Federal Communications Commission

Copy

Silver Anniversary Report

For the Fiscal Year 1959

With anniversary and other
historical background

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C.

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COMMISSIONERS

Members of the Federal Communications Commission

(As of June 30, 1959)

JOHN C. DOERFER, *Chairman*
(Term expires June 30, 1961)

ROSEL H. HYDE
(Term expires June 30, 1966)

ROBERT T. BARTLEY
(Term expires June 30, 1965)

ROBERT E. LEE
(Term expires June 30, 1960)

T. A. M. CRAVEN
(Term expires June 30, 1963)

FREDERICK W. FORD
(Term expires June 30, 1964)

JOHN S. CROSS
(Term expires June 30, 1962)

A list of present and past Commissioners appears elsewhere in this report.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D.C.

To the Congress of the United States:

Transmitted herewith is the annual report of the Federal Communications Commission for the fiscal year 1959.

It is of particular interest because it marks the 25th anniversary of Government regulation of telecommunications services as coordinated in and exercised by this Commission. Consequently, in addition to containing 1959 fiscal year information and data specified by the Congress in section 4(k) of the Communications Act, as amended, the report provides historical background to point up the phenomenal growth and development of electrical communication since the Commission was established in 1934.

This report also points up current problems which beset the Commission, and its efforts to resolve them. The attention of Congress is invited to legislative proposals by the Commission (enumerated in the special chapter on "Litigation and Legislation") which would assist it materially in this connection.

Specifically, it requests legislation to clarify and liberalize its authority over TV "boosters"; certain authority with respect to community antenna TV systems, also common carrier microwave relay of chain broadcasting programs; elimination of the prehearing notice now required before an application can be designated for hearing; enable it to combat mounting minor violations by the imposition of small fines; correct certain omissions in the Communications Act concerning "ex parte" presentations; permit the Commission to make more use of its review staff; eliminate the present requirement of oaths on routine forms; and give its investigators the same Federal law protection now afforded those in other Government agencies.

Pursuant to annual practice, required information concerning employees joining and leaving the Commission during the 1959 fiscal year is being reported in a nonprinted supplement.

Respectfully,

JOHN C. DOERFER, *Chairman.*

Anniversary Greeting

The 25th anniversary of the Federal Communications Commission affords me, in the name of the Commission, to pay tribute to American imagination and ingenuity which have made the United States a world leader in telecommunication.

Modern radio and wire communication is playing an increasingly important role in the American way of life. Rapid and efficient communication goes hand in hand with our national welfare and progress. Its public dividends cannot be counted in dollars alone; they are best evinced in the convenience and timesaving benefits derived from expediting official, commercial, and private correspondence, and in performing other useful functions.

Radiobroadcast is the magic medium that brings information, education, religion, and entertainment into our homes. Television adds image—even in color—to the family enjoyment. What is more, the American system of broadcasting is by private enterprise, and the Government does not censor programs or exact fees for broadcast receiver use.

But in a far larger manner, radio is also serving other public, business, and individual needs. It aids land, water, and air transportation; it contributes to police and fire protection; it speeds medical and other emergency assistance; it facilitates the work of public agencies, commercial establishments, and individuals; and it augments common carrier services. At the same time, it is reassuring to know that our extensive communication systems form a vital link in the national defense program.

Internationally, official and private business relations are furthered by the ability of telephony and telegraphy, whether by radio or cable, to span oceans and continents within seconds.

And technical developments have opened new frontiers for electronic contact, to the inclusion of over-the-horizon microwave transmission as well as communication with objects in outer space.

Consequently, the Commission salutes not only those who have made possible the phenomenal telecommunication accomplishments of the past quarter century but also those who are working on still bigger things to come.

JOHN C. DOERFER, *Chairman.*

Table of Contents

BROADCAST SERVICES—Continued

SAFETY AND SPECIAL RADIO SERVICES—Continued

COMMON CARRIER SERVICES—Continued

FIELD ENGINEERING AND MONITORING—Continued

APPENDIX—Continued

Anniversary Report Summary

1934 AND 1959

The 25th year of the Federal Communications Commission was marked by continued advances in and utilization of electronic communication which served to reemphasize the U.S. world leadership in telecommunication.

In the FCC's quarter century, these major events have transpired:

Radio authorizations have practically multiplied by that number of years—from slightly more than 100,000 at the close of the Commission's first year to nearly 2.5 million today.

Radio stations of all kinds have increased from 51,000 to more than 507,000 and currently represent the use of about 1.8 million transmitters.

From 600 stations (all AM) in 1934, broadcast authorizations collectively today exceed 10,000, of which 3,500 are AM and over 970 and 930 are TV and FM, respectively.

The number of broadcast receivers has soared from 18½ million to more than 200 million (150 million aural and 50 million TV). Almost two-thirds of the world's total are in the United States. This country now has more sets than people and almost three times as many sets as it has automobiles.

Amateur radio operator authorizations have climbed from about 36,000 to around 188,000.

Commercial radio operator permits have skyrocketed from some 21,000 to more than 1.7 million.

Twenty-five years ago there was insufficient spectrum space to accommodate all who wanted to use radio. Personalized use of radio, impossible until 1949 except by amateurs, is presently reflected in more than 50,000 citizens radio operations.

The past 25 years have witnessed the automation and expansion of common carrier facilities, including the installation of coaxial cable and microwave radio adjuncts, and oversea telephony by cable as well as by radio. The telephone and telegraph industries have kept pace with electronic progress in services, equipment, and operating techniques.

The United States has more than half of the world's telephones—now approaching 70 million as compared with 17 million in 1934. More than 80 percent of today's total are in the Bell System. Domestic telephone conversations have increased from 73 million to 250 million daily. Dial operation has become general. Telephone service now extends to planes as well as ships and motor vehicles. The Bell System operates a national coaxial cable and microwave network which, among other things, relays TV programs.

The first transatlantic telephone cable is in its third year of operation and another one has been opened. Telephone cables also extend to the new States of Alaska and Hawaii. Others are in prospect. There is radio-telephone service to 125 foreign countries contrasted to 60 in 1934. Since then international telephone conversations have increased from 16,500 to 2.7 million annually.

Since the creation of the FCC, two competitive domestic wire telegraph companies (Postal and Western Union) have merged. The now single national telegraph system handles about 123 million land-line domestic messages a year. Western Union is extending the Chicago terminus of its present microwave system to St. Louis and Kansas City. Its facsimile, direct tie-line, customer-to-customer, and leased private wire services have seen marked expansion.

The volume of international telegraph traffic of all carriers amounts to about 22 million messages a year compared to 14 million in 1934.

Over-the-horizon microwave communication, to the inclusion of TV, is in operation between Florida and Cuba.

World War II experience demonstrated the importance of wire and radio communication to both military and civilian participation. As a result, these services and facilities form an integral part of today's national defense program. The CONELRAD system, established by the Commission in 1950 at the request of the Department of Defense, has since 1957 been put to incidental peacetime use in disseminating storm and flood warnings.

Telecommunication has advanced a long way since 1934, making its biggest strides since World War II. Postwar development of new electronic devices and techniques has opened the door to additional uses of radio besides contributing to the expansion and efficiency of the older communication systems. Advent of the transistor has made possible more compact receiving and other equipment. Radar is now used on land as well as water. Coaxial cable is responsible for a multitude of closed-circuit TV operations.

The usable radio spectrum has been extended from 300 to 30,000 megacycles. This has provided elbow room for new services and more

space for existing services. Even so, radio users still suffer from "growing pains," and the Commission has had to give prime consideration to the more essential services and shared use of the available frequencies. The Commission is reviewing present and prospective usage throughout the entire radio spectrum. Meanwhile, "channel splitting" and "single sideband" and "offset carrier" operation are making some additional frequencies available.

That radio is no longer earthbound is evinced by the start of communication with objects in outer space and a move for international agreement to provide and protect frequencies for this and other scientific developments.

The mushrooming of transmitters and the increasing use of electronic devices have brought added interference problems. From less than 3,800 cases in 1934, the number of interference complaints requiring FCC field investigation now exceeds 24,000 a year, not counting routine cases handled by local and regional cooperating groups.

Though there is still an acute "housing shortage" in popular parts of the spectrum, more than 65 different categories of services are able to utilize radio for a myriad of purposes. In addition to broadcast, common carrier, and individual use, these operations encompass public safety services by police, fire, and other local government entities; marine ship and shore facilities; aviation aircraft and ground communication; land transportation usage by railroads, taxicabs, buses, and trucks; and in connection with manufacturing and other business pursuits.

Here is a comparison of current radio authorizations with those at the end of the FCC's first year:

	June 30, 1935	June 30, 1959	Increase
Stations			
Marine	2,157	84,947	82,790
Aviation	678	77,682	77,004
Public safety	298	29,363	29,065
Industrial	146	49,697	49,551
Land transportation	0	59,894	59,894
Amateur	45,561	195,776	150,215
Broadcast	623	10,120	9,497
Common carrier	565	3,845	3,280
Other	1,046	10,703	9,657
Station total	51,074	522,027	470,953
Operators			
Amateur	36,525	[1] 188,000	151,475
Commercial	[1] 21,000	1,705,903	1,684,903
Operator total	57,525	1,893,903	1,836,378
Grand total	108,599	2,415,930	2,307,331

[1] Estimated.

Following are some highlights of the Commission's 1959 fiscal year:

BROADCAST

General

The only broadcast service in 1934 was AM. Regular FM and TV service started in 1941. The result is that, as of June 30, 1959, there were more than 5,400 authorized broadcast stations (3,500 AM, 971 TV, and 934 FM), not counting about 4,700 remote pickup and other auxiliaries. Of these, 3,377 AM, 767 TV, and 776 FM stations held operating authorizations.

Included were 224 noncommercial educational station authorizations—59 TV and 165 FM—of which 43 and 154, respectively, had authority to operate. The number of TV channel allocations for educational use has increased from 242 in 1952 to 259 today. Also included were 245 TV translator station authorizations, of which 158 held operating authority.

As a result of staff study of TV network broadcasting and subsequent hearing, the Commission is engaged in proceedings concerning national spot sales, option time, and network program selection practices. Though directed at TV primarily, possible extension to consider aural networking is involved.

Televised programs showing candidates on news film clips caused Commission interpretations of the political broadcast laws and rules which prompted Congress to adopt legislation exempting certain news programs.

Under Commission consideration are such general broadcast subjects as "stereophonic" operation, revision of the broadcast application form with respect to statement of program service, and curbing "payoffs" for dismissal of applications in hearing to effect mergers of competitors.

TV

The Commission is considering various plans to deal with the UHF–TV problem. Much depends upon whether additional VHF space can be obtained from the Government. As of July 6, 1959, there were 437 VHF and 75 UHF commercial TV stations operating in 267 markets. Almost half of the UHF permits issued since 1952 have been surrendered, and 92 of the 167 UHF stations which were in operation are now off the air. Only about a third of the operating UHF stations reported a profit.

The Commission has proposed legislation to enable it to authorize VHF "booster" (repeater) stations under safeguards to prevent

interference. The number of present illegal booster operations is estimated up to a thousand or more.

The Commission also requested legislation to give it authority over community antenna (CATV) systems (now estimated to number about 700) to the extent of requiring such closed-circuit systems to obtain the consent of the stations whose programs they pick up, and to carry programs of local TV stations.

Though the Commission on March 24, 1959, announced that it would consider applications by TV stations to test subscription TV under limited conditions, none has yet been received.

Translator stations, which rebroadcast TV programs on the higher UHF channels to small communities, were enabled to increase power to 100 watts.

FM

Increased interest in FM was attested by mounting applications for new stations (some of which were competitive and required hearing) as well as by fewer station deletions. Only seven States are still without FM stations.

One factor in this revised interest is the opportunity, afforded since 1955, for FM stations to obtain additional revenue through subsidiary "functional music" programs to subscribers. The number of stations so engaged totals 127. The Commission is considering possible additional multiplexing services by FM stations.

A court ruled that the functional music rules are invalid insofar as they exclude such operation on a simplex basis.

AM

Commission determination is pending on questions involved in the clear channel and daytime skywave proceedings. It held that extended hours of operation for daytime stations is not feasible, but did make it possible for local channel AM stations to increase their daytime power from 250 watts to 1 kilowatt.

Senate ratification of the North American Regional Broadcasting Agreement of 1950 and a bilateral agreement with Mexico in 1957 has not yet materialized.

Because of the AM application backlog, it was necessary for the Commission to establish a "cutoff" time after which new applications will not be considered with those already on file.

SAFETY AND SPECIAL

There are more than 40 categories of safety and special radio services, most of which did not exist 25 years ago or were then in the experimental stage. Over half a million licensees now operate more

than 1.7 million fixed, mobile, and portable transmitters in these services which operate in the air and on the water as well as on the ground. This represents a tenfold increase since 1934, having practically doubled in the past 5 years.

Since no leveling in the demand for these facilities is foreseen for many years to come, the Commission is seeking more effective ways of utilizing the spectrum space available for these purposes as well as handling the increasing volume of applications.

There was mounting interest in the four new radio services provided for local government, manufacturers, business and telephone maintenance.

COMMON CARRIER

Telephone

The telephone industry, comprising the Bell System and about 4,000 independent companies, together operate nearly 70 million telephones, representing an industry investment of more than $24 billion, with annual gross revenues approaching $8 billion.

About 94 percent of all Bell telephones and 80 percent of the independent telephones are now dial operated. About 12 million subscribers can dial nearby toll calls and another 8 million can dial long distance.

Bell System reported consolidated net income for calendar 1958 applicable to capital stock of the parent company, American Telephone & Telegraph (A.T. & T.), totaled more than $952 million, an increase of 11.5 percent over 1957.

At the close of the fiscal year the Commission initiated discussions with the Bell System which resulted in an agreement to reduce charges for interstate long-distance-message toll calls by about $50 million annually.

Pending decision in its investigation of private line telephone and telegraph rates, the Commission ordered a 15-percent reduction in A.T. & T. rates for private line telephone services to be effective in August 1958, and permitted interim increased rates for private line telegraph services to become effective in December 1958, representing an increase of 18 percent for the telephone system and 15 percent for Western Union. Bell still handles the major part of the private line telegraph business.

The Bell System canceled its controversial tariff filing concerning the lease and maintenance of private mobile communication systems following announcement of its intention to withdraw from this service.

Telegraph

Western Union's gross landline operating revenues for calendar 1958 totaled $240,729,000, a decline of $4.8 million from its previous high in 1957. Its systemwide net income, including ocean cables, amounted to $12,660,000 in 1958 after Federal income taxes as compared with $14,194,000 for 1957.

Private line telegraph services, its second major source of revenue, increased to $40.7 million, or more than $4.5 million from the year previous. Western Union has installed and leased more than 2,000 private wire systems representing about 3 million circuit-miles. One of these is the world's largest private wire system—a 250,000-mile network linking U.S. Air Force bases. Another 25,000-mile system serves 245 offices and plants of a business establishment.

About 43 million telegrams are sent each year over 36,000 "deskfax" (facsimile) machines used by customers. A 12,000-mile facsimile weather map network has been installed for the Air Force.

"Telex," which permits customers to dial other customers directly for two-way telegraph communication, links New York with Chicago and 24 Canadian cities. Extension of this system to San Francisco has begun.

In the fall of 1958, Western Union was permitted to increase rates for various interstate services by about $10 million a year to offset a previous increase in employee wages.

In providing the only nationwide telegraph service, Western Union operates nearly 4½ million miles of telegraph circuits, 21,200 telegraph offices and agencies, and some 56,000 direct teleprinter and "deskfax" connections to customers. Its eastern microwave network is being extended from Chicago to Kansas City.

International

Revenues of international telegraph carriers exceeded $77 million in calendar 1958, an increase of 0.6 percent over 1957. Oversea telephone service revenues increased 21.6 percent to $26 million.

The Commission ordered Western Union to present a plan for divestment of its ocean cable operations which is required by law as a result of its merger with Postal in 1943.

The Commission has endorsed, in principle, legislation to permit merger of international telegraph carriers.

Another transatlantic telephone cable is operating, this time between Newfoundland and France. An earlier one connects Newfoundland and England.

NATIONAL DEFENSE

Besides augmenting the CONELRAD system to minimize the navigational aid an attacking enemy might obtain from radio emissions, the Commission, with the cooperation of the U.S. Air Force and the U.S. Weather Bureau, has developed a system whereby broadcasters utilize CONELRAD alerts for weather warnings.

The Commission continues to cooperate with military and civil agencies concerned with emergency communication planning, and has appointed national and State industry advisory groups to assist in this program. Also, a Commission unit of the National Defense Executive Reserve has been established to handle certain FCC problems in event of a national emergency.

A Defense Steering Committee has been set up within the Commission. It is headed by Defense Commissioner Robert E. Lee. Much of the Commission's defense activity is classified and therefore cannot be included in this report.

LITIGATION AND LEGISLATION

Never before has so much of the Commission's time and attention been required by litigation and legislative matters. This is manifest in the man-hours which must be devoted to these subjects at the expense of other pressing business. Court actions have necessitated new and additional time-consuming procedures, and congressional considerations have resulted in an unprecedented number of comments on proposed legislation, personal appearances before various committees and subcommittees, and special studies and reports to answer specific questions from congressional groups.

During the fiscal year the Commission was party to or participated in 122 cases in the Federal courts. Congress was considering many proposals to amend the Communications Act, including 10 submitted by the Commission.

FREQUENCY ALLOCATIONS

Besides its own proceedings to review present and prospective use of the radio spectrum now available for its assignments, the Commission and the Government are engaged in joint long-range planning concerning Government as well as civilian allocations.

In the international allocations field, major interest is directed to the 1959 conference which is scheduled to revise the world's radio regulations and consider extending the radio spectrum to 40,000 megacycles. Since this is the first such session since 1947, high importance attaches to its consideration of developments of subsequent years, including space communication. Through public proceedings the Commission, under Department of State auspices, helped

to prepare the U.S. proposals for Geneva. FCC Commissioner T. A. M. Craven is Chairman of the U.S. delegation at the radio administrative session and FCC Commissioner Rosel H. Hyde is Vice Chairman of the U.S. delegation at the plenipotentiary session.

OTHER INTERNATIONAL CONFERENCES

During the year the Commission prepared for 26 other international conferences to which it furnished 4 delegation chairmen, 3 vice chairmen, and 42 other representatives. Chairman John C. Doerfer headed the U.S. delegation to the International Telephone and Telegraph Consultative Committee subcommittee meeting in Tokyo in May 1959.

FIELD ENGINEERING AND MONITORING

Interference and enforcement problems continued to tax the FCC's field engineering force. In the early years of radio, interference came mainly from communication systems; today it is augmented by many electronic devices used by industry as well as in the home. The volume of complaints is such that the Commission must depend upon some 560 cooperative groups to handle run-of-the-mill cases at the local level.

During the year FCC field engineers uncovered 329 unlicensed radio operations, including an additional 215 illegal TV boosters.

While able to give priority to furnishing monitoring bearings to ships and planes in distress, the Commission had to curtail inspection of some radio stations. It conducted examinations for radio operator licenses, obtained and analyzed technical data for the Commission, and carried on certain contractual work for other Federal agencies.

Another important task, performed in Washington, is processing applications for high antennas involving aeronautical safety considerations. Eighty-one TV towers of a thousand feet or higher are now in operation, the tallest being the 1,610-foot shaft of KSWS–TV, Roswell, N. Mex., but higher ones are under construction.

RESEARCH AND LABORATORY

The Commission's Washington engineering office, assisted by a laboratory at Laurel, Md., conducted various technical projects which covered, among other subjects, study of TV matters, stereophonic broadcasting, radio wave propagation, patent aspects of engineering standards, noncommunication systems, and interfering devices. Type approving or type accepting of certain equipment continued as a guard against interference before it starts. The experimental radio

services afforded industry and others opportunity to engage in basic research and to develop and test new equipment and techniques.

COMMISSION

The Commission's 1934 budget was under $2 million; in 1959, for the first time, it exceeded $9 million. However, its personnel during the interval has only slightly more than doubled—from about 500 at the close of its first year to not quite 1,300 in 1959. Indeed, its present staff is smaller than for 10 previous years. About one-fourth of its employees are engaged in field engineering work.

Less than 10,000 applications of all kinds were received by the Commission in its first year of operation. The annual figure now approaches 600,000, not counting legal, tariff, and other filings.

There were no changes in the Commission membership during the year, Commissioner Rosel H. Hyde being reappointed.

History of Regulation

EARLY WIRE REGULATION

Though several earlier acts of Congress dealt with specific telegraph matters, Federal regulation of interstate electrical communication may be said to date from passage of the Post Roads Act in 1866. It authorized the Postmaster General to annually fix rates for Government telegrams.

In 1887, Congress gave the Interstate Commerce Commission authority to require telegraph companies to interconnect their lines for more extended public service.

Government regulation of the accounting practices of wire communication carriers began with the Mann-Elkins Act of 1910. That act authorized the Interstate Commerce Commission to establish uniform systems of accounts for telegraph and telephone carriers, to make valuation studies of certain wire telegraph companies, and to be informed of extensions and improvements in order to keep these valuation studies up to date. In this connection, telephone and telegraph carriers were required to file monthly and annual financial reports with the Interstate Commerce Commission.

EARLY RADIO REGULATION

The Mann-Elkins Act also gave certain regulatory powers over radiotelegraph carriers to the Interstate Commerce Commission. This statute, in effect, extended provisions of the Interstate Commerce Act of 1887 to cover wireless telegraph.

Meanwhile, the usefulness of radiotelegraphy in protecting life and property at sea became so apparent that a preliminary international wireless conference was held at Berlin in 1903 to consider a common distress call for ships and to provide for wireless communication between ships and shore as well as between ships.

WIRELESS SHIP ACT OF 1910

The first legislation dealing with marine radio was approved by Congress in 1910. Known as the Wireless Ship Act, it required installation of wireless apparatus and operators on large seagoing passenger vessels. Enforcement of this act was made the responsibility of the Secretary of Commerce and Labor, who at that time administered the domestic maritime navigation laws.

In 1912, the Third Radio Telegraph Conference in London approved regulations to secure uniformity in practices of radiotelegraph services. The enforcement of these regulations, as far as the United States was concerned, was delegated to the Secretary of Commerce and Labor.

Later that same year, Congress amended the Wireless Ship Act of 1910 to cover large cargo vessels; also to require an auxiliary source of power supply on ships, an adequate means of communication between the radio room and bridge, and two or more skilled radio operators on certain passenger vessels.

RADIO ACT OF 1912

Regulations for further uniformity of wireless communication practices were adopted by the International Radio Telegraph Conference at London in 1912. To carry out its obligations under that treaty, the United States enacted the Radio Act of 1912. This was the first law for the domestic control of radio communication in general.

The Radio Act of 1912 embodied regulations concerning the character of emissions, transmission of distress calls, set aside certain frequencies for Government use, and placed licensing of wireless stations and operators under the Secretary of Commerce and Labor. Licensing began that year.

WORLD WAR I PERIOD

During the period from August 1, 1918, to July 31, 1919, the Federal Government exercised control of telephone and telegraph communication as a war measure.

In 1920, Congress authorized the Secretary of the Navy to use Government-operated radio stations for the transmission of press and private commercial messages between ships and between ships and shore, at reasonable rates subject to review by the Interstate Commerce Commission.

By the Transportation Act of 1920, the Interstate Commerce Commission was directed to prescribe the depreciation rates and charges of telephone and telegraph companies. Also, in 1920, the Interstate Commerce Act was amended to permit consolidations of telephone companies when approved by the Interstate Commerce Commission.

An Executive order, issued in 1921 pursuant to the Cable Landing License Act, authorized the Department of State to receive all applications to land or operate ocean cables, and to advise the President with respect to the granting or revocation of such licenses. Prior to that time, the Presidents had, since 1869, exercised this control under their broad executive powers.

RADIO ACT OF 1927

The Radio Act of 1912 did not anticipate or provide for broadcasting. This did not present any serious problems prior to the First World War.

In 1919 broadcasters were classified as "limited commercial stations." In 1922 the "wavelength" of 360 meters (approximately 830 kilocycles) was assigned for the transmission of "important news items, entertainment, lectures, sermons, and similar matter." Stations engaged in this service held limited commercial authorizations from the Department of Commerce.

Recommendations of the First National Radio Conference, held at Washington in 1922, resulted in further regulations by the Secretary of Commerce (Hoover). A new type of broadcast station came into being, with minimum power of 500 watts and maximum not to exceed 1,000 watts. Two frequencies (750 and 833 kilocycles) were assigned for program transmission.

So rapid was the growth of broadcast stations that, upon recommendation of subsequent National Radio Conferences (1923 and 1924), the Department of Commerce allocated the present standard broadcast band (AM being the only form of broadcast at that time), and authorized power up to 5,000 watts for experimental use.

Increase in the number of broadcast stations caused so much interference that, in 1925, a Fourth National Radio Conference asked for a limitation on broadcast time and power. The Secretary of Commerce was unable to deal with the situation because court decisions held that the Radio Act of 1912 did not give him sufficient authority. Many broadcasters jumped their frequencies and increased their power and operating time at will. This caused bedlam on the air.

In 1926 President Coolidge urged Congress to remedy matters. The result was the Dill-White Radio Act of 1927, which was signed February 23, 1927.

FEDERAL RADIO COMMISSION

The Radio Act of 1927 created a five-member Federal Radio Commission to have certain regulatory powers over radio, including the issuance of radio station licenses, the allocation of frequency bands to various services, assignment of specified frequencies to individual stations, and control of station power.

However, the same act also delegated to the Secretary of Commerce authority to inspect radio stations, to examine and license radio operators, and to assign radio call signals.

The Federal Radio Commission started to function on March 15, 1927. Much of its early activity was devoted to resolving the prob-

lem in the broadcast band. It was impossible to care for the 732 AM broadcast stations as then operating. New rules and regulations caused about 150 of them to surrender their licenses.

Under the Radio Act of 1927, the Federal Radio Commission was, at the end of that year, to become an appellate body to review decisions of the Radio Division of the Department of Commerce in making allocations. Its authority as a licensing agency was extended annually by Congress until 1929, when an act was approved continuing its powers "until otherwise provided by law."

COMMUNICATIONS ACT OF 1934

The Radio Act of 1927 did not give the Federal Radio Commission jurisdiction over telegraph and telephone carriers. As previously indicated, the Post Office Department, the Interstate Commerce Commission, and the Department of State exercised certain authority with respect to telegraph service; some regulation of telephone service was under the Interstate Commerce Commission; and the Federal Radio Commission had supervision over broadcasting. This divided and sometimes overlapping authority caused much confusion.

At the request of President Roosevelt, the Secretary of Commerce in 1933 appointed an interdepartmental committee to study the situation. The committee reported that "the communication service, as far as congressional action is involved, should be regulated by a single body." Accordingly, it recommended the establishment of a new agency which would regulate all interstate and foreign communication by wire and radio, including telegraph, telephone, and broadcast.

On February 26, 1934, the President sent a special message to Congress urging creation of the Federal Communications Commission for that purpose. The next day Senator Dill and Representative Rayburn introduced bills to carry out this recommendation. The Senate bill (S. 3285) passed the House on June 1, 1934, and the conference report was adopted by both Houses 8 days later.

The Communications Act was signed by President Roosevelt on June 19, 1934. Some parts of it became effective July 1 of that year; others on July 11.

The Communications Act coordinated in the Federal Communications Commission broadcast regulatory functions previously exercised by the Federal Radio Commission, which was abolished by the Communications Act; supervision of certain telegraph and telephone 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 the Cable Landing License Act. The Communications Act gave the Federal Communications Commission additional

authority, including supervision of rates of interstate and international common carriers, and domestic administration of international agreements relating to electrical communication generally.

The stated purposes of the act are "regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges * * * the national defense * * * promoting safety of life and property through the use of wire and radio communication * * *."

It applies "to all interstate and foreign communication by wire or radio and all interstate and foreign transmission of energy by radio, which originates and/or is received within the United States, and to all persons engaged within the United States in such communication or such transmission of energy by radio, and to the licensing and regulating of all radio stations * * *."

This authority extends to the territories and possessions of the United States, but not to the Canal Zone. Radio communication facilities operated by the Federal Government are not under Commission jurisdiction.

In general, the act limits licensing by the Commission to citizens of the United States. It further denies the license privilege to corporations in 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.

The statute consists of six major sections or "titles":

Title I defines the purposes of the act, the terms and duties of the commissioners, and confers general powers.

Title II contains provisions applicable to common carriers that are subject to Commission regulation.

Title III relates to radio and is divided into three parts. Part I deals with radio licensing and regulation in general. Part II pertains to use of radio equipment and radio operators on board ship. Part III concerns radio installations on vessels carrying passengers for hire.

Title IV spells out procedural and administrative provisions.

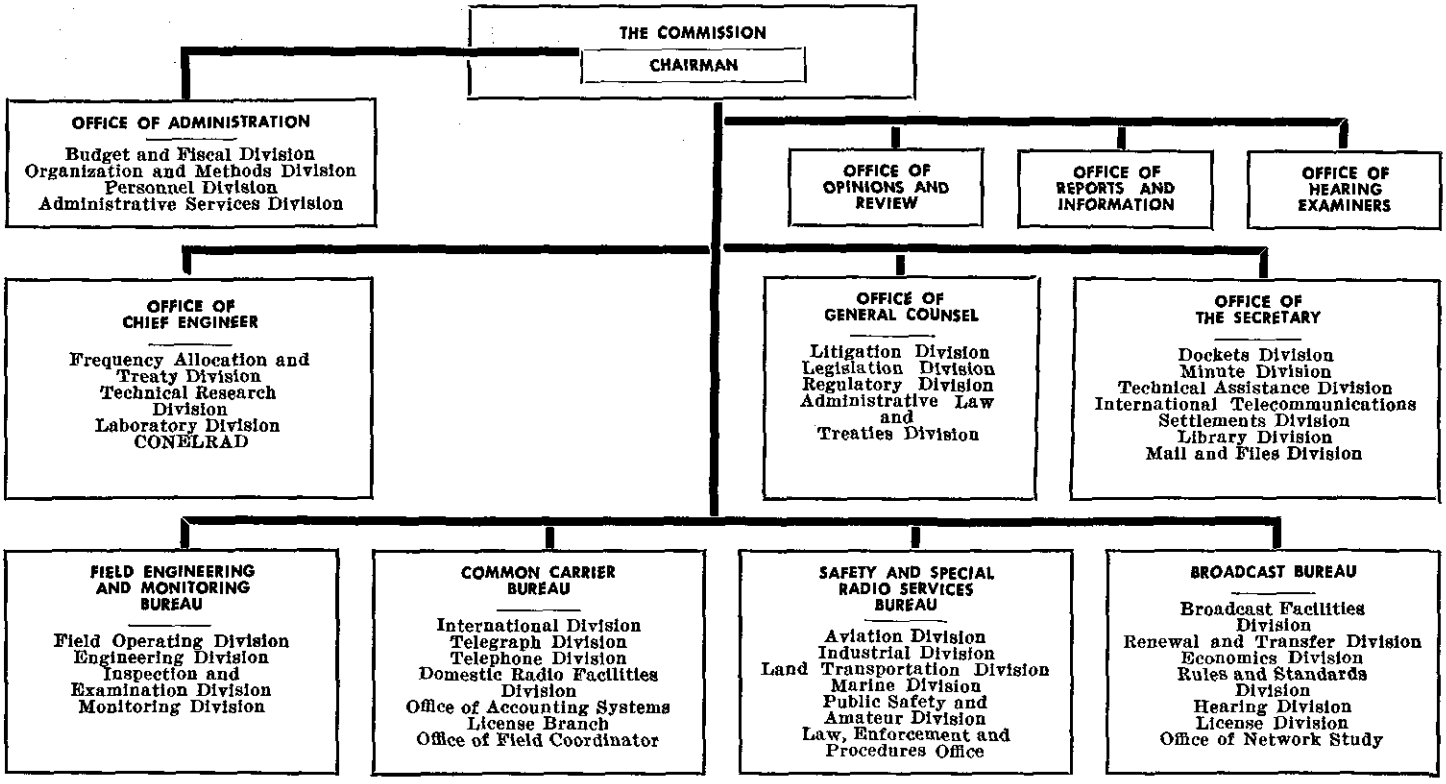
Title V prescribes penalties and forfeitures for violators.

Title VI prohibits unauthorized interception and publication of communications by wire or radio and gives the President certain powers to deal with communication matters in event of war or other national emergency.

Extensive revisions of the act—particularly in 1952—made important changes in the Commission's organization and its procedures.

FEDERAL COMMUNICATIONS COMMISSION

Organization Chart as of June 30, 1959



Commission

COMMISSIONERS

The Commission is composed of seven Commissioners appointed by the President with the advice and consent of the Senate. One of the Commissioners is designated as Chairman by the President to serve at the latter's pleasure. The Chairman is the Commission's chief executive officer and is responsible for the general administration of its internal affairs.

The normal term of a Commissioner is 7 years, except in filling an unexpired term. The terms are staggered so that only one terminates in a year. Not more than four members of the Commission can be members of the same political party. Commissioners cannot engage in private business while in office, nor can they have financial interest in any business which they regulate.

The Commission started to function on July 11, 1934. Six days later it organized into three divisions—Broadcast, Telegraph, and Telephone—with two different Commissioners, plus the Chairman, heading each division. However, because of administrative difficulties and the need for unified control by the Commission as a body, this divisional organization was abolished as of October 13, 1937.

All policy determinations are made by the Commission as a whole. The Commissioners function as a body, with delegations of responsibility to individual Commissioners or committees of Commissioners, and to staff units. Examples are a designated Defense Commissioner, Telephone and Telegraph Committees, and assignments of individual Commissioners and staff members as members of or in liaison with various outside agencies and other groups (see list elsewhere in this chapter).

Commission practices conform to the Communications Act of 1934, as amended, the Administrative Procedure Act, and other applicable laws.

The Communications Act requires the Commission to meet at least once a month. However, the volume of its work necessitates regular meetings each week (with the exception of August), also special meetings and a monthly workload review meeting. These are in addition to the Commissioners sitting en banc in many hearings and oral arguments. (In any case in which an examiner has made an initial decision, the Commissioners have to hear oral argument on the request of any party to the proceeding.)

Pursuant to a 1952 amendment to the act, the Commission makes a special monthly report to Congress on the backlog of pending applications and hearing cases.

Membership of the Commission remained unchanged during the year. On April 17, 1959, the President nominated Commissioner Rosel H. Hyde for another term, and the latter was confirmed on June 4.

Following is a list of past and present members of the Federal Communications Commission; their terms of service as Commissioners and Chairmen; and their political affiliations and States of legal residence when appointed:

Commissioners	*Politics*	*State*	*Terms of service*
*Eugene O. Sykes	Dem.	Miss.	July 11, 1934–Apr. 5, 1939
Chairman			July 11, 1934–Mar. 8, 1935
*Thad H. Brown	Rep.	Ohio	July 11, 1934–June 30, 1940
Paul A. Walker	Dem.	Okla.	July 11, 1934–June 30, 1953
Acting Chairman			Nov. 3, 1947–Dec. 28, 1947
Chairman			Feb. 28, 1952–Apr. 17, 1953
Norman S. Case	Rep.	R.I.	July 11, 1934–June 30, 1945
Irvin Stewart	Dem.	Tex.	July 11, 1934–June 30, 1937
*George Henry Payne	Rep.	N.Y.	July 11, 1934–June 30, 1943
*Hampson Gary	Dem.	Tex.	July 11, 1934–Jan. 1, 1935
*Anning S. Prall	Dem.	N.Y.	Jan. 17, 1935–July 23, 1937
Chairman			Mar. 9, 1935–July 23, 1937
T. A. M. Craven	Dem.	D.C.	Aug. 25, 1937–June 30, 1944
*Frank R. McNinch	Dem.	N.C.	Oct. 1, 1937–Aug. 31, 1939
Chairman			Oct. 1, 1937–Aug. 31, 1939
*Frederick I. Thompson	Dem.	Ala.	Apr. 13, 1939–June 30, 1941
James Lawrence Fly	Dem.	Tex.	Sept. 1, 1939–Nov. 13, 1944
Chairman			Sept. 1, 1939–Nov. 13, 1944
*Ray C. Wakefield	Rep.	Calif.	Mar. 22, 1941–June 30, 1947
Clifford J. Durr	Dem.	Ala.	Nov. 1, 1941–June 30, 1948
Ewell K. Jett	Ind.	Md.	Feb. 15, 1944–Dec. 31, 1947
Interim Chairman			Nov. 16, 1944–Dec. 20, 1944
Paul A. Porter	Dem.	Ky.	Dec. 21, 1944–Feb. 25, 1946
Chairman			Dec. 21, 1944–Feb. 25, 1946
Charles R. Denny	Dem.	D.C.	Mar. 30, 1945–Oct. 31, 1947
Acting Chairman			Feb. 26, 1946–Dec. 3, 1946
Chairman			Dec. 4, 1946–Oct. 31, 1947
*William H. Wills	Rep.	Vt.	July 23, 1945–Mar. 6, 1946
Rosel H. Hyde	Rep.	Idaho	Apr. 17, 1946–
Chairman			Apr. 18, 1953–Apr. 18, 1954
Acting Chairman			Apr. 19, 1954–Oct. 3, 1954
Edward M. Webster	Ind.	D.C.	Apr. 10, 1947–June 30, 1956
Robert F. Jones	Rep.	Ohio	Sept. 5, 1947–Sept. 19, 1952
*Wayne Coy	Dem.	Ind.	Dec. 29, 1947–Feb. 21, 1952
Chairman			Dec. 29, 1947–Feb. 21, 1952
George E. Sterling	Rep.	Maine	Jan. 2, 1948–Sept. 30, 1954
Frieda B. Hennock	Dem.	N.Y.	July 6, 1948–June 30, 1955

*Deceased.

Commissioners	*Politics*	*State*	*Terms of service*
Robert T. Bartley	Dem.	Tex.	Mar. 6, 1952–
Eugene H. Merrill	Dem.	Utah	Oct. 6, 1952–Apr. 14, 1953
John C. Doerfer	Rep.	Wis.	Apr. 15, 1953–
Chairman			July 1, 1957–
Robert E. Lee	Rep.	Ill.	Oct. 6, 1953–
George C. McConnaughey	Rep.	Ohio	Oct. 4, 1954–June 30, 1957
Chairman			Oct. 4, 1954–June 30, 1957
Richard A. Mack	Dem.	Fla.	July 7, 1955–Mar. 3, 1958
T. A. M. Craven	Dem.	Va.	July 2, 1956–
Frederick W. Ford	Rep.	W. Va.	Aug. 29, 1957–
John S. Cross	Dem.	Ala.	May 23, 1958–

It is interesting to note that two present members of the FCC were on the staff of the original Commission. Commissioner Rosel H. Hyde transferred from the Federal Radio Commission as an attorney, later became the FCC's General Counsel and served a term as Chairman. Commissioner Robert T. Bartley was Director of the Commission's original Telegraph Division. Twice an FCC Commissioner, T. A. M. Craven, who had served on the staff of the old FRC, started with the FCC in 1935 as its Chief Engineer. Commissioner Frederick W. Ford joined the FCC in 1947 and was the first Chief of the Broadcast Bureau's Hearing Division.

STAFF ORGANIZATION

Until April 3, 1950, the Commission staff functioned with four bureaus—Engineering, Accounting, Law, and Secretary—with the first three named bureaus sharing responsibility for administering common carrier, broadcast and nonbroadcast matters. On that date there was initiated a reorganization of the staff to operate on functional instead of professional lines. This resulted in establishing the present four self-contained operating bureaus—Common Carrier, Broadcast, Safety and Special Radio Services, and Field Engineering and Monitoring. These are supplemented by seven offices—Secretary, Administration, Chief Engineer, General Counsel, Hearing Examiners, Opinions and Review, and Reports and Information.

The only major change in staff organization during the current year was reorganization of the Office of the General Counsel, announced March 20, 1959, into four divisions—Litigation, Legislation, Rules and Enforcement, and Administrative Laws and Treaties—in place of the previous two divisions (Litigation and Legislation, Treaties and Rules).

The present organization chart appears as a separate page of this chapter.

AUTOMATIC DATA-PROCESSING STUDY

With the cooperation of the National Bureau of Standards, the Commission is studying the feasibility of using electronic equipment, commonly known as ADPS (automatic data-processing systems), to expedite and increase efficiency in handling its workload.

PERSONNEL

At the end of the fiscal year the Commission had 1,281 employees on its rolls. This figure included 53 employees who were hired for the summer months only, and 91 employees who were carried on the Commission's rolls but were performing work for other agencies on a reimbursable basis. The actual average employment for the entire year for staff engaged in regular Commission activities was 1,129.4. This represents an increase of 31.3 over 1958. Distribution by organization units of the average employment for the year was as follows:

	Washington	Field	Total
Commissioners' offices	47.6		47.6
Office of Opinions and Review	26.8		26.8
Office of Hearing Examiners	26.1	1.0	27.1
Office of Reports and Information	4.0		4.0
Office of Administration	81.1		81.1
Office of Secretary	57.0		57.0
Office of General Counsel	29.3		29.3
Office of Chief Engineer	60.8	13.0	73.8
Common Carrier Bureau	93.3	26.0	119.3
Safety and Special Radio Services Bureau	134.2		134.2
Broadcast Bureau	181.7		181.7
Field Engineering and Monitoring Bureau	54.0	293.5	347.5
Total	795.9	333.5	1,129.4

Biographies of employees added during the year, also names of those leaving during that period, are being reported to Congress separately pursuant to section 4(k)(3) of the Communications Act, as amended in 1952.

Total FCC personnel at the close of each previous fiscal year follows:

1935	503	1943	1,942	1951	1,205
1936	739	1944	1,524	1952	1,138
1937	610	1945	1,362	1953	1,070
1938	623	1946	1,291	1954	1,146
1939	616	1947	1,329	1955	1,094
1940	629	1948	1,380	1956	1,116
1941	1,414	1949	1,340	1957	1,197
1942	2,041	1950	1,286	1958	1,238

A current and continuing Commission personnel problem is to recruit qualified engineers and stenographers (especially typists). This is due to the competition by industry and other business for skilled workers in those categories.

APPROPRIATIONS AND EXPENDITURES

For fiscal 1959 the Commission received appropriations totaling $9,781,100. This was an increase of $1,046,745 over the previous year. However, $446,550 of this amount was required to cover increased salary rates that prevailed for only a portion of fiscal 1958. Personal services accounted for about 83 percent of the 1959 budget. A breakdown follows:

Personal services	$8,140,420
Travel	98,250
Transportation of things	17,001
Communication services	215,277
Rents and utilities	68,269
Printing and reproduction	69,957
Other contractual services	203,909
Supplies and materials	140,086
Equipment	184,410
Land and structures	114,734
Contribution to Civil Service Retirement Fund	509,055
Awards and indemnities	6,283
Taxes and assessments	3,248
Total obligations	9,770,899
1959 funds expended in 1958	10,176
Total	9,781,100

The sources of these funds and the authority for expenditures thereunder are Public Laws 766 and 844, 85th Congress, and Public Law 30, 86th Congress. Expenditure details and their justification are set forth at length in the FCC budget presentation to Congress.

Appropriations to the Commission in past years are shown for the fiscal years stated:

1935	$1,896,885	1943	$7,777,135	1951	$6,625,000
1936	1,925,000	1944	7,884,914	1952	6,585,550
1937	1,997,000	1945	6,312,343	1953	6,408,460
1938	1,649,000	1946	5,489,900	1954	7,400,000
1939	1,745,000	1947	6,236,900	1955	6,911,769
1940	1,838,175	1948	6,240,000	1956	7,323,000
1941	4,726,340	1949	6,717,000	1957	7,828,000
1942	5,655,924	1950	6,729,345	1958	8,734,355

DOCKETS

Broadcasting still accounts for the majority of docket cases. The following docket statistics for fiscal 1959 refer to individual applications in hearing status:

	Pending June 30, 1958	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1959
AM broadcast	175	240	103	85	227
TV broadcast	93	51	20	40	84
FM broadcast	18	24	8	10	24
Other broadcast	14	8	3	2	17
Total broadcast	300	323	134	137	352
Safety and special	32	56	35	26	27
Common carrier	30	41	18	6	47
Joint and general	60	22	23	5	54
Total nonbroadcast	122	119	76	37	128
Petitions, etc	43	13	36	1	19
Grand total	465	455	246	175	499

During the year the Commission issued 134 initial decisions covering 176 applications. Of these, 99 concerned 140 broadcast applications.

The broadcast hearing workload is a major Commission concern. It is due mainly to competitive and procedural considerations.

An application which cannot be granted must be afforded opportunity for a hearing. However, before being designated for hearing, such an applicant (and other parties of interest) must be advised by letter as to the reason and given a month in which to reply. Each additional competing application means a new round of letters.

Also, the law requires an application granted without hearing to be set for evidentiary hearing or oral argument if timely and properly protested. The Commission must give priority consideration to such protests. Further, the courts have recognized nonlicensees as protestants, even though they may not be in the communications business. This has opened the door to protestants in other lines who allege possible economic injury.

Petitions and motions, together with the oppositions and replies they engender, likewise add to the adjudicatory burden. They encompass requests to enlarge or change hearing issues, alter application proposals, and appeals from procedural rulings and decisions. These are many, often repetitious, and delay finality.

Another obstacle to expeditious functioning is a 1952 amendment to the Communications Act which bars Commissioners from consulting FCC staff experts on legal and technical considerations in adjudicatory proceedings.

Remedial action by Congress on the "protest" and "separation of functions" provisions and changes in the Commission's rules together with increased personnel seem to offer the only practical solution.

AUTHORIZATIONS

The Commission closed its fiscal year with more than 2,400,000 radio authorizations outstanding, an increase of nearly 284,000 since 1958. Comparative figures for those years follow:

Class	June 30, 1958	June 30, 1959	Increase
Broadcast services	9,037	10,120	1,083
Safety and special services	437,851	507,171	69,320
Common carrier services	3,271	3,845	574
Experimental	834	891	57
Commercial radio operators	1,500,854	1,705,903	205,049
Amateur radio operators	180,738	[1] 188,000	7,262
Total	2,132,585	2,415,930	283,345

[1] Estimated.

