation aboard ship provides means also for exchanging operational and public correspondence with coast stations, other ships and, in some cases, with aircraft.

Radio as an aid to navigation has proved its value over the years. Through the use of weather broadcasts, direction finding, loran and radar, ships are assisted in navigating safely, with stranding, collision, and foundering held to a minimum.

Through the use of the radiotelephone, radar, and the radio direction finder, ships on the Great Lakes carrying cargoes primarily of ore, grain, and coal; integrated barge tows on the Mississippi River and tributaries carrying cargoes primarily of petroleum products; and bulk freighters and tankers in the coastal trade carrying petroleum products, coal, grain, and other materials are operated in a more safe and expeditious manner, thereby contributing materially to the national production, security, and economy. Ships in the coastal and international trade also use radiotelegraphy, in particular where communication with foreign stations is carried on.

A ship having a radio installation is classified for convenience as either compulsorily equipped or voluntarily equipped. This distinction is necessitated by the fact that Federal statutes and international agreements require the mandatory installation of radio for safety purposes on board certain classes of ships. Title III, part II, of the Communications Act (for the high seas) and the Ship Act of 1910 (for the Great Lakes) embody the domestic law on this subject, while the International Convention for the Safety of Life at Sea constitutes international law with respect to safety radio requirements on international voyages. The Commission is the sole Federal agency having responsibility for the domestic administration and enforcement of these safety radio laws and treaty radio provisions.

The Commission, pursuant to the Communications Act, also licenses

all compulsory and voluntary radio stations on board vessels of United States registry (including certain U. S. Government ships).

Since a large percentage of the world's ships are engaged on international voyages and since radio is used as international media for communication, the Commission regularly assists the Department of State by participating in international conferences or meetings related to the regulation, control or improvement of the equipment, facilities, frequencies, methods of operation and radio operators for international marine radiocommunication, and for radio aids to international marine navigation.

SAFETY AT SEA

Administration of title III, part II of the Communications Act requiring radio apparatus and operators on board ocean-going vessels, involved, as of June 30, 1951, approximately 1,500 ships of United States registry. When navigated in the open sea, these ships must carry one or more qualified radio operators and maintain safety watches on the radiotelegraph calling and distress frequency. Vessels of countries which are not parties to the International Convention for the Safety of Life at Sea are subject to these same equipment and operator requirements when leaving United States ports.

Commission records disclose that the international radio telegraph distress signal ["SOS"] was used throughout the world 206 times during the year. Studies of distress communications, made pursuant to section 4 (c) of the Commications Act, are used to strengthen the related rules of the Commission for the purpose of insuring maximum use of radio for safety of life and property at sea.

The Commission is authorized by the Communications Act and the Safety of Life at Sea Convention to exempt ships in certain categories from radio requirements if it finds that the route or the conditions of the voyage or other circumstances render such radio requirements unreasonable or unnecessary. Pursuant to this authority, the Commission renewed for 1 year blanket exemptions for passenger vessels of 15 or less gross tons when navigated in coastal waters of the United States not more than 20 nautical miles from the nearest land or not more than 200 nautical miles between two consecutive ports, and also for passenger vessels of less than 100 gross tons when navigated within certain designated coastal areas.

Individual applications for ship radio exemption received during the year numbered 35. Renewal of exemption was granted to several cargo vessels used as tenders and moored most of the time to oil well drilling platforms located within 15 miles of the coast of Louisiana in the Gulf of Mexico. These vessels are voluntarily equipped with two-way radiotelephone installations capable of communicating with

nearby coast stations, with ships similarly equipped, and with United States Coast Guard stations.

SAFETY ON THE GREAT LAKES

Of outstanding significance during the year was formal discussion with Canada of a proposed marine radio treaty between that country and the United States which would be applicable for safety purposes to certain vessels operating on the Great Lakes. This development had been anticipated since the Commission reported to the Seventy-sixth Congress in 1940 its special study of radio requirements for ships navigating the Great Lakes.

The treaty, as proposed, would require several hundred Great Lakes vessels to carry radiotelephone installations and to maintain radio watches for safety purposes. Such radio installations would also have to meet specific minimum standards.

Delegations representing the United States and Canada conferred formally for this purpose at Ottawa from May 7 to May 11, 1951. FCC Commissioner Edward M. Webster was Chairman of the United States delegation. In addition, two members of the Commission's marine radio and legal staff participated as official advisors. Agreement was reached upon the substance of the proposed treaty with the exception of a certain legal technicality which required further study. The conference recessed on May 11, 1951, to await the outcome of that study.

RADIO AIDS TO NAVIGATION

Authorizations were renewed for operation on an experimental basis of shore-based radar (radionavigation land) stations in the cities of Long Beach and San Francisco, Calif., and Baltimore, Md., and new authorizations were granted for like stations at Los Angeles and New York. These stations are used for providing information intended to assist the safe piloting of ships entering, leaving, or mooring within the harbor. Since the Coast Guard has the responsibility for providing and supervising public aids to marine navigation, the establishment of these private aids to navigation is carried out only with the concurrence of that agency. Very high frequency maritime radiotelephone systems are being used experimentally by such radar stations, in some cases to communicate with the pilots aboard ships to furnish navigational information.

Nine experimental radar authorizations (radionavigation land stations) are held by various members of the petroleum industry engaged in off-shore oil drilling activities in the Gulf of Mexico. In each case, these stations are used in the navigation of ships of the licensee in his particular operations.

As of June 30, 1951, there were more than 1,600 United States merchant ships authorized to use radar on a regular basis.

Nine experimental authorizations were renewed to cover shore based radar stations for training merchant marine deck officers in shipboard radar operation on the Great Lakes and on the seaboard. The need for this type of station arises from the fact that shipborne radar is a relatively new device and its use is not sufficiently widespread to provide normal means of training navigators.

INTERNATIONAL FREQUENCY COORDINATION

The efficient functioning of the marine radio services on a systematized and universal basis depends, to a high degree, on international agreements and decisions. For this purpose, international conferences are held periodically to consider frequency allocation and utilization problems. The latest and most far-reaching of these conferences was that of the International Telecommunications Union at Atlantic City, 1947. Some of its revised radio regulations came into force on January 1, 1949, and the remainder, mainly involving the assignment of frequencies between 14 and 150 kilocycles and between 4000 and 27,500 kilocycles, are to become effective on a date or dates to be determined by an ITU Extraordinary Administrative Radio Conference scheduled to convene in Geneva on August 16, 1951.

In treaty region 2 (Western Hemisphere), an assignment plan was evolved and final coordination completed for the 415–535-kilocycle frequency band which affects, mainly, coast stations and compulsorily equipped ship stations which use telegraphy.

It is proposed to implement this plan in the latter part of 1951. Other assignment plans, which involve marine radio services and the fixed public service in Alaska, were prepared for the frequency bands 150–415 kilocycles and 2000–3500 kilocycles; however, further international coordination appears necessary before implementation may be considered.

In the 2000–3500-kilocycle plan, additional ship-shore radio channels would be provided for public telephone service at certain major ports of the continental United States where the present radio channels are greatly overloaded. These proposed additional channels and areas selected for their use are provided, insofar as possible, in accordance with the recommendations of the Radio Technical Commission for Marine Services.

PROPOSED AUTOMATIC RADIOTELEPHONE ALARM SYSTEM

The Commission has actively participated in the preparation of a recommendation concerning the use of an automatic alarm device for guarding the proposed international marine telephone distress frequency 2182 kilocycles.

The relative efficacy of the systems proposed by the United States, United Kingdom, and France for the purpose was studied through comparative practical tests conducted by personnel of the Commission's Laboratory, Marine and Field Engineering Divisions using experimental equipment developed in this country and some equipment received for test from abroad. Tests were made in the New York, Gulf of Mexico, and Great Lakes areas. Considerable interest in the auto alarm problem was evidenced abroad particularly by the extensive coordinated tests made across the English Channel by the United Kingdom and France which led to the development and proposal of a second alarm system by the former administration. The comparative and somewhat competitive tests of similar alarm equipment in the United States and Europe have provided an excellent background for the selection and development of an automatic alarm system for standardization on a worldwide basis.

This matter was considered at the sixth meeting of the International Radio Consultative Committee (CCIR) at Geneva, Switzerland (June 1951), with a resultant recommendation that an auto alarm signal consisting of alternate tones of 2,200 and 1,300 cycles per second, each having a duration of 250 milliseconds, be provisionally adopted internationally for use on the maritime radiotelephone distress frequency subject to a prescribed study program involving laboratory and field tests to be completed within a 1-year period. An engineer of the Commission's Marine Division was a member of the United States delegation at this meeting to aid in the study of the auto alarm matter and the formulation of the CCIR recommendation.

COAST STATIONS

The use of high frequencies by ocean-going ships for long-distance communication with coast stations continues to increase.

During the fiscal year, eight public coast stations using telegraphy were granted authority to discontinue operation. These stations were located at Thomaston, Maine; Norfolk, Va.; Jupiter, Fla.; Beaumont, Tex.; Seattle, Wash.; Kailua, T. H.; Frankfort, Mich.; and Westlake, Ohio. On the seaboard, this trend to curtailment of service arises, in part, from an increase in the number of ship stations being equipped with high frequency radiotelegraph installations in addition to the medium frequency installations required by law and treaty, thereby allowing direct long distance communication with certain coast stations which serve the predominant seaboard ports. On the Great Lakes, the curtailment trend is due to the fact that there are now in operation on those lakes not more than six ship stations licensed by the Commission for telegraphy and these ships also have radiotelephone installations.

A new public coast telegraph station was established at Lake

Charles, La., and public coast stations using telephony were authorized at Pittsburgh, Pa., and at Lake Texhoma, Tex., an inland lake. A limited coast station was authorized in Nueces County, Tex., for communicating with ships desiring passage through the swing gate bridge at that location.

At the close of the fiscal year, a number of applications were pending for authority to establish additional radiotelephone communication channels and stations in the 2–3-megacycle band to meet an increasing need for public ship-shore service in the United States coastal waters. [Pending implementation of the new proposed international frequency allocations, the Commission on July 18, 1951, modified its rules so as to provide for the further use of frequencies presently allocated to this service by designating supplemental "day only" frequencies for use at Boston, New Orleans, Seattle, Miami Beach, Los Angeles, San Diego, San Francisco, Eureka (Calif.), and Tampa. An additional channel was made available at Galveston on a 24-hour basis.]

Numerous applications for VHF (Very High Frequency) coast stations and associated ship stations, both public and nonpublic, were granted during the year. These stations have been operating on an experimental basis and provide a local type of communication for a large number of vessels in harbor and port areas.

The operational results obtained and the interest shown in this new type of radiotelephone facility have formed a basis for regularization of the use of very high frequencies for both public and nonpublic radiotelephone service as reflected in the Commission's recently revised Maritime Service rules.

A unique feature in the operation of these VHF Maritime Mobile Service stations in the regular service is that the VHF ship telephone stations may be operated by a person who does not hold an operator license issued by the Commission provided a specified series of conditions are complied with at all times during such operation. Only modern VHF ship telephone transmitting equipment which has been type-accepted by the Commission, may be licensed for this purpose. The equipment must not be that required on board vessels for compliance with the safety provisions of treaty or statute.

With respect to the operation of nonpublic VHF maritime mobile stations, short range communication plays an important part in piloting and docking ships by providing direct radiotelephone service between the pilot or master of the ship, the dockmaster, and the tugs. In one case, a licensee at New York City emphasized the safety aspect of his particular service in establishing an auxiliary coast station at a location different from his primary station in order to maintain communication should the primary station fail. Thereafter, a severe storm struck New York Harbor, and the auxiliary station operation

resulted in saving valuable property and possibly lives by directing tugboats in the harbor.

The Commission's records indicate that 80 VHF public and non-public coast stations had been established under experimental licenses as of June 30, 1951. With each coast station is associated a number of VHF ship stations that communicate with it.

There were 35 coast stations licensed to use telegraphy in the United States at the end of the fiscal year, including 3 formally classified as "mobile press" stations. The number of coast stations using telephony for regional service, exclusive of those in Alaska, numbered 53. There are five coast stations in the United States employing telephony on high frequencies for long distance public service with ocean going vessels.

VOLUNTARY USE OF RADIOTELEPHONY

Commission records show that there are approximately 25,000 vessels of United States registry equipped with licensed radiotelephone stations for operation on available frequencies in the 2000–3000-kilocycle band. The large increase in the number of ship stations using telephony in this band has aggravated the already serious problem of insufficient frequencies to accommodate all the desired communication at the major seaports. Because of this condition the Commission has modified its rules, as previously stated, to provide for duplicate use of presently allocated ship frequencies in certain additional areas on a "day only" basis.

The Commission, effective July 23, 1951, made over-all revisions to parts 7 and 8 of its maritime rules, which provided for the additional use of the inter-ship telephone frequency 2638 kilocycles on the rivers and inland waters, a use previously not permitted. A study is being made regarding the feasibility of allocating frequencies in the 2000–3500-kilocycle band for assignment to small boats for inter-ship communication on a "geographic area basis". The Commission's revised maritime rules improve communication facilities for the operation of vessels by providing two frequencies in the medium-frequency band and several frequencies in the very high frequency band for ship-shore business and operational purposes.

To further enhance the safety of radiotelephone communication, beginning July 23, 1951, the frequency 2182 kilocycles may be used by ship stations of the United States on a voluntary basis for calling and distress purposes and for safety communication within certain prescribed areas. It is anticipated that this frequency will be recognized eventually for this purpose on an international basis.

A large number of vessels have installed very high frequency equipment for telephone communication with public coast stations along the Atlantic, Gulf, and Pacific coasts and on the shores of the

Great Lakes. The principal users of this service are pleasure boats, tugs, tow boats, and fishing vessels; and on the Great Lakes, bulk freighters carrying iron ore, coal, and grain.

FIXED PUBLIC SERVICE AND MARITIME MOBILE SERVICE IN ALASKA

The Fixed Public Service and the Maritime Mobile Service in Alaska utilize specially assigned frequencies to provide communication between communities in Alaska, with the Alaska Communication System and between coast stations and ships in Alaskan waters. The Alaska Communication System (ACS), under the Department of National Defense, operates the main intra-Alaska communication system and routes Alaska message traffic to all parts of the world. The ACS makes its general point-to-point communication service available as a connecting system to non-Government stations. The Commission maintains liaison with the ACS in coordinating communications facilities in Alaska to serve the public interest.

The number of licensed Fixed Public Service stations (point-to-point) in Alaska decreased during the fiscal year from 524 to a total of 517, while the total number of coast stations in Alaska increased in the same period from 340 to 344.

Several administrative problems have arisen concerning the regulation of non-Government stations in Alaska which call for an early revision of the regulations applicable to these stations. Because of the increasing need for frequencies by other services, notably the aeronautical service, and by Government agencies for stations in Alaska, and because of the effect of forthcoming treaty implementation which will reduce the frequencies available for Fixed Public Service in Alaska, the Commission is confronted with a difficult situation in reducing and changing the fixed service frequency allocation there. In addition, there is undesirable duplication of these radio facilities as between the ACS and the non-Government stations at certain locations. Although the Commission has these matters under advisement, the necessary corrective action is being delayed because the limited Commission staff assigned to resolve these problems must give priority to more pressing work dealing with safety at sea and participation in international treaty work.

INTERFERENCE

Numerous cases of unauthorized radiation from radiotelephone transmitters used aboard small craft have been reported. This has caused harmful interference, in some instances, to the aeronautical service. The possibility of using some convenient and relatively inexpensive but effective means applicable to each existing transmitter for reducing these interfering emissions has been made the subject of investigation.

The matter of interference to reception by Civil Aeronautics Administration stations in Alaska of signals from aircraft stations on the frequency 3105 kilocycles caused by ship, point-to-point, and coast station operations in Alaska has been mitigated to some extent by the issuance of a general notice by the Commission to all involved licensees pointing out the existing problem and requesting precautionary operating measures. Improper technical adjustment of the transmitters was found to be the major cause of this interference.

EQUIPMENT APPROVALS AND PROBLEMS

Additional installations of the nickel-cadmium type of storage battery have been made on board ships required to carry an emergency power supply as part of their compulsory radio installation. This type of storage battery has certain advantages for use on ocean-going vessels; one of the more important features is its ability to remain in good operating condition without attention during sustained periods when a ship is temporarily out of service. Although progress has been made in solving certain regulatory problems involved in the use of such batteries, the development of a practical means for determining its state of charge was still under consideration.

During the year the Commission type-approved for licensing purposes four basic types of ship radar equipment after the required commercial laboratory and shipboard tests. Such type-approval is a regulatory requirement intended to prevent interference prior to operation of the equipment. Two of the types approved are of foreign manufacture. One of these is unusual as compared to commercial equipment manufactured in this country in that separate transmitting and receiving antennas are employed. Also the transmitter, modulator, and receiver "front-end" circuits are associated with the antenna system and rotate with it as one assembly.

Anticipating the possible early effective date of the Safety of Life at Sea Convention, London, 1948, the Commission in a rule-making proceeding proposed more stringent technical requirements for all new types of radiotelegraph auto alarms which would be subject, under the law, to its approval. The related comments of the industry were directed to the important technical question of how best to specify operating tolerances for the dashes and spaces of the alarm signal. Accordingly, the Commission, as a temporary measure, adopted a related rule which embodies the text of the convention regulations (general in character) on this subject. At the same time, the matter of determining the precise text of an appropriate final rule prescribing these operating tolerances was referred in June 1951 to the Radio Technical Commission for Marine Services for study and recommendations.

RULES GOVERNING STATIONS IN MARITIME SERVICES

An extensive revision of the maritime service rules was adopted by the Commission during the fiscal year, to become effective on July 23, 1951.

The revised rules incorporate information relative to procedures to be followed in the licensing of stations and reflect the applicable provisions of more recent international treaties and agreements concerning these services.

The revised rules also regularize the heretofore experimental use of certain very high frequencies in the maritime service. Ship and coast stations, including those which will be authorized to operate on very high frequencies, are classified as "public" or "limited", depending on whether or not the station is open to public correspondence. Also, a new class of nonpublic station known as a Marine Utility station is established, to operate under one station license on either ship or shore as occasion requires. It will be of low power and portable, using radiotelephony, and its scope of operations will be confined to designated geographic areas. This class of station is intended to serve the purely local communication needs of maritime interests, such as harbor pilots who find small portable communication equipment useful in the performance of their duties.

In regularizing former experimental operation, an additional class of fixed station designated Marine Fixed has been established. This type of station is normally located in water areas adjacent to the coast and is authorized to communicate with nearby coast stations using telephony. It is intended primarily to meet the communication needs of the petroleum industry engaged in off-shore, oil-drilling operations.

The revised rules establish new classes of coast stations and several new classes of associated stations. The new classes of coast stations are designated as Public Class I, II, and III; Limited Class I, II, and III, and Marine Utility. The new classes of stations to be associated with them are designated Marine Control, Marine Repeater, Marine Relay, and Marine Receiver Test. Marine Control and Marine Repeater stations will provide for remote control of transmitters, and for relay of received signals on frequencies above 70 megacycles, where this is necessary in lieu of wire lines. The Marine Relay station will be authorized on frequencies above 70 megacycles for exchanging operating signals and for forwarding and relaying ship-to-shore message traffic. The former class of Marine Relay stations, which comprised a coast station using telegraphy under a separate marine relay license to communicate with other marine relay stations in expediting the transmission of telegraph message traffic to ships, has been abolished. However, its functions have been included in the scope of oper-

ations of a coast station licensed for telegraphy. Marine Receiver Test stations will be used at fixed locations on shore for regularly testing the receiving equipment of public coast telephone stations.

The revised rules also establish the Maritime Radiolocation Service on a regular basis and classify the different types of stations, both on ship and ashore, which will provide radionavigation and radiolocation services. The numerous ship radar stations already licensed will be transferred, under the revised rules, from the former "ship" service to the new service. This is in accordance with implementation of the radio regulations adopted at Atlantic City.

To provide for development of equipment or techniques in the marine services, new classes of "developmental" stations have been established which, during the developmental period, will operate experimentally.

Provision is made in the revised rules for type approval or type acceptance of transmitters and other radio equipment to be used for specific marine purposes. Type acceptance will be given for a readily identifiable type of transmitting equipment upon proper showing made in writing by the manufacturer or applicant that the equipment is capable of meeting requirements for station licensing. Type approval, as distinguished from type acceptance, will be given only after suitable tests have been made to determine ability to meet specific requirements for which type approval is requested. With the exception of radar equipment, type approval is applicable only to radio equipment compulsorily installed on ships for safety purposes (such as main transmitters, emergency transmitters, auto alarms, etc.).

The revised rules provide for type approval of radar equipment to be used either on ship or on shore, since such equipment requires special testing techniques to determine its adequacy for licensing purposes.

The revised rules require installation of automatic-alarm-signal-keying devices on ships compulsorily equipped with radiotelegraph installations. Such keying devices will provide, in time of distress, a needed method for automatically and correctly transmitting the alarm signal.

RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Commission continued its participation in the activities of the Radio Technical Commission for Marine Services (RTCM). Commissioner Edward M. Webster was reelected its vice chairman for another 2-year term, a Commission engineer continued as Executive Secretary and office space was provided by the Commission for the Secretariat. During the year, the RTCM was reorganized and its membership doubled, with the industry members furnishing an assist-

ant to the Executive Secretary and contributing toward part of the expenses of the Secretariat.

The RTCM studied and made recommendations on radio problems of marine interest and concern. Among these were a study and report on the difficulties which would result from a failure to standardize internationally upon the use of FM (frequency modulation) for VHF marine communication, including an analysis of the advantages of FM over AM (amplitude modulation) for such use; also a study and recommendation to provide an adequate marine radiotelephone service. Technical committees of the RTCM are presently studying medium distance (3 to 50 miles) marine navigational radio systems to determine whether any modifications should be recommended in the existing United States policy on such aids. On November 2, 1950, the RTCM sponsored a demonstration of improved and new electronic navigational aids at the United States Coast Guard Electronic Engineering Station, Wildwood, N. J. A special committee of the RTCM is continuing study on the proposed standardization of selective signaling and ringing devices for the marine radiotelephone services. The RTCM, through the facilities of some of its members, assisted the Commission's engineers in making practical tests of the domestic and foreign radiotelephone auto alarm equipment previously referred to.

3. AERONAUTICAL RADIO SERVICES

The Aeronautical Radio Services provide radio facilities for aircraft operation and safety of life and property in the air. Radio communication has become vital to aviation both from the standpoint of safety of life and property as well as for efficient, expeditious, and economical operation of aircraft.

These services consist of Aircraft radio stations, Aeronautical Land and Aeronautical Fixed stations, Airdrome Control stations, Aeronautical Mobile Utility stations, Aeronautical Advisory stations, Flying School stations, Flight Test stations, Aeronautical Public Service stations, Civil Air Patrol stations, and Navigational Aid stations including radio beacons, ranges, radar devices, direction-finding systems, traffic control operations, approach and instrument landing systems, radio altimeters, and distance measuring devices.

Expansion of aviation radio has been extremely rapid. In 1938 there were less than 1,500 aeronautical stations of all kinds. There were more than 34,000 authorized aircraft and ground stations at the close of fiscal year 1951. This increase is due at least in part to the large growth of voluntary installations of communications equipment aboard private aircraft.

AVIATION ORGANIZATIONS AND CONFERENCES

In order to maintain the aviation radio service at the high level of reliability necessary for safety purposes and to encourage further development, the Commission has increased its participation in the various interagency coordinating and policy groups both on a domestic and international scale. The organizations in which the Commission has been most active are the International Administrative Aeronautical Radio Conference (IAARC) of the International Telecommunications Union, the International Civil Aviation Organization (ICAO), the Air Coordinating Committee (ACC), and the Radio Technical Commission for Aeronautics (RTCA).

The IAARC recommendations and planning form a basis not only for the international allotment of aeronautical frequencies but also for a high-frequency plan for the continental United States. Such a plan to serve the aeronautical operations for this country has been drawn up and will be associated with the United States position for the ITU Extraordinary Administrative Radio Conference planned to start in Geneva on August 16, 1951.

A major and continuing function of the Commission is participation in the work of the Air Coordinating Committee. The ACC recommends proposed United States policy on aviation to the President and acts as a vehicle for coordinating aviation matters between the various departments of the Government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees: Aeronautical Communications and Electronic Aids, Airspace—Rules of the Air and Air Traffic Control, Search and Rescue, and Airmen Qualifications.

The Commission is also represented on the Air Traffic Control and Navigation Panel. This was established as a result of the recommendations of the Congressional Aviation Policy Board and the President's Air Policy Commission for the purpose of guiding the program for providing all-weather air navigation and traffic control facilities as well as a national air defense system. Special working group 5 of this panel completed a detailed set of operational requirements and procedures as the blueprint for the integration of air traffic control operations within the United States. The report of this group was approved by the panel and the Technical Division of the ACC as a guide for implementation of the transition system.

The Radio Technical Commission for Aeronautics is a cooperative association of the United States Government-industry aeronautical telecommunication agencies. The RTCA conducts studies of aeronautical telecommunications problems and related matters for the purpose of providing guidance to and coordinating the efforts of all organizations concerned.

The Commission's Aviation Division participates in the Executive Committee and several special technical subcommittees of the RTCA. During the past year these special committees have studied and made recommendations on such problems as:

Special Committee 12—Test procedures and performance requirements for airborne radio transmitting equipment operating within the frequency range 2–30 megacycles and 500 kilocycles.

