

FEDERAL

COMMUNICATIONS

COMMISSION

24th Annual Report

For Fiscal Year 1958

**With report summary and notations
of later important developments**

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COMMISSIONERS

Members of the Federal Communications Commission

(As of June 30, 1958)

JOHN C. DOERFER, *Chairman*

(Term expires June 30, 1961)

ROSEL H. HYDE

(Term expires June 30, 1959)

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 in the appendix to this report.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C.

To the Congress of the United States:

The Federal Communications Commission herewith transmits its 24th annual report for the fiscal year 1958. Subsequent important developments are noted for more current reference.

The report contains information and data specified by the Congress in section 4 (k) of the Communications Act of 1934, as amended.

Further required biographies of employees joining the Commission during the fiscal year, also a list of those leaving during that period, are being reported in a nonprinted supplement.

Respectfully,

JOHN C. DOERFER, *Chairman*

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Report Summary

GENERAL

Increasing leadership by the United States in all fields of electrical communication is reflected by the unabated upswing in licensing and other regulatory activities of the Federal Communications Commission. In no other country are radio and wire facilities utilized for public service, private business, and personal convenience to the extent achieved in the United States. At the same time, it is reassuring to know that our extensive communication systems form an integral part of the national defense program.

The Commission closed its 24th year with more than 2.1 million radio authorizations on its books. This is the largest figure in the Nation's history.

Of these, 1.5 million were commercial radio operator permits of different grades required to man this country's spreading forest of transmitters.

Authorizations for radio stations of all kinds exceeded 450,000. For the first time, broadcast station authorizations rose above 9,000. But there are nearly 50 times that many stations in the nonbroadcast services.

However, the number of radio stations is not a true indication of the number of related transmitters. One authorization in a non-broadcast service does not usually mean a single transmitter. For example, an authorization for a police radio system covers many mobile transmitters. A grant for forestry conservation permits the use of numerous portable transmitters. In consequence, radio station authorizations collectively represent nearly 1.5 million transmitters.

The increasing demand for communication facilities is evinced in the fact that during the year the Commission received more applications than ever before. Rapid changes in electronic techniques and utilization add greatly to the Commission's task of accommodating new services, administering to expanding services, adjudicating highly competitive proceedings, obtaining more economical use of radio frequencies in great demand but short supply, and dealing with mounting interference and other "growing pains."

Though broadcasting matters—particularly those relating to tele-

vision—continued to draw the lion's share of popular interest, the year's developments in the nonbroadcast field, though less spectacular and less headlined, were even more important and significant. The latter have greater public impact because they concern the protection of life and property; aid land, water, and air transportation; contribute to the efficiency of industrial and other business operations; and affect telephone and telegraph services to the public.

COMMON CARRIER

Time and distance have been pulverized by application of automation and electronic developments to telephone and telegraph operations. This is particularly true in long-distance communication.

Telephone

The domestic telephone industry (Bell and independents) has become a \$22 billion investment. Its gross revenues exceed \$7 billion.

Telephones in use are nearing 64 million. They handle nearly 240 million calls daily.

Dial operation is possible on 92 percent of the Bell and 75 percent of the independent telephones. Some 5 million Bell subscribers can dial toll calls to 30 million other telephones.

The long lines telephone system has expanded to 32 billion circuit miles of which about 11 million are radio and a similar amount is coaxial cable.

Common carrier service is furnished by over 700 2-way land mobile systems and is being tested for passengers on aircraft in flight.

More than 100 1-way signaling systems are used for "paging" purposes.

Telegraph

Western Union, with a landline investment of some \$351 million, grossed over \$245.5 million. This was \$7 million more than the previous high in 1956 although messages declined from 151.6 to 143.9 million.

Western Union's microwave system was linked with Cincinnati and Chicago, and is being extended to Kansas City via St. Louis and to Detroit and Cleveland from Chicago.

Facsimile service is provided by 33,700 "deskfax" machines to customers in 155 cities, by 1,700 "intrafax" units, and by installations of a newer "ticketfax".

A domestic telegraph rate increase is expected to provide Western Union \$10 million additional revenue a year to offset a comparable wage increase.

International

Communication with the rest of the world is provided by 4 cable and 6 radiotelegraph carriers and 1 radiotelephone carrier. There is direct telegraph service by radio to 84 foreign countries and ocean-cable telegraph service to various European and Latin American countries. Sixty foreign points are reached by direct radiotelephone circuits and several such points are also served by submarine cable.

Volume of international telegraph traffic increased for the fourth consecutive year, attaining a new high of 607.5 million words and grossing nearly \$77 million in revenue.

International telephone traffic also reached a new high of 2.2 million calls and \$21.5 million revenue.

The transatlantic telephone cable marked its initial year of operation, and another one is planned. Also, for the first time, telephone cables serve Hawaii and Alaska.

The Commission ordered Western Union to present a plan for divestment of its ocean cables to comply with requirements of the law which permitted its merger with Postal Telegraph in 1943. An appeal has been taken to the court.

SAFETY AND SPECIAL

Nearly 438,000 licensees in the safety and special radio services were employing about 1.4 million transmitters to provide a variety of public, business, and other services. By chief categories they were:

Class	Licensees	Transmitters	Class	Licensees	Transmitters
Marine.....	72,426	78,619	Public safety.....	26,512	304,400
Aviation.....	62,684	81,335	Amateur.....	179,314	176,660
Land transportation.....	48,801	341,753	Miscellaneous.....	8,048	7,906
Industrial.....	39,978	416,591			

¹ Represents stations since no transmitter count is available.

These services, collectively, have nearly doubled in the past 5 years.

Radio is employed for safety and navigational purposes by ships and aircraft. It is used to expedite the movement of trains, buses, trucks, and taxicabs, and to provide automobile emergency service. In industry it aids delivery of petroleum, power, and other products. Public agencies depend upon radio for police and fire protection, highway maintenance, and forestry conservation. Radio also plays an important role in defense, disaster, and other emergency programs. In addition, it is put to special uses by amateurs and other individuals.

The "housing shortage" in popular parts of the radio spectrum makes it difficult to satisfy the growing demand for room—especially exclusive occupancy—on the teeming airwaves. However, channel

splitting and more efficient use of available spectrum space through channel sharing and other means have provided some additional frequencies for new or expanding services.

During the year, four additional services were established; one for manufacturers, another for business in general, a third for local government, and the fourth for telephone maintenance.

BROADCAST

Broadcast authorizations collectively passed the 9,000 mark. Of this number, 874 were TV stations, 791 FM, and 3,353 AM; auxiliaries, etc., made up the remainder.

TV

Of 665 commercial TV stations authorized, 556 held operating permits. In addition, 92 of 156 authorized TV translator stations were on the air.

Proposals for "booster" and "repeater" stations to further extend TV service to isolated places were under consideration.

Over 90 percent of the population is within range of at least 1 present TV station and 75 percent are within range of 2 or more stations. Over 83 percent of all homes have 1 or more TV receivers and over 46 million sets are in use. Also, the United States is said to be the only nation receiving regular TV color programs.

The possibility of moving all or a major portion of TV broadcasting to the UHF portion of the spectrum continued to receive study; a TV industry group was cooperating in obtaining comparative UHF and VHF technical data; and, meanwhile, present disparity between UHF and VHF operation was relieved to some extent by deintermixture in various localities and other interim actions.

The Commission held that its regulatory jurisdiction does not extend to community antenna TV (CATV) systems, since they do not transmit over the air, but is studying the effect of satellite, translator, booster, and CATV operations on the growth of regular TV service.

Closed circuit (wired) TV, which does not require FCC licensing, is being harnessed to an increasing number of business and other nonentertainment purposes.

The matter of subscription TV has been under consideration in Congress, so the Commission is deferring any grants for trial of pay TV until after the 1st session of the 86th Congress. Meanwhile, it will accept and process any applications which may be submitted. As of the close of the fiscal year, it had received but one application, and that did not meet prescribed trial requirements.

Hearings were concluded on a special staff report on TV network broadcasting. Meanwhile, violations of the existing chain broad-

casting rules revealed by this study were being called to the attention of the networks and stations involved with reprimands.