Because some service authorizations cover the use of more than one transmitter, radio station grants collectively represent the use of about 1.8 million transmitters.

APPLICATIONS

Nearly 600,000 applications of all kinds were received by the Commission during the year, which was an increase of almost 60,000 over the previous year. Application figures for fiscal 1958 and 1959 were:

Class	1958	1959	Increase or (decrease)
Broadcast services (nonhearing)	10,347	12,002	1,655
Safety and special services	212,581	250,120	37,539
Common carrier services	4,566	5,104	538
Experimental	3,057	2,026	(1,031)
Commercial radio operators	306,698	327,466	20,768
Total	537,249	596,718	59,469

Amateur radio operators are not listed here as a separate category because both their station and operator authorizations are included in the safety and special services total.

These application figures do not cover thousands of petitions and other filings in hearing, rulemaking, and other proceedings.

CORRESPONDENCE

More than 1,500,000 pieces of mail were received or dispatched by the Commission's Washington office during the year, which was about 180,000 more than the previous year. Of the 1959 total, 1,020,019

were incoming and 538,658 were outgoing. These figures do not include mail handled by the Field Engineering and Monitoring Bureau. The Commission paid the Post Office Department $51,769 for the use of penalty mail, including $10,271 for CONELRAD program purposes.

RELEASES AND PUBLICATIONS

By public notices released at its Washington headquarters, the Commission announces its actions, the filing of broadcast and certain other applications, petitions for rulemaking, hearing calendars, etc. Copies of orders and other documents are served on the parties concerned and are available to others interested as long as the limited supply lasts. No public mailing list is maintained for the Commission's mimeographed issue. Its mimeographing during the year required 55,600 stencils, more than 10 million sheets of paper, and over 14 million impressions.

All hearing orders and rulemaking proposals and finalizations are given official promulgation in the Federal Register. The Government Printing Office sells the texts of the Commission's major decisions in weekly pamphlet form. This series is also available there in 6-month bound-volume compilations.

The Government Printing Office also sells printed copies of the Commission's rules and regulations, annual and special reports, etc. During the year certain rule parts were combined in volumes which, with subsequent amendments, are available from the Government Printing Office on a subscription basis. The Commission does not supply copies of its printed publications which are sold by the Government Printing Office. A list of such publications will be furnished by the Commission on request.

COOPERATION

The Commission works closely with Federal agencies concerned with telecommunications matters to the inclusion of participating in international conferences. In addition, individual Commissioners or staff representatives are members of or maintain liaison with various international, interagency and industry organizations. Among these are:

International.—International Electrotechnical Commission (IEC), International Radio Consultative Committee (CCIR), International Scientific Radio Union (URIS), International Special Committee on Radio Interference (CISPR), and International Telegraph and Telephone Consultative Committee.

Interagency.—Air Coordinating Committee (ACC), Committee for Sale of Alaska Communications System, Interagency Committee on National Censorship (in event of war), Interagency Group on Technical Assistance, Interde-

partment Council on Radio Propagation and Standards, Interdepartment Radio Advisory Committee (IRAC), National Association of Railroad and Utilities Commissioners (NARUC), Operations Coordinating Board (OCB), Radio Technical Commission for Aeronautics (RTCA), Radio Technical Commission for Marine Services (RTCM), Telecommunications Advisory Board (TAB), Telecommunications Coordinating Committee (TCC), and Telecommunications Planning Committee (TPC).

Industry.—American Standards Association (ASA), Electronic Industries Association (EIA), National Industry Advisory Committee for Emergency Broadcast System, Radio Propagation Advisory Committee (RPAC), and Television Allocations Study Organization (TASO).

FOREIGN TECHNICAL ASSISTANCE

The Commission also cooperates with the Department of State, the International Cooperation Administration, and the United Nations in planning, arranging, and supervising study of domestic telecommunications by administrative and engineering personnel from friendly foreign nations. Pay for such travel comes from other Government sources.

More than 50 countries have been represented in the programs arranged by the FCC since 1952 for about 275 participants. In addition, numerous visiting officials from foreign telecommunication administrations, but not under sponsorship of the above-named agencies, have been assisted by the Commission in their observations of related government and industry activities in this country.

Litigation and Legislation

LITIGATION

During the fiscal year, as in past years, the Commission was a party to court cases which enunciated principles of constitutional and administrative law having significance quite beyond their immediate effect upon the Commission's administrative procedures. From a more general standpoint, several of these decisions also have had, or will in all likelihood have, a substantial impact upon the operating procedures of all Federal administrative agencies.

Supreme Court Decision in *Sangamon Valley* Case

Illustrative of cases having an overall impact upon administrative agencies were the Supreme Court actions of October 20, 1958, in *Sangamon Valley Television Corp.* v. *United States and Federal Communications Commission* (358 U.S. 49), and *WIRL Television Co.* v. *United States and Federal Communications Commission* (358 U.S. 51). In these cases the Supreme Court vacated and remanded to the Court of Appeals two rulemaking proceedings involving the reassignment of TV channels from Springfield, Ill., to St. Louis, Mo., and from Peoria, Ill., to the Rock Island-Moline-Davenport area, respectively, in view of indications of ex parte presentations made with respect to the merits of the Springfield-St. Louis proceeding to various members of the Commission subsequent to initiation of this rulemaking. Pursuant to the Supreme Court's mandate, the Court of Appeals for the District of Columbia Circuit, following oral argument, on May 8, 1959, vacated and remanded the *Sangamon* proceeding to the Commission for an evidential hearing and, on May 12, 1959, similarly vacated the *WIRL* case for such proceedings, if any, as the Commission may find proper after its consideration of the *Sangamon* case.

These court actions have had a serious and substantial impact upon the Commission's longstanding freedom of consultation in rulemaking proceedings which had been premised upon what had been considered legal tradition, as well as upon the vitalness of such freedom of consultation for the purpose of informal rulemaking in the public interest. In the Commission's view, so-called ex parte presentations in connection with the exercise of its quasi-legislative functions were permis-

sible under existing law and necessary to the discharge of the Commission's statutory obligations. The Court of Appeals conceded that proceedings involving the allocation of TV channels among communities constitute rulemaking rather than adjudication within the meaning of the Administrative Procedure Act. Nevertheless, it was of the view that the nature of the particular allocation proceeding involved in the *Sangamon* case was such that it also possessed adjudicatory overtones and considerations. Consequently, the court held that the proceeding was invalid because of the ex parte consultations and approaches which occurred during the pendency of the proceeding and which were disclosed in testimony before the House Subcommittee on Legislative Oversight. The court thus enunciated what is believed to be a new concept relating to the rulemaking procedures of administrative agencies generally.

Court of Appeals Decisions

Several decisions of the Court of Appeals for the District of Columbia Circuit, the impact of which adversely affected the work and procedures of the Commission in a more particularized sense, were: *Carroll Broadcasting Co.* v. *Federal Communications Commission*, decided July 10, 1958 (258 F. 2d 440, 103 U.S. App. D.C. 346); *WLOX Broadcasting Co.* v. *Federal Communications Commission*, decided September 18, 1958 (260 F. 2d 712, — U.S. App. D.C. —), and *Functional Music, Inc.* v. *United States and Federal Communications Commission*, Case No. 14374, decided November 7, 1958.

Carroll case.—In the *Carroll* case, the Court of Appeals overturned, on the basis of an existing broadcast station's protest, a basic Commission practice of long standing by requiring the Commission to consider economic factors, such as insufficiency of revenues to support another station, in granting a new broadcast application in a community. The court reversed and remanded the case to the Commission on the basis of its holding that the Commission erred on both jurisdictional and policy grounds in its refusal to make findings as to whether the competitive effect of a grant of an application for a new broadcast facility upon an existing station in the immediate area would result in damage to or destruction of services to the listening public to an extent inconsistent with the public interest. Although holding that the Commission may disregard economic injury to an existing station as a result of a new grant, the court was of the view that the Commission has "not only the power but the duty" to consider whether services to the public will be affected.

In view of the court's decision, the Commission cannot presently properly deny an evidential hearing in any case where there are

sufficient allegations of competitive economic injury resulting in adverse effects upon the public interest, despite (1) the probability that the party protesting the new grant will fail to discharge its heavy burden of proof, (2) the fact that the Commission still may ultimately find the evidential showing as merely constituting injury to the protesting party and not public detriment, and (3) the Commission's view that it lacks the tools necessary to predict what the future competitive outlook may be between two or more stations, and its further view that common carrier principles are engrafted upon the free enterprise basis of broadcast operation under title III of the Communications Act when its functions are so extended. The Commission recommended to the Department of Justice the filing of a petition for writ of certiorari in the Supreme Court, but this recommendation was not accepted.

WLOX case.—In the *WLOX* case, the court reversed and remanded the Commission's decision in a comparative TV proceeding on the basis that, for purposes of making a comparative evaluation of the two applicants, the Commission failed to treat a minor stockholder, but lender of all the funds to one of the applicants for construction and initial operation of its station, as a significant principal.

More importantly, although the issue was neither raised, briefed nor argued on appeal, the court *sua sponte* determined that the Commission also erred in its conclusion that both applicants were financially qualified because no supporting findings of basic facts were made either in the hearing order or the final decision. Inasmuch as the issue of financial qualifications of the applicants was neither raised nor briefed on appeal, the Commission petitioned for partial rehearing and modification of that portion of the court's decision which required the Commission to make basic findings in support of all preliminary *ex parte* conclusions as to an applicant's qualifications. The court subsequently denied the Commission's petition.

As a result of the court's *sua sponte* requirement, the Commission's manner of processing applications relating to prehearing ultimate findings as to an applicant's qualifications has been modified so that presently the Commission, in designating an application for a comparative hearing, is required to support its *ex parte* conclusions of adequate qualifications in the hearing order with basic facts, even though it determines upon the basis of the applicant's prehearing submissions that designation of the particular qualification issue for hearing is not warranted.

Functional music case.—In the *Functional Music* case, the court held invalid the Commission rule which requires frequency modula-

tion (FM) broadcast stations which transmit "background" and other "functional music" services to commercial, industrial, and other institutional subscribers to do so on a subsidiary "multiplex" basis only; i.e., on a "subchannel" separate from the "main channel" which carries the broadcast service to the public at large.

A number of FM stations have transmitted functional music services on a "simplex" basis. Instead of separating the functional music and broadcast programs, such stations arrange their broadcast program format so that it includes the music and special announcements which their functional music subscribers require, and then utilize a special supersonic control signal, receivable only on the sets of subscribers, to delete such portions of the original program as the individual subscriber does not desire or to augment the volume of certain commercial announcements.

In the Commission's view, functional music services, whether "simplex" or "multiplex", are nonbroadcast in nature. The "simplex" system, moreover, allows the special nonbroadcast service to institutional subscribers to dominate the use of a frequency allocated by the Commission for broadcast services intended to be received by the public at large. After allowing a substantial period for the development of "multiplex" equipment, the Commission refused to authorize further "simplex" functional music operation.

In reversing the Commission, the court held that "simplex" functional music services were "broadcasting" within the meaning of the Communications Act. Because of the broad impact of this holding upon the development of the FM broadcast industry and its serious impairment of the Commission's authority to define and regulate the uses to which frequencies shall be put, a petition for writ of certiorari was filed by the Commission and the Solicitor General. It was denied by the Supreme Court on October 12, 1959.

"*Ex parte*" *cases.*—The Commission continued its participation in the litigation of the so-called *ex parte* cases. In addition to the pending Miami channel 10 and Boston channel 5 proceedings, initiated prior to the fiscal year, both the Commission and the Court of Appeals took action in two additional adjudicatory TV cases.

On May 21, 1959, the court, on motion of the Commission, remanded the proceeding relating to channel 9 at Orlando, Fla., to the Commission for hearing in light of alleged *ex parte* presentations occurring during the pendency of the proceeding that were disclosed in testimony before the House Subcommittee on Legislative Oversight.

On April 17, 1959, the Commission, on its own motion, ordered a similar hearing relating to the grant of channel 7 at Miami, Fla., in

light of other testimony disclosed before the House subcommittee. The court on May 13, 1959, ordered the pending channel 7 appeal (*Sunbeam Television Corp.* v. *Federal Communications Commission*, Case No. 15041) held in abeyance pending conclusion of the *ex parte* hearing ordered by the Commission.

Western Union divestment.—The Court of Appeals for the Second Circuit handed down a decision in a common carrier case of first impression and some importance to the Commission's regulatory powers in this field. In *Western Union Telegraph Company* v. *United States of America and Federal Communications Commission*, Case No. 231, October Term, 1958, decided June 15, 1959, the court sustained the statutory power of the Commission to order Western Union to divest its international telegraph cable operations, pursuant to section 222 of the act, where the Commission had specified that disposition by stock division techniques would be permissible as "consideration commensurate with the value of the properties" under the statute, and that Western Union could not refuse to divest because it remained contingently liable for its cable leases. However, the Commission's order was set aside on the ground that the Commission was without statutory warrant to set a deadline for submission of a divestment plan without finding whether due diligence by Western Union could produce a feasible plan meeting the statutory requirements of the act, and the case was remanded for further proceedings.

Bendix AIRINC Case

The Commission's rulemaking order of April 16, 1958, which limited non-Government access to certain frequency bands in order to permit their effective use by the President under section 305 of the act for vital national defense purposes, was likewise the subject of litigation. Upon the basis of certain classified representations as to defense needs, submitted by the Office of Civil and Defense Mobilization on behalf of the executive branch, and taking into account the spectrum needs of non-Government users, the Commission had determined that the public interest required it to restrict the access of its licensees to the affected portions of the spectrum. Because of the urgency and classified nature of the Government's requirements and the defense considerations involved, the Commission dispensed with prior notice of rulemaking and made its reallocation order effective immediately, pursuant to the discretion conferred by section 4 (a) and (c) of the Administrative Procedure Act. This action was reaffirmed by the Commission on July 30, 1958, when it denied petitions for rehearing, reconsideration, and stay of its April 16th order. In *Bendix Avia-*

tion Corporation v. *Federal Communications Commission* and *Aeronautical Radio, Inc.* v. *United States*, Cases Nos. 14650 and 14693 (C.A.D.C.), aviation interests have challenged the Commission's action insofar as frequencies in the bands 420–450 megacycles and 8750–8850 megacycles are involved. Oral argument was heard by the Court of Appeals for the District of Columbia Circuit on May 25, 1959.

Other Court Cases

The Commission also participated in court cases involving unlicensed operation of radio stations, operation of radio equipment by unlicensed personnel, and injunction proceedings to require compliance with part 18 of the Commission's rules against industrial plants improperly using radiofrequency-generating equipment for industrial heating capable of causing serious interference to authorized communications services. To bring the heater interference problem in the New York-New Jersey area under control, the Commission initiated actions in the district courts. In each of these cases the court issued orders requiring compliance with the Commission's rules.

Court Case Statistics

During the fiscal year the Commission was a party to or participated in 122 Federal cases. Seventy-four were instituted during that period—54 in the Courts of Appeal, 14 in the Supreme Court, 3 in the District Court for the Southern District of New York, 2 in the District Court for the Eastern District of New York, and 1 in the District Court for the District of New Jersey. Thirteen petitions for writ of certiorari were filed in the Supeme Court, 12 by parties other than the Commission and 1 on the Commission's behalf by the Solicitor General. The Commission participated as *amicus curiae* in one case in which its position as *amicus* was affirmed by the Supreme Court. Of the 12 petitions filed by parties other than the Commission, 9 were denied, 3 were granted and the cases remanded to the Court of Appeals.

In the Courts of Appeal, the Commission was affirmed in 21 cases, and reversed, with a remand, in 12 others. Thirteen cases were dismissed either by the court on jurisdictional grounds, on motion by the appellant, by agreement of the parties, or as being moot. The district courts issued appropriate orders at the Commission's request in six cases.

As of June 30, 1959, there were 50 cases pending in the Courts of Appeal and 1 in the Supreme Court. Of the 50 pending appeals, 2 were submitted but undecided at the end of the fiscal year and the court retained jurisdiction in 5 previously remanded cases.

A tabulation of cases decided and pending in the courts for fiscal 1959 follows:

	Supreme Court	Court of Appeals 402(b)	Court of Appeals 402(a)	Court of Appeals (neither 402(a) nor 402(b))	District courts	Total
Total	14	65	30	7	6	122
Cases affirming Commission	[1] 1	14	7		6	28
Cases reversing Commission	3	9	3			15
Cases dismissed on jurisdictional grounds or by agreement of the parties or as being moot		10	2	1		13
Cases in which mandamus to Commission was denied				6		6
Actions denying certiorari by parties other than Commission	9					9
Cases pending June 30, 1959	1	[2] 32	[3] 18			51

[1] The position advanced by the Commission as *amicus curiae* was affirmed in *Farmers Educational Union v. WDAY, Inc.*, — U.S. —, 3 L. Ed. 2d 1407.
[2] The court retained jurisdiction in 3 adjudicatory cases remanded to the Commission for special hearings.
[3] The court also retained jurisdiction in 2 appeals from rulemaking proceedings remanded to the Commission for special hearings.

LEGISLATION

Enacted Laws

During the 1st session of the 86th Congress, two measures were enacted which directly affected the activities of the Commission:

Public Law 86–8, approved April 3, 1959, provided that certain communication activities at the IX Plenary Assembly of the International Radio Consultative Committee, held in the United States in 1959, should not be construed to be prohibited by the Communications Act or any other law.

Public Law 86–75, approved June 30, 1959, amended, among others, section 4251 of the Internal Revenue Code of 1954 (12 U.S.C. 4251), to provide for termination of the tax on general telephone service, effective July 1, 1960.

FCC Legislative Program

The Commission submitted to the 86th Congress 10 proposals to amend the Communications Act which were introduced and included:

An amendment to sections 3 and 325(a) and a proposed new section 330, which would impose certain requirements on community antenna television (CATV) systems. The proposal would define the CATV systems covered therein; would require them to obtain the consent of the originating station for the redistribution to CATV subscribers of programs broadcast by such originating stations; and would require CATV systems to carry the programs of TV stations assigned to communities in which the CATV services operate (S. 1801, H.R. 6748). Insofar as CATV systems distribute programs broadcast by TV stations located elsewhere, they perform a function

basically similar to that performed by TV "repeater" stations. "Repeater" stations, which transmit signals by radio, come directly within the provision of section 325(a) of the Communications Act, which imposes the statutory requirement that a station rebroadcasting programs of another broadcast station first obtain the consent of the originating station. The Commission believes that it would be appropriate and desirable that Congress impose the same requirement on CATV systems. This proposal is also intended to afford TV stations an improved opportunity to maintain their services despite the competition for local audiences offered by local CATV systems.

An amendment to section 4(b), which would repeal the section of the Communications Act which permits the Commissioners to receive an honorarium for the presentation or delivery of publications or letters (S. 1735). A 1952 amendment to the act relaxed a prohibition against Commissioners engaging in any other business, vocation, profession, or employment by providing that this prohibition should not apply to the presentation or delivery of publications or papers for which a reasonable honorarium or compensation may be accepted. The Commission feels that the reasons which led to the adoption of this exemption are outweighed by the ambiguities as to its extent and coverage and, accordingly, recommended its repeal.

An amendment to section 5(c), to redefine the duties and functions of the Commission's review staff (S. 1738, H.R. 6573). Its purpose is to afford the Commission greater discretion in the utilization of the review staff provided for by that section. The principal advantage of the amendment would be to expedite the disposition of adjudicatory cases by permitting the professional staff of Opinions and Review to assist the Commission more fully than at present on those matters which do not involve final disposition, thus allowing the Commissioners to concentrate their attention on the important questions of policy, law, and fact coming before them.

An amendment to section 202(b), to expand the Commission's authority to regulate charges and services of common carriers for the use of microwave and other point-to-point radio circuits (use of wires only is now provided) in chain broadcasting or incidental to radio communication of any kind (S. 1740, H.R. 6571). This was recommended because of the increasing use of such radio facilities interchangeably with wire service in providing network service and control circuits furnished by common carriers to broadcasters and other radio users. It is further necessary and desirable because such amendment will give a clear statutory direction to the Commission of its responsibility in this field.

An amendment to sections 219, 308, and 319, to eliminate the requirement of an oath or affirmation on certain documents filed with the Commission (S. 1736, H.R. 6127). This requirement imposes a burden on the public, and also on the Commission in instances where the applicant omits the required oath or affirmation. In such cases the workload of the Commission is increased to the extent necessary to return reports or application forms for the required verification. This slows up consideration by the Commission of the matters involved and the processing of applications. Inconvenience and delay to the public result. Title 18, section 1001 of the United States Code, now provides that whoever makes any false or fraudulent statements or representations concerning any matter within the jurisdiction of any department or agency of the United States shall be punished by a fine of not more than $10,000 or imprisoned for not more than 5 years, or both. In addition, the Communications Act provides in section 312(a) that a station license or construction permit may be revoked for false statements knowingly made in an application or in any statement of fact which may be required under section 308.

An amendment to section 309(b), to eliminate the requirement for a prehearing notice to the applicant and known parties in interest before an application is designated for hearing (S. 1733, H.R. 6572). The purpose of the notice is to afford the applicant an opportunity to correct deficiencies in his application and thus avoid the necessity for a hearing. Rarely does the response to the section 309(b) notice obviate the necessity for a hearing and, in view of the impact of the notice requirement upon the processing of applications, the Commission urged that the requirement for a prehearing notice be eliminated entirely. In most cases, the applicant knows, or has the means to know, the nature of the objections to his application, so that a 309(b) notice serves no useful purpose. Inasmuch as section 309(b) notices are now required in more than 80 percent of the AM broadcast applications, the impact upon the Commission's workload is apparent.

The entire protest procedure provided for by section 309 of the Communications Act (47 U.S.C. 309) has been under study by the Commission and the Federal Communications Bar Association. At their request, bills to amend revised section 309 were introduced in the 86th Congress (S. 1898 and H.R. 7017). The Commission has worked with the association and there is mutual agreement on modifications of the Commission's proposals, which modifications are reflected in S. 1898 as passed by the Senate on August 19, 1959.

An amendment to section 318, to remove the explicit requirement that transmitting equipment of broadcast stations be operated by license operators (S. 1741, H.R. 6471). In recent years the art of transmitting has advanced tremendously and the Commission believes that it should have greater statutory latitude as to the requirements for operators of broadcast transmitting equipment. For instance, at present there may be an inference in section 318 that the operator be in personal attendance, whereas in some situations the Commission believes that it is enough for the operator to turn the equipment on, have it operated under his general control but not be in personal attendance. This situation is particularly true of transmitters engaged solely in rebroadcasting.

An amendment to section 319(d), to permit the Commission to grant licenses to TV installations engaged solely in rebroadcasting signals if they were constructed on or before January 1, 1959, and if the Commission finds that the public interest, convenience, and necessity would be served thereby (S. 1739, H.R. 6471). The Commission has been endeavoring to work out a satisfactory plan for authorizing TV service to isolated areas. In the meantime some communities have devised their own systems. Under the Communications Act, however, the Commission is prohibited from licensing facilities constructed before the Commission granted a construction permit.

An amendment to section 409(c)(2), which would prohibit any person (not only those who have participated in the presentations or preparation for presentation in any case of adjudication which has been designated for a hearing by the Commission) from directly or indirectly making any presentation respecting such case (other provisions of section 409(c)(2) to remain unchanged) (S. 1734). The objective is to clarify the present section 409(c)(2) as it does not contain an explicit statutory prohibition against any other person, not identified therein, making a presentation to an examiner or a Commissioner in such a case after it has been designated for a hearing; nor is there a specific statutory requirement that any such person shall give notice of his presentation so as to afford an opportunity for all parties in the case to participate.

An amendment to title V by amending section 504(b) and adding a new section 508, to authorize the imposition of forfeitures for violation of certain of the rules and regulations of the Commission in the common carrier and safety and special fields (S. 1737, H.R. 6574). Its purpose is to give the Commission authority to impose fines for violations by radio stations in these fields. The need for this legislation is emphasized by the rapid and phenomenal expansion in the non-broadcast radio service. The Commission has found that its

existing sanctions are inadequate to handle the situation. Present sanctions, such as criminal penalties, revocation of licenses, and issuance of cease and desist orders, are too drastic for the relatively minor types of offenses involved, and too cumbersome and time-consuming considering the multitude of violations that occur.

In addition, two other Commission proposals were pending at the close of the fiscal year in the Bureau of the Budget for coordination with other Government agencies concerned. They were:

An amendment to exempt persons serving in the FCC unit of the National Defense Executive Reserve, who are not otherwise employed by the Commission, from the conflict-of-interest provisions of section 4(b) of the Communications Act which prohibit any "member of the Commission or person in its employ" from having, for example, a financial interest in the manufacture or sale of wire or radio apparatus. These provisions have been found to be unduly restrictive and have deterred well-qualified persons from serving in the Commission's National Defense Executive Reserve Unit.

An amendment to section 1114 of title 18 of the United States Code (and by reference thereto section 111 of title 18) to include as a Federal criminal offense the killing or assaulting of certain employees of the Commission while engaged in the performance of their inspection duties. The enforcement of the Communications Act of 1934, as amended, and its rules and regulations, involves physical dangers and risks to employees who serve in the capacity of inspectors pursuant to that act. The Commission feels that its enforcement arm should be strengthened and that offenses against its employees should be punished in the same manner and to the same degree as are offenses against the Federal employee now designated in section 1114 of title 18 of the United States Code.

Legislation Affecting the FCC

In the 86th Congress more than 250 bills and resolutions affecting the Commission directly and indirectly were introduced (some 200 in the House and 50 in the Senate). This proposed legislation included such subjects as:

Prohibiting the authorization of subscription TV.

Directing the FCC to authorize the use of VHF boosters to bring TV to remote communities.

Establishing a community TV bureau to aid small communities in obtaining TV service.

Amendments to exempt "news" programs from section 315 of the act relating to equal-time broadcasting for political candidates; and to restrict the application of that section to the major candidates.

Spectrum management and utilization.

Authorizing funds for educational TV.

Payments to local and state governments (in lieu of property taxes).

Ethics, conflicts of interest, and standards of agency conduct.

Advertisements of alcoholic beverages in interstate commerce.

Implementation of recommendations of the Legislative Oversight Committee.

Terms and conditions for the Government selling its Alaskan communication facilities.

Limiting the applicability of antitrust laws to broadcasting certain professional sports events.

Establishment of a military or auxiliary radio service (MARS).

Giving the Commission jurisdiction over broadcast networks.

Congressional Committee Work

A significant portion of the Commission's efforts during the year was devoted to attendance at congressional hearings, preparing testimony and exhibits, and furnishing information to such committees concerning the FCC and its functions.

The Communications Subcommittee of the Senate Interstate and Foreign Commerce Committee held hearings on Commission legislative proposals to the 86th Congress. This subcommittee also held hearings on bills relating to political broadcasting (sec. 315 of the Communications Act) and collateral matters involving equal-time opportunities for candidates for public office.

The Communications and Power Subcommittee of the House Interstate and Foreign Commerce Committee held hearings on political "equal-time" bills and, in addition, conducted a panel discussion on spectrum utilization.

The Special Subcommittee on Legislative Oversight of the House Committee on Interstate and Foreign Commerce also conducted a panel discussion concerning administrative problems of the independent regulatory agencies.

During the fiscal year the Commission submitted to the appropriate committees of Congress and the Bureau of the Budget comments concerning 104 legislative proposals which had been referred to the Commission for study.

National Defense

DELEGATION OF EMERGENCY POWERS

In time of war or other national emergency the President, under section 606 of the Communications Act, has certain powers to deal with wire and radio communication and devices capable of radiations which could be used as "homing" beams to guide enemy aircraft and missiles.

This authority covers closure or utilization of facilities in such an emergency; establishment of priorities for essential communications, and employment of the Armed Forces to protect communication facilities. Severe penalties are prescribed for convicted violators.

Since 1951 the FCC, under Presidential directive, has established and enforced regulations concerning electromagnetic radiation from noncommunication devices.

CONELRAD

CONELRAD is a code word meaning *CON*trol of *EL*ectromagnetic *RAD*iation. It is a voluntary program prepared at the request and with the cooperation of the Department of Defense and the Office of Civil and Defense Mobilization. In addition to minimizing the navigational aid an enemy might obtain from radio emissions, it encompasses a variety of classified projects. It seeks to mobilize, for emergency purposes, the entire non-Government communications industry at no capital cost to the taxpayer.

CONELRAD plans have been completed and implemented for the majority of the radio services authorized by the Commission.

These plans establish means for dissemination of the CONELRAD radio alert to all radio stations. Upon notification of a CONELRAD radio alert, all AM, FM, and TV stations leave the air after making a short announcement. Certain designated AM stations return to the air and broadcast civil defense messages and other pertinent information on the emergency broadcast frequencies of 640 and 1240 kilocycles. Stations in other radio services whose operation is essential to the national safety or the safety of life and property are permitted to operate in a controlled manner. All others must remain silent until the CONELRAD radio all clear has been issued.

The CONELRAD radio alert is invoked by the Commander in Chief, North American Air Defense Command, and is transmitted to certain designated key broadcast stations which in turn broadcast the CONELRAD attention signal and follow it immediately with the alert message. All other broadcast stations, as well as stations in other radio services, are required to monitor a key broadcast station in order to receive the alert message and thereafter comply with prescribed procedure.

The Commission, in cooperation with the U.S. Air Force and the U.S. Weather Bureau, has put the CONELRAD alerting system to an important peacetime use in addition to its national defense purpose. In the event of a threat by the elements to life and property, the local weather bureau advises certain cooperating broadcast stations which, in turn, broadcast the attention signal and the weather bureau advisory notice. This is done on the station's normal frequency.

A nationwide CONELRAD drill was held on April 17, 1959, for a 30-minute period beginning at 11:30 a.m., EST. Participation was mandatory for all broadcast stations. All other classes of radio stations were not required to take part. Reports indicate that the drill was most successful and that the service areas provided by the Emergency Broadcasting System stations during daytime hours extended considerably beyond that predicted.

Under authority set forth in Executive Order 10312, the Commission has appointed advisory committees to assist it in executing the various provisions of that order.

A National Defense Advisory Committee has been appointed consisting of representatives from each of the organized radio services licensed by the Commission. The purpose of this committee is to further formulate and develop plans to be used in the event of a national emergency, including but not limited to—

Implementation of approved CONELRAD plans.

Development of standby emergency communication facilities.

Development of backup communication facilities where leased facilities failure would be involved. Such backup facilities would be used only until normal leased facilities are restored to service.

Development of plans to restore normal operation as expeditiously as possible following the issuance of the CONELRAD radio all-clear.

Assist the military and Federal, State, and local civil defense officials in the performance of their duties, consistent with the provisions of the Communications Act, rules and regulations of the Commission, and related Executive orders issued by the President.

State Industry Advisory Committees have been organized in substantially all of the States. These committees are for the purpose of cooperating with local, State, and Federal civil defense as well as military authority in the field of emergency defense communication.

There has been significant progress in planning and testing communication systems utilizing authorized privately owned radio facilities as an emergency backup in the event of disablement of common carrier facilities. These projected systems interconnect many radio facilities at minimal cost, thereby providing an efficient and reliable communications network.

Being charged with the responsibility of maintaining communication facilities in times of emergency, the Commission appreciates the understanding and teamwork of the Nation's industries, its military and political authorities, and its civil population in establishing this essential part of the national defense program.

A considerable portion of the CONELRAD activity is classified and cannot be included in a public report of this nature. These projects can be generally described as including the development of a privately owned radio backup for common carrier wire and cable facilities, and extension of CONELRAD radio coverage in the event of disaster. The CONELRAD staff, in conjunction with the Department of Defense, is also engaged in the development and implementation of various classified projects.

OCDM REGIONAL BOARDS

The Commission continues to cooperate with military and civil government agencies concerned with emergency communication facilities and planning. One of these, the Office of Civil and Defense Mobilization, has set up eight regional boards to take control of emergencies. An FCC district engineer has been assigned to each regional board to participate in its planning and operations. This will be especially important during expected "cutoff" periods when communication cannot be maintained with relocated central offices.

A particular project is to set up a special network for a Presidential broadcast in connection with the alert program to cover as much of the country as possible. This network will include all present national AM networks with such regional nets as can be rapidly interconnected, the purpose being to deliver the President's emergency messages directly to the general public.

In further cooperation with OCDM, selected FCC monitoring stations are being tied into the former's regional offices by short-range radio circuits in order to use the Commission's monitoring wire and radio communication facilities in an emergency. Because of obligations of higher priority, the present agreement covers the handling only of a limited number of service messages when needed to assist in maintaining emergency OCDM communication.

In addition, several relocation sites have been established at strategic locations for use by FCC district offices in all-out emergencies.

During civil defense alert exercises, selected relocation sites were manned for joint operations with other Federal agencies to demonstrate the feasibility of current plans.

EMERGENCY COMMUNICATION

In order to provide emergency communication between the Commission's emergency relocation site and the monitoring network, a mobile radio unit has been placed in service. It provides facilities for radioteletype as well as radiotelegraph transmission and reception. Under normal propagation conditions its range is well over 1,000 miles so that any one of a number of the fixed monitoring stations may be contacted directly to act as a relay point to other stations if necessary.

OPERATION ALERT 1958

The Civil Defense Operation Alert 1958 covered 2½ days' activity during which time over 60 people manned the Commission's emergency relocation site simulating a national emergency and handling all FCC operations from this temporary headquarters.

Such exercises are necessary to test plans and determine changes. For example, certain needs immediately became apparent, such as protected centralized housing, offices, and food supplies. An electric power failure emphasized the need for a local emergency powerplant at the relocation site. A simulated breakdown in the wire communication system emphasized the importance of being able to maintain uninterrupted contact with district offices and emergency headquarters.

NATIONAL DEFENSE EXECUTIVE RESERVE

A National Defense Executive Reserve was authorized by Congress in 1955 and activated by an Executive order in 1956. Under its provisions, the OCDM established an Interagency Executive Reserve Committee composed of representatives of various Federal agencies, including the FCC.

The Commission completed the 25 appointments to its unit, which is comprised of recently retired FCC executives and qualified men in other branches of the communications industry or the professions to train for handling the problems which will arise due to the essential expansion in event of a national emergency.

During Operation Alert 1959 it was planned to give intensive training to FCC Executive Reservists and, for the first time, to have participation by the members of both the National and State Industry Advisory Committees.

DEFENSE STEERING COMMITTEE

To assist in the overall planning of defense matters, a Defense Steering Committee has been set up within the Commission. This committee is headed by the Defense Commissioner (Robert E. Lee) and includes representatives of each bureau and staff office. One necessary action was the establishment of a line of succession for key officials in case of a national emergency.

THE WAR YEARS

National defense aspects of wire and radio communication are indicated in the Communications Act of 1934, as amended. That statute provides for particular control of such facilities in a national emergency, and gives the President special powers in this connection.

Under such authority, the President in 1940 created a special Defense Communications Board to coordinate defense communication planning. Two years later it became the Board of War Communications, and functioned until 1947. During its existence the board was headed by then Chairmen of the Federal Communications Commission.

In 1940 the FCC established a National Defense Operations Section. Later known as the Radio Intelligence Division, it operated nearly a hundred monitoring stations in watching for illicit radio transmissions, detecting interference to wartime radio communication, and listening for distress calls by ships and aircraft. These functions were absorbed by the Commission's field engineering staff in 1946.

In 1941 the Commission organized a Foreign Broadcast Monitoring Service, which was renamed the Foreign Broadcast Intelligence Service the following year. Throughout the war this unit translated, analyzed, and reported on programs of foreign broadcast stations as recorded by the Radio Intelligence Division. Its work was taken over by the then War Department in 1945.

In 1942 the FCC set up an Interceptor Section which maintained liaison between the Army and the Commission for silencing radio stations on alerts of possible enemy attack; also a Security Section which helped to protect communication facilities against sabotage.

In all of these activities the Commission worked in close cooperation with military, civil defense, and industry interests. This joint planning and action resulted, among other things, in—

Banning amateur radio communications for the war's duration.
Placing ship radio under Navy control.
Requiring fingerprints and citizenship proof of radio operators.

Freezing new radio station construction to conserve materials needed for war.

Decreasing power of broadcast stations to prolong lives of vacuum tubes.

Relaxing requirements for commercial radio operators to relieve the manpower shortage.

Transferring less essential civilian radio frequencies to the Armed Forces.

Establishing new classes of radio stations for emergency use.

Developing means to prevent receiver radiations from revealing a ship's location to enemy submarines.

Registering transmitters, diathermy, and other radiofrequency apparatus capable of sending signals.

Cataloging surplus radio equipment for war use.

Issuing radio research authorizations in connection with war contracts.

Studying foreign-language broadcasts by domestic stations.

Closing domestic point-to-point radiotelegraph circuits, curtailing some international radiotelephone communication, but authorizing new communication routes to foreign points not served previously.

Granting extensions of wire line facilities only when needed for war use.

Investigating speed and adequacy of wartime telegraph services, prohibiting transmission of nonessential messages, and giving priorities to telegrams important to the war effort.

Checking employees of communication common carriers.

Requiring international carriers to retain originals of all oversea cable and radio messages.

Scrutinizing telephone and telegraph charges to forestall unwarranted increases.

Even while helping to handle such matters of the moment during the war, the Commission found time to take stock of electronic developments spurred by that conflict, and as early as 1944 opened hearings on prospective postwar frequency allocation needs.

Broadcast Services

NETWORK RULES

The Commission continued its consideration of matters arising out of the study of radio and TV network broadcasting, authorized by Congress in fiscal 1956. A special network study staff made its report to the Commission on October 3, 1957. Entitled "Report on Network Broadcasting," it has been published by the Government Printing Office as a report of the House Committee on Interstate and Foreign Commerce (H. Rept. 1297, 85th Cong., 2d sess.). This comprehensive staff study covers network practices with respect to stations and advertisers in TV, as well as of the multiple ownership of TV stations.

The report made specific recommendations concerning modification and enforcement of existing rules and new statutory authority. Commencing in March 1958, the Commission conducted a public hearing which afforded interested parties an opportunity to comment on the findings, conclusions, and recommendations of the report.

National Spot Sales

As a sequence to this hearing, the Commission on January 28, 1959, invited comments on a rulemaking proposal to prohibit TV station licensees from being represented in national spot sales by any organization which also operates a TV network. The principal issues were whether operations of networks restrain competition for national spot sales representation and restrain competition between national spot and network business. On the basis of its findings, the Commission in October 1959 adopted a rule to prohibit TV networks from serving as national spot representatives of their affiliated stations but gave them until December 31, 1961, to abandon this practice.

Option Time

As a result of the same public hearing, the Commission adopted detailed findings concerning "option time"; i.e., the term used to designate certain hours of the broadcast day during which network affiliated stations contract to carry sponsored network programs. The number of hours that may be optioned, and the conditions under which the option may be exercised, are regulated by Commission rule. The

Commission concluded that optioning of time by affiliates to their networks is reasonably necessary for successful network operation and is in the public interest.

On January 14, 1959, these findings were submitted to the Attorney General of the United States for an opinion on the applicability of the antitrust laws to the option-time practice. By letter of February 27, 1959, the Assistant Attorney General in charge of the Antitrust Division informed the Commission that, in his opinion, the option-time practice "runs afoul" of the Sherman Antitrust Act.

Thereafter, on April 23, 1959, the Commission proposed to amend its existing rules governing the option-time practice. The proposed changes are designed to improve the competitive position of other groups affected by option time, and the freedom of program selection of a station under its affiliation contract, while maintaining the essential features of the option-time practice. Interested parties were given until August 3, 1959, to comment on the TV option-time proposal, as well as to comment on the need for similar rulemaking with respect to the aural broadcast service.

Network TV Program Selection Practices

Because the staff network report did not include programing, the Commission subsequently undertook a study of this subject and, on February 26, 1959, initiated an investigatory proceeding into network TV program selection practices, including "tying-in" of programs with network time and facilities, attempts to control programming, attempts to restrict and exclude independent programs, and other related questions.

As a result of TV program revelations, this inquiry (docket 12782) was enlarged on November 9, 1959, for Commission review of its statutory authority to determine what, if any, action it could take in the matter of broadcast programing.

POLITICAL BROADCASTS

Lar Daly Case

On February 19, 1959, the Commission issued a series of interpretations on the applicability of section 315 of the Communications Act to certain newscasts by a number of Chicago TV stations. Its actions arose from the following facts: Lar Daly was a legally qualified candidate for nomination for mayor of Chicago in both the Democratic and Republican primaries. Mayor Richard J. Daley and Timothy P. Sheehan were mayoralty candidates in the Democratic and Republican primaries, respectively. Lar Daly complained to the Commission that the stations in question had in their newscasts shown film clips of his primary opponents and had refused his request for equal time.

The film clips showed Daley and Sheehan filing their nominating petitions, accepting political endorsements, certain political interviews, and Mayor Daley greeting the President of Argentina in Chicago and appealing for funds for the March of Dimes campaign.

With two exceptions, the Commission, by unanimous vote, held that the film clips constituted a "use" of the facilities of the stations under section 315 entitling Lar Daly to equal time. There was a 4-to-3 vote on the two exceptions; namely, Mayor Daley greeting the President of Argentina and appealing for contributions for the March of Dimes campaign.

The Columbia Broadcasting System and the National Broadcasting Co. (licensees of stations involved in the case) petitioned for reconsideration, and certain interested parties filed briefs in support of these petitions. On June 15, 1959, the Commission, by a majority vote, issued an interpretive opinion in which it denied the petitions. Two Commissioners dissented, and one Commissioner dissented in part and concurred in part.

The majority opinion held that there was no legal basis for exempting candidates on newscasts from section 315; that the appearance of a candidate on such film clips was a "use" of a station's facilities within the meaning and intent of section 315; and that under the circumstances the station permitted a benefit or advantage to accrue to the candidate, thus placing itself under the statutory obligation to extend equal opportunities to opposing candidates under the then-wording of section 315.

Subsequently, Congress amended section 315 to exempt from the equal-time requirement qualified candidates appearing on "bona fide" newscasts, news interviews, news documentaries, and coverage of on-the-spot news events without, however, relieving broadcasters of their obligation to operate in the public interest and to afford reasonable opportunity for the discussion of conflicting views on issues of public importance. It became law with the President's signature on September 14, 1959.

Comparable Time

In another case the Commission held that the requirements of comparable time do not require a station to make exactly the same period of time available to each candidate, nor does it have to make available the specific periods requested by the claimant candidate; that the station must treat rival candidates the same with respect to the use of its facilities and if it permits one candidate to use facilities over and beyond the microphone, it must permit a similar usage by other similarly qualified candidates; and reiterated that section 315 applies only to legally qualified candidates and not to authorized spokesmen.

Political Libel

Section 315 also prohibits a licensee from censoring the contents of a broadcast by a legally qualified candidate for public office. In 1948 the Commission held, in the *Port Huron Broadcasting Co.* case, that this prohibition prevents a station from censoring material in a political broadcast, including material which may be libelous. In April 1958, in the case of *Farmers Educational and Cooperative Union of America* v. *WDAY, Inc.*, the North Dakota Supreme Court affirmed a judgment for a defendant radio station involved in a libel action based on statements made in a political broadcast. The court held that where, as in this case, the station called the libelous material to the candidate-speaker's attention and had permitted its presentation only after he insisted as a matter of right under section 315, the station was absolved from libel by the provisions of that section. On June 29, 1959, the Supreme Court of the United States affirmed this decision.

"PAYOFFS" IN HEARING CASES

The Commission is evaluating comments in a rulemaking proceeding, inaugurated June 26, 1958 (docket 12509), proposing revision of the rules so that whenever consideration, including an agreement for consolidation of interests, is paid or promised in connection with the default, dismissal, or amendment of a broadcast application in hearing status, the applications of all parties to the agreement will be dismissed with prejudice. This proposal was prompted by the growing number of such cases.

The principal objection raised to this proposal is that it would bar compromises in broadcast hearing cases which often hasten the advent of new broadcast service. Several alternative proposals made in the comments would eliminate or penalize the filing of "strike" applications and the making of excessive payments.

REVISION OF BROADCAST APPLICATION FORMS

On November 24, 1958, the Commission invited comments (docket 12673) on proposed changes in the "Statement of Program Service" section of its broadcast application forms. The purpose is to reclassify the types of programs listed so as to render all classes descriptive of the substance of the program. A detailed analysis of the number and length of spot announcements is also proposed, reducing the period of such study, however, to the daytime hours of radio and nighttime hours of TV broadcasts. The required program log analysis would also be restricted to these hours. Comments by various associations, networks, multiple owners of broadcast facilities, individual licensees, and others are being studied.

STEREOPHONIC BROADCASTING

In the past, the broadcast of stereophonic programs has required the use of two separate transmission channels. Many AM, FM, and TV broadcast stations have transmitted such programs as a joint venture with other AM, FM, and TV stations.

The Commission has received petitions for rulemaking to permit stereophonic broadcasting in the AM, FM, and TV broadcast services whereby these programs can be transmitted by a single station utilizing new methods. Under developmental authority granted by the Commission, several stations are experimenting with various systems in an effort to gather needed technical information to support these petitions.

BROADCAST STATION SALES

Applications involving ownership changes of TV, AM, FM, and auxiliary broadcast facilities totaled 1,412 for the fiscal year, an increase of 17.3 percent over the previous year. Such AM applications rose from 741 to 917. It is interesting to note that the number of AM transfer applications 25 years ago was 82.

Although there was no increase in the number of sales of FM stations during fiscal 1959, the increase in the prices paid for FM stations in that period is another indication of the renewed interest in FM. One FM station in San Francisco and another in Los Angeles each brought a price of $100,000.

The Commission is completing a special legislative, administrative and judicial history of broadcast station transfer and assignment regulation under the Radio Acts of 1912 and 1927 and the Communications Act of 1934. It was prompted by a report of the House Special Subcommittee on Legislative Oversight.