Special Committee 13—Test procedures for airborne radio equipment operating within the frequency band 30–400 megacycles.

Special Committee 53—Protection ratios for carrier current systems operating in the frequency band 200–415 kilocycles.

Special Committee 56—Implementation of the VHF (118–132 megacycles) utilization plan and review of transition period communications requirements.

Special Committee 57—High altitude grid plan for VOR/DME frequency pairing.

Special Committee 58—Minimum performance requirements for airborne electronic equipment for the transition period common system.

The ICAO is an international organization established to develop standards and recommend practices for international civil aviation throughout the world. During fiscal 1951 the Commission assisted in the preparation for and participated in the ICAO Second Middle East Regional Air Navigation meeting and the fourth session of the Communications Division. In addition, the Commission assisted in preparing for the following ICAO meetings scheduled in fiscal 1952: Third Search and Rescue Division meeting, South American/South Atlantic RAN meeting, and Third European Mediterranean meeting.

Commission participation in the preparation for and in the work of these ICAO meetings affords an opportunity for the guidance of aeronautical planning to insure the most efficient use of the limited radio frequency spectrum and at the same time to provide an adequate communication and navigation service for international aviation. In addition, representation on these groups insures that the Commission will be kept informed of current trends in international aviation telecommunications requirements which, because of the nature of aviation operations, affect and in many instances become a part of the United States domestic requirements.

AIRCRAFT RADIO STATIONS

The largest increase in the aeronautical radio services was that of private aircraft. There were more than 30,000 authorized aircraft radio stations at the close of the fiscal year as compared with approxi-

mately 20,000 in 1950, and of the former, more than 28,000 were private aircraft. To meet the congestion of communications channels which resulted from expansion of civil aviation, additional very high frequencies (VHF) have been placed in service. New communication and traffic control procedures are being adopted and utilized.

There has been a sizable increase in the number of aircraft utilizing radio since aircraft landing at many major airdromes and operating in defense areas are required to be radio equipped.

Related to the general subject of aviation use of radio, but not included in the Aeronautical Radio Services, is a special class of operator authorization for operating radiotelephone stations on private aircraft. This is covered in another section of the current report.

AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

The more than 1,300 aeronautical land and aeronautical fixed stations provide communications necessary for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations communicate with aircraft whereas aeronautical fixed stations provide point-to-point communications to enable aircraft operators to carry on their business more efficiently.

In the continental United States, aeronautical fixed stations are used primarily as "back-up" circuits for land line facilities; however, in international operations, aeronautical fixed stations provide the primary service. In accordance with Civil Air Regulations, domestic air carriers are required to maintain ground-air-ground communication at terminals and at such other points as may be deemed necessary by the Government to insure satisfactory communications over the entire certified route. Such a system is independent of radio facilities provided by Federal agencies.

The expansion of aircraft operation in the Territory of Alaska has resulted in the formulation of an Alaskan communication plan to provide additional high and very high frequencies. The aeronautical portion of part 14 of the Commission's rules has been incorporated in part 9 together with the other rules affecting aircraft operation in Alaska.

CIVIL AIR PATROL STATIONS

These stations handle the necessary radio communication for civil air patrol activities and emergencies pertaining to the protection of life and property. The Civil Air Patrol, operating on frequencies made available by the United States Air Force, participates in air shows, missing aircraft search missions, training missions and communication systems at encampments, bases, and official meetings. There were nearly 1,500 authorized Civil Air Patrol base stations at

the close of the fiscal year. Approximately 5,000 mobile stations are associated with these base units.

AIRDROME CONTROL STATIONS

This type of station provides communication between an airdrome control tower and aircraft or aeronautical mobile utility stations for the purpose of controlling aircraft within the control area of an airport and both aircraft and vehicular traffic on any portion of the landing area. Such control is mandatory in directing arriving and departing aircraft so as to maintain safe separation of aircraft to avoid collisions and to provide an efficient flow of air traffic into and out of the airport. Fifty-six stations of this type are licensed by the Commission.

AERONAUTICAL MOBILE UTILITY STATIONS

This class of station is installed on board crash, fire, and maintenance vehicles operating on an airdrome to provide communication with the airdrome control tower so that the control tower operator may have direct contact and control over such stations at all times. This service is essential to municipalities and individuals operating airports for safeguarding personnel aboard the vehicles and aircraft utilizing the field. Nearly 100 aeronautical mobile utility stations are authorized.

AERONAUTICAL NAVIGATIONAL AID RADIO STATIONS

These stations involve the transmission of special radio signals to establish traffic lanes of the air so that aircraft may determine position with reference to the navigation facility. The navigational aid stations include radio beacons, radio direction-finders, radio ranges, localizers, glide path, marker beacons, ground control approach, instrument landing, radar and distance measuring stations. This service is normally operated by the CAA; however, as a result of the inauguration of off-airways route operation by the air carriers, it has been necessary for the air carriers to establish and operate additional navigation facilities. At the close of fiscal 1951 there were more than 150 aeronautical navigation type facilities authorized by the Commission.

FLYING SCHOOL RADIO STATIONS

A flying school station is a station on the ground or on board an aircraft used for communications pertaining to flight instructions to students or pilots while actually operating aircraft and for the promotion of safety of life and property. At the close of the fiscal year, 18 flying school stations held licenses.

FLIGHT TEST RADIO STATIONS

A flight test radio station is installed on ground or aircraft for the transmission of communications in connection with the test of aircraft or major components of aircraft. The development of aircraft and associated equipment has steadily increased. For the flight testing of such aircraft and associated equipment, communication with the ground station is essential in order that the aircraft manufacturer may acquire information necessary for the designing and production of aircraft and components which will be safe and efficient. Nearly 100 flight test stations were in operation.

AERONAUTICAL PUBLIC SERVICE RADIO STATIONS

An aeronautical public service radio station provides private communication between individuals aboard aircraft in flight and persons on the ground. The aeronautical public service station operates in connection with the Nation-wide, land-line telephone system through the coastal harbor radio telephone and coastal telephone stations. This service has continued to increase inasmuch as the operators of large aircraft used for business purposes consider communications between individuals aboard their aircraft in flight and the ground to be essential. Nearly 550 of these stations held licenses.

AERONAUTICAL ADVISORY STATIONS

This is a new class of station, first authorized during 1951 to meet an increasing demand for advisory air-ground communication at the smaller airdromes, many of them in remote locations not served by regular aeronautical control or communication facilities.

This type of station provides advisory communications between an airport operator and private aircraft to enable airmen to ascertain the condition of the runways, type of fuel available, wind conditions, weather and other information necessary for aircraft operations. Aeronautical advisory stations are not used for the control of aircraft at a landing area and authorizations for these stations are issued only to the owner or operator of a landing area not served by an airdrome control station. Thirty-three such stations have been authorized.

4. PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services encompass radio communication used for State and local police, fire, forestry-conservation, and highway maintenance organizations, and for certain State military organizations. Included, also, is the Special Emergency Radio Service used for the alleviation of an emergency endangering life or property.

Just as the Marine Radio Services afford safety to ships at sea and the Aeronautical Radio Services care for the safety needs of aircraft,

the Public Safety Radio Services provide important communication facilities required by the different non-Federal governmental jurisdictions for the public safety needs of the over-all population of the country.

Although public safety use of radio on land is taken as a matter of course and it receives little, if any, publicity, State and local police departments have found that, with radio, one police officer can do the work that formerly required at least three or four men. Highway departments have also found that by using radio they can keep roads in condition and make repairs faster with fewer pieces of road equipment and less personnel. Accordingly, in this time of manpower and material shortages, the Public Safety Radio Services have continued a steady growth as evidenced by the authorization of some 1,500 new stations during the year, bringing the over-all total of public safety radio systems to more than 9,100 with an estimated total of nearly 90,000 transmitters.

During the year a new service was added to the public-safety group—the State Guard Radio Service. Regulations governing this service are provided in the new subpart K of part 10 which became effective when adopted by the Commission on October 30, 1950. Under the new regulations, authorizations for stations in the State Guard Radio Service may be issued to the official State guard, or comparable organization of a State, Territory, possession, or of the District of Columbia, where such an organization has been created by law and is subject only to the governor or comparable official of the State or Territory in which it is to be licensed as distinguished from National Guard organizations subject to Federal control.

PUBLIC SAFETY ASSOCIATIONS AND CONFERENCES

In order to acquaint public-safety licensees more fully with the Commission's rules and their interpretations, and in order to become acquainted with the problems of the licensees, the Commission has increased its attendance at national meetings held by the associations of licensees in the various public-safety services. Notably, these are the yearly meetings of the Associated Police Communication Officers, Inc.; the International Municipal Signal Association, Inc.; the Forestry Conservation Communications Association, and the American Association of State Highway Officials.

Members of the Commission's staff have attended these meetings to deliver addresses on the subjects of Commission rules, interpretations, and current trends in the services. They have also participated in the associated technical sessions at which problems cropping up in the day-to-day operations are discussed and analyzed. Thus, the Commission is kept informed of what changes may be required in order to keep its rules current to meet the varying needs of the licensees.

Staff members of the Commission responsible for administering the Public Safety Radio Services have participated, to the extent that work relates to such matters, in the work of several committees that are engaged in the preparation of reports and recommendations outlining the United States position on policy matters to be presented by the Department of State at the next international conference—the Extraordinary Administrative Radio Conference, to be held at Geneva, starting August 16, 1951. This work has been divided into three stages. The first stage consisted of discussions between the IRAC and FCC representatives to resolve conflicts between the Federal and non-Federal frequency assignments and to prepare a unified United States assignment plan. Secondly, a second series of conferences will be held in order to resolve conflicts between the assignment plan evolved in step 1 and those of other countries in the American region. The unified plan covering the American region will then be presented for consideration at the Geneva conference. This, of course, is a continuing project and work thereon will be continued during the next fiscal year.

The Commission has also participated extensively in discussions with other governmental agencies, with the Interdepartment Radio Advisory Committee, and with industry with respect to the needs for civilian defense radio communication facilities. As a result of these meetings, the Commission is now in the process of preparing rule amendments which are intended to clarify the extent to which the individual public safety radio services will participate in the civilian defense program of the country.

POLICE RADIO SERVICE

Police radio station authorizations are issued to States, Territories, cities, and towns. Governmental institutions charged with the responsibility for providing their own police protection are also eligible. There are some 6,200 police radio authorizations.

During the year the Commission was able to regularize high-powered operation on the part of State police radio systems. Preliminary work on this project was started during 1949 when experimental authorizations were issued to four separate States. As a result of the experience gained from this experimental operation, the Commission found it in the public interest to permit State police systems using frequencies between 42–44 megacycles to operate high-powered stations. It is expected this will result in a more efficient as well as economical radio system, particularly for those States covering large areas and having a low density of population.

The Commission was also successful in its efforts to provide for the needs of the Territorial Highway Patrol in Alaska for point-to-point

voice communication between the various territorial police radio stations. An amendment to part 10 authorized the use of the frequency 7480 kilocycles for such police communication in Alaska.

The police in the Midwest had established the value of intersystem communication in previous years. Based on this experience, several extensive networks have been inaugurated on the west coast to provide intersystem communication among all the police agencies in a given area. In view of the mountainous terrain encountered and since the police operate principally in the VHF part of the frequency spectrum, which is in general limited to line of sight transmission, most of the intersystem networks on the Pacific coast involve the use of unattended fixed relay stations located on mountain tops. These stations are triggered off by signals received via radio from a police department in one valley and automatically retransmit these signals on another frequency to other police departments on the other side of the mountain.

FIRE RADIO SERVICE

Eligibility in the Fire Radio Service is extended to governmental agencies and organizations which are responsible for providing local fire protection. Volunteer fire departments are included among those organizations eligible in this service. At the end of the year there were some 430 fire radio stations authorized—a growth of approximately 50 percent during the year. However, it is to be noted that this expansion is occurring primarily in the urban areas and in the suburban areas adjacent thereto. In the rural areas the volunteer fire departments are not generally able to install independent radio systems due to the limited funds available. It is customary, therefore, in the rural areas for the fire department to take service from the nearest police radio station.

FORESTRY-CONSERVATION RADIO SERVICE

Stations in the Forestry-Conservation Radio Service are authorized to transmit communications relating to the prevention, detection, and suppression of forest fires and other official forestry conservation activities. Eligibility is generally restricted to States, Territories, possessions, and other governmental subdivisions, and to persons or organizations charged with specific forestry conservation activities.

The value in combatting and preventing the spread of forest fires has been clearly demonstrated in the many fires that occurred during the past year. Additionally, radio has proved its value in connection with the conservation of wildlife and in the enforcement of fish and game laws in many States. As a result, the service has shown a steady growth during the year from a total of approximately 1,300

stations at the end of fiscal year 1950 to approximately 1,700 stations at the end of the current year.

HIGHWAY MAINTENANCE RADIO SERVICE

The Highway Maintenance Radio Service was first established on July 1, 1949. Despite this very brief history, the service has grown to more than 400 stations. This service provides the radio communication needs in connection with the maintenance, supervision, and operation of public highways. Eligibility is extended to States, Territories, possessions, and governmental subdivisions including counties, cities, towns, etc. Although there are relatively few State-wide highway maintenance systems in operation at present, these systems have indicated the savings that radio can achieve in the operation and maintenance of our public highways. It is anticipated, therefore, that this service will enjoy an uninterrupted and steady growth.

SPECIAL EMERGENCY RADIO SERVICE

The Special Emergency Radio Service is the only one of the public safety group which is not generally reserved for governmental subdivisions. It is included in that group, however, because communications are restricted to transmissions directly relating to public safety and the protection of life and property.

Eligibility is extended to private individuals who are concerned in one way or another with public safety, such as ambulance service, beach patrols responsible for life-saving activities, school bus operators having routes in rural areas, doctors and veterinarians, and organizations established for relief purposes in emergencies. Persons having establishments in remote locations and lacking other communication facilities are eligible. Communications common carriers are also permitted to use special emergency radio stations to bridge gaps in wire line circuits in order to speed the restoration of normal communications which have been disrupted.

There were more than 300 authorizations in this service at the close of the year.

STATE GUARD RADIO SERVICE

State Guard Radio Service, available only to a bona fide State military organization under State direction, is used primarily for the transmission of emergency communications directly relating to public safety and the protection of life and property. Such stations may also be used to transmit nonemergency communications necessary for training and maintaining an efficient organization. In view of the limited number of frequencies available, the Commission was able to provide only one frequency for this service, but provision is made for such stations to operate on certain frequencies in the band 2505–3500

kilocycles where a frequency can be made available upon a shared basis through appropriate arrangements with governmental agencies. The State of Texas was the first licensee in this service, and it now holds licenses covering 1 mobile, 47 base, and 3 fixed stations. As of June 30, there were 50 State Guard authorizations.

5. LAND TRANSPORTATION RADIO SERVICES

The Land Transportation Radio Services include the Railroad, Taxicab, Intercity Bus, Urban Transit, Highway Truck, and Automobile Emergency Radio Services. Communications are limited to those relating directly to the protection of life or important property and to messages essential to the maintenance, supervision, and efficient operation of land transportation systems.

Although the rate of expansion in radio facilities authorized for the transportation services during the past year has not been as rapid as during the period immediately following July 1, 1949 (when part 16 of the Commission's rules became effective), the fact that the services are now established on a regular basis rather than experimental continues to provide for the sound and orderly expansion of new and existing radiocommunication systems engineered and planned on a long-range basis. The year closed with nearly 5,000 authorizations covering 78,000 transmitters.

RAILROAD RADIO SERVICE

The Railroad Radio Service provides for the radiocommunication needs of the Nation's passenger and freight railroads providing a common carrier service. As of 1951, the railroads had in excess of 600 radio authorizations covering nearly 400 land stations and 5,300 mobile units. Approximately 50 percent of the class 1 railroads now have radio facilities.

The history of railroad radiocommunication dates from 1915, when the first experimentation commenced. Both space radio and carrier current or inductive systems are presently in use. It is generally recognized, however, that the carrier system cannot be used satisfactorily in all cases as a substitute for space radio.

Generally, railroad communications may be broken down into two general types: (1) Communication on and with trains en route, and (2) communication within yard and terminal areas. To provide for the communication needs of the railroads, the Commission has allocated 41 frequencies in the 152–162-megacycle band for the Railroad Radio Service in the city of Chicago where 23 trunk-line railroads with a total of 32 routes are operated. Of these 41 frequencies, 39 are available for use outside of Chicago, some being shared with the

Public Safety Radio Services in areas where there will be no interference to railroad radio operations.

The use of radio by the railroads has progressed on a conservative, but sound and carefully planned, basis. The growth of this service has been steady, and it is anticipated that it will continue. Of significance in this respect is the change in emphasis in railroad communications which is now centered on main-line operations while in the past it was on the yard and terminal type of operation.

Additional frequencies in the microwave region are also available to the railroads on a developmental basis. The availability of frequencies in this region of the radio spectrum has created a whole new concept of point-to-point local and long distance communication. The successful operation of a limited number of microwave systems presently operated by the railroads to supplement their point-to-point communication needs gives promise that an increased number of requests for authority to construct such systems can be expected. Determining factors in the expansion of activity in the microwave type of installation presently appears to be the availability of suitable and reasonably priced equipment, and the development of new techniques and types of terminal equipment leading to increased channel or circuit utilization.

TAXICAB RADIO SERVICE

The Taxicab Radio Service provides a communication service for persons furnishing to the public, for hire, a nonscheduled passenger land transportation service which is not operated over a regular route or between established terminals. The principal use of this service is in connection with dispatching of taxicabs.

The Taxicab Radio Service has operated on a regular basis since 1949, and since that time has grown at a phenomenal rate. There are now nearly 3,200 separate systems operating in this service with more than 63,000 mobile units. The Taxicab Radio Service has a total of eight frequencies in the 152–162-megacycle band, and these are heavily loaded in some areas. Improved equipment which has been readily available has contributed to the growth of this service. Such equipment has permitted satisfactory adjacent channel operation in congested areas, which in turn leads to better utilization of spectrum space. In addition, the year saw the first large scale developmental operation on frequencies in the 450–460-megacycle band where results appear to be satisfactory and may encourage further growth of the service by providing additional spectrum space in congested areas.

INTERCITY BUS RADIO SERVICE

The Intercity Bus Radio Service provides for the radiocommunication needs of companies which are regularly engaged in passenger

transportation over public highways between cities as distinguished from the Urban Transit Service which is limited to operations within urban or suburban communities. Use of radio by bus transportation companies assists operators in providing safe, efficient, and more dependable service. Communication facilities are often required to warn drivers of dangerous or unusual road conditions which may be encountered, and as a means of expediting the dispatching of additional buses, ambulances, repair trucks, and wreckers.

The growth of the Intercity Bus Radio Service has been relatively slow but steady since it was inaugurated in 1949. There are 31 such authorizations. The communication requirements of this service necessitate installations which are capable of providing coverage over an extensive service area, and such systems require careful planning. Installations of this type may be quite costly and operators are proceeding cautiously in the use of the service.

URBAN TRANSIT RADIO SERVICE

The Urban Transit Radio Service provides a communication service for companies operating city and urban bus lines whose operations are primarily within urban and suburban communities. The basic purpose and chief use of this service is to furnish communication between supervisory cars and repair trucks during power and equipment failures, collisions, and to assist in rerouting transit lines during traffic tie-ups, fires, and other such emergencies. The majority of the more than 100 authorizations in this service have been issued to transit systems in the larger cities.

HIGHWAY TRUCK RADIO SERVICE

The Highway Truck Radio Service provides a communication service for persons regularly engaged in the operation of trucks on a route basis outside of metropolitan areas. This service is not available for truck routes within a single metropolitan area.

The Highway Truck Radio Service was established because wire line facilities are not generally available at all hours and locations to truckers on many intercity routes. Although highway radio systems are generally expensive to install because of the extensive number of installations required, the service now has nearly 300 authorizations.

AUTOMOBILE EMERGENCY RADIO SERVICE

The Automobile Emergency Radio Service provides for the radiocommunication needs of persons or organizations providing emergency road service. Masses of automobiles on crowded highways require prompt towing and repair service if highways are to be kept clear. This service has proven effective in the dispatching of emer-

gency road service trucks and towcars to stalled or disabled vehicles, which contributes toward public safety on the highways, particularly in urban areas. The number of authorizations was approaching 100.

Lack of spectrum space has hindered the development of this service in the past. With the availability of equipment capable of operating on frequencies in the 450–460-megacycle band, it is anticipated that congestion may be materially decreased on the single 30–40-megacycle frequency with a resultant improvement of service in crowded areas.

6. INDUSTRIAL RADIO SERVICES

The Industrial Radio Services include the Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, and Low-Power Industrial Radio Services. The growth of these services has been very rapid in the past year. They have nearly 10,000 authorizations to use 70,000 transmitters.

As an aid to efficient administration of these services, the industries are recognized individually for purposes of allocating frequencies and determining eligibility. Regional industry advisory groups are functioning in several of these services and have appreciably reduced the Commission's administrative load by supplying applicants with information as to which frequencies in a given area may be the most desirable from the standpoint of interference.

On February 17, 1949, the Commission temporarily allocated the band 1750–1800 kilocycles to the radiolocation service for use within 150 miles of the Gulf of Mexico for the location of petroleum deposits. In the light of the current national emergency, and due to the increased interest shown by parties interested in the use of radiolocation in the off-shore exploration for petroleum, the Commission held a hearing on June 4, 1951, to determine whether a radiolocation service should be provided in the 1750–1800-kilocycle band, which is presently allocated to the Disaster Communications Service. A decision in this matter is pending.

POWER RADIO SERVICE

The Power Radio Service provides for the radiocommunication needs of persons who are engaged in generating, transmitting, collecting, purifying, storing, or distributing, by means of wire or pipeline, electrical energy, artificial or natural gas, water or steam for use by the public.

This service is used by public utilities generally in connection with the restoration of service which may have been interrupted by fire, flood, storm, accident, or disaster. The principal volume is messages concerning routine maintenance activities not necessarily of an emergency nature. Communications are required to coordinate pipelaying, wire-stringing, cable-pulling, and other construction projects.

Messages are also required between load dispatchers and generating stations, gas storage areas, pumping stations, and other supply sources.

The use of radio by public utilities continued to increase at a rapid rate during the past year. There are more than 5,000 such authorizations. In addition to the new mobile and fixed system installations, many utilities have shown an increasing interest in the development of the microwave portion of the spectrum and multichannel radio links which permit central operation of electrical control circuits for entire power plants and systems.

PETROLEUM RADIO SERVICE

This service provides for the radiocommunication needs of persons who are engaged in locating, producing, collecting, refining, or transporting by means of pipelines, petroleum or petroleum products including natural gas.

The Petroleum Radio Service is used, for example, by persons engaged in the geophysical exploration beneath the earth's land and water surfaces for oil. Other uses include drilling for, producing, collecting, or refining and piping those products.

Petroleum is usally located in remote areas where the construction of telephone lines is impractical. Fire, explosion, well blowouts, accidents and equipment failures require prompt and efficient communications if serious disasters are to be prevented or halted. Radio is also used to maintain communication between field headquarters and drilling sites to provide close supervision of drilling operations.

The use of radio by the petroleum industry, particularly in the production and pipeline phases, has been increasing at a phenomenal rate. There were more than 2,400 authorizations at the year's close. Many new point-to-point microwave radio circuits are being installed parallel to pipelines, one such system extending from Houston to Chicago. These microwave systems usually are capable of handling several voice, telemetering, and control circuits simultaneously, and many are quite complex and expensive, being integrated with mobile radio systems along pipelines.

FOREST PRODUCTS RADIO SERVICE

The Forest Products Radio Service provides for the communication needs of persons engaged in tree logging, tree farming, or related woods operations. There is no provision for any other uses of radio in this service other than those involved in actual woods operation. The more than 450 authorizations in this service provide private business with radiocommunication facilities similar to those used by Federal and State governments for fire detection, prevention, and suppres-

sion. They may also be used to promote safer, more efficient, and more economical logging operations.

Lumbering in recent years has in many areas become a vast tree farming operation, whereby trees are planted in denuded areas, protected during growth and then cut and replaced with seedlings. Patrol and protection of these areas require adequate communication facilities although actual logging operations may not occur over long intervals. As in the past, the greatest usage of this service is in the Pacific Northwest.

MOTION PICTURE RADIO SERVICE

The Motion Picture Radio Service is intended to serve the radiocommunication needs of the motion-picture industry and is available for persons engaged in the production or filming of motion pictures. The number of authorizations fluctuates around a score.

This service may be used by picture companies on location to connect parties with the nearest wire lines for purposes of safety of life and property, to expedite shipment of supplies and to promote more efficient operation on location. The low-power radio transmitting equipment generally used to coordinate action taking place on outdoor sets serves a useful function during filming, often eliminating time consuming retakes.

RELAY PRESS RADIO SERVICE

The Relay Press Radio Service is intended to provide for the radiocommunication needs of newspapers and established press associations. The principal use of this service is in the dispatching of reporters and photographers. The greatest use of this service is by the large metropolitan dailies. There are 35 authorizations.

SPECIAL INDUSTRIAL RADIO SERVICE

The Special Industrial Radio Service, which has nearly 1,500 authorizations, is limited to persons engaged in an industrial activity primarily devoted to producton, construction, fabrication, manufacturing, or similar processes as distinguished from activities of a service or distribution nature. An applicant is further required to show that his activities involve construction projects of a public character, and are confined to a remote or sparsely settled region or to the yard area of a single plant.