Of 53 authorized educational TV stations, 32 held operating permits.

The number of TV channels reserved for education grew to 257, or 15 more than first allocated in 1952.

Though some educational reservations have been removed or changed, the Commission has denied requests for commercialization where educators have shown an active intent to use them.

FM

For the second consecutive year, commercial FM stations gained in number. Of 634 authorized stations, 548 were on the air.

Pending applications increased from 24 to 57. Increasing competition was reflected in the fact that 23 of the latter were in hearing.

Renewed interest in FM is due primarily to the ability of commercial stations to augment their income through subsidiary programs and Commission consideration of the possibility of permitting additional supplemental services through multiplex operation.

Noncommercial educational FM stations continued their slow but steady growth. The 157 such authorizations were 9 more than the year previous, and the 147 on the air was a gain of 12.

AM

AM authorizations rose to 3,353, of which 3,253 had operating permits.

The Commission proposed to eliminate the exclusive nighttime use of 12 clear channels by stations in 7 large cities to permit additional stations in 12 western cities to take care of less served areas.

TALL TOWERS

The mounting height of antenna towers is giving air navigation increasing concern. More than 60 TV transmitting shafts rising 1,000 to 1,610 feet above ground are now in operation. A proposed tower would reach 1,859 feet. Possible solutions involve grouping on antenna "farms," extending painting and lighting requirements to antennas used for reception only, and requiring marking of abandoned towers.

FIELD ENGINEERING AND MONITORING

The Commission's engineering field force functioned through 24 district offices, 5 suboffices, 2 marine offices, and 18 monitoring stations assisted by 47 mobile units, 2 of which are designed for TV enforcement work.

Besides patrolling the radio spectrum, monitoring stations furnished more than 2,000 bearings for ships and planes in distress.

The field staff uncovered 142 unlicensed radio operations, or 42 more than in 1957. Of the 1958 total, 88 were unauthorized TV boosters.

Inspection was made of more than 1,100 broadcast stations, 5,600 other land radio stations, and 6,600 ship radio stations.

Effort continued to induce small-boat operators to obtain radio licenses, required by a new law, curb superfluous radio communication to the inclusion of indecent and profane language, and protect the frequencies used for emergency purposes.

Nearly 23,000 complaints of interference were received, of which 18,700 concerned TV. This was a decrease from the previous year due, in large part, to local remedying assistance by 32 cooperative interference committees and 520 TV interference committees.

RESEARCH AND LABORATORY

Engineering problems facing the Commission involve all radio services and require engineering study in promoting additional uses of the radio spectrum and utilization of new techniques. These considerations involve radio wave propagation, technical standards, and control of interference. They necessitate close cooperation between Government and industry.

In order to guard against potential interference, types of transmitters used in different radio services are approved by the Commission before they are manufactured.

Besides examining transmitters for type approval, the Commission's laboratory at Laurel, Md., also tests devices which, though not used for communication, can cause interference. Type approval is given to those which meet these tests. Twenty-four such items were certified during the year.

The experimental radio services provide opportunity to test new radio methods and devices. Though licensees in this service fluctuate because of the generally short duration of their experiments, more than 800 were active at the close of the year.

FREQUENCY ALLOCATION

In order to minimize interference and standardize frequency usage throughout the world, allocations of bands of frequencies for specific purposes are agreed to internationally. Participating nations make their own suballocations accordingly.

International frequency usage will be reviewed at a Geneva conference in 1959. It will be the first comprehensive review since 1947.

During the year, the Commission helped to prepare for 13 other

international conferences, dealing with telecommunications matters, and 36 additional sessions are in prospect.

Meanwhile, the Commission was inquiring into domestic frequency use and requirements throughout practically the entire radio spectrum in connection with long-range planning on the national level.

The Commission participates in an international system of frequency and station assignment notification. It is also the medium for resolving interference and other infractions involving domestic and foreign radio stations.

Call signals of radio stations are keyed to letters of the alphabet apportioned to the nations for identification purposes.

NATIONAL DEFENSE

The Commission is responsible for making it impossible, in time of war, for electrical radiations to be used by an enemy to direct bombers or guided missiles. In that connection it administers what is known as the "CONELRAD" program to ~~alter~~ ^{alert} the Nation in event of an attack and to enable certain AM stations to continue operation for emergency communication on shifted frequencies to confuse the enemy.

In late 1957, the Commission, with the cooperation of the Air Force and Weather Bureau, put the CONELRAD system to peacetime use for warning communities and areas about impending hurricanes, floods, and other threats by nature to public life and property.

The Commission also works with military, civil defense, and other Government agencies in planning the role that wire and radio facilities would play in event of hostile attack. These activities range from providing alternate communication circuits to furnishing special monitoring and other technical assistance.

COMMISSION

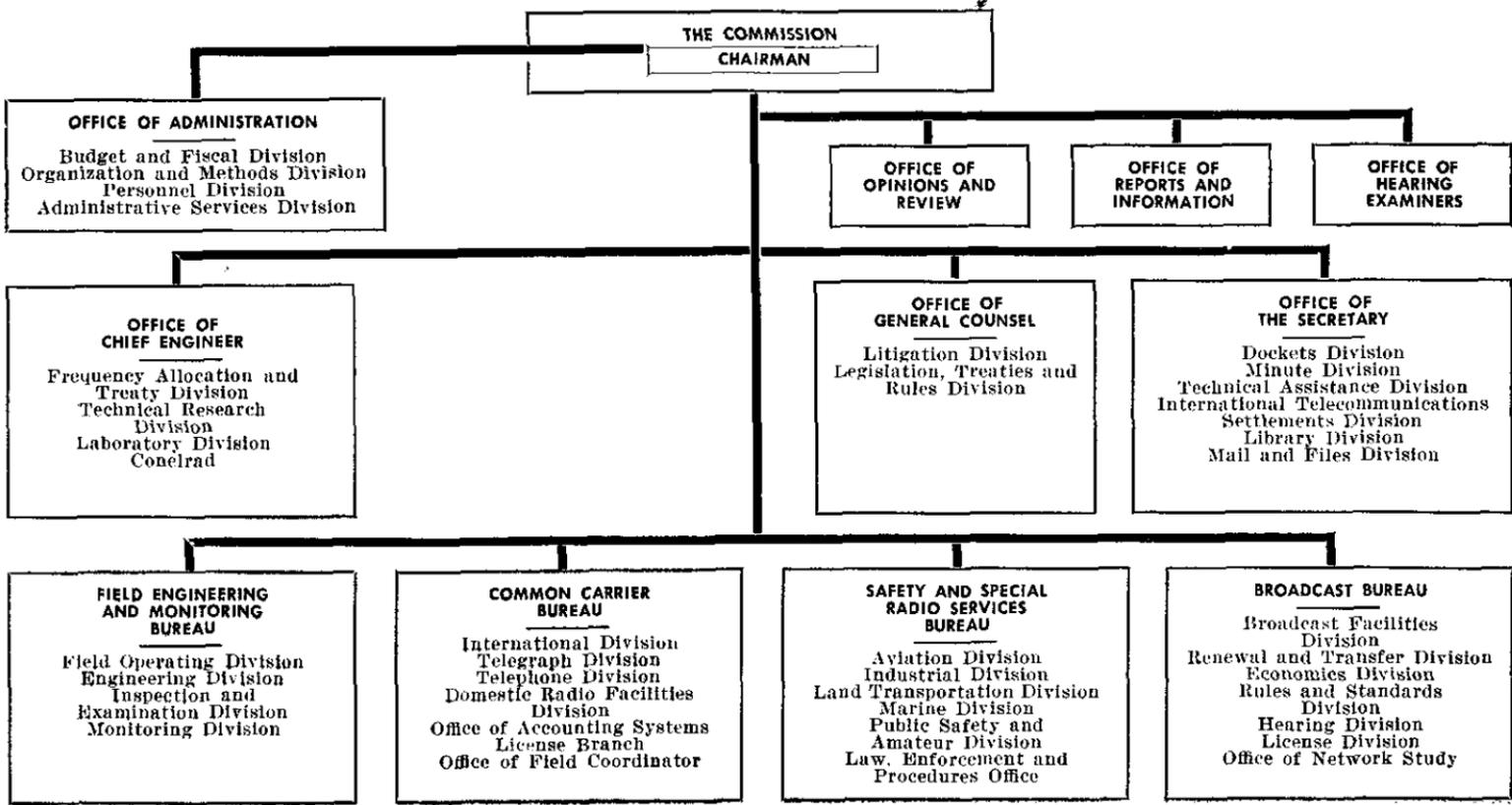
During fiscal 1958, the Commission operated with 1,238 employees and appropriations of \$8,734,355, most of which was for personnel services. More than one-third of this force was engaged in field engineering work.