EDITORIALIZING

More broadcast stations appear to be engaging in editorializing. However, during the year several additional stations were advised that in taking an editorial position against subscription TV without making any adequate effort to present the other viewpoint, they did not meet the standard of fairness set forth in the Commission's 1949 report on "Editorializing by Broadcast Licensees."

ANNOUNCEMENT OF SPONSORED PROGRAMS

A number of stations were advised that their failure to make the required sponsorship announcements while televising the kinescope summaries of the Kohler strike hearings conducted by a Senate committee in 1958 violated both the act and the rules. These summaries had been supplied by the National Association of Manufacturers.

In another case, the Commission ruled that on TV an oral announcement of sponsor identification need not be given if an appropriate visual announcement is being telecast.

PROGRAMS

Probably the most misunderstood phase of Commission regulation is that pertaining to broadcast programing. There is a popular but erroneous impression that the Commission has jurisdiction over individual programs. This misconception is reflected in letters it receives complaining about certain programs or urging that favorite programs not be dropped. But the fact is that, in general, the Commission cannot put any individual program on or off the air.

The reason is that the Commission is given less control of broadcasting than of telephone and telegraph services. While its regulation of common carriers extends to rates, practices, and even to bookkeeping, its authority over broadcasting is more limited.

Section 3(h) of the Communications Act, which governs the Commission, stipulates that a person engaged in broadcasting shall not "be deemed a common carrier." Consequently, Commission powers with respect to broadcast operation differ from those relating to telephone and telegraph services.

Further, section 326 of the same act specifically enjoins the Commission from acting as a censor. It says in that connection:

> Nothing in this act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication.

In view of these and other provisions of the law, the Commission has no say in the day-by-day programing of broadcast stations (other than requiring identification and certain other announcements), or the charges made for air time, employment, or salaries paid, labor relations, or other aspects of station internal management. It does, however, require the keeping of station logs, and the filing of periodic financial reports to enable it to evaluate the economic condition of the industry as a whole or in part. Unlike those of common carriers, financial reports of individual broadcast stations are not open for public inspection.

In brief, Commission supervision of broadcasting is confined to two major categories. The first deals with the allocation of portions of the spectrum to the different types of broadcast services. The second concerns the individual station, and embraces applications to build and operate; the assignment of specific frequencies, power, operating time, and call letters; the periodic inspection of transmitting equip-

ment and other engineering aspects of operation; passing upon transfers and assignments of facilities, also changes in existing authorizations; modifying and renewing construction permits and licenses; and issuing permits to radio operators to man the transmitters of these stations.

However, broadcast stations are required by the act to serve "the public interest, convenience, and necessity." Because radio channels are limited and are a part of the public domain, it is important that they be entrusted to licensees who have a proper sense of public responsibility.

The Communications Act sets up basic requirements which must be met by those who want to engage in broadcasting. In addition to being legally, technically, and financially qualified, applicants must show that their proposed operation will be in the public interest. It is the responsibility of each broadcast grantee to conduct his overall activities accordingly.

As far as programing is concerned, the Commission does not prescribe any percentages of time which should be devoted to particular subjects, such as news, education, religion, public issues, music, etc. That is something which must be determined by the station owner on the basis of local, budgetary, and other considerations. In other words, programing is the responsibility of the individual licensee.

Determination of program composition by station licensees can vary with the tastes and interests of the communities served. Thus, in an agricultural region, a station naturally features farm subjects. In some places the emphasis may be on religion, education, or music. In places where rival stations carry national network programs, the independent station must rely largely on local talent, transcriptions, etc. In small remote localities an AM station may, for economic reasons, have to depend primarily upon recordings.

The Commission does review the engineering, financial, and general service performance of a broadcast station, usually when it applies for renewal of license, to determine whether it has lived up to its representations and is operating in the public interest.

The Commission does not require the regular filing of program scripts or recordings, nor does it ordinarily monitor programs. Its review of a station's general performance is based upon the station's renewal application and the Commission's record of its past operation.

One section of the renewal form requires general information with respect to programing. The station submits logs and an analysis of its programing for a designated composite week. The broadcaster reports, percentagewise, on classifications of his programs by subjects, including commercials, for the composite week.

This comparison of present with past programing enables the Commission to determine whether a station licensee seeking renewal is continuing the program structure which he had previously represented to the Commission to be in the public interest. If there seems to be a serious discrepancy, the Commission withholds license renewal while it calls the station's attention to the discrepancy. The station is usually able to make an acceptable explanation or readjust its program schedule. Pending action on its renewal application, the station continues to operate.

While it does not pass upon the nature or length of broadcast advertising, the Commission's review of a station's performance does consider deviation from promised program service which tends toward constant interruptions of the program service in a manner not consistent with the public interest. Also, under a cooperative arrangement with the Federal Trade Commission, which has jurisdiction over false and misleading advertising on the air, the FCC notifies the station concerned of broadcast advertising cited by the FTC so that these stations may take any necessary action consistent with their obligation to operate in the public interest.

The Communications Act has an express provision (sec. 315) dealing with broadcasts by political candidates. It says, in effect, that if a station permits any legally qualified candidate to use its facilities, it shall afford equal opportunities to all other such candidates for that office, without power of censorship and any charges not to exceed comparable use of such station for other purposes. This applies only to the use of a station by a candidate personally and not to other persons speaking in the interest or support of a candidate. In 1959, section 315 was amended to exempt from this section an appearance by a candidate on a "bona fide" newscast, news interview, news documentary and on-the-spot coverage of a bona fide news event.

Other than the provision affecting political candidates, neither the act nor the rules require a station to afford "equal time" for the purpose of replying to a controversial issue of public importance which has been discussed over the station. However, the 1959 amendment to section 315 contains a provision that broadcasters are not relieved of their obligation to operate in the public interest and to afford reasonable opportunity for the discussion of conflicting views on issues of public importance.

In its report on "Editorializing by Broadcast Licensees" in 1949, the Commission then, and has since, held that freedom of speech on the air must be broad enough to provide equal opportunity for presenting both sides of public issues. Under such a condition, broadcast station licensees have the right to editorialize.

The U.S. Criminal Code contains provisions, formerly in the Communications Act, which prohibit broadcast of advertising or information concerning "any lottery, gift enterprise, or similar scheme, offering prizes dependent in whole or in part upon lot or chance," and utterance of "obscene, indecent, or profane language" over the air. These provisions are reflected in the Commission's rules. Courts have held that the usual type of broadcast "giveaway" program is not a lottery.

Letters received by the Commission complaining about program matters not under its jurisdiction are acknowledged with explanation of why the Commission can take no action. Complaints which may come within its authority are sent to the networks or the individual stations concerned; this affords an opportunity for the stations to submit comments. Upon receipt of the reply, the Commission evaluates the evidence and determines what action, if any, is necessary. Such complaints are likewise acknowledged and the complainants are notified of the result of the Commission's inquiry. Complaints involving false and misleading broadcast advertising are referred to the Federal Trade Commission. Complaints alleging fraud over the air are referred to the Department of Justice.

In cases of gross violation of the Communications Act or its own rules, the Commission can either order a hearing on the renewal application or a proceeding looking toward revocation of license. The latter is the method usually followed. Some broadcast station licenses have been revoked, but these were mainly because of hidden ownership, misrepresentation, faulty engineering, or continued and willful violation of the technical rules.

The Commission does not license networks as such; only individual stations. However, station licensees are subject to certain "chain broadcasting" rules adopted by the Commission in 1941 to further competition in broadcasting. Recommendations of a special staff study of network broadcasting were the subject of a Commission hearing in 1958.

There is a Commission rule against the same person or group from operating more than one network, or more than one commercial broadcast station of the same type (AM, FM, or TV) in the same area, or more than seven AM, seven FM, or seven TV commercial stations throughout the country as a whole. Not more than five of these TV stations can be in the VHF band. Persons convicted of antitrust violations are, under section 313 of the Communications Act, subject to license revocation.

The Commission does not license radio sets that are used for reception only, nor does it regulate their production, sale, or servicing. However, it does impose limitations on any radiations from such sets

which may interfere with broadcast or other air communication services.

TELEVISION (TV) BROADCAST SERVICE

Television Allocations Problems

TV has grown phenomenally under the policies adopted in 1952. Nevertheless, it has become increasingly evident that the present TV channel allocation system fails to provide sufficient opportunity for expansion and attainment of a nationwide TV service.

UHF has not lived up to expectations by developing as an integral part of a nationwide competitive system. On the other hand, station growth has nearly reached its ceiling within the 12 VHF channels. Only 70 commercial VHF assignments within the continental United States are open for new stations under present minimum spacing requirements. These potential assignments are in sparsely populated areas of the North Central and Western States and few, if any, can be moved to areas where demand exists for additional stations. The only other possibility for station growth is within the 70 UHF channels, upon which only minor clusters of stations now survive.

As of July 6, 1959, there were 437 VHF and 75 UHF commercial TV stations in operation in 267 markets. These figures have changed but little in the past 2 years. Almost half of the 370 permits issued for UHF stations since 1952 have been voluntarily surrendered, and 92 of the 167 UHF stations which were built and operated are now off the air. A commercial nationwide survey in the spring of 1958 reported 3.2 million TV homes viewing one or more UHF stations as compared to 3.7 million UHF homes reported in a 1956 survey. Recent statistics of TV set manufacturers indicate that production of all-channel receivers (for both VHF and UHF reception) has dropped below 10 percent of total production. Also, only 26 of the 75 commercial UHF stations in operation during the first half of 1958 reported a profit.

The failure of UHF to develop has led to a critical shortage of stations in many important markets. Of the top 103 TV markets, 36 have less than 3 VHF or 3 UHF stations. In nearly all of these 36 markets, the shortage of comparable facilities creates a serious obstacle to fully effective competition. Many of the 36 markets contain the country's largest population centers, such as Hartford-New Haven, Grand Rapids-Kalamazoo, Birmingham, Providence, Dayton, Toledo, Syracuse, and Rochester. UHF stations are operating in only 11 of these 36 markets in competition with VHF stations; in the other 25, UHF has failed in 8 and has never been attempted in 17. Outside of the top 103 TV markets, UHF is operating in 33 com-

munities, mostly in areas where little VHF service is available because of distance or terrain. All but 5 of these 33 communities have UHF stations only.

The Commission, the Congress, and the industry have given particular attention to this problem for a number of years. In a general rulemaking proceeding extending over a 9-month period in 1955–56 (docket 11532), the Commission made an exhaustive study of possibilities for improvement of the TV situation. However, no proposal was found which warranted adoption at that time on the basis of the information at hand and without further study and evaluation.

A general allocation study was accordingly launched to explore the various possibilities for major long-range changes in the TV allocation structure which might facilitate improvement and a fuller expansion of the nationwide competitive TV service. One possible basic course of action—the shift of all or a major part of TV to the UHF band—was earmarked for special consideration. Pending the outcome of this long-range study, the Commission has also been endeavoring to improve the TV situation by the deintermixture of VHF and UHF assignments in those communities where it was able to find that such action was feasible and offered realistic prospects for additional stations.

Television Allocations Study Organization

In considering alternative allocations, the Commission has taken into account generally the comprehensive and useful technical data contained in the report furnished by the Television Allocations Study Organization (TASO) in March of 1959. This organization, composed of representative segments of the TV industry, has been working since it was formed on January 1, 1957, at the instance of the Commission, on a program of research into the technical aspects of present and potential VHF and UHF–TV service. The TASO studies include transmitting and receiving equipment, prediction and measurement of signal propagation, and subjective determinations of picture quality levels, together with field tests and theoretical analysis of TV service. (See further mention in chapter on "Research and Laboratory.")

TASO's functions were limited to technical study, factfinding, and interpretation of technical data, and its report made no recommendations as to any specific TV technical standards which should be adopted. Complete data were supplied, however, from which a choice of specifications could be made. Also, the TASO data on equipment were based on current design and performance and contain no estimates of possible future improvements. The work of

TASO is substantially completed except for tests of directional transmitting antennas, certain other unfinished studies, and a supplemental report dealing with an analysis of the accumulated data.

Deintermixed VHF–UHF Systems

In the 1956 allocation proceeding, the Commission noted the inherent shortcomings in an extensive nationwide deintermixture program, including the undesirability of eliminating VHF assignments in areas with little UHF set saturation, the inability to carve out significant areas in which UHF could grow because of the penetration of most areas with signals from VHF markets, and the likelihood that elimination of local VHF assignments would deprive substantial areas of existing service. It was hoped, however, that deintermixture would be a helpful interim measure pending adoption of a long-range allocations solution by serving to increase competitive outlets in some communities, establish a core of viable UHF markets, and arrest deterioration in the UHF industry.

Experience with deintermixture has been disappointing. The possible communities in which deintermixture could be justified have been restricted by such relevant considerations as the limited opportunity to drop in VHF assignments at approved minimum spacings, the necessity of rearranging assignments or station antennas in other communities, the danger of creating "white" areas, the availability of multiple VHF signals from nearby major cities, unfavorable terrain, and insufficient UHF set conversion. Procedural delays caused by adjudicatory requirements in cases where VHF assignments were ordered to be removed have also served to minimize immediate benefits from deintermixture.

In order to reevaluate the situation, studies were made during the year of deintermixture, both on a selective community and on a general area basis. In the selective community study, 23 communities containing approximately 1 million homes were considered for deintermixture to all UHF. Generally, these communities are in markets which have one VHF and one or more UHF assignments, and are reasonably distant from VHF-only markets. Transition to UHF in these markets would be a slow and difficult process. Penetration of VHF signals into some of these communities could not be avoided. Thus, UHF in Lancaster would be subjected to competition from Philadelphia VHF stations, UHF in Manchester from Boston VHF stations, and UHF in Flint from Detroit VHF stations. The impact on UHF set production would not be great since the homes in those communities have some UHF set distribution.

For the UHF area deintermixture plan, a solid and sizable area containing about 12 million homes was considered by including a

chain of communities having UHF experience and expanding it to encompass nearby and interspersed VHF communities. This would require deintermixing many large markets with little or no previous UHF experience, such as Cincinnati, Atlanta, Louisville, Indianapolis, Columbus, Rochester, Dayton, Toledo and Syracuse, and deleting some 90 VHF stations.

Among the deficiencies of this approach are that the basis for the selection of deintermixture areas is too vague to prevent "discrimination" as among communities, that the dislocation required is too substantial, that there is no assurance that all receivers would thereafter be all-channel sets, and that there would be little or no additional opportunities for communities within VHF-only areas to have a local outlet or multiple stations.

12 VHF System

Evaluation of various methods of extending the use of the present 12 VHF channels, from reducing present minimum cochannel and adjacent channel spacings to an overall reshuffling of TV assignments, demonstrate that it is virtually impossible within the confines of 12 channels to have both sufficient competitive outlets in the major markets and local outlets in a large number of communities.

The possibilities of using precision offset and directional antennas were also considered. The latest available data do not indicate that either of these techniques can overcome the inherent limitations of a 12-channel system. The Commission's studies indicate that, because of the geographical distribution pattern of cities, a significant increase in assignments is possible only if cochannel minimum spacing is reduced to the order of 100 miles. Indications are that if new stations were squeezed in at reduced cochannel spacings of a minimum of about 100 miles, coverage of both the new and established stations would be limited to 25–30 miles.

Alternative Courses of Action

Fifty-channel system (retaining present 12 VHF channels).— Studies of sample assignment plans indicate that it is possible with 50 channels within and adjoining the VHF band to provide sufficient assignments to reasonably meet present and future TV needs. This plan is premised on study of 19 States east of the Mississippi River and north of Tennessee and North Carolina, because the problem of equitable allocations is the greatest in this area due to population density and concentration of cities. Present minimum cochannel (170 miles) and adjacent channel (60 miles) spacings, as well as required protection to Canadian assignments, were employed. This plan would permit at least five stations in all major TV markets, and

would provide liberally for local outlets elsewhere. Every operating or authorized VHF or UHF station could have an assignment. At least 1 channel could be assigned in this region to every community of 35,000 population or more in a county of at least 50,000 population. Educational TV assignments could be made to large markets and to smaller important educational centers.

This plan would require an additional block of 228 megacycles above channel 13, which is now allocated to the Government except for a few megacycles whose use is shared by the amateur, aeronautical, radionavigation, and meteorological aids services. An exchange of spectrum space with the Government and the move of these non-government services to other frequency bands with similar propagation characteristics would be required. The present UHF allocation (470–890 Mc.) could be released for other radio services. However, 24 channels (300–444 Mc.) would extend into the lower portion of the UHF spectrum, and they would be more subject to certain undesirable effects, such as shadows, and would not permit as extensive service areas as the present 12 VHF channels.

Transition to this expanded VHF system could be expected to take at least a decade. It would involve large expenditures by the Government for conversion of existing facilities, also require cooperation with other nations, and cost the public additional for all-channel sets.

Fifty-channel system (retaining channels 7–13).—An alternative system considered is a continuous 50-channel system which begins at 174 megacycles (channel 7) and extends upward to 475 megacycles. The spectrum space above channel 13 up to 450 megacycles is now almost entirely allocated to the Government, and the space between 450 and 470 megacycles to the non-Government land mobile radio services.

This alternative would release TV channels 2–6, as well as the UHF channels 14–83, and might better serve the needs of various communication services for additional VHF to UHF spectrum space than a 50-channel plan retaining channels 2–13. There may also be some economies in set design and production in a continuous band.

This plan would, however, be subject to the same complex and costly conversion and transitional problems as the alternative 50-channel plan. Moving existing stations from channels 2–6 to new assignments above 216 megacycles would also involve additional costs and reduce their present service areas. If such shifts were opposed, as must be presumed, the resulting adjudicatory process could be so time consuming and burdensome as to discourage this solution.

Twenty-five-VHF channel system (retaining channels 7–13).—Another alternative studied would allocate 25 contiguous VHF chan-

nels to TV, beginning at channel 7 (174 Mc.) and continuing to 324 megacycles. Under this plan, TV would lose channels 2–6 and would obtain additional spectrum space between 216 and 324 megacycles from the Government. This approach recognizes the possibility that national defense and other considerations might make the allocation of 50 channels to TV infeasible.

Studies indicate that 25 channels approximate the minimal number needed to correct serious deficiencies in the present TV system. A 25-channel system would not be as flexible or permit the expansion possible in a 50-channel system. With presently required minimum spacings, a 25-channel plan would allow 5 stations in most of the top 100 TV markets but with limited opportunities for growth above this minimum. It could not meet community needs for local outlets.

In 65 communities selected in the test area as requiring 1 assignment (at least 35,000 city and 50,000 county population), all 65 could have 1 under a 50-channel plan, but 15 of the 65 could not under a 25-channel plan. With different specifications, such as limiting top markets to four assignments, more assignments could be available for smaller communities. Overall, a 25-channel system would permit moderate expansion in the total number of present stations. Substantial spectrum space in the UHF and VHF bands could be released for other radio services. However, these benefits must be weighed with the costs of a changeover from the present system.

Present 82 VHF–UHF system, with all sets capable of receiving both VHF and UHF.—As long as the bulk of home receivers are equipped to receive only VHF, the present intermixed system will not work satisfactorily. This handicap might be removed by a statutory requirement that all TV sets shipped in interstate commerce be equipped to receive both VHF and UHF channels. This would result in automatic conversion over the next 10 years as the public replaced old sets with new sets. It would also make it potentially possible for UHF stations to reach all TV homes in their communities. This might be the stimulus needed for widescale UHF development.

If effective, this course would have many advantages. The 12 VHF channels would insure wide-area service to rural and fringe populations. The 70 UHF channels would permit multiple stations in the major markets and local outlets in over 1,000 communities. UHF could grow with a minimum of disruption to the present TV structure and to the public. Both existing and potential UHF stations would be aided by the conversion of more and more homes to UHF.

Nationwide distribution of all-channel sets would, however, involve higher costs to the public unless the costs of all-channel sets and antenna and installation could be lowered to the VHF-only level—the

differential now averages about $25. With only all-channel sets on the market and the pressure of competition, this might happen. However, improvements in UHF equipment and other factors could increase production costs and result in higher prices for all-channel sets for a time at least.

Even if all-channel sets were in general use, it is questionable whether an intermixed VHF–UHF system would prove competitively feasible in markets with multiple VHF stations. Propagationwise, UHF stations have a shorter service range and are more affected by "shadowing" effects from uneven terrain, tall buildings, and changing atmospheric conditions than VHF stations. These differences are handicaps in obtaining network affiliations and national advertiser support.

Seventy-channel UHF system.—The merits of assigning all or a substantial portion of TV to the UHF band were given extensive consideration in the 1956 allocation proceeding. This approach to a long-range solution was found to warrant further study since, if feasible, major benefits might ensue. Among these would be that no reallocation of other radio services would be required, that no international problems would be engendered, and that with 70 channels the long-run need for competing stations in the larger markets and for outlets in other communities could be adequately served.

An appraisal of the potential of UHF to supplant VHF coverage was deemed essential to ascertain the feasibility of this approach, and a program of research was undertaken to ascertain the extent to which UHF transmission and reception could be improved. TASO, as a joint industry group, has not been able to undertake equipment research and development programs because of antitrust considerations.

As part of its studies, the Commission has inquired into the current status of UHF equipment development. It has found that research and development in UHF is continuing but at a slow pace due to the present generally unfavorable economic outlook for UHF. Improvements from transmitters to receivers appear essential if UHF service is to equate more nearly with VHF service. There is no strong evidence that UHF overall can provide service substantially equal to VHF without major increased outlays by the public generally.

In its thinking on the all-UHF approach, the Commission is concerned about such factors as the timelag before necessary improvements in UHF equipment would be in actual use, the additional cost to the public for such equipment, the possible loss of national program services to the rural public if it must depend on local UHF stations, and the possibilities that some proportion of TV families would be deprived of existing service.

Satellite Stations

Since 1954 the Commission has authorized some TV stations to operate on a "satellite" basis. These stations have the same status as regular TV stations and operate on channels allocated to their respective communities. They are not, however, required to originate local programs or maintain studios. Usually they are in places without regular TV service. Most of them are owned by licensees of regular TV stations in the same general area and serve to extend the service of these stations. In many instances, satellites have installed local studio equipment and originated some local programing.

UHF Translators

To further help bring TV service to new areas, the Commission has since 1956 authorized UHF "translator" stations. These stations pick up the signals of regular TV stations and rebroadcast them on the 14 higher UHF TV frequencies (channels 70–83). Using relatively inexpensive and low-power equipment, their average cost of installation is now under $5,000. Until recently, translators were limited to a maximum power output of 10 watts with which they provided, on the average, good reception to a distance of 15 or 20 miles. In June of 1958 they were permitted to increase maximum power to 100 watts. Translators may not originate any broadcast material and must obtain the consent of the stations whose signals they retransmit. Typically, they are built and operated by nonprofit corporations or groups, or by local governmental bodies. Most translators are in the West.

VHF Boosters or Repeaters

Though the Commission has not authorized regular TV repeater service in the VHF band, many VHF repeaters (also called boosters) are in operation, particularly in the mountainous and sparsely settled areas of the West. They receive the signals of distant TV stations and retransmit them either on the same or another VHF channel. While the exact number of these installations is unknown, estimates run as high as a thousand or more. The typical VHF booster is quite simple and inexpensive. They are often built by local nonprofit groups.

Since boosters are presently illegal and could cause interference to other radio operation, the Commission in 1956 issued cease and desist orders against certain booster operators in Washington State. On appeal, this action was reversed by the Court of Appeals for the District of Columbia (*C. J. Community Services, Inc.* v. *FCC*, 246 F. 2d 660) on May 3, 1957. The court held that such orders should not issue automatically against such unauthorized operations and that other factors must be considered including whether, and on what

basis, the operations could be authorized. Thereafter, an extensive proceeding (docket 12116) was held to consider authorization of VHF booster operations. On December 30, 1958, the Commission concluded that such service could best be carried on by UHF translators since it did not appear that VHF boosters could operate as at present without threat of interference to TV and other radio services. Accordingly, booster operators were given a period of grace in which to apply for UHF translator facilities.

However, the demand for VHF booster authorization has continued and the Commission now has the matter under further study and has submitted to Congress proposals to amend sections 318 and 319 of the Communications Act, to clarify the present statutory requirements concerning operation of radio facilities only by licensed operators, and to remove the present prohibition against the licensing of broadcast facilities constructed without prior Commission authorization. The proposed section 319 amendment would permit the Commission to license, under appropriate restrictions, VHF boosters which were constructed before January 1, 1959, and to authorize new ones.

At the same time the Commission announced certain tentative minimum requirements which appeared necessary, including limiting maximum power output to 1 watt, prohibiting "on-channel" booster operation (on the channel of the picked up station), and providing for remote control and the designation of a qualified person to be responsible for technical supervision and emergency call. Further action looking toward rules and standards to govern booster operations or toward the licensing of such operations depends largely upon congressional consideration of the Commission's proposed legislation.

Meanwhile, the general "grace" period for unauthorized VHF booster operations was extended to September 30, 1959. The Commission also announced that if rules are adopted to license VHF boosters, a reasonable period will be given existing VHF boosters to conform. On September 10, 1959, the Commission announced that it needed additional time to complete consideration of proposals to license boosters and hoped to resolve the remaining problems by the end of calendar 1959. It, accordingly, extended the grace period for existing VHF boosters to December 31, 1959.

Community Antenna TV Systems

Community antenna TV (CATV) systems are installations consisting essentially of a master receiving antenna for reception of distant TV stations, and a cable system by which the received signals are distributed from the antenna to the home TV sets of subscribers. Since these systems do not transmit on the air, they do not require

Commission authorization. However, CATV's are subject to Commission rules which prescribe limitations on their radiations to prevent interference to licensed radio and TV services.

It is estimated that there are now some 700 CATV systems serving more than 500,000 subscribers (representing about 2 million persons) located in all but a few States. Pennsylvania leads in the number of systems and subscribers. The largest systems have at least 10,000 subscribers. The number of TV stations carried on each system ranges from one to seven or more. The majority carry at least three stations to afford subscribers a choice of programs. CATV systems are generally commercial operations, the subscriber paying an installation fee and a flat monthly charge which vary from community to community.

Economic Impact of CATV and Other Auxiliary TV Operation

In May of 1958 the Commission instituted an inquiry into the economic impact of CATV, translator, booster, and satellite operations on the development of TV broadcasting (docket 12443).

Claim of economic injury was advanced by a number of broadcasters, chiefly from Western States, in Senate committee hearings in 1958 and 1959, as well as in comments filed in the Commission's inquiry. There was one complaint of the effect on a TV station of the Commission's authorization of two translators to bring outside stations into the community. Another complaint concerned the impact on one TV station by a VHF booster presenting programs from a station located elsewhere.

For the most part, however, the broadcasters' complaints relate to the impact from CATV systems diverting a portion of the audience which the local TV station would otherwise have. In particular, broadcasters complain of large CATV's bringing in very distant "big city" stations, more than 300 miles away in some instances, via microwave common carrier facilities. In 1959 some 50 microwave relay systems served CATV's in about 75 communities.

In April of 1959 the Commission concluded that, while economic injury in these situations is undoubtedly present, it is difficult (and impossible in any of the situations actually presented) to determine when such injury reaches a point to threaten the continued existence of the local station or advent of a new station. Therefore, the Commission decided that drastic restrictive action such as barring the operation of CATV's in particular "impact" situations—which would amount to excluding signals from a market where persons are willing and able to receive them via CATV—would not be justified and that no authority to take action along those lines should be sought from Congress.

It was determined that there is no present basis upon which FCC jurisdiction over CATV's, as common carriers or otherwise, can be based. It was also concluded that possible economic injury to a broadcaster from a common carrier microwave-fed CATV is not legal ground for refusal to authorize such facilities. However, it was believed that amendments to the Communications Act should be sought to put into effect two of the broadcasters' proposals: (1) to require CATV systems to have the consent of the TV stations whose programs they carry, and (2) to require CATV systems to carry the programs of the local TV station on one of the CATV channels, if the local station requests it, and to do so without degrading the TV station's signal.

At the close of the year, a subcommittee of the Senate Interstate and Foreign Commerce Committee commenced hearings on the Commission's proposed legislation concerning VHF boosters and CATV's and on several other Senate bills on the same subject, including proposals to give the Commission jurisdiction to license and control CATV's.

Subscription TV

The question of authorizing a new type of service which would permit TV stations to transmit programs on a subscription basis is being explored in a rulemaking proceeding (docket 11279). Originally instituted in February 1955 in response to proposals involving different systems of subscription TV, this highly controversial subject evoked comments from more than 25,000 parties.

The Commission concluded in a first report, released October 17, 1957, that before it could make a realistic assessment of the merits of subscription TV, adequate trial demonstrations, suitably limited and controlled, were desirable. Conditions were specified under which such applications by TV stations would be considered.

In a second report, released February 27, 1958, the Commission deferred action on any applications until after the close of the 85th Congress in order to afford Congress an opportunity to consider pending legislation on the subject. Upon request of the House Interstate and Foreign Commerce Committee in July 1958, the Commission maintained the status quo so that the first session of the 86th Congress could resume consideration of this legislation.

Upon further review of the matter, and determination that a change in this policy would be consonant with current congressional consideration, the Commission on March 24, 1959, released a third report announcing that it was prepared to consider any appplications by TV stations conforming with the revised requirements and limitations set out in the third report.

The revised conditions look to 3-year trial authorizations limited to markets in which there are at least four existing commercial TV

services, to the trial of any system in only one market, to one trial subscription system per market, and to subscription programs being broadcast over only one local TV station at a time. Also, until the Commission is able to reach an ultimate decision as to whether a regular broadcast subscription TV service should be authorized, and if so on what basis, it has decided that the public should not be called upon to purchase any special equipments required for toll TV reception but not needed to obtain "free" TV broadcasts.

As of July 1, 1959, no applications were on file.

STANDARD (AM) BROADCAST SERVICE

Application Backlog

The Commission has been concerned about the mounting backlog of applications for new and major changes in AM broadcast facilities and the time elapsing between their filing and Commission action. This backlog has resulted from various factors, including accelerated filings and the time required to study each application because of the complexity of interference and other technical considerations.

One of the major delays is due to the necessity of reprocessing the same applications many times because of amendments changing the engineering proposals. To obviate this, the Commission on April 8, 1959 (effective May 16 thereafter), amended its rules relating to the filing of new applications for consideration with earlier applications. Under this new procedure, the Commission periodically publishes in the Federal Register a list of 50 applications at the top of the processing line and announces a date (not less than 30 days after publication) by which additional applications must be on file if they are to be considered with any of those listed. A new file number is assigned to an application when it is amended to change its engineering proposal other than with respect to equipment. Any application which has been assigned a new file number is treated as a new application filed on the day of its amendment.

Though applying to all broadcast services, a 1952 amendment to the Communications Act (sec. 309(b)) delays in particular the designation of AM applications for hearing. This provision requires the Commission to first notify each applicant of the reason he faces a hearing and give him time in which to reply even though the applicant is usually aware of the situation. Accordingly, the Commission on February 18, 1959 (effective March 2 thereafter), amended its rules to make possible the granting of an applicant's request for waiver of such notification, when other interested applicants join in the request, in order to expedite the hearing designation.

Clear Channels

The basic question to be resolved in the clear-channel proceeding (docket 6741) is what changes, if any, should be made in the use of the clear channels of the AM broadcast band which are available by international agreement for use in the United States. The class I stations which operate on these channels are designated to render skywave (long range) service as well as groundwave (short range) service. At night they reach extensive areas beyond the range of other classes of stations. The United States has priority for 25 stations on 25 of the 39 class I–A channels, and priority for 34 stations on 20 of the 24 class I–B channels.

Under the present rules, class I–A channels with two exceptions are not shared at night by the class I–A stations with any other domestic stations. The class I–B channels are so allocated that the class I–B stations share the same channel with one or more other U.S. stations and with foreign stations. Thus, listeners are afforded a relatively high degree of protection from interference in reception of class I–A stations, and a lesser, though substantial, degree of protection from interference in receiving class I–B stations. The skywave operation of clear channel stations is the only nighttime AM service available to approximately 25,631,000 persons in an area of about 1,727,000 square miles, which comprises somewhat more than half of the land area of the continental United States, with the exception of Alaska.

The fundamental conflict in the proposals for revision of the clear-channel rules lies between sustaining or increasing the capacity of the class I stations to render wide-area service and increasing the number of stations on these channels. Following an examination of the extensive record in the proceeding, the Commission on April 15, 1958, set forth its tentative conclusions. Comments were invited on proposals to open 12 specified class I–A channels in New York, Cleveland, Rochester, Chicago, Pittsburgh, St. Louis, and Philadelphia for additional unlimited-time assignments and to reserve for later determination proposals to increase power on the remaining class I–A channels. The class I–B channels would remain unchanged.

On September 18, 1959, the Commission proposed further rule-making to consider the assignment of new class II stations—1 each on 23 clear channels. It also provided opportunity for interested parties to update the record on proposals to increase the power of class I–A stations.

Daytime Skywave

In the daytime skywave proceeding (docket 8333) the Commission considered the desirability of amending the rules to provide, within

the areas served by class I clear-channel stations during daytime hours, a measure of protection against interfering skywave signals following sunrise and before sunset from cochannel stations. These skywave radiations cause increasing interference during the 2-hour interval before sunset, and decreasing interference during the 2-hour interval after sunrise.

On September 18, 1959, the Commission terminated this proceeding and adopted permissible radiation curves to protect class I clear-channel stations from future daytime or limited-time stations authorized to operate on those channels. It lifted the "freeze" on such new construction on six particular clear channels to increase that number to eight, but retained it on the other clear channels pending the outcome of the clear-channel proceeding.

Extended Hours Proposals for Daytime Stations

On September 19, 1958, the Commission decided in a rulemaking proceeding (docket 12274) not to adopt a proposal of the Daytime Broadcasters Association, Inc. (DBA), to extend the hours of operation of daytime stations from 5 a.m. or local sunrise (whichever is earlier) to 7 p.m. or local sunset (whichever is later), in lieu of the local sunrise to sunset hours now authorized. The proposal was rejected principally because it was found that the population which would lose service by the change, particularly in rural areas, would be vastly greater than the population which would gain service during the proposed nondaytime hours involved. The proposal would also involve interference to foreign stations inconsistent with international agreements. A petition of the DBA for reconsideration was denied on January 7, 1959.

In an effort to determine whether some extended hours for daytime stations might be possible without causing the extreme interference involved in the 5 a.m.–7 p.m. proposal, the Commission on January 7, 1959, instituted an inquiry (docket 12729) to ascertain whether rulemaking would be warranted on a proposal to permit daytime stations to operate from 6 a.m. or local sunrise (whichever is earlier) to 6 p.m. or local sunset (whichever is later). Upon reviewing the comments, the Commission on July 8, 1959, decided against this proposal. Its decision was based on the losses of AM service, both groundwave and skywave, which would result in the various areas affected. The Commission also was unable to find any expression of local need which could not be substantially fulfilled under existing rules.

Daytime Power Increase for Class IV Stations

The rules were changed July 7, 1958 (docket 12064), to provide for acceptance and consideration of class IV (local) AM station applications for increases in daytime power up to 1 kilowatt instead of the

former 250-watt maximum, utilizing directional antennas, if necessary, to protect other AM stations to the same extent as required previously. At the same time the Commission deferred final action on such applications until the new power maximum could be coordinated with other parties to the North American Regional Broadcasting Agreement (NARBA) and to the United States-Mexican Agreement.

On April 13, 1959, the Commission modified this so as to permit action on applications for class IV stations for power of over 250 watts on a local channel in all areas except those within 62 miles of the Mexican border or within a certain area in Florida (to protect Cuban stations).

By July 1, 1959, 355 applications by class IV stations to increase power over 250 watts had been filed.

North American Regional Broadcasting Agreement

The first serious effort to control interference between AM stations in the North American region resulted in an agreement signed at Havana in 1937. Signatories were the United States, Canada, Cuba, Mexico, the Dominican Republic, and Haiti. Mexico subsequently raised certain problems with respect to six channels which were resolved in a collateral agreement between the United States and Mexico only (the so-called "Gentlemen's Agreement").

The original North American Regional Broadcasting Agreement (NARBA) entered into force in 1941 and expired in 1946. It was succeeded by an interim agreement which, other than minor adjustments, extended the NARBA for a period of 3 years. Upon its expiration in 1949, Cuba refused to negotiate a new agreement and, for a while, made a number of assignments not in accord with the NARBA provisions which caused serious interference to AM service in the United States, particularly on the clear channels.

A new NARBA was negotiated in 1950 which would, upon its entry into force, require adjustments in Cuban assignments to minimize the interference caused by the uncoordinated assignments. Mexico was not signatory to this agreement, but subsequent negotiations resulted in the signing of a United States-Mexico bilateral agreement in 1957.

The NARBA will not become effective until ratified by three of its major signatories—Canada, Cuba, and the United States. Cuba ratified it in 1951 and Canada in 1957. The bilateral agreement with Mexico, of course, requires ratification by both Governments. To date, the United States has not ratified either agreement. In 1951 the President presented the NARBA to the Senate, and subcommittee hearings were held in July 1953 but no action was taken, possibly

because of opposition by a group of broadcasters known as the Clear Channel Broadcasting Service (CCBS). In July 1958, subsequent to negotiation of the bilateral agreement with Mexico, further hearings encompassed both agreements. In this second hearing the CCBS supported ratification, but another group known as the Daytime Broadcasters Association (DBA) opposed the agreement with Mexico and, again, no action was taken. At a further hearing in July 1959 the DBA continued its objection. Additional headings are scheduled in January 1960.

Opposition of the DBA, which represents some 150 of the approximately 3,500 AM broadcast stations in this country and is interested in added hours of operation for daytime stations (mentioned previously), is directed only against a provision of the Mexican agreement restricting the use of six Mexican clear channels by U.S. stations. This provision reflects continuation of a similar provision of the "Gentlemen's Agreement." The latter has no termination date, whereas the new bilateral agreement, which will supersede it, is for a period of 5 years.

In the last several years Cuba has made additional assignments not in accordance with the NARBA and it can be expected that further delay in ratification of the two agreements will result in a progressive deterioration of the present conditional status quo.

FREQUENCY MODULATION (FM) BROADCAST SERVICE

Commercial FM

Increased interest in commercial FM broadcast was manifest during the year. It was evinced by a net gain of 135 such authorizations, 74 more stations on the air, 8 fewer deletions, more competition for facilities (24 applications being designated for hearing), and by higher prices in station sales.

Except for portions of the northeastern part of the country and some of the larger cities (Chicago, Los Angeles, San Francisco, and possibly others), FM channels are still available. California appears to still lead all other States in FM interest—108 commercial FM stations are now authorized there. Seven States still have no FM stations—Alaska, Idaho, Montana, North Dakota, South Dakota, Vermont, and Wyoming. Puerto Rico gained three commercial FM stations during the year.

The Commission abandoned its class B FM allocation plan in August 1958. Under this plan, the 60 class B channels were allocated to cities throughout the country. If an applicant desired a channel where none was allocated, a rulemaking was necessary. Applicants now select their own channels, giving consideration to other assign-

ments and pending applications in the area. Abandonment of the plan has resulted in more expeditious handling of applications.

The majority of the new applicants are licensees of AM broadcast stations who propose to duplicate their AM programing over their FM facilities. Many of the applicants with no other broadcast connections propose programing primarily intended for "good music" listeners.

Subsidiary FM Operation

One factor in the revived interest in FM is the opportunity to obtain supplemental revenue through subsidiary operations. Since 1955 the Commission has permitted FM stations to engage in certain types of limited nonbroadcast services, commonly called "functional music," as an adjunct to their regular FM operations. An example is the supplying of "background music" programs to commercial establishments. At the close of the year, 127 FM stations held authorizations to conduct this type of supplemental service.

Initially the Commission authorized FM stations, upon proper application, to conduct functional music operations on a "simplex" basis pending the availability of suitable equipment, or on a "multiplex" basis at any time. When functional music programs are multiplexed, they cannot be heard on ordinary FM receivers. When simplexed they can be heard on FM receivers since they are transmitted on the same carrier used for FM broadcasting. Special receivers sold or leased to subscribers eliminate or amplify certain portions of the simplexed programs by means of inaudible supersonic signals.

On November 7, 1958, the Court of Appeals held the functional music rules invalid insofar as they excluded such operation on a simplex basis and remanded to the Commission the case brought by WFMF, Chicago, which had appealed the Commission requirement that SCA licensees change from simplexing to mutliplexing. On October 15, 1959, the Supreme Court declined to review the case. Meanwhile, 15 stations involved in this litigation continued to simplex.

On July 8, 1958, the Commission began an inquiry to consider possible additional uses of multiplexing by FM broadcast stations. Contemplated uses range from furnishing price quotations and stock market reports to providing doctor paging services and traffic light control. In considering the comments received in this proceeding and the increased public interest of stereophonic broadcasting, the Commission on March 11, 1959, requested comments on the subject of stereophonic broadcasting on a multiplex basis by FM broadcast

stations. The time for filing these comments has been extended to December 11, 1959.

Noncommercial Educational FM Broadcast

The noncommercial educational FM broadcast service continued its slow but steady growth—adding 12 authorizations during the year to bring its total to 165.

Two applications for noncommercial educational FM stations in the Los Angeles area were designated for consolidated hearing because of interference problems; these were the first applications for such stations ever designated for hearing. However, one applicant withdrew, leaving the field clear for a grant of the other.

INTERNATIONAL BROADCAST STATIONS

In recent months there has been a renewed interest in international broadcast stations. In November 1958 the Commission authorized a new station near Belmont, Calif., to direct its programs to Central and South America. Another station, located near Scituate, Mass., has expanded its operations and presently transmits programs to Europe, Africa, and Central and South America. An application filed in May 1959 proposes a new international station in Texas to beam programs to Central and South America. One experimental station in Cincinnati, Ohio, operates on an international broadcast frequency to provide a continuous signal used in propagation studies by the National Bureau of Standards. All other international broadcast facilities in the United States are operated by the U.S. Information Agency.

EXPERIMENTAL BROADCAST SERVICES

The Commission makes special provision for experimentation in connection with research and development in the technical phases of broadcasting. Stations engaged in this type of operation develop new or improved equipment and techniques and, in addition, obtain engineering data useful to both the Commission and the industry.

Experimental Television

Numerous licensees were active during the year in the field of experimental TV. This activity ranged from development of a hand-carried TV camera and transmitter to experimentation with directional antennas. The improvement of translator equipment is receiving the attention of two manufacturers, and another company is conducting research to improve UHF and microwave tubes, an-

tennas, and transmitting equipment. One UHF licensee is utilizing a low-power on-channel repeater station transmitting vertically polarized emissions to explore the possibility of minimizing reflections or "ghosts."

Developmental Broadcast

A developmental broadcast station, by definition, is one licensed experimentally to carry on development and research in radiotelephony, whereas the experimental TV station directs its research toward the improvement of TV broadcasting. Applicants for the developmental type of authorization generally hold an AM or FM station license, and permission for short-term special operation may be granted these permittees without the necessity of submitting a formal application.

The statistical analysis of broadcast station authorizations do not reflect the 36 such authorizations during the year, each permitting a specified program of technical research for a 90-day period. Thirty-one of these were conducted by aural broadcast licensees investigating possible methods of providing stereophonic broadcasts to the general public. Their reports will be helpful to the Commission in its consideration of the stereophonic rulemaking proceeding. While investigation of "stereo" has received major emphasis, some limited developmental research continues in the field of compatible single sideband transmission by AM stations.

STATISTICS

Current Broadcast Authorizations

At the close of fiscal 1959, outstanding broadcast authorizations totaled 10,120, which was a gain of 1,083 collectively for the year.

Authorizations for the different classes of broadcast services at the year end were—

Class	June 30, 1958	June 30, 1959	Increase or (decrease)
Commercial AM	3,353	3,500	147
Commercial TV	665	667	2
Educational TV	53	59	6
TV translator	156	245	89
Auxiliary TV	861	991	130
Experimental TV	17	20	3
Commercial FM	634	769	135
Educational FM	157	165	8
International	2	3	1
Remote pickup	3,087	3,630	543
Studio-transmitter-link	51	59	8
Developmental	1	0	(1)
Low-power auxiliary (cueing)	0	12	12
Total	9,037	10,120	1,083

Status of Broadcast Authorizations

The 1959 fiscal year closed with 5,405 AM, TV, and FM broadcast station authorizations outstanding. Of these, 4,920 had authority to go on the air, and the remaining 485 held construction permits. A breakdown follows:

Class	Operating authorizations	Construction permits
Commercial AM	3,377	123
Commercial TV	566	101
TV translator	158	187
Educational TV	43	46
Commercial FM	622	11
Educational FM	154	71
Total	4,920	485

Further breakdown and readjustment of the TV figures give these results:

	On air	Not on air	Total
Commercial VHF	436	[1] 35	471
Commercial UHF	74	[2] 117	191
Total commercial	510	152	662
Educational VHF	33	5	38
Educational UHF	9	16	25
Total educational	42	21	63
Grand totals	552	173	725

[1] Includes 2 stations which went on the air and subsequently went off the air.
[2] Includes 45 stations which went on the air and subsequently went off the air.

The TV translator stations are all UHF. Also, 127 FM stations held subsidiary communications authorizations to engage in functional (background) music operations.

Broadcasting Since 1934

Though there was prior experimental operation, regular FM and TV broadcasting did not begin until 1941, and educational TV and TV translator services started in 1952 and 1957, respectively. Hence, the only regular broadcasting until 1941 was AM operation.