In view of the current national defense program, the scope of plant area communication systems has been extended to permit the operation of mobile transmitters outside of the physical limits of such installations on matters involving plant security in those cases where use of the Low-Power Industrial Radio Service does not meet the operational

requirements of the industry which would otherwise be eligible for that service.

Establishing the Special Industrial Radio Service was not easily accomplished. Chief among the problems faced was the question of how far the Commission could go, in view of the limited amount of spectrum space, toward permitting businesses, whatever their character, to operate private radio systems. The demand for facilities, especially in urban areas, has been so great that there are not enough frequencies to provide for a mobile dispatching service for retail stores and service or distribution organizations.

LOW-POWER INDUSTRIAL RADIO SERVICE

The Low-Power Industrial Radio Service affords a communication service for industrial and commercial activities which have need for short-distance mobile radiocommunication to permit more efficient and safe conduct of their operations. It provides for the operation of any number of portable transmitter units which are restricted to a very low power in order to reduce the interference range between units and thereby permit large numbers of transmitters to operate on a few frequencies. As in the past, most of the 150 authorizations in this service are held by contractors and maintenance and service companies.

MISCELLANEOUS

In addition to these regular services, there is a very limited radio operation in California where, since 1926, nine point-to-point telegraph stations have transmitted agricultural market information for regional use.

7. AMATEUR RADIO SERVICE

The Amateur Radio Service is one of the oldest radio services recognized and established by the Commission, and continues to be one of the largest and most active of the services administered. Amateurs now hold collectively about 180,000 station and operator licenses.

At the end of the fiscal year there were approximately 90,500 amateur station licenses and 88,700 amateur operator licenses outstanding. The number of amateur stations remains slightly higher than the number of amateur operators as a result of many operators being licensees of more than one amateur station, either as trustee-licensees of stations used by amateur radio clubs or by military units, or as owners of personal stations at more than one address. The number of these additional stations, however, is balanced somewhat by a corresponding number of amateur operators who do not have amateur station licenses, due principally to their being in the Armed Forces

or otherwise unable to locate an amateur station at some permanent address.

There is no age limit in the Amateur Radio Service, station and operator licenses being held by persons in their early teens as well as by persons in their seventies and eighties. Any citizen of the United States who passes the prescribed examination and is otherwise qualified may obtain an amateur operator and station license. Women as well as men are welcomed to the ranks of the amateur radio hobbyist and find it an interesting avocation; in fact, their special interest in amateur radio is evidenced by the formation of a national and international organization known as the Young Ladies Radio League which holds meetings and general get-togethers over the air.

The amateurs, or "hams" as they prefer to be known, are internationally recognized and licensed in many countries, although possibly three-fifths of the amateur stations in the world are located in the United States and its possessions and Territories. Their ranks comprise persons in almost every walk of life, from those who obtain a livelihood from employment in the radio industry to housewives, school children, and others whose livelihood is obtained in completely unrelated lines of endeavor. They are all united, however, by a common interest in experimentation and self-improvement in radio techniques; an interest which is without pecuniary considerations and involves only personal aims. Through the exercise of their skills in designing, developing, constructing, and experimenting with radio equipment, and developing communication techniques, as well as by providing scientific observation services and emergency communication service in times of disaster or local emergency, and the handling of personal messages between members of the Armed Forces and their families at home, the amateurs have demonstrated that the privileges granted them have been well justified.

In addition, the Amateur Radio Service has a high degree of national value. It constitutes a reserve of self-trained radio technicians and operators upon which the country can draw in times of war and other national need, and its special networks, the equipment of its stations, and other amateur activities have proved extremely valuable in the national defense program. In the planning for the defense of the civilian population in case of armed attack, the Federal Civil Defense Administration is encouraging the integration of amateur radio stations, operators and networks into the local civil defense organizations to provide civil defense communication.

To assist in the planning of civil defense communication and the utilization of amateurs for that purpose, the Commission on January 17, 1951, in cooperation with the Federal Civil Defense Administration and with the concurrence of the Armed Forces, announced that certain portions of the regularly allocated amateur frequency

bands are to remain available for use of amateur radio stations and operators to provide communication for civil defense activities after any suspension of normal amateur activity which may be found to be necessary because of war or other national emergency, and that regulations to govern the use of those frequency bands in the civil defense program would be the subject of later action by the Commission. At the close of the fiscal year, this matter was under active study by the Commission, with the possibility that proposed rules to govern the operation of amateur stations and operators for civil defense purposes would be made public during the latter part of 1951.

The value of the Amateur Radio Service in times of emergency was again amply demonstrated during the year. One of the most outstanding examples of public service by the amateurs occurred during January and February 1951, when severe ice storms blanketed a large portion of Texas for a period of over 170 hours, completely disrupting communication and power wire lines in that area. Communications handled by the amateurs in the area, using emergency power in many cases and on an entirely voluntary basis, related to the dispatching of trains and other utilities, the relaying of orders for emergency food supplies, the reporting of hourly weather observations, the bridging of gaps in commercial telegraph facilities for handling emergency and death messages, and the relaying of personal messages regarding the health and safety of individuals. Cases of similar service in the Pacific Northwest, in California, in Mississippi and Tennessee, in Florida and Alabama, and in the New England States, when floods, hurricanes, and other natural disasters struck, were reported to the Commission.

Another example of the value of amateur response to distress was a report that an amateur station at Nome Creek, Alaska, saved the life of a woman at a remote hamlet. The amateur's call was picked up by the Commission's monitoring station at Anchorage, which alerted an Air Force Rescue Squadron which, in turn, dispatched an Army doctor by air who administered a blood transfusion and transferred the woman by plane to a hospital in Fairbanks.

During the year the Commission amended its amateur rules in a number of important aspects to bring them into conformity with current needs. Foremost among those actions was the finalization of rule changes first proposed in April 1949, to foster the further development of amateur radio by defining the basic purpose for which amateur stations are licensed and revising the operator license structure. After due deliberation of the written comments filed and arguments presented, the Commission on January 29, 1951 finalized the rules, effective March 1 thereafter. Among other things, the rules now provide for two new classes of amateur operator licenses, available July 1,

1951; one for the beginner in radio who wishes a "learner's permit" so that he may qualify by actual experience for a higher class of amateur license, the other for the technically minded individual who wishes to experiment with radio without the necessity for qualifying in the Morse Code to the extent required for operation on the lower amateur frequencies. These new amateur operator licenses, called the "Novice" and "Technician" classes, respectively, require an ability to transmit and receive the International Morse Code at a speed of only 5 words per minute, as compared with the minimum of 13 words per minute required for other classes of amateur operator licenses.

In addition, a new higher class of amateur operator license, called the Amateur Extra Class, was also established, to become available January 1, 1952. This license, which is designed to recognize superior amateur qualifications, including the ability to transmit and receive in the International Morse Code at the rate of 20 words per minute, will authorize the same amateur operating privileges as the former class A amateur license (renamed the Advanced class) which will not be available, other than by renewal of existing licenses, after December 31, 1952. The other existing classes of amateur operator privileges, previously known as class B and class C, were also renamed as General and Conditional classes, but were otherwise continued without change.

Other amendments to the amateur rules include the addition of frequencies 3800 to 3850 kilocycles in the amateur "80-meter" band for use by amateur radiotelephone stations; permanent provision in the rules for the use of narrow band frequency or phase modulated radiotelephony in the bands 3800 to 3850 kilocycles, 14,200 to 14,250 kilocycles, 28.5 to 29.7 megacycles, and 50 to 54 megacycles; and a revision of rules with respect to the renewal of amateur operator licenses to require that the showing as to operating activity be made in terms of operating time rather than in terms of the number of other stations with which radio communication is established.

In consideration of the service of numerous amateurs in the Armed Forces during the present period of national emergency, and the resulting inability of those amateurs to qualify for the renewal of their amateur operator privileges by operation of their amateur stations, the Commission waived the requirements of a showing of operating time with respect to all amateur operator licenses which expire during the period January 1 to December 31, 1951, inclusive, where it is shown that the individual amateur was unable to meet the requirements because he was on active duty in the Armed Forces of the United States. The extension of the period of this waiver will, of course, depend upon the status of the national emergency at the end of the calendar year 1951.

Interference to the reception of television broadcast continues to be an item of major concern to amateurs throughout the United States, particularly to those whose stations are located within a short distance from TV receivers as compared to the distances of those receivers from the TV stations which they are attempting to receive. This problem is especially acute when the owners of TV receivers are using them to receive weak signal programs beyond the normal service areas of the TV stations concerned and beyond the normal range for which TV receivers are designed. The situation is additionally aggravated by the receiving characteristics of many TV receivers which, because of their extreme sensitivity, are particularly susceptible to signals appearing on frequencies to which they are not even tuned.

The challenge to reduce radiation of harmonic and other spurious emissions which may cause interference on the frequencies to which TV receivers are tuned has been successfully met by many amateurs; the problem of eliminating the interference caused by the inability of a receiver to differentiate between signals on entirely different frequencies is also being solved in many cases by the use of wave-traps and "band-pass filters". However, the Commission is aware of the problems presented and is studying the matter with a view to clarifying individual responsibilities in such cases.

In response to a request from the Department of the Army, and with the concurrence of the largest national organization of amateurs, the Commission on April 25, 1951, issued a public notice requesting the voluntary cooperation of the amateurs in the avoidance of harmful interference to military radio operation in the 3700- to 3900-kilocycle portion of the amateur "80-meter" band during large scale military maneuvers to be staged in North and South Carolina from August 6 to September 7, 1951. In that notice, the amateurs were asked to refrain from all operations during the specified period and in the specified frequency band in an area roughly composed of the States immediately surrounding North and South Carolina; and to similarly limit their operations during night hours in all States east of the Mississippi River.

Despite an enviable record of self-policing on the part of amateur licensees in general, as usual, it was necessary for the Commission to issue a number of citations in cases of frequency deviation or other minor infractions of its rules. It also ordered the suspension of the licenses of 10 amateurs involved in more serious violations of its rules and ordered a hearing in the case of one applicant whose past record indicated a complete disregard of the regulations of the Commission when operating amateur stations previously licensed to him.

Increased activity was noted during the year in the preparation by amateurs for emergency operations of all kinds, particularly in the provision of emergency power supplies for their home stations and in

the installation of mobile units in their automobiles, in preparation for the communication problems incident to a widespread disaster resulting from natural causes, accident, or armed attack. This included a healthy expansion of the use of the VHF and UHF amateur bands, with scheduled drills and tests on a continuing or regular basis in many areas. As a result of this increased activity, new records for distance of communication on the VHF were being established frequently, giving further impetus to more experimentation on those bands.

8. CITIZENS RADIO SERVICE

The Citizens Radio Service provides a radiocommunication service for the individual citizen. Licensing procedures are relatively simple and any citizen of the United States who is 18 years of age or older is eligible.

This service may be used for radiocommunication, radio signalling, control of objects or devices by radio, and for any other purpose not specifically prohibited by the Commission's rules. Stations licensed in this service are not permitted to charge for messages, carry broadcast material, to transmit directly to the public or to engage in communications that are contrary to law.

Although this service has been established since January 1949, the wide usage predicted for it has not yet materialized; consequently it has grown rather slowly and there are somewhat less than 600 authorizations. The chief reason for this has been the absence of readily available low-cost radiotelephone equipment designed specifically for operation in the citizens radio band, 460–470 megacycles. Equipment intended for operation in this service for control of objects or devices including garage door openers has recently appeared on the market. The demand for such equipment will increase as the availability increases and cost decreases.

A proposal to amend the rules governing this service to provide for the operation of control devices on the frequency 27.255 megacycles is presently under consideration.

9. DISASTER COMMUNICATIONS SERVICE

The Disaster Communications Service is a new service, established by the Commission on March 21, 1951. However, the planning for that service extended over a period of several years as the result of early recognition by the Commission of the need for a liaison service for handling of emergency communications in times of disaster to be composed of amateurs and other non-Government and Government groups operating fixed, land, and mobile stations. The frequencies available to this service, 1750 to 1800 kilocycles, were set aside for disaster communications by the Commission on February 17, 1949,

pursuant to a proposal in that regard made in its Report of Proposed Allocation Below 25,000 Kilocycles, dated May 21, 1945.

Any person eligible to hold a station license under the provisions of the Communications Act, is eligible for station license in the Disaster Communications Service, provided it is shown that the station will constitute an element of a bona fide disaster communications network organized or to be organized and operated in accordance with a locally or regionally coordinated disaster communications plan. Stations of the United States Government may also operate in this service if authorized to do so by their controlling agencies.

Stations in the Disaster Communications Service may provide essential communication incident to or in connection with disasters or other incidents which involve loss of communication facilities normally available or which require the temporary establishment of communication facilities beyond those normally available. Thus, they may be used, when needed, in connection with such incidents as floods, earthquakes, hurricanes, explosions, aircraft or train wrecks, and armed attack, when the health or safety of a community or larger area, or of a group in an isolated area, is threatened or involved.

As a consequence of the present state of national emergency emphasis on preparations for civil defense, it is natural that the Disaster Communications Service should be looked upon as one of the possibilities of providing means for the handling of civil defense communications. This was anticipated by the Commission in providing that, while the organization and operation of disaster communications plans shall be under the leadership and direction of competent local authority in the areas served by such stations, duly designated civil defense officials of such areas will also be considered competent local authority.

At the end of the fiscal year, licenses in the Disaster Communications Service had been issued to two municipalities—Santa Cruz, Calif., and Phoenix, Ariz.—both primarily for civil-defense purposes. These licenses authorize the operation of two station units at fixed (control center) locations, 29 portable station units capable of being moved from place to place and being used at undetermined locations, and 32 mobile station units mounted in automobiles, trucks, or other mobile vehicles. Several applications for licenses in this service were pending at the end of the year, and are expected to be granted as soon as the necessary showings of eligibility and purpose of the proposed stations are completed.

10. ENFORCEMENT

The centralization during the past year of enforcement and compliance activities in the Safety and Special Radio Services was a new

organizational concept which, it was hoped, would produce better results through concentration of records, standardization of methods and procedures and specialization of personnel. The necessity for some drastic action became evident with the rapidly increasing number of violation citations, complaints of interference, and other irregularities amounting to nearly 20,000 annually. These were to be expected, of course, with the vastly increased use of radio for commercial and safety purposes in recent years, and the extension of eligibility to large segments of the general public who were new to radio and hence unappreciative of the technical difficulties of large-scale radiocommunication and the need for strict compliance with the necessarily complex regulations in order that all licensees might obtain the full benefits of this form of communication.

The new arrangement has proved very satisfactory. After a period of organization and experience in classifying the general categories of enforcement and compliance problems, steps were taken to standardize letters, forms, procedures, and methods which have enabled the Enforcement Unit, with less than half the personnel heretofore available for the purpose, to keep abreast of the current influx and reduce to a very large extent the backlog of violation matters which had existed at the inception of the unit. Over-all compliance is still far from satisfactory, however, and the staff has devoted considerable study to possible new concepts of enforcement methods that may offer promise of better end results.

Despite efforts to create "assembly-line machinery" to speed the handling of routine cases, many practical factors such as public interest, degree of offense, honest mistakes, new situations not contemplated by rules, etc., make it necessary to exercise original judgment and discretion in a high percentage of the cases. Thus, one of the most time-consuming aspects of enforcement activity is that of conducting an exchange of correspondence in regard to citations for irregularities due to misunderstanding or misinterpretation of rules. Although these situations generally require individual treatment, standardized letters and information releases have been and are being developed for certain recurring types.

In addition to the large volume of citations and complaints disposed of by routine administrative methods, certain enforcement matters involve formal proceedings such as imposition of monetary forfeitures, license suspension, and revocation proceedings or reference to the Department of Justice for prosecution. The Commission is empowered to mitigate or remit certain forfeitures incurred by vessels, or their masters, by reason of the navigation of the vessel in the open sea contrary to radio requirements of the Communications Act. During the past year a total of $9,220 was collected in the settlement of such cases.

Studies were made during the past year of possible amendments of the Communications Act which would serve to lessen the enforcement task and facilitate enforcement procedure. A proposed amendment to section 319 of the act was submitted to Congress which would permit waiver of the requirement for construction permit in the majority of stations in the Safety and Special Radio Services. No practical purpose is served by the construction permit in many instances and the proposed amendment, if enacted into law, should remove an important source of technical violations. A study was completed looking toward possible amendment of the penalty provisions of the act to enable the assessment of small civil penalties to be collected or mitigated by the Commission. Such legislation is similar to that administered by the Coast Guard and other Government agencies and is considered essential to deal effectively with the type of minor irregularities so prevalent in the Safety and Special Radio Services.

11. STATISTICS

Number of Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 177,000 at the close of the fiscal year. This represents a net increase of more than 23,000 during the year. The number of authorized stations in the various services are shown in the following table:

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Aeronautical Services:			
Carrier aircraft	1,572	2,173	601
Private aircraft	17,856	28,113	10,257
Public service aircraft	690	546	(144)
Aeronautical land and fixed	1,409	1,310	(99)
Civil air patrol	1,886	1,483	(403)
Airdrome control	53	56	3
Aeronautical navigational	134	155	21
Flight test	83	86	3
Flying school	16	18	2
Aeronautical utility mobile	95	88	(7)
Aeronautical advisory	0	33	33
Total	23,794	34,061	10,267
Marine Services:			
Ship	22,601	26,681	4,080
Ship radar	1,125	1,625	500
Coastal and marine relay	130	116	(14)
Alaskan coastal	340	344	4
Alaskan fixed public	524	517	(7)
Other	201	261	60
Total	24,921	29,544	4,623
Public Safety Services:			
Police	5,618	6,198	580
Fire	276	432	156
Forestry-Conservation	1,307	1,728	421
Highway maintenance	238	408	170
Special emergency	168	313	145
State guard	0	50	50
Total	7,607	9,129	1,522

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Land Transportation Services:			
Railroad	450	604	154
Urban transit	100	111	11
Intercity bus	30	31	1
Taxicab	2,750	3,152	402
Highway truck	107	270	163
Automobile emergency	58	85	27
Citizens	335	560	225
Total	3,830	4,813	983
Industrial Services:			
Power	3,601	5,016	1,415
Petroleum	1,380	2,416	1,036
Forest products	246	453	207
Special industrial	724	1,451	727
Low-power industrial	93	150	57
Relay press	26	35	9
Motion picture	20	21	1
Agriculture [2]	9	9	0
Total	6,099	9,551	3,452
Amateur and Disaster Services:			
Amateur	87,967	90,585	2,618
Disaster communications	0	2	2
Total	87,967	90,587	2,620
Grand total	154,218	177,685	23,467

[1] The apparent decrease in the number of Civil Air Patrol stations was the result of a change in licensing procedure. For administrative convenience, there was inaugurated a "system license" plan in which all of the land station transmitters at the same location and the associated mobile units authorized to a particular CAP Wing were combined into a single station authorization. There has been considerable activity in this service and under the former licensing procedure would have shown a sizable increase in the number of stations authorized, since more than 200 new systems were added during the fiscal year 1951.

[2] This service was grouped with the Common Carrier statistics in the sixteenth annual report.

NOTE.—A station is defined as a separate license or construction permit authorization. For example, 65 mobile units operating on 1 license are counted as 1 station.

Applications Received in Safety and Special Radio Services

More than 107,000 applications for stations in the Safety and Special Radio Services were received during 1951. This represents an increase of more than 13,000 applications compared with the previous year. The number of applications received in each service is shown in the following table:

Class of station	Received 1950	Received 1951	Increase or (decrease)
Aeronautical Services:			
Aircraft	14,201	19,662	5,401
Ground	2,413	2,830	417
Total	16,614	22,432	5,818
Marine Services:			
Ship	16,905	18,757	1,852
Ship radar	680	1,196	516
Coastal and marine relay	126	177	51
Alaskan coastal	264	503	239
Alaskan fixed public	351	647	296
Other	340	307	(33)
Total	18,666	21,587	2,921
Public Safety Services:			
Police	8,119	6,104	(2,015)
Fire	488	801	313
Forestry-Conservation	2,201	1,337	(864)
Highway maintenance	327	555	228
Special emergency	298	447	149
State guard	0	90	90
Total	11,433	9,334	(2,099)
Land Transportation Services:			
Railroad	579	550	(29)
Urban transit	104	78	(26)
Intercity bus	13	11	(2)
Taxicab	4,323	3,602	(721)
Highway truck	189	416	227
Automobile emergency	116	125	9
Citizens	596	192	(404)
Total	5,920	4,974	(946)
Industrial Services:			
Power	5,228	4,467	(761)
Petroleum	2,452	2,661	209
Forest products	364	656	292
Special industrial	1,418	2,378	960
Low-power industrial	169	160	(9)
Relay press	48	37	(11)
Motion picture	41	29	(12)
Agriculture	0	14	14
Total	9,720	10,402	682
Amateur and Disaster Services:			
Amateur	31,034	38,469	7,435
Disaster Communications	0	11	11
Total	31,034	38,480	7,446
Grand total	93,387	107,209	13,822

NOTE.—An unusually large number of applications for renewal of license was received in the Public Safety, Industrial, and Land Transportation Radio Services during 1950. Consequently, in some services, there was a decrease in the number of applications received during 1951 since renewal periods have been staggered in an effort to equalize the load.

Number of Transmitters in Safety and Special Radio Services

More than 392,000 transmitters are authorized to operate in the Safety and Special Radio Services. These figures were compiled on the basis of records as of January 1, 1951, unless otherwise stated.

Of this total over 111,000 were land or fixed stations and more than 280,000 were portable or mobile units.

The breakdown follows:

Class of station	*Land or fixed* station transmitters	*Mobile* station transmitters	Total transmitters
Aeronautical Services:			
Aircraft		25,293	25,293
Ground	3,181	7,282	10,463
Total	3,181	32,575	35,756
Marine Services:			
Ship		25,545	25,545
Ship radar		1,384	1,384
Coastal and marine relay [1]	101		101
Alaskan coastal [1]	382		382
Alaskan fixed public [1]	612		612
Other [1]	178	1,156	1,334
Total	1,273	28,085	29,358
Public Safety Services: [2]			
Police	4,266	59,991	64,257
Fire	383	7,945	8,328
Forestry-Conservation	1,365	10,041	11,406
Highway maintenance	311	1,513	1,824
Special emergency	224	943	1,167
State guard	30		30
Total	6,579	80,433	87,012
Land Transportation Services:			
Railroad	379	5,280	5,659
Urban transit	54	1,453	1,507
Intercity bus	26	387	413
Taxicab	3,067	63,479	66,546
Highway truck	119	1,878	1,997
Automobile emergency	76	989	1,065
Citizens [3]		1,500	1,500
Total	3,721	74,966	78,687
Industrial Services: [4]			
Power	3,524	39,538	43,062
Petroleum	1,861	10,429	12,290
Forest products	269	2,639	2,908
Special industrial	769	9,363	10,132
Low-power industrial		1,692	1,692
Relay press	16	369	385
Motion picture	10	142	152
Agriculture	9		9
Total	6,458	64,172	70,630
Amateur and Disaster Services:			
Amateur	90,599		90,599
Disaster communications [5]	2	61	63
Total	90,601	61	90,662
Grand total	*111,813*	280,292	392,105

[1] As of Nov. 30, 1950.
[2] As of Mar. 9, 1951.
[3] Estimated.
[4] As of Apr. 20, 1951.
[5] As of June 30, 1951.

NOTE.—Due to the change in licensing procedure for Civil Air Patrol Stations, accurate records, which show the number of portable and mobile units, are not currently available. It is estimated that there are 7,000 such transmitters authorized.

CHAPTER IV—RADIO BROADCAST SERVICES

1. RULE CHANGES

Probably the most significant rule change affecting broadcast application processing was the adoption of part 17, Rules Concerning the Construction, Marking and Lighting of Antenna Structures, which is discussed elsewhere in this report.

Other rule changes pertaining to broadcasting included the following:

1. Authorization was given to the engineer in charge of the headquarters' district offices of the Comission's Field Engineering and Monitoring Division to act upon AM and FM licensees' requests for temporary operation with operators of lesser grade than normally required.

2. Arrangement was made to have the expiration of licenses of commercial broadcast stations occur in groups on a geographical basis (instead of a frequency basis as heretofore). AM and FM stations in each of 18 geographical areas will have their licenses expire at the same specified time and the time of expiration of these groups is spaced at 2-month intervals through their 3-year license period. Similarly, the expiration dates of the 1-year licenses of TV stations are divided into six geographical groups for the same purpose. This procedure permits the licensees of several kinds of broadcast stations in the same area to make the necessary equipment tests and prepare the reports on all stations at one time.

3. The Commission's rule requiring that the main studio of a broadcast station be located in the city the station is licensed to serve,

and that a majority of its programs must originate there, was relaxed to permit the establishment of the main studio at the transmitter site. It was also relaxed to permit licensing of a station to serve more than one city, if a substantial number of live programs would originate in each place, and if a satisfactory showing could be made regarding compliance with the standards (particularly with respect to coverage) and regarding the unreasonableness of considering the station as serving a single city.