It received more than 537,000 applications and nearly 940,000 pieces of mail during the year.

Technical assistance was given 57 engineers and technicians of friendly foreign governments who visited this country under Government-sponsored programs.

During the year, the President appointed Commissioner John C. Doerfer as Chairman, named Frederick W. Ford and John S. Cross to fill vacancies on the Commission, and reappointed Robert T. Bartley for another term.

FEDERAL COMMUNICATIONS COMMISSION
Organization Chart as of June 30, 1958



General

COMMISSION

The Federal Communications Commission is an independent Federal agency. It was established by Congress in 1934. Its authority is derived from the Communications Act of that year. Its basic statutory purposes 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, nationwide, 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, and * * * securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication * * **

The act 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 * * *."

In general, the Commission's regulation covers common carrier (telephone and telegraph) services, safety and special radio services, and broadcast services. The act declares that broadcast stations are not common carriers. Consequently, Congress provided different standards for regulating common carriers and broadcasters.

Major activities of the Commission include allocating bands of frequencies to the different radio services, assigning frequencies and call signals to individual radio stations, licensing radio stations and operators of radio transmitters, regulating common carriers engaged in interstate and international communication, promoting safety of life and property through the use of radio on the land, on the water, and in the air, encouraging more effective and wider application of radio, and helping harness wire and radio facilities to the national defense program.

COMMISSIONERS

The Commission is composed of seven Commissioners. They are appointed by the President with the advice and consent of the Senate. The President designates one of their number as Chairman (without Senate confirmation) to serve at his pleasure. The Chairman is the chief executive officer of the Commission.

Not more than four Commissioners can be members of the same political party. The normal term of a Commissioner is 7 years, except in filling out an unexpired term. The law forbids a Commissioner (or any employee of the Commission) from having financial interest in any business which he helps to regulate. Nor can Commissioners engage in private business while in office.

The Commissioners function as a body in supervising the Commission's activities and in making its policy determinations. En banc meetings are normally held weekly. Commissioners also sit in some hearing and other cases, and hear oral argument.

Certain responsibilities are delegated to individual Commissioners or committees of Commissioners. The Commission has designated one of its members as Defense Commissioner; others serve on the FCC telephone and telegraph committees, and on the Telecommunications Coordinating Committee, Telecommunications Planning Committee, Telecommunications Advisory Board, Air Coordinating Committee, Radio Technical Commission for Marine Services, Radio Technical Commission for Aeronautics, and as liaison with the Office of Defense Mobilization. Individual Commissioners serve in rotation to act on motions.

A list of Commissioners as of June 30, 1957, appears on the back of the title page of this report. Past and present Commissioners and their periods of service are listed in the appendix.

On July 1, 1957, Commissioner John C. Doerfer succeeded George C. McConaughy as Chairman, by designation of President Eisenhower.

The following day the President appointed Frederick W. Ford for a 7-year term to succeed Mr. McConaughy as a Commissioner. The latter's term expired June 30, 1957. Commissioner Ford was confirmed by the Senate on August 5, and took office on August 29.

Commissioner Richard A. Mack resigned March 3, 1958.

On March 10 thereafter, President Eisenhower nominated John S. Cross to fill out Commissioner Mack's term, which expires June 30, 1962. Confirmed by the Senate on May 15, 1958, Commissioner Cross took office on May 23.

On April 29, Commissioner Robert T. Bartley was reappointed by President Eisenhower for another 7-year term, from June 30, 1958. He was confirmed on May 15 and resworn June 4.

STAFF ORGANIZATION

Organization of the Commission staff remained virtually unchanged during the year.

As indicated by the organization chart appearing with this chapter, there are 4 operating bureaus—Field Engineering and Monitoring, Common Carrier, Safety and Special, and Broadcast; and 7 offices—Administration, Chief Engineer, General Counsel, Secretary, Opinions and Review, Hearing Examiners, and Reports and Information.

On September 25, 1957, the Commission established an Office of Network Study in the Broadcast Bureau and, on April 9, 1958, re-established a Hearing Division in the same bureau.

PERSONNEL

The Commission closed the year with a personnel total of 1,238, or 41 more than in 1957. About one-third of this force was engaged in field engineering work. Distribution by units was as follows:

	Washington	Field	Total
Commissioners' offices.....	47	0	47
Office of Opinions and Review.....	29	0	29
Office of Hearing Examiners.....	26	0	26
Office of Reports and Information.....	4	0	4
Office of Administration.....	84	0	84
Office of Secretary.....	62	0	62
Office of General Counsel.....	37	0	37
Office of Chief Engineer.....	66	49	115
Common Carrier Bureau.....	91	27	118
Safety and Special Radio Services Bureau.....	133	0	133
Broadcast Bureau.....	189	4	193
Field Engineering and Monitoring Bureau.....	65	325	390
Totals.....	833	405	1,238

A 1952 amendment to the Communications Act requires biographies of employees added during the year, as well as the names of those leaving during that period, to be reported to Congress. This is being done separately.

APPROPRIATIONS AND EXPENDITURES

Appropriations totaling \$8,734,355 were received by the Commission for fiscal 1958. This was an increase of \$906,355 over the previous year. Personnel services accounted for about 85 percent of the 1958 budget. A breakdown follows:

Personnel services	\$7, 423, 440
Travel	88, 873
Transportation of things	12, 541
Communications services	193, 305
Rents and utilities	63, 920
Printing and reproduction	45, 558
Other contractual services	144, 813
Supplies and materials	132, 554
Equipment	112, 887
Land and structures	34, 953
Contribution to Civil Service Retirement Fund ¹	446, 716
Awards and indemnities	1, 790
Taxes and assessments	3, 342
Total obligations	8, 704, 692
Savings, unobligated balance	29, 663
Total	8, 734, 355

¹ Required for first time in 1958 by amendment to Retirement Act.

The sources of these funds and the authority for expenditures thereunder were Public Laws 69, 352, and 472, 85th Congress.

DOCKETS

Broadcast continued to account for the majority of hearing cases. Docket statistics for fiscal 1958 are shown in the following table:

	Pending June 30, 1957	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1958
AM broadcast	144	158	55	72	175
TV broadcast	58	88	22	31	93
FM broadcast	0	25	6	1	18
Other broadcast	10	10	6	0	14
Total broadcast	212	281	89	104	300
Safety and special	20	56	41	3	32
Common carrier	34	25	20	9	30
Joint and general	51	26	10	7	60
Total nonbroadcast	105	107	71	19	122
Petitions, rules, etc.	41	56	53	1	43
Grand total	358	444	213	124	465

LITIGATION

Section 401 of the Communications Act confers upon the United States district courts jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the several courts of appeals over suits to enforce, enjoin, set aside, annul, or suspend, any Commission order with the exception of those granting or refusing applications for radio licenses.

Section 402 (b) provides for direct appeal from such orders to the United States Court of Appeals for the District of Columbia Circuit. Most of the cases involving review of Commission action are instituted in the latter court under section 402 (b).

During the fiscal year there were 106 Federal court cases in which the Commission was a party. Sixty-nine of these were instituted during that period—68 in the courts of appeal, and 1 in the Supreme Court. The other 37 cases were pending at the beginning of the year.

Four cases involving violations of the act were referred to the Department of Justice for possible criminal prosecution. Conviction was obtained in one, prosecution was deferred in another with an appropriate warning to the defendant, no action was taken in a third, and action is pending in the fourth.