Until 1949 Commission reports of broadcast totals did not give figures for stations actually on the air. Consequently, the following figures for the period 1935 to 1948, inclusive, give total authorizations

only for commercial AM, FM, and TV stations at the close of the fiscal years indicated:

	AM	*FM*	*TV*
1935	623	0	0
1936	656	0	0
1937	704	0	0
1938	743	0	0
1939	778	0	0
1940	847	0	0
1941	897	49	2
1942	925	42	10
1943	912	48	8
1944	924	52	9
1945	955	53	9
1946	1,215	511	30
1947	1,795	918	66
1948	2,034	1,020	108

However, the following table shows the number of authorized, licensed, and operating broadcast stations, and pending applications at the close of the succeeding 11 fiscal years; also the number of stations deleted during those years:

Year	Grants	Deletions	Pending applications	Licensed	CPs on air	Total on air	CPs not on air	Total authorized
			COMMERCIAL AM					
1949	200	55	382	1,963	43	2,006	173	2,179
1950	194	70	277	2,118	26	2,144	159	2,303
1951	116	35	270	2,248	33	2,281	104	2,385
1952	60	25	323	2,333	22	2,355	65	2,420
1953	187	23	250	2,439	19	2,458	126	2,584
1954	148	29	226	2,565	18	2,583	114	2,697
1955	161	18	304	2,719	13	2,732	108	2,840
1956	197	18	389	2,871	25	2,896	124	3,020
1957	232	14	431	3,044	35	3,079	159	3,238
1958	132	17	536	3,218	35	3,253	100	3,353
1959	159	12	679	3,328	49	3,377	123	3,500
			COMMERCIAL FM					
1949	57	212	65	377	360	737	128	865
1950	35	169	17	493	198	691	41	732
1951	15	91	10	534	115	649	10	659
1952	24	36	9	582	47	629	19	648
1953	29	79	8	551	29	580	21	601
1954	27	54	5	529	24	553	16	569
1955	27	44	6	525	15	540	12	552
1956	31	37	10	519	11	530	16	546
1957	40	26	24	519	11	530	31	560
1958	98	24	57	526	22	548	86	634
1959	153	18	71	578	44	622	147	769

Year	Grants	Deletions	Pending applications	Licensed	CPs on air	Total on air	CPs not on air	Total authorized
EDUCATIONAL FM								
1949	18	7	9	31	3	34	24	58
1950	25	4	3	61	1	62	20	82
1951	19	6	2	82	1	83	12	95
1952	12	2	2	91	1	92	12	104
1953	13	1	3	106	0	106	10	116
1954	9	2	1	117	0	117	6	123
1955	7	3	1	121	3	124	3	127
1956	13	4	5	126	0	126	10	136
1957	17	5	2	135	0	135	13	148
1958	11	3	6	144	3	147	10	157
1959	16	8	2	150	4	154	11	165
COMMERCIAL TV								
1949	15	7	338	13	56	69	48	117
1950	0	8	351	47	57	104	5	109
1951	0	0	415	81	26	107	2	109
1952	0	1	716	96	12	108	0	108
1953	381	6	572	101	97	198	285	483
1954	174	81	200	104	298	402	171	573
1955	67	58	127	137	321	458	124	582
1956	60	25	128	186	310	496	113	609
1957	55	13	129	344	175	519	132	651
1958	35	21	125	427	129	556	109	665
1959	24	22	114	475	91	566	101	667
TV TRANSLATOR								
1957	74	0	48	17	24	41	33	74
1958	88	6	34	92	0	92	64	156
1959	96	7	27	158	0	158	87	245
EDUCATIONAL TV								
1952	0	0	1	0	0	0	0	0
1953	17	0	29	0	1	1	16	17
1954	13	0	17	0	6	6	24	30
1955	5	1	14	1	10	11	23	34
1956	7	0	11	1	19	20	21	41
1957	8	0	8	14	12	26	23	49
1958	4	0	9	29	3	32	21	53
1959	6	0	7	37	6	43	16	59

Reinstatement of some deleted authorizations and other considerations not detailed in this table account for any seeming discrepancy in the relation of grants and deletions during the year to the total year-end authorizations.

Stations actually operating or holding authorizations to operate are covered by the term "on the air." "CPs" indicate construction permit status.

Broadcast Applications

During the year, 12,002 broadcast applications were received, or 1,655 more than the previous year. The following is a breakdown of broadcast applications in nonhearing status at the end of the fiscal year (for docket statistics, see "Commission" chapter):

Class	On hand June 30, 1958	Received	Granted	Dismissed, denied, or returned	Designated for hearing	On hand June 30, 1959
TV						
New stations	95	213	144	59	36	85
Major changes	63	163	153	18	6	50
Transfers	14	101	99	5	1	11
Renewals	64	364	292	3	1	131
Licenses	114	235	226	24	0	99
Other	145	244	120	21	1	147
TV total	494	1,320	1,133	130	45	523
FM						
New stations	45	222	167	35	21	51
Major changes	25	194	151	24	3	43
Transfers	9	112	103	7	0	11
Renewals	92	218	239	9	0	62
Licenses	35	183	138	18	0	63
Other	35	392	338	23	0	66
FM total	241	1,321	1,136	116	24	296
AM						
New stations	412	447	119	104	168	516
Major changes	261	630	127	70	60	649
Transfers	102	917	806	116	3	96
Renewals	422	1,244	1,133	78	2	453
Licenses	109	444	369	38	1	149
Other	108	1,054	893	82	4	184
AM total	1,414	4,736	3,447	488	238	2,047
Auxiliary						
New stations	90	1,218	1,027	147	0	134
Major changes	38	377	364	15	1	36
Transfers	30	282	281	8	0	23
Renewals	276	1,401	1,087	42	0	548
Licenses	327	1,268	1,209	92	0	294
Other	6	79	68	7	0	5
Auxiliary total	762	4,625	4,036	311	1	1,040
Total nonhearing applications	2,911	12,002	9,752	1,045	308	3,906

TV and FM figures include noncommercial educational; TV, in addition, includes translator stations.

Broadcast Industry Financial Data

In the calendar year 1958, the radio and television industry's total revenues (which are derived from the sale of time, talent, and program materials to advertisers) were reported at $1,553.1 million.

Total radio revenues increased by 1 percent to $523.1 million while TV revenues rose to $1,030 million, or 9 percent above 1957.

Total radio and TV profits of $209.2 million were 3 percent below 1957. Television broadcast profits of $171.9 million were 7 percent higher and radio profits of $37.3 million were 32 percent lower.

The following tables show the comparative calendar 1957–58 financial data for the radio and television broadcast industries:

All Networks and Stations, 1957–58

Item	1957 (millions)	1958 (millions)	Percent increase or (decrease) in 1958
Total broadcast revenues	$1,461.1	$1,553.1	6.3
Radio [1]	517.9	523.1	1.0
Television	943.2	1,030.0	9.2
Total broadcast expenses	1,246.5	1,343.9	7.8
Radio	463.3	485.8	4.9
Television	783.2	858.1	9.6
Broadcast income (before Federal income tax)	214.6	209.2	(2.5)
Radio	54.6	37.3	(31.7)
Television	160.0	171.9	7.4

[1] Includes AM and FM broadcasting.

Note 1: 1958 radio data cover the operations of 4 nationwide networks and 3 regional networks, 3,197 AM and AM–FM and 93 independent FM stations. Excluded are 99 AM and AM–FM stations and 18 independent FM stations whose reports were filed too late for tabulation. 1957 data are for the same networks and 3,097 AM and AM–FM and 67 independent FM stations. Excluded are 59 AM and AM–FM stations whose reports were filed too late for tabulation. 1958 TV data cover the operations of 3 networks and 514 stations. 1957 TV data cover the operations of 3 networks and 501 stations.

Note 2: 1957 data revised.

Nationwide Networks Only, 1957–58

[Including owned and operated stations]

Item	1957 (millions)	1958 (millions)	Percent increase or (decrease) in 1958
Total broadcast revenues	$535.9	$581.2	8.5
Radio	68.0	64.5	(5.2)
Television	467.9	516.7	10.4
Total broadcast expenses	466.6	509.1	9.1
Radio	69.4	69.4	
Television	397.2	439.7	10.7
Broadcast income (before Federal income tax)	69.3	72.1	4.0
Radio	(1.4)	(4.9)	
Television	70.7	77.0	8.9

Note 1: Radio data include the operations of 17 nationwide network-owned AM stations in 1957 and 19 in 1958.

Note 2: Television data include the operations of 16 network-owned stations in 1957 and 19 in 1958.

AM Radio [1] *Broadcast Revenues, Expenses, Income and Investment, 1957–58*

[In thousands]

Item	4 nationwide networks and their stations [2]		3 regional networks and their stations [3]		All other stations [4]		Industry total	
	1957	1958	1957	1958	1957	1958	1957	1958
Total broadcast revenues	$68,065	$64,488	$5,430	$4,870	$442,417	$451,239	$515,912	$520,597
Total broadcast expenses	69,428	69,380	4,131	3,609	387,295	409,618	460,854	482,607
Broadcast income (before Federal income tax)	(1,363)	(4,892)	1,299	1,261	55,122	41,621	55,058	37,990
Investment in tangible broadcast property:								
Original cost	17,170	18,661	1,658	1,780	309,368	312,860	328,196	333,301
Depreciation to date	10,069	10,384	1,176	1,207	155,617	153,657	166,862	165,248
Depreciated cost	7,101	8,277	482	573	153,751	159,203	161,334	168,053

[1] Excludes independently operated FM stations, 67 in 1957 and 93 in 1958. Also excludes 59 AM and AM-FM stations reporting too late to tabulate in 1957 and 99 in 1958.
[2] Includes the operations of 21 network-owned stations in 1957 and 23 in 1958.
[3] Includes 3,076 stations in 1957 and 3,174 in 1958.

TV Broadcast Revenues, Expenses and Income, 1958

[In millions]

Item	3 networks and their 19 owned and operated TV stations	495 other TV stations	Total 3 networks and 514 TV stations
Revenues from the sale of time:			
Network time sales:			
Nation-wide networks	$306.7	$117.8	$424.5
Miscellaneous networks and stations			
Total network time sales	306.7	117.8	424.5
Non-network time sales:			
National and regional advertisers	73.5	271.7	345.2
Local advertisers	24.6	156.7	181.3
Total non-network time sales	98.1	428.4	526.5
Total time sales	404.8	546.2	951.0
Deduct—Commissions to agencies, representatives, etc.	[1] 83.4	75.9	159.3
Net time sales	321.4	470.3	791.7
Revenues from incidental broadcast activities:			
Talent	161.8	10.4	172.2
Sundry broadcast revenues	33.5	32.6	66.1
Total incidental broadcast activities	195.3	43.0	238.3
Total broadcast revenues	516.7	513.3	1,030.0
Total broadcast expenses of networks and stations	439.7	418.4	858.1
Broadcast income (before Federal income tax)	77.0	94.9	171.9

[1] Of this amount $64.5 million is applicable to the total sale of network time.

Note: 1957 national and regional time sales for the 3 networks and 501 TV stations are revised from $296.4 to $300.5 million and local time sales from $178.1 to $174.0 million. Revisions reflect reporting errors for 1957 detected too late to be included in the 1957 report.

FM Broadcast Revenues, Expenses and Income, 1957–58

Item	1957		1958	
	Number of stations	Amount (millions)	Number of stations	Amount (millions)
TOTAL FM BROADCAST REVENUES				
FM stations operated by:				
AM licensees:				
Reporting no FM revenues	319		309	
Reporting FM revenues	113	$1.1	131	$1.5
Non-AM licensees	67	2.0	93	2.5
Total FM stations	499	3.1	533	4.0
TOTAL FM BROADCAST EXPENSES				
FM stations operated by non-AM licensees	67	2.5	93	3.2
Industry total		(1)		(1)
FM BROADCAST INCOME				
(before Federal income tax)				
FM stations operated by non-AM licensees	67	(0.5)	93	(0.7)
Industry total		(1)		(1)

[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.

( ) Denotes loss.

Investment in Tangible Broadcast Property of Television Networks and Stations, 1958

Item	Number of stations	Investment in tangible broadcast property (thousands)	
		Original cost	Depreciated cost
Three networks and their owned and operated stations	[1] 19	$136,105	$82,652
Pre-freeze stations	94	149,149	69,235
Total pre-freeze	[1] 113	285,254	151,887
Post-freeze stations:			
VHF	322	203,108	123,218
UHF	79	34,412	18,662
Total post-freeze stations	401	237,520	141,880
Grand total	514	522,774	293,767

[1] Includes 5 post-freeze stations (4 UHF and 1 VHF) owned and operated by networks.

Safety and Special Radio Services

GENERAL

The Safety and Special Radio Services comprise more than 40 categories of radio users. They embrace all non-Federal usage of radio except broadcasting, common carrier, and experimental. These radio stations are used to assist in the preservation of safety to life and property, for operational and business purposes, and for navigational aids, all forms of maritime, air, and land transportation, by almost every kind of business and industry. Two services permit radio usage for personal convenience or pleasure.

Most of these radio services did not exist 25 years ago. At that time only the marine and amateur services had a significant number of stations.

During the past quarter century a tremendous development has occurred in these nonbroadcast services. By virtue of technical advances and greater knowledge concerning the utilization potentials of the radio spectrum, it has become possible to accommodate many more users at a cost feasible to them.

The Commission has had under constant study methods by which more effective usage can be made of the limited spectrum space available. This has resulted in a regulatory program involving tighter technical standards, narrower channel spacing, and other devices which have made it possible to extend greatly the usage of radio. This development is best portrayed by a few numerical contrasts. At the present time, over half a million licensees are authorized to operate more than 1.7 million fixed, mobile, and portable transmitters for the many varieties of safety and specialized communication purposes on the water and in the air as well as on the ground. These half million authorizations represent a tenfold increase over 25 years ago. In fact, their number has practically doubled in the last 5 years.

All this has taken place despite the limited frequency space allocated to these services and the fact that the licensees are required to share frequencies. No leveling in the demand for such communications facilities is foreseen for many years to come. Thus, the Commission's effort to discover more effective ways to utilize the spectrum, as evinced by the general radio spectrum inquiries discussed hereafter,

as well as constant efforts to increase speed and efficiency in handling the volume of applications, continue to be major problems to which priority attention is being directed.

LEGAL AND REGULATORY PROBLEMS

Microwave Inquiry

Pending the outcome of the major allocation inquiry in docket 11866 involving the allocation of frequencies in the so-called microwave portion of the spectrum above 890 megacycles, most of the authorizations for private point-to-point microwave systems have been granted on a limited basis for short-term periods.

Shortly after the close of the fiscal year, the Commission adopted a report and order in this microwave inquiry which summarized the problems, enunciated general principles to govern its further actions, and terminated the proceeding. The determination of greatest significance to the users or potential users of the Safety and Special Radio Services is summarized as follows:

> There are now available adequate frequencies above 890 megacycles to take care of present and reasonably foreseeable future needs of both the common carriers and private users for point-to-point communications systems, provided that orderly and systematic procedures and proper technical criteria are applied in the issuance of authorizations, and that implementation is consistently achieved with respect to all available and future improvements in the art. There is a demonstrated need for private point-to-point communications systems. Accordingly, the decision looks toward liberalization of the basis for issuance of such authorizations. Availability of common carrier facilities will not be considered as a condition of eligibility for such private users.

Concurrently, the Commission proposed rulemaking looking toward adopting interim technical standards to govern the granting of applications for private communications systems (excluding broadcasters) using microwave frequencies above 952 megacycles. This would result in applying orderly technical criteria to the issuance of microwave authorizations for such private microwave systems until rules and standards are adopted for the use of microwave frequencies on a regular basis in each of the safety and special services.

It is anticipated that the general policies announced in the microwave docket, as further implemented by specific rules, will spur utilization of the microwave portion of the spectrum to the public interest and benefit.

As indicated, while the general microwave proceeding was in process, private point-to-point microwave systems were granted on a developmental basis for short-term periods in certain safety and special services. In some instances, the Commission was unable to

reach a public interest finding permitting grants for private microwave systems within the applicable rules or the policies set forth in the microwave proceeding. This is illustrated by the *Central Freight Lines* case (docket 12570) which was designated for hearing on July 31, 1958 and the evidentiary hearing phase completed in June 1959.

25–890-Megacycle Inquiry

This frequency allocation inquiry covers nearly all of the present allocations for the Safety and Special Radio Services (excluding point-to-point private microwave operations), as well as the broadcasting and common carrier usage of frequencies. This inquiry (docket 11997) was instituted on April 5, 1957, for the purpose of developing a general review of the basic frequency allocation policies, based on technical information and needs developed since the last overall review of this kind made over a decade ago.

As of June 1959, the oral phase of this inquiry was completed. The record is voluminous and will require exacting and probing analysis. It is expected that this task will result in the development of broad policy principles which, in turn, will generate specific rulemaking designed to convert and implement these policies into positive action programs.

A.T. & T. Consent Decree and Applications Involving Bell Contracts

As indicated in previous annual reports, the antitrust consent decree of January 24, 1956, involving the American Telephone & Telegraph Co. and its subsidiaries, has created legal and regulatory problems concerning the leasing and maintenance of equipment by such companies for private communications systems in all the safety and special radio services.

During fiscal 1959, all applications in these services showing leasing of equipment from a Bell company were reviewed on a case-by-case basis, pursuant to the Commission's obligation to consider relevant antitrust matters in its general public interest determinations.

Consideration of this category of applications has necessitated the development of policies to deal with varied situations presented. The most basic and significant of these policies were formulated through adjudicative and rulemaking proceedings. Based on formal protest involving applications of the *Connecticut Water Co.* and *Wooldridge Bros., Inc.* (dockets 12323–4), the Commission interpreted section V of the consent decree and resultant Commission public interest policies in a decision adopted December 3, 1958. Further guides were developed in a rulemaking proceeding (docket 12722) which, on March 25, 1959, promulgated a new rule.

Strict adherence to these formally stated standards has been maintained by a continued special review of applications. The result is that no applications involving Bell contracts executed after March 9, 1956, are being granted, and applications involving Bell contracts which were executed on or before March 9, 1956, and which do not require additional equipment are being granted with a termination date of January 24, 1961.

One problem of the consent decree remains unresolved in the rulemaking proceeding in docket 12722. This involves the effect, if any, upon the restrictions imposed on the Bell companies by section V of the consent decree should any jurisdiction declare such lease-maintenance activity to be a communications common carrier service subject to public regulation. The latest action having a bearing upon this question is a June 29, 1959, decision of the California Public Utilities Commission refusing to permit the Pacific Telephone & Telegraph Co. to cancel its tariff and withdraw from leasing and maintaining such equipment for private communication systems.

MARINE RADIO SERVICES

Safety At Sea

Safety of Life at Sea Conference, 1960.—An international conference is scheduled to be held in London during 1960 for the purpose of revising the 1948 safety convention. Preparatory work on formulating U.S. recommendations for revision of the 1948 radio provisions has been completed by a Government-industry radiotelegraphy and radiotelephony committee. Over 8 months were spent on this task.

St. Lawrence Seaway.—Opening of this seaway (*a*) brought U.S. oceangoing ships engaged on international voyages into the Great Lakes, and (*b*) permitted large U.S. cargo ships to navigate on international voyages between U.S. ports on the Great Lakes and Canadian St. Lawrence River ports outside the Great Lakes area. Under existing law, most of the commercial ships in either of these categories are required to be equipped with a radiotelephone installation for compliance with the Great Lakes agreement and with a radiotelegraph installation for compliance with the safety convention; i.e., they are required to maintain simultaneous operational availability on the same ship of two safety radio systems. To alleviate the burdens created by this situation, pending appropriate revision of the safety convention, the Commission adopted a policy whereby oceangoing ships in category (*a*) may be relieved from radiotelegraph requirements while being navigated west of Montreal, and nonoceangoing ships in category (*b*) may be exempted from radiotelegraph requirements.

The St. Lawrence Seaway Development Corporation issued operating rules and regulations pertaining to that portion of the seaway under U.S. jurisdiction. The Commission contemplates rulemaking to conform its present rules to the frequencies agreed upon by the United States and Canada in a document signed August 14, 1957. The governmental frequency matters involved will be coordinated with the Interdepartment Radio Advisory Committee (IRAC).

Exemption from compulsory radio requirements.—In order to eliminate the necessity of formal applications for individual exemptions from the radiotelephone requirements of title III, part III, of the Communications Act in circumstances where such applications would invariably be granted, and thereby provide a public convenience to the vessel operators concerned and appreciably reduce some of the routine administrative work of the Commission, a general exemption from title III, part III, was granted by the Commission to all U.S. vessels subject thereto which are of less than 50 gross tons and are navigated not more than 1,000 feet from the nearest land at mean low tide in the coastal waters and tidewaters of the Gulf of Mexico in the area between the Rio Grande River and Cape Sable, East Cape, Fla.

Exemption applications were handled as follows during fiscal 1959:

	Applications for exemption				
	Received	Granted	Denied	Dismissed	Pending
From compulsory radiotelegraph requirements [1]	37	[2] 32	4	0	1
From compulsory radiotelephone requirements (title III, pt. III, of Communications Act) [3]	[4] 372	100	47	90	35

[1] Not included in this table are 28 emergency radiotelegraph exemptions granted.
[2] Granted on condition that specified radiotelephone requirements would be met.
[3] Not included in this table are 45 temporary radiotelephone exemptions which were granted.
[4] Includes 45 applications carried over from previous fiscal year.

Technical Developments and Studies

New requirements for equipment.—Effective January 1, 1959, certain shipboard radiotelegraph and radiotelephone transmitters operating on frequencies below 30 megacycles became subject to prescribed spurious emission limitations. On the same date, the Commission's type-acceptance program became applicable to certain radiotelephone transmitters operating below 30 megacycles. Further, on July 1, 1959, the minimum power requirements became effective for radiotelephone transmitters operating between 2000 kilocycles and 25,000 kilocycles.

Tests of vertical antennas.—Interest in the use of vertical main antennas by compulsory radiotelegraph-equipped ships has continued to grow, and one such system has been accepted for installation on U.S. vessels without individual measurements of antenna efficiency.

Single sideband.—To encourage further economy in the use of the radiofrequency spectrum, four ship stations and three Alaskan fixed stations were authorized to employ single sideband radiotelephone transmitters for the purpose of developing and testing this mode of operation. Three different models of equipment made by as many different manufacturers are in use.

Radio Technical Commission for Marine Services.—Two important studies were made during the fiscal year by the Radio Technical Commission for Marine Services (RTCM), which is composed of Government agencies and non-Government organizations. *Special Committee 39* investigated and reported on the possible problems involved in the implementation of bridge-to-bridge communication. The impetus for this study was provided by recommendation (4) included in the January 3, 1957, report of the House Committee on Merchant Marine and Fisheries (84th Cong., 2d sess.). *Special Committee 37* reviewed and correlated the present and future marine radio spectrum requirements. This was one of RTCM's contributions to U.S. participation in the 1959 Geneva conference.

Marine Radio Communication System

VHF radiotelephony for navigational communication.—The Commission on April 2, 1958, adopted rules establishing a regulatory policy relative to voluntary VHF (Very High Frequency) radiotelephone installations for use on the bridges of U.S. oceangoing ships to promote safety at sea by affording direct communication between navigating officers. A petition for reconsideration presented a basic issue as to whether multichannel or single-channel operation should be provided for the "bridge-to-bridge" operation. On July 29, 1959, the Commission amended parts 7 and 8 of the rules governing maritime land and shipboard stations, respectively, to permit single-channel VHF ship station operation under developmental licenses. Thus, the petitioner was granted the principal relief requested.

Changes in 35-megacycle band.—Frequencies used by the maritime mobile service in the 35-megacycle band have been reallocated exclusively to the Business Radio Service. Marine operations in the 35-megacycle band which cannot be accommodated in the Business Radio Service may be accommodated on maritime VHF frequencies in the 156.25–157.45-megacycle and 161.85–162.00-megacycle bands. Marine licensees as of April 1, 1958, may continue operation in the

35-megacycle band until April 1, 1963, but new marine systems will not be authorized in that band.

Coast stations.—As of June 30, 1959, the number of public coast and limited coast stations, other than those in Alaska, providing communication service to ship telephone and telegraph stations was as follows:

Frequency band and range	Public	Limited
Telephony, 2-3-Mc. band (medium range)	61	5
VHF telephony (short range)	46	236
HF telephony (long range)	4	0
Telegraphy, LF, MF, HF (medium to long range)	27	1

Radio communication in Alaska.—During the past year the demand for point-to-point radio communication within Alaska has increased. Several oil exploration and producing companies operating in Alaska require communication from remote locations for safety and business purposes. In addition to the communication needs of many industrial firms, Alaskan communities depend largely on radiotelephone and radiotelegraph for contact with other communities for their safety and business needs because wire-line facilities are not available. Although the Commission revised its rules within the last several years to make better use of the frequencies designated for Alaska, increased business activity there has caused serious congestion in the use of available frequencies.

The Commission has not completed its long-range study of the problem of duplication of public radio communication facilities in Alaska. This study deals chiefly with Alaskan industrial concerns that have indicated a need to operate public service stations for safety and business purposes at locations where public facilities, either Government or non-Government, are already established. Pending further study, with the cooperation of the Alaska Communication System (ACS), certain industrial firms have been granted short-term licenses for safety and business communication.

AVIATION SERVICES

The Commission prescribes the manner and conditions under which portions of the radio spectrum may be made available for radio communication and navigation facilities to aircraft operators, aeronautical enterprises, and organizations which require radio transmitting facilities for safety and other necessary purposes.

Stations aboard aircraft are utilized for communication and navigation. Included are special uses, such as flight testing. Ground stations include aeronautical en route, aeronautical fixed, operational fixed, aeronautical advisory, aeronautical utility mobile, airdrome

control, flight test, flying school, radio navigation, aeronautical public service aircraft, aeronautical metropolitan stations, aeronautical search and rescue mobile stations, and Civil Air Patrol. There were more than 77,000 licenses and over 123,000 transmitters authorized in the aviation services at the close of the current year, as contrasted with less than 700 licenses in 1935.

Aviation Organizations and Conferences

The Commission participates in the work of various coordinating and policymaking groups in the administration of the non-Government aviation services. The most critical area in this respect is the continuing demand for additional radio usage which must be accommodated within the available radiofrequency spectrum. Administrative steps to assure maximum utilization of available facilities were taken during the year through contact with the providers and users of aviation radio.

Coordination was maintained through such groups as the Radio Technical Commission for Aeronautics (RTCA), the Air Coordinating Committee (ACC), and internationally through the International Civil Aviation Organization (ICAO).

Radio Technical Commission for Aeronautics is a Government-industry body representative of more than 100 aeronautical telecommunication agencies. During the year the Commission participated in special RTCA technical committees on the following subjects: helicopter air navigation and communication, minimum performance standards for airborne electronic equipment, interference to aircraft electronic equipment by devices carried aboard, and environmental test procedures.

Air Coordinating Committee is the Federal interagency group which coordinates and recommends aviation policies affecting more than one agency of the Government. The Commission is a member. Besides formulating policies for the guidance of U.S. representatives to various conferences and meetings, ACC continued to study and make recommendations concerning aeronautical hazards posed by the increasing number and height of broadcast antenna towers—especially TV. A total of 834 such cases were referred to the ACC by the Commission. (See further reference in the chapter on "Field Engineering and Monitoring.")

International Civil Aviation Organization formulates standards and recommends practices with respect to international aviation matters, including aviation use of radio. The Commission furnishes guidance to the Department of State in the preparation of U.S. positions and furnishes representation for international meetings.

Rule Amendments

A major problem which continually confronts administration of the Aviation Services is keeping part 9 of the covering rules current. Aviation and aviation communications are rapidly expanding industries in which technical advances and refinements in operational tech-

niques and procedures are commonplace. In addition, amendments to the Communications Act (such as the recent amendment allowing certain alien pilots to obtain aircraft radio stations and operator licenses) as well as treaties and international agreements require appropriate amendments to the rules.

The following rulemaking proceedings of the 1958 fiscal year contributed to the efficiency of the Aviation Services.

One amendment permits the authorization of transmitters which have not been type accepted for use by flight test stations, for limited periods, where justified. This exemption is necessary because much flight testing is done in the performance of Government contracts in a rapidly changing field where it would be impractical to require type-accepted transmitting equipment. The Civil Air Patrol, which receives the majority of its equipment from Federal agencies, has indicated that to require type acceptance could impair its mission.

The institution of 50-kilocycle channeling in the VHF 117.975 through 132.0-megacycle band in lieu of the former 100-kilocycle bandwidth per channel virtually doubles the number of channels available to aircraft in this critical band.

The exclusive allocation of the 1435–1535-megacycle band for aeronautical telemetering contributes directly and importantly to the safety of life and property in the testing of aircraft.

The 13,250–13,400-megacycle band was allocated for airborne "doppler" radar use.

Procedures and rules were established for the wartime control of stations in the Aviation Services.

A new class of station—Aeronautical Search and Rescue Mobile Station—was added. These stations will furnish communication with aircraft engaged in search-and-rescue operations.

In the interest of greater efficiency in processing applications, a new FCC Form 406 was adopted which replaced six previously used forms.

PUBLIC SAFETY RADIO SERVICES

General

The public safety radio services comprise the police, fire, forestry conservation, highway maintenance, special emergency, State Guard, and local government radio services. Their authorizations now exceed 29,000 representing nearly 330,000 transmitters.

Rule Changes

The main objective of the rules adopted during this year relating to these services has been to improve on and abet the changes caused by last year's "split-channel" proceedings which made more frequencies

available and also created the Local Government Radio Service. To protect new licensees who must use narrow-band equipment from interference from the pre-August 1, 1958, users, the Commission required the latter to make technical improvements in the operation of their systems. On the other hand, existing licensees are afforded protection from those seeking authority to operate on one of the newly available "split-channel" frequencies by stringent frequency coordination requirements imposed on new applicants. They are also required to use narrow-band equipment. Thus, a balance is maintained between the desires of an ever-increasing number of applicants to engage in radio communication and the interests of existing licensees in the continued efficient operation of their systems.

The problem of insufficient frequency spectrum space to meet the constantly increasing demand is still serious. The use of radio for speedmeters and to control traffic lights is on the rise. The appearance on the market of small, compact portable units will soon make itself felt in terms of more radio usage in these services, particularly by policemen patrolling their beats. While reexamination of the frequencies between 25 megacycles and 890 megacycles has been initiated, measures are being taken to create better service on the frequencies now available. Thus, the conditions which had to be met by a user seeking a mobile relay system will be relaxed as will the frequencies on which such a system may be operated, but there will be restrictions on the type of operation to be permitted (tones which must automatically deactivate, etc.).

Police Radio Service

Licenses in this service are issued only to States, territories, possessions, and other governmental subdivisions including counties, cities, and towns. Such stations may be used only to transmit communication essential to official police activities, except that until October 31, 1963, police radio stations may also handle communication essential to official fire activities of a licensee. This restriction on the scope of permissible communications along with the creation of the Local Government Radio Service has resulted in a more efficient Police Radio Service. The Commission adopted a rule which would exempt until November 1, 1963, police licensees from having to operate narrow-band equipment while on the two frequencies especially allocated for intercommunication with neighboring police systems. This should aid such licensees in making an orderly transition to narrow-band equipment without immediate financial burden and without impairment of efficiency in the interim.

Fire Radio Service

Eligibility in this group is limited to the same public entities, except that volunteer fire departments may obtain a license by demonstrating a specific public responsibility for fire protection. Fire departments, forewarned that they can no longer be served by police systems after 1963, will either become part of a Local Government Radio system or will obtain their own authorizations; hence, the Commission anticipates a growth in the number of licensees in this service. The Commission also expects that certain frequencies will be designated for intersystem use to enable neighboring fire departments to coordinate their activities, similar to the practice now prevailing in the Police Radio Service.

Forestry Conservation Radio Service

Licensees in this service are divided into two groups. The first group functions to protect the forests, particularly in the detection, prevention, and suppression of forest fires. The other group acts to safeguard wildlife and natural resources. While these activities are not incompatible, experience has shown that close cooperation is needed on an interstate basis. Hence, it appears likely that in this service, too, frequencies available for intersystem communications will be allocated.

Highway Maintenance Radio Service

Authorizations in this service are likewise limited to governmental entities. These stations can transmit only communications essential to official highway activities of the licensee. The Commission is considering a petition to install radio as standard equipment on vehicles to enable a governmental entity to inform those traveling its highways of driving conditions, accidents, or other pertinent information.

Special Emergency Radio Service

This service provides emergency communication facilities for a number of user groups, including physicians and veterinarians who have a regular practice in rural areas; schools of medicine in rural areas; ambulance operators; rescue organizations; beach patrols providing a lifesaving service; schoolbus operators; persons in isolated areas where public communication facilities are not available; communication common carriers desiring to provide standby facilities or make emergency repairs; and disaster relief organizations. The Commission is studying a proposal to establish a Health Radio Service. While such a service would by no means replace the Special Emergency Radio Service, it should result in greater usage of radio for medical purposes and would probably result in many licensees shifting their radio operations to such a service.

Local Government Radio Service

The Local Government Radio Service, which was created during the previous year, permits governmental entity licensees to transmit communications essential to their official activities including those which concern civil defense. This covers all types of administrative messages, as well as any type of emergency communication, as long as it is required by an official activity of a licensee.

There has been an expected surge in applications for this service, and a greater increase is anticipated as governmental entities of all sizes realize the benefits in terms of efficiency which can ensue. Thus far, the problems of obtaining proper frequency coordination have hampered some applicants, and this situation will worsen as frequencies become more scarce. The Commission is trying to apportion frequencies in a manner which will enable the largest possible number of potential users to obtain efficient radio communications.

State Guard Radio Service

Licenses in this service are issued only to the State Guard or comparable organizations, and only where such organization has been created by law and is subject to State control. This service, with 10 authorizations and over 400 transmitters, is relatively inactive inasmuch as its principal need does not arise until the National Guard is ordered into Federal service.

DISASTER COMMUNICATIONS SERVICE

This service furnishes communication facilities in the 1750–1800-kilocycle band for use in emergencies such as war, storm, and flood. Its stations may transmit any communication necessary to civil defense or relief work during a disaster. At other times, communications are limited to those necessary in drills and tests to assure efficient functioning of equipment and personnel.

Over 85 percent of the disaster service licensees are civil defense organizations. Of the civil defense organizations, 76 percent are also using the Radio Amateur Civil Emergency Service for their civil defense communication.

There are at present 43 approved disaster communications plans covered in 380 station authorizations.

LAND TRANSPORTATION RADIO SERVICES

General

The nearly 60,000 licensees in the Land Transportation Radio Services, who employ more than 442,000 transmitters, presented a minimum number of problems with respect to split-channel and narrow-

band operation due to the helpful cooperation of the industries concerned, particularly the motor carriers and railroads.

The most important development affecting the land transportation services during the year was finalization of rulemaking which: (1) changed the effective date of the Commission's narrow-band standards so that all systems authorized subsequent to August 1, 1958, must use equipment meeting the new standards; (2) required frequency coordination with stations in any service operating within 30 kilocycles of the requested frequency; and (3) required that the frequency deviation of all transmitters authorized prior to August 1, 1958, to operate in the 35.70–35.98-, 42–44-, and 152–162-megacycle bands be reduced by February 1, 1959, so as not to exceed plus or minus 5 kilocycles.

With the exception of motor carriers, licensees in the land transportation services were able for the most part to make use of the newly available frequencies without serious difficulty. Thus, many taxicab licensees, by moving to secondary frequencies, alleviated mutual interference. Use of the 152–162-megacycle frequencies by motor carriers was complicated by the fact that railroad licensees were permitted to continue the use of these frequencies until November 1, 1963. Under mutual agreement between the two industries it was possible to make limited immediate use of the secondary frequencies; however, use of most of the primary frequencies awaits such time as the railroads vacate those frequencies. Meanwhile, it appeared that many railroads were voluntarily vacating those frequencies earlier than required.

While most licensees were able to meet the requirement that frequency deviation be reduced, numerous requests were received, particularly from the taxicab service, for waiver. More than 700 such waivers were granted for 90 days (approximately 200 of which were renewed for a period up to 1 year) on condition that no interference be caused to equipment meeting the narrow-band standards. The reasons for which waivers were granted included unavailability of equipment or additional time to convert, cost, and willingness to tolerate mutual interference caused by continuous use of "broadband" equipment.

Among other rule changes, the Commission clarified the permissible scope of cooperative use of facilities in the land transportation services. The amended rules more clearly describe what is considered to be the rendition of a private radio communication service, and the conditions under which such service may be rendered.

Additional rule amendments limited the plate power input of land transportation stations using frequencies in the band 220–500 megacycles to 120 watts, which is presently believed adequate, with the provision that power not in excess of 600 watts may be authorized on a developmental basis under certain conditions.

Proposals still requiring determination are to (1) achieve uniformity in the use and placement of transmitter identification cards, (2) eliminate the operator requirements for stations operating on frequencies above 30 megacycles (25 megacycles in certain services) during normal rendition of service, (3) limit the use of frequencies in the 30–50-megacycle range by stations in the motor carrier service to the single frequency method of operation, and (4) authorize mobile stations in the railroad service to act as repeater stations.

Motor Carrier Radio Service

In response to the need for additional frequencies, particularly by common and contract carriers of property, the Commission during fiscal 1959 made available to motor carriers for the first time a total of 24 primary and secondary frequencies and 24 tertiary frequencies in the 152–162-megacycle band. One consideration was the anticipated increase in the number of licensees due to expansion of the eligibility provisions to include common or contract carriers of property operating within a single urban area and not necessarily engaged in intercity, interstate, or international shipment. Increased interest was common of which was the contract pickup and delivery of freight in passenger-carrying vehicles on a trial basis.

Railroad Radio Service

There was expanded use of railroad radio facilities in connection with services performed by persons other than the licensee, the most common of which was the contract pickup and delivery of freight in terminal areas. Because of the reduction of spectrum space available to the railroads, this industry's frequency assignment plan calls for substantial use of the tertiary or 15-kilocycle channels. An important rule change proposed would permit the use of mobile stations for relay purposes under certain conditions and also provide for mobile-relay stations in main-line operations to extend base-to-mobile communication range on a regular rather than developmental basis.

Taxicab Radio Service

Fiscal 1959 witnessed the more efficient use of radio by this industry, particularly in standard metropolitan areas of 50,000 or more population where 3 additional frequency-pairs in the 152–162-megacycle band permit licensees to convert their operations to the newly available split channels, thus reducing interference stemming from excessive channel loading.

Automobile Emergency Radio Service

With the increase in the number of frequencies in the 150.8–162-megacycle and 450–460-megacycle bands available to associations of

automobile owners, there has been a significant increase in the number of new licensees, as well as in the expansion of existing systems by use of multiple-base stations operating on different frequencies to cover large metropolitan areas. The availability of frequencies in the 150.8–162-megacycle band permits private garages to convert their radio operations from the formerly available 25–50-megacycle frequencies, which were subject to severe long-range skip interference. The expansion in this service is due in part to the fact that persons who were reluctant to use the former frequencies can operate systems on the more suitable frequencies now available. It appears that a reexamination of the eligibility requirements of this service may be desirable.

CITIZENS RADIO SERVICE

Fiscal year 1959 witnessed a complete revision of the Commission's rules governing the Citizens Radio Service and the application form for citizens radio license. Perhaps the most important accomplishment was the establishment of the class D citizens station which provided for the use of frequencies in the 27-megacycle range, for the first time, for voice communication by stations licensed in this service.

Following the advent of lightweight portable short-range communication equipment of the "walkie-talkie" type during World War II, the Commission in May of 1945 forecast the peacetime use of such equipment in a new Citizens Radio Service which would open up uses as broad as the imagination of the public and the ingenuity of equipment manufacturers could devise. In general, it was contemplated that there would be three broad categories of uses: (1) communication in connection with business activities not provided for in other rules; (2) control of remote objects or devices; and (3) personal communication. To accomplish these purposes, the Commission allocated frequencies in the 460–470-megacycle band and, later, 27.255 megacycles for control purposes only.

During the early 1950's it became apparent that, although there was available suitable equipment for the first two categories of users, there was little if any development of low-cost 460–470-megacycle equipment for private voice communication. Accordingly, in 1957 the Commission proposed the allocation of certain frequencies in the 27-megacycle band, in which frequency range the development of low-cost equipment appeared feasible, to the citizens service for voice communication.

The short period of time that has elapsed since the establishment of the class D station, having available 23 frequencies in this band and a

maximum power input of 5 watts, has witnessed the development of moderately priced equipment and a subsequent increase in the number of applications from less than 1,000 to more than 6,000 per month.

The increase in number of applications without a concurrent increase in personnel has lengthened the time between receipt of an application and action thereon to approximately 80 days. This invited numerous inquiries which added to the administrative burden and compounded the average delay. Near the end of the fiscal year it was possible to obtain additional personnel and office facilities at Gettysburg, Pa., at which location most applications for classes B, C, and D citizens stations are now being processed more expeditiously.

The heterogeneous nature of classes B, C, and D citizens operations has caused the Commission some concern. While it was intended that the citizens service would be used to meet a definite communications requirement, it now appears that many persons have the mistaken notion that this service provides for the use of radio as a hobby, for experimentation, or for random communication with unknown or distant persons. In order to correct this situation, rule changes have been proposed to more clearly indicate the conditions governing the operation of homemade and factory assembled equipment. In addition, the Commission has proposed that all transmissions be directed to specific persons and otherwise limit both the content and the extent of individual communications.

Other changes resulting from revision of the citizens rules and related proceedings were (1) reducing spectrum space in the 460–470-megacycle band with provision that licensees may continue to operate on frequencies no longer available until June 15, 1963; (2) providing for the assignment of specific frequencies in this band; (3) making five additional frequencies in the 27-megacycle range available to class C stations; (4) adopting stricter equipment standards and changing permissible transmitter power input; and (5) discontinuing the processing of citizens applications by the Commission's field offices. Further rulemaking proceedings provided for (1) type acceptance on a voluntary basis of crystal-controlled transmitters for class C or D stations; (2) deletion of the 25-foot limitation between antenna and transmitter of classes B, C, and D stations at fixed locations; (3) clarification of the term "remote control" of transmitters; and (4) reduction in the age requirement of class C licensees from 18 to 12 years.

Citizens stations increased by over 10,600 during the year to total over 49,000, with more than 206,000 transmitters.

INDUSTRIAL RADIO SERVICES

General

The 1959 fiscal year can be characterized as one in which the Industrial Radio Services tested new wings in a variety of directions. Thus, in addition to experiencing customary heavy growth with respect to its senior industrial services, the Commission was faced with implementing a multitude of measures which, although provided for in the previous fiscal year, became effective on August 1, 1958. These measures—especially those creating a number of new industrial services—appear to have survived the shakedown period in admirable fashion, and the areas for supplemental rulemaking are becoming more discernible.

Expansion

As presently constituted, the Industrial Radio Services include the power, petroleum, forest products, motion picture, relay press, special industrial, industrial radiolocation, manufacturers, telephone maintenance, and business radio services. The latter three are new industrial services, and the old Low Power Industrial Service is now a part of the Business Radio Service. The steady growth of these services is reflected by the fact that total authorized stations increased by over 9,700 to nearly 50,000, and total authorized transmitters increased to over 442,000.

The Telephone Maintenance Radio Service was created for communications common carriers having requirements for radio facilities in connection with construction and maintenance activities. This service has a shared access to 5 frequencies in the 27-megacycle band, and an exclusive access to 2 other frequencies in the 25–50-megacycle band, 2 frequencies in the 150–160-megacycle band, and 10 frequencies in the 450–460-megacycle band. Although it is still too early to tell whether this frequency complement will meet the ultimate needs of the communications common carriers, it very nearly satisfied the estimates available to the Commission at the time of its proceeding in the matter.

The Manufacturers Radio Service was created to meet the need by manufacturers for reliable radio communication to aid in production control, security activities, and localized materials handling. In keeping with these primary purposes, the Commission placed a 60-watt power limitation on most frequencies available to the service, and provided that base stations could be located only within or immediately adjacent to the boundaries of the manufacturing facility involved. These restrictions may be working a hardship on larger manufacturing concerns which have subsidiary plants and material-pickup locations spread over particular metropolitan areas, so the

Commission has been studying the possibility of offering some relaxation of the restrictions consistent with the additional interference that is likely to occur. This problem is especially acute with respect to some 15 frequencies in the 150–160-megacycle band which the manufacturers service currently shares with the heavily used petroleum and forest products services.

The new business service was called upon to accommodate many initial applicants. It made high powers and 25–160-megacycle frequencies available for the first time to "any person engaged in a commercial activity." Others eligible in the new service are educational or philanthropic institutions, clergymen or ecclesiastical institutions, and hospitals, clinics, and medical associations. In the 10 months since the birth of the business service, the Commission has authorized nearly 8,900 stations covering approximately 80,300 transmitters. It has been estimated that the equipping of its vehicles with radio gives a business establishment the equivalent of five such vehicles for every four actually operated.

With industrial applications being received at alltime highs, the Commission's staff and physical facilities are being taxed to ever-greater degrees. In this connection, the streamlining of procedures is a continuing project and the Commission is experimenting with the use of microfilm as its current working record in the business service to determine its practicability and adaptability to other safety and special services. Consideration is also being given to the possibility of using other mechanical and electronic aids in these administrative processes.

Older Services

Fiscal 1959 also had its effect on the older services. In connection with its actions reducing separations in the 152–174-megacycle and certain segments of the 25–50-megacycle bands, the Commission adopted new narrow-band technical standards for such bands. These new standards must be complied with by all users in the bands affected by November 1, 1963. However, since August 1, 1958, it has been necessary for all new radio systems in the above bands to utilize equipment fully meeting the new standards, and users of "old" equipment were required by February 1, 1959, to reduce the deviation of their transmitters to a point where it did not exceed plus-or-minus 5 kilocycles. Although the Commission in December 1958 rescinded the latter requirement with respect to systems operating on frequencies not immediately involved in the channel-splitting actions, many of the Commission's industrial licensees were required to expend large sums of money to effect the equipment modifications contemplated by the rule. Despite the adoption of a liberal policy in the matter

of extending good-cause waivers with respect to the February 1 date, the Commission believes that the close of fiscal 1959 found most of its "older" industrial licensees in compliance with the deviation limitation.