4. The Commission issued a report on the establishment of a uniform policy to be followed in licensing radio broadcast stations in connection with violations by an applicant of laws of the United States other than the Communications Act of 1934, as amended. The purpose of the report was to set forth the basic principles which will guide the Commission in the exercise of its licensing functions where the applications raise questions with respect to violations of law other than the Communications Act. In that report the Commission stated:

> The Commission must be satisfied that an applicant has the requisite qualifications to assure that public interest will be served by a grant of his application. This determination cannot be made on the basis of isolated facts but should include a careful, critical analysis of all pertinent conduct of the applicant. We believe that if an applicant is or has been involved in unlawful practices, an analysis of the substance of these practices must be made to determine their relevance and weight as regards the ability of the applicant to use the requested radio authorization in the public interest. We do not believe that the outcome of this determination should be prejudged by the adoption of any general rule forbidding any grant in all cases where unlawful conduct of any kind or degree can be shown. Nor do we believe that any rule could adequately prescribe what type of conduct may be considered of such a nature that in all cases it would be contrary to the public interest to grant a license.

2. TELEVISION (TV) BROADCAST SERVICE

INCREASE IN TV APPLICATIONS

The Commission continued its "freeze" policy concerning the construction of new television stations and, consequently, there was no increase in the number of commercial TV broadcast stations on the air during the fiscal year. The 107 stations that were in operation continued to bring national and local video programs to 63 cities and metropolitan areas with a population of approximately 87,000,000 people in 43 States. Of these stations on the air, 81 held licenses while 26 operated on a commercial basis under special temporary authorizations.

Notwithstanding the Commission's request to interested parties not to file applications for new television stations until after a final determination had been reached on the issues in the pending television rule-making proceeding, discussed hereinafter, there was a steady increase in the number of applications for new TV broadcast outlets

and at the end of the year 415 such applications were pending. It appears that in many areas, due to the limited number of available channels, comparative hearings will be necessary to determine which of the applicants are best qualified to construct and operate the requested facilities.

Television-receiver production continued at a rapid pace despite material restrictions and the limited areas of normal reception. Continued progress was made in receiver design with emphasis on larger direct-view picture tubes. It is estimated that there were over 12,500,000 receivers in the hands of the public at the close of the fiscal year.

COLOR TELEVISION

In its Notice of Further Proposed Rule Making, issued on July 11, 1949, the Commission stated that it would consider color-television systems which could operate in a 6-megacycle channel. Three such systems were proposed to the Commission; i. e., the field sequential system, the dot sequential system, and the line sequential system. Hearings were held on these proposed systems between September 26, 1949, and May 26, 1950, during which period the Commission heard the testimony of 53 witnesses during 62 days of hearing covering 9,717 pages of transcript, and received in evidence 265 exhibits. Demonstrations of the proposed color systems were viewed by the Commission on eight separate occasions.

The Commission's detailed findings and conclusions with respect to the color-television issues were set forth in the First Report of the Commission, issued on September 1, 1950. On October 11, 1950, the Commission issued its Second Report of the Commission, and at the same time issued an order amending its television engineering standards to provide for color standards based on the field sequential system. This order and the proceedings incident to its promulgation and adoption were thereafter the subject of litigation in the Federal courts. On May 28, 1951, the Supreme Court of the United States affirmed the judgment of the lower court sustaining the order of the Commission.

Color broadcasts based on the field sequential system began on a commercial basis on June 25, 1951. The initial programs were carried over a limited network and for a limited period during the day.

TELEVISION PROCEEDINGS

The Commission's extensive rule-making proceedings to amend its television rules, regulations, engineering standards, and frequency assignments were instituted on July 11, 1949. The Commission had discovered, as stations began operating under the present table of TV frequency assignments, that too little mileage separation had been

provided between stations, and that the interference resulting from tropospheric propagation caused a serious degradation of service.

The television situation was further complicated by the fact that the 12 channels in the VHF band comprising the present table of assignments were so limited in number that many communities were of necessity either without any assignments whatever or with insufficient channels to provide adequate service. The Commission, therefore, was faced with the additional task of investigating the feasibility of employing channels in the UHF portion of the spectrum to supplement the present table in order to insure a Nation-wide competitive system.

Since the allocation problems of the UHF (Ultra High Frequency) and VHF (Very High Frequency) bands are interrelated, it was necessary to consider them simultaneously to insure a fair and equitable assignment of TV channels throughout the country. The purpose of the television rule-making proceedings has been to lay the groundwork for an efficient Nation-wide television service In addition, the Commission gave consideration to such developments as color television, the reservation of channels for noncommercial educational purposes, stratovision and polycasting. Pending the outcome of these proceedings, the Commission on September 30, 1948, stopped granting new TV stations.

In September 1949, the Commission commenced extensive public hearings in these proceedings (dockets 8736 et al.) starting with the color-television issue already mentioned, which extended into 1950.

On October 16, 1950, the Commission began hearing testimony on the general issues. These included the feasibility of utilizing the UHF portion of the spectrum for commercial TV broadcasting, classification of stations, mileage separations between stations, oscillator radiation, image interference, intermodulation, stratovision, polycasting, and the reservation of television channels for noncommercial educational stations. This phase of the hearings continued to January 31, 1951, at which time the Commission recessed in order to study the voluminous record.

On the basis of this record, the Commission on March 22, 1951, issued a Third Notice of Further Proposed Rule Making looking toward the promulgation of television engineering standards based on the latest technical information; the adoption of a Nation-wide television assignment plan utilizing both the VHF and UHF portions of the frequency spectrum; a partial lifting of the freeze under certain conditions, and the reservation in specific communities of television channels for noncommercial educational use. The proposed table provides for 1,965 assignments in 1,256 cities. Of these assignments, 209 assignments would be reserved for noncommercial educational stations. Approximately 700 written comments and 400 oppositions

to comments were filed with the Commission in connection with these proposals.

The Commission received three petitions challenging the legality of its proposals to adopt an assignment plan under which television channels would be assigned to various communities in the United States in accordance with a principle of priorities and engineering standards of allocation. In a memorandum opinion and order, released June 15, 1951, the Commission designated these petitions for oral argument insofar as issues relating to the authority of the Commission to issue a table of assignments and to reserve channels for noncommercial educational stations were raised. This argument was held June 28, 1951.

Upon consideration of the comments and oppositions filed in connection with the Third Notice of Further Proposed Rule-Making, and in view of its action in designating for oral argument the petitions which challenged its authority to adopt a table of assignments and to reserve channels for a noncommercial educational service, the Commission, in a third report, released June 21, 1951, concluded that it was not appropriate, at that time, to partially lift the television "freeze".

EXPERIMENTAL TV SERVICE

At the end of the fiscal year there were 18 licenses, 4 construction permits, and 5 special temporary authorizations for experimental television stations to carry on research and experimentation for advancement of the television broadcasting art.

Some of these experimental stations were used by equipment manufacturers for the development of different types of transmitting apparatus. A considerable amount of research was conducted in the UHF (470–890 megacycles) for the purpose of determining the propagation characteristics and other properties to be expected on these frequencies. Studies were also made of the propagation characteristics of the different frequencies over various types of terrain, the design and development of transmitters, receivers and converters, and the feasibility of satellite operations.

In the field of color television, experimental broadcasting was conducted on both the VHF and UHF bands. Much of the experimenting was directed toward the field testing of color equipment developed in the laboratory. Limited public participation was solicited for the purposes of conducting subjective tests relative to the characteristics of the different systems.

Two authorizations were issued by the Commission for testing proposed systems of subscription television. The first system, described by its proponents as "Phonevision", was the subject of a technical and economic test between January 1, 1951, and March 31, 1951. In brief,

"Phonevision" may be described as the transmission of a jittered television picture which may be received in scrambled form by any television receiver. When the owner of a television set wishes the jittered picture unscrambled and his set is equipped for "Phonevision", he asks the telephone operator to allow the key signal to reach his set. As soon as the request is received at the telephone exchange, the key signal is sent along the telephone wire through a filter and into the set. The picture then becomes clear and may be viewed on the receiver.

Prior to these "Phonevision" tests, 300 television set owners in the Lakeside area of Chicago had their sets adjusted so they could receive scheduled programs at a cost of $1 per program by calling the telephone operator as described. The results of these tests had not been submitted to the Commission at the close of fiscal 1951.

In addition to the "Phonevision" tests, the Commission granted authority to a New York television station to test the technical operations of a system of subscription television described by its proponents as the "Skiatron Subscriber-Vision System". This system also involves the transmission over the air of a scrambled television picture which may be received in scrambled form by any television receiver. An unscrambling device or decoder which may be built into the set automatically clears up the incoming picture when a special key or card is inserted into the receiver.

TELEVISION BROADCAST AUXILIARY SERVICES

During the year, rules were adopted establishing on a regular basis three classes of television auxiliary stations: Television Pickup Stations, Television STL (Studio-Transmitter Link) Stations, and Television Inter-City Relay Stations. These stations operate in the microwave region of the radio spectrum and are used in connection with the regular facilities of a television broadcast station.

Television pickup stations are operated by TV broadcast station licensees or permittees and are used for the purpose of relaying television program material such as sporting contests, parades, and other special events from their points of origination to the broadcast stations. Television broadcasters rely heavily on this service as a readily available means which permits considerable flexibility in the programming of special events.

As their name implies, television STL stations are employed to provide a radio circuit between the studio and transmitter of TV broadcast stations. Ordinary wire lines are usually incapable of carrying TV signals, and special coaxial circuits are expensive to install and to operate.

Television intercity relay stations are licensed to television broad-

casters to provide privately owned television relay circuits between cities where adequate common carrier facilities are not available.

OTHER TELEVISION DEVELOPMENTS

Television network facilities, operated principally by communications common carriers, both coaxial cable (wire) and microwave relay (radio), were greatly expanded. At the end of the year, a total of 47 cities and metropolitan areas, representing 80 stations, were interconnected while 16 cities with 27 TV stations were noninterconnected. It was anticipated that within the calendar year the east and west coasts would be connected. (See also reference to coaxial cable and microwave relay in the chapter on common carriers.)

3. STANDARD (AM) BROADCAST SERVICE

CLEAR CHANNELS

No action was taken during the year on the so-called Clear Channel Hearing (docket 6741) and Daytime Skywave Hearing (docket 8333), because of the pendency of the new North American Regional Broadcasting Agreement (NARBA), which is discussed later.

These hearings, the records on which have been closed for several years, are directed primarily to the question of how to make best use of the clear channels of the standard broadcast band assigned by an international agreement for use by the United States. The clear channels are necessary for standard broadcast service to rural areas since channels which are primarily allocated for service to population centers (the so-called regional and local channels) must be shared by a multiplicity of stations and are, therefore, cluttered with interference—particularly at night when propagation conditions make interference problems more acute—to such an extent that each station provides satisfactory service only over relatively short distances where its signals are strong enough to override the interference. Rural areas beyond these distances thus receive no service from such stations and must rely on the 10- to 50-kilowatt clear channel stations. On the other hand, the number of regional and local channels is insufficient to satisfy the present demand for stations to provide local service to cities and towns.

At present, Commission rules limit the power used on clear channels to 50 kilowatts. On 25 of the clear channels which are assigned for use by class I–A stations the night-time operation of a second station is prohibited. Whether the over-all utilization of the clear channels would be improved by permitting higher power, by permitting more stations on each channel, or by some combination of these is the basic issue in the clear channel proceeding.

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It should be noted that under the current NARBA agreement the United States acquires new priority for class I stations on clear channels as follows:

Frequency (kilocycles)	Station	Previous classification	Classification under new NARBA
1030	WBZ—Boston, Mass.	I–B	I–A
1540	KXEL—Waterloo, Iowa	II	I–B
1550	KPMC—Riverside, Calif.	II	I–B
1560	WQXR—New York, N. Y.	II	I–B

NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

The difficult process of arriving at an international agreement regarding assignments in the standard broadcast band and rules for the sharing of channels moved a long step closer to realization during the year with the signing on November 15, 1950, of the Third North American Regional Broadcasting Agreement in Washington. It was signed by all the countries of the North American region excepting Mexico and Haiti. The signed document was submitted by the President to the Senate in February, and was referred to the Committee on Foreign Relations for the necessary action looking toward ratification.

Following the expiration of the preceeding regional agreement on March 29, 1949, most of the countries of the North American region continued their operations as if it were still in force, recognizing that uncoordinated assignments would lead to serious interference problems and would eventually create a complex situation very difficult, if not impossible, to untangle. Cuba, however, believing that certain provisions of the old agreement had been unduly restrictive and contrary to her interests, had made a number of assignments during 1949 which were not consistent with the expired agreement, some of which caused extensive interference to certain United States stations. It was chiefly the difficult problem of adjusting the increased number of Cuban stations into the regular broadcast station assignment pattern that led to the breaking off of negotiations for a new agreement in December of 1919 at Montreal as well as the bilateral discussions with the Cubans in March of 1950 at Havana. In breaking off, it had been agreed to resume the conference in the summer of 1950, and the Third North American Regional Broadcasting Conference, accordingly, resumed its sessions on September 6, 1950, with delegations from all North American countries, except Haiti, participating. These countries are Bahamas, Canada, Cuba, Dominican Republic, Jamaica, Mexico, and the United States.

The final document of the Montreal session, which outlined the

form of the treaty and contained substantial agreement on administrative procedures, was used as a basis for composing the new agreement. Modifications and refinements in this document were made in some instances to accommodate the ideas of the Mexican delegation which had not participated in the Montreal session, and general agreement on this part was obtained without undue difficulty.

The problem of station assignments, particularly for the higher powered stations in Cuba and Mexico, was still the most difficult and time-consuming aspect of the negotiations, and led to the withdrawal of the Mexican delegation from the conference on October 18, 1950. In withdrawing, the Mexican delegates made the announcement that they had not been able to receive satisfaction on a sufficient number of their requirements to continue in the negotiations, but that they would expect to reach bilateral agreements with other governments "founded on an equitable and just basis". They recommended that the remaining conferees give serious consideration to reducing the channel separation from 10 to 9 kilocycles, thus creating some 11 new channels in the broadcast band, since this seemed to offer the best and perhaps the only solution to the Mexican requirements.

The Commission is gratified to note that since that time Mexico has continued to give de facto recognition to the expired agreement, which is taken as evidence of her continuing intention of keeping the way open for an "equitable and just" agreement on broadcasting. The difficulties with Cuban assignments were finally resolved on a basis which involved considerable changes by both Cuba and the United States.

The message from the President transmitting the text of the agreement to the Senate enclosed a report by the Secretary of State on its effects. This report points out, among other things, that an agreement is necessary as a basis for reasonable assurance that, in the reception of radio program service, the public will not be plagued unduly with interference from foreign stations and that the orderly and more efficient development of domestic broadcast service will be favored by a fair measure of international stability on the broadcast band.

To quote from the report:

> Taking into account the diverse interests of the countries concerned, the new NARBA is considered to be, despite certain drawbacks, the most satisfactory agreement that could be negotiated at this time. There are some features of the agreement which, from the viewpoint of the United States, are not wholly desirable and in some respects the agreement is not as favorable to the United States as was the original NARBA agreement of 1937. Nevertheless, it must be realized that, for reasons indicated hereinbefore and in the enclosed memorandum, there is no practical possibility of restoring the situation as it existed under the provisions of the previous agreement. Under the new NARBA the position of broadcasting in the United States would, in the view of the Depart-

ment of State, the Federal Communications Commission, and a number of non-Government broadcasting interests, be far more favorable than would be the case in the absence of such an agreement. Within the framework of the new NARBA the people of the United States can continue to receive, in general, the same level of broadcasting service received by them heretofore and there is considerable room within that framework for improvement of broadcasting service within the United States by domestic action. On the basis of past experience and a practical view of international political factors involved, it is clear that the primary question with respect to the new NARBA is whether the public interest of the United States in the field of broadcasting would be served better by the ratification and entry into force of the agreement than by no agreement at all, since there is no real prospect for negotiation of a more favorable agreement. Notwithstanding the opposition of some elements of the broadcasting industry, it is considered that the best interests of the United States would be served by ratification and entry into force of the agreement.

The more important provisions of the agreement as signed are discussed in the following paragraphs:

Station notifications and classifications and general standards of protection from interference.—The new NARBA provides in general for continued recognition of past notifications of United States stations and for international acceptance by the parties thereto of the station and channel classifications, engineering standards of station protection, and other related engineering factors. This is basic from the viewpoint of the United States if many of its approximately 2,200 standard (AM) broadcasting stations are to continue to operate within the band of 107 channels available for such broadcasting and continue to receive the international protection necessary for a stabilized broadcasting system capable of genuinely serving the people of this country. For example, under the new NARBA the channels available for standard broadcasting are classified as "clear", "regional", and "local" channels as under past agreement; stations are classified in classes I, II, III, and IV; and power and other specific engineering requirements are set out to govern the use of the several types of channels and the operation of the different classes of stations. The importance of provisions such as these should be fully appreciated for our whole broadcasting system is predicated upon the use of such classifications and standards internationally as well as domestically. And, as indicated earlier, such station and channel classifications, and engineering standards, as well as the continued acceptance and protection of our existing station assignments, are effective from an international viewpoint only to the extent that they are provided for by agreement. One of the technical standards contained in past agreement and in the new agreement, but with respect to which Cuba has taken reservation in the new agreement, is the so-called 650-mile rule. It is referred to subsequently in connection with provisions of the agreement concerning clear channels.

Duration of agreement; investigation and elimination of objectionable interference; arbitration, etc.—The new NARBA contains a number of provisions of a general legal and administrative nature which are most important from the viewpoint of the United States. For example, provision is made that the new NARBA will remain in effect even beyond its normal term of 5 years in the event that a subsequent NARBA is not available to replace it. Thus, in the absence of denunciation of the agreement, the type of uncertainty and dislocation which has existed during the past year or two because of the absence of an agreement will be circumvented for the future. The new NARBA also contains agreement by the parties to cooperate in the investigation and elimination of objectionable interference. Moreover, it contains clear-cut provisions for com-

pulsory arbitration of disputes in the event that such disputes are not settled otherwise, and for the holding of administrative conferences permitting frequent consideration of engineering matters during the period between plenipotentiary conferences.

Class I–A stations.—Under the original NARBA the United States secured priority in the use of 25 clear channels for class I–A stations. As a result of domestic assignments this number was reduced to 24 during the period of past agreement. Class I–A stations are intended to serve wide areas at considerable distances from the transmitter location. The protection to which these stations were entitled under the original NARBA was basically (*a*) a requirement that the signal at the border of the United States from any foreign station on the channel not exceed a specified maximum strength and (*b*) that no foreign station operate on the channel at night within 650 miles of the United States border. As previously indicated, Canada and Mexico each received six such assignments and Cuba received one, which it subsequently relinquished upon acquiring a number of other important privileges in the interim agreement. Under the interim agreement of 1946 Cuba was authorized to establish stations on 4 of the 24 clear channels upon which the United States had class I–A priority. No requirement was specified for the protection of these Cuban stations from interference caused by stations in the United States.

Since the expiration of the original NARBA and the interim agreement, Cuba, asserting a right as a sovereign country to use of all channels in the absence of any agreement to the contrary, has assigned one or more stations to each of approximately 14 of these channels. And, in the absence of any NARBA, Cuba has considered itself to be without special obligation to protect the United States stations on these channels. Under the new NARBA, the number of clear channel class I–A priorities recognized for the United States has been restored to 25 and the number of such priorities recognized for Canada has been increased from 6 to 7. One such priority is also recognized for the Bahamas. Cuba will utilize only 6 of the 25 channels so assigned to the United States, withdrawing stations from approximately 8 of them. Moreover, Cuba has agreed to accord a high degree of protection to the United States stations on those channels. Jamaica would use 2 of the 25 channels, but would fully protect the border of the United States. On these eight channels, i. e., the six to be used by Cuba and the two to be used by Jamaica, the United States would provide a limited protection to the Cuban and Jamaican stations specified in the agreement but would otherwise retain full freedom in the use of those channels.

Accordingly, under the new NARBA the United States would retain its class I–A priority on 25 clear channels. This is the same number as under past agreement. On 19 of these channels all other countries signatory to the agreement would protect the United States stations to the border of the United States. For example, in the case of Cuba this would mean protecting the United States to the tip of Florida even though we may not at present have a useful signal at that point. The border protection specified in such cases is exactly the same as that which was provided in past agreement. From our recent experience without an agreement it is quite clear that in the absence of the new NARBA continued recognition by all parties to the agreement of the priorities and protection just indicated cannot be expected. On six of these channels the United States station would receive a degree of protection which, though somewhat less than full I–A protection, is greater than that accorded any other type of station and would still permit them to render service over extensive areas hundreds of miles from the station. On these channels, also, a considerably lesser degree of protection could be expected in the absence of the new NARBA. In view of the provision of the NARBA requiring full "border" protection to United States stations on 19

clear channels, and in view of the fact that under the agreement the United States would have no obligation whatever to protect any station that might in the future be assigned on any of its I–A channels, failure of Cuba to accept the so-called 650-mile rule does not in reality appear to present a particularly serious difficulty, although it would have been preferable to have Cuban acceptance of that rule and every effort was made by the United States delegation to secure such acceptance.

It is to be noted that in no case is a class I–A station in the United States required to change its operation.

One of the important factors in evaluating the effect of the new NARBA is the effect that the provisions with respect to class I–A priorities would have upon service to rural areas in the United States. As a result of the reduction in the actual use by Cuba of clear channels upon which the United States has class I–A priority, there would, as a practical matter, be a significant improvement in service to rural areas from class I–A stations. Moreover—and this of utmost importance—in the absence of the new NARBA interference to such rural service from stations in other countries would in all probability become even worse than at present. The improvement in rural service that would result from the new NARBA is of utmost importance because of the great dependence in rural areas upon I–A channels for broadcasting service.

The new NARBA also contains most important provisions concerning class I–A channels which are favorable to the United States and which were not found in earlier agreement. For example, flexibility in the use of class I–A channels, that is, freedom to add additional stations to those channels, change existing assignments, increase power, etc., without in any way jeopardizing internationally the class I–A status and protection of its 25 channels, and without the obligation to protect any foreign stations on the channels with the exception of the 6 Cuban and 2 Jamaican stations which have been referred to at an earlier point and which would be entitled to protection as class II stations. The clear recognition of this right of flexibility was not contained in past agreement and is a matter of greatest importance in order to make possible the most effective domestic improvement in broadcasting service.

Class I–B stations.—This class of station, like class I–A stations, is intended to serve wide areas through skywave service. Although a station of this class does not receive protection from foreign interference at the border of the country, it does receive a high degree of protection in areas in which its service is useful. Under the new NARBA, Cuba would be permitted to cause some derogation of the usual protection standards for United States class I–B stations by 14 stations on 11 channels. Under past agreement this was permitted by six stations on five channels. However, in none of these instances recognized in the new NARBA does it appear that as a practical matter the United States station would suffer sufficiently to prevent satisfactory accomplishment of its operation. Moreover, under the new NARBA three additional class I–B priorities are recognized for the United States, and in no case would it be necessary for the United States station to change its operation.

Class II stations.—A class II station also operates on a clear channel but its operation is subordinate to the class I operation on the channel. Under past agreement class II stations were not entitled to any protection from class I stations. Under the new agreement those class II stations which now exist would receive a degree of protection from changes in existing class I assignments and from future class I assignments. It is under this new provision that the Cuban and Jamaican class II stations on eight clear channels upon which the United States has class I–A priority would receive some protection. However, it is important to note that under this provision at least 25 class II

stations in the United States would also be entitled to protection from class I stations for the first time. In addition, to accommodate certain frequency changes in Cuba which are part of a general reallocation in that country, three United States class II stations would be required under the new NARBA to change frequency, with consequent changes being required in their antennas and equipment.

Class III stations.—There are approximately 900 class III stations in the United States. In general, they are intended to serve not only the cities in which they are located but also a substantial area surrounding their locations. With few exceptions, the standards governing class III stations and protection remain the same under the new NARBA as under past agreements. In 10 cases Cuban stations on regional channels would be permitted to operate with powers in excess of that normally permitted on such channels. In three of these cases the Cuban stations are classified as class III stations. In seven of these cases the Cuban stations are classified as class I–C or I–D stations which are discussed in the immediately following paragraph. However, in all 10 of these cases the class III protection is accorded the United States stations on the channels involved. In one of these cases a United States station would be required to modify its antenna system to reduce radiation toward Cuba. However, Cuba would also be required to modify its use of the same frequency in order to reduce radiation toward stations in the United States to an equal degree.

Special protection of certain Cuban stations.—On 11 channels Cuba would be entitled to a relatively high degree of protection from future assignments in other countries. These Cuban stations would be classified as classes I–C and I–D stations. It is to be noted in this connection that under the new agreement Cuba does not receive any class I–A assignments and would receive only one class I–B assignment. It is also to be noted, as indicated above, that the special protection to which Cuban I–C and I–D stations would be entitled in no way affects existing stations. It only has reference to future assignments.

4. FREQUENCY MODULATION (FM) BROADCAST SERVICE

Seventeen applications for new stations were filed during the year, an increase of one over the number received the previous year. Thirteen of these applications were from operators of AM stations, seven of which operate daytime-only AM stations. Seven of the applications were for stations to be located in cities with populations under 5,000.

A few of the applications for modification of FM facilities were for higher powered installations; the majority were for lower powered installations. Many of the latter were submitted when it was found that the FM operations were not profitable, while others found that interim operation with less than the authorized facilities provided satisfactory coverage and the expense of the additional installation was not warranted. Some of those who have been withholding authorized construction while awaiting decisions on pending applications in the TV or AM broadcast services or an improvement in the FM situation were granted licenses for their present interim FM installations if they were found to meet requirements of the rules and standards.