The only petition for writ of certiorari filed in the Supreme Court by a party other than the Commission was denied. In the court of appeals, the Commission was affirmed in 20 cases and reversed, with a remand, in 12 others. Twenty-six cases were dismissed by agreement of the parties. The district court granted judgment for the Commission in one case, and another case was dismissed by agreement.

As of June 30, 1958, there were 45 cases pending in the court of appeals. Of these, nine were heard and are awaiting decision.

A tabulation of the litigation situation for the fiscal year 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.....	1	86	16	1	2	106
Cases affirming Commission.....		16	4		1	21
Cases reversing Commission.....		10	2			12
Cases dismissed by agreement of the parties.....		22	4		1	27
Action denying certiorari petition by party other than Commission.....	1					1
Cases pending June 30, 1958.....		38	6	1		45

Important Cases

During the year the court of appeals released decisions in important areas of Commission action:

Comparative TV decisional standards.—Grants made by the Commission in resolving some of its many postfreeze comparative hearings constituted a major source of litigation. The losing applicant or applicants in several such cases sought review of the Commission's decision, alleging error in the findings, the comparative criteria employed, or the judgments reached. In one case dealing with the merits of the comparative decision (*WORZ, Inc. v. Federal Communications Commission*, No. 13996 C. A. D. C.), the court affirmed the Commission. In two others (*The Radio Station KFH Co. v. Federal Communications Commission*, 247 F. 2d 570; *WIBC, Inc. v. Federal Communications*

Commission, No. 14085 C. A. D. C.), the court remanded the decision for further consideration because of procedural errors.

Allocation rulemaking cases.—The Commission's rulemaking activities in the TV field were also the subject of litigation. In all six cases decided on the merits the Commission was affirmed. In two of these cases (*Sangamon Valley Television Corp. v. United States and Federal Communications Commission*, No. 13992 C. A. D. C.; *WIRL Television Co. v. United States and Federal Communications Commission*, 253 F. 2d 863), the Commission had moved channels in order to deintermix areas. In the other four cases (*Springfield TV Broadcasting Corp. v. Federal Communications Commission*, No. 14050 C. A. D. C.; *Winnebago Television Corp. v. United States and Federal Communications Commission*, No. 14086 C. A. D. C.; *Gerico Investment Co. v. Federal Communications Commission*, No. 14179 C. A. D. C.; *Mackey v. United States and Federal Communications Commission*, No. 14239 C. A. D. C.), the Commission had refused to make changes in allocations desired by petitioners. The court noted "the widely varying circumstances in individual markets and the numerous factors which bear on the choice in each area," and disclaimed authority "to reappraise the merits of" conclusions reached by the Commission after evaluating the factors in each case.

Standing to protest under section 309 (c).—In two cases the court liberalized the protest provision (sec. 309(c)) of the act by broadening the class of those having standing to protest. In *Philco Corp. v. Federal Communications Commission*, No. 14166 C. A. D. C., Philco protested renewal of licenses of National Broadcasting Co. stations in Philadelphia, claiming standing because Philco competes in the manufacture and sale of electrical appliances with Radio Corporation of America, NBC's parent corporation, and because NBC's Philadelphia stations allegedly provided RCA with free advertising and publicity not available on the same basis to other appliance manufacturers. The court, reversing the Commission, found that Philco has standing to protest because it was adversely affected by the "preferential economic advantage over the protestant" which RCA was deriving from the stations. In *Robert Hecksher v. Federal Communications Commission*, 253 F. 2d 872, the licensee of a station protested a new grant nearby which he said would cause objectionable interference to his station. The Commission rejected his protest because it found his field intensity measurements, on which he based his claim of interference, to be in clear violation of the Commission's regulations for taking measurements. But the court, holding that difficult conditions of terrain made literal compliance impossible and that it was not clear that his measurements were insufficient under the circumstances, ordered a hearing.

Power of the Commission to subpoena records.—In *Federal Communications Commission v. Cohn*, 154 F. Supp. 899, the court for the southern district of New York enforced subpoenas issued by the Commission requiring independent TV program producers to show their books and records in connection with the Commission's general investigation of network operations. Although the Commission has no direct jurisdiction over such producers because they are not broadcasters, the court allowed general inquiry into their operations by the Commission because of their relations with networks and stations.

Economic factors in broadcast grants.—The Commission's power and duty to consider the effect of competition on broadcast service was asserted by the court in *Carroll Broadcasting Co. v. Federal Communications Commission*, No. 14104 C. A. D. C., decided July 10, 1958. Carroll, which operates an existing station, had protested grant of a new station in a nearby town, alleging that the area could not support two stations. The court found that the Com-

mission could not make the new grant without first considering upon timely demand whether the competition which would exist between the two stations might adversely affect the public interest.

Suspension of operators' licenses.—Under section 303 (m) (1) (c) of the act the Commission can suspend an operator's license if he willfully damages radio apparatus. In *Didriksen v. Federal Communications Commission*, 254 F. 2d 354, the Commission had suspended an operator's license for misplacing, concealing, and manipulating equipment at a radio station in such a way that operation was impossible. He had done this in connection with a strike. The court upheld the Commission, finding "damage" from his actions.

Effect of change in TV allocations.—Under Commission rules a TV channel may be assigned to two nearby cities jointly; this makes it available for use in either city. Channel 45 was assigned to New Castle, Pa., and WKST had a permit therefor but had ceased operation for financial reasons. At WKST's request the assignment was changed to New Castle, Pa.-Youngstown, Ohio. WKST subsequently sought to modify its permit to move its antenna to a site near Youngstown while continuing as a New Castle station. Competing applications for channel 45 at Youngstown were filed by others, who claimed that the allocation change voided WKST's permit and left the channel unoccupied. The court in *Community Telecasting Company v. Federal Communications Commission*, No. 13872 C. A. D. C., upheld the Commission's dismissal of these applications on the ground that WKST still had a valid permit for the channel, and *Ashbacher Radio Corp. v. Federal Communications Commission*, 326 U. S. 327, thus did not apply.

Before and since the close of the fiscal year, both the Commission and the courts have taken action in television cases which have been connected with alleged ex parte representation to the Commission by testimony at hearings before the House Subcommittee on Legislative Oversight.

The first case, involving the grant of Channel 10 at Miami, Fla., was, at the Commission's request, remanded to it by the Court of Appeals on April 17, 1958 for evidentiary hearing. On June 18 the Commission announced that it had designated Judge Horace Stern to hear the issues. On July 31 the same court remanded the proceeding concerning Channel 5 at Boston, Mass., to the Commission for a similar hearing because of other testimony before the House subcommittee. On October 2, the Commission announced its own inquiry into the Orlando, Fla., Channel 9 grant. On December 1 Judge Stern issued his initial decision in the Miami Channel 10 case and, on December 4, was designated to hear the Boston Channel 5 proceeding.

In addition to these adjudicatory matters, the Supreme Court, on October 20, remanded to the lower court two rule-making cases—one involving removal of Channel 2 from Springfield, Ill., to St. Louis, Mo., and the other the shift of Channel 8 from Peoria, Ill., to the Rock Island-Moline-Davenport area—for further consideration in the light of allegation of ex parte representation in testimony before the House subcommittee relating to the St. Louis-Springfield proceeding.

LEGISLATION

A significant portion of the Commission's legislative activity during fiscal 1958 was devoted to furnishing information and assistance to congressional committees and attending congressional hearings. Both the Senate and the House Interstate and Foreign Commerce Committees and their subcommittees held extensive hearings directly

concerning the Commission and, in addition, conducted other hearings relating to legislation and problems in areas related to the Commission's regulatory functions which required testimony and documentary information from the Commission.

Commission Proposals

A number of legislative proposals were offered to the Congress by the Commission. They included:

An amendment of sections 503 and 504 of the Communications Act (47 U. S. C. 503 and 504) to authorize the Commission to impose small fines for violation of its rules and regulations by all radio stations other than those in the broadcast services. This amendment was introduced in the Senate as S. 1978 and in the House as H. R. 6748.

The Commission also proposed that it be authorized in described circumstances to require the painting and/or illumination of abandoned transmitting towers as an air safety measure. To enact such legislation, S. 1874 was introduced in the Senate and H. R. 6746 in the House.