In terms of rate of growth, the older industrial services continued in fiscal 1959 to be led by the Special Industrial Radio Service. Although this is mostly attributable to the nature of the service—wherein such heterogeneous activities as agriculture, heavy construction, mining, petroleum-service, ready-mixed concrete, and fuel delivery share a common pool of frequencies—the elimination of all standard metropolitan area restrictions (effective August 1, 1959) was also a contributing factor. With the lifting of the restrictions, many special industrial businesses whose activities are concentrated within metropolitan areas attained full eligibility for the first time for base-mobile operations as they are commonly known.

The Commission extended to gas, water, and steam utilities licensed in the Power Radio Service the privilege—previously limited to electric utilities—of engaging in one-way signaling on mobile service frequencies to indicate failures and outages in transmission or distribution systems (docket 12028). The rules governing the power service were also amended to permit gas utility companies to use their licensed radio facilities in connection with supplying liquefied petroleum gas to customers located beyond existing gas distribution lines.

PRIVATE MICROWAVE SYSTEMS

So many requests were received during the year with reference to the number of authorized private microwave systems in the safety and special services that the following table is included here as a matter of general interest. It shows the number of microwave stations authorized in each of these services as of February 12, 1959 (the most recent count). In cases where two frequency bands are used at a particular station, that station has been counted twice. It should be noted further that the stations shown are included in the general statistics at the conclusion of this chapter.

Microwave stations in Safety and Special Radio Services

Frequency band (Mc.)	Industrial	Public safety	Land transportation	Marine	Aeronautical	Total
952–960	179	241	19	9	6	454
1850–1990	780	130	4	0	5	919
2110–2200	3	0	0	0	0	3
2500–2700	38	39	0	0	0	77
6575–6875	788	144	29	0	14	975
Above 10,000	0	0	0	0	0	0
Total	1,788	554	52	9	25	2,428

AMATEUR RADIO SERVICE

General

The popularity of amateur radio is reflected in the ever-increasing number of applications for the six classes of licenses. This increase has placed a considerable burden on the limited Commission staff available for processing these applications. At the same time, this large group of stations, now more than 195,000, is crowding the available amateur frequencies. The Commission is constantly striving to promote more efficient usage of this frequency space to accommodate all who wish to participate in amateur radio.

The importance of this service as a vehicle for experimentation was highlighted during the year. On two occasions in June, amateur communication was conducted between California and Hawaii in the 220-megacycle frequency band. The prestige of the amateur service was enhanced in April when Congress permitted foreign amateur licensees to operate a U.S. amateur station at the CCIR convention in California. This demonstrates the universality of amateur radio and recognition of its use as a tool to promote better understanding between citizens of different countries.

Public service performed by "hams" during weather emergencies such as snowstorms and hurricanes and also in times of fire, accidents, etc., is a continuing record. A large part of this service is through the Radio Amateur Civil Emergency Service (RACES) for the benefit of community civil defense organizations. RACES functions during peace to aid in times of natural disasters and emergencies. In wartime when other amateur activity must cease, RACES is the means whereby amateur activity may continue to furnish essential communication to help civil defense authorities.

Rule Changes

The Commission has endeavored to adopt rules which would allow the largest number of amateurs to use the frequencies available to this service without impairing the efficiency of operation of all the licensees. Hence, RACES operation is now permitted in the 3.5-meter band and has been expanded in the 7-, 14-, and 21-meter bands. Technicians have recently been allowed to operate in a segment of the 144–148-megacycle band. Pending are proposals to establish 100-kilocycle segments in certain amateur frequency bands in which only type A1 (radiotelegraph) emission will be permitted and also to extend radiotelephone privileges in the subband 14,300 to 14,350 kilocycles. There is also outstanding an inquiry directed toward determining the future of the Extra Class license.

The Commission's reexamination of "mail-order" licensees was expanded; novices and technicians were added to those who may be subject to an examination under Commission supervision.

ENFORCEMENT

General Problems

Unlicensed radio operations.—The failure of some safety and special licensees to file timely renewal applications has resulted in the operation of their stations after the expiration of the license term. Another general problem results from radio operation without proper authorization by reorganized or reconstituted associations, partnerships, or corporations whose predecessor organization had previously been licensed. A similar problem has been created by the transfer of ownership of business firms, vehicles, and vessels by licensees, followed by continued radio operation by the new owners without obtaining the required license.

Such cases are handled by furnishing the offenders with necessary application forms and warning them that continued unlicensed operations may result in criminal sanctions. Issuance of licenses in these cases is withheld until an applicant adequately explains the circumstances surrounding the violation, gives assurance that improper operation has stopped, and indicates that there will be no recurrence. Special temporary authorizations have been granted liberally in cases where it has been shown the element of willfulness is not present and that economic hardship would result from prolonged withholding of the operating privilege.

The foregoing problems are the subject of informational and educational programs for the purpose of alleviating their occurrence. However, they continue to grow numerically, and may be expected to do so in proportion to the constant increase of radio usage in the Safety and Special Radio Services.

Violations resulting from erroneous sales advice.—Several enforcement cases resulted from erroneous information and advice by venders of equipment intended for use in the safety and special services. Sales representatives often neglect to warn the buyer that Commission operating authority is necessary, or imply that the seller will obtain it for the purchaser. This has been especially noticeable in industrial and land transportation equipment deals. The results are (1) commencement of radio operations prior to obtaining FCC authorization, (2) permitting the use of a licensed station by nonlicensed persons, and (3) premature station construction prior to issuance of a permit.

Enforcement problems created by this situation are considerable. Most users of radio in these services are not radio experts. They need

and benefit from technical information which may be furnished by manufacturers and sales representatives. On the other hand, purchasers need to be protected from misleading information beyond the scope of the seller. Study of these problems looks toward new rules or administrative procedures, as well as voluntary cooperation by manufacturers and dealers to eliminate their cause.

Revocation of station licenses.—Failure by licensees to respond and show an interest in correcting deficiencies or violations of technical rules is a frequent cause for revocation proceedings in the safety and special services. Forty-three such hearings were handled or instituted during the year. This number of formal proceedings is overshadowed by the number of violation cases settled informally by means of correspondence or personal conferences. A program was initiated during the year whereby the Commission's field offices issue letters of warning to licensees who fail to reply to violation notices. This has resulted in a substantial reduction in the number of cases referred to Washington.

Special Problems Concerning Individual Services

Enforcement of maritime compulsory usage of radio.—A total of 254 marine forfeiture cases were settled during the year. Forfeitures arising from violations of title III, part II, of the Communications Act continued to grow. However, many of these involved technical irregularities, and mitigation of the monetary penalties was found to be in order. Violations of title III, part III, compulsory radio requirements constituted the bulk of the forfeiture cases, and these involved smaller vessels. Forfeitures were mitigated or remitted when a first offense was involved, except in a few cases where lack of cooperation was evident. Forfeitures under section 507 of the act involving Great Lakes vessels all resulted from failure of the vessels concerned to be inspected and certified as complying with the Great Lakes radiotelephony provisions. It was necessary to refer seven of these cases to the Attorney General for collection of the forfeitures.

Suspension of amateur operator permits.—In addition to routine amateur operation suspensions, there were four cases of suspension because of fraud in connection with examinations. A unique cause for suspension were three instances of transmission of signals by amateurs to simulate those of a satellite put into orbit during the International Geophysical Year.

Summary Conclusion

In view of the phenomenal growth of safety and special radio usage, the number and variety of cases requiring enforcement action is certain to grow despite the constant educational and informational pro-

gram. It is expected that the surge in applications in the citizens and business services, resulting from an enlargement of the eligibility base, will become a particularly heavy enforcement burden.

STATISTICS

Stations in Safety and Special Radio Services

The 1959 fiscal year closed with 507,171 stations authorized in the Safety and Special Radio Services, or 69,320 more than the 437,851 in 1958. For these purposes, separate license, construction permit, or combination construction permit and license have been counted as one station. Therefore, in many cases, a station includes a base transmitter and various mobile units. The following table compares station authorizations at the close of fiscal years 1958 and 1959:

Stations in Safety and Special Radio Services

Class of station	June 30, 1958	June 30, 1959	Increase (or decrease)
Amateur and disaster services:			
Amateur	179,314	195,776	16,462
Disaster	380	390	10
RACES	7,668	9,422	1,754
Total	187,362	205,588	18,226
Aviation services:			
Aeronautical and fixed group	3,122	3,554	432
Aircraft group	48,037	61,441	13,404
Aviation auxiliary	254	318	64
Aviation radionavigation	327	363	36
Civil Air Patrol	10,944	12,006	1,062
Total	62,684	77,682	14,998
Industrial services:			
Business		8,861	[1] 8,861
Forest products	1,648	1,792	144
Industrial radiolocation	218	255	37
Low power	2,333		(2,333)
Manufacturer		90	90
Motion picture	71	67	(4)
Petroleum	7,151	7,341	190
Power	11,320	11,878	558
Relay press	130	142	12
Special industrial	17,107	19,246	2,139
Telephone maintenance		25	25
Total	39,978	49,697	9,719

[1] Includes total stations formerly licensed in low power.

Stations in Safety and Special Radio Services—Continued

Class of station	June 30, 1958	June 30, 1659	Increase (or decrease)
Land transportation services:			
Automobile emergency	962	1,052	90
Citizens	38,611	49,269	10,658
Highway truck	503	349	(154)
Interurban passenger	59	46	(13)
Interurban property	1,386	1,606	220
Railroad	2,265	2,449	184
Taxicab	4,733	4,827	94
Urban passenger	110	116	6
Urban property	172	180	8
Total	48,801	59,894	11,093
Marine services:			
Alaskan group	1,054	1,132	78
Coastal group	434	393	(41)
Marine auxiliary group	92	95	3
Marine radiolocation land	23	31	8
Ship group	70,911	83,296	12,385
Total	72,514	84,947	12,433
Public safety services:			
Fire	4,725	5,283	558
Forestry conservation	3,264	3,618	354
Highway maintenance	2,580	3,068	488
Police	12,450	13,103	653
Public safety (combined)	158	148	(10)
Special emergency	3,325	3,631	306
State Guard	10	10	
Local government		502	502
Total	26,512	29,363	2,851
Grand total	437,851	507,171	69,320

Transmitters in Safety and Special Radio Services

More than 1,726,000 transmitters were authorized in the Safety and Special Radio Services at the end of fiscal 1959. This was an increase of 321,600 over the January 1, 1958, figure reported in last year's annual report. A breakdown of land or fixed transmitters and mobile station transmitters, by class of station, follows:

Transmitters in Safety and Special Radio Service

	Land or fixed transmitters	Mobile station transmitters	Total transmitters
Amateur and disaster services:			
Amateur	195,776		195,776
Disaster	397		397
RACES	9,422		9,422
Total	205,595		205,595
Aviation services:			
Aeronautical and fixed group	5,754		5,754
Aircraft group		100,000	100,000
Aviation auxiliary group	47	1,593	1,640
Aviation radionavigation land	471		471
Civil Air Patrol	5,252	9,954	15,206
Total	11,524	111,547	123,071
Industrial services:			
Business	5,222	75,130	[1] 80,352
Forest products	1,633	14,568	16,201
Industrial radiolocation	114	470	584
Low power industrial			
Manufacturer	107	2,497	2,604
Motion picture	55	685	740
Petroleum	18,821	50,195	69,016
Power	10,030	133,130	143,160
Relay press	108	1,653	1,761
Special industrial	18,637	200,390	219,027
Telephone maintenance	52	1,456	1,508
Total	54,779	480,174	534,953
Land transportation service:			
Automobile emergency	997	8,294	9,291
Citizens	200,000	6,110	206,110
Interurban passenger	32	413	445
Interurban property	1,504	27,725	29,229
Highway truck	311	5,174	5,485
Railroad	2,616	78,259	80,875
Taxicab	5,300	97,409	102,709
Urban passenger	74	2,170	2,244
Urban property	156	5,927	6,083
Total	210,990	231,481	442,471
Marine services:			
Alaskan group	2,327		2,327
Coastal group	641		641
Marine auxiliary group	625	7	632
Marine radiolocation land	49		49
Ship group		90,000	90,000
Total	3,642	90,007	93,649
Public safety services:			
Fire	4,805	60,132	64,937
Forestry conservation	7,272	26,699	33,971
Highway maintenance	2,780	29,209	31,989
Local government	2,257	5,804	8,061
Police	11,355	160,335	171,690
Public safety (combined)	3,627		3,627
Special emergency	4,786	9,714	14,500
State Guard	195	238	433
Total	37,077	292,131	329,208
Grand total	523,607	1,205,340	1,728,947

[1] Includes total transmitters formerly licensed in low power.

Applications in Safety and Special Radio Services

During fiscal 1959, more than 250,000 applications for stations in the Safety and Special Radio Services were received, which was an increase of 37,540 from the corresponding figure in 1958. A comparison of the number of applications received in each service during the past 2 years follows:

Applications in Safety and Special Radio Services

Class of station	Received 1958	Received 1959	Increase or (decrease)
Amateur and disaster services:			
Amateur	103,650	102,942	(708)
Disaster	160	49	(111)
RACES	2,663	2,277	(386)
Total	106,473	105,268	(1,205)
Aviation services:			
Aeronautical and fixed group	1,994	2,236	242
Aircraft group	24,375	30,527	6,152
Aviation auxiliary group	188	219	31
Aviation radionavigation land	179	175	(4)
Civil Air Partol	4,691	4,770	79
Total	31,427	37,927	6,500
Industrial services:			
Business	178	10,261	10,083
Forest products	798	859	61
Industrial radiolocation	213	221	8
Low power industrial	1,211	(1)	(1,211)
Manufacturer		367	367
Motion picture	28	22	(6)
Petroleum	3,635	3,909	274
Power	5,211	5,258	47
Relay press	81	74	(7)
Special industrial	10,048	8,878	(1,170)
Telephone maintenance		61	61
Total	21,403	29,910	8,507
Land transportation services:			
Automobile emergency	705	433	(272)
Citizens	5,276	25,346	20,070
Interurban passenger	21	17	(4)
Interurban property	840	832	(8)
Highway truck	191	111	(80)
Railroad	1,181	1,448	267
Taxicab	2,963	3,201	238
Urban passenger	73	33	(40)
Urban property	212	204	(8)
Total	11,462	31,625	20,163
Marine group:			
Alaskan group	383	364	(19)
Coastal group	210	432	222
Marine auxiliary group	109	30	(79)
Marine radiolocation land	32	20	(12)
Ship group	27,437	29,753	2,316
Total	28,171	30,599	2,428
Public safety service:			
Fire	2,194	2,157	(37)
Forestry conservation	1,704	2,045	341
Highway maintenance	1,771	2,132	361
Local government	13	1,159	1,146
Police	6,038	5,780	(258)
Public safety (combined)	168		(168)
special emergency	1,745	1,516	(229)
State Guard	11	2	(9)
Total	13,644	14,791	1,147
Total safety and special stations	212,580	250,120	37,450

[1] Applications received reflected in business radio service.

Common Carrier Services

DOMESTIC TELEPHONE

Highlights

At the close of the fiscal year the Commission initiated discussions with the Bell System which resulted in an agreement to reduce charges for interstate long-distance-message toll telephone calls by about $50 million annually.

Under an interim order issued by the Commission in its investigation of private line rates of American Telephone & Telegraph Co. (A.T. & T.) and Western Union, private line telephone rates of the former were reduced by about 15 percent in August 1958. Interim increased rates for private line telegraph services became effective in December 1958, representing an increase of 18 percent for A.T. & T. and 15 percent for Western Union.

A.T. & T. canceled its controversial tariff filing concerning the lease and maintenance of private mobile communications systems following announcement by the Bell System to withdraw from this service.

Common carrier relay service to community antenna TV systems continued to present a particular problem, and there are larger and more extensive problems in accommodating common carrier services in service reallocations in the radio spectrum.

General

Telephone industry.—The telephone industry includes about 4,000 independent companies in addition to the largest corporation in the United States, A.T. & T., which, with its associated companies, comprise the Bell System. The industry continued its expansion during calendar 1958 with about 3 million telephones being added to bring the nationwide total to 66.6 million, an increase of 4.7 percent over 1957. The total gross industry investment increased about 8.5 percent to exceed $24.2 billion. Annual gross revenues exceeded $7.7 billion, or 7.5 percent over 1957. Average daily local and toll calls increased about 4.4 and 5.3 percent, respectively. Private line telephone and telegraph revenues increased about 16.1 percent, while TWX (teletypewriter exchange service) rose about 6.9 percent.

About 80 percent of all independently owned telephones and about 94 percent of Bell System telephones are now dial operated. The Bell System continued the expansion of direct distance dialing service, and today some 8 million subscribers can dial their own toll calls to about 46 million other telephones, while another 12 million can dial nearby toll calls.

Bell System reported consolidated net income for the calendar year 1958 applicable to A.T. & T.'s capital stock totaled $952,304,782, an increase of 11.5 percent over 1957. Earnings per share increased from $13 to $14.01, with the average number of shares outstanding increasing about 4.1 million. As of the close of calendar 1958, the Bell System reported a plant book cost of more than $20.6 billion, revenues of $6,771,403,000 and 592,000 employees.

Interstate facilities.—The Bell System, which provides the bulk of the Nation's interstate toll facilities, continued its accelerated toll construction program. Substantial circuit additions were required by the steady increases in toll telephone calls, the rapid increases in private line services, particularly for Government services, and the rearrangement and growth in circuitry to handle operator- and customer-dialed toll calls. The program of constructing new radio relay express routes to avoid major metropolitan areas and other military targets, and new bypass routes contiguous to target areas, continued. Additional channels were constructed on existing radio relay systems, and a number of cables were provided to supplement facilities.

During fiscal 1959 the Commission authorized construction projects totaling about $117 million. Included in this amount was about $61.2 million for new radio relay systems or the addition of channels on existing systems totaling about 48,345 channel miles.

By the close of the fiscal year, Bell had over 223,000 channel-miles of radio relay in service, of which about 78,000 miles were being used for TV program networking. An additional 13,500 TV program-miles were being provided by coaxial cable. These facilities interconnected directly some 364 TV stations. An additional 19 TV stations were connected to the network by means of Bell off-air pickup and microwave relay, while other stations received network programs by picking up the signals of the connected stations.

New automatic toll-dialing offices were placed in service, during 1958 and first 6 months of 1959, at Salt Lake City, Utah, San Jose, Calif., Seattle, Wash., Columbia, S.C., and Jackson, Miss., to bring the Bell total to 57.

The Bell System had nearly 63 million miles of toll circuits. A.T. & T.'s Long Lines Department, which provides the bulk of the

interstate toll facilities, had about 37 million circuit-miles in service at the close of the fiscal year, of which about 44 percent were derived from radio relay and 32 percent from coaxial cable.

Interstate Message Toll Telephone Rates

Since the close of the business recession in the fall of 1958, the level of earnings of the Bell System companies from their interstate services showed a steady upward trend. In the light of the Commission's continuing studies of interstate operating results, it initiated discussions with A.T. & T. at the close of the fiscal year concerning the indicated need for rate reductions. These discussions resulted in an agreement by the Bell System to file revised tariffs with the Commission reducing rates for interstate long-distance telephone calls by about $50 million annually.

The reductions, which became effective in mid-September 1959, are applied to rates for distances above 675 miles and range from 5 cents in the initial period at the shorter distances to 25 cents at the greatest distances. Thus, for example, the transcontinental station-to-station initial period day rate is reduced from $2.50 to $2.25. Related reductions are also made in the overtime rates and night and Sunday rates.

Charges for interstate long-distance calls were last adjusted effective October 1, 1953, by a general rate increase. The previous rate reduction was negotiated in 1945.

Private Line Telephone Rates

The general investigation of rates for private line services of A.T. & T. and Western Union (dockets 11645 and 11646), which was begun in March 1956, was nearing completion, with expectation that the hearing record will be submitted in the fall of 1959 for decision. Pursuant to an interim order issued by the Commission in the investigation, the private line telephone rates of A.T. & T. were revised effective August 24, 1959, reducing revenues by about 15 percent annually. On the basis of the current level of business, the reduction amounts to more than $10 million annually.

Private Line Telegraph Rates

Revised interim tariff schedules increasing the rates for private line telegraph service of A.T. & T. and Western Union became effective December 2, 1958, after a 1-day suspension with requirement that the carriers keep account of the amounts received through the revised schedules. The revisions represented an 18-percent increase in private line telegraph revenues of A.T. & T. and 15 percent for Western Union. In acting on the increased rates, the Commission noted that the record in the proceedings in dockets 11645 and 11646 supported

the need for some increases on an interim basis, but that the lawfulness of the revised schedules is still under investigation.

Bell System Lease-Maintenance Service

Previous reports referred to the Commission's order of March 27, 1957, suspending new A.T. & T. tariff schedules providing rates and regulations for the leasing and maintenance of equipment used by private mobile communications systems and ordering an investigation and hearing (docket 11972). On March 25, 1959, the Commission granted an application by A.T. & T. to cancel its controversial tariff schedules. It was represented by A.T. & T. that the Bell System intended to withdraw from furnishing this service. A petition of Motorola, Inc., requesting the Commission not to dismiss the proceedings without findings, was denied and the proceedings were terminated by order of April 15, 1959. (See further discussion in chapter dealing with the Safety and Special Radio Services.)

Tariff Filings

As of June 30, 1959, there were on file 721 telephone tariffs of 522 telephone carriers. During the year, 16,334 new or revised tariff schedules were received, as well as 41 applications requesting special tariff permission.

Domestic Common Carrier Radio Facilities

Solution of substantial problems in the area of domestic common carrier radio hinges upon the allocation of sufficient radiofrequency space at appropriate places in the radio spectrum.

One of these problems arose out of the April 16, 1958, action of the Commission in reallocating the non-Government band 890–942 megacycles to Government radio services because of national defense requirements. The urgency at that time did not afford opportunity to provide substitute frequencies for the common carriers occupying the 890–940-megacycle portion of that band. Accordingly, the Commission is now faced with the prospect that implementation of this Government requirement will cause harmful interference to many common carrier microwave installations which are being used to furnish essential public communication service, including circuits vital to the operations of the SAGE system and to other national defense needs.

The Commission unsuccessfully attempted, in the proceedings in docket 11866, to find other frequencies above 890 megacycles to which these common carrier microwave radio systems could be shifted without necessity for extensive redesign or replacement of equipment. A solution is now being sought below 890 megacycles, in connection with

the frequency allocation hearings in docket 11997 with a view to maintaining continuity of public service and avoiding substantial adverse economic impact upon the common carriers, which may result if suitable replacement frequencies cannot be found.

Also in docket 11997, the Commission is again considering the Bell System's proposal for a broadband mobile radio system and is exploring the feasibility of allocating sufficient frequencies between 25 and 890 megacycles to provide for such common carrier requirements. The broadband plan has been estimated to require 3 to 5 years to develop necessary equipment and techniques, and involves development costs of several million dollars.

Still another major problem, which the Commission is considering in docket 11997, is whether frequencies between 25 megacycles and 890 megacycles should be provided for public telephone service between ground stations and persons in aircraft. Although this service may be afforded on a limited basis over public service channels of coast stations in the marine radio service, these stations have been so busy communicating with vessels, and are so limited geographically that, as a practical matter, the aircraft cannot be served dependably. Additionally, the number of aircraft which could be accommodated on the marine facilities would be inadequate in relation to the number of aircraft requiring service.

Developmental tests of common carrier air-ground public radiotelephone service to private and commercial aircraft have been conducted for almost 2 years by the Bell System at Chicago and Detroit to determine, among other things, the public acceptability of such service and the problems involved in establishment and operation of radio facilities to provide that service in the vicinity of 460 megacycles. The interest evinced in this service indicates that providing it on a regular basis and on a nationwide scale may be in the public interest.

Another problem stems from the presently inadequate provision for control and repeater stations to operate on frequencies below the microwave region of the spectrum. Such stations are typically used, in lieu of wire lines, for communication between a base station and its remote control point, or for the automatic alarm circuits which are customarily used between an unattended microwave radio relay station and its remotely located alarm center. Because of the substantially higher costs of microwave equipment, applicants have generally deemed its use for control and repeater circuits unacceptable. Accordingly, in connection with the proceedings in docket 11997, this problem is being kept in mind with a view of affording such relief as may be found practicable in the light of all requirements for frequencies in the same part of the spectrum.

Shortage of sufficient radiofrequency space for miscellaneous common carriers, who provide one- and two-way communication service to mobile units as well as rural subscribers, is an ever-increasing problem, especially in those areas of the country where the service has achieved wide public acceptance. Since the service is authorized on an interference-free basis, the possibility of authorizing new stations in many significant areas is fast becoming impossible. New stations in critical areas can be authorized only after extensive technical consideration and often after lengthy hearings to determine whether such service may be feasible.

Such hearings are almost immediately reflected in an increased backlog of applications awaiting processing because of the diversion of staff time from processing to hearing work. This, in turn, results in a sharp increase in the number of inquiries from applicants and their attorneys as to the status of individual applications, and the answering of such inquiries further diverts efforts from actual processing.

Microwave Relay to CATV Systems

The Commission's inquiry (docket 12443), initiated May 22, 1958, into the impact of TV community antenna systems, translators, "satellites" and "repeaters" on the orderly development of TV broadcasting, together with the petition for reconsideration of the Commission's memorandum opinion and order of April 2, 1958, concerning its regulatory jurisdiction over CATV systems (*Frontier Broadcasting Company* v. *Laramie TV Company, et al.*, 16 R.R. 1005), was disposed of by action of April 13, 1959, which terminated the proceeding in docket 12443 and denied the petition for reconsideration.

The Commission concluded, in essence, that impact of CATV on TV broadcasting does exist, but that its extent in any particular circumstance is not readily determinable and that, in any event, control of such impact as may exist cannot be regulated through restrictions imposed upon the common carriers serving CATV systems. Further, it was decided that jurisdiction over, or regulation of, the CATV systems themselves cannot be undertaken under the present language of the Communications Act. Regulation of CATV systems in at least three respects, to place them on a more competitive footing with broadcasters, was deemed desirable, however, and appropriate legislative recommendations were transmitted to Congress. (See further discussion in "Broadcast" chapter.)

At the close of the fiscal year, protests pursuant to section 309(c) of the act were filed by 5 TV broadcast stations against 12 construction permits granted to 5 applicants for point-to-point microwave facilities on a common carrier basis to serve CATV systems in 8 communities.

These protests were granted in June 1959 to the extent of postponing the grants and permitting the parties to argue, in July thereafter, the policies and conclusions announced in the decision in docket 12443 insofar as applicable to the facts of the protested applications. It appears that policies and considerations relative to permitting point-to-point microwave common carriers to serve CATV systems will continue to be a major problem throughout fiscal 1960.

Other Regulatory Matters

Discontinuance of service.—The Commission during fiscal 1959, considering in each case public convenience and necessity, granted 12 requests for discontinuance of communication service by telephone carriers. One such case involved circumstances where the telephone subscribers live in an adjoining State and in the territory of another carrier which will continue to provide service; another where the community had been abandoned; eight where the telephone service would be continued by another telephone company; and two where telephone companies discontinued message telegraph service in areas which will continue to be served by Western Union.

Speed of service.—The Bell System reported further strides in expediting toll calls. The average speed of completion during 1958 was 64 seconds.

Acquisitions and consolidations.—The Commission received 19 applications from telephone companies during fiscal 1959 for certificates under section 221(a) in connection with the proposed acquisition of the property of other telephone companies. Sixteen of these, together with three held over from 1958, were granted without hearing.

Of the four pending at the close of the year, one involved an application by Wisconsin Telephone Co. to acquire the Menomonee Falls Telephone Co. and the Lisbon Telephone Corp. Pursuant to request of the United States Independent Telephone Association, a hearing was held on that application and the initial decision recommending grant was issued on September 19, 1958. Oral argument on exceptions was held before the Commission on April 24, 1959, and the application was granted on July 1 thereafter.

Depreciation.—During fiscal 1959, as a result of extensive studies, the Commission revised depreciation rates previously prescribed for 4 Bell System companies, including 2 multistate companies serving 12 State areas. The new rates reflect both upward and downward adjustments in rates for the individual classes of plant of the companies involved. They represent a net increase of about 1.6 percent in the charges based on the depreciation rates previously in effect.

The need for controlling the level of depreciation rates has become more evident since telephone plant facilities are continuing to expand because of unprecedented service requirements. In the case of the 23 companies of the Bell System, the total depreciable plant amounted to approximately $5.4 billion and $20.6 billion as of the end of 1945 and 1958, respectively. The related annual depreciation accruals aggregate $216 million and $898 million, respectively. For the year ending December 31, 1958, the depreciation charges are equal to almost 20 percent of the Bell System's total operating expenses as compared to current maintenance, traffic, commercial, and other operating expenses which approximate 29, 21, 14, and 16 percent, respectively.

Because of the continued rapid expansion of the telephone industry and accompanying technological changes, the Commission's task in connection with the prescription of depreciation rates and other depreciation matters is becoming increasingly more complex and extensive. The development of an electronic central office system is an example of a revolutionary change. Commission studies during the past 2 years indicate that, because of a number of significant advantages offered by this new development, a large portion of the electromechanical types of central office systems currently in service may be retired prematurely. The introduction of electronic central office systems could also have an important impact on depreciation rates for other classes of facilities such as telephone instruments, private branch exchanges, and even some outside distribution plant.

Original cost accounting.—The accounting rules and regulations of the Commission provide that telephone plant acquired shall be recorded at original cost and that journal entries recording such acquisitions shall be submitted to the Commission for consideration and approval. The accounting for several current acquisitions of plant, including acquisitions of communication plant from nontelephone companies, was handled during the year. In certain instances, this involved the disposition of amounts in excess of original cost.

Relief and pensions.—Certain of the Bell System companies submitted proposals to revise their service pension accrual programs by providing for the amortization over a 10-year period (20-year period for two companies) of the unfunded actuarial reserve requirement. Approval was granted and it is expected that the other Bell companies will submit similar proposals.

Field Studies and Reviews

The accounts, records, and accounting procedures of communication carriers are reviewed periodically for compliance with the Commission's accounting rules and regulations. Such reviews, conducted

by the three Common Carrier Bureau field offices (New York City, St. Louis, and San Francisco) and by the headquarters staff, are directed to the ascertainment and verification of the adequacy and propriety of the accounting performed, the reliability of which is required for rate studies, rate proceedings, and depreciation rate studies.

During fiscal 1959, reviews and studies were made of certain of the accounts and related records of seven Bell companies and one independent company. These reviews and studies were directed primarily to accounting for station apparatus and station connections, for additions to and retirements of telephone plant, distribution of overhead and supply expense, Federal income taxes on profits of Western Electric Co., inventories, and the establishment and maintenance of continuing property records as well as other matters.

A study is in progress to determine the reasonableness of the revised actuarial data underlying the basic factors used in the determination of Bell System service pension accrual rates for the year 1959. Also, a review was made of the diversification of the investments of the Bell pension trust funds.

The preliminary study, mentioned in the 1958 report, tracing the corporate history and development of the General Telephone System from its organization in 1935 to the present time, is now completed.

DOMESTIC TELEGRAPH

Highlights

For the calendar year 1958, the Western Union Telegraph Co. reported a 2-percent decline in gross landline operating revenues, and systemwide net income of $12,660,000 compared to $14,194,000 in 1957. The decline was due to an 8.4-percent drop in telegram volume which was not offset by the substantial growth which occurred in leased-line business or rate increases in the latter half of the year. The company continued its modernization program to reduce costs and improve service, but speed of service showed need of more improvement. Direct Western Union office representation in small communities continued to diminish by the closure of many railroad and other telegraph agency offices.

General

Western Union provides the only nationwide telegraph message service. It operates nearly 4½ million miles of telegraph circuits, and serves the public through 21,200 telegraph offices and agencies and some 56,000 direct teleprinter and deskfax customer connections with central telegraph offices. Its landline telegraph plant represents an investment of some $364 million.

Western Union's domestic public message service accounted for only 66 percent of its total landline revenue as compared with 69 percent in 1957, reflecting a 9.2-percent loss in public message volume. Private-line telegraph services, its next major source of revenue, accounted for 17 percent of total revenue as compared with 15 percent in 1957, reflecting expansion in the service and rate increases which were placed in effect December 2, 1958, on an interim basis. Although Western Union's leased private-line service revenue of $40.7 million represented more than a $4.5 million increase over 1957, the Bell System still handles the major part of the Nation's private-line telegraph business. Western Union also provides domestic telegraphic money order service (its third most important revenue producer), commercial news (stock ticker and commodity prices) services, and a variety of other nonmessage services.

Western Union's gross landline operating revenues for calendar 1958 totaled $240,729,000, a decline of $4.8 million from the previous high in 1957. The decline, due principally to the loss in message volume, occurred in spite of message rate increases and other revenue relief effectuated in the latter half of 1958. The company's system-wide net income, including ocean-cable operations, amounted to $12,660,000 in 1958 after Federal income taxes, compared to $14,194,000 for 1957.

The company's investments in seven companies active in electronics and allied fields, as part of a program of selective diversification and to supplement Western Union's own research and development activities, amounted to more than $3 million at the end of 1958.

Services and Facilities

Modernization and plant improvements.—During 1958, Western Union expended about $4 million on its modernization and plant improvement program. Since the program's inception in the middle 1940's, Western Union has spent about $80 million, and another $18 million is projected. The principal facets of the program include the continued automation of message handling at traffic centers and central offices, and improvements to increase the capacity of the radio beam network presently linking New York, Philadelphia, Washington, Pittsburgh, Cincinnati, and Chicago. Extension of this microwave network to Kansas City, planned for 1960, will provide increased coverage to meet the growing demands for private wire facilities by business and Government. The program also includes the installation of new-type carrier terminal equipment to increase the number of telegraph channels derived by Western Union from voice channels leased from the Bell System.

Private wire systems.—Western Union has installed and leased more than 2,000 private wire systems, using approximately 3 million miles of circuits, and some of these systems cover hundreds of individual points. Facilities in private wire service in calendar 1957 were 2,533,251 miles. In December 1958, Western Union completed installation of the last of 5 fully automatic centers serving the U.S. Air Force, linking 200 Air Force bases with a 250,000-mile network—the world's largest private wire system. A contract has been negotiated for the construction and sale of similar automatic centers at oversea Air Force bases to extend the system around the world. Similar centers will be set up for the Federal Aviation Agency at Hawaii and the Canal Zone. A 25,000-mile private wire system was placed in service for International Business Machines Corp. to link its headquarters and 245 offices, plants, laboratories, and parts centers. A 15,000-mile system was installed for General Dynamics Corp. Additional systems were installed for other business firms, and existing networks for other customers were expanded substantially during the year.

Intrafax.—In May 1959, Western Union installed a new 12,000-mile nationwide facsimile weather map network for the U.S. Air Force Strategic Air Command. This new system, known as the Strategic Facsimile Network, links 57 weather stations at Air Force bases throughout the country and makes it possible for up-to-the-minute weather maps to be transmitted immediately to air operation centers. Maximum copy size of maps received over this system are up to and including 18 inches by 36 inches, approximately three times larger than any previously transmitted by facsimile.

Facsimile and teleprinter tielines.—During the fiscal year, 2,300 new deskfax machines were installed to speed service, increase business, and reduce costs. As of July 1, 1959, there were 36,000 facsimile machines used by the public to send and receive approximately 43 million telegrams a year in picture form, simply by pushing a button. The telegrams of another 19,500 business firms are handled by a teleprinter connection with Western Union central offices, making a total of 55,500 direct connections now serving telegraph users.

The program, started in 1954, of furnishing larger users with direct tieline connections into the Western Union system is being continued. Twenty-one additional large users were provided with these connections during fiscal 1959, increasing the number to 381. In addition, approximately 140 business firms using teleprinters in Detroit have been connected directly into the automatic telegraph network and the plan is being extended to other cities.

Telex service.—The first customer-to-customer teleprinter exchange service between the United States and Canada was inaugurated by

Western Union in May 1958. The new service, called Telex, permits users to dial other subscribers directly for two-way telegraph communication. In February 1959, the telegraph company took a first step in providing Telex service between subscribers within the United States by linking New York with Chicago, as well as with 24 Canadian cities then served. Extension of this service to Los Angeles and San Francisco is expected to be started in late 1959, with other cities in the United States to be added in the future.

Research and development.—Western Union expended $1.4 million for research and development in 1958. Developments included completely transistorized carrier terminals, a new fully automatic private wire reperforator switching system for commercial users, a flatbed type of facsimile transmitter which transmits a stack of messages automatically, and improved techniques in microwave propagation and application of computer techniques to switching system problems through experiments with magnetic drum storage. The company is engaged in programs designed to improve existing and develop transmission techniques to provide intercity facilities capable of handling the transmission of high-speed data and facsimile material.

Supplementation of facilities and curtailments of service.—Primarily to meet the needs of private wire services, Western Union was authorized to extend or supplement its lines by the addition of more than 300,000 telegraph channel-miles and 24,000 facsimile channel-miles, leased from other carriers.

In the area of service curtailment, the Commission during fiscal 1959 granted 1,145 applications of Western Union, two-thirds of which involved the closure of agency offices operated by railroads and local establishments handling negligible amounts of traffic. The remainder concerned closures or hour reductions of company-operated main and branch offices. Agency closures generally result in eliminating direct Western Union representation in many small communities, although service remains available by telephone. The closure of branch telegraph offices has often been occasioned by the growth of customer tielines and the increased use of telephone for acceptance and delivery of messages. In all cases of closure or reduced hours of public offices, substitute service has been made available. A limited number of on-the-spot field investigations have been made by the FCC staff to ascertain service conditions before and after service curtailments.

Speed of service.—Western Union is required to conduct and report monthly on studies of the speed of its message services. To the extent that the FCC budget permits, on-the-ground service investigations are made at Western Union offices and agencies. During the year, 200

such inspections were made. Deficiencies revealed through these and other sources, including complaints from users, are brought to the company's attention in order that corrective measures may be taken to improve service.

The overall origin to destination speed of service (time filed to time delivered, or first attempt) reported by Western Union was somewhat slower in 1957 and 1958, particularly with respect to messages delivered by telephone and messenger, although it continued to be faster than prior to 1955. The slower service resulted principally from the application of rigorous expense controls which, according to the telegraph company, were made necessary by the declining message load. As a result, labor force requirements were not predictable with sufficient accuracy to avoid instances of service deficiencies.

Reports submitted thus far in 1959 indicate that increased efforts are required on the part of the company to bring service up to a satisfactory level at several cities, particularly with respect to messages delivered by messenger. The company advises that major changes in the methods of operation to improve service are contemplated at certain cities in 1959 and 1960, and that studies are being made at other offices with the view of devising and carrying out new procedures or installing equipment for the purpose of eliminating service deficiencies.

Rates and Tariffs

Domestic telegraph rates.—On August 1 and on subsequent dates in 1958, increased rates for interstate message telegraph, press, money order, and miscellaneous services were effected by Western Union. The rate increases resulted in revenue increases of about $10 million a year and offset in part wage increases negotiated in June 1958 estimated to increase operating expenses by about $10,838,000 annually.

Also effective August 1, 1958, charges were revised for international messages and associated landline charges which were estimated to increase Western Union landline revenues over $2 million annually.

Upon petition of the major marine telegraph carriers, the Commission, on December 30, 1958, modified its order of September 4, 1952, in docket 9915, to allow increases in the maximum charges for marine telegraph full-rate messages of 1½ cents per word in the landline forwarding charge and of 1 cent per word in the coast-station charge, with proportionate increases for other message classifications.

Leased facilities services.—The Commission's investigation (docket 11646) into the lawfulness of the charges, classifications, regulations, and practices in connection with the leased facilities services of Western Union continued. During the year Western Union filed tariffs to

effectuate increases in the charges for these services. The Commission found that the record in the proceeding supported the need for some increases in rates on an interim basis, but that the tariff schedules presented certain questions as to the lawfulness of the charges and regulations contained therein. The Commission also found that the interest of Western Union in an interim revenue increase, and the interests of the public in protection against any charges that may ultimately be found not justified, would both be served by the issuance of a 1-day suspension order requiring Western Union to keep accounts of the amounts received by the new schedules. Revisions of the rates applicable to intra-U.S. interstate private wire facility leases were placed into effect December 2, 1958, on an interim basis, and were estimated to increase Western Union's annual revenue by $5 million. Important rate level and rate structure decisions must be made by the Commission before this matter is finalized.

Tariff schedules.—During the year, carriers filed 958 pages of domestic telegraph tariff material and 32 applications for permission to file tariff schedules effective on less than statutory notice.

INTERNATIONAL TELEGRAPH AND TELEPHONE

Highlights

In fiscal 1959, the international telegraph industry as a whole reported good earnings as a result of both the substantial growth which has occurred in the so-called customer-to-customer oversea services and the message telegraph rate increases effected in August 1958.

The year also witnessed a modification in the policy heretofore adhered to of restricting A.T. & T.'s oversea operations to the rendition of voice communication and of restricting the international telegraph carriers to furnishing record-type communication. This change of policy is the outgrowth of customer requirements (particularly defense requirements) for oversea channels which can be used alternately or simultaneously for a combination of voice-, record-, and data-type transmissions. Since such requirements can only be met by A.T. & T.'s new high-capacity transoceanic cables, the Commission authorized it to provide the service requested for defense purposes.

Also, during the year, the Commission went on record as endorsing, in principle, proposed legislation which would authorize a merger of the international telegraph carriers.

A second A.T. & T. transatlantic telephone cable to handle communications primarily with the European continent via France was opened September 22, 1959.

General

International telegraph service is furnished principally by American Cable & Radio Corp. (through its operating subsidiaries), RCA Communications, Inc., and Western Union, which handle above 90 percent of all international telegraph traffic, and five smaller carriers. International telephone service is furnished principally by A.T. & T. These companies also furnish service to ships at sea and aircraft.

Revenues of the international telegraph carriers were over $77 million in calendar 1958, an increase of 0.6 percent over 1957. Some $11 million of this amount was derived from leased channel and Telex services, a 15.2-percent increase from the previous year. A.T. & T. revenues from oversea services increased 21.6 percent over 1957 to $26 million in 1958.

Problems

Technological advances and changing user requirements (particularly of the defense agencies) are the principal contributors to a number of problems facing the Commission in the field of international communication. The more important of these problems are outlined in the following paragraphs.

Revision of policy generally restricting an international carrier to either telegraph or telephone services.—Until recently, communication by wire and radio could be categorized as either record or voice. The Commission has generally followed a policy in the international field of restricting telegraph carriers to the furnishing of record communications services and generally restricting the telephone carriers to the furnishing of voice communications services.

New techniques and user requirements, however, have created a demand, principally from defense agencies, for broadband voice grade channels to be used in transmitting data and other record communications simultaneously or alternately with voice communications. At the present time, A.T. & T.'s submarine telephone cables can best accommodate this demand since the international telegraph carriers cannot provide the necessary facilities.

The Commission has therefore had to reexamine its policy and has authorized A.T. & T. to provide such services to the defense agencies. At the same time, it authorized A.T. & T. to lease facilities to the telegraph carriers to enable them to provide similar services to the defense agencies.

Increasing scarcity of frequencies allocated to international point-to-point radio services.—Although developments have made it possible to provide some additional channels and new circuits in that portion of the frequency spectrum allocated to international point-to-

point operations, it is becoming increasingly difficult to satisfy the demand for frequencies without interference to or from worldwide operations. This problem may be aggravated if foreign proposals to reduce frequency space for fixed service are adopted at Geneva. One possible solution to the demand for frequency space is the construction of high-capacity cables of the type now in operation to the United Kingdom, Alaska, and Hawaii. At present, however, these cables have not resulted in the release of radiofrequencies formerly used for such operations because of the necessity of having standby radio systems in case of cable breakdown.

Reevaluation of rate structure of international telegraph carriers.—Since 1950 the revenues of international telegraph carriers from leased channel and Telex services have risen from 2.7 to 14.7 percent of their total revenues. Rate investigations by the Commission in the international telegraph field in recent years have been mainly confined to point-to-point message services. With the rapid growth of the direct customer-to-customer services there is a growing need to undertake the complex problem of examining the rates for these services to determine their reasonableness.

Threatened loss of traffic by international telegraph carriers.—In addition to the loss of traffic associated with the demand for broadband channels, the international telegraph carriers face a possible loss of traffic, particularly in the overnight category, to the Post Office Department as the use of jet aircraft and missile mail delivery is developed. This threat can best be met by the development of faster, more efficient telegraph service at low rates. In addition, with the new demand for leased channel and data-processing services which require high-quality broadband channels, it is likely that the international telegraph carriers will lose business to A.T. & T.'s high-capacity cables unless they can install plant of the necessary quality.

Western Union divestment.—This company, as a result of its 1943 merger with Postal Telegraph, became subject to the requirement in section 222 of the act that it divest itself of its international telegraph operations. The Commission, after ordering such divestment in 1943, allowed successive extensions of the time in which this was to be accomplished.

In 1958, as a result of an investigation in docket 10151, the Commission ordered Western Union to submit by December 31, 1958, a plan under which divestment would be accomplished within 6 months after approval of the plan. On appeal, the Circuit Court held that, although the Commission had authority to order Western Union to come forward with a plan for divestment under conditions set out by the court, the order at issue was not within such conditions. The

matter was remanded to the Commission for further action. The Commission on July 29, 1959, required Western Union to present a plan for divestment within 90 days, subject to certain conditions and to take other related action in this matter.

International formula.—Section 222 of the act also requires that Western Union distribute telegraph traffic destined to points outside the continental United States among the various international telegraph carriers in accordance with a formula prescribed by the Commission in 1943 when Western Union merged with Postal. A number of hearing cases have been instituted with respect to the operation of this formula, some of which have not as yet been resolved. Changing conditions in the industry, as well as an evaluation of certain aspects of the formula indicate that a revision of the formula may be desirable in order to achieve the legislative purposes more effectively.