At the present time only three FM stations using 50-kilowatt transmitters are in operation. Of approximately 70 grants made by the Commission for use of 50-kilowatt transmitters, only 12 remain outstanding—the others have been deleted or modified to specify smaller installations. Three stations which had 50-kilowatt installations ceased operation after it was found that FM was not proving to be as successful as expected. The equipment operated by one of these stations was purchased by the University of Illinois, and is now being installed at that institution for use in the noncommercial educational FM broadcast band.

A number of FM broadcast station licensees have complained that FM receivers are in short supply in their areas and, consequently, a build-up of their FM audiences cannot be achieved. It has been claimed that the set makers will not supply a pent-up demand for FM receivers. Groups representing the broadcasters and the manufacturers met in June 1951 in an attempt to cooperatively solve their problems. Figures presented by the two groups apparently were at variance, with the broadcasters showing shortages whereas the manufacturers countered with a survey showing large distributor and factory inventories. Both groups agreed that the problem should be attacked on a market-by-market basis as shortages develop. The broadcasters are to report shortages of FM set stocks in their areas to manufacturers. A joint committee will explore the feasibility of cooperative effort in publicizing and promoting the advantages of FM listening.

The failure of FM to expand and develop in accordance with original expectations has presented numerous problems to the Commission and to industry. Licensees of FM stations, in an attempt to supplement broadcast revenues, have resorted to functional music operations, including storecasting, transitcasting, and specialized services to factories and restaurants. In the spring of 1951 the Commission determined that functional music operations were in violation of the Communications Act and the Commission's rules and regulations. There was pending before the Commission a petition filed on behalf of 13 FM stations engaged in functional music requesting the Commission to reconsider that decision.

5. NONCOMMERCIAL EDUCATIONAL FM BROADCAST SERVICE

This service is continually expanding, although in a rather slow fashion. Applications for 18 new stations were received during the year. At the year's close there were 95 authorized stations, 82 of which held regular licenses.

Thirty-nine stations in this service use transmitters with power ratings of 10 watts or less. The majority of new applications are

for these lower power stations. A number of stations starting with this power have modified their installations to use more powerful equipment.

The rules for noncommercial educational FM broadcast stations were amended to allow the operation of stations in this service having transmitters with power output ratings of 10 watts or less by holders of the new Radiotelephone Third Class Operator Permit or the Radiotelegraph Third Class Operator Permit (formerly Restricted Radiotelegraph Operator Permit).

As a further aid to stations using transmitters with output ratings of 10 watts or less, the Commission amended its rules to permit remote control operation of such stations. Of the 39 stations authorized to use low power transmitters, only 3 have so far availed themselves of remote control operation. The covering rules merely require control circuits between the operating position and the transmitter to provide positive on and off control (faults on line must remove transmitter from the air), aural monitoring of the transmissions at the operating position, and equipment of the station to be on premises under control and supervision of the licensee and not accessible to others. The operator stationed at the remote control position must hold a license of the proper grade for operation of the transmitter.

In contrast to a considerable number of deletions of regular FM broadcast stations operating in the commercial portion of the FM band, no noncommercial educational FM broadcast station having once started programming on the air has ever been deleted. However, six authorizations for educational stations have been deleted before construction—several were allowed to expire without explanation and were considered forfeited, while in the other cases it appears that, due to changes in plans on the part of the educational institution, construction would have had to be postponed indefinitely and the permittees accordingly submitted their authorizations for deletion.

6. FACSIMILE BROADCAST SERVICE

FM broadcast stations may engage in facsimile broadcasting. Little interest, however, seems to be shown by FM licensees in providing such a service.

Facsimile may be transmitted on a simplex or multiplex basis. Simplex facsimile transmissions may only be broadcast at times when aural FM programs are not being transmitted. Multiplex facsimile transmissions may be broadcast at the same time the aural programs are being transmitted.

During the year the Commission amended its rules regarding multiplex facsimile transmissions to remove the limitation on the hours of such operation (formerly a maximum of 3 hours between 7 a. m. and midnight with no limit for the hours between midnight and 7 a. m.)

and to require no reduction in quality of the simultaneously transmitted aural programs below 15,000 cycles (formerly 10,000 cycles) as required by the standards concerning FM broadcast stations. The standards were amended to permit either amplitude or frequency modulation of the subcarrier when multiplexing in place of amplitude modulation as formerly required.

7. INTERNATIONAL BROADCAST SERVICE

There was no change during the year in the number of international broadcast stations. Forty such stations, licensed by the Commission, continued to function under the auspices of the Department of State in beaming the "Voice of America" programs in many languages to various parts of the world.

8. AUXILIARY BROADCAST SERVICES

As in the case of experimental and auxiliary stations associated with television, the Commission authorizes three classes of supplemental aural broadcast stations—remote pick-up, studio-transmitter link, and developmental. A brief description of these adjuncts follows:

REMOTE PICK-UP BROADCAST SERVICE

Remote pick-up broadcast stations, operated by broadcast station licensees, permit "on-the-spot" coverage of happenings outside of the studio. Use of portable or mobile radio transmitters of low power provide temporary aural program circuits from scenes of sport meets, parades, conventions or other public gatherings, religious services and other special events. Many of the pick-up transmitters are self-powered and highly mobile and can provide emergency communication facilities during the disruption of normal circuits resulting from floods, storms or other disasters. There are more than 1,000 such stations.

This service has grown steadily during the past year and broadcasters are using it more and more to provide a variety of programs which could not be made available through the use of less flexible wire line circuits.

BROADCAST STL SERVICE

Broadcast STL (Studio-Transmitter Link) stations, operated by broadcast station licensees, are utilized to provide a program circuit between the studio and transmitter. Employment of radio for this purpose permits locating broadcast transmitters at favorable locations which may be inaccessible to ordinary wire lines. These stations operate in the 925 to 952-megacycle portion of the spectrum and are required to employ directional antennas for spectrum economy.

During the past year, the rules were amended to extend this service

to AM broadcast stations and to permit both AM and FM broadcast stations to use STL facilities from secondary studios as well as the main studios. Thus, broadcast stations are enabled to establish studios in small adjacent communities which are unable to support a broadcast station of their own and where existing telephone circuits are not suitable for and are usually unavailable for broadcast use.

DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are licensed experimentally to conduct research and development looking toward the advancement of the broadcast art. They are used extensively by manufacturers for the development and testing of radio transmitters and antennas designed for use in the broadcast or auxiliary broadcast services. Stations in this service are also operated for the purpose of making propagation studies or to obtain data on other engineering problems related to broadcasting.

Among the more interesting projects conducted during the past year was the operation of a very low powered transmitter installed in the studio of a television broadcast station for the purpose of developing and testing an extremely compact, light-weight, inconspicuous "hearing aid" type earphone receiver, which can be worn by performers and production personnel participating in TV programs and used to receive cues and orders or prompting. Another project saw the development of a highly portable television pickup camera in which the cumbersome and heavy cables normally employed with such devices were completely eliminated through the use of low powered radio transmitters.

9. STATISTICS

BROADCAST AUTHORIZATIONS

There were 4,592 broadcast authorizations outstanding as of June 30, 1951. These were broken down by broadcast services as follows:

Class of broadcast station	June 30 1950	June 30 1951	Increase or (decrease)
Standard (AM)	2,303	2,385	82
Frequency modulation (FM)[1]	732	659	(73)
Television (TV)	109	109	
Television experimental and auxiliary	206	213	7
Noncommercial educational (FM)	82	95	13
International	40	40	
Remote pickup	1,003	1,043	40
Studio transmitter	29	42	13
Developmental	6	6	
Total	4,510	4,592	82

[1] Commercial facsimile broadcasting is now authorized over FM facilities.

GROWTH OF BROADCASTING

The growth of AM, FM, and TV broadcast services since 1943 is shown in the following table of authorized and licensed stations at the close of each fiscal year.

	AM		FM		TV		Total	
	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed
1943	912	911	48	37	6	6	966	954
1944	924	912	52	45	9	6	985	963
1945	955	931	53	46	25	6	1,033	983
1946	1,215	961	456	48	30	6	1,701	1,015
1947	1,795	1,298	918	48	66	6	2,779	1,352
1948	2,034	1,693	1,020	142	109	7	3,163	1,842
1949	2,179	1,963	865	377	117	13	3,161	2,353
1950	2,303	2,118	732	493	109	47	3,144	2,658
1951	2,385	2,248	659	534	109	81	3,153	2,863

BROADCAST APPLICATIONS

	Pending June 30, 1950	Received	Disposed	Pending June 30, 1951
AM				
New stations	277	216	223	270
Change in facilities	255	223	243	235
Renewals	238	933	903	268
License	73	393	392	74
Transfers	67	401	391	77
Miscellaneous	74	726	724	76
Total AM	984	2,892	2,876	1,000
FM[1]				
New stations	20	35	43	12
Change in facilities	34	133	129	38
Renewals	36	317	283	70
License	41	139	142	38
Transfers	10	75	73	12
Miscellaneous	20	355	359	16
Total FM	161	1,054	1,029	186
TV				
New stations	351	72	8	415
Change in facilities	17	31	18	30
Renewals	9	44	49	4
License	11	41	37	15
Transfers	3	17	13	7
Miscellaneous	6	69	72	3
Total TV	397	274	197	474
All other				
New stations	57	344	368	33
Change in facilities	8	129	127	10
Renewals	245	460	606	99
License	80	348	381	47
Transfers	31	121	113	39
Miscellaneous	12	80	90	2
Total all other	433	1,482	1,685	230
Grand total	1,975	5,702	5,787	1,890

[1] Includes noncommercial educational.

BROADCAST STATION DELETIONS

Month	AM	FM	TV	Total
1950				
July	10	7	0	17
August	3	10	0	13
September	5	4	0	9
October	4	8	0	12
November	7	3	0	10
December	9	5	0	14
1951				
January	1	15	0	16
February	6	8	0	14
March	10	14	0	24
April	1	6	0	7
May	4	8	0	12
June	10	3	0	13
Total	70	91	0	161

RECEIVING SETS

The Commission does not license or otherwise regulate broadcast receivers. At the close of the fiscal year industry estimated that there were more than 102,000,000 such sets in use, as compared with 163,000,000 reported by the United Nations for 128 countries. In June the United States Census Bureau estimated that out of 42,520,000 occupied dwellings in the United States, 40,093,000 had receiving sets.

BROADCAST INDUSTRY FINANCIAL DATA

GENERAL

In the calendar year 1950, the grand total revenues of the broadcasting industry (AM, FM, and TV) passed the half-billion mark for the first time. Total revenues, which comprise revenues derived from the sale of time, talent, and program material to advertisers, were reported at $550.4 million. The 1950 AM and FM revenues amounting to $444.5 million were the highest on record. Aggregate TV revenues in 1950, of $105.9 million, were more than triple the $34.4 million for 1949.

Broadcasting industry profits of $59.0 million in 1950 were more than double those of the previous year. Industry profits realized from AM–FM broadcasting operations were $68.2 million, or approximately 30 percent above 1949 while the industry's over-all loss from TV broadcasting operations was reduced from $25.3 million in 1949 to $9.2 million in 1950. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1949–1950 financial data for the AM, FM, and TV broadcast industries:

ALL NETWORKS AND STATIONS

Item	1949	1950	Increase or (decrease)
			Percent
Total broadcast revenues	*$449, 500, 000*	*$550, 400, 000*	22.4
AM and FM	415, 200, 000	444, 500, 000	7.1
TV	34, 300, 000	105, 900, 000	208.7
Total broadcast expenses	422, 200, 000	491, 400, 000	16.4
AM and FM	362, 600, 000	376, 300, 000	3.8
TV	59, 600, 000	115, 100, 000	93.1
Broadcast income (before Federal income tax)	27, 300, 000	59, 000, 000	116.1
AM and FM	52, 600, 000	68, 200, 000	29.7
TV	[1](25, 300, 000)	[1](9, 200, 000)	

NATION-WIDE NETWORKS ONLY

[Including owned and operated stations]

Item	1949	1950
Revenues:		
AM	$105, 300, 000	$106, 000, 000
TV	19, 300, 000	55, 500, 000
Total	124, 600, 000	161, 500, 000
Expenses:		
AM	86, 800, 000	87, 300, 000
TV	31, 400, 000	65, 500, 000
Total	118, 200, 000	152, 800, 000
Income (before Federal income tax):		
AM	18, 500, 000	18, 700, 000
TV	[1](12, 100, 000)	[1](10, 000, 000
Total	6, 400, 000	8, 700, 000

[1] Deficit.

NOTE.—The 4 Nation-wide AM networks (ABC, CBS, MBS, and NBC) owned and operated a tota of 18 stations in 1949 and 1950.

The 4 TV networks (ABC, CBS, Dumont, and NBC) owned and operated a total of 14 stations in 1949 and 1950.

Some networks indicated that expense allocations between AM and TV operations were not complete to the extent that certain indirect operating expenses of TV are included under AM operations.

AM BROADCAST REVENUES, INCOME AND INVESTMENT

[Revenues and income before Federal income tax]

Item	4 Nation-wide networks and their 18 stations		3 regional networks and their 8 stations		All other stations [1]		Industry total	
	1949	1950	1949	1950	1949	1950	1949	1950
Revenues from network time sales	$86,683,599	$83,955,101	$1,959,184	$2,099,285	$46,255,542	$45,475,830	$134,898,325	$131,530,216
Revenues from sale of time to national and regional advertisers and sponsors	17,292,386	17,597,734	1,269,055	1,382,475	89,753,066	99,843,671	108,314,507	118,823,880
Revenues from sale of time to local advertisers and sponsors	5,621,396	6,121,701	1,481,059	1,559,909	175,041,846	195,529,224	182,144,301	203,210,834
Total revenues from time sales	109,597,381	107,674,536	4,709,298	5,041,669	311,050,454	340,848,725	425,357,133	453,564,930
Commissions paid to representatives, etc	23,012,591	22,393,667	910,163	1,020,272	26,384,929	29,061,836	50,307,683	52,475,775
Incidental broadcast revenues:								
Revenues from sale of talent, etc	10,566,163	13,072,375	134,540	268,106	11,297,566	11,862,240	21,998,269	25,202,721
Furnishing material or service	3,675,093	4,038,953	946	2,418	5,783,849	5,851,649	9,459,888	9,893,020
Other incidental revenues	4,461,515	3,644,959	219,027	149,381	2,596,484	3,078,609	7,277,026	6,872,949
Total broadcast revenues	105,287,561	106,037,156	4,153,648	4,441,302	304,343,424	332,579,387	413,784,633	443,057,845
Total broadcast expenses	86,788,853	87,374,551	4,747,280	4,119,565	265,985,585	280,820,467	357,521,718	372,314,583
Total broadcast income	18,498,708	18,662,605	(593,632)	321,737	38,357,839	51,758,920	56,262,915	70,743,262
Investment in tangible broadcast property:								
Original cost	25,499,895	28,431,206	4,930,738	1,662,737	[2] 200,156,402	[2] 212,303,407	230,587,035	242,397,350
Depreciation to date	14,986,235	16,061,913	1,696,588	1,200,943	63,829,920	75,721,314	80,512,743	92,984,170
Depreciated cost	10,513,660	12,369,293	3,234,150	461,794	136,326,482	136,582,093	150,074,292	149,413,180

[1] Includes 1993 stations in 1949 and 2117 stations in 1950.
[2] Data available from 1997 stations in 1949 and 2108 stations in 1950.

TV BROADCAST REVENUES, INCOME AND INVESTMENT [1950]

Item	4 networks and their 14 owned and operated stations	93 other stations	Industry total
Revenues from network time sales	$27,312,824	$7,897,652	$35,210,476
Revenues from sale of time to national and regional advertisers and sponsors	8,207,754	16,826,579	25,034,333
Revenues from sale of time to local advertisers and sponsors	6,857,926	23,526,985	30,384,911
Total revenues from time sales	42,378,504	48,251,216	90,629,720
Commissions paid to representatives, etc	7,415,806	6,892,987	14,308,793
Incidental broadcast revenues:			
Revenues from sale of talent, etc	10,860,695	4,300,804	15,161,499
Furnishing material or service	7,223,049	3,062,665	7,223,049
Other incidental revenues	2,429,603	1,717,225	7,209,493
Total broadcast revenues	55,476,045	50,438,923	105,914,968
Total broadcast expenses	65,506,575	49,622,386	115,128,961
Total broadcast income or loss	(10,030,530)	816,537	(9,213,993)
Investment in tangible broadcast property:			
Original cost	25,504,165	44,756,253	70,260,418
Depreciation to date	7,547,824	12,454,185	20,002,009
Depreciated cost	17,956,341	32,302,068	50,258,409

FM BROADCAST REVENUES, INCOME AND INVESTMENT

Item	1949		1950	
	Number of stations	Amount	Number of stations	Amount
FM Broadcast Revenues				
FM stations operated by:				
AM licensees:				
Reporting no FM revenues [1]	452		420	
Reporting FM revenues	167	$1,200,000	163	$1,400,000
Non-AM licensees	104	1,400,000	86	1,400,000
Total FM stations	723	2,600,000	669	2,800,000
FM Broadcast Expenses				
FM stations operated by:				
Non-AM licensees	104	5,000,000	86	4,000,000
Industry total		(1)		(1)
Total FM Broadcast Income (Before Federal Income Tax)				
FM stations operated by:				
Non-AM licensees	104	(3,600,000)	86	(2,600,000)
Industry total		(1)		(1)

( ) Denotes loss.

[1] In view of the difficulty in a joint AM-FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM-FM licensees, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily available. In only a few instances did AM-FM licensees state they were unable to segregate the FM revenues.

CHAPTER V—MISCELLANEOUS RADIO SERVICES

1. GENERAL

Not grouped with the Safety and Special Radio Services or with the Radio Broadcast Services, but having an important bearing on the over-all electrical communications picture, is the use of radio for experimentation and development, the operation of noncommunications equipment for industrial, scientific, and medical purposes; the growing utilization of low power devices which radiate frequency energy, and general rules applicable to antennas for all types of radio stations.

This chapter deals with those specific subjects.

2. INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

A serious limiting factor in the use of radio transmitting and receiving equipment is the prevalence of electrical interference tending to prevent the satisfactory reception of transmitted signals. This interference may be in the form of atmospheric background noise, or it may appear as a result of spurious and harmonic emissions from various types of electrical and radio frequency operated equipment. The Commission has long recognized that certain equipment using radio frequency, but not designed for communication purposes, contributes a substantial portion of the interference to authorized radio services, and the operation of equipment of this type has often resulted in the disruption of the service of communication systems. Such interruptions to radio reception are not confined to the broadcast services, but also seriously hamper services concerned with the safety of life and property.

To minimize the actual or potential interference from particular kinds of noncommunication equipment using radio-frequency energy, the Commission adopted, effective June 30, 1947, part 18 of its rules

which relates to the Industrial, Scientific, and Medical Service. Part 18 is designed to govern the operation of medical diathermy, industrial heating, and miscellaneous equipment.

Medical diathermy equipment includes any apparatus (other than low power intermittent surgical diathermy equipment) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment includes apparatus using radio frequency energy for the purpose of heating operations in manufacturing or production processes. Miscellaneous equipment includes apparatus, other than diathermy or industrial heating equipment, in which the action of the energy emitted is directly upon the workload and does not involve the use of associated radio receiving apparatus.

Part 18 specifies the frequency bands which have been allocated for the operation of such equipment and also defines the extent to which harmonic and spurious radiations on frequencies outside the allocated bands must be suppressed. Subsequent to the adoption of part 18 of the rules, five additional frequency bands above 40 megacycles have been made available for this service, but have not as yet been included in part 18.

The Commission has dealt with interference problems arising from the operation of equipment included in part 18, first, on a request-for-cooperation basis, and later, in those cases where cooperation was not satisfactorily accomplished, by the use of enforcement provisions available to the Commission. In the administration of part 18, the Commission has been guided by a desire to provide interference-free communications and yet permit the necessary use of medical diathermy, industrial heating, and miscellaneous equipment. Advice and suggestions regarding the possibility of modifying older types of equipment to effect compliance with the rules has been given by the Commission. The Commission's efforts to bring about amicable solutions of interference problems created by the use of equipment included in part 18, have, in general, been well received.

The expanding use of television facilities, and the further congestion of the frequency spectrum by other services, has resulted in an increase in the number of interference cases reported. Thus far, the procedure set up for processing complaints of interference to radio reception has been satisfactory. However, the rapid growth of the broadcasting, communication and safety services can lead to an increase in the number of difficult situations which may be resolved only by the use of stronger measures available under the act.

In addition to its regulatory duties, the Commission has held conferences with representatives of industries engaged in the manufacture and sale of equipment regulated by part 18. These conferences have been helpful to both industry and the Commission in the solu-

tion of problems relative to equipment included in that part of the rules. Type approval certificates have been issued covering 70 diathermy machines and 8 types of miscellaneous equipment tested in accordance with the procedure set forth in the rules, and found to be in compliance.

Through rule-making procedure, the Commission has issued orders successively postponing the effective date of the rules concerning welding devices employing radio frequency energy pending further study. An industry committee has been cooperating with the Commission to eliminate interference caused by the operation of such welders. Further study of this problem, both by industry and the Commission, is continuing in an effort to arrive at suitable technical standards whereby the welding industry can be brought under the rules and, at the same time, minimize interference caused to other services.

3. EXPERIMENTAL RADIO SERVICES

In compliance with the Communications Act requirement that the Commission "study new uses for radio, provide for the experimental use of frequencies, and generally encourage the larger and more effective use of radio in the public interest", the Commission has provided for experimental radio stations. Part 5, Rules and Regulations Governing Experimental Radio Services, became effective October 1, 1939, and has been modified from time to time as the demands of the experimental service have required. These rules were designed to promote all types of experimentation in and relating to the radio art.

The present rules provide for three categories of experimental stations, namely, class 1, class 2, and class 3. Class 1 stations are for the use of persons engaged in fundamental or general research, experimentation and development of the radio art; or for the development, testing and calibration of radio equipment. Class 2 stations are authorized for the development of a new radio service or the expansion of an established service. Class 3 authorizations are available to individuals interested in conducting experimental programs on their own behalf for a limited period of time.

The Commission's rules provide for two subclasses of class 1 experimental stations in addition to the above general categories. These subclasses are contract developmental and export developmental stations. The former classification includes experimental stations licensed for the purpose of developing equipment or techniques to be used by stations operated by the United States Government. The latter classification is for a similar purpose where the equipment is to be used by stations under the jurisdiction of a foreign government.

The majority of class 1 stations are operated by equipment manu-

facturers and research and development organizations. These stations are engaged in experimentations directed toward the improvement of existing radio equipment as well as the development of new equipment, new techniques in the electronic art, and fundamental studies involving radio propagation. Several licensees are engaged in developing narrow band equipment suitable for adjacent channel operation which would effect a more efficient use of the radio spectrum. Other development work includes new and improved radio aids to navigation, radiolocation equipment, and microwave communication equipment. Continued experimental work is being done in ionospheric investigations and propagation studies of the various frequency bands throughout the spectrum, particularly in the upper range of the spectrum where the presently available information is meager.

The frequency allocation rules (part 2) provide for the experimental use of various bands of frequencies above 25 megacycles subject to the condition that interference is not caused to the service or stations to which these frequencies are regularly assigned. Specific frequencies below 25 megacycles, which are listed in part 5 of the rules, are allocated for use by class 1 experimental stations.

Numerous class 1 authorizations have been issued to manufacturers and sales engineers for field intensity or coverage surveys in areas where it is proposed to establish radio communication systems. The results of these surveys provide useful information for choosing the operating frequencies, power, emission, and antenna location for optimum performance.

Applications for class 2 experimental stations usually involve proposals for the establishment of new services which are not provided for in the rules or are directed toward the development of some phase of an established service. Since the establishment of the new Land Transportation and Industrial Services on a regular basis the number of class 2 stations has decreased.

Because of the limited scope of experimentation permitted by class 3 authorizations, the Commission receives few requests for such authorizations. Most types of experimentation permitted under a class 3 authorization may also be conducted under a class 1 authorization or, for qualified persons, under the Rules Governing the Amateur Radio Service.

Part 5 of the rules is being completely revised, and it is expected that the necessary rule-making procedure looking to final adoption will be completed in the near future.

Statistics for the experimental radio services follow:

NUMBER OF EXPERIMENTAL RADIO STATIONS

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Class 1	416	348	(68)
Class 2	50	56	6
Total	466	404	(62)

EXPERIMENTAL TRANSMITTERS

Classification	Nonmobile	Mobile	Total
Class 1	203	1,154	1,357
Class 2	17	151	168
Total	220	1,305	1,525

EXPERIMENTAL APPLICATIONS

Class of station	Received 1950	Received 1951	Increase or (decrease)
Class 1	799	839	40
Class 2	100	51	(49)
Total	899	890	(9)

4. RESTRICTED RADIATION DEVICES

The necessity for establishing a minimum field strength figure, below which it would not require the use of radio-frequency emissions to be licensed, has been recognized by the Commission and, as a result of studies undertaken in 1938, rules relating to certain low power devices were adopted. These rules, presently codified as part 15, Rules Governing Restricted Radiation Devices, do not place a limitation upon the permissible power, but do place a limitation on the distance at which such equipment can be used, the distance being an inverse function of the frequency employed, and specify a maximum permissible field intensity at that distance.