The Commission proposed that section 307 (d) of the act be amended to authorize it to grant broadcast station licenses for a period not to exceed 5 years instead of the present 3-year period. S. 1759 was introduced in the Senate and four bills to achieve this amendment were introduced in the House (H. R. 3514, 5935, 6216, and 6430).

The Commission submitted legislative proposals to amend section 409 (c) of the act to remove some of the restrictions on the Commission working with its own engineering and legal staff in adjudicatory proceedings.

The Commission has also either submitted or is preparing legislative proposals relative to its authority over incidental and restricted radiation; the marking and lighting of receiving towers which may be a hazard to air navigation; amendment of section 319 (a) of the act regarding premature construction; enlargement of the jurisdictional language of section 202 (b) of the act on charges for services in connection with certain types of radio communication; extension from 3 to 6 months of the suspension period of section 204 of the act pending a decision or hearing; an amendment of the act so as to place the burden of proof upon a common carrier in a change of a charge, classification, regulation, or practice; amendment or repeal of the protest provision of section 309 (c); amendment of section 409 (b) to prohibit any person making ex parte representation to the Commission, and deletion of section 4 (b) provision regarding honorariums to the Commissioners.

During the 1st session of the 85th Congress, one measure (Public Law 133) was enacted which had a direct effect on the activities of

the Commission. This legislation created the Airways Modernization Board and provides for the development and modernization of a national system of air navigation and air traffic control facilities. The Commission is concerned since some of these devices will use portions of the radio spectrum.

On August 28, 1958, the President signed a bill amending sections 303 (1) and 310 (a) of the Communications Act to permit the Commission to issue, in certain cases, licenses to noncitizens for radio stations on aircraft and for the operation thereof. The Commission supported this legislation because of the increased air safety consideration.

A number of bills affecting the Commission and its activities were introduced in the 85th Congress. At the request of congressional committees, the Commission made a study of these proposals as they relate to its functions and submitted comments with reference to 80 bills and resolutions.

AUTHORIZATIONS

As of June 30, 1958, the Commission had over 2.1 million radio authorizations outstanding. This was an increase of 270,000 for the year. A comparison of the 1957 and 1958 figures follows:

Class	June 30, 1957	June 30, 1958	Increase
Safety and special services.....	381,150	437,851	56,701
Broadcast services.....	8,034	9,037	1,003
Common carrier services.....	2,790	3,271	481
Experimental services.....	788	834	46
Commercial radio operators.....	1,304,300	1,500,854	196,554
Amateur radio operators.....	165,195	180,738	15,543
Totals.....	1,862,257	2,132,585	270,328

Since a single grant in some services can cover the use of a number of transmitters, station authorizations for all radio services collectively represent the use of nearly 1.5 million fixed and mobile transmitters.

APPLICATIONS

Applications received by the Commission during the year exceeded 537,000. This was an increase of over 32,000 compared with the year previous. Figures for 1957 and 1958 were:

Class	1957	1958	Increase or (decrease)
Safety and special services.....	186,025	212,581	26,556
Broadcast services (nonhearing).....	9,704	10,347	643
Common carrier services.....	6,262	4,566	(1,696)
Experimental.....	2,395	3,057	662
Commercial radio operators.....	300,681	306,698	6,017
Totals.....	505,067	537,249	32,182

These figures do not list amateur radio operations as a separate category because their applications embrace stations as well as operating authorizations and are included in the safety and special services total. Nor do they cover thousands of petitions and other filings in hearing and rulemaking proceedings, tariffs submitted by common carriers, and reports by various licensees.

CORRESPONDENCE

Mail received or dispatched by the Commission's Washington office (not including that handled by the Field Engineering and Monitoring Bureau) amounted to 1,378,412 pieces, which was about 35,000 more than the previous year. Of the 1958 total, 939,512 were incoming and 438,900 were outgoing. The Commission paid the Post Office Department \$29,700 for the use of its penalty mail.

RELEASES AND PUBLICATIONS

Commission actions are reported in public notices released at its Washington headquarters. It likewise announces the filing of certain applications, petitions for rulemaking, hearing calendars, etc. There are no public mailing lists for this mimeographed issue. Mimeographed copies of Commission orders and other documents, besides being served on the parties involved, are available on individual request as long as the limited supply lasts.

All hearing orders and rulemaking proposals and finalizations are given official promulgation in the Federal Register. Since January 1, 1957, the Government Printing Office has printed and sold the texts of the Commission's major decisions in weekly pamphlet form. This series is also available in 6-month bound volume compilations. That Federal agency also sells the Commission's rules and regulations, annual and special reports, etc. The Commission does not supply copies of its printed publications which are on public sale. They are listed in the appendix to this report.

Commission mimeographing required more than 50,000 stencils, 9.3 million sheets of paper, and nearly 13.4 million impressions during the year.

FOREIGN TECHNICAL ASSISTANCE

The Commission plans, arranges, and supervises programs of study and observation of the domestic telecommunications industry for engineers and technicians of friendly foreign governments. This is in connection with technical assistance programs of the Department of State, the International Cooperation Administration, and the United Nations.

Since 1952, the Commission has arranged itineraries for representatives of more than 50 countries. Over 230 participants have spent over 1,115 man-months of study. Fiscal 1958 accounted for 57 of these participants and 325 man-months. These figures do not include casual foreign visitors.

GENERAL PROBLEMS

In addition to specific problems affecting the respective communication services mentioned throughout this report, the Commission has overall problems which complicate and delay its processes in general.

To those who think that the FCC is slow in reaching decisions, the answer is simple—its governing law requires repetitious paperwork and other routine that is impeding its functioning. Indeed, the Commission is fettered with more extraneous and time-consuming redtape than probably any other Federal agency. Since 1952, in particular, certain amendments to the Communications Act have lengthened Commission proceedings and thwarted expeditious determinations.

Chief among the Commission's handicaps is the 1952 "separation of functions" amendment which bars the Commissioners from consulting FCC staff experts on questions in adjudicatory proceedings. Under this provision, the General Counsel and Chief Engineer cannot advise on important legal, technical, and other considerations.

Another 1952 statutory obstacle pertaining only to the Commission is the requirement that, before applicants can be designated for hearing, they must be advised by letter as to the reason or reasons, and given 30 days in which to reply. If, in an already contested case, another application is filed, the new party, too, must be notified and supplemental letters sent to the other parties concerned, which means another month's delay. Sometimes a series of 3 and 4 Commission letters are necessary, which further delays the actual hearing.

Also, there is a 1952 amendment which requires the Commission to give priority consideration to "protests" to grants made without hearing. Further, court interpretation of this provision recognizes nonapplicants as protestants, even though they may not be in the communications business. This priority is an invitation to a widening field of protests which hamper the administrative process and delays the furnishing of new or augmented services to the public.

Delay in finalizing decisions in hearing matters is, in many cases, due to applicants changing their organizational complexions and application proposals during the course of the proceedings. This invites further filings by competitors and necessitates additional study by the Commission.

Sometimes cases in the process of hearing before examiners have to be recessed because parties make a practice of appealing procedural rulings of the examiners to the Commission. The hearings cannot resume until the Commission has considered and ruled on the questions raised.

Denial of petitions for reconsideration of Commission actions often brings petitions for reconsideration of the denial, and so on ad infinitum. Though rarely introducing new argument, each petition requires Commission study and formal disposition.

As a step toward eliminating some of these obstacles to expeditious functioning, the Commission is seeking remedial action by Congress with respect to the "separation of functions" and "protest" provisions of the 1952 amendments, and is tightening its own rules and regulations insofar as it is possible to do so under controlling law.

Despite these and other problems resulting from its multiplied workload, the Commission had to function with about 150 less personnel than it had a decade ago.

National Defense

WAR EMERGENCY POWERS OF PRESIDENT

Section 606 of the Communications Act delegates to the President certain emergency powers over electrical communication in time of war or other national emergency. Among other things, the Chief Executive may—

Direct that particular communications be given priority;

Suspend or amend the rules and regulations applicable to radio stations or devices capable of emitting electromagnetic radiations;

Suspend or amend the rules and regulations applicable to wire communication, close any wire communication facility and employ it for Government use, with just compensation to the owners;

Employ the Armed Forces to prevent obstruction or retardation of communication.