International telegraph merger.—The Commission endorsed, in principle, a bill to permit merger of international telegraph carriers. The Commission's position was that such merger would aid in solving some of the problems facing the industry. Thus, a merged carrier could more easily add new plant incorporating the latest technological advances without encountering problems faced by the presently competing carriers. It would also be able to ease the pressure on available frequency space through more efficient use of frequencies. Problems arising from the administration of the international formula would be reduced. Absorption of the Western Union cable system into such a merged carrier would meet the divestment mandate of Congress. In its comments, the Commission made suggestions as to the precise wording of a permissive merger bill. If such bill is enacted into law, and application is made to the Commission for approval of a proposed merger, it is likely that a lengthy public hearing will be necessary.

Ocean Telephone Cables

Interest in ocean telephone cables has heightened. The United States is now linked with Hawaii and Alaska by A.T. & T. telephone cables. The first transatlantic telephone cable, connecting Newfoundland and England, is carrying increased traffic, and another A.T. & T. cable, between Newfoundland and France, has been opened. Both of these cables are linked to the United States by radio facilities.

Docket Cases

Puerto Rico applications.—A final decision in this matter (docket 10056) was issued October 1, 1958, after oral argument on RCA Communications exceptions to the initial decision. It upheld the grant of applications of Mackay Radio & Telegraph Co. and all

America Cables & Radio, Inc., for modification of their fixed public service radiotelegraph station licenses to permit operation of a circuit between the United States and Puerto Rico on a regular rather than on emergency basis.

Far East traffic.—An initial decision in this matter, upholding the legality of Western Union handling of traffic to various Far Eastern points over its cable system via London, was released December 15, 1958 (dockets 11364 and 11663). The matter is now awaiting oral argument on exceptions filed by RCA Communications, which claimed that Western Union under the international formula is not entitled to handle such traffic.

Delays in handling international press traffic.—On July 9, 1957, a hearing was held on complaint of Press Wireless, Inc., alleging excessive delays in the transfer by Western Union to Press Wireless of international press traffic specifically routed by the sender via Press Wireless (docket 11871). An initial decision was issued February 25, 1958. Both parties filed exceptions and the matter is awaiting decision.

Radiotelephone service to Hawaii.—On July 29, 1959, after oral argument on RCA Communications exceptions to an initial decision, the Commission upheld the grant of A.T. & T.'s application (docket 11954) to communicate with Hawaii from its radiotelephone transmitting station in California, and denied the mutually exclusive application of RCA Communications (docket 11955) except for nonmessage services.

Western Union practices under international formula.—Hearings in this matter, requests of American Cable & Radio Corp. and RCA Communications for Commission rulings on the lawfulness under section 222 of the Communications Act and the international formula of certain Western Union practices (dockets 9369 and 11298), have been deferred pending negotiations between the parties.

Circuits to Turkey and Israel.—As reported previously, applications of Mackay and RCAC to communicate with Ankara, Turkey (docket 10360), have been consolidated for hearing with the application of Mackay to communicate with Istanbul, Turkey (docket 10489). Similarly, a hearing has been ordered on the application of RCAC to communicate with Tel Aviv, Israel (docket 8990). At the request of the parties, these hearings have been postponed indefinitely.

Participation under international formula.—Mobile Marine Radio, Mobile, Ala., is negotiating with other international telegraph carriers receiving outbound marine traffic from Western Union in an effort to attain informally the objective sought in a petition it filed

in January 1957 for participation in the distribution of such traffic under the international formula. Mobile Marine Radio has asked that no action be taken on its petition meanwhile.

Press Wireless license modification.—Hearings were ordered on applications of Press Wireless, Inc., for modification of its licenses to permit it to handle nonpress material over its Telex service (dockets 12539 and 12540).

Alternate voice and data transmission service for U.S. Air Force.—On June 5, 1958, the Commission granted the applications of A.T. & T. for modification of its point-to-point microwave radio service station licenses for facilities between Portland, Maine, and the Canadian border connecting with the transatlantic telephone cable system (TAT), so as to authorize the furnishing of an alternate voice and data transmission service to the U.S. Air Force.

Subsequently, Western Union filed a protest and request for reconsideration. In addition, A.C. & R. and RCAC also opposed the grants. On July 31, 1958, the Commission set the applications for hearing (docket 12569) but permitted A.T. & T. to continue to furnish the subject service pending outcome of the hearings. Further prehearing conferences were deferred pending attempt of the parties to obtain certain data informally with respect to the requirements of the Air Force in connection with the subject service.

STATISTICS

General

Annual reports were filed by 509 common carriers and 6 controlling companies for the calendar year 1958. Considerable financial and operating data taken principally from these reports are published annually in a volume entitled "Statistics of Communications Common Carriers." The larger telephone and telegraph carriers also file monthly reports of revenues and expenses, and summaries of these data are published monthly by the Commission.

Telephone Carriers

Annual reports were filed by 500 telephone carriers, including 96 carriers engaged in general landline telephone service and 404 miscellaneous common carriers engaged only in providing land mobile radiotelephone service. Sixty-two of the 96 telephone carriers were subject to the comprehensive landline telephone reporting requirements of the Commission, and the remaining 34 were required to report on the more limited basis applicable to mobile radio carrier licensees.

Selected financial and operating data concerning 54 general tele-

phone carriers whose annual operating revenues exceed $250,000 are shown in the following table for the year 1958 as compared to 1957.

Telephone carriers [1]

Item	1957	1958	Percent of increase or (decrease)
Number of carriers	54	54	
Book cost of plant (as of Dec. 31)	$20,337,580,177	$21,998,473,853	8.17
Depreciation and amortization reserves	4,611,206,261	4,898,318,412	6.23
Net book cost of plant	15,726,373,916	17,100,155,441	8.74
Local service revenues	3,856,426,053	4,178,551,133	8.35
Toll service revenues	2,471,140,872	2,614,891,776	5.82
Total operating revenues	6,647,798,713	7,142,942,217	7.45
Operating expenses and operating taxes	4,919,782,837	5,057,587,955	2.80
Provision for Federal income taxes	793,143,706	963,073,448	21.42
Net operating income after all taxes	934,872,170	1,122,280,814	20.05
Net income	861,790,961	1,001,792,064	16.25
Dividends declared	626,438,891	670,136,909	6.98
Company telephones:			
Business	15,212,157	15,730,185	3.41
Coin	1,109,405	1,147,594	3.44
Residence	39,594,950	41,669,686	5.24
Number of calls originating during the year:			
Local [2]	87,945,665,525	91,709,071,298	[3]
Toll [2]	3,141,782,287	3,348,760,655	[3]
Number of employees at end of October	687,781	637,025	(7.38)
Male	272,842	265,707	(2.62)
Female	414,939	371,318	(10.51)
Total compensation for the year	$3,124,436,405	$3,116,255,692	(.26)

[1] Data shown relate to telephone carriers whose annual operating revenues exceed $250,000. 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 1958, due to enlargement of numerous local calling areas.

Landline telephone companies filing reports with the Commission include most of the larger companies (accounting for over 90 percent of the industry revenues), but exclude the great majority of the 3,900 telephone companies in the United States. There are also additional thousands of connecting rural or farmer lines and systems. Telephone industry estimates are that its operating revenues in 1958 totaled $7.7 billion, with book cost of plant at December 31, 1958, of $24.2 billion, and 701,000 employees.

Land mobile radiotelephone service is offered by 30 of the 62 telephone carriers reporting to the Commission as "fully subject" carriers. This service is also offered by 34 other carriers engaged in general landline telephone service. In addition, 404 miscellaneous common carriers offer land mobile radiotelephone service. Reports filed by the latter group show that their operating revenues for 1958 totaled $3.1 million. More than half of these carriers reported operating losses for 1958.

Domestic Telegraph Carrier

The following table sets forth financial and operating data relating to the domestic landline operations of the Western Union Telegraph Co. for the calendar year 1958 as compared to 1957. The data per-

taining to its cable operations are included in tables below showing data of international telegraph carriers.

The Western Union Telegraph Co.[1]

Item	1957	1958	Percent of increase or (decrease)
Book cost of plant (as of Dec. 31)	$350,859,633	$364,497,783	3.89
Depreciation and amortization reserves	147,334,384	149,692,282	1.60
Net book cost of plant	203,525,249	214,805,501	5.54
Message revenues	194,248,819	185,155,970	(4.68)
Total operating revenues	245,548,609	240,728,570	(1.96)
Operating expenses, depreciation, and other operating revenue deductions	228,219,321	225,145,413	(1.35)
Net operating revenues	17,329,288	15,583,157	(10.08)
Provision for Federal income taxes	[2] 5,993,000	[2] 4,975,000	(16.99)
Net income	12,911,194	11,061,731	(14.33)
Net income (landline and cable systems)	14,194,036	12,660,209	(10.81)
Dividends (landline and cable systems)	7,165,272	7,505,206	4.74
Number of revenue messages handled [3]	143,946,655	131,866,816	(8.39)
Number of employees at end of October	36,467	33,620	(7.81)
Total compensation for the year	$159,157,308	$154,032,171	(3.22)

[1] Represents data for landline operations. Figures covering cable operations are included in tables below showing data of international telegraph carriers.

[2] Reflects estimated net reductions in Federal income tax liability of $1,768,000 and $2,132,000 in 1957 and 1958, respectively, arising from the utilization, for income tax purposes but not for accounting purposes, of a liberalized depreciation method recognized by sec. 167 of the Internal Revenue Code of 1954. Also reflects an estimated net reduction of $303,000 in 1957 and an estimated net increase of $13,000 in 1958 in Federal income tax liability arising from the use in prior years of 5-year amortization authorized under sec. 168 of the Internal Revenue Code of 1954.

[3] Includes domestic transmission of transoceanic and marine messages (about 9,724,000 in 1957, and about 9,544,000 in 1958).

International Telegraph Carriers

Financial and operating statistics relating to the U.S. international telegraph carriers for the calendar year 1958 are shown below as compared to similar figures for 1957. Statistics pertaining to radiotelegraph and ocean cable carriers are also shown separately.

International telegraph carriers

Item	1957	1958	Percent of increase or (decrease)
Number of carriers	9	9	
Book cost of plant (as of Dec. 31)	$149,439,860	$154,438,536	3.34
Depreciation and amortization reserves	80,068,183	82,018,352	2.44
Net book cost of plant	69,371,677	72,420,184	4.39
Message revenues:			
Domestic [1]	2,500,804	2,547,355	1.86
Transoceanic	50,399,799	50,302,692	(.19)
Marine	1,931,272	1,781,143	(7.77)
Total operating revenues	76,845,286	77,281,294	0.57
Operating expenses, depreciation, and other operating revenue deductions	66,258,760	67,044,376	1.19
Net operating revenues	10,586,526	10,236,918	(3.30)
Provision for Federal income taxes	5,385,905	4,868,445	(9.61)
Net income	5,920,790	6,605,154	11.56
Dividends declared [2]	1,783,670	2,120,202	18.87
Number of revenue messages handled:			
Domestic [3]	152,641	137,272	(10.07)
Transoceanic	24,143,486	23,348,028	(3.30)
Marine	1,156,680	1,104,771	(4.49)
Number of employees at end of October	11,502	11,182	(2.78)
Total compensation for the year	$41,993,931	$42,855,263	2.05

See notes after "Ocean cable carriers."

Radiotelegraph carriers

Item	1957	1958	Percent of increase or (decrease)
Number of carriers	6	6	
Book cost of plant (as of Dec. 31)	$53,115,420	$56,923,518	7.17
Depreciation and amortization reserves	21,287,387	22,821,079	7.20
Net book cost of plant	31,828,033	34,102,439	7.15
Message revenues:			
Domestic [1]	2,306,364	2,330,961	1.07
Transoceanic	27,196,393	26,705,538	(1.81)
Marine	1,931,272	1,781,143	(7.77)
Total operating revenues	41,403,043	42,216,032	1.96
Operating expenses, depreciation, and other operating revenue deductions	33,378,493	35,240,210	5.58
Net operating revenues	8,024,550	6,975,822	(13.07)
Provision for Federal income taxes	3,770,905	3,693,445	(2.06)
Net income	5,435,284	4,569,908	(15.92)
Dividends declared	900,000	1,590,000	76.67
Number of revenue messages handled:			
Domestic [3]	57,533	52,542	(8.68)
Transoceanic	13,672,370	13,102,992	(4.17)
Marine	1,156,680	1,104,771	(4.49)
Number of employees at end of October	[4] 5,401	[4] 5,270	(2.43)
Total compensation for the year	$24,118,840	$25,127,406	4.18

Ocean cable carriers (including Western Union cable operations)

Item	1957	1958	Percent of increase or (decrease)
Number of carriers	3	3	
Book cost of plant (as of Dec. 31)	$96,324,440	$97,515,018	1.24
Depreciation and amortization reserves	58,780,796	59,197,273	.71
Net book cost of plant	37,543,644	38,317,745	2.06
Message revenues:			
Domestic [1]	194,440	216,394	11.29
Transoceanic	23,203,406	23,597,154	1.70
Total operating revenues	35,442,243	35,065,262	(1.06)
Operating expenses, depreciation, and other operating revenue deductions	32,880,267	31,804,166	(3.27)
Net operating revenues	2,561,976	3,261,096	27.29
Provision for Federal income taxes	1,615,000	1,175,000	(27.24)
Net income	485,506	2,035,246	319.20
Dividends declared [2]	883,670	530,202	(40.00)
Number of revenue messages handled:			
Domestic [3]	95,108	84,730	(10.91)
Transoceanic	10,471,116	10,245,036	(2.16)
Number of employees at end of October	[4] 6,101	[4] 5,912	(3.10)
Total compensation for the year	$17,875,091	$17,727,857	(.32)

[1] Includes revenues of 2 ocean cable carriers and the radiotelegraph carriers from the domestic transmission of transoceanic and marine messages outside of points of entry or departure in the United States, and revenues from domestic-classification messages (primarily Canadian and Mexican).

[2] All dividends declared by Western Union Telegraph Co. have been reported in the table above relating to the domestic landline operations of that company and are excluded from this table.

[3] Represents domestic-classification messages (primarily Canadian and Mexican).

[4] Certain employees of 1 radiotelegraph carrier and 2 ocean cable carriers serve more than 1 of the companies. The amounts of compensation reported for each of these companies are after intercompany charges and credits. As a result, the number of employees and total compensation shown are not on the same basis.

Common Carrier Applications

Over 5,000 applications were filed with the Commission by common carriers during the fiscal year (exclusive of Alaskan and marine mobile). The following table shows the number of applications according to class of service:

Class	Pending June 30,1958	Received	Disposed of	Pending June 30, 1959
Radio facilities				
Domestic:				
Point-to-point microwave radio stations	200	1,779	1,773	206
Local television transmission stations		19	17	2
Rural radio stations	15	231	204	42
Domestic public land mobile radio stations	62	816	757	121
Developmental stations	18	17	32	3
Registration of Canadian radio stations licensees		21	21	
International:				
Fixed public and fixed public press telegraph	2	179	180	1
Fixed public telephone	1	70	71	
International control	5	13	18	
Subtotal	303	3,145	3,073	375
Wire facilities				
Telephone extensions	7	180	180	7
Telegraph extensions		58	56	2
Telephone reductions	1	14	11	4
Telegraph reductions	112	1,162	1,167	107
Subtotal	120	1,414	1,414	120
Miscellaneous				
Interlocking directorates		8	7	1
Jurisdictional determination		6	6	
Submarine cable landing licenses		1		1
Petitions or motions (nondocket)		3	3	
Renewals		533	533	
Subtotal		551	549	2
Total	423	5,110	5,036	497

Field Engineering and Monitoring

GROWTH OF FIELD ENGINEERING WORK

Since the birth of radio, governmental regulation has required a field staff to administer and check on compliance with rules and, generally, to act as the enforcement arm of the regulating body.

In 1934 the FCC's field engineering facilities consisted of 20 offices, 7 monitoring stations, 9 mobile units, and 113 employees. Today its Field Engineering and Monitoring Bureau operates 31 offices, 18 monitoring stations, and 80 mobile units. It does this with a staff of about 400. Meanwhile, the number of radio stations has increased tenfold and radio operator authorizations about 30 times.

How does the Commission cope with the corresponding increase in its field engineering work? The answer lies in improved organization and methods; but it must be added that less attention can be given to some field operations. Sampling inspection of certain radio stations has reached a figure of less than 2 percent, compared to 17 percent in 1934. In other phases, methods of attacking the workload require new approaches and considerable "self-help" from industry. One compelling objective is to resolve major day-to-day radio problems which affect the public and industry at the "grassroots" level.

Following are some of the problems encountered in the Commission's field engineering work, and techniques and progress directed toward their solutions. Statistical tables are appended to this chapter.

INTERFERENCE

Interference by Plastic Heaters

The Commission is confronted with a serious interference condition from plastic heaters in and around New York City and, to a more limited degree, in other industrialized areas. Air navigation radio aids, police, defense, broadcast, and other radio communication systems are affected. It is caused by radiation from the concentration of small plants using unshielded electronic heaters in manufacturing wares. Many of the heaters operate in violation of part 18 of the Commission's rules. Clearing the New York City area of their interference is a difficult problem; however, progress is being made.

Because heater emissions continuously change in frequency and intensity, it is hard to locate an offender where hundreds of others are operating simultaneously. Bearings are difficult to obtain because the signals have multiple reflections from the many large buildings in the area. Spectrum studies are being made to determine a pattern which may lead to easier solutions. In some instances where operation and interference persist, legal action is necessary. During the year FCC show-cause orders were issued against five New York City firms and Federal court restraining orders against six others.

Interference by Amateur Stations

When an amateur station causes interference because it is not operating in accordance with the terms of its license, FCC field engineers require the operator to correct his equipment or go off the air until the defect is remedied. In most cases, however, interference blamed on a neighborhood amateur station is due to the inability of the complainant's receiver to reject unwanted stations. Interference of this type can usually be eliminated by installing a simple high-pass filter on the complainant's receiver. These filters are often furnished by manufacturers and dealers of TV receivers through the cooperation of local television interference committees.

Interference by Garage Door Openers

Radio services still get interference from garage door openers but, fortunately, most of these radio-controlled devices are in residential areas away from radio centers. Recent investigation of such interference to military radio communication near Denver disclosed that the receiver portion of garage door openers operating in the 250–270-megacycle range was at fault. This trouble can be eliminated only by modifying the devices or discontinuing their use.

Malicious Interference

Sixty families in a New York City apartment house received radio and TV interference because a disgruntled resident deliberately operated a sparking motor device in his apartment. In Ohio a radio technician used an unlicensed transmitter to disrupt a business rival's radio system. In Oregon a community antenna TV system employed an unlicensed transmitter to jam the programs of a competing TV translator station. FCC field engineers traced and closed down these operations.

Carrier Current Systems

There has been a tendency by college carrier current systems to increase radiation in excess of that allowed by the Commission's rules in order to reach more listeners. Also, other groups have established

such systems for "piping" programs of entertainment, religion, weather, news, and advertising. Close surveillance by FCC field engineers is necessary to prevent them from developing into uncontrolled wired-broadcast systems. For example, in an Ohio town a merchant was dissuaded from sending music and advertising over the powerlines. He exceded the allowable radiation limits for carrier current operation.

Several college carrier current systems found in violation promptly reduced radiation. Docket 9288 looks to amending part 15 for more effective control and to clarify conditions under which college-type carrier current systems may operate.

Low-Power Communications Devices

There is growing interest in low-power communications devices that may be operated without a license, particularly when used as portable transmitters. Several companies have designed small communication sets of this type. The Commission is watching this development to be sure that radiation rule requirements are met. Devices in this category are similar to "walkie-talkies" licensed in the Citizens Radio Service except that the communication range is more limited.

Incidental Radiation Devices

Incidental radiation devices contribute to interference in industrial and densely populated areas. They include electric motors, generators, powerlines, appliances, fluorescent lights, neon signs, ignition systems, etc. Their number is so great that it would be impossible to investigate each one, so the Commission seeks the cooperation of users to reduce interference when complaints are received.

Industrial, Scientific, and Medical Equipment

Except in the New York City plastic heater situation, industrial, scientific, and medical (ISM) equipment is not a serious interference problem. Users of industrial heaters are usually cooperative in remedying trouble. No nonconforming medical diathermy machines were found in use during fiscal 1959.

Cooperating Groups

The FCC continues to enlist the help of industry and citizens groups in curbing radio interference. Cooperating in this endeavor are:

Cooperative Interference Committees (CIC), 32 in operation, composed of engineers, industry executives, Government officials, and others interested in resolving mutual interference problems.

Television Interference Committees (TVIC), numbering 525, representative of amateur radio operators, radio and TV repairmen, and others interested in

voluntarily contributing their skills in eliminating radio and TV interference in their communities.

Induction and Dielectric Heating Subcommittee of the Electric Heating Committee of the American Institute of Electrical Engineering, which studies problems of industrial heater installations with the view of developing improved methods of measuring radiation.

Radio Interference Committee of the Society of the Plastics Industry, Inc., which recommends to the users methods of reducing plastics heater interference.

Joint Industry Committee on High Frequency Stabilized Arc Welders of the National Electrical Manufacturers Association, which aids users of RF welding devices to control interference.

ILLEGAL OPERATION

The field engineering staff is gathering information on illegal TV "booster" station operation. It found 216 during the year, but the total number is still undetermined; estimates range from more than 500 to over a thousand. Indications are that booster efficiency is being increased by improved equipment and ability to carry more channels. Additional communities in remote areas are being reached by boosters retransmitting the signals of other boosters. (See also reference to boosters in "Broadcast" chapter.)

Investigation of unlicensed radio operation for "beating the bookies" at racetracks continues. Ingenuity is necessary to apprehend such operators because the small transmitters are well hidden, are moved about continuously in a crowd, and are on the air only momentarily. One operator found guilty of so disseminating racetrack information in Florida was sentenced to pay a fine of $260 or spend 60 days in jail.

Types of unlicensed operation of radio transmitters are many and varied. In Portland, Oreg., a young radio enthusiast attached a 60-foot antenna to a small wireless oscillator and got into trouble. A cannery on an island off Washington State used unlicensed radio equipment for communicating with its fishing boat. A Georgia county sheriff operated an unlicensed highway radar device because its salesman said no license was required. In a California city an electronic technician operated an unlicensed mobile transmitter in the amateur service while driving to and from work.

Illegal stations uncovered during the year numbered 114 (exclusive of booster stations), which was 28 less than in 1958.

MONITORING

Location Problems

A number of monitoring stations which were miles away from residential areas or industrial plants at the time of their construction are now hemmed in to such an extent that their operations are adversely affected.

Two monitoring stations were moved during the year. The Chillicothe, Ohio, station was relocated from leased quarters to a more desirable site on Government property. The Hawaiian station, requested to vacate its temporary quarters at a Marine Corps air station, is moving to a Government tract near Honolulu. The Millis, Mass., monitoring station will be moved to Government property near Canandaigua, N. Y.

Monitoring Enforcement Problems

Millions of radio signals in the high-frequency range are received, observed, and measured at the FCC's monitoring stations. The two biggest problems continue to be the extremely limited coverage at the fixed monitoring stations of the spectrum above 30 megacycles due to propagation characteristics and difficulties in identifying radio transmission where call signs are either not transmitted or only infrequently.

Mobile investigative units, TV mobile units, test cars and microwave units, augmented by a limited amount of exploratory-type monitoring by engineers on inspection and examination trips, are FCC's effort to meet the limited coverage problem.

The monitoring need for identification of both foreign and domestic radio transmissions is complicated by the traffic load on some circuits. Attempts to resolve this have resulted in the development of automatic methods for superimposing identifying signals on regular traffic. Several such methods are in use by the United States international fixed public licensees, and at least two foreign countries are beginning the use of such systems. The U.S. proposal for revision of article 19 of the International Radio Regulations will, if adopted, materially assist monitoring stations to identify foreign radio transmissions.

Monitoring for Interference

The FCC's monitoring and direction-finding network continued to give round-the-clock assistance to domestic licensees, Government agencies, and foreign administrations in the solution of long-range interference problems. Some examples were:

The transmitter of an oil well drilling company in Oklahoma was found to be disrupting a radio-dispatching system in San Francisco.

A Portuguese station in the Cape Verde Islands was determined to be the source of interference to aeronautical radio services at Cleveland, Ohio.

An aeronautical radio beacon in Bristol, England, was identified as causing interference to radio operations of a county fire department in East Palestine, Ohio.

Electronic heater radiations from equipment near Helena, Ark., used in the manufacture of skis, were the cause of interference to commercial airlines at Chicago.

Interference complained of by the Canadian forestry service was traced to an industrial heater at La Grange, Ind.

Interference experienced in West Germany proved to be from a station in the Fiji Islands.

Several requests to identify pulse-type signals, some of which were causing interference, pointed up the need for wideband receiving and oscillograph equipment for monitoring stations to allow for more accurate observation and measurement of very short pulse transmissions. A limited number of such items will be procured as a start to eventually equipping all FCC monitoring stations. In two instances the Commission's observations and measurements of pulse signals saved other Government agencies considerable time and money for further investigation.

Monitoring Surveillance and Special Surveys

Detection of illegal, clandestine, or subversive radio operations is a continuing program of the FCC monitoring network. It presents a problem because of personnel and other limitations. Although monitoring stations routinely "cruise" (tune) through the radio spectrum on the lookout for unauthorized transmissions, there have been distractions due to pressure of other duties. To take care of this situation, a special cruising assignment has been put into effect. It is rotated so that each month two monitoring stations are relieved of much of their other work in order to concentrate on surveillance of the spectrum. This has shown a considerable increase in the number of signals intercepted requiring coordinated action by the entire network for followup identification.

More monitoring survey work is requested than FCC's facilities can accommodate. The monitoring program continued to provide spectrum occupancy and frequency usage data for the Commission and other Federal agencies in preparation for the 1959 International Radio Conference, to furnish such data to the International Frequency Registration Board, and for special or routine requests.

One special monitoring survey revealed a continuing high percentage of unlicensed itinerant aircraft radio stations; another a considerable number of daytime broadcast stations in violation of the required sign-on and sign-off times. Monitoring for violations by ship radio stations operating on the distress and calling frequencies of 500 and 2182 kilocycles, as well as adjacent-channel interference to the ship calling frequency of 8364 kilocycles, was extensively carried out. Many violations were detected; the greater number on 500 and 8364 kilocycles were predominately by foreign ships. Resolution of these noncompliance problems will require further extensive con-

centration of monitoring effort and, in some services, international cooperation.

Enforcement and Surveillance

Enforcement and surveillance have been made more difficult by the accelerated interest in class D Citizens Radio Service stations on the part of industry as well as by individuals. This class of license is easily obtained and the station communication range may be long or short depending upon propagation and other factors. Class D licensees generally do not have any radio experience, with the result that a large percentage of violations are noted in this still young service. (See "Citizens Radio Service.")

Equipment Problems

Electronic instruments are the working tools of the field staff. Performance of its many engineering and technical duties requires a variety of items such as direction finders and monitoring receivers; equipment for measuring frequency, bandwidth, modulation levels, signal field strength, and audio fidelity; instruments for observing the technical characteristics of video and other transmissions containing pulsed components, and signal recording and analyzing equipment for signal identification.

Twenty-five years ago, radio communication was generally on frequencies below 25 megacycles and was largely between stations at fixed locations or on shipboard. The useful spectrum has since been extended to tens of thousands of megacycles per second, with many stations moving on the water, on the ground, in the air, and a few even in outer space. Technical regulations for the control of their emissions have been increasingly tightened in order to make maximum use of the spectrum with a minimum of interference. This creates an exacting supervisory problem.

The Commission has been hard pressed in the past decade to keep abreast of developments by obtaining adequate quantity and quality of modern monitoring and measuring instruments. Rising cost of this equipment complicates matters. For example, in 1940 the best available high-frequency monitoring receivers cost less than $300; today's equivalent costs more than $1,000.

The FCC has met this problem in several ways, such as continuing modernization of equipment with available funds, obtaining equipment declared excess by other agencies, modifying available relatively inexpensive equipment to meet specific needs in lieu of purchasing more expensive special purpose instruments, having several field offices share the use of the more expensive instruments rather

than purchasing one for each office, and creating or developing its own apparatus.

Sixteen of the 18 monitoring stations have modern FCC-designed-and-built long-range direction finders and the 2 remaining stations will install new direction finders during 1960; 9 have spectrum analysis and bandwidth-measuring instruments of recent design, similar equipment is on order for 2 more, and 14 have frequency-measuring equipment of adequate precision to meet present recognized tolerances. Field offices operating mobile units have field strength measuring instruments in sufficient quantity to meet normal requirements for frequencies from 14 kilocycles to 1000 megacycles, and limited facilities can be provided to measure up to 10,000 megacycles.

With activation of a western TV enforcement unit during the year, two mobile engineering measurement units are now checking the technical characteristics and shortcoming of both the visual and aural transmissions of TV broadcast stations. Two microwave mobile monitoring units provide coverage of the important 1000- to 10,000-megacycle microwave regions. Modernization of mobile investigative vehicles by installation of "package-type" equipment assemblies has progressed to the point where 21 vehicles are so equipped. These assemblies provide wide-range frequency coverage with modern equipment, and may be transferred from one vehicle to another.

Search and Rescue Program

The FCC long-range HF direction finder network was able to provide positions of distressed aircraft and seacraft to assist in rescue efforts coordinated by the Coast Guard and Air Force. Some examples of these emergencies were:

Direction finder bearing obtained by the Santa Ana monitoring station helped a Coast Guard plane locate a yacht in distress near Santa Catalina Island. Other distressed yachts and small boats in both the Atlantic and Pacific Oceans were likewise positioned.

Assistance to distressed aircraft included a commercial plane with a runaway propeller over the North Atlantic, a military plane with defective navigational equipment while flying from Bermuda to the mainland, a Navy seaplane which was forced to land in the ocean on its way to Bermuda, and a Scandinavian Airlines plane carrying Mr. Mikoyan back to Russia after it developed a fire in one engine. Other instances of such FCC assistance occurred in Pacific Ocean areas off California, Hawaii, and Alaska.

Marine Safety Watches

The program of maintaining three special marine safety watches at selected monitoring stations, to cover the Atlantic, Gulf, and Pacific

Ocean areas, has been tapering off because of limited personnel. This year only token watches could be kept. It is important that these watches be manned to observe coast and ship radio operations, particularly in marine disasters. Partial coverage of ship and coast stations was given by all monitoring stations in their routine cruising of the spectrum. The Allegan monitoring station gave particular attention to operations on the Great Lakes in view of the opening of those lakes to ocean shipping.

Contractual Work for Other Federal Agencies

While the Commission furnished assistance to other Government agencies in the identification and suppression of radio interference and participated in special projects involving the normal functions of the monitoring network, other agencies requested work of a more extensive nature which required contracts providing for transfer of funds to cover personnel and equipment costs. Four such agreements were in effect during fiscal 1959. The largest ones were with defense agencies for tracking and monitoring high-altitude weather balloons and floating hurricane detection buoys. Engineering personnel recruited and trained by the Commission continued to perform the major portion of this work. However, considerable supervision and assistance was required by regular personnel, necessitating measures to prevent undue interference with normal monitoring functions.

INSPECTIONS

Ship

Commission field inspection is concerned primarily with ships required by law and treaty to be provided with radio installations for safety purposes. Inspections must be made periodically to determine that prescribed equipment actually is provided; that it is adequately installed, protected, and maintained in a state of readiness; and that it is in charge of competent operators. Such inspections lead to the issuance of certificates if the ships are found in compliance. Ship radio requirements are based on the area in which the vessel is navigated, the service in which it is engaged, and its size.

Fiscal 1959 was the second year of applying mandatory radiotelephone installation and operator requirements to smaller boats, namely: those carrying more than six passengers for hire and operating in the open sea and in certain tide waters. Such vessels must be certified at 2-year intervals. To expedite this, the Commission has authorized its field offices to issue the certificates. Unlike larger vessels, these small boats operate out of numerous small ports and harbors and constitute a bigger inspection problem from the standpoint of accessibility.

With the opening of the St. Lawrence Seaway and the passage to and from the Great Lakes of large ships, and because the radio system prescribed for seagoing ships is different from that required for Great Lakes ships, it has become necessary to inspect and certify a number of vessels under the radio provisions of both the Safety of Life at Sea Convention and the Great Lakes agreement. This has increased the extent and complexity of inspections in both the lakes and Atlantic coastal region.

Great Lakes ships present another special inspection problem. Under the Great Lakes agreement, the annual radio inspection or survey, if made while a ship is inactive, must be done within a month before it is placed in active service. Unlike oceangoing ships, Great Lakes vessels have this additional time factor which must be taken into account in scheduling inspections. Because of the winter lay-up period, this tends to concentrate inspection work during the early spring months.

Marine Enforcement Actions

The Commission devoted special effort to an enforcement problem occasioned by the misuse of the radiotelephone distress and calling frequency by small boats. Superfluous communications and unauthorized transmissions have been hampering the use of this frequency for its intended high-priority purposes. The FCC marine offices at Tampa, Fla., and San Pedro, Calif., and several monitoring stations and port offices developed new techniques of identification. Intercepts of unidentified improper communication, profane language and superfluous talk are made on tape, cataloged and compared with identified communications. A person found misusing the frequency is formally warned or faces proceedings toward suspension of his radio operator license. Unfortunately, the number of corrective actions is greatly exceeded by the number of transgressions. A disregard for official notices heralds a real and difficult problem. Small-fine legislation which is currently being given consideration would provide ship inspection personnel with the most effective weapon.

Also, in the case of small boats, the captain usually serves as a radiotelephone operator and has a tendency to ignore his responsibility to keep a radio watch on the distress and calling frequency. Such cases require special attention, including observation and radio contact from the air and, in several instances, evidence has been obtained which warrants invoking forfeitures.

Broadcast

Through field inspection, the Commission checks on compliance of broadcast stations with many of the equipment standards and opera-

tional requirements, and upon the technical supervision provided. Broadcast service to the listening and viewing public is dependent to an important degree on these factors. Some inspections made during the year had to be limited to a sampling basis. Many of the deficiencies observed were attributable to lack of technical supervision by the stations.

Other Stations

Because of their number, it is no longer possible to inspect most other radio stations regularly. A sampling procedure serves as a guide in determining where emphasis should be placed. An indication of the need for inspection is the fact that approximately 30 percent of the aircraft stations inspected were found without licenses.

COMMERCIAL RADIO OPERATORS

Operators of radio stations other than amateur are classified as commercial radio operators. The 7 classes of commercial operators now exceed 1,700,000. Six classes of licenses are issued on the basis of an examination. The remaining license is obtained on the basis of certification by the applicant with respect to knowledge of basic rules and other simple qualifications. The issuance of this type of license (restricted radiotelephone permit) is a heavy administrative burden. Extending the permit for life is offset by the tide of demand. Rulemaking is in progress to make such a license unnecessary for certain "pushbutton" stations.

In prescribing operator requirements and qualifications, the Commission must be guided in part by certain minimum requirements set forth in the Communications Act and in international radio regulations under which licensed operators are required for radiotelegraph and radiotelephone operation in the various services.

The examination and licensing of commercial operators constitutes a large part of the field work and, to accomplish this with the limited personnel available, it has been necessary from time to time to change the examination techniques. For a number of years the examination questions have been of the multiple-choice-answer type as distinguished from those requiring essay-type answers, and this has facilitated the examination process, particularly the grading of examination papers. During the past year the Commission instituted a new method of scoring the commercial operator examinations which further increases the speed and accuracy of grading.

The Commission is by law authorized to issue radio operator licenses only to citizens of the United States. However, the modern age of air transportation has necessitated a change. Consequently, Congress in 1958 amended section 303(1) of the Communications Act

so as to grant the Commission authority to waive the citizenship requirement in the case of certain alien aircraft pilots. Rulemaking is underway to provide for the issuance of operator licenses to aliens who have been found qualified by the Federal Aviation Agency to hold pilot certificates. More than 400 applications are on hand from alien pilots, and interim procedures for handling these have been established pending formulation of permanent rules.

During the year much interest was evinced by voluntary associations and groups in improving radio operating conditions in the small-pleasure-boat field. The Coast Guard Auxiliary and the U.S. Power Squadrons were particularly active. More than 5,000 voluntary examinations of ship radio installations were conducted by members of the Coast Guard Auxiliary, and the U.S. Power Squadrons are engaged in a program to qualify all members for a radiotelephone third class operator permit. This is a higher class license than required by the Commission's rules and assures an adequate knowledge of ship operating requirements. The field offices are cooperating by arranging for special examinations. Also, a local group in New Orleans has been assisting Cajun fishermen, who use the English language with difficulty, to qualify for operator licenses. By encouraging such self-help the Commission hopes that better compliance with radio laws by small boat radio operators will become contagious.

ENGINEERING MEASUREMENTS AND SURVEYS

The proper functioning of today's complicated radio communications systems depends upon engineering measurements by licensees and by the Commission's field staff. The results of stations straying from their assigned frequencies onto frequencies assigned to other stations are quite obvious. Deviations from other technical requirements have a correspondingly serious effect.

In order to fit as many stations as possible into the AM broadcast band, numerous stations must use directional antennas so that the strongest signal is concentrated in areas to be served and less emission transmitted in directions that would cause interference to another station on the same channel. Field engineering measurements made during the year disclosed that the radiation pattern of more than 75 percent of the stations checked was faulty. These stations were required to take corrective action. Few analyses of technical characteristics which determine audio quality could be made, but they did indicate such faults as high noise level and audio distortion, which the stations were required to correct.

As a result of complaints from FM broadcast listeners, increased emphasis was placed on checking FM transmissions for overmodulation in order that the public might enjoy more of the benefits of the

high-quality broadcasting of which FM is capable without interference being caused to other stations.

The Commission again had protests that aural and TV stations frequently overmodulate or "step up the volume" during commercial announcements. However, extensive observations and measurements revealed few indications of commercials being consistently stronger than the regular program material. The commercials were found sometimes stronger, sometimes weaker. It would appear that complaints of loud commercials are frequently due to an impression of loudness arising from the content or manner of delivery of the commercial rather than an actual increase in measured signal level. However, the matter is continuing to receive attention and steps will be taken if engineering measurements disclose violation of the rules.

With only two mobile enforcement units to make engineering measurements and technical observations of all TV stations, a considerable length of time still will be required to cover the entire country. Most of the TV stations checked during 1959 had varying degrees of technical deficiencies which, on a number of occasions, resulted in deterioration of the picture or were a potential or actual source of interference to other stations or services.

For example, during one trip through 6 States east of the Mississippi, 20 TV stations were checked, and technical discrepancies were found in the transmissions of 17 of them. On another trip in the western part of the country, technical deficiencies were observed at all 19 TV stations checked. The discrepancies covered a wide range, including off-frequency operation, defective signal wave form, and spurious radiations. Corrective action was undertaken by all stations concerned. The result is that the public benefits directly from the improved TV service which results from strict adherence to technical standards.

SPACE COMMUNICATION

The imminence of space travel and of earth satellites which may be used to relay transmissions between distant points on the earth pose particular FCC engineering problems. With the promulgation of international and domestic regulations for the control of the technical characteristics of transmissions used for space communication purposes, the Commission's field force must be prepared to perform the necessary monitoring and measuring functions and to locate and identify interference sources. In anticipation of such requirements, limited observations and frequency measurements have been made on transmissions from artificial satellites, and highly sensitive receivers and high-gain directional antennas have been installed at three monitoring stations—Powder Springs, Ga., Kingsville, Tex., and Santa Ana, Calif.

One example of problems introduced by space measurements is the fact that the normal speed of space objects introduces a phenomenon known as the "doppler" effect. As a result, a space signal whose frequency is constant and unvarying will appear to be changing in frequency while being measured by an observer on the earth. As a satellite approaches, the frequency will appear higher, and as it speeds away from the observer it will appear lower, somewhat as the pitch of a passing train whistle or automobile horn seems to change. Space communication and its supervision will increase in importance and complexity as this new frontier is opened.

ANTENNAS

During fiscal 1959 a record number of transmitting antennas were constructed for all types of services. This was accomplished notwithstanding mounting aeronautical problems presented by the relation of high towers to expansion of air travel facilities, particularly the growing use of jet aircraft.

The Commission still has pending docket 11665 which proposes to amend part 17 of its rules to require applicants considering the construction of towers more than 500 feet high to use existing antenna structures of "antenna farms," or to demonstrate why the antennas cannot be so located. Included in this proceeding are revisions in criteria for determining whether proposed antenna structures will require special aeronautical study. These changes were recommended by the Joint Industry-Government Tall Structures Committee (JIGTSC).

TV transmitting towers continue to increase both in number and in height. At the close of the fiscal year, 81 towers of a thousand feet or higher were in operation. Eight construction permits were outstanding for towers in excess of 1,000 feet, and applications were pending for 20 additional such towers.

The present world's tallest manmade structure, the 1,610-foot tower for KSWS–TV at Roswell, N. Mex., will be surpassed by the 1,676-foot tower of KFVS–TV at Cape Girardeau, Mo., and the 1,619-foot tower of WGAN–TV at Portland, Maine.

During the year, WMAR–TV, WJZ–TV, and WBAL–TV, each with an overall antenna height of 729 feet above ground, constructed their combined "candelabra type" tower at Baltimore, Md. This is the second structure of its kind in the country.

WISC–TV installed, on an experimental basis, a system of condenser discharge ("strobe") lights on its 1,107-foot tower at Madison, Wis., to provide during daytime hours additional protection to aircraft flying under visual flight rules. This system, which supplements

the standard tower lighting required by the Commission, was requested by the Wisconsin State Aeronautical Commission because of the substantial daytime haze often encountered in that area.

WABC, New York City, at the request of the Federal Aviation Agency and with the approval of the FCC, repainted the top portion of its AM tower at Lodi, N.J., with the new Day Glo paint that is being used experimentally on aircraft and painted the remainder of the tower with paint of standard specifications. Evaluation of the two types of paint by the FAA may lead to changes in existing antenna painting specification.

The Communications Act requires painting and illumination of transmitting towers when in FCC's judgment such towers do or may constitute a menace to air navigation. Being of latticed construction, antenna towers are less visible than solid structures such as buildings, water towers, smokestacks, and the like, and are considered by aviation interests as greater hazards. Part 17 of the FCC rules sets forth criteria for determining whether proposals for new or modified antenna structures require special study by Regional Airspace Subcommittees of the Air Coordinating Committee. The ACC was created by Executive order to coordinate and make recommendations on civil and military aviation matters affecting more than one agency of the Government. Proposals that do not exceed these criteria are approved by the Commission subject to obstruction markings.

STATISTICS

Field engineering statistics for fiscal 1959 in comparison with 1958 follow:

Investigative statistics

	1958	1959	Increase or (decrease)
Interference complaints received by FCC:			
Interference to monochrome TV	18,687	20,018	1,331
Interference to color TV	35	56	21
Interference to aural broadcast	2,385	2,225	(160)
Interference to amateurs	347	343	(4)
Interference to other services	1,261	1,394	133
Total	22,715	24,036	1,321
Interference investigated by FCC	14,417	15,811	1,394
Other investigations by FCC	774	993	219
Total	15,191	16,804	1,613
Number of Cooperative Interference Committees	32	32	0
Number of TV Interference Committees	520	525	5
Total	552	557	5
Unlicensed TV boosters	88	215	127
Other unlicensed operations	142	114	(28)
Total	230	329	99
Indecent language cases	38	24	(14)
Unauthorized divulgence of radio communications	0	6	6

Monitoring statistics

	1958	1959	Increase or (decrease)
Monitoring citations for violations	13,040	15,070	2,030
Alerts, unknown, or suspicious signals	11,256	11,314	58
Monitoring cases:			
Major interference	2,419	2,342	(77)
Major noninterference	1,582	1,668	86
Minor interference	4,002	4,731	729
Minor noninterference	8,254	10,589	2,335
Total	12,256	15,320	3,064
Interference cases:			
Major	2,419	2,342	(77)
Minor	4,002	4,731	729
Total	6,421	7,073	652
Noninterference cases:			
Major	1,582	1,668	86
Minor	8,254	10,589	2,335
Total	9,836	12,257	2,421
Grand total	16,257	19,330	3,073
Signals identified and indexed	125,194	96,810	(28,384)
Bearings on alerts	88,906	82,674	(6,232)
Direction finding bearings:			
Monitoring cases	88,906	80,324	(8,582)
Search and rescue	2,097	2,340	243
Contractual balloon and buoy	60,140	65,160	5,020
Propagation check	55,997	45,581	(10,416)
Target oscillator	10,839	9,434	(1,405)
Total	217,979	202,839	(14,940)
Major cases handled in Washington:			
Interference	1,622	1,584	(38)
Monitoring	481	429	(52)
Surveys	23	21	(2)
Special surveys	9	31	22
Contractual	5	7	2
Total	2,140	2,072	(68)
Monitoring citations:			
Issued by marine watch	1,104	1,455	351
Issued for frequency deviation	390	355	(35)
Total	1,494	1,810	316
Monitoring observations to International Frequency Board:			
Federal Communications Commission	118,094	38,956	(79,138)
Commercial companies	25,813	52,000	26,187
Total	143,907	90,956	(52,951)
Number of observers in training course	131	117	(14)
Number of warning letters	112	465	353
Monitoring interference complaints:			
U.S. Air Force	447	423	(24)
U.S. Army	55	71	16
U.S. Navy	100	75	(25)
U.S. Coast Guard	127	170	43
Federal Aviation Agency	35	59	24
Other Government agencies	53	64	11
Law enforcement agencies	43	34	(9)
Commercial airlines	86	57	(29)
Commercial concerns	660	625	(35)
Foreign governments	6	9	3
Miscellaneous (minor interference cases)	4,002	4,731	729
Total	5,614	6,318	704

Monitoring statistics—Continued

	1958	1959	Increase or (decrease)
Monitoring interference complaints—Continued			
Interference cases:			
Major	2,419	2,342	(77)
Minor	4,002	4,731	729
Total	6,421	7,073	652
Requests for monitoring noninterference:			
Field Engineering and Monitoring Bureau	171	139	(32)
Other FCC units	35	26	(9)
Other Government agencies	139	129	(10)
Amateurs	112	118	(6)
Commercial concerns	13	11	(2)
Foreign governments	38	44	6
Total	508	467	(41)
Noninterference cases:			
Major	1,582	1,669	87
Minor	8,254	10,589	2,335
Total	9,836	12,258	2,422

Field inspection statistics

Class of station or service	United States		Foreign	
	1958	1959	1958	1959
Compulsory ship stations				
Authorized stations	[1] 6,908	[2] 5,801		
Inspections made subject to—				
Title III, part II, of Communications Act	1,115	1,106	5	2
Title III, part III, of Communications Act	1,984	780		
Safety of Life at Sea Convention			233	76
Great Lakes agreement	459	535		5
Portable lifeboat equipment at Coast Guard request	982	1,025		
Total [3]	4,540	3,446	238	83
Deficiency notices served	1,659	1,150	74	24
Violations corrected during inspection [4]	2,603	2,791	278	98
Certificates of compliance issued	3,236	2,174	219	74
Voluntary ship stations				
Authorized stations	60,344	73,516		
Inspections made	1,773	1,675		
Deficiency notices served	903	924		
Notices of unlicensed operation	229	421		
Broadcast stations				
Authorized stations	9,037	10,120		
Inspections made	1,148	1,048		
Violation notices served	741	655		
Other radio stations (excluding ship and amateur service)				
Authorized stations	178,886	233,935		
Inspections made	5,655	4,030		
Violation notices served	1,622	1,447		

[1] Includes estimated 5,000 title III, part III, vessels.
[2] Includes estimated 4,000 title III, part III, vessels.
[3] Not including callbacks to verify correction of violations.
[4] For which deficiency notices were not served.