Considerable use has been made of equipment designed to operate within the provisions of part 15, particularly in the frequency band allocated for use by the Standard Broadcast Service. Typical of these uses are "college campus" broadcast stations, which employ carrier current techniques for the distribution of programs essentially broadcast in nature; industrial signalling and communications systems using carrier current techniques; space radiating devices such as phono-oscillators, garage-door openers, remote-control devices for model airplanes or other objects; etc.

Since the operation of radio transmitting devices under part 15 does not involve licensing for either equipment or operators, this mode of operation has been adopted by many persons. As a result, the Commission has received considerable correspondence regarding restricted radiation devices purportedly operating in compliance with part 15.

It has been found, however, that much of the equipment intended to operate under these rules has proved incapable of compliance with the maximum permissible field strength limitation. Campus broadcasting, and other carrier current systems, have grown to such proportions that a study of the problems created is being made. A notice of proposed rule making has been published and comments invited regarding the various types of restricted radiation devices and systems now in use. However, further study will be necessary before a satisfactory solution to the problem of restricted radiation devices can be found.

5. NEW ANTENNA RULES

On May 23, 1950, the Commission proposed rules concerning the construction, marking, and lighting of antenna towers and their supporting structures. The rules, as part 17, were made final on December 13, 1950, effective February 15, 1951. Their purpose is to prescribe certain procedures and standards with respect to the Commission's consideration of proposed antenna structures which will serve as a guide to persons intending to apply for radio station authorizations.

Part 17 is a result of a need for definite procedures governing a study of each antenna proposal and consultation with all aviation interests concerned for the purpose of determining the extent of aeronautical hazard created by a proposed antenna structure. To this end the criteria contained in part 17 were developed in conjunction with the Air Coordinating Committee (ACC), the Civil Aeronautics Administration (CAA), the Department of Defense, other Government agencies, and the radio industry.

The new rules were promulgated pursuant to section 303 (q) of the Communications Act which grants the Commission authority to require the painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute, a menace to air navigation. Prior to the adoption of part 17, the question of the degree of hazard created by a proposed antenna tower was referred to the Civil Aeronautics Administration for that agency's recommendations in accordance with section 1.377 of the Commission's rules. All applications proposing the construction of antennas over 150 feet, or located within 3 miles of an airport, were being so referred at the rate of about 175 per month. The CAA's recommendations were predicated on its Technical Standard Order N18, Criteria for Determining Obstructions to Air Navigation, and its predecessor standards.

With the adoption of part 17, the function of making recommendations concerning the possible aeronautical hazards of antennas passed from the CAA to the Airspace Subcommittee (ASP) of the Air Coordinating Committee (ACC). The ACC was created in 1946 by

Executive Order No. 9781 to provide for the development and coordination of aviation policies. The Airspace Subcommittee (ASP) of the ACC coordinates proposals by Government agencies, private individuals, and industry which may involve conflict in the navigable airspace; the ASP assumes the responsibility previously delegated to the CAA for determining whether a proposed tower will be a menace to air navigation.

Part 17 is composed of three subdivisions. Subpart A contains general information, including statements of basis and purpose, definitions of the technical terms involved, a specification of how and when an application should be made, and a description of the Commission's procedure in the consideration of an application. Subpart B contains the criteria set forth for determining whether or not a proposed radio tower will require special aeronautical study by the Airspace Subcommittee. If a proposed radio tower meets the specifications of these criteria, it is deemed not to involve a hazard to aviation. Subpart C specifies tower painting and lighting requirements.

In view of the technical phases of part 17, and the fact that antenna proposals involve various types of radio services, the Commission decided that the antenna surveys be coordinated in a single branch in the Office of Chief Engineer. Statistics of antenna applications processed by the Antenna Survey Branch (ASB) for the fiscal year subsequent to February 15, 1951, the effective date of part 17, follow:

Antenna applications

Services	Received	Cleared by ASB	Not cleared by ASB—referred to ASP for study	Pending June 30, 1951
Broadcasting:				
AM	234	172	53	9
FM	26	18	3	5
TV	22	18	3	1
Experimental	5	5	0	0
Common carrier	89	81	4	4
Special services	2,846	1,986	56	804
Total	3,222	2,280	119	823

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CHAPTER VI—RADIO OPERATORS

1. COMMERCIAL RADIO OPERATORS

The Commission is concerned not only with radio station licensing but also with the licensing of the stations' operators. Over 600,000 commercial radio operators (as distinguished from amateur radio operators, treated elsewhere in this report) now hold licenses. There are nine basic classes of commercial operator licenses graduated to meet the operating requirements of the various classes of radio stations. Included among the commercial operators licensed are those whose use of radio is complementary to their occupation as well as those who operate radio stations as a vocation.

Basically, all radio stations licensed by the Commission are required by law to have licensed radio operators and the Commission has the duty in accordance with the Communications Act to issue operator licenses. In this connection, the Commission prescribes the kinds and classes of radio operators and the qualifications they must possess as a basis for licensing. Examinations for the various operator licenses are given regularly at the Commission's field offices and at regular intervals at examination points located throughout the United States.

Commercial radio operator licenses normally have 5-year terms and an operator wishing to maintain his licensed status must take steps at the end of the term to obtain either a renewal or a new operator license. Renewal licenses normally are given without examination if the operator has been working under his license for a reasonable portion of the license term. The accelerated drafting of operators into the Armed Forces which occurred during the past year and the temporary employment of operators in rearmament work prevented many operators from obtaining the requisite service for renewal and the Commission in the public interest temporarily waived the normal renewal service requirements.

The present national emergency and rearmament program have created a special demand for electronic technicians. This demand has

been supplied partly from the licensed operator personnel of radio stations and this in turn has created a shortage of radio operators holding licenses of the higher classes. Furthermore, the amount of ocean-going shipping was increased to meet the requirements of the emergency and an increased number of experienced radiotelegraph operators were needed to man the ships. As an emergency measure to add to the supply of experienced marine operators, a special class of radio operator license was created in April 1951 which is valid only for ship radio stations. The license is issued to certain former operators upon their passing an appropriate Morse Code test.

The shortage of operators holding radiotelephone first-class operator licenses has had a serious impact upon broadcast stations located in the small market areas. To afford temporary relief, the Commission established a policy of granting temporary permission for periods up to 30 days to utilize lower class operators for the normal operation of stations under the supervision of one or more fully qualified full-time operators. This relaxation is granted only where it is shown that the station concerned has made reasonable efforts to employ first-class operators and has been unable to do so. The Commission by amending its rules delegated authority to administer this policy with respect to AM and FM broadcast stations to its 23 district field engineering offices. Licensees applying for temporary relief from the normal operator requirements accordingly should apply to these offices rather than to the Commission's Washington offices. At the end of the fiscal year, authorizations to employ lower grade operators were being granted at the rate of approximately 28 per week.

The Commission has authority under the law to issue radio operator licenses only to United States citizens. This limitation, coupled with the basic statutory requirement that radio stations in the United States have operators licensed by the Commission, generally prevents foreigners from operating radio stations of this country. This situation is most evident in the case of mobile stations such as those on board aircraft travelling between Canada and the United States. From the difficulties arising in this connection, it appeared desirable to effect some arrangement whereby citizens of these two countries could operate each other's stations, and this led to negotiations with Canada in which the Commission participated. As a result, representatives of the two Governments on February 8, 1951, at Ottawa, signed a convention which would provide a solution to some of the operator problems presented. At the end of the year, the convention had not been ratified by either Canada or the United States and was not yet in effect. That there is considerable interest in the provisions of the convention is indicated by the numerous inquiries received from aircraft pilots.

The Commission on January 29, 1951, in line with the International

Radio Regulations, issued a proposal to amend section 13.61 of its rules so as to further define the operating authority of holders of the Restricted Radiotelephone Operator Permit and the Aircraft Radiotelephone Operator Authorization. Under the proposed amendment, operators obtaining these authorizations would not be eligible to operate ship or aircraft radiotelephone stations having a power capability greater than 50 watts. The matter had not been finally decided at the end of the year.

During the past year, work was completed on material for a supplementary examination for licensed radio operators who wish to perform or supervise tests and adjustments of ship radar installations during the installation, servicing, or maintenance of such equipment. The examination consists of 50 questions on specialized theory and practice applicable to the proper installation, servicing, and maintenance of ship radar in general use for marine navigational purposes. Upon passing the examination, known as element 8, the eligible applicant is entitled to have a radar endorsement placed upon his radio operator license.

The Commission publishes a booklet to show the scope of the examinations for the various classes of commercial radio operator licenses and endorsements. This publication, entitled "Study Guide and Reference Material for Commercial Radio Operator Examinations", is printed and made available to interested persons by the Government Printing Office. Because of substantial changes made during the preceding year in the examinations, the Commission made extensive revisions of the publication.

2. STATISTICS

AUTHORIZATIONS

Commercial operator licenses of all classes reached a total of approximately 612,000 at the close of the year, which was a net increase of more than 74,000 over the previous year. Comparative figures follow:

Class of license	June 30, 1950	June 30, 1951	Increase or (decrease)
Radiotelegraph:			
First class	4,795	4,432	(363)
Second class	8,350	7,667	(683)
Third class [1]	1,162	1,155	(7)
Temporary limited:			
Radiotelegraph			
Second class		141	141
Radiotelephone:			
First class	38,049	39,000	951
Second class	17,535	18,400	865
Third class		4,400	4,400
Restricted radiotelephone permit	346,990	398,960	51,970
Aircraft radiotelephone authorization	120,550	137,988	17,438
Total	537,431	612,143	74,712

[1] Includes restricted radiotelegraph operator permits.

APPLICATIONS

During the year more than 150,000 applications for commercial operator licenses were received. This represents an increase of approximately 50,000 over the figure for last year.

CHAPTER VII—FIELD ENGINEERING AND MONITORING

1. GENERAL

The Field Engineering and Monitoring Division constitutes the Commission's primary inspection, examination, enforcement, and engineering fact-finding unit. Its field staff inspects radio stations of all types and serves notices for discovered discrepancies, conducts radio-operator examinations and issues operator licenses to those found qualified, monitors the radio spectrum to assure that stations operate on their assigned frequencies with prescribed power, locates and closes unauthorized transmitters, investigates complaints of interference to various radio services, obtains and correlates technical data for Commission use, furnishes fixes and directional information to aircraft which are lost and provides bearings and fixes on ships in distress.

2. FIELD OFFICES

The Commission's 9 regional engineering offices supervise 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations, which are listed in the appendix. The engineering work performed by these field offices and monitoring stations is coordinated and directed by the Washington office.

3. MONITORING STATIONS

The Commission operates 18 monitoring stations of which 11 are primary stations and 7 are secondary stations. Sixteen are located in the United States, one in Hawaii, and one in Alaska. The secondary station at North Scituate, R. I., was closed in January 1951 for budgetary economy reasons. A request has been made to Congress that four new monitoring stations be added during the next fiscal year, with corresponding increase in the present monitoring station staffs.

This unique monitoring and direction-finding network is the only one of its kind in the United States. It renders services to the public and Government in numerous ways and to the Commission in special categories. Functioning as it does on a round-the-clock basis and being linked together and with Washington headquarters by radio and teletypewriter circuits, it constitutes a prompt and accurate identifying, localizing, and frequency-measuring adjunct to the Commission's law enforcement and emergency aid programs.

4. INSPECTIONS

BROADCAST STATION INSPECTIONS

The Commission's engineers regularly inspect the equipment of all stations in the AM, FM, and TV broadcast services. These inspections are to determine whether the stations abide by the rules and regulations under which their operation has been authorized and whether they render an adequate technical broadcast service to the listening and viewing public. All of the stations' technical operations are carefully reviewed, including their maintenance of directional radiation patterns, their authorized power, the frequency and stability of emissions, the program modulation including quality of music or voice, the proper lighting of the antenna towers for the enhancement of safety to airborne passengers and the maintenance of logs and records showing that other requirements of the Communications Act are being observed.

Following is a tabulation of the number of broadcast stations of the three classes inspected in 1950 and 1951.

Broadcast stations inspected	1950	1951
AM	1,476	1,242
FM	306	204
TV	104	44
Total	1,886	1,490

Discrepancies noted in broadcast station operation during 1950 totaled 1,108 as compared with 885 during 1951. Percentage-wise, 59 percent of the station inspections made in 1950 resulted in citations while 59.4 percent resulted in this action in 1951.

SHIP STATION INSPECTIONS

Since 1910, the United States has continued in the forefront in the enactment of safety legislation and in the enforcement of international laws for the safety of lives and property at sea. The Commission's engineers, as did those of its predecessor agencies, assist ship owners and operators in maintaining ship radio apparatus in a condition of

instant readiness for emergency demands. Ship inspection figures for 1950 and 1951 follow:

Number of ship inspections	1950	1951
United States ships	6,982	7,897
Foreign ships	3,032	2,939
Total	10,014	10,836

During inspections of ship radio stations, the formal action to obtain correction of defects and irregularities is here shown:

Number of deficiency notices served	1950	1951
United States ships	6,960	4,393
Foreign ships	1,943	1,431
Total	8,903	5,824

The ever-present danger of complacency in the maintenance of radio equipment by owners and licensees points out the need of continued and regular inspections of ship radio stations to maintain their readiness and efficiency when disaster strikes in the age-old battle of men against the sea.

The number of discrepancies which were corrected immediately by the licensee or his representative during the inspection, and therefore did not necessitate the serving of formal deficiency notices, is indicated below:

Violations cleared during inspections	1950	1951
United States ships	2,783	3,355
Foreign ships	513	540
Total	3,296	3,895

INSPECTION OF OTHER RADIO STATIONS

Inspections made of stations in services other than broadcast and ship totaled 13,507 in 1951 and 12,755 in 1950. Discrepancies of a technical nature totaling 3,742 were revealed in 1951, while 3,699 were discovered in 1950. The use of radio in more and more services to the public, in the dispatching of vehicles of various types in the safety services, in providing communication to isolated communities, in watching by radio the rise and fall of river levels to prepare the populace for floods, and in underground prospecting and in other apparently unlimited and widely divergent fields continues to present added field responsibilities and obligations. Records are maintained in each Commission district office of the new stations, and as they are authorized these stations are scheduled for inspection upon the next

trip to that vicinity. Due to the number of new stations added annually, it has been impossible lately to accomplish yearly inspections of all stations with the available inspectional force and, as a result, inspections are made of stations at least once during their license period.

In order to facilitate compliance with the Commission's rules and regulations, the inspecting engineer calls technical discrepancies to the attention of the station at the time the discrepancy is discovered and clears those which are corrected while the inspection is in progress. These discrepancies, consequently, are not recorded as formally cited and the incident is recorded as a minor discrepancy which was "cleared during inspection".

In continuing its efforts to hasten the correction of operational discrepancies, and particularly in those cases where the station's operation does not directly involve safety of life and property, "sample inspections" are made of groups of stations. Inspections also occur during Nation-wide drives synchronized with the release of appropriate public notices, as was recently accomplished in connection with private aircraft. This method has proven quite effective in bringing to the attention of groups of radio-station operators the need for their obtainment of required operator and station licenses in cases where these documents had not been secured previously, also, to bring to their realization the need for standard operating procedures and "circuit discipline" of a "party line" nature. This tends to free the itinerant aircraft frequencies of unnecessary conversation which can disrupt the channels with consequent loss of their usefulness in an emergency.

The Commission's field engineers are responsible for the inspection of the hundreds of thousands of stations in the various categories. These include mobile stations as well as the fixed stations which service them. Mobile stations are in the majority. They encompass radio equipment on police, fire department, ambulances, tow trucks, taxicabs, and other vehicles which serve the public. Inspection is made of these stations as frequently as limited inspectional personnel can be spared from other duties.

5. OPERATOR EXAMINATIONS

Commercial operator licenses totaling 139,732 were issued in the field during 1951 as compared to 101,226 issued during 1950. This is an increase of 38 percent. The licensing of stations in new or expanding radio services calls for an ever-increasing number of licensed operators for their operation. Some stations—such as TV and radiotelegraph stations on ocean going ships—require operators holding the highest grades of radiotelephone and radiotelegraph licenses which are obtained only after the applicant has passed a thorough technical

examination given by an examining engineer. Licenses valid for the operation of other types of radio stations require examinations which are designed to determine the applicant's knowledge of and familiarity with the service in which he seeks authority to operate.

Examinations are given regularly at field engineering offices of the Commission, at the Washington examination office and at various points in the United States, its Territories and possessions. In addition, examinations given at points outside the district offices are held annually, semiannually, or quarterly as the needs of the locality indicate. The places and times of these examinations are made known by publication, semiannually, of an official examination schedule which may be obtained by writing to any of the district engineering offices listed in the appendix hereto.

6. INVESTIGATIONS

Investigative activity increased somewhat in 1951 over that in 1950. This was brought about by a number of factors, among which are the steady increase in the number of new adaptations of radio and to the mounting purchases of television receivers. During 1951 a total of 9,652 investigative complaints of all types were handled by Commission investigative engineers as compared with 8,613 in 1950.

Investigations may be divided into two general groups: (*a*) Those pertaining to licensed stations and (*b*) those made in connection with unlicensed, unidentified, or unknown stations or sources of radio interference. Although the number of cases involving unlicensed stations is a relatively small proportion of the total number of investigations conducted, such investigations constitute an extremely important activity due to the fact that unlicensed operation must be suppressed as quickly as possible, particularly if serious interference is involved. Cases of deliberate violations of the Communications Act must be prepared for prosecution of the persons responsible. In this category are investigations to apprehend persons who commit other violations such as the use of profane and indecent language, or who use radio surreptitiously for illegal purposes such as that occasionally attempted at race tracks to "beat the bookies".

The Commission's investigative engineers recently uncovered several unauthorized TV broadcasting stations which were installed for the purpose of providing "bootleg" television programs to communities which, due to their geographical location, were unable to receive programs from authorized stations. The Commission's ability to speedily discover these and other illegal operators who attempt to break the laws acts as a deterrent to more widespread illegal radio operation.

During the year, 11 cases of illegal operation were referred to the

Department of Justice for prosecution. Convictions were obtained in four cases, while the others had not yet reached court. Prosecution and conviction of all operators of illegal stations found are not sought by the Commission in cases where the violation was manifestly not premeditated, particularly when committed by minors. During 1951, a total of 101 unauthorized stations were discovered and closed as compared to 149 in 1950.

A total of 5,625 investigative cases relating to licensed stations were handled during 1951, an increase of 417 over 1950. These investigations were made in connection with complaints relating to authorized stations of all classes. Interference to TV reception accounted for the largest number but interference to AM and FM broadcasting and, of lesser magnitude, interference to and by the various stations or services, likewise received appreciable effort.

Less numerous, but of considerable importance to safety of life and property, were cases involving interference to aviation and other communications services caused by equipment frequently located more than a thousand miles from the place at which the interference was experienced. The equipment responsible for such interference was frequently found to be radio frequency "industrial heaters" used in certain manufacturing processes. Such interference sources are first localized by the Commission's long-range direction-finding network, then tracked down by means of mobile direction-finding units.

Many interesting phenomena are discovered due, to some extent, to the large number of stations which are being installed, particularly in the urban communities. Rectification of radio signals, due to imperfect metallic contacts in homes and mixing of radio signals in a radio receiver from two or more radio stations in the complainant's vicinity, is a frequent cause of interference. Other sources are various domestic electric appliances, passing airplanes, trains, streetcars and buses, electric-welding equipment, diathermy, and, in some cases, radio receivers which radiate radio signals into the neighborhood while they are receiving. The latter has been found to be particularly true of some TV receivers now in use.

7. MONITORING FUNCTIONS

Commission monitoring is analogous to the work of traffic policemen in maintaining order on the Nation's highways. Most countries of the world have found it necessary to maintain monitoring stations. In fact, it is an obligation under international treaties and radio conventions to do so. The United States has been a pioneer in this regard and strives to maintain its leadership of operating, in the

Federal Communications Commission, the best monitoring system of this type in the world.

INTERFERENCE COMPLAINTS

When a signal which cannot be identified by the complainant is causing interference to other radio operations, quick corrective action is essential. Vital messages can be jammed by accident or negligence as well as by design. It is natural that the Commission, through its monitoring service charged with keeping order in the air lanes, is looked to both for identifying the station causing interference and for eliminating the trouble.

A typical example of this type of interference elimination occurred when an engineer in Washington, D. C., noted a particularly strong unidentified signal estimated to be a potential, if not actual, source of interference to an aircraft frequency. Consequently, an "alert" was placed via the Federal Communications Commission's teletype in order that coordinated long-range bearings could be obtained. Later during the same evening an Air Force base in Texas filed a formal complaint through the nearest monitoring station on the same interfering signal already under observation. In addition to the complaint from Texas, another was received from an Air Force base in Montana. In a short time bearings were obtained, plotted, and a "fix" evaluated indicating the offending signal to come from the vicinity of an Air Force base in California. The responsible authorities were notified and shortly thereafter the interfering signal left the air. All of this was accomplished in the relatively short time of 37 minutes from the time the initial complaint was received until the time that the interfering signal was removed.

Another instance involved interference to a channel used by the Transcontinental and Western Airways at New York. Bearings were obtained, a fix determined, and the source located, all in 15 minutes.

But sometimes neither the identification nor the removal of the trouble is so simple. In more complicated cases, a final step must be taken by calling mobile units into operation to trace the source of the offending transmission. One case in point during the year was when the Coast Guard advised the Commission's monitoring service that an unidentified signal was at times blocking out transmissions on an aircraft channel. After long-range bearings were taken, a mobile unit was dispatched from the New York area to run down the offender. It was found to be an excessively radiating industrial heater used for gluing wood panels. This operation took approximately 3 days. Since the owner of the machine did not offer cooperation leading toward eliminating the interference, it was necessary for the Commmission to secure an injunction to remedy the situation.

In some cases, long-range bearings for identification are not required, but extensive monitoring observations, including frequency and band-width measurements, observations of modulation percentage, etc., must be made of a station to determine the facts. The Commission's monitoring personnel is called upon to make observations and recommendations. The latter are then brought to the attention of other bureaus of the Commission, or other agencies or governments if necessary, to effect a solution to the interference problem.

A total of 2,479 major monitoring cases were handled during the fiscal year, which was 596 more than in 1950. This reflects the increase of interference complaints proportionate to the number of operating stations. The trend is expected to continue as more and more stations are authorized in the various services.

EMERGENCY SERVICE

The Commission's monitoring stations continued to be called upon to furnish emergency long-range direction finder fixes on lost or otherwise disabled air and sea craft. During the past year 168 requests were received in this category as compared with 116 in 1950. More can be anticipated next year, due to the increased amount of military training flights.

Several cases of emergency monitoring assistance given during fiscal 1951 were of interest. Among these were instances of aid furnished lost B–29's en route from Honolulu to the mainland; aid furnished the giant Navy aircraft *Mars* which lost the use of two engines over the Pacific; aid given a military transport, en route to Halifax with failing engines, which radioed at the end of the journey, "Have landing in sight thank God"; aid furnished a giant B–50 lost in the Middle West; aid furnished a PAA clipper ship flying the Pacific; aid furnished a lost yacht named the *Francis C* which, after receiving its position, transmitted "Continuing voyage express appreciation for assistance rendered"; and assistance given planes seeking to fix the position of many of the hurricanes last fall in the Caribbean.

MONITORING SURVEYS

During the year many monitoring surveys were made, both for the Commission's use and at the request of other agencies. These surveys for the most part are exacting and time consuming but are necessary for the efficient use of the radio spectrum. Data from such surveys are also used at international conferences.

MONITORING ENFORCEMENT

In policing the spectrum, thousands of improper operations have been detected and brought to the attention of the offenders. During

fiscal 1951, as a result of monitoring activities, 8,846 violation notices were served on radio stations and operators both domestic and foreign. This is slightly lower than the 9,817 served during the previous fiscal year and undoubtedly represents an improvement in the maintenance of frequency stability and in operating practices due to close surveillance.

8. TECHNICAL OPERATIONS

As a result of rapid expansion of radio communication into higher frequencies and new fields of radio activity, there continues to be corresponding need for new and improved equipment for use in exercising technical surveillance over the operations of radio stations, locating unlicensed stations and sources of interference to authorized services, and for obtaining propagation data and other information for use in connection with allocation of frequencies, especially in frequency ranges above 50 megacycles. To meet these equipment needs a number of items of equipment were purchased and modifications were made in existing equipment to provide improved and more diversified operation.

During the fiscal year 68 new engineering projects were assigned to the field offices and monitoring stations as a result of requests from the various offices in the Commission and from other Government agencies or originated by the Field Engineering and Monitoring Division. In addition, 93 projects were carried over from the previous year. The total of 161 active engineering projects which involved engineering studies, measurements and investigations was about 25 percent greater than for the previous year and 33 percent greater than for 1949. The field engineers spent more than 8,000 man-days during fiscal 1951 on these subjects, about the same total time as for the two previous years.

Examples of engineering project assignments were:

The directional patterns of 236 different AM broadcast stations were checked to determine whether the stations were operating their antenna systems in accordance with the specifications set forth in their licenses. Field intensity measurements and surveys were made of the emissions of eight AM broadcast stations in connection with interference to other services from these stations involving harmonic radiation, cross modulation, and other spurious radiations.