Fines of from \$1,000 to \$20,000 and imprisonment of from 1 year to 20 years, or both, are provided for convicted violators.

In 1951 this Presidential authority was extended to include radiation from noncommunication devices which might serve as “beams” to guide enemy aircraft, electronic missiles and other weapons of sky attack. Later that same year the President directed the Federal Communications Commission to draft and enforce regulations in this connection.

CONELRAD IN WAR AND PEACE

The so-called CONELRAD program was initiated by the FCC in 1950 at the request of the Department of Defense to govern radio operation in event of an enemy attack. The word is a convenient abbreviation for the formal term “control of electromagnetic radiation.”

National Defense Purpose

The basic purpose of CONELRAD is to provide a radio system to quickly alert the nation in the event of an imminent or actual air attack. Certain classes of radio stations would be enabled to continue essential operation under controlled conditions.

As far as broadcasting is concerned, a CONELRAD radio alert would cause all FM and TV stations to leave the air until an all clear signal is received, but designated AM stations would broadcast official

bulletins, civil defense instructions, and other pertinent information.

This would be done on 2 particular frequencies—640 and 1240 kilocycles. They are so indicated on the tuning dials of most AM receiving sets.

The operation would be conducted in such a way as to confuse the enemy about the location of the transmitters in use. Consequently, for air navigation deception purposes, AM stations, operating in groups, would use one or the other of the designated frequencies, in rotation, for disseminating emergency information in connection with an attack.

Radio silence would be maintained by nonbroadcast stations except for transmission of communications of extreme urgency affecting the safety of life and property under the particular situation.

Generally speaking, broadcast stations are alerted by the Air Force Defense Command; other radio stations receive the alert by monitoring key broadcast stations in the air defense divisions in which they are located.

Of the 3,353 AM stations authorized at the end of the fiscal year, 1,224 were voluntarily participating in conelrad.

As to future systems for the broadcasting of vital information in emergencies, there is one under consideration which, by utilizing 95 channels cleared for the purpose, 98 percent of the population of the United States would receive such service under total effectiveness.

Peacetime Use

With the cooperation of the United States Air Force, the United States Weather Bureau and the Federal Communications Commission, the CONELRAD alerting system has, since late 1957, been put to an important peacetime use for alerting communities and areas to threats of weather conditions endangering the public.

The new weather warning system works like this:

By noting or receiving word of an impending severe storm, abnormal rising water, or other threat by the elements to life and property, the local Weather Bureau representative alerts a cooperating AM, FM, or TV station in the vicinity, whereupon the latter broadcasts a timely warning. This warning is picked up by receivers in other broadcast stations in the areas which, in turn, help spread the word.

These warning transmissions are not confined to the two CONELRAD frequencies; they are sent out by the broadcast stations on their regularly assigned frequencies or channels. Hence, these bulletins can be received on ordinary home sets. For the listener or viewer, it simply means keeping tuned to any broadcast station participating in the plan.

However, some establishments want to be alerted to these weather bulletins without having to continually listen in for them. In that category are broadcast stations, public safety and emergency agencies, governmental entities, schools, industrial plants, transportation and other business concerns, farms, ranches, recreation areas, etc. For that purpose, interested manufacturers are producing an inexpensive receiver which, when tuned to the frequency of a broadcast station providing weather warnings, remains mute until activated by the signal which precedes the weather bulletin. But, for that matter, any ordinary AM or FM receiver can be adapted for the same purpose at a nominal cost for the extra material and installation.

With hundreds of broadcast stations now cooperating in the immediate dissemination of weather warnings, a valuable peacetime public service is made possible by a system intended primarily for national defense purposes.

OTHER DEFENSE ACTIVITIES

The Commission cooperates with military, civil defense, and other Government elements in planning for and otherwise harnessing wire and radio facilities to the emergency program. These activities range from providing for alternate communication circuits to meet possible contingencies, to rendering monitoring and other special technical assistance in research and development work. Special projects undertaken at the request of other Federal agencies cannot be reported here because of the security classification given them by their originating authority.

The Commission has its own Defense Steering Committee, headed by a Defense Commissioner. It has also established a line of succession for its key officials to act under extreme emergency.

Meanwhile, its existing safety and special radio services continue to safeguard life and property, furnish assistance in time of disaster, and contribute to civil defense and other public-protection programs. In addition, the FCC's monitoring network patrols the airways around the clock and, among other things, furnishes bearings to planes and ships in distress.

NATIONAL DEFENSE EXECUTIVE RESERVE UNIT

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

The Commission has completed appointments to the initial complement of its unit.

The purpose of these units is to provide qualified persons, representative of segments of industry and the professions, to train for participating in an executive capacity in essential mobilization functions in their respective areas in event of a national emergency.

Electronics and Communication

TODAY

Electronics has gone modern. It has become one of the most useful wonders of the age. It is revolutionizing technical means and methods that affect everybody. In so doing, it has become man's foremost helper and time-saver. In the field of communication, particularly, it knits distances and people to an extent never known before. As a result, the world is in a new era of scientific transition.

As far as the United States is concerned, electronic developments enable electrical communication to be utilized by more people to serve more needs than in any other country. No other nation has made such progress in telecommunications. Whether it is broadcast, other radio, or wire operation, service in this country far surpasses that anywhere else on the globe.

Today our utilization of radio actually extends "from the cradle to the grave"—from speeding medical service for imminent mothers to controlling funeral processions in large cemeteries. And, throughout life's span, radio plays a prominent role in day-by-day business and industrial activities, besides contributing to the safety, convenience, and other welfare of individuals.

Radio advances further safeguard all forms of transportation, besides expediting the movement of persons and goods. This applies to air and water craft, and land vehicles to the inclusion of railroads, streetcars, buses, trucks, and taxicabs.

Radio refinements additionally aid police and fire protection, besides contributing highway and other emergency services, and promoting forestry conservation.

Never before has radio figured so largely in national defense and disaster relief programs.

Modern radio is harnessed to a myriad of tasks for business and industry. These include intercommunication between offices and buildings, remote control of apparatus and processes, construction work, logging operations, delivery of supplies, dispatching of repair crews, surveying, and even exploring for new oil deposits.

American ingenuity and "know-how" has given the United States more aural and television broadcast service than all the other coun-

tries combined. Moreover, ours is the only nation now enjoying regular color TV programs.

The United States is also a leader in education by radio and TV. Visual education is augmented by either transmissions over the air or by "closed circuit" (cable) systems.

In addition to school use, wired TV facilities are serving many business, industrial, entertainment, religious, professional, municipal, and other interests.

The telephone and telegraph systems are adding to their radio links. More than half of the national telephone network is now radio.

The United States has more than half of the world's telephones.

A pair of coaxial cables can carry nearly 1,900 different telephone conversations at the same time.

The first telephone cables to Europe, Alaska, and Hawaii have been placed in operation to meet today's demands.

Practically every place on the globe has been brought within quick contact with the United States through international radio and cable circuits.

Various mechanical communication devices using wire facilities interconnect many business users, not only domestically but across the ocean.

The latest use of telegraph facsimile is to transmit train tickets.

Pictures are flashed between continents in seconds.

The military is employing electronics to an unprecedented degree. Bombs and guided missiles are fired and controlled by such means. About one-third of the cost of a modern jet fighter plane is for electronic gear. Naval surface and subsurface craft depend increasingly upon electronic aids.

At the same time, electronics is furthering the application of nuclear energy to peacetime uses.

Radar and other systems are employed to facilitate navigation on the water and in the air. Radar also helps the police to patrol highways for speeding cars.

Electronics has made possible quicker weather predictions and warnings to the public.

Special radio services include paging doctors and other customers. They carry vest-pocket receivers which alert them to telephone in for further instructions.

Some restaurants use electronic radiation to cook food more speedily. The food is heated from the inside out, which is the reverse of the usual method.

In the early days of radio, with its limited usable spectrum, there was no room for personalized use of radio except for amateur operation. Today citizens radio permits individual communication on

farms and ranches, reservation areas and remote places, and with moving vehicles within limited range; and permits control of devices such as garage doors, model airplanes, display signs, etc.