Applications processed by Antenna Survey Branch

Services	Pending July 1, 1958	Received in ASB	Cleared by ASB	Pending June 30, 1959
Broadcast:				
AM	51	916	761	206
FM	7	317	285	39
TV	26	781	769	38
International	0	1	1	0
Experimental	0	41	41	0
Total broadcast	84	2,056	1,857	283
Safety and special radio services	331	16,881	14,615	2,597
Common carrier	38	743	752	29
Total	453	19,680	17,224	2,909

Proposals referred to Regional Airspace Subcommittee

Services	Pending at Airspace July 1, 1958	Sent to Airspace during year	Received from Airspace during year	Pending at Airspace June 30, 1959
Broadcast:				
AM	40	190	188	42
FM	5	48	48	5
TV	24	69	70	23
International	0	0	0	0
Experimental	0	0	0	0
Total broadcast	69	307	306	70
Safety and special radio services	40	477	450	67
Common carrier	11	50	58	3
Total	120	834	814	140

Commercial radio operator licenses

Class of license	Outstanding June 30, 1958	Outstanding June 30, 1959	Increase or (decrease)
Radiotelegraph:			
1st class	6,396	6,376	(20)
2d class	9,611	9,660	49
3d class	1,952	1,997	45
Temporary limited, 2d class [1]	8	1	(7)
Radiotelephone:			
1st class	61,739	65,196	3,457
2d class	45,216	48,932	3,716
3d class	41,027	48,193	7,166
Restricted permits [2]	1,321,444	1,525,558	204,114
Aircraft authorizations [1]	13,461	0	(13,461)
Total	1,500,854	1,705,913	218,547

[1] These classes of licenses discontinued.
[2] This class of license issued for lifetime of operator.

FIELD ENGINEERING OFFICES AND MONITORING STATIONS

A list of field engineering district offices and monitoring stations follows:

District offices	*Address*
1	1600 Customhouse, Boston 10, Mass.
2	748 Federal Bldg., New York 14, N.Y.
3	1005 New U.S. Customhouse, Philadelphia 6, Pa.
4	400 McCawley Bldg., Baltimore 2, Md.
5	402 Federal Bldg., Norfolk 10, Va.
6	718 Atlanta National Bldg., Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (marine office) 409–410 Post Office Bldg., Tampa 2, Fla.
8	608 Federal Bldg., New Orleans 12, La.; (suboffice) 419 U.S. Courthouse and Customhouse, Mobile 10, Ala.
9	326 U.S. Appraisers Bldg, Houston 11, Tex.; (suboffice) 301 Post Office Bldg., Beaumont, Tex.
10	Room 401, States General Life Insurance Bldg., Dallas 2, Tex.
11	849 South Broadway, Los Angeles 14, Calif.; (suboffice) 1245 7th Ave., San Diego, Calif.; (marine office) 326 U.S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	507 U.S. Courthouse, Portland 5, Oreg.
14	806 Federal Office Bldg., Seattle 4, Wash.
15	521 New Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3100 Federal Office Bldg., Kansas City 6E, Mo.
18	826 U.S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Post Office Bldg., Buffalo 3, N.Y.
21	502 Federal Bldg., Honolulu 13, Hawaii.
22	322–323 Federal Bldg., San Juan 13, P.R.
23	53 U.S. Post Office and Courthouse Bldg., Anchorage, Alaska; (suboffice) 6 Shattuck Bldg., Juneau, Alaska.
24	Room 106, 718 Jackson Pl. NW., Washington 25, D.C.

Primary Monitoring Station	*Secondary Monitoring Station*
Allegan, Mich.	Searsport, Maine
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Douglas, Ariz.
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Ambrose, Tex.
Laurel, Md.	Chillicothe, Ohio
Livermore, Calif.	Anchorage, Alaska
Portland, Oreg.	Fairbanks, Alaska
Powder Springs, Ga.	
Lanikai, Oahu, Hawaii	

Research and Laboratory

TECHNICAL RESEARCH

Television Studies

During the year, the Television Allocations Study Organization (TASO) completed much of its work and submitted its final report to the Commission. Commission personnel participated in TASO meetings either as observers or as presiding officer, and FCC engineers contributed technical material and otherwise aided in the work of several panels and committees. Work is continuing on a limited number of items. The Commission has studied the final report in connection with its consideration of TV allocations.

The principal value of the TASO report is a collection of authoritative technical data on the characteristics of the various parts of the TV broadcast system, including transmitting and receiving equipment, propagation effects, and human evaluation of the performance associated with various signal and interference conditions. These technical data have been analyzed and applied to Commission purposes by deriving specific figures for the service ranges of TV stations in the presence of noise or of interference from other stations on the same or adjacent channels. Further useful data are expected from TASO when its tests of directional transmitting antennas are completed in the near future. Additional applications of TASO data will be made as work progresses on specific TV problems.

(See also "Broadcast" chapter reference to television.)

Stereophonic Broadcasting

In July 1958 the Commission, in docket 12517, requested comments on several questions concerning additional use of multiplexing by FM broadcast stations to provide various forms of subsidiary communications. Because of the widespread interest in stereophonic programing revealed by the comments, and the close relationship of such programing to other forms of FM multiplexing, the scope of the proceeding was enlarged in March 1959 to invite comments and data directed specifically to stereophonic programing on a multiple basis by FM stations. These filings are due December 11, 1959.

There is also a growing interest in stereophonic programing by TV and AM stations. Several systems are being advocated. Some of these systems have been proposed in petitions to the Commission and have been employed in transmission under experimental authorization. From the standpoint of the listening public, it is necessary that stereophonic transmission of programs not degrade the quality of reception of conventional broadcast.

Since early 1959, the National Stereophonic Radio Committee (NSRC), which was established by the Electronic Industries Association (EIA), has been gathering data and field testing stereophonic program transmission and reception, and investigating other aspects of the subject. This information and the results of further technical studies to be made by the Commission will be used in considering technical standards for stereophonic broadcasting.

Noncommunication Systems

One of the noticeable trends in the type-acceptance program became apparent during the year with the extension of type acceptance to cover equipment operating in the aeronautical services. In addition to relatively conventional communications transmitters, modern commercial aircraft may carry an enormous amount of other electronic equipment, such as long-range radio navigation devices, various types of radar, tracking and computing instruments, anticollision and telemetering devices. They make use of the radiofrequency spectrum to transmit and receive intelligence of extremely complex and diverse nature. Simple design techniques and noncritical engineering standards for these equipments no longer suffice to preclude interference with each other and with the important message communication channels of the aircraft. Accordingly, as the type-acceptance workload involving these complex equipments increases, further studies are necessary to bring the present engineering and technical standards in line with both the requirements of present communication equipment and new devices. These studies should result in technical standards which insure a maximum of protection from interference with a minimum of burden upon the manufacturer and operator of aeronautical equipment.

Patent Aspects of Technical Standards

Technical standards promulgated by the Commission do not require the use of a specific equipment design, but merely specify the performance of the equipment. For example, the technical standards for AM broadcast stations require that their frequency be maintained within 20 cycles per second of the assigned frequency, but do not specify the design of the frequency-control apparatus. Accordingly, stations

may, and do, use any of a variety of apparatus for maintaining frequency within the required tolerance.

Although most such equipment has probably been the subject of patents, this is not considered detrimental to the public interest, particularly in view of the fact that the Commission's technical standards permit use of any apparatus design which will meet the Commission's performance requirements. Consequently, compliance with the rules is not limited to any single apparatus invention. In fact, this practice encourages competitive development of alternative kinds of apparatus designed to meet the Commission's performance standards. As a result, the Commission has not encountered any situation in which the regulated services have been impaired due to exercise of patent rights. Conversely, no invention capable of meeting the performance standards has been prohibited by Commission rules.

Interfering Devices

Parts 15 and 18 of the FCC's rules control such gadgets as openers for garage doors, ovens for cooking food, hair-removing devices, medical equipment, machines for "sewing" plastic raincoats, food sterilizers, etc. All these devices have one thing in common—they use radio-frequency energy to produce the desired end product. Since these devices have a large interference potential, control is required.

This widespread use of radiofrequency-using devices is not an overnight phenomenon. The Commission adopted the original regulations for what is now part 15 as early as 1938, and for part 18 in 1946.

The 1938 regulations were designed to control wireless record players and the first remote-control devices for radio receivers. Over the years, these regulations were extended to cover other control devices, to carrier current systems, and to wireless microphones. Today part 15 regulates receiver radiation, low-power communication devices (which include wireless record players, wireless microphones, and radio-control devices), radiation from CATV systems, carrier current systems, and any type of electrical equipment which generates and radiates radiofrequency signals incidental to its operation.

While part 18 has not expanded as broadly as part 15, the number of devices operated under part 18 has increased astronomically. The growing use of heaters is indicated in the following table based on a statement by the Subcommittee on Induction and Dielectric Heating of the AIE in docket 11442:

Number of industrial (RF) heaters sold

	Number of units	Total kilowatts
Induction heaters:		
Sold before 1947	4,168	58,844
Sold after 1947	8,794	100,884
Total	12,962	159,728
Dielectric heaters:		
Sold before 1947	1,132	5,139
Sold after 1947	5,355	26,285
Total	6,487	31,424
Total heaters sold	19,449	191,152

All industrial heating equipment is presently required to be certificated by an engineer in order to demonstrate compliance with the Commission's radiation limits. There is evidence, however, that this requirement is not satisfactorily met by many operators, particularly those in the plastics manufacturing industry. A project is presently under way to develop rules that will more firmly establish the responsibility for valid certification of industrial heating equipment. In addition, industry groups are cooperating with the FCC in developing a more simplified field strength measurement procedure than is presently used in connection with certifying industrial heating equipment. Such a simplification is expected to decrease the expense of performing field strength measurements, thereby removing a deterrent for complying with the Commission's certification requirements.

Similarly, the problem of providing adequate protection to authorized radio services from radiofrequency-stabilized arc welders has not been resolved. Such devices are widely used when welding stainless steel or certain nonferrous metals such as aluminum. This type of welder generates radiofrequency energy by means of a spark gap and the radio emissions produced are very broad in frequency. Continued study by Government and industry has not yet evolved a satisfactory method of suppression that will materially reduce radiation below 10 microvolts per meter at 1 mile. It appears that radiofrequency-stabilized arc welders will require extensive basic research before further interference safeguards are forthcoming.

Other devices regulated by part 18 are medical diathermy machines used for therapeutic purposes; ultrasonic aids both for therapeutic and industrial purposes (cleaning, cutting brittle and ultrahard substances, boring irregular openings); and a variety of miscellaneous items. This part is also applicable to scientific devices that use radiofrequency energy such as linear accelerators or cyclotrons.

Receiver Radiation

The Commission's program to curb receiver radiation, which is directed basically at TV receivers, is only 4 years old. In view of the many older, noncomplying sets still in use, this program must be considered a long-range effort. Although some effects are already apparent, its full benefits will be realized only after the noncomplying receivers are retired from service.

Receiver radiation regulations must be applied to the user and not to the manufacturer in accordance with the Commission's authority under the Communications Act. However, the user is not in a position to reduce his receiver radiation to a noninterference level. By its very nature, this characteristic must be built into the set, and that is most readily accomplished at the design stage and during manufacture.

The Commission has received excellent cooperation from the majority of receiver manufacturers who have voluntarily undertaken to build complying sets. The small number of manufacturers who have not participated in this program still present a problem.

Experimental Radio Services

Part 5 of the rules provides Experimental Radio Services (other than broadcast, which has its own experimental category) for the experimental uses of radiofrequencies to aid (1) basic research in radio and electronics, and (2) development and testing of new transmitting equipment and techniques.

Propagation studies of the upper atmosphere in connection with the International Geophysical Year are being continued by universities and research foundations. Much useful information has been revealed by the technical data thus obtained.

Experimentation in the field of radionavigation and radiopositioning is being accelerated. The answer to the accurate all-range radionavigation problem has not yet been found.

Collision avoidance techniques for the protection of both airplanes and automobiles are being developed along various lines. An anticollision device for use on automobiles has been announced by one of the large manufacturers. In addition, automatic electronic guidance systems for high-speed automobile traffic have been tested by at least two manufacturing companies.

As experimental operations expand, the amount of harmful interference mounts. During the fiscal year, several cases of disruptive interference resulted from high-powered experimental transmitters.

Greater efficiency in usage of the frequency spectrum is being accomplished through experimental development of single sideband and split-channel techniques. High-speed data transmission systems give

promise of replacing the slower methods of the past. More and more communication at higher and higher speeds is demanded in this atomic age. Today's methods are quickly made obsolete by tomorrow's technological developments.

Increasing radio and electronic developments are being carried on by colleges, research laboratories, and industrial organizations. Generally, these activities are conducted under contractual agreements with military agencies, and often carry the highest degree of urgency and secrecy.

There are a number of recurring problems associated with the experimental services, some of which are:

(1) No frequencies are assigned to experimental stations as such. Frequencies assigned to other services are used, and there is increasing difficulty in finding frequencies on which developmental and testing operations can be conducted without causing harmful interference to other services.

(2) Applicants should not develop equipment on frequencies which would not be available for this use if the development is successful. Consequently, applicants should exercise much more care in selecting the frequencies requested for experimentation.

(3) Equipment to be used by the military services should be designed for use on Government frequencies since that will be their ultimate location. In some instances individual military agencies have permitted civilian organizations to use non-Government frequencies for development of equipment intended for Government frequencies.

(4) Applicants have a tendency to apply for special temporary authorizations for projects which are of a continuing nature and should be conducted under a regular license. This causes delay because many of them must be returned to the applicants for proper submission.

Experimental radio services

Fiscal year	Formal applications received	Informal applications granted	Number of stations licensed	Fiscal year	Formal applications received	Informal applications granted	Number of stations licensed
1952	915	140	369	1956	1,507	643	715
1953	1,055	168	444	1957	1,824	602	788
1954	975	300	586	1958	2,050	762	834
1955	1,447	528	625	1959	2,026	788	891

Type Acceptance of Transmitters

Type acceptance by the Commission of transmitters for operation in the various radio services affords a practical method of ascertaining that they are capable of performance in accordance with the Commis-

sion's technical standards. Type acceptance is granted after review of test data furnished by the manufacturer (or the applicant for license) shows the transmitter to be technically adequate. During the past several years, type-acceptance requirements have been incorporated in the rules for most of the radio services. A major effect of this procedure is the reduction of interference between stations due to out-of-channel radiations. As a result, more stations can operate in the crowded spectrum than would otherwise be possible.

Type-accepted transmitters are listed in the "Radio Equipment List" and supplements issued from time to time. This list is referred to by the Commission in connection with licensing and station inspections, by licensees and applicants, and by manufacturers and prospective users of transmitters. In conjunction with this activity, the Commission maintains a central file containing data on all types of transmitters and other equipment which has been type accepted, type approved, or for which data has been filed for reference purposes. These data are a prime source of information concerning equipment capabilities in connection with licensing and rulemaking. The data are also available to other Government agencies.

Type-acceptance applications have increased in number as this procedure has been extended into additional services. On January 1, 1959, type acceptance became a requirement for all new ship radiotelephone installations operating below 30 megacycles. On July 1, 1959, type-acceptance requirements became effective for new installations in the aviation radio services. As a result of this expansion of type-acceptance requirements and the development of new types of transmitters for use in other services, the type-acceptance work increased during the past year as is indicated in the following table.

Service	Equipments type accepted as of June 30, 1959	Increase since June 30, 1958	Total manufacturers as of June 30, 1959	Increase since June 30, 1958	Power range	Frequency range (megacycles)
TV broadcast	39	13	4	1	0.001 to 100 kw	0.54 to 890.
Aural broadcast	261	18	18	1	0.01 to 50 kw	0.54 to 108.
Nonbroadcast	1,640	290	134	55	0.032 w to 6.5 kw	1.6 to 13,200.
Total	1,940	321	141	57	0.032 w to 100 kw	0.54 to 13,200.

In addition to the increases reflected in the above table, the applications for type acceptance received represent an increase of about 6 percent over fiscal 1958.

Radio Wave Propagation Research

Although major difficulties which arose during the year dealt with questions concerning TV station allocations, notable progress was

made in the application of new information to service and interference problems in all types of radio communication.

The rapidly developing and constantly changing economic picture of the TV industry requires that the best available information on the transmission properties of the wave bands allocated for this purpose be applied in the formulation of rules and standards for the service. Where satisfactory information was not available, additional information was obtained by (1) organizing projects for investigation and measurement utilizing the facilities of the Commission, (2) requesting industry cooperation through engineering committees organized for this purpose, and (3) developing the theoretical aspects of the problems.

Today's frequency allocation standards for broadcasting were based, to a considerable extent, upon wave-propagation information obtained from field-strength recordings made at the Commission's monitoring stations during the last 25 years. In recent years, the advent of VHF and UHF TV has provided means for developing information which could be obtained only from actual transmission. During the last fiscal year, approximately 18 station-years of field-strength recordings of UHF stations were analyzed and studied. This material was used in cooperation with the Television Allocations Study Organization (TASO) in the formulation of new UHF propagation curves. Additional field-strength recordings made of seven TV and FM stations during the year are being studied. These measurements were combined with information obtained from various sources for the development of a revised set of VHF propagation curves. Factors involving these measurements, which are vital in specifying channel and station separation requirements, vary with time and season, with geographic location in different regions, and with terrain and topography in local areas.

Certain segments of information relating to the application of principles developed in this work have been resolved, and the results have indicated the nature of other segments which are open for future investigation. Examples are (1) the need for information concerning the efficiency of directional antennas for TV and other radio services, and (2) the need of practical methods for predicting service coverage with greater accuracy for TV and other stations and for contemplated changes in the allocation rules.

Detailed studies are being made of selected areas served by several TV stations using measurements furnished by TASO. An effort is being made to devise methods for predicting a station's service range with greater accuracy in areas characterized by smooth or rough terrain or in built-up city areas. Some improvement has been achieved in the accuracy with which the quality of broadcasting service may

be predicted, and work is continuing with the goal of obtaining greater accuracy.

Various proposals of new systems of aural and video broadcast were investigated in relation to wave-propagation effects. One was for a special type of single sideband operation, in which it was expected that certain types of interference due to the combining of groundwave and skywave components would not cause the distortion usually prevailing with regular types of transmission. Another proposal consisted of placing several TV transmitters at spacings considerably less than those specified in the Commission's rules, to replace a single high-power station. With this system, called "polycasting" or "multicasting" depending upon the number of frequency channels used, it is possible that greater allocation efficiency and greater economy in transmitter costs may result. Recent studies have revealed the general requirements for a multicasting operation, and propagation experiments are being conducted by the industry in order to obtain further information.

The field-strength "sunspot cycle" recording program was terminated January 1, 1959, after a year of extremely high-sunspot activity, to complete two 11-year sunspot cycles of these measurements on AM broadcast stations.

LABORATORY

The Commission's laboratory is located near Laurel, Md. There a small staff makes tests on equipment and communication systems in support of programs carried on by the Commission.

Type Approval of Equipment

One class of equipment tested by the laboratory is composed of noncommunication devices which perform their own intended functions at the risk of causing interference to licensed radio and TV services. These devices include medical diathermy and ultrasonic equipment, epilators, electronic neon signs, electronic ovens for the home, and commercial ultrasonic units; shipboard telegraph transmitters, lifeboat transmitters, and automatic alarm receivers which are important for safeguarding life and property at sea. These devices are tested from the standpoint of assuring maximum reliability of operation under adverse conditions. Laboratory-approval tests are also made on new models of monitoring equipment used in aural and TV broadcast stations to assure that maximum program quality is obtained with minimum interference to other stations. Another class of equipment tested is that used without the supervision of licensed operators. This category includes marine radar and citizens' radio equipments.

Summary of type-approval testing activity during fiscal year

Class of equipment	Number of submissions for test	Number of type approvals granted	Class of equipment	Number of submissions for test	Number of type approvals granted
Shipboard auto alarm	1		AM broadcast modulation monitor	5	2
Shipboard radar	9	8	Medical diathermy	2	2
Shipboard radiotelegraph transmitter	3		Medical ultrasonic	10	7
Shipboard auto-alarm keyer	1		Epilator	5	5
TV broadcast translator	5	3	Neon sign	2	2
TV broadcast monitor	2		Citizens radio transmitter	3	1

Study of New Systems and Devices

Laboratory studies during the year included FM broadcast multiplex, including aspects of stereophonic problems in both FM and AM; interference between radar and TV stations; detrimental effects to automatic alarms aboard ship from Government stations operating in the band 475 to 535 kilocycles; measurement of interference from portable receivers and hearing aids; also measurements in connection with problems of both UHF and VHF TV boosters and repeaters.

Radio Propagation Measurements

The laboratory provides the equipment techniques and calibrates the field-strength recorders which are located in a number of the FCC monitoring stations. During the year, it made calibration tests at three monitoring stations, operated several UHF signal recorders, and placed in operation an automatic device for recording spectrum occupancy between 1250 kilocycles and 20 megacycles. Construction of improved models for installation at other locations is underway.

Development and Calibration of Field Equipment

Two specially modified frequency spectrum analyzers were delivered to the monitoring stations, as were nine receivers specially modified to be used with the spectrum analyzers. Six field-strength meters and six signal generators were repaired and calibrated and returned to the field offices and monitoring stations.

Frequency Allocation and Use

NATIONAL FREQUENCY ALLOCATIONS

Joint OCDM–FCC Long-Range Allocation Planning

The FCC and the Office of Civil and Defense Mobilization are conducting joint long-range planning to produce, as the initial objective, an improved pattern of frequency allocations which could be implemented within the next 10 to 15 years. This study, which is on a continuing basis, seeks ways and means to accommodate expansion and growth in the use of radio, to simplify allocations for each use of radio including TV, and to provide for reasonable transition periods as necessary. It represents a new approach in Government planning for the long-term future in the field of frequency allocations. Heretofore, such studies have been conducted independently by the respective offices with conclusions coordinated thereafter.

The technical study group, which includes representatives of member agencies of the Interdepartment Radio Advisory Committee (IRAC), plans to give first attention to allocations between 50 and 1000 megacycles in view of the difficult problems concerning that region of the spectrum. It will consider requirements of the broadcasting, land mobile, aeronautical mobile, maritime mobile, radiopositioning, radionavigation, and earth-space satellite services based on both Government and non-Government data which the group has requested.

Possible Reallocation of VHF Government Frequencies

The joint OCDM–FCC study is particularly significant since the various plans for the possible reallocation of bands for TV broadcast depend on whether a wholesale readjustment of VHF spectrum space would be feasible and in the public interest. The Commission is currently exploring with the Government (OCDM) the possibility of reallocating Government frequencies above 216 megacycles to non-Government use. It is hoped that a definite determination can be made in the near future.

However, in the event additional VHF frequencies became available for non-Government use, the Commission would have to consider the needs not only of TV but of other vital radio services seeking additional space in this part of the spectrum. The requirements of these

services are currently being examined by the Commission in its general review of spectrum allocations between 25 and 890 megacycles.

General Spectrum Studies

Extensive consideration has also been given to extremely complex engineering problems involved in various congressional proposals for a general study to bring about the most efficient utilization of the radio spectrum. This requires evaluations of existing and future frequency requirements of all radio services. Also, it entails analysis of existing governmental methods for handling the Nation's frequency allocations, with special attention to Government and non-Government division of spectrum space.

Other National Frequency Allocation Actions and Problems

Fiscal year 1959 saw an unusually large number of changes in national frequency allocations. Some of these were necessary to provide continuity of service in the aftermath of the Commission's action of April 16, 1958, in reallocating, for national defense reasons, several important non-Government segments of the radio spectrum for Government use. Others were made to meet current needs in anticipation of international acceptance of the U.S. proposals to the 1959 International Telecommunication Union (ITU) Radio Conference. Still others were to cope with the burgeoning frequency demands of radio services already authorized by the Commission or coming into being.

The Commission is continually faced with national frequency allocation problems relating to (1) the establishment of new radio services for which a public interest showing can be made, (2) the day-to-day accommodation of new assignments to meet the increasing frequency demands of existing radio services, and (3) making the most effective use of today's basic table of frequency allocations.

How did these problems develop and what is the Commission doing to resolve them?

When the FCC came into being 25 years ago, for all practical purposes there were no international frequency allocations above 28 megacycles simply because radio developments had not progressed beyond that point. U.S. proposals to the ITU conference would expand that upper limit to 40,000 megacycles, representing a usable spectrum 1,430 times greater than that allocated internationally in 1934.

Although the Commission's rules in 1934 viewed the then total spectrum as extending in frequency from 10 kilocycles to 500 megacycles, inclusive, its current frequency allocations include frequencies to above 30,000 megacycles. Until recent years, this extension permitted a phenomenal growth in the number of users of the spectrum. As bands allocated to the various services became overcrowded or as

new developments occurred in higher bands, families of bands were allocated to those services. However, because of economic and other considerations, plus the fact that propagation characteristics of higher frequencies become more and more like those of light beams, the greatest demand for frequencies by non-Government users remained below 1000 megacycles. Hence, expanding services must now rely upon more efficient utilization of spectrum space, rather than an expanding spectrum, to meet the bulk of their needs.

There are approximately a dozen petitions for rellocation of spectrum space on which the Commission has been unable to take affirmative action because of congestion in the bands which might otherwise be made available. These petitioners can be satisfied only by taking spectrum space from other non-Government services or by acquiring additional space from Government services. The advisability of following the first course is one of the results to be expected from the Commission's overall spectrum inquiry.

Five separate allocation changes were made during the year to accommodate the needs of growing services. Three of these were further steps to implement the "split" channel program begun in fiscal 1958 when technological advances in equipment permitted halving the separation between assignable channels. In the other 2 instances, allocations were finalized for aeronautical telemetry at 1435–1535 megacycles and for aeronautical doppler navigators at 13,250–13,400 megacycles in anticipation of ITU acceptance of those bands.

Many opportunities present for adding additional services, on a geographical basis, to the existing allocation structure without degradation of service. Two examples were changes to permit international point-to-point operations in the band 952–960 megacycles in the Virgin Islands and Puerto Rico, and use of tropospheric scatter for public correspondence between Florida and the Bahama Islands at 2110–2200 megacycles.

A further extension of this philosophy has been applied to a unique situation occasioned by the advent of radio astronomy—a service in which the participants are unlicensed since they are interested in receiving rather than transmitting radio signals. A National Radio Astronomy Observatory (NRAO) has been constructed at Green Bank, W.Va., a site selected because of its relative freedom from manmade radio noise and the sparsely settled surrounding area. In order to protect the reception there of extremely weak electromagnetic radiations of extraterrestrial origin, the Commission requires that, within 60 miles of the observatory, most new stations (and existing stations for which certain technical modifications are desired) coordinate their proposed operations with the NRAO. This is the first

instance of protection being given to signals other than those from manmade radio apparatus.

INTERNATIONAL FREQUENCY ALLOCATIONS

International Radio Conference, Geneva 1959

Fiscal 1959 was of particular importance in the field of international frequency allocations, having seen the culmination of about 2 years of preparatory work to develop the U.S. allocation proposals for presentation at the 1959 radio conference at Geneva. The preparatory groups, working under the aegis of the Department of State and representatives of industry, the Commission, and other interested Federal agencies, drafted a tentative proposed international allocation table ranging from 10 kilocycles to 40,000 megacycles.

The Commission's workload in this preparatory work was exceptionally heavy, because this is the first world conference since 1947 to consider a complete revision of the international radio regulations and, as a key member of the preparatory study groups, the FCC participated actively in every subject under consideration and every phase of the other preparations. This undertaking is of vital concern to all radio users in the United States, particularly in view of the fact that actions taken by some 100 foreign administrations at the conference will affect the entire telecommunications field. It is important, therefore, that the U.S. proposals be fundamentally firm and practicable, and acceptable to both Government and industry users of radio.

In its docket 12263 proceeding, the Commission undertook to keep its licensees and the general public informed of the general nature of the U.S. proposals. The 75 responses were studied carefully to determine if, and in what ways, these proposals could be improved upon. Separate teams of U.S. experts traveled throughout the Caribbean-South American and European regions explaining the proposals, answering questions, and evaluating the reactions to the proposals. Additionally, formal and informal meetings were held in Washington, Ottawa, and London to discuss matters of mutual interest and resolve major differences. These exchanges permitted necessary revisions to be made well in advance of the conference.

In addition, the Commission prepared material for the Department of State to distribute to the preparatory study groups and the Technical Coordinating Committee, and to the ITU for translation into various foreign languages for the member countries.

In further preparation for this session, the Ninth Plenary Assembly of the International Radio Consultative Committee (CCIR) was held in Los Angeles during April 1959 for the purpose of obtaining the

recommendations of international experts on various technical problems which affect practically all users of radio.

Other International Conferences

During the year, the Commission prepared for 26 other international conferences, and some of these necessitate continuing followup work. It furnished 4 chairmen, 3 vice chairmen, and 42 other members of delegations. These international conferences are under Department of State sponsorship.

INTERNATIONAL FREQUENCY COORDINATION

The importance of the Commission's role in international frequency coordination matters increases with the tremendous expansion of radio throughout the world. The frequency situation becomes more critical because more and more radio operations must be squeezed into the same radio spectrum. The need for frequencies is not limited to new radio stations being authorized throughout the world, but is shared by established radio stations which are expanding.

It is important that frequencies used by the Commission's licensees are adequate to handle the service they wish to render and remain relatively free of harmful interference from other stations operating in the same part of the radio spectrum. In keeping with this principle, several international frequency assignment plans for the aeronautical and maritime mobile services, between 2850–23000 and 4000–23000 kilocycles respectively, emerged from the Extraordinary Administrative Radio Conference, Geneva 1951. In addition, the conference adopted regional plans for all radio services operating below 4000 kilocycles. These plans, based on the 1951 concept of requirements, provided for both present and future operations. However, in actual practice, many of the contemplated operations did not materialize, others not planned became necessary, and some operations of that time have since been discontinued. Further, some of the planned assignments were found incompatible and required alteration.

Areas adjacent to the United States-Canadian border are particularly troublesome since many operations in close proximity to each other are authorized each year by both Governments. Absence of extensive interference from this multiplicity of stations is due, primarily, to their longstanding cooperation in such matters. A mutual 1950 procedure provided ground rules for coordinating assignment of frequencies in certain bands, specifically VHF and UHF, for use in the sensitive border areas. Due to the ever-increasing number and variety of uses of radio in both countries, it has been necessary to amend that procedure on several occasions.

The extent of this United States-Canadian relationship is demonstrated by the fact that almost 2,400 coordination letters and telegrams were exchanged during the past year. This represents an increase of almost 100 percent over the previous year.

The Commission also exchanged many communications with other nations for the purpose of avoiding harmful interference either to or by U.S. operations. These exchanges constitute one means of providing a degree of harmony or compatibility on the part of users of radio in different countries with resultant benefits to U.S. users.

INTERNATIONAL INTERFERENCE AND INFRACTIONS

The importance of resolving radio interference is recognized universally since it can affect safety of life and property at sea or in the air and the ability of an operating company to provide service. Accordingly, article 14 of the radio regulations annexed to the International Telecommunication Convention (Buenos Aires, 1952) prescribes the procedures to be followed whenever international harmful interference is experienced. The Commission is recognized internationally, within the terms of that treaty, as an administration of the United States for radio matters.

Each case of harmful interference has its own peculiarities so that the actions required must be carefully evaluated to avoid any relinquishment of the licensee's right to operate. Therefore, these cases cannot be handled on a production-line basis. Further, the volume of cases has little relation to the actual work required, inasmuch as one case may need much more attention than another. Also, resolution of a case must be mutually satisfactory to both administrations. Accordingly, the technical problems are coordinated between the Commission and the foreign technical officials concerned. The assistance of the Department of State is solicited whenever deemed advisable.

The service rendered by the Commission frequently means whether an aircraft or ship station is able to maintain reliable service. In other cases, international communication between fixed points is involved and a disruption of service can affect official and private business. More important, interference is sometimes caused on frequencies used worldwide for distress, search and rescue, and other emergency communications.

Of 310 cases arising during the year, 258 were resolved satisfactorily and negotiation with foreign administrations continues on the remainder. In addition, the Commission forwarded 72 reports of harmful interference to the U.S. Government agencies alleged to be responsible and, when requested to do so, collaborated in correspondence addressed to the complaining foreign officials.

The Commission also participates, under Article 15 of the International Radio Regulations, in a closely allied program to prevent the development of cases of international harmful interference. Essentially, it provides for observing and reporting improper technical operations by foreign radio stations. In this way, many potential cases of harmful interference can be avoided with mutual benefit to all of the countries concerned.

INTERNATIONAL FREQUENCY USAGE DATA

The Commission furnished approximately 91,000 monitoring observations to the ITU for publication in the latter's "Summary of Monitoring Information Received by the IFRB."

The summary provides valuable types of information regarding frequency stability, emissions in use, areas where transmissions are received and their relative signal levels, etc. Also, it can be used as a guide to determine if stations are actually using their frequencies at the times indicated, especially during certain portions of the year or periods of sunspots. In other cases, the data have helped radio users to bring their operations into conformity with the international frequency allocations.

The Commission made recommendations to the ITU to improve the quality and usefulness of the data which resulted in the summary now being published monthly rather than quarterly, with an accomplished saving of over 2 months in time with respect to printing and distribution.

The program is a cooperative effort participated in by about two dozen countries, so that the cost to any one is relatively small in consideration of the results obtained, particularly since the monitoring stations of any single nation cannot effectively cover all areas of the world.

NATIONAL FREQUENCY COORDINATION

The ever-increasing demand for frequency space has resulted in an excessive frequency coordination workload. This condition has created two particular problems: (1) The requirement for numerous phone calls and man-hours for informal coordination of proposals, and (2) the extremely heavy administrative load imposed by the monthly FCC-Government meetings necessary for formal action.

The probability of harmful interference to established radio services is always present when a new frequency is assigned. In order

to minimize this condition, all proposals for new or modified domestic radio facilities are coordinated between Government and non-Government users when an engineering study indicates that some conflict may exist. If this informal coordination proves successful, Government and non-Government proposals are submitted to a joint FCC-Government Committee (FAS/IRAC) for final action. This joint body is representative of the major Federal users of radio. The Commission, while not a member, serves in a liaison capacity representing the non-Government interests.

The seeming solution to the first problem would be a private-line teletype connecting the major Government agencies involved, or some new system involving record communications. Such a system would not only result in great savings in time for all but, equally important, would provide a written record of all agency comments. To this end, a time study is now being conducted and, if the finding warrants, plans will be made accordingly.

Due to the increase in applications, monthly FAS/IRAC meetings have required additional time to act on the now 1,200 to 6,500 agenda items. Where 2 days used to be sufficient, the workload now requires 3 to 4 days of meetings. This, coupled with the preparation needed for such a session, is extremely time consuming and outmoded. Since all agencies face this common problem, they are now engaged in streamlining the procedures.

NATIONAL FREQUENCY LISTS

During the first part of the fiscal year, the compilation, printing, and distribution of the Commission's frequency list became an unwieldy and costly problem. So a new system was inaugurated.

The frequency list had been printed in frequency order, consisting of several volumes totaling over 4,000 pages. It was decided to break it up in smaller "service" volumes; that is, broadcast, aviation, police, etc., stations were grouped together in their own separate publications. This reduced by more than half the previous printing of well over half a million pages semiannually.

The Commission received mounting requests from industry groups and others who desired to obtain one or more copies of these lists. Since the Commission is unable to distribute these lists, arrangements were made with industry for their publication on a cost basis to all those interested.

STATISTICS

Frequency coordination actions

	Fiscal 1958	Fiscal 1959	Percent increase
Formal coordination	6,400	6,800	7
Experimental	1,127	1,504	25
Informal coordination	1,700	2,350	40
Broadcast	102	135	32

Frequency assigments processed

	Fiscal 1958	Fiscal 1959
Authorizations processed	45,304	[1] 50,741
International notifications	46,945	[1] 33,189
Ship notifications to ITU	15,458	[1] 21,601

[1] As of June 5, 1959.

Appendix

ELECTRICAL COMMUNICATION MILESTONES

Early Communication

The earliest method of distance communication was by runners who carried verbal or written messages. After man domesticated the horse, riders were able to convey messages faster and farther.

For signaling purposes, primitive peoples used drums, fire, and smoke. Torches and fire towers figured in the Greek and Roman military campaigns. Agamemnon sent the news of the fall of Troy to his wife by flares along the way. Cyrus, king of the Persians, stationed men with strong lungs on hilltops to relay orders through hide megaphones. During the Crusades, Saladin dispatched messages by pigeons.

The ancients also employed burnished metals to reflect the sun's rays for daytime signaling. Invention of the mirror brought the heliograph. Semaphore systems which involved the use of supports with movable arms likewise aided visual code communication. Napoleon directed troop movements with such a device. Signaling with flags by day and by flashing lights at night has long been in vogue.

For lack of speedy communication, Andrew Jackson fought the British at New Orleans after peace had been reached in the War of 1812.

Communication Developments

The colorful pony express required 10½ days to carry mail from St. Joseph (Mo.) to San Francisco. Trains have crossed the continent in 2½ days and jet planes in 3¼ hours.

Before the advent of the railroad, it required 44 hours for stagecoaches to bring news from the National Capital to New York. Express riders cut this down to 20 hours. Trains now do it in 3½ hours. A jet plane has made the same trip in less than half an hour.

In 1492 it took 70 days for Columbus to reach the New World. Centuries later American clipper ships crossed the Atlantic in 2 weeks. Steamships have done it in 3¼ days, and jet passenger planes now span that ocean in 6½ hours.

However, telephone and telegraph are able to bridge the continent or sea almost immediately.

At the turn of the century, radio was confined to wireless telegraphy, largely for marine purposes, and code communication was possible for comparatively short distances. Today radio has been put to many aural and visual communication uses on the land, on the sea, and in the air, including communication with objects in outer space.

Wire Telegraph

Invention of the steamboat and locomotive reduced greatly the time element in communication. But it remained for the telegraph to strengthen our national life and unity.

The principle of the electromagnetic telegraph was developed by Samuel F. B. Morse. While a professor of arts and design at New York University in 1835, he proved that signals could be transmitted by wire.

As is the case with many notable inventions, he had difficulty in arousing interest. He gave a public demonstration in 1838, but it was not until 5 years later that Congress appropriated $30,000 to construct an experimental telegraph line from Washington to Baltimore.

In early 1844, Members of Congress witnessed the sending and receiving of messages over a part of the line. Before the line had reached Baltimore, the Whig Party held its 1844 national convention there and, on May 1, nominated Henry Clay. This news was hurried to Annapolis Junction (between Washington and Baltimore) where Morse's partner, Alfred Vail, wired it to the Capital. This was the first news dispatch carried by electric telegraph.

"What hath God wrought?" sent by Morse from the old Supreme Court chamber in the U.S. Capitol to his partner in Baltimore, officially opened the completed line on May 24, 1844.

Three days later the Democratic National Convention met at Baltimore. Van Buren seemed the likely choice, but James Polk won the nomination. When this news was telegraphed to Washington, skeptics refused to believe it. Only after persons arriving by train from Baltimore confirmed the report were many convinced of the telegraph's value.

Morse and his associates obtained private funds to extend their line to Philadelphia and New York. Small telegraph companies sprang up in the East, South, and Midwest. Dispatching of trains by telegraph started in 1851. The corporate body now known as Western Union commenced business in that year. It built the first transcontinental telegraph line in 1861, mainly along railroad rights-of-way.

The telegraph provided speedy communication at the time the West was being opened. It aided in the extension and operation of railroads. Side by side, the iron rail and iron wire pushed over plain and through wilderness to make new settlements possible, and to bring regions into closer contact. This association of telegraph and railroad built up communities, opened markets, and aided commerce.

The original Morse telegraph printed code on tape. However, in the United States the operation developed into sending by key and receiving by ear. A good Morse operator could transmit 40 to 50 words a minute. Automatic transmission, introduced about 1914, handles twice that number a minute.

In 1913 Western Union developed "multiplexing" which made it possible to transmit eight messages simultaneously over a single wire (four in each direction). "Teleprinter" and "teletypewriter" machines started to come into use about 1925. "Varioplex," introduced in 1936, enables a single wire to carry 72 transmissions at the same time (36 in each direction). High-speed switching systems date from 1937. Two years later Western Union introduced the first of its automatic facsimile devices.

Until 1877, all rapid long-distance communication depended upon the telegraph. However, the advent of the telephone in that year brought rivalry. Patent litigation between Western Union and the infant telephone system was terminated in 1879 by an agreement which largely separated the two services.

In 1881 the competitive Postal Telegraph system entered the field. For economic reasons, Postal was merged with Western Union in 1943. The result is that today only one company—Western Union—offers a nationwide telegraph service. There are a few independent telegraph companies, but they are small and mostly serve railroads or particular industries in limited areas.

Ocean Cable Telegraph

In fathering the telegraph, Samuel F. B. Morse also pioneered in submarine telegraphy. Ocean telegraph cable is, in effect, a seagoing extension of the land telegraph system to link islands and continents.

In 1842, over an insulated copper wire submerged in New York Harbor, Morse demonstrated that electrical impulses could be sent under water. It remained for the perseverance of Cyrus W. Field to make the submarine cable practical. Transoceanic cable service was accomplished after many disappointments.

With capital obtained from private subscriptions in New York and London and, in part, appropriated by the British and United States Governments, an attempt was made in 1857 to lay a cable under the

Atlantic Ocean. The cable broke after 335 miles of it had been payed out by a ship operating from Ireland. In June the following year, another attempt failed. Not daunted, these pioneers succeeded in laying the cable the following month. But it soon became inoperative. Another cable-laying effort, in 1865, proved futile.

On July 27, 1866, the steamship *Great Eastern* completed laying a new cable from Valentia, Ireland, to Heart's Content, Newfoundland, for the Anglo-American Telegraph Co. Returning to mid-Atlantic, the ship located and raised the cable used in the 1865 attempt, spliced it, and extended it to Newfoundland, where it was landed on September 8. Thus, America and Europe were linked by two cables. Other ocean cables followed.

Cable communication did for the linked continents what the land telegraph accomplished domestically. International commerce was stimulated and the exchange of news became a matter of minutes instead of weeks.

Ocean cables were first operated by manually repeating the messages along the route. In 1921 "regenerators" were developed which permit direct transmission between terminals. Less than 300 letters a minute could be sent over the original transatlantic cable. Modern "permalloy" cables have a capacity of about 2,400 letters a minute.

Wire Telephone

If I can get a mechanism which will make a current of electricity vary in its intensity, as the air varies in density when a sound is passing through it, I can telegraph any sound, even the sound of speech.

So declared Alexander Graham Bell in 1875 while experimenting with his "harmonic telegraph". On June 2 of that same year, by fashioning a makeshift diaphragm, this teacher of deaf mutes discovered that he could hear over a wire the sound of a twanging clock spring.

Nine months later—on March 10, 1876—Bell transmitted the first complete sentence heard over a wire. What he said was, "Mr. Watson, come here, I want you!" It was received by his associate, Thomas A. Watson, in an adjoining room of their tiny Boston laboratory.

U.S. Patent No. 174,465, issued to Bell in 1876, became recognized as the "most valuable patent." Yet early efforts to popularize the telephone met with disappointment. Though people paid to hear Bell lecture on "the miracle discovery of the age," for a time they seemed unaware of its possibilities.

However, the year 1877 witnessed erection of the first regular telephone line—from Boston to Somerville, Mass. At the close of 1880 there were 47,900 telephones in the entire United States. The

following year brought telephone service between Boston and Providence, and New York and Boston were connected in 1884. Service between New York and Chicago started in 1892, but not until 1915 was transcontinental service by overhead wire inaugurated.

Early telephones were leased in pairs. The subscriber had to put up his own line to connect with another listener. The first switchboard was set up in Boston in 1877. New Haven saw the first regular telephone exchange in 1878. Early switchboards were manned by boys.

Toward the close of the 19th century the myriad of overhead telephone wires in large cities became such an obstacle to effective fire-fighting and were so subject to snow and sleet damage that it was necessary to develop overhead cables. In 1888 it was possible to squeeze 100 wires into a large cable; today more than 4,000 strands can be encompassed in a cable about the size of a man's wrist.

Experiments with underground telephone cable began in 1882, but it was not until 1902 that the first long-distance buried cable was placed in operation—between New York and Newark, N.J. The first cross-continent cable line was opened in 1942. There are now six coast-to-coast telephone wire lines—two cable and four largely open wire.