The long range AM broadcast field intensity recording program was continued at six stations and a new program of VHF and UHF field intensity recording in cooperation with the Central Radio Propagation Laboratory was initiated at nine monitoring stations and one district office. At the close of the year, 20 AM broadcast and 22 VHF and UHF television and FM broadcast recorders were in continuous operation. Information obtained from these 42 recorders is used in

connection with allocation studies and in determination of range of coverage to be expected from the various classes of stations. Special mobile field intensity recordings were also made at five offices, using test cars to obtain information and data which could not be obtained at fixed locations.

Considerable progress was made during the year in replacing the old mobile investigative units with new investigative cars. When the year ended, 15 of the new cars had been completely modified and equipped and work was progressing on 7 additional cars. The Field Engineering and Monitoring Division operates a total of 39 fully equipped investigative cars.

Installations of low frequency direction finders (250 to 1500 kilocycles) were made at seven of the monitoring stations to extend the coverage with fixed direction finders below that previously available. In addition, considerable progress was made in development of new long range direction finders which may be remotely controlled and operated from the monitoring building. Two different methods of performing this feat have been devised and operational tests are now in progress to determine the relative accuracy and usability of the two arrangements. Such direction finders will greatly increase the efficiency of the Commission's direction finding network, leading to faster fixes and more economical utilization of manpower.

Other field activities involved construction of special equipment for monitoring and engineering measurements and for other purposes which cannot be fulfilled by commercially available equipment. Also, a number of tests were made to determine the suitability of various items of equipment for use at the field offices and stations.

CHAPTER VIII—TECHNICAL AND LABORATORY ACTIVITIES

1. GENERAL

Research and technical studies are basic to Commission allocation of frequencies and the establishment of rules governing the operation of all types of radio services. Such highly involved and complicated matters can be handled only by specialized engineers. Those engaged in this phase of the Commission's work are grouped into two divisions—Technical Research and Laboratory. Both divisions function under the Office of the Chief Engineer. Particular projects require the cooperation of the Commission's field engineers and monitoring system.

2. TECHNICAL RESEARCH DIVISION

The Technical Research Division serves as an operational research group for the purpose of resolving problems relating to wave propagation, technical standards, and various allied subjects. In this connection it organizes research projects for the collection of technical data by the Field Engineering and Monitoring Division, the Laboratory Division, and other organizations including certain groups in the radio industry. It also participates in the technical studies incident to international conferences and treaties, and represents the Commission in the coordination of radio research, standardization, and instrumentation with Government and industrial organizations.

During fiscal 1951, the Technical Research Division continued its current long-term projects at about the same level as during the previous year while it increased activities in the VHF and UHF part of the spectrum. More emphasis was also exerted on those projects dealing with technical standards. The duties of the Ad Hoc Committee on television continued through most of the year and resulted in the release of the widely accepted Ad Hoc reports. The division continued to carry on special studies and to collect and analyze basic data concerning radio wave propagation as well as other communica-

tion problems, and to make the resulting scientific information available to the Commission for guidance in the promulgation of new rules and the determination of technical limitations and practical engineering standards.

Allocation of radio frequencies to the various radio services is premised upon a knowledge of many highly technical and complicated things. These include ionosphere and troposphere propagation, terrain effects, useful intensities of signal as related to various sources of interference, geographical and frequency separations necessary to alleviate interference in accordance with various requirements, equipment capabilities and limitations, new developments and their possibilities, and other fundamental considerations.

The Commission must have a detailed knowledge of the propagation characteristics of radio signals throughout the spectrum in order to make the most economic and practical allocation of facilities. The propagation characteristics of the band of frequencies allocated to a particular service has to be consistent with the operating requirements. The further allocation of stations within a service—i. e., the determination of cochannel and adjacent channel distance separations, service ranges, and power limitations—can only be founded on a knowledge of propagation. This knowledge is best obtained from deductions arrived at by experienced engineers through the study and analysis of long-term field intensity measurements involving the use of carefully calibrated recording equipment. It is the primary function of the Technical Research Division to obtain and evaluate such data.

VHF AND UHF PROPAGATION STUDIES

Television and FM—Ad Hoc Committee.—Several members of the division participated actively in the Ad Hoc Committee for the evaluation of the radio propagation factors concerning the TV and FM broadcast services in the frequency range between 50 and 250 megacycles. This committee was formed in October 1948 and functioned through July 1951 in connection with the Commission's hearings on TV and FM allocations. The committee was headed by the Chief of the Technical Research Division and consisted of propagation experts from industry and Government. A considerable amount of time was spent by several of the members of this division on the subcommittee responsible for preparing volume II of the Ad Hoc Committee Report, which was introduced into the record of the television allocation hearing of October 1950.

TV standards.—The division participated actively in the drafting of engineering standards for TV broadcast stations, as proposed by the Commission on September 21, 1950, and March 22, 1951.

Measurements.—During the early part of the year plans were drawn

for the recording of field intensities of new TV and FM stations by the Commission's monitoring stations. During the last quarter of the fiscal year the plans were finalized and the work of installing recorders and collecting field data got under way.

In collecting information on radio propagation and atmospheric noise, the division has maintained close liaison with the Central Radio Propagation Laboratory of the National Bureau of Standards, exchanging data and collaborating in the preparation of propagation curves and charts. Recently the CRPL has endeavored to expand its recording program and, because of its inability to increase these activities to the extent desired, expressed its desire to assist in the expansion of the Commission's recording program in order to provide the military services with much-needed technical information at the earliest possible date. In order to supply the required propagation data, plans were worked out for the inauguration of a project of VHF and UHF propagation measurements in which the Commission will obtain information useful in the allocation problems associated with TV, FM, and other radio services utilizing these frequencies, and, at the same time, vital information will be obtained concerning the application of these frequencies to defense problems.

The division continued to analyze data accumulated at various monitoring stations and prepared numerous technical reports on the subject. These included information concerning UHF propagation as applied to broadcasting purposes resulting from measurements made on frequencies between 529 and 535 megacycles, as transmitted by the National Broadcasting Company from station KC2XAK in Bridgeport, Conn. This was the first station in the United States to transmit TV programs regularly on UHF.

A paper on VHF propagation was prepared in cooperation with industry engineers and presented before the joint meetings of the Institute of Radio Engineers and International Radio Scientific Union, held in Washington in April 1951.

Other studies.—In preparation for the television allocation hearing, numerous studies were made of the effect upon TV broadcast service areas of the different parameters, such as transmitting antenna height, acceptance ratio (ratio of desired to undesired signals required to give satisfactory service), multiple interference, etc. These studies were made for both the VHF and UHF ranges of frequencies under propagation conditions typical of different parts of the country.

Extensive studies were made of available data to evaluate the variation of field intensity for the UHF band. These studies included both long-distance tropospheric propagation and line-of-sight propagation over irregular terrain. These studies enabled intelligent estimates to be made of the service available in the UHF band.

152–162-Megacycle study.—During the year the Common Carrier Bureau was confronted with applications for facilities in the Public Land Mobile Service in excess of those which could be accommodated by the available frequency pairs. For example, a large number of applications came from the New York area. This involved an allocation problem which ranged from New Brunswick, N. J., to Hempstead on Long Island and north to West Chester, Conn. Since the applicable rules did not contain definitive engineering standards for the allocation of frequencies, it was necessary to investigate the propagation characteristics of the 152–162-megacycle band and the performance of the equipment used by this service in order to arrive at engineering standards dealing with service and cochannel interference. Much use was made of the material developed by the TV Ad Hoc Committee, which was interpolated to give the expected transmission conditions in this frequency range. A technical report was prepared summarizing all of the pertinent factors and making recommendations. Technical assistance was rendered to the engineers of the Common Carrier Bureau in the preparation of the technical exhibits for the application hearings. Assistance was rendered in hearings on similar problems in Chicago, Los Angeles, and Dallas.

Color television.—Since the Technical Research Division had been actively involved in the color television hearings, considerable time and effort were also expended in analyzing the voluminous hearing record and exhibits. The salient technical points involved were brought out in the Commission's color television report.

TECHNICAL STUDIES AND STANDARDS

General.—Each year produces its crop of new radio developments and with each comes a fresh series of technical problems. When a new service or a new phase of an old service is inaugurated there is immediate need for new rules including definitions of terms, technical requirements, and operational limitations. With the rapid expansion which is taking place in the many existing radio services and, due to the development of new services, the need for technical studies grows steadily. By the same token the Commission's problems of interference prevention are continually becoming more extensive and more acute. This is not hard to understand when it is realized that approximately 18 million new broadcast receivers were manufactured in this country during the past year.

Restricted radiation devices.—The study of restricted radiation devices undertaken during the previous year was carried forward during fiscal 1951. The most acute problem was that of interference from power line carrier current systems to navigational aids. The Government-industry committees continued work on this problem. Field-intensity measurements, including measurements on the ground

and in the air, were completed. Reports submitted by the different task forces were distributed to the interested parties. A summary of the carrier current measurements in the form of a mass plot was prepared by the division. This chart represented the first attempt to show graphically, and in a general way, how the radiation from carrier current systems varies with distance from the generating source or distribution lines.

Incidental radiation devices.—Incidental radiations from devices such as receivers, electric razors, heating pads, fluorescent lights, automobile ignition systems, etc., cause untold interference to radio reception. A considerable amount of time was spent in the study of such radiation with a view to determining the most troublesome sources and to finding effective remedies.

Receiver radiation.—Probably the most prolific offenders in the incidental radiation field are FM and TV receivers. Radiation from these receivers causes interference not only to FM and TV reception but to certain safety devices such as aviation navigational aids. Representatives of the division met with the industry committees dealing with this problem. As a result, two outstanding jobs were completed during the year. First, a standard method of making "open field" measurements of receiver radiation was evolved; second, definite limits of radiation for FM and TV receivers were agreed upon and recommended by the Radio-Television Manufacturers Association to its member companies. The Commission will continue to encourage better circuit design and more effective suppression methods among all receiver manufacturers. The problem of measuring receiver radiation and means of reducing the degree of radiation in the UHF bands is now under study.

Spurious and harmonic radiation.—Work in this field was carried on during the year as a continuing problem. Numerous interstaff meetings were held. A considerable amount of work is still to be performed before this troublesome problem can be presented to the Commission for action.

Radiolocation.—This problem, carried over from previous years, commanded division attention at various times during 1951. A promising proposal for the solution of the frequency problem involved the sharing of the 1750–1800-kilocycle band with the Disaster Communications Service. A general plan was drafted for presentation to the Commission.

Coordination of technical rules.—The desirability of maintaining uniformity of the technical phases of the rules throughout all parts and all services has long been sought, but the processes for this accomplishment have not been easy to inaugurate. However, the work under this project will be accelerated during the coming year.

GOVERNMENT-INDUSTRY COMMITTEES

The Commission is represented by its Technical Research Division on a number of important standing committees of Government and industry. Among these are executive groups of the Central Radio Propagation Laboratory, the URSI (International Radio Scientific Union), and CCIR (International Radio Consultative Committee), committees of the Institute of Radio Engineers and the Radio-Television Manufacturers Association, and panels of the Committee on Electronics of the Research and Development Board. The chief of the division continued to serve as chairman of the central committee which coordinated technical work related to restricted radiation devices and also served as chairman of the Ad Hoc Committee on television. He also attended the CCIR meetings in Geneva.

TECHNICAL CONSULTING SERVICE

Besides furnishing technical advice to the Commission, the division is called upon to answer technical questions of other Government agencies, industry, and private engineers. Unabated demands of this nature added to the backlogs of routine work.

MEDIUM FREQUENCY PROJECTS

Sunspot cycle recordings.—Solar activity has a profound effect upon radio-wave propagation. During daytime hours, standard broadcast stations are heard only over relatively short distances. At night, sky-wave signals may be heard from distant States as well as from Mexico and Canada. The sunspot cycle covers a period of about 11 years. The Commission's sunspot cycle project was inaugurated in 1938 and is still active. Continuous recordings of broadcast signals are being made at Baltimore, Md.; Grand Island, Nebr.; Portland, Oreg.; Powder Springs, Ga.; Fort Lauderdale, Fla.; Kingsville, Tex., and from time to time at other points. These data are needed to supplement that taken in previous years. In the cases of several stations under study, additional recordings are required to cover the full cycle. This information is being coordinated with similar recordings in Canada. An extensive analysis of the accumulated data is underway to determine the nature and magnitude of the medium frequency sky-wave propagation effects corresponding to variations in solar activity during the last sunspot cycle.

Atmospheric noise.—Continuous field intensity recordings of atmospheric noise between 200 and 1600 kilocycles were continued. This information is analyzed and correlated with thunderstorm data and the results are used in the preparation of a series of noise maps to show characteristic variations with the time of day and a percentage of time for each frequency band and for various latitudes. These maps are used in estimating the signal level required to provide an accept-

able radio service in the presence of atmospheric noise; hence, the possible service ranges when interference from other stations is absent. Because of the pressure of other duties, analyses of atmospheric noise charts and the preparation of noise maps could not be undertaken during fiscal year 1951.

North American Regional Broadcasting Conference.—Considerable time was devoted to preparation of technical standards for and attendance at the NARBA conference in Washington. A staff member of the division served as secretary of committee No. 1. This committee handled all matters related to technical standards in connection with the preparatory session.

3. LABORATORY DIVISION

GENERAL FUNCTIONS

The Commission maintains a Laboratory Division near Laurel, Md. This division makes technical measurements and engineering investigations to aid the Commission in allocating frequency bands, establishing and revising engineering standards and regulations for new as well as existing services, and drafting regulations covering noncommunications type of equipment employing radio-frequency energy which may interfere with the radio communication services.

The Laboratory Division's activities include:

1. Investigation of various methods of transmission and reception to determine which method permits the most efficient utilization of the spectrum and to ascertain the interference factors which limit the various methods.

2. Tests of transmitters to determine whether interference signals are emitted on frequencies other than the assigned channel.

3. Tests of receivers to determine how close together the Commission might place stations without the listeners receiving several stations at the same time.

4. Tests of receivers to determine what interference they may produce in other nearby receivers either in the same service or in other services.

5. Tests for reliability of operation of equipment such as apparatus involving safety at sea. This type of equipment is required by the Commission's rules and regulations or by treaty.

6. Tests of the accuracy and reliability of monitoring equipment required to be used by stations.

7. Investigation of interference produced by noncommunication uses of radio-frequency energy.

8. Development of special monitoring equipment for use of Commission engineers in the field, and maintenance of the accuracy of measuring installations and equipments.

The work of the laboratory generally is directed toward the testing of a type of equipment rather than the testing of individual units. Attempt is made to anticipate interference problems and to have remedial measures taken prior to the manufacture and distribution of a large number of units instead of waiting until the interference occurs in the field and requires numerous individual investigations.

In some instances type tests are required by the rules and regulations, and formal approval is given. In other cases the laboratory makes type tests not specifically required, in order that the Commission may be aware of the existing service and interference problems encountered in practical operation, so that either the allocation structure may be designed to fit the units available or the Commission may take other action leading to improved equipments which will permit more efficient use of the available radio frequencies.

Type testing also is required of certain noncommunications equipment, such as diathermy machines which employ radio frequencies and may cause serious interference unless the frequencies are properly maintained and the harmonic and spurious emissions sufficiently restricted.

Following is a summary of particular laboratory activities engaged in during the year.

BROADCASTING

Most of the Laboratory Division work in the broadcast field concerned tests as to receiver oscillator radiation and the various spurious responses of receivers, with especial emphasis as to impact of these problems on the implementation of the UHF television band. Studies were made of a number of proposed UHF tuners submitted by manufacturers. A number of exhibits were prepared and introduced in the TV allocation hearing. With regard to receiver oscillator radiation, the Laboratory Division participated in a number of conferences with manufacturers' representatives and observed the operation of receiver oscillator measurement ranges. A permanent new field intensity range is being installed at the laboratory to replace a tentative one used during the establishment of proposed measurement methods.

In order to obtain propagation data for the UHF television band, the laboratory provided a field intensity recording installation at the University of Connecticut for a portion of the year, and an additional recording installation continued in operation at the Laurel laboratory.

Certain observations were made at the laboratory to determine what interference the Luxembourg effect of high-power stations might cause on other channels.

The Laboratory Division participated in the color-TV hearing

leading to the establishment of the present Commission color standards, providing both oral testimony and a number of exhibits covering laboratory measurements. Observations have been made by the laboratory on the regular commercial color television program initiated near the close of the fiscal year. Changes are being made in the laboratory's television signal generator equipment to facilitate operations on both color and monochrome. Permanent facilities are being installed to permit examination of interference between several color television signals on the adopted standards, and to permit the examination of new systems or methods for television transmission.

SERVICES OTHER THAN BROADCASTING

Measurements were made of the selectivity, intermodulation, and other spurious responses of receivers used in other than broadcast services. Tests also were made of the oscillator radiation of nonbroadcast receivers. Examination was made of the performance of deviation limiting devices now required in many transmitters to reduce interference on channels near the one in use. The foregoing tests have indicated that the state of the art has progressed to the point where, with good equipment, consideration can be given to the implementation of closer used channel spacings to provide more communication facilities.

At the present time automatic equipment which responds to distress signals is required only on certain ships which are radiotelegraph-equipped. Through international conferences it now has been agreed to extend this general type of protection to radiotelephone-equipped vessels. A number of units operating on the United States proposed type of signal have been designed and constructed at the laboratory, and some of these have been furnished to foreign administrations for testing. In addition, tests have been conducted by the laboratory on these alarms and on proposed models submitted by the British and French Governments at four places in the United States to determine their reliability under the varying interference conditions. From these tests it appears that much added protection can be obtained at a modest cost.

CALIBRATION OF INSTALLATIONS AND APPARATUS

In its enforcement and investigation activities the Field Engineering and Monitoring Division uses a large amount of testing equipment. During the year calibrations of the recording equipment were checked at five of the field intensity recording installations operated by that division. Three field intensity meters and 21 signal generators were calibrated for the division during the year. Ten standard broadcast station monitors used by the division were adjusted and calibrated.

NONCOMMUNICATIONS EQUIPMENT

Industrial heating, medical diathermy, and other miscellaneous uses of radio-frequency energy for purposes other than communication have expanded to such an extent that the power used by this group exceeds the total transmitter power required for radio communication. Since such noncommunications equipment employs frequencies of the same order as used by the communications industry, severe interference may be expected unless these units are designed and operated properly. Some of these units use power far in excess of the 50-kilowatt maximum permitted AM broadcast stations. Devices in this category are covered by part 18 of the rules and regulations of the Commission.

Medical diathermy apparatus which falls within this classification is type-approved by the laboratory to insure that the frequency is maintained within one of the specified bands and that the harmonic and spurious radiations are within the limits of the Commission's rules and regulations. During the year 21 submissions of diathermy machines were received for test.

In addition, the Laboratory Division made tests on welding and other devices employing radio-frequency energy and capable of causing interference.

The Laboratory Division has been represented on the following committees which are working toward reduction of interference from industrial radio-frequency heating equipment, power lines, etc.: I. R. E. Industrial Electronics Committee, A. I. E. E. Subcommittee on Induction and Dielectric Heating, A. I. E. E. Subcommittee on Radiation Measurements above 300 Megacycles, and A. S. A. Technical Subcommittee No. 1 of Committee C63.

CHAPTER IX—FREQUENCY ALLOCATION AND TREATY ACTIVITIES

1. GENERAL

In the last 30 years, radio has grown to gigantic proportions and is a virile and dynamic industry. In many ways the growth of radio communication has been like the growth of transportation and has created many similar problems. Like the highways of commerce, radio channels can only handle a certain amount of traffic before new ones need to be added, the old ones made larger or the speed of traffic increased. Broadly speaking, frequency allocation may be defined as the study of the spectrum so that radio channels may be reserved, widened, and modified to keep pace with the developments in the art and to provide the maximum of usefulness to all of the users consistent with the public need.

Not all radio frequencies act alike and, although they encompass the spectrum from 10,000 cycles per second to about 30 billion cycles per second, the frequencies in the various portions of the spectrum exhibit different qualities. For example, 1000 kilocycles (1,000,000 cycles or 1 megacycle) is excellent for broadcasting aural programs but would be practically useless for television broadcasting. Similarly, 415 kilocycles is excellent for ship navigation by direction finding but would be useless for ship navigation by means of radar.

Because of the differing characteristics of the various orders of frequencies, certain bands of frequencies throughout the spectrum have been reserved (allocated) to specific kinds of uses (services). These bands have in many instances been further subdivided so as to reserve portions of them even more specifically. For example, frequencies in the range of 30 to 40 megacycles have been allocated in the United States to the mobile service (use between stations on vehicles

or between stations on vehicles and stationary stations). This band has been further subdivided, however, so as to reserve certain portions for specific categories of mobile use such as police mobile, industrial mobile, etc.

Inasmuch as the energy transmitted by a radio station cannot necessarily be confined to the borders of the transmitting country, the use of the spectrum must be coordinated by all of the countries of the world so as to prevent interference. The growth of the art has thus led to the adoption of international treaties governing the allocation and conditions of use of radio frequencies throughout the spectrum.

Although frequency allocation (reservation) is not the same as frequency assignment (authority to use) one cannot be accomplished without reference to the other. Because of this, an integral part of frequency allocation work is the maintenance of frequency assignment records of the United States and of the world.

2. INTERNATIONAL FREQUENCY ALLOCATION

The project in which the United States has been engaged since 1947, relating to the preparatory work for bringing into force the International Table of Frequency Allocations, continued during the past year. The various related conferences and meetings in which the Commission participated during the year are listed in section 5 of this chapter.

The work on the 2000–3500-kilocycle United States frequency list for region 2 was continued. This included a survey which involved the interception, recording, classification, tabulation, and preparation of a graphical display of more than 35,000 monitoring intercepts made in that band. A proposed list was released in August 1950 in the form of a complete frequency list (list A) of all the United States Government and non-Government stations proposed for this band as well as an abbreviated list of proposed non-Government entries. As the result of the consideration of public comments received and other factors, a revised list A was compiled in final form and was recommended to the Department of State for coordination with other region 2 countries. A public notice containing a discussion of the comments received and resulting changes, and a revised non-Government frequency list were issued at the same time. Lists of 2000–3500-kilocycle requirements have been received from most other American countries and, in all instances, coordination is continuing without difficulty.

While the lists of most countries did not reveal serious conflicts with the United States list, the Canadian list resulted in many conflicts. A week-long conference was held beginning March 9, 1951, for the purpose of resolving these differences. At the end of this confer-

ence, some 80 problems remained to be solved. Therefore, another conference was held beginning May 28, 1951, and ending June 8, 1951. This meeting resulted in resolving the interference conflicts between proposed United States and Canadian frequency assignments, and work is continuing in an effort to complete all region 2 coordination before the Extraordinary Administrative Radio Conference is convened in Geneva during August 1951.

With respect to the region 2 frequency lists below 2000 kilocycles, the few conflicts which appeared have been resolved. At the present time, bilateral agreements are being negotiated with the other American countries, and it is expected that the Atlantic City allocations below 2000 kilocycles can be implemented at an early date. Representatives of the Commission were present and assisted the Department of State at a 1-week meeting in Canada during July 1950, when solutions to certain conflicts in the 415–535-kilocycle band were found.

3. NATIONAL FREQUENCY ALLOCATION

During the year, 14 amendments to part 2 were adopted by the Commission. A complete new printing of part 2 was made by the Government Printing Office, including all revisions prior to December 20, 1950. A list of the 1950 amendments follows:

2–11 Appendix A, list of treaties amended.

2–12 A new footnote, US25, was added to the bands 172–174 megacycles and 406–420 megacycles wherein Government frequencies were made available to non-Government stations for hydrological and meteorological telemetering purposes. Footnote US7 was deleted since the frequency 140.58 megacycles was no longer required for civil aviation.

2–13 Appendix A, list of treaties amended.

2–14 The temporary allocation of 1750–1800 kilocycles to the radiolocation service was extended another 6 months to January 17, 1951.

2–15 Footnote NG13 was deleted from the band 890–940 megacycles because of the use of a specific frequency assignment plan in the band for broadcast STLs.

2–16 Appendix A, list of treaties amended.

2–17 The name "Interim Television relay station" was changed to "Television intercity relay".

2–18 Footnote US3, permitting temporary use of 72.2 megacycles for radiosonde, was deleted.

2–19 Added section 2.104 (c) which permits use of Government frequencies by non-Government stations where intercommunication is desirable.

2–20 Section 2.302 was amended to add WWVH as a call sign for standard frequency transmissions.

2–21 A new class of station, "Aeronautical Advisory", was added and defined and the frequency 122.8 megacycles was allocated for this use.

2–22 Station Symbols for Television Intercity Relay, Television Pickup and Television Relay, which were omitted from 2–17 were added.

Amendments to the December 20, 1950, revision which were adopted are:

2–1 Footnote US19 to the band 162–174 megacycles was amended to permit use of a pair of the forestry frequencies by non-Federal conservation agencies.

2–2 Appendix A, list of treaties amended.

The problem of regulation of various radiating low power radio frequency devices has been the subject of further study with a great deal of effort concentrated on the nonbroadcast carrier current communication systems. Arc welders using radio frequency starting and arc stabilizing devices have been investigated as a result of a request for relief from the ISM rules (part 18) and a request for an allocation at medium and at low frequencies. Many of these devices radiate at levels considerably in excess of the rules limits.

Preparation of the Disaster Communications Service rules occasioned considerable study on the subjects of the listing of discrete frequencies in the rules and the determination of practical frequency separations. Final rules for this service were adopted during the year.