Electronics has spurred automation. Mechanical "brains" do more and more computing and processing work. Practically all telegrams are handled by automatic printers. Communication systems depend upon mechanical switching, repeaters, etc. Most local telephones are now dial operated, and long-distance dialing service is expanding. Dial teleprinter exchange telegraph service has been inaugurated between the United States and Canada. The midget transistor has eliminated vacuum tubes in many devices and has made miniature radio receivers possible. Wire circuits in receiving sets and other small equipment are now printed—that is to say, metallic lines impressed on bases do away with old-fashioned wiring.

Since electronic developments have impact on telecommunication users all over the world, this has necessitated better understanding and cooperation among nations on mutual problems of use which can only be resolved by international agreements.

TOMORROW

Electronics has become a huge and dynamic industry. Unbounded horizons are being opened by its developments. Radio communication is no longer restricted by technical limitations on spectrum use and by old concepts of radio transmitting and receiving apparatus. Things are changing so rapidly that it is difficult to predict future events other than to speculate that almost anything is possible.

Offset carrier, single sideband, split channel and other new techniques promise more economical use of frequencies and more room for new or expanded radio services.

Opening up the microwave portion of the spectrum for beaming communication from one point to another is furnishing new voice and telegraph channels, teletype, facsimile, relay, and remote-control opportunities for common carriers, broadcasters, public agencies, industry, and other business.

Tropospheric and ionospheric scatter offer the prospect of international communication, to the inclusion of television. This involves using these upper layers of the atmosphere to reflect transmissions far beyond the horizon.

Just as it has enabled use to be made of the ultra high frequencies, so will equipment be developed to permit radio services to develop on the super high, and even the extremely high, frequencies.

When that day comes it will be marked by the growth of small and less costly TV stations.

Time will put TV stations on a more equitable engineering basis.

Still bigger TV screens are in prospect, with their ultimate inclusion in the walls of new housing.

FM broadcast bids for better recognition of its superior aural capabilities when operated with equipment to do them full justice.

Because of mounting interest in the subject, aural and video educational programming will increase, whether done by educational or commercial stations or closed circuit, or a combination of the three.

Widening use of radio by private business and individuals is inevitable. It will become increasingly important to every citizen, whether at work, at home, or at play.

Three new industrial radio services have just been established—one for business in general, another for manufacturers, and the third for telephone maintenance activities. The future will see others consistent with their comparative needs and the availability of spectrum space.

More and more radio interference "bugs" will be eliminated through better curbs on radiation, improvement of equipment, and the cooperation of manufacturers and others concerned.

Ways will be found to reduce the aircraft-menacing height of high transmitting and receiving antennas without sacrificing service or quality.

Experiments with visual telephony indicate that some day persons engaged in telephone conversation will be able to see as well as hear each other.

Bouncing radio signals off the moon and receiving emissions from man-launched satellites circling the globe heightens speculation of radio communication with future space platforms and outer-earth travel.

All of which indicates that, as far as the progress of electronics and radio as a team are concerned, the sky is not the limit.

Frequency Allocation and Use

GENERAL

In the early days of wireless there was little need for national or international regulation. Few stations were on the air and, although the spectrum which could then be used covered only a few hundred kilocycles (it now extends to tens of thousands of megacycles), there seemed to be plenty of space for anyone to utilize radio, as we now call it, to meet his communication requirements.

However, it was soon found that ships, for example, if they were to communicate with one another or with shore for safety purposes, needed certain recognized standard wavelengths (frequencies). This was perhaps the first frequency allocation problem and it resulted in designating exclusive frequencies to meet a particular communication need.

It became apparent that radio could be put to all sorts of other useful purposes and demands for spectrum space increased by leaps and bounds. Since radio signals pay no attention to geographical boundaries, the countries of the world found it desirable to plan the use of the spectrum so that many radio services could operate without mutual interference. So came about the designation of particular frequencies or bands of frequencies for use by different services. This is known as frequency allocation.

The rapid development of radio services continued to result in shortages of frequencies. Fortunately, engineers were able to continuously develop equipment that required less and less spectrum space. For example, in the early days of radio it was not unusual for a radiotelephone conversation to require several dozen kilocycles of spectrum space. Today the same conversation may require as little as three kilocycles. This and similar decreases in band width for other types of communication may be called spectrum economy or increased efficiency of spectrum utilization.

Not only did the spectrum space requirements for particular types of transmission become reduced, thereby permitting more stations, but technical improvements enabled frequencies higher and higher in the spectrum to be harnessed to meet the ever-increasing communications needs of the world.

Congestion on the radio highways has historically led to regulations designed to conserve the spectrum and to limit its use to those services which, in the public interest, have the greater need.

Frequency allocations are made both at the national and international levels. For services which operate in portions of the spectrum most suitable to long distance service, international allocations and rules of assignment are required to minimize interference. National frequency allocations are needed to promote the use of radio by those domestic services whose functions are mainly in the public interest.

Within the framework of international and national allocations and regulations, it is necessary to coordinate with other countries so that new frequency assignments will not interfere with existing operations. Teamwork is also required, at the national level, between radio-using agencies.

NATIONAL FREQUENCY ALLOCATIONS

The national frequency allocation picture has been influenced considerably by the scheduled convening of an International Radio Conference at Geneva, Switzerland, in August 1959. That is because an international table of frequency allocations resulting from such a session represents a composite of the proposals introduced there by the various countries.

Two broad allocation proceedings were instituted by the Commission last year which, because of their wide scope and complexity, are still matters of active consideration. The first of these was an inquiry into the frequency and operational requirements of present or proposed services in the bands above 890 megacycles. The submission of evidence, testimony, and briefs in this proceeding was completed late in calendar 1957. This material is being evaluated by the Commission and will serve as the basis for future allocation proceedings designed to meet the specific national needs made evident by the inquiry.

The second proceeding was a similar inquiry but was limited to that portion of the spectrum between 25 and 890 megacycles. Although written comments have been submitted, a date has not yet been set for taking oral testimony.

Inquiries such as these are a necessary part of any long-range planning in the field of national frequency allocations. They serve to point out which services are outgrowing their previous allocations, which services are not growing and therefore do not require all of the spectrum space previously allocated to them, and indicate space needs for radio services that were not in existence at the time of earlier distributions of the spectrum.

The completion of several of the earlier instituted "split channel" proceedings continued to play an important role in the national fre-

quency allocation picture insofar as many domestic land mobile and maritime mobile services operating between 25 and 470 megacycles were concerned. These proceedings were the outgrowth of technical advances that made it possible to halve or even further reduce the spacing between assignable channels. They have the effect of at least doubling the amount of usable space that had been available to the mobile services.

During the past year the cold war precipitated three separate actions wherein, in the interest of the national defense, national frequency allocations were changed by order rather than through rule-making. In the first instance, certain relatively narrow non-Government bands allocated to the land mobile service between 40 and 50 megacycles were reallocated to accommodate Government point-to-point circuits employing the relatively new technique known as "forward propagation by ionospheric scatter" (FPIS). This resulted in the displacement of certain non-Government land mobile services. However, in return for the space lost, the Government band between 150.8 and 152.0 megacycles was reallocated for use by the non-Government land mobile services. FPIS is not technically feasible in this band.

In the second instance, all amateur bands above 220 megacycles were reallocated to provide for Government radiopositioning operations on a primary basis with the amateur service continuing to use these same bands conditioned to not interfering with the Government operations. The same order reallocated the non-Government point-to-point band 890-942 megacycles to Government. It also reallocated to the Government, on an exclusive or shared basis, various other bands above 2000 megacycles that had previously been available to non-Government mobile or radionavigational services. The Commission proposed rulemaking looking toward further reallocation which, among other things, would accommodate to the extent practicable the stations and services adversely affected.

In the third instance, non-Government fixed and mobile allocations in the 90-110 kilocycle band were deleted and the FCC allocation now is for radionavigation only.

Efforts to provide a national frequency allocation to satisfy, in part, the requirements of radio astronomy (astronomical radio observations) continued. This is a unique problem in that it would mean an allocation of frequencies on which all transmissions would be prohibited, and such a band would be dictated by nature rather than man insofar as the primary interest to radio astronomers is concerned. The "hydrogen line frequency" (1420 megacycles) is the one frequency selected by all parties as requiring such protection. Current Commission proposal would allocate the band 1400-1427 mega-

cycles to radio astronomy on a national basis. Additionally, it is affording the maximum feasible amount of protection from interference on all frequencies within about 50 miles of Government observatories at Green Bank and Sugar Grove, W. Va. The latter action involves the screening and coordination of proposed new assignments within that area so that problems relative to harmonics and close proximities of transmitters may be minimized.

The Commission was petitioned for permission to operate single-channel maritime mobile equipment for bridge-to-bridge communication between ships for navigation and related purposes. While offering encouragement to the type of communication contemplated, the Commission reaffirmed its policy of requiring that any VHF maritime mobile communication equipment have a minimum of three channels so that the using vessel is capable of functioning in the safety system associated with the marine service. In this regard, the Commission is inquiring into the radio safety aspect of all ship stations.

The Commission has continued to study the frequency requirements for radiopositioning in which radio techniques are used for such purposes as surveying in oil exploration procedures. It proposed to use the frequencies below 200 kilocycles and is considering the replies.

The fluidity of the Commission's rules in keeping abreast of current domestic allocation needs is evinced in the 24 separate orders adopted affecting part 2 during the past year. Final action was completed on all but four of the related rulemaking proposals.

INTERNATIONAL FREQUENCY ALLOCATION

Since international conferences are usually several years apart it is important that the United States proposals to the 1959 Geneva session be based on well-thought-out planning to cover our current and anticipated national and international frequency requirements.

Moreover, to be representative of the total United States requirement, the proposals must reflect the thinking of both Government and non-Government radio users. With this in mind, preparatory committees and subcommittees were established under Department of State auspices to formulate a revised table of frequency allocations and revised operating rules that, to the extent practicable, would best fit the Nation's requirements. On those committees and subcommittees were representatives of industry, the Commission and other Federal agencies. The task required many months of exhaustive study, coordination, cooperation, and compromise, but a proposed international table of frequency allocations was constructed, ranging from 10 kilocycles to 40,000 megacycles.

The United States proposal is, in effect, an extension on a world-wide basis of our domestic table. The advantages of such an arrangement are manifold. It makes possible global standardization in a great number of bands, particularly those used for aeronautical mobile, maritime mobile, and radionavigation. Another advantage is that there is a foreign market for commercial equipment developed and in use in this country on standardized frequencies.

These same proposals were brought to the attention of the general public in notices of inquiry released by the Commission soliciting public comment. Meanwhile, domestic frequency requirements may change and new advances may be made in the state of the art. Consequently, although present United States proposals are firm insofar as current thinking is concerned, certain changes may be made before the conference convenes.

INTERNATIONAL FREQUENCY USAGE DATA

In continuing to cooperate in furnishing monitoring information to the International Telecommunication Union for publication in the Summary of Monitoring Information received by the I.F.R.B., the Commission submitted a total of 143,969 monitoring observations obtained by its own monitoring stations and 10 private monitoring stations. They represent more than 25 percent of the observations published in the summary which, it is understood, will soon be distributed monthly rather than quarterly. This information is of help to radio users in bringing their operations into conformity with the international allocations.

INTERNATIONAL FREQUENCY ASSIGNMENT COORDINATION

The extensive and ever-increasing use of frequencies in all countries has made it highly important to work with other nations in bringing into use new assignments and in changing existing assignments in order to prevent difficult interference problems and their costly economic consequences.

The traditional cooperation between the United States and Canada is exemplified by extensive frequency coordination between the Commission and the Canadian Department of Transport. The notification procedure between the two agencies for non-Government assignments and exchange of engineering data in portions of the VHF and UHF bands continued. It was expanded during the year to include certain border assignments of the two countries in the Alaskan area. More than 1,200 letters and telegrams were exchanged on this activity.

A nominal amount of frequency coordination with Mexico and other neighboring countries continues. Also, there is a continuing

exchange of comments as requested between the United States and other countries.

In regard to worldwide efforts in frequency coordination, the implementation program begun by the ITU Extraordinary Administrative Radio Conference, Geneva, 1951, has progressed to the extent that the final adjustment period has been completed by the cooperating countries. The results of this tremendous effort will be useful to all countries in preparing for and reaching agreement at the 1959 conference.

INTERNATIONAL CONFERENCES AND MEETINGS

Since November 1956, the Commission has been heavily involved in preparatory work for the 1959 Geneva Conference, since this is the first contemplated revision of the International Radio Regulations since the 1947 Atlantic City conferences. Because 100 governments have become ITU members or associate members, vital interests in the field of telecommunications are at stake.

During the year the Commission helped to prepare for 13 other international conferences sponsored by the Department of State, furnishing 2 delegation chairmen and 16 other representatives. FCC Chairman Doerfer headed the United States delegation to the ITU telephone and telegraph conference at Geneva in the fall of 1958. Work is also underway or in prospect for 36 anticipated sessions. Some of these relate to the Geneva 1959 Conference and others concern the United States defense effort or other important phases of the international telecommunication situation.

INTERNATIONAL INTERFERENCE AND INFRACTIONS

The resolution of international radio interference problems between countries continues. Each year several hundred such cases must be resolved in a manner mutually satisfactory to the domestic and foreign stations involved.

The Commission engages in a companion program which helps to prevent the development of international interference cases. This is the reporting of improper technical and operating characteristics by foreign stations. The Commission's monitoring stations prepare about 3,000 such reports each year for evaluation and transmission to other nations.

NATIONAL FREQUENCY RECORDS

During fiscal 1958, the FCC Master Frequency List was published twice, once in the same format as in previous years by frequency, and later by services. This changeover was made necessary by the in-

increased number of licenses issued by the Commission. The new system has effected a saving in time and money and there are indications that it will be more usable both to Government and non-Government users. The latest publication, in 14 different volumes, consists of 4,339 pages as compared with 3,429 pages previously. Arrangements have been made with industry users for reprinting this list on a nonprofit basis so as to make it available to more people who are interested. During the year a total of 45,304 authorizations were processed to keep the various editions of the service lists current. This is 4,304 more than processed in 1957.

INTERNATIONAL FREQUENCY RECORDS AND REGISTRATION

In order that all nations utilize the radio frequency spectrum as efficiently as is possible and to permit new station assignments without interfering with operations already on the air, there is in existence an international system of frequency registration and notification. Under this arrangement, the International Telecommunication Union (ITU) in Geneva publishes lists of assignments by frequency, and special lists of stations in particular services. These lists assist administrations in making frequency assignments and aid international communication services. For example, without published lists, a United States ship in foreign waters would not know what frequency to use for communicating with a particular foreign coast station. Also, without such lists, the United States might make an important assignment on a frequency which would be interfered with by some existing foreign operation.

The Federal Communications Commission is responsible for furnishing the ITU with notification and registration information concerning all United States assignments, Government and non-Government alike.

Since 1950 the United States has been unable to fulfill its treaty obligations in the matter of submitting ship license data to the ITU. However, beginning November 1, 1957, the Commission commenced forwarding individual code slips for each ship license new or modified. To date, 12,252 ship notifications have been processed. It is anticipated that it will take approximately 4 years to report all our radio-equipped ships.

The United States frequency notifications processed through the Commission for the International Frequency Registration Board continued at a heavy rate with 46,945 forwarded to Geneva during fiscal 1958. Unfavorable findings by the IFRB amounted to 442 which were returned to the various agencies involved, including the military. Each one is then checked and rechecked and, if at all possible, returned to the board with sufficient evidence to invite inter-

national recognition. Late in fiscal 1958 the IFRB began reviewing all previous unfavorable assignments and has sent lengthy questionnaires to the countries concerned.

NATIONAL FREQUENCY ASSIGNMENT COORDINATION

It is equally important that frequency assignments in the United States be made so as to avoid interference domestically. Accordingly, the Commission coordinates with Federal agencies all those FCC assignments which may cause or receive interference from Government operations. Likewise, the Government works with the Commission on Government assignments which may conflict with stations licensed