Submarine telephone cables have long connected this country with Cuba. The first transatlantic telephone cable—connecting Newfoundland with England—was opened in 1956. Later that same year a submarine telephone cable from Washington (State) to Alaska was put into operation. Hawaii was linked by telephone cable with the mainland in 1957. A telephone cable to France was opened in 1959.

Development of the telephone is strikingly revealed in the evolution of its instruments. For example, it is a far cry from the streamlined dial handsets of today to the cumbersome wall hand-rung models of a few generations ago.

It is an oddity that the dial telephone was invented by an undertaker—Almon B. Strowger of Kansas City. He devised it about 1889. The first dial exchange was installed at La Porte, Ind., in 1892. Most domestic telephones are now dial operated for local calls, and long-distance dialing is increasing.

Coaxial cable had its first experimental operation between New York and Philadelphia in 1936. Commercial service was inaugurated between Stevens Point, Wis., and Minneapolis in 1941. It proved so successful that the American Telephone & Telegraph Co. is now using many coaxial links in its national cable-microwave system. This coast-to-coast service was inaugurated in 1951 when the Japanese Peace Conference in San Francisco was televised. The coaxial cable is designed to handle radiobroadcast and television programs as well

as telephone and telegraph traffic. One pair of coaxial units is capable of carrying 1,860 simultaneous telephone conversations or, alternatively, 18 telegraph circuits.

Not many radio listeners are aware that few aural broadcast programs travel through the air exclusively. Most of them are sent over telephone wires, many across the continent. Broadcast stations also depend upon telephone wire facilities to connect their studios and transmitters.

In the early days of the telephone, many cities and towns had rival telephone systems. Philadelphia was the last major area to give up dual service, doing so in 1943.

The first Bell telephone company started in 1878. It developed into the American Telephone & Telegraph Co., incorporated in 1885. The latter and its subsidiaries comprise the "Bell System," which provides a variety of communication services. Many independent telephone companies also operate, largely in the rural areas. Most of them connect with the Bell System.

Radiotelegraph

The advent of radio was a natural result of advances made in the fields of electricity and magnetism. It paved the way for development of wireless communciation, first by telegraph and then by telephone.

In the 1860's Maxwell predicted the existence of radio waves, and in 1886 Hertz demonstrated that rapid variations of electric current could be projected into space in the form of radio waves similar to those of light and heat.

There was other pioneer experimentation—in fact, a U.S. patent on a wireless system was issued as early as 1872—but it remained for Guglielmo Marconi, an Italian inventor, to give practical demonstration of the feasibility of radio communication. Marconi sent and received his first radio signal locally in Italy in 1895. In 1899 he flashed the first wireless signal across the English Channel and 2 years later received the letter "S" telegraphed from England to Newfoundland. This was the first successful transatlantic radio transmission. Marconi also sent the first eastward transatlantic radiotelegraph message—in 1902.

These activities aroused world interest. The result was that the first general application of radio was for marine telegraphy. In 1899 the U.S. Army established wireless communication with a lightship off Fire Island, N.Y. Two years later the Navy adopted a wireless system. In addition to visual signaling, the Navy had been using homing pigeons to send messages to shore.

By this time a number of ocean steamships had installed wireless equipment. This prompted the first international wireless conference, held at Berlin in 1903. Sea disasters proved the new medium to be an effective aid in rescue work, as well as for communicating between ships and between ships and shore points.

The first radio distress call from an American vessel (a Navy relief ship) has been traced to 1905. But Jack Binns made world news in 1909 when he remained at his post as radio operator on the stricken steamship *Republic* to summon aid with the then British radio distress call "CQD." Later that same year the SS *Arapahoe* brought help with "SOS," which was adopted as an international radiotelegraph distress call in 1906 and is still in use. ("Mayday" was adopted in 1927 as the international distress call for radiotelephony.) In 1912 the ill-fated *Titanic* also resorted to wireless. By international agreement in 1927, the alphabet was apportioned among the nations for basic use in radio calls to identify both the nationality and the type of radio stations.

Fessenden had been experimenting with wireless, and in 1906 was engaged by the U.S. Weather Bureau to experiment with radiotelegraphy to speed notice of weather conditions. Meanwhile, in 1901, radiotelegraph service was inaugurated between five Hawaiian Islands; in 1903 a Marconi station at Wellfleet, Mass., exchanged greetings between President Theodore Roosevelt and King Edward VII; in 1905 the naval battle of Port Arthur in the Russo-Japanese war was reported by wireless; in 1909 Robert E. Peary, polar explorer, radiotelegraphed: "I found the Pole"; in 1910 Marconi opened regular America-Europe radiotelegraph service which, several months later, enabled an escaping British murderer to be apprehended on the high seas; and in 1912 the first transpacific radiotelegraph service was established, linking San Francisco with Hawaii.

Oversea radiotelegraph service developed slowly, due primarily to the initial use of spark and arc sets which were unstable in operation and caused much interference. The Alexanderson high-frequency alternator and the De Forest tube were the answer to many of these early technical problems.

During the First World War, governments began using radio telegraph to keep abreast of events and to direct the movement of troops and supplies. World War II not only further demonstrated the military value of radio but spurred its development and utilization for peacetime purposes.

Today six American companies operate point-to-point radio telegraph circuits between the continental U.S. and foreign countries. They are RCA Communications, Inc. (organized in 1929); Mackay

Radio & Telegraph Co. (1926); Globe Wireless, Ltd. (1930); Press Wireless, Inc. (1929); Tropical Radio Telegraph Co. (1913); and United States-Liberia Radio Corp. (1928). Through their facilities it is possible for anyone almost anywhere in the United States to send a radiogram to almost any place in the world.

At present there is no domestic radiotelegraph service on a national basis. Two radio communication companies had domestic networks connecting certain large cities, but these were closed down in World War II and were not reopened. However, microwave and other developments make it possible for domestic telegraph communication to be carried in substantial part over radio circuits. In 1945 Western Union established a New York-Philadelphia microwave link. This was expanded in 1948 into a system connecting Washington and Pittsburgh. By 1958 it had been extended to Cincinnati and Chicago, with links to Kansas City and St. Louis under way. This system is able to transmit 2,000 telegrams simultaneously in each direction.

Radiotelephone

The first time the human voice was sent by radio is a subject for debate. Claims to that distinction range from "Hello Rainey" spoken by Stubblefield to a partner in a localized test near Murray, Ky., in 1892, to an experimental program of talk and music sent by Fessenden from Brant Rock, Mass., in 1906, which was heard by radio-equipped ships within a radius of several hundred miles.

In 1915 speech was first transmitted successfully across the continent—New York City to San Francisco; also across the Atlantic Ocean—from the naval radio station NAA at Arlington, Va., to the Eiffel Tower in Paris. There was some experimental military radio telephony in World War I, between ground and aircraft.

The first ship-to-shore two-way radio conversation occurred in 1922, between Deal Beach, N.J., and the SS *America*, 400 miles at sea. However, it was not until 1929 that high-seas public radiotelephone service was inaugurated. At that time telephone contact could be made only with ships within 1,500 miles of shore. Today it is possible to telephone nearly every large passenger liner wherever it may be on the globe.

Commercial radiotelephony linking America and Europe was opened in 1927, and with South America 3 years later. In 1935 the first telephone call was made around the world, using both wire and radio circuits.

Until 1936, all American transatlantic telephone communication had to be routed through England. In that year a direct radiotelephone circuit was opened to Paris. Others followed. Direct radiotelephone circuits now connect the United States with some 125

foreign countries, which in turn connect with many other countries.

Microwave telephone transmission was first sent across the English Channel in 1930. The first microwave system in this country for telephone service, between Boston and New York, was placed in operation in 1947. The first oversea telephone call from a moving automobile was made from St. Louis to Honolulu in 1946. An international microwave "scatter" transmission circuit was inaugurated between Florida and Cuba in 1957. Microwave is being used increasingly to beam telephone and telegraph messages and TV programs over chains of relay stations.

The U.S. terminals of direct oversea radiotelephone circuits connecting this country are all operated by the American Telephone & Telegraph Co. and tie in with the domestic telephone system.

Broadcast

As indicated in the reference to radio telephony, there were many experimental audio transmissions, but it was not until after World War I that regular broadcasting began. The first system used was AM (amplitude modulation).

AM broadcast.—Licensing of broadcast stations on a regular basis began in 1921. The first station so licensed was WBZ, Springfield, Mass. Some broadcast stations developed from experimental operations prior to that date. A pioneer in this respect was KDKA, Pittsburgh, Pa.

There was experimental network operation over telephone lines as early as 1922. President Coolidge's message to Congress was broadcast by six stations in 1923. In 1926 the National Broadcasting Co. started the first regular network with 24 stations. Its first coast-to-coast hookup was in 1927. In the latter year the Columbia Broadcasting System was organized. The first round-the-world broadcast was made in 1930.

Before 1923, radiobroadcast was localized. Today, thanks to telephone lines, coaxial cable, microwave, and other relay means, it is possible to send the same program over many stations simultaneously.

FM broadcast.—Though a patent on frequency modulation was issued in 1902, the principle of FM had been known previously. However, its advantages for broadcasting were not developed until shortly before World War II. Largely as a result of FM developmental work by Edwin H. Armstrong in the 1930's the Federal Communications Commission in 1940 authorized commercial FM broadcasting to start January 1, 1941.

There was no "first" individual commercial FM authorization because, on October 31, 1940, the Commission granted construction

permits to 15 such stations simultaneously. The first licensed commercial FM station was WSM–FM, Nashville (May 29, 1941), which operated until 1951.

TV broadcast.—The beginning of visual radio has been traced to 1884 when Nipkow, a German, patented a scanning disk for transmitting pictures by wireless. In our own country, Jenkins began study of the subject about 1890. Rignoux and Fournier conducted "television" experiments in France after the turn of the century. In 1915 Marconi predicted "visible telephone." In 1925 Jenkins demonstrated his mechanical TV apparatus. A year later there were experiments by Alexanderson, Farnsworth, and Baird.

An experimental TV program was sent by wire in 1927, between Washington and New York, by the Bell Telephone Laboratories. The next year on outdoor pickup was tested. Large-screen TV was demonstrated in a New York theater in 1930.

Seventeen experimental TV stations were operating in 1937. An experimental mobile TV station was placed in use that year. The first U.S. President seen on TV was Franklin D. Roosevelt, when he opened the New York World's Fair in 1939.

In 1939 the Milwaukee Journal filed the initial application to broadcast TV programs on a commercial basis. As a result of a hearing held in 1940, the Commission authorized commercial TV operation to start July 1, 1941.

Meanwhile, a number of TV stations which had been operating experimentally applied for commercial authorization. The first grant looking to regular TV operation was issued to WNBT, New York, on June 17, 1941, effective July 1 of that year.

As a result of proceedings which started in 1948, the Commission on April 14, 1952, added 70 UHF (Ultra High Frequency) channels to the 12 VHF (Very High Frequency) channels then used for TV broadcast, thus making more than 2,000 channels available for assignment in nearly 1,300 communities throughout the United States.

Color TV.—Color television had long been a subject for study and experimentation. In 1928 Baird, in England, demonstrated one system. The next year color was sent over wire in a test at the Bell Telephone Laboratories.

The question of color TV was considered initially by the Federal Communications Commission in 1941, when it proposed alternative standards for monochrome and color. In 1945 it allocated certain UHF frequencies for experimentation in developing color and high definition black-and-white TV. It was not until 1946 that it received a formal proposal for the adoption of color standards.

Proceedings during 1949–50 resulted in the Commission on October 11, 1950, adopting a color system which required special receivers or adapters. In so doing, it held the door open for consideration of subsequent developments and, as a result, adopted the present "compatible" color system in 1953.

Educational broadcast.—University engineers helped to construct some of the Nation's pioneer AM broadcast stations, and many early broadcast licenses were issued to educational institutions.

By 1925, educational groups held 171 such licenses. For various reasons, most of these stations were off the air when the Federal Communications Commission was created in 1934. However, some educational bodies still operate in the AM band, either commercially or without profit.

To encourage the development of noncommercial educational broadcasting, the Commission in 1938 set aside certain AM channels for the exclusive use of educational institutions. Only a few educational institutions applied to use them, and most of these stations later changed to FM operation when the Commission allocated FM channels for noncommercial educational use, starting in 1941.

As an additional incentive to educational broadcasting, the Commission in 1948 authorized low-power (10 watt) for noncommercial educational FM stations and, since 1951, has permitted remote control operation of such stations.

In its television decision in 1952, the Commission allocated 242 TV channels for noncommercial educational purposes. This number has since increased.

The first noncommercial educational TV grant was made July 23, 1952, to the Kansas State College of Agriculture and Applied Science (KSAC–TV).

Miscellaneous Radio Services

Amateur radio is almost as old as radio itself. There was some amateur operation at the turn of the century and, in 1912, several hundred self-styled "hams" were in radiotelegraph communication with one another or listening-in on marine telegraph transmissions. The amateur fraternity, which now also uses radiotelephony, has been highly instrumental in popularizing and advancing the radio art.

Police radio is among the older public safety services. As early as 1916 the New York City police department operated a radio station to communicate with its harbor patrol boats. The Detroit police department experimented with radio communication in 1921, using the significant call letters "KOP." The first State police radio system was established in 1923 by Pennsylvania. The first construction permit

for a two-way police radio system was issued to Bayonne, N.J., in 1932, but Port Jervis, N.Y., obtained the first license.

Radiofrequencies for railroad use became available in 1927. Radiotelephone service for train passengers was inaugurated by the Baltimore & Ohio and Pennsylvania Railroads in 1947, between New York and Washington.

Pictures have been transmitted by radio since 1923 when a photograph was sent from Washington to Philadelphia in a test. A year later the Radio Corporation of America made the first transatlantic radiophoto transmission when a photograph of Charles Evans Hughes was received in New York from London. RCA inaugurated regular transatlantic radiophoto service in 1926.

Today radio is used for a variety of purposes other than common carrier and broadcast. Nonbroadcast operations regulated by the Federal Communications Commission include aviation; marine; public safety (police, fire, local government, forestry-conservation, highway maintenance, special emergency, etc.); industrial (business, industrial, power, petroleum, forest products, motion picture, relay press); land transportation (railroads, buses, trucks, taxicabs, automobile emergency, etc.); disaster communications; experimental; and individuals (commercial and amateur operators and private citizens).

FCC LOG HIGHLIGHTS

Following is a capsule chronology of highlights gleaned from releases and annual reports of the Federal Communications Commission during its 25 years of operation. The dates shown are largely those of the covering releases and do not necessarily indicate the dates the actions were taken.

1934

June 19 President signs Communications Act establishing FCC.
July 11 Commissioners take office and hold first meeting.
July 17 Commissioners organize into 3 divisions—Broadcast, Telegraph, and Telephone.
Aug. 21 Broadcast stations required to file ownership information.
Dec. 14 Filing of rates prescribed for common carriers.

1935

Jan. 22 Recommends to Congress that no fixed percentages of AM broadcast facilities be allocated for education at this time; outlines course of Commission action to promote educational broadcast.
Mar. 15 President approves telephone investigation by Commission pursuant to Senate resolution.
June 19 Adopts uniform system of accounts for telephone companies.
Aug. 14 Annual reports required of common carriers.
Dec. 18 First rules of practice and procedure adopted.

1936

Apr. 6 Calls engineering conference on problems of allocating frequencies to different radio services.
May 19 Authorizes zone and interzone police radio stations.
June 5 Congress repeals Davis amendment to Communications Act which set up 5 zones for allocation of broadcast facilities.
June 19 Senate ratifies safety of life at sea convention (London, 1929).
Dec. 10 Supreme Court affirms right of Commission to prescribe uniform system of accounts for common carriers.

1937

Mar. 10 Two types of ship auto alarms approved.
Mar. 29 Communications Act amended to permit waiver of license for operation of automatic transmitting devices.
May 20 Communications Act amended to require radio installations on certain ships.
Oct. 13 Commissioners abolish Broadcast, Telephone, and Telegraph Divisions.
Dec. 13 First North American Regional Broadcasting Agreement signed.

1938

Jan. 20 Issues report on "Social and Economic Aspects of Radio Broadcasting".
Mar. 18 Investigation of chain (network) broadcast practices instituted.
Mar. 23 Broadcast stations required to file annual financial reports.
Apr. 1 Proposed report on telephone investigation sent Congress.
May 1 Issues study on distribution of broadcast facilities.
June 15 Calls conference on radio needs for forest protection.
June 22 Establishes Emergency Radio Service.
July 2 Political broadcast rules adopted.
Nov. 7 Confers with networks to discourage indiscriminate use of words "flash" and "bulletin" in nonnews broadcasts.
Nov. 21 First rules for low-power radio frequency devices adopted.

1939

Jan. 3 First application received for a commercial TV broadcast station.
Jan. 16 Frequencies allocated for forestry radio use.
Mar. 13 Reports on allocation of frequencies from 30,000 to 300,000 kilocycles.
May 16 General rules and regulations adopted.
May 18 Fixed public radio service rules adopted.
May 22 First Commission committee report on TV broadcast study.
May 23 Adopts rules for international and experimental broadcast services.
June 14 Final report on telephone investigation sent Congress.
June 19 Senate resolution authorizes FCC investigation of telegraph industry.
June 22 AM broadcast license period extended from 6 months to 1 year.
Aug. 1 AM broadcast standards become effective.
Oct. 1 Establishes Experimental Radio Service.
Dec. 21 Commission committee report looks to limited TV commercial broadcasting.

1940

Jan. 3 Merger of Western Union and Postal telegraph companies recommended to Congress.
Jan. 21 International section of telegraph investigation report sent Congress.
Jan. 23 Reports on AM broadcast stations owned or controlled by newspapers.

Feb. 25 Merger of international telegraph carriers recommended to Congress.
Feb. 26 Private radio service not in public interest at this time because of lack of frequencies.
Feb. 29 Limited TV commercial broadcast authorized to start Sept. 1. (Suspended Mar 22 for further hearing.)
Mar. 25 Supreme Court upholds Commission in *Sanders* (economic injury) broadcast case.
Mar. 29 Five "lottery" programs referred to Attorney General. (On Apr. 10 he advises that prosecution is not warranted.)
May 7 Experimental railroad yard radio use authorized.
May 20 FM broadcasting put on a commercial basis (effective Jan. 1, 1941).
May 28 Full commercialization of TV broadcast indicated as soon as industry agrees on standards; meanwhile will authorize further experimentation.
June 12 Commission's special broadcast network investigating committee submits report.
June 27 Field force expanded to handle national defense duties.
Sept. 24 FCC Chairman heads new Defense Communications Board.
Oct. 31 First commercial FM broadcast applications granted.
Dec. 16 Reports to Congress on radio needs for Great Lakes and inland waters.

1941

Jan. 16 Adopts *Mayflower* decision frowning on editorializing by broadcast licensees.
Jan. 27 National Television System Committee proposes uniform TV broadcast standards to inclusion of color.
Feb. 26 Foreign Broadcast Monitoring Service established.
Feb. 27 Proposes alternative standards for monochrome and color TV broadcast.
Mar. 19 Initiates inquiry of newspaper ownership of broadcast stations.
Apr. 1 Institutes telephone rate inquiry.
Apr. 30 Adopts National Television System Committee standards, paving way for commercial TV broadcasting to start July 1.
May 2 Report on broadcast network investigation requires National Broadcasting Co. to dispose of 1 of its 2 networks.
June 24 First radiotelephone service for Mississippi River system authorized.
Oct. 11 AM broadcast license period extended from 1 to 2 years.
Oct. 18 Recommends to Congress that act be amended to permit merger of Western Union and Postal telegraph companies.
Nov. 13 Chain broadcasting rules postponed pending determination of preliminary injunction.
Dec. 7 Amateur radio operation suspended for duration of emergency.
Dec. 10 President delegates Defense Communications Board certain emergency authority under Communications Act.
Dec. 21 Commission gives priority to national defense activities.
Dec. 30 Defense Communications Board puts all ship radio facilities under Navy control.

1942

Jan. 26 Communications Act amended with respect to President's war powers.
Feb. 16 District Court holds that radio transmissions know no State boundaries.
Feb. 17 2-year license term for nonbroadcast radio stations in new staggered renewal plan.

Feb. 24 *Commission* bans broadcast station construction with materials needed for war.
Apr. 16 Defense Communications Board requires registration of radio frequency apparatus.
Apr. 21 Radio operator requirements relaxed because of manpower shortage.
May 18 Registration of medical diathermy apparatus required as war measure.
May 19 Executive order directs Commission to help protect communication facilities from sabotage.
June 8 Registration required of unused radio transmitters.
June 12 War Emergency Radio Service established.
June 15 Defense Communications Board renamed Board of War Communications.
June 19 Amateurs required to register their transmitters.
June 30 Board of War Communications closes domestic point-to-point radiotelegraph circuits.
July 7 Inquiry ordered into gearing telegraph operations more closely to war effort.
July 23 Board of War Communications terminates certain international radiotelephone communication.
July 28 Name of Foreign Broadcast Monitoring Service changed to Foreign Broadcast Intelligence Service.
Oct. 29 Board of War Communications establishes priority system for telephone calls.
Nov. 5 Board of War Communications order spurs harnessing telegraph services to war effort.
Nov. 20 Radio licensees required to report surplus equipment.
Dec. 1 No further wire and telephone grants if construction involves use of critical material unless military or vital public need is involved.
Dec. 2 Bell System directed to eliminate pension accounting from operating expense.
Dec. 18 Board of War Communications orders discontinuance of nontelegraphic services by telegraph industry; bans transmission of domestic congratulatory messages.
Dec. 29 Communications Act further amended with respect to war powers of President.

1943

Jan. 19 *House adopts Cox resolution to investigate FCC.*
Civil Air Patrol radio stations established.
Jan. 21 Board of War Communications orders priority for telegrams essential to war effort or public safety.
Mar. 6 Communications Act amended to permit merger of Western Union and Postal telegraph companies.
May 10 Supreme Court upholds validity of chain broadcasting regulations. (They go into effect June 15.)
July 6 FM broadcast stations permitted to duplicate programs of affiliated AM stations.
Aug. 24 New call system for FM broadcast stations replaces letter-numeral calls.
Sept. 22 Initiates investigation of telephone and telegraph facilities use to disseminate racetrack information.
Sept. 27 Approves merger of Western Union and Postal Telegraph companies.

Nov. 23 Broadcast multiple-ownership rule adopted to ban dual control by same interest in same service area.
Dec. 14 AM broadcast licenses extended from 2 to 3 years.

1944

Jan. 13 Dismisses proceeding concerning newspaper ownership of broadcast stations; to report findings to Congress.
Mar. 22 House committee hears FCC testimony on domestic foreign-language broadcasting.
May 2 Hearing ordered on railroad radio requirements.
June 20 Authorizes first experimental microwave telephone system (between New York and Boston).
July 25 Asks Congress direction on policy to follow in considering sales of broadcast stations where price is in excess of value of physical property.
Aug. 17 Bans broadcast mechanical reproductions being simulated as live talent.

1945

Jan. 4 FCC and Board of War Communications request common carriers to conserve facilities and manpower used in disseminating racetrack information.
Jan. 15 Proposed report on commercial monochrome TV broadcast.
Feb. 20 Hearing scheduled on possible changes in AM broadcast "clear channel" allocations.
Mar. 21 Western Union authorized to use experimental microwave link.
May 18 Asks industry cooperation in studying desirability of moving FM broadcast to higher portion of spectrum.
May 21 Proposed report on frequency allocations below 25 megacycles.
May 25 13 VHF channels allocated for commercial TV broadcast; need for more space cited; UHF channels made available for experimentation and future TV development to inclusion of color.
Final report on frequency allocations between 25 and 30,000 megacycles.
June 27 FM broadcast to move from 42–50 megacycles to 88–108 megacycles; 80 channels for commercial use and 20 channels for education.
Aug. 3 Opens broadcast station ownership data to public inspection, but not financial data or contracts of individual stations.
Aug. 7 Removes wartime restrictions on use of critical materials for radio station construction.
Aug. 14 To issue experimental authorizations to test two-way radiotelephone service on land, water, and in the air.
Aug. 17 Reassures FM industry that 88–108-megacycles band is "permanent home" of FM broadcast.
Sept. 6 Proposes that interested parties have opportunity to apply for licenses of broadcast stations offered for sale.
Sept. 23 Considers rules to curb interference from radiofrequency apparatus.
Oct. 31 Orders investigation of use of telephone recording devices.
Nov. 16 Adopts new system of numbering FM broadcast channels.
Nov. 28 Reports on survey of rural attitude toward broadcast service.
Dec. 5 Foreign Broadcast Intelligence Service ceases operation.
Dec. 13 First experimental authorization for use of radar.
Dec. 31 Railroad Radio Service activated.

1946

Jan. 14 AM "clear channel" hearing starts.
Feb. 25 Interim North American Regional Broadcasting Agreement signed.
Feb. 27 First regular railroad radio grant.
Mar. 7 Adopts report on "Public Service Responsibility of Broadcast Licensees".
Apr. 16 "Petrillo amendment" added to Communications Act.
May 9 Broadcast stations permitted to reduce power during coal shortage.
May 14 First grant to test proposed rural radiotelephone service.
June 21 Announces master plan for policing expanded postwar radio spectrum.
July 1 Field Division and Radio Intelligence Division merged into Field Engineering and Monitoring Division.
July 19 *Scott* decision by FCC holds atheists entitled to broadcast consideration.
Aug. 12 Public Utility Radio Service authorized.
Sept. 13 FCC presents some original Samuel F. B. Morse papers to National Archives.
Sept. 25 Adopts revised frequency allocation below 25,000 kilocycles.
Sept. 27 Receives first petition by network for color TV operation. (Opens hearing Dec. 9.)
Dec. 30 Frequency made available for emissions of radio energy-using apparatus.

1947

Jan. 6 Broadcast station announcement "By authority of the FCC" not required by statute or regulation.
Jan. 8 "Freeze" placed on consideration of new AM broadcast station applications pending disposition of pending backlog. (Lifted May 1.)
Feb. 25 Board of War Communications abolished.
Feb. 26 First aeronautical mobile utility radio station grant.
Mar. 12 Institutes investigation of international telegraph rates.
Mar. 18 First petition for commercial TV color operation denied; further experimentation urged, with particular reference to accommodating color in 6-megacycle bandwidth used for monochrome.
May 8 Proposes rules for "daytime skywave" AM broadcasting.
May 16 Atlantic City telecommunications conference opens with FCC Chairman presiding. (Pact signed Oct. 3 by participating nations.)
June 13 Tentative allocation plan for class B FM broadcast stations adopted.
June 30 Rules governing industrial, scientific, and medical service effective.
July 1 Old FM broadcast channels opened to other services.
July 15 First postwar FM and TV broadcast licenses issued.
July 16 Post Roads Act of 1866 repealed; eliminates special domestic telegraph rates to Government.
July 28 Launches inquiry of "wired-wireless" operations.
Aug. 11 Warns broadcasters against surrendering responsibilities under advertising or other contracts.
Sept. 8 Schedules hearing on broadcast editorializing in light of interpretations of *Mayflower* decision of 1941.
Nov. 4 Issues report on "An Economic Study of Standard Broadcasting".
Nov. 26 Use of telephone recording devices approved, subject to tone warning that conversation is being recorded.

Dec. 4 "Clear channel" and "daytime skywave" AM broadcast proceedings consolidated.

Dec. 10 Ship radar becomes regular service.

1948

Apr. 30 Rules governing miscellaneous radio equipment become effective.

May 1 FM broadcast license period extended from 1 to 3 years.

June 14 TV channel 1 deleted.

June 28 FCC *Port Huron* decision holds broadcast stations cannot censor broadcasts of political candidates.

July 15 Regular facsimile service by FM broadcast stations permitted.

July 21 Hearing called on broadcast sale of national spot advertising and other commercial time.

Aug. 8 Proposes rules to ban broadcast of lotteries and other gift programs.

Sept. 1 Lottery and obscenity ban in Communications Act transferred to United States Code.

Sept. 27 Rules for low-power operation of FM educational broadcast stations effective.

Sept. 30 TV broadcast applications "frozen" pending study of general TV situation.

Oct. 21 First low-power educational FM broadcast grant.

1949

Jan. 7 Adopts rules relating to reservation of broadcast time in station sales.

Feb. 21 Proposes repeal of "AVCO" requirement concerning advertising for bids on broadcast station sales. (Repealed June 9.)

Mar. 9 Publication of employment data concerning common carriers and broadcast stations transferred to Department of Labor.

Mar. 11 First type approval of arc welder meeting noninterference requirement.

Mar. 16 First experimental harbor-shore radar system authorization.

Mar. 30 Citizens Radio Service rules adopted (effective June 1).

Apr. 27 Industrial and Land Transportation Radio Services established (effective July 1).

June 2 Commission separates administrative and prosecutory functions; Chairman made responsible for internal affairs of Commission.

Report holds broadcasters have right to editorialize subject to affording opportunity for opposing views. (Reverses *Mayflower* decision of 1941.)

July 11 Proposes to add UHF channels for TV broadcast, consider color, reserve channels for education, etc.

Aug. 18 Adopts rules concerning lotteries and "giveaway" broadcast programs. (Postponed Sept. 21 because of litigation.)

Oct. 14 First regular license for public mobile radiotelephone service.

Dec. 21 Bell System required to permit interconnection of its intercity TV relay facilities with private systems.

1950

Jan. 12 Proposes rules to curb trafficking in transfer of broadcast station construction permits.

Feb. 8 First authorization to test subscription TV.

Mar. 9 Commission reorganizes staff on functional lines.

June 5 Supreme Court upholds rules banning contracts for reservation of broadcast time in station sales.

July 21 Inquiry into sale of national spot advertising by networks insufficient to conclude that it violates chain broadcasting rules but still considering whether it is in public interest.

Aug. 25 Proposes frequency service assignments below 27,500 kilocycles.

Sept. 1 First report in TV color proceeding finds "field sequential" system only one meeting FCC criteria but, because it cannot be received on monochrome sets, proposes postponing decision if manufacturers will equip future monochrome receivers to get color in black and white.

Establishes third-class radiotelephone and radiotelegraph grades of radio operators.

Oct. 11 Second report in TV proceeding finds response of set makers to Sept. 1 proposal insufficient and adopts field sequential color system, effective Nov. 20, but holds door open for new developments.

Nov. 24 Authorizes second subscription TV test.

Dec. 15 President declares state of national emergency.

1951

Jan. 19 Institutes investigation of interstate and foreign telephone rates.

Feb. 1 Rules for marking and lighting of transmitting antennas effective.

Feb. 7 First grant for remote control of low-power educational FM broadcast station.

Mar. 21 Disaster Communications Service established. (First authorization May 29.)

Mar. 22 Further rulemaking in TV proceeding looks toward adopting standards, adding UHF channels, nationwide allocation plan, reserving educational channels, and lifting "freeze."

May 28 Supreme Court upholds validity of FCC decision adopting field sequential TV color system.

June 21 Third report in TV proceeding holds partial lifting of "freeze" not appropriate at this time.

Engages management study firm to survey Commission units not covered in previous reorganization.

July 12 Fourth report in TV proceeding allots 5 additional UHF channels for TV broadcast.

July 26 Fifth report in TV proceeding enables existing TV stations to increase power subject to final determination.

Aug. 1 Broadcast station renewals placed on geographic basis.

Oct. 10 Third authorization to test subscription TV.

Oct. 24 Communications Act amended to give President emergency powers over electromagnetic radiation. (On Dec. 10 he authorizes FCC to draft and enforce such regulations.)

Nov. 20 National Production Authority bans manufacture of color sets for public sale to conserve materials. (Relaxed June 24, 1952.)

1952

Feb. 1 Industrial Radiolocation Service activated.

Mar. 2 Redistribution and realinement of staff duties mark final step in Commission reorganization.

Apr. 14 Sixth report in TV proceeding lifts "freeze"; adds 70 UHF channels, allocates VHF and UHF channels throughout Nation, and reserves 242 channels for education (effective July 1).

Apr. 22 First microwave system grant in Special Industrial Radio Service.

July 16 President signs McFarland amendments to Communications Act changing FCC procedures in many particulars.

July 23 First educational TV broadcast station grants.

Aug. 15 Radio Amateur Civil Emergency Service activated.

Oct. 9 Not sufficient evidence to require Bell and Western Union systems to connect their facilities for TV program relay purposes.

Oct. 15 Processing of competing TV broadcast applications suspended to concentrate on noncompetitive workload.

Dec. 2 Announces CONELRAD plan for AM broadcasting in national emergency to minimize use of transmissions as enemy navigation aids. (Subsequently extended to all radio services.)

1953

Feb. 19 First TV share-time broadcast authorization.

Feb. 27 Finalizes rules for painting and lighting of transmission antenna towers.

June 25 Decides that theater TV does not merit special frequencies and should continue to use common carrier facilities.

July 2 Proposes advertising by all applicants for new TV broadcast stations. (Withdrawn Feb. 1, 1954.)

July 17 Adopts code of ethics for FCC employees.

Aug. 10 Separates "clear channel" and "daytime skywave" AM broadcast proceedings.

Sept. 30 Defers hearings on competing TV applications in cities which have 4 or more operating TV stations.

Nov. 5 License term of TV broadcast stations increased from 1 to 3 years.

Mar. 3 Budget Bureau directs FCC to establish fees for licensing and other services. (Fees proposed by FCC on Jan. 28, 1954, but suspended thereafter because of Senate resolution for delay.)

Nov. 27 Multiple-ownership broadcast rules amended to limit control by same interest to not more than 7 AM, 7 FM, and 5 TV broadcast stations.

Dec. 17 Approves industry's proposed compatible-color TV standards; replaces incompatible system.

Dec. 31 Proposes to enable FM broadcasters to render supplemental "functional music" service.

1954

Jan. 22 Requests Congress to amend Communications Act to prevent "protest" rule being used to delay broadcast grants.

Feb. 4 Withdraws proposal to require advertising of applications for new TV broadcast stations.

Feb. 17 Limits number of pleadings which may be filed in hearing proceedings.

Mar. 23 Communications Act amended to provide misdemeanor rather than felony for minor offenders.

Mar. 26 Act amended to extend time from 15 to 30 days for Commission to act on protests to grant without hearing.

Amendment to act waives construction permits for certain types of transmitters.

Apr. 5 Supreme Court sustains Commission's rules on broadcast of lotteries with exception of "giveaway" programs. (Broadcast lottery rules made effective May 19 without portion dealing with "giveaway" programs.)

Apr. 27 New law clarifies FCC jurisdiction between interstate and intrastate common carriers.

May 6 First grant for private microwave system to relay TV programs.

May 7 Permits use of telephone answering devices in places where there is such local or State authorization.

May 10 President delegates FCC to act on applications to land and operate submarine cables in United States.

June 10 Proposes to deny amateur or commercial radio operator licenses to members of subversive groups.

Aug. 4 Broadcast "10 percent (interference) rule" revised.

Aug. 5 To consider applications for "satellite" TV broadcast stations.

Sept. 2 Political broadcast rules amended to reflect act amendment that charges not exceed normal station rates.

Motor Carrier Radio Service activated.

Sept. 17 Multiple-ownership rules amended to increase maximum joint ownership of TV broadcast stations from 5 to 7, not more than 5 of which may be VHF.

Oct. 20 Authorizes submarine telephone cable from Washington (State) to Alaska.

Nov. 3 First UHF TV "satellite" broadcast station grant. (First such VHF grant Nov. 18.)

Dec. 20 Issues initial decision on Western Union's divestment of its international telegraph cables.

1955

Jan. 5 WDTV, Pittsburgh, sold for $9,750,000. (Highest price yet paid for single TV station.)

Feb. 11 Invites comments on proposed subscription TV.

Feb. 24 Court of Appeals holds multiple-ownership rules invalid to extent they impose general maximum limits.

Mar. 14 First license to an educational TV broadcast station.

Mar. 22 Adopts rules permitting FM broadcasters to engage in supplemental "functional music" operations (effective July 1).

Mar. 31 Invites comments on possible TV "booster" station operation.

Apr. 1 Limits number of briefs and time for oral arguments in hearings.

May 3 Authorizes telephone microwave relay system to connect with first transatlantic telephone cable. (Cable put in operation Sept. 25, 1956.)

May 19 Engineering standards incorporated in broadcast rules.

June 30 Congress authorizes FCC to make special study of radio and TV network broadcasting.

July 28 Establishes line of succession for FCC officials to act in an emergency.

Sept. 8 Authorizes construction of a telephone cable to Hawaii.

Oct. 4 Commission's first mobile TV monitoring unit placed in operation.

Oct. 5 Plans "single sideband" operation for certain fixed and mobile radiotelegraph services.

Oct. 12 First FM broadcast subsidiary "functional music" authorization.

Oct. 31 Office of Chief Accountant abolished.

Nov. 10 Initiates rulemaking proceeding to consider UHF and other TV problems on national basis.
Dec. 14 Aeronautical service licensee gets first regular authorization for "scatter" operation.
Dec. 22 Rules curbing radiation extended to broadcast receivers.

1956

Jan. 12 Proposes "translator" UHF TV broadcast stations.
Issues hearing manual.
Jan. 20 Gives interim approval to revised plan for apportioning Bell System costs between intrastate and interstate telephone service.
Act amended to enable Commission to deny a protest, after oral argument, without full evidentiary hearing.
Mar. 8 Provides 30-day waiting period before acting on applications for new broadcast stations or major changes in existing ones.
Mar. 9 Orders investigation of leased and private line telephone and telegraph services.
Mar. 29 Proposes grouping tall transmitting towers on "antenna farms".
May 21 Supreme Court upholds broadcast multiple-ownership rules.
May 24 UHF TV translator stations authorized (effective July 2).
June 14 Establishes Domestic Public Land Mobile, Rural Radio, Point-to-point Microwave Radio, and Local Television Transmission Services.
June 21 First "over-the-horizon" radiotelephone service authorized (to Cuba).
June 26 Announces long-range and interim plan to promote comparable competitive TV facilities; invites comments on feasibility of all or major UHF operation; proposes research and development to better UHF service; increases maximum UHF power; initiates deintermixture in certain areas.
June 30 Field Engineering and Monitoring Bureau regional offices abolished.
July 12 Adopts rules governing radiation of community antenna TV systems.
July 20 Suspends proposed Western Union telegraph rate increase. (Subsequently adjusted rates become effective Aug. 26 and Sept. 14.)
July 31 Salaries of Commissioners increased from $15,000 to $20,000 (Chairman $20,500).
Aug. 2 Act amended relating to FCC regulatory authority over common carriers.
Aug. 6 Act amended to require small vessels carrying more than 6 passengers for hire to have radiotelephone.
Aug. 31 Calls industry meeting on TV UHF research and development program.
Sept. 6 First TV "translator" station grants.
Sept. 20 Provides "split-channel" operation for vehicular radio in 152–162-megacycle band.
Sept. 27 Will no longer issue tax-relief certificates in connection with involuntary sale of broadcast stations.
Oct. 4 Relaxes rules on identification of recorded broadcast programs.
Nov. 9 Institutes study of microwave and other allocation needs above 890 megacycles.
Nov. 15 To publish documents in weekly subscription service. (Starts Jan. 11, 1957.)
Nov. 21 Additional data required from idle UHF TV broadcast permittees.

1957

Jan. 29 United States-Mexico bilateral AM broadcast agreement signed.

Feb. 7 To announce instructions in major docket cases.

Feb. 21 To restrict issuance of special temporary authorizations to TV broadcast stations.

Announces liaison between FCC and Federal Trade Commission relating to false and misleading radio and TV advertising.

Mar. 14 Court of Appeals reverses FCC ruling that TV bingo-type game is lottery.

Mar. 27 Orders investigation and hearing into Bell System leasing and maintaining equipment of private mobile radio systems.

Apr. 4 Developments require new study of radio spectrum between 25 and 890 megacycles.

Apr. 18 Authorizes test of aircraft public radiotelephone service.

Apr. 24 Proposes allocating TV broadcast stations on individual basis rather than on present table of assignments. (Canceled Oct. 10, 1957.)

Apr. 25 Terminates patent rulemaking proceeding.

WNEW, New York City, sold for $5,160,800 (highest price yet paid for single aural broadcast station).

Proposes restrictions on TV "translator" station operation. (Canceled August 1.)

May 2 Establishes hearing procedure for competitive FM broadcast applications.

May 16 Bell System amends tariffs to permit use of "Hush-A-Phone" and like devices.

May 23 Requests comments on prospect of trial subscription TV.

May 31 First regular grants for "over-the-horizon" TV program relay (Florida to Cuba).

June 19 Method of distributing mimeographed public documents changed to meet requests of law and engineering firms.

June 28 Rejects proposals for VHF TV "booster" stations; proposes rules for UHF "booster" operation.

First experimental grant for simultaneous UHF–VHF by single broadcast station.

July 29 To consider low-power TV "repeater" stations for VHF or UHF service to small communities.

July 30 Reminds marine industry that "bridge-to-bridge" radiotelephone aids safety at sea.

Sept. 19 Amends rules to permit aural broadcast stations to extend remote control operations.

Sept. 20 Allocation changes in 25–60-megacycle band to aid vehicular radio and to accommodate Government defense needs.

Oct. 3 Report by special staff studying network broadcasting.

Oct. 17 Looks to authorizing trial of subscription TV under certain conditions.

Nov. 7 Abolishes "unique program" provision in AM broadcast rules.

Nov. 27 Statement on "subliminal perception" TV broadcast advertising.

Dec. 3 Alien deported for obtaining radio operator permit under false pretenses.

Dec. 19 Invites comments on proposal to extend daytime AM broadcast operating hours. (Denied Sept. 19, 1958.)

Splits channels in 42–50-megacycle band; other changes in that and 150–152-megacycle band.

Dec. 20 Statement on status of FM broadcast band.

1958

Jan. 29 Testimony at start of FCC phase of inquiry by House Interstate and Foreign Commerce Committee Special Subcommittee on Legislative Oversight.

Feb. 5 CONELRAD put to peacetime use for emergency weather warning.

Feb. 26 Second report in subscription TV proceeding cites House and Senate resolutions and stays processing of applications.

Mar. 26 New call-sign prefix to be assigned amateur stations.

Apr. 3 Makes frequency available to further "bridge-to-bridge" radiotelephone communication. Initiates inquiry into safety aspects of marine radio.

Holds community antenna TV systems not subject to common carrier regulation.

Apr. 15 Proposes to open 12 AM "clear channels" to additional unlimited time stations.

Apr. 16 Proposes changes in national and international frequency allocations.

Apr. 17 Inquires of TV networks and affiliates about complaints of unfair treatment of subscription TV issue.

First letters to TV stations about use of kinescope summaries of a congressional hearing without announcing their origin.

May 9 Establishes Local Government Radio Service.

May 22 First letters to broadcast stations concerning violations of existing chain broadcasting rules revealed by network study.

To inquire into impact on TV broadcasting by community antenna systems, "translators," "satellites," and "boosters."

June 19 Establishes Business, Manufacturers, and Telephone Maintenance Radio Services.

June 25 Orders 15-percent reduction in private-line telephone rates.

June 27 Adopts narrow-band standards for Public Safety, Industrial, and Land Transportation Services.

Proposes rules to curb "payoffs" for dismissal of competing broadcast applications.

July 3 Launches inquiry into possible extension of FM subsidiary communication services.

July 9 Orders Western Union to present plan for divestment of its international cable operations.

July 16 Grants Pittsburgh second educational channel.

UHF TV broadcast agreement with Mexico effective.

July 24 Grants first new international broadcast station since World War II.

WCAU (AM, FM, and TV), Philadelphia, sold for $20 million (largest package sale to date).

Will consider applications for student use of radio for school demonstrations.

July 30 Authorizes use of "cuing" transmitters for broadcast studio use.

Abandons class B FM broadcast channel allocation plan (effective Aug. 20).

July 31 Liberalizes policy respecting private intercity TV relay systems operated by TV broadcasters.

Aug. 1 Western Union increases rates for domestic telegraph services.

Aug. 18 Requests that act be amended to have FCC separation of functions provisions conform to those of Administrative Procedure Act.

Aug. 28 Act amended to permit FCC to license alien flyers to operate radio in aircraft in interest of air safety.

Sept. 5 Citizens Radio Service applicants required to certify that stations will not be used for unlawful purposes.

Oct. 2 Government Printing Office to sell volumes of FCC rules and regulations by categories.

Oct. 6 Issues revised edition of "Use of Broadcast Facilities by Candidates for Public Office."

Nov. 7 Appeals Court holds FM broadcast functional music rules invalid insofar as they exclude such operation on a simplex basis.

Nov. 20 Adopts rules to protect radio astronomy from interference.

Dec. 31 Terminates consideration of low-power TV broadcast "repeater" stations; affords existing unlicensed "booster" stations opportunity to convert to "translator" operation.

1959

Jan. 8 Proposes frequencies for "space" communication.

Jan. 27 To further study TV "booster" operation problem.

Jan. 29 To consider rule concerning network representation of TV stations in national spot sales.

Feb. 19 Interprets political broadcast law with respect to Lar Daly.

Feb. 27 Institutes inquiry into network TV program selection practices.

Mar. 5 Releases correspondence with Department of Justice on relation of antitrust law to broadcast "option time" practice.

Mar. 23 To consider applications to test toll TV under limited conditions.

Adopts rules governing safety and special services applications involving Bell System lease-maintenance contracts.

Apr. 9 New procedure for processing AM applications; new cutoff dates established.

Power up to 1 kilowatt permitted for most class IV AM stations.

Apr. 14 Report of impact of community antenna TV systems, etc., on TV broadcasting.

Seeks law change to permit licensing VHF TV "repeater" stations.

Apr. 22 Reports to Senate committee on TV allocation problems and possible remedies.

Apr. 23 Proposes to amend chain broadcasting rules with respect to TV option time.

Apr. 30 Joint OCDM–FCC long-range frequency allocation planning.

June 1 Special release on FCC silver anniversary.

June 24 Stays microwave relay grants to serve community antenna TV systems pending oral argument pursuant to Court of Appeals remand of May 21.