An amendment of parts 2 and 11 to provide rules for the Radiolocation Service was announced as proposed rule making on April 4, 1951. This proposal would make the band 1750–1800 kilocycles permanently available for radiolocation on a shared basis with the Disaster Communications Service where now available for radiolocation on a temporary basis. The remainder of the frequency bands listed are already allocated on a permanent basis in part 2 for the service. The proposed rule-making was the subject of a 2-day hearing, starting June 4, 1951. Decision was pending at the close of the fiscal year.

On June 8, 1951, the Mutual Telephone Co. of Hawaii submitted a petition requesting that the allocation of the bands 72–88 megacycles and 98–108 megacycles be changed from TV and FM broadcasting to the Common Carrier Domestic Public Fixed Service in the Territory of Hawaii. The company estimated that this much VHF space will be required to take care of demands for service for the next 10 years. This allocation problem is receiving current attention by the Commission.

The Commission received a petition from Federal Telecommunications Laboratories, Inc., to reallocate the band 2110–2200 megacycles to the Common Carrier Fixed Service. After a thorough study of the situation the Commission announced a decision on October 31, 1950, that it would only consider this problem in conjunction with other problems existing above 1000 megacycles such as the theater television request and the possible need for additional television pickup frequencies.

Two motion-picture companies continued their experiments in the microwave relaying of events of interest to theater audiences. A number of petitions were received from various interested parties in the motion-picture industry requesting the Commission to recognize this as a new radio service and to allocate frequencies for theater television purposes. A fact-finding hearing on the issues raised by these petitions was scheduled.

In order that amateur participation in civil defense might be on a sound basis it is necessary to assure that such amateur activity continue during times of national emergency although, in past wars, all amateur activity was shut down. By negotiating with the military agencies and the FCDA, arrangements were made whereby certain portions of some of the amateur bands will be available for use by amateurs properly identified with organized civil defense plans for civil defense purposes only. A public notice to this effect was released January 17, 1951.

On June 1, 1951, an informal conference with representatives of the power radio service industry and Commission staff members was held. The conference concerned an industry petition for the use of 72–76 megacycles for the purpose of tying in certain electric-power companies so as to provide for coordinated circuit switching and the transmission of instructions during times of emergency. A decision on the matter has not yet been made by the Commission.

4. FREQUENCY REGISTRATION AND NOTIFICATION

The past year required a continuation of extensive changes in the Commission's frequency records. Changes were made in the master frequency card records (consisting of an estimated 62,000 cards) to conform to the Atlantic City Radio Regulations. This was accomplished as modified licenses were issued and the International Telecommunication Union (ITU) notified accordingly.

The master frequency record comprises a card record of each new authorization issued by the Commission with the exception of aircraft, amateur, citizens, and ship stations; also information regarding the modification, renewal, and deletion is incorporated into the original card record. From these records and from lists furnished by the several Government agencies, notifications of frequencies assigned to stations in the various services are made to the ITU to safeguard the priority of frequency use by the United States.

Notifications to the ITU are prepared, on a weekly basis, to keep the lists published by the latter current insofar as the United States is concerned.

In addition to the master frequency card records, a supplemental record is maintained of all Commission authorizations, with excep-

tions as noted above, on IBM cards. From these cards current lists are made available to the various units of the Commission and certain Government agencies. The reproduction of the master frequency record by mechanical means, whereby the lists may be reproduced in a number of different ways such as by frequency, by location, by service, etc., relieves the Commission and other Government agencies of considerable research concerning the assignment of frequencies to radio stations, location of towers, etc.

The task of converting all of the present master frequency record cards to the format and column-numbering system prescribed by the Atlantic City Radio Regulations remains to be accomplished.

5. INTERNATIONAL TREATY ACTIVITIES

Coordination with Canada.—The rapid increase in radio station occupancy of the VHF non-Government fixed and mobile bands has continued. Consequently, the activity relating to coordination between the Commission and the Canadian Department of Transport of proposed VHF frequency assignments has been an important one. The informal procedure for such coordination was announced May 3, 1950, by both Governments, and during the first year approximately 450 proposed assignments were exchanged for comment. Up to the present time this procedure appears to have been quite effective, in that no new cases of harmful interference caused by groundwave signals in this region of the spectrum have developed. Prior to the adoption of the procedure, several cases of harmful intereference existed between the two countries and they have not all been satisfactorily settled up to the present time.

International interference cases.—During the year, the Commission received complaints concerning approximately 350 new international radio interference cases. These, plus some 75 cases which already existed at the start of the year, were handled by the Frequency Allocation and Treaty Division, in some cases with the assistance of the Department of State. Because of the long-term nature of negotiations connected with some of these interference cases, about 80 such cases remained unresolved at the end of the year. A revised procedure was adopted for keeping records related to interference cases which resulted in considerably shortening the time required for this activity.

Reports of treaty infractions.—Infractions by foreign stations of the International Telecommunication Convention and Radio Regulations and of the radio provisions of the International Convention for the Safety of Life at Sea detected by the Commission's monitoring stations and inspection offices continued to be forwarded to the appropriate foreign administrations in accordance with those regulations. Prior to being sent abroad, these reports were processed to

insure that citations were based upon the appropriate treaty provisions.

Special studies.—Special studies were conducted concerning United States proposals for revision of the general technical provisions of the Radio Regulations (Atlantic City, 1947) in the light of recent experience. One of the most important of these studies relates to provisions of the regulations concerning the procedure for the international notification and registration of radio-frequency assignments for the purpose of obtaining international recognition of the use of frequencies.

Studies were conducted in connection with participation in Department of State preparatory committees for the Extraordinary Administrative Radio Conference scheduled to be held in Geneva in August 1951. One of the principal studies in this connection relates to the international problems of VHF assignments, resulting from the increasing occupancy of the VHF spectrum and of the consequently increasing seriousness of interference cases arising from the long distance propagation conditions which frequently occur.

Foreign requests for technical information.—During the last 2 months of the fiscal year some 10 instances of requests for technical information were forwarded to the Department of State for disposition.

International conferences.—During the fiscal year the Commission assisted in the United States preparation for and participated in 20 International conferences and other meetings. These conferences were world-wide, regional or bilateral in nature and most of the major ones were convened under the auspices of either the International Telecommunication Union or the International Civil Aviation Organization.

The international organization now known as the International Telecommunication Union first came into begin following the signing of a telegraph treaty in Paris in 1865. In 1906 the International Telegraph Convention at Berlin entrusted the Bureau of the Union with duties relating to radiotelegraphy and, at an International Conference in Madrid in 1932, the ITU was created. At a later conference in Atlantic City in 1947, the ITU became one of the specialized agencies of the United Nations. The seat of the union is at Geneva. More than 80 nations of the world participate in the union's activities.

The International Civil Aviation Organization was established under the Convention on International Civil Aviation at Chicago in 1944. The ICAO, which has its seat at Montreal, came into being April 4, 1947, after 2 years of activity by an interim organization, the Provisional International Civil Aviation Organization. The ICAO was established to develop the principles and techniques of international air navigation and to foster the planning and develop-

ment of international civil aviation so as to insure its safe and orderly growth by promoting uniformity in regulations, standards, and procedures throughout the world. Fifty-seven countries participate in the ICAO's activities.

The need and general desirability of convening regional conferences, concluding regional agreements and forming regional organizations, is recognized by the Atlantic City Convention of 1947 for the purpose of settling telecommunication questions which are purely regional in character and therefore more susceptible of being treated on a regional rather than on a world-wide basis, provided agreements so reached are not in conflict with the world convention. The American countries have observed this principle over a period of years, as is reflected by inter-American agreements reached at Havana in 1937, Santiago in 1940, Rio de Janeiro in 1945, and Washington in 1949. Meetings which may be termed subregional have been held to solve problems peculiar to Central, South, or North America. Typical of these are the North American Regional Broadcasting Conferences, convened in Havana in 1937, Washington in 1941, and Montreal in 1949, out of which have come the North American Regional Broadcasting Agreements (NARBA) discussed in the chapter on broadcasting.

In the fiscal year 1951, the Commission furnished two chairmen, six delegates or representatives, 14 advisers, and a small number of staff assistants for United States delegations to the following conferences:

1. May 1–Aug. 19, 1950	Florence and Rapallo.	Second International High Frequency Broadcasting Conference.
2. Sept. 6–Nov. 11, 1950	Washington	Third North American Regional Broadcasting Conference, second session.
3. Oct. 17–Nov. 7, 1950	Istanbul	ICAO Second Middle East Regional Air Navigation Meeting.
4. 1950 to 1951	Ottawa	Discussions between the United States and Canada on treaty covering ship radio requirements for the Great Lakes.
5. Mar. 5–22, 1951	Geneva	Meeting of study groups of International Telegraph Consultative Committee, ITU.
6. Apr. 5–June 2, 1951	Montreal	ICAO Communications Division, fourth session.
7. June 5–July 6, 1951	Geneva	International Radio Consultative Committee, ITU, sixth assembly.

In addition to the foregoing multilateral conferences, there were numerous bilateral meetings with Mexico, Cuba, and Canada concerning such problems as broadcasting, aeronautical communications and

interference, as well as the coordination of frequency lists for presentation to the forthcoming Extraordinary Administrative Radio Conference at Geneva.

At the end of the fiscal year there are projected the following conferences and meetings for which the Commission's staff is currently engaged in preparatory work:

1.	Aug. 16, 1951	Geneva	Extraordinary Administrative Radio Conference, ITU.
2.	Sept. 4, 1951	Montreal	ICAO Search and Rescue Division, third session.
3.	Oct. 30, 1951	Site undetermined	ICAO South American-South Atlantic Regional Air Navigation meeting.
4.	October 1951	Rome	International Telephone Consultative Committee, sixteenth assembly.
5.	Jan. 22, 1952	Lisbon	ICAO Third European Mediterranean Regional Air Navigation meeting.
6.	Feb. 19, 1952	Montreal	ICAO Personnel and Licensing Division meeting.
7.	First half 1952	Site undetermined	ICAO Combined North Pacific-South Pacific Regional Air Navigation meeting.
8.	First half 1952	Site undetermined	ICAO Third North Atlantic Regional Air Navigation meeting.
9.	Last half 1952	Site undetermined	ICAO Second Southeast Asia Regional Air Navigation meeting.
10.	Last half 1952	Site undetermined	ICAO special meeting.
11.	October 1952	Buenos Aires	Plenipotentiary Conference, Administrative Telegraph and Telephone Conference, ITU.
12.	1952	Montevideo	Fifth Inter-American Radio Conference.
13.	First half 1953	Site undetermined	ICAO Second African-Indian Ocean Regional Air Navigation meeting.
14.	First half 1953	Site undetermined	ICAO special meeting.
15.	Last half 1953	Site undetermined	ICAO Fourth European-Mediterranean Regional Air Navigation meeting.
16.	Last half 1953	Site undetermined	ICAO Third Caribbean Regional Air Navigation meeting.
17.	Last half 1953	Site undetermined	ICAO Communication Division, fifth session.
18.	Last half 1953	Site undetermined	ICAO, 2 special meetings.
19.	1953	Holland	International Telegraph Consultative Committee, ITU.
20.	1954	Buenos Aires	International Telephone and Telegraph Conference, ITU.

6. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Commission does not license United States Government radio stations or assign their frequencies. Such frequency assignments are made by the President upon recommendation of the Interdepartment

Radio Advisory Committee (IRAC), composed of 11 Federal agencies. The Commission provides the secretariat of the IRAC.

During the fiscal year the IRAC approved 6,264 new and deleted 1,967 regular assignments. In addition, it approved 3,095 changes in assignments, 2,283 temporary assignments and 500 deletions of temporary assignments.

APPENDIX

1. FIELD OFFICES

The Commission maintains 64 field installations geographically distributed throughout the United States and its possessions. Fifty-nine of these are engaged in engineering work, comprising 9 regional offices, 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations. There are also four Common Carrier Bureau field offices, and one Office of General Counsel field office. The complete list follows:

FIELD ENGINEERING AND MONITORING DIVISION

Regional offices	*Headquarters*
North Atlantic	506 Federal Bldg., New York 14, N. Y.
South Atlantic	411 Federal Annex, Atlanta 3, Ga.
Gulf States	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific	323–A Customhouse, San Francisco 26, Calif.
North Pacific	801 Federal Office Bldg., Seattle 4, Wash.
Central States	1300 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan	52 Post Office and Courthouse, Anchorage, Alaska.

District offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 U. S. Customhouse, Philadelphia 6, Pa.
4	508 Old Town Bank Bldg., Baltimore 2, Md.
5	402 New Post Office Bldg., Norfolk 10, Va.; (ship office) 106 Post Office Bldg., Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409–410 Post Office Bldg., Tampa 2, Fla.
8	400 Audubon Bldg., New Orleans 16, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.; (ship office) 406 Post Office Bldg., Galveston, Tex.

District offices	*Address*
10	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15 U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	307 Fitzpatrick Bldg., Portland 5, Oreg.
14	801 Federal Office Bldg., Seattle 4, Wash.
15	521 Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3200 Fidelity Bldg., Kansas City 6E, Mo.
18	1300 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Federal Bldg., Buffalo 3, N. Y.
21	609 Stangenwald Bldg., Honolulu 1, T. H.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	7–8 Shattuck Bldg., Juneau, Alaska; (suboffice) 53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska.

Primary monitoring stations	*Secondary monitoring stations*
Allegan, Mich.	Searsport, Maine.
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho.
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Lexington, Ky.
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Bay St. Louis, Miss.
Portland, Oreg.	
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	
Anchorage, Alaska.	

COMMON CARRIER BUREAU FIELD OFFICES

Atlanta, Ga., 733 Hurt Building.
New York, N. Y., 604, 90 Church Street.
St. Louis, Mo., 334, 815 Olive Street.
San Francisco, Calif., 180 New Montgomery Street.

OFFICE OF GENERAL COUNSEL FIELD OFFICE

Los Angeles, Calif., 1031 South Broadway.

2. PUBLICATIONS

In general, the Federal Communications Commission's printed publications are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and are not distributed by the Commission.

Following is a list of such publications which are available from that source, at the prices noted, unless otherwise indicated:

Title	*Price*
Communications Act of 1934, with amendments and index, revised to Sept. 1, 1948	$0.30
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 3, July 1936 to February 1937	2.00
Volume 4, March 1937 to Nov. 15, 1937	1.50
Volume 5, Nov. 16, 1937 to June 30, 1938	1.50
Volume 6, July 1, 1938 to Feb. 28, 1939	1.50
Volume 7, Mar. 1, 1939 to Feb. 29, 1940	1.50
Volume 8, Mar. 1, 1940 to Aug. 1, 1941	1.50
Volume 10, Apr. 2, 1943 to June 30, 1945	2.00
Volume 11, July 1, 1945 to June 30, 1947	3.75
Volume 12, July 1, 1947 to June 30, 1948	3.50
Annual reports of the Commission:	
First Annual Report—fiscal year 1935	.15
Twelfth Annual Report—fiscal year 1946	.20
Thirteenth Annual Report—fiscal year 1947	.25
Fourteenth Annual Report—fiscal year 1948	.30
Fifteenth Annual Report—fiscal year 1949	.35
Sixteenth Annual Report—fiscal year 1950	.40
Seventeenth Annual Report—fiscal year 1951	(1)
Statistics of the Communications Industry:	
For the year 1939	.25
For the year 1940	.20
For the year 1942	.35
For the year 1943	.30
For the year 1944	.40
For the year 1945	.50
For the year 1946	.55
For the year 1947:	
Secs. A and B	.75
Sec. B (Broadcast only)	.25
For the year 1948:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.35
For the year 1949:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.25
Report on Public Service Responsibility of Broadcast Licensees [Blue Book], 1946	.25
The Safety and Special Radio Services—a Public Primer, 1950	.15
Telephone and Telegraph—a Public Primer, 1949	.10
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to Feb. 1, 1951	.35

[1] In the process of printing—available at Government Printing Office at a later date.

Title	Price
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947	$1.25
Sec. 26, Sunrise and Sunset Table	.10
Concerning FM Broadcast Stations, revised to Jan. 18, 1950	.10
Concerning Television Broadcast Stations, revised to Dec. 19, 1945	.15
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc	(2)
Part 1, Practice and Procedure, revised to Dec. 29, 1949	.20
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to Dec. 20, 1950	.20
Part 3, Radio Broadcast Services, revised to Dec. 13, 1950	.20
Part 4, Experimental and Auxiliary Broadcast Services, revised to Oct. 30, 1950	.15
Part 5, Experimental Radio Services, revised to Jan. 16, 1948	.10
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949	.10
Part 7, Stations on Land in the Maritime Services, effective July 23, 1951	.20
Part 8, Stations on Shipboard in the Maritime Services, effective July 23, 1951	.25
Part 9, Aeronautical Services, revised to July 1, 1947	.15
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949	.15
Part 11, Industrial Radio Services, revised to Apr. 27, 1949	.10
Part 12, Amateur Radio Service, revised to June 6, 1951	.10
Part 13, Commercial Radio Operators, revised to June 27, 1950	.05
Part 14, Radio Stations in Alaska (other than Amateur and Broadcast), revised to Apr. 28, 1948	(2)
Part 15, Restricted Radiation Devices, recodified July 21, 1948	(2)
Part 16, Land Transportation Radio Services, revised to Apr. 27, 1949	.10
Part 17, Construction, Marking and Lighting of Antenna Structures, effective Feb. 15, 1951	.05
Part 18, Industrial, Scientific and Medical Service, revised to Jan. 25, 1950	.05
Part 19, Citizens Radio Service, effective June 1, 1949	.10
Part 20, Disaster Communications Service, effective Mar. 21, 1951	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.35
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.25
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to Oct. 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Oct. 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948	.10
Part 45, Preservation of Records of Telephone Carriers, effective October 1, 1950	.10
Part 46, Preservation of Records of Wire-telegraph, Ocean-cable, and Radiotelegraph Carriers, effective October 1, 1950	.10
Part 51, Occupational Classification & Compensation of Employees of Class A and Class B Telephone Companies, effective Oct. 10, 1951	.05

[2] Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Title	*Price*
Rules and Regulations—Continued	
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944	$0.05
Part 61, Tariffs, Rules Governing the Construction, Filing, and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to August 1, 1946	.10
Part 62, Applications under sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to December 30, 1946	(2)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[2] Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased until a complete revision thereof is reprinted. In the event any exception is made in this procedure, rule purchasers will be advised by letter where the amendments may be obtained. All Standards of Good Engineering Practice and most of the rule parts are printed on 8- by 10½-inch pages and punched to fit standard three-ring binders.

The Commission is not able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

International treaties, agreements, and arrangements relating to radio and telecommunications which were in force and to which the United States was a party as of June 30, 1951, are listed below. Unless otherwise indicated, copies of these documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. (TS relates to Treaty Series, EAS to Executive Agreement Series, and TIAS to Treaties and Other International Act Series.)

Date	Series	Subject
1910		Ship Act of 1910 as amended in 1912 (radiocommunication on the Great Lakes).
1925	TS 724-A	Arrangement with Great Britain, Canada, and Newfoundland to prevent broadcast interference by ships.
1928-29	TS-767-A	Arrangement with Canada concerning private experimental radio communication.
1929	TS 777-A	Arrangement with Canada, Cuba, and Newfoundland relating to high-frequency assignments.
1929	TS 910	Safety of Life at Sea Convention (London).
1930	TS 921	Amendment to Regulation XIX of Annex I of Safety of Life at Sea Convention.
1934	EAS 62	Arrangement with Canada concerning amateur and private experimental communication.
1934	EAS 66	Arrangement with Peru concerning amateur communication.

Date	Series	Subject
1934	EAS 72	Same, with Chile.
1937	EAS 109	Agreement with Canada concerning issuance of radio licenses (largely suspended by TS 777-A, TS 962, EAS 227 and TIAS 1553).
1937	*TS 962*	*North American Regional Broadcasting Agreement (Havana)* (supplemented by EAS 227 and TIAS 1553).
1937	TS 938	Inter-American Radio Communications Convention (First Inter-American Conference, Havana) (amended by TIAS 1802).
1938	TS 948	General Radio Regulations (Cairo Revision 1938); annexed to Telecommunications Convention (Madrid, 1932). (See TIAS 1901.)
1938	EAS 142	Agreement with Canada concerning radio communications between Alaska and British Columbia.
1938	TS 949	Regional Radio Convention (Guatemala—in behalf of the Canal Zone).
1938	EAS 136	Arrangement with Canada concerning broadcasting.
1939	EAS 143	Arrangement with Canada concerning civil aeronautical services.
1940	EAS 231	Inter-American Radio Communications Agreement (Second Inter-American Conference, Santiago, Chile).
1940	EAS 196	Agreement with Mexico concerning broadcasting.
1941	EAS 227	Supplementary North American Regional Broadcasting Agreement (Washington). (See TS 962 and TIAS 1553.)
1944	EAS 400	Wartime agreement with Canada re broadcasting stations in Northwestern Canada.
1945		Inter-American Telecommunications Convention (Third Inter-American Conference, Rio de Janeiro). (Not yet ratified by United States.) (Not available from Government Printing Office.)
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement (Modus Vivendi), Washington. (Amended by TIAS 1802.)
1946	TIAS 1527	Agreement with U. S. S. R. concerning commercial radio teletype communication channels.
1947	TIAS 1726	Agreement with Canada concerning FM broadcasting in 88-108 mc.
1947	TIAS 1670	Interim arrangement with Canada concerning mobile transmitters.
1947	TIAS 1901	Telecommunication Convention, Final Protocol, and Radio Regulations, Atlantic City, 1947. (Since the United States is not a party to the Additional Radio Regulations, they are not included in TIAS 1901 and are available only through the International Telecommunication Union, Geneva, Switzerland.)
1947	TIAS 1652	Agreement with Great Britain concerning standardization of distance measuring equipment.
1947	TIAS 1676	Agreement with the United Nations concerning its headquarters' use of radio.
1948	TIAS 1802	Arrangement with Canada on engineering standards applicable to allocation of standard broadcast stations.
1949		*Agreement between United States* and certain British Commonwealth governments (London). (To be published by Government Printing Office.)
1949	TIAS 2175	Telegraph Regulations (Paris Revision, 1949) annexed to International Telecommunications Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations. Signed at Paris, Aug. 5, 1949; effective July 1, 1950. Instrument of ratification of United States deposited with International Telecommunication Union Sept. 26, 1950. (Not available as of *June 30, 1951, but to be published by Government Printing* Office. Available through International Telecommunication Union, Geneva, Switzerland.)
1950		Arrangement with Ecuador concerning third-party amateur communication. (To be published by Government Printing Office.)
1951	TIAS 2223	Radio communications between amateur stations on behalf of third parties. Agreement between U. S. A. and Liberia effective Jan. 11, 1951. (Not yet available but to be published by Government Printing Office as a TIAS document.)

In addition, the United States is bound by certain other treaties and agreements which are generally considered as superseded because certain of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to its relations with those particular countries. These include the following:

Date	Series	Subject
1912	TS 581	International Radiotelegraph Convention (London).
1927	TS 767	International Radiotelegraph Convention and General Regulations (Washington).
1932	TS 867	International Telecommunication Convention; General Radio Regulations (Madrid).
1937	EAS 200	Inter-American Arrangement concerning Radio Communications and Annex (Havana, 1937), was replaced by Inter-American Agreement concerning Radio Communications (Santiago, 1940, EAS 231).

The following treaties, agreements and arrangements have been signed by the United States and are included for informational purposes because of their importance or the imminence of their effective dates.

Date	Subject
1948	International Convention on Safety of Life at Sea (London), effective Jan. 1, 1951.
1949	Inter-American Radio Agreement between the United States, Canada and other American republics.[1] (Fourth Inter-American Conference) (Washington), effective Apr. 1, 1950. (Not yet available from Government Printing Office; available through ITU, Geneva.)
1950	North American Regional Broadcasting Agreement between the United States of America, Canada, Cuba, Dominican Republic, United Kingdom of Great Britain and Northern Ireland for the Territories in the North American Region (Bahama Islands and Jamaica). Signed at Washington, Nov. 15, 1950. Agreement will enter into force subsequent to ratification of at least 3 of these 4 countries, in accordance with pt. III, par. 1, of the Agreement: Canada, Cuba, Mexico, and the United States. Subject to ratification procedure in the United States. (Not available from Government Printing Office. Available through the International Telecommunication Union, Geneva, Switzerland.)

[1] In addition, certain resolutions and recommendations were adopted by a number of member countries of the ITU in region 2 at Washington, July 9, 1949. (Not yet available from Government Printing Office but available through ITU, Geneva.)

There are, in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Federal Communications Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series	Subject
1944	TIAS 1591	International Civil Aviation Convention (Chicago).
1946		Special Radio Technical Meeting (COT), Montreal.[1]
1946		ICAO Regional Air Navigation Meetings, Communications Committee, Final Reports.[1]
1947		
1948		
1949		
1950		
1946		ICAO Communication Division, Second Session, Montreal.[1]
1949		ICAO Communications Division, Third Session, Motreal.[1]
1949		Frequency Allotment Plan for the Aeronautical Mobile Service and Final Agreement. Agreement between the United States of America and other Powers. Signed at Geneva Oct. 14, 1949. (Not available from Government Printing Office. Available through International Telecommunication Union, Geneva, Switzerland.)
1951		ICAO Communications Division, Fourth Session, Montreal.[1]

[1] Not available from Government Printing Office; available from Secretary General of ICAO, Dominion Square Bldg., Montreal, Canada.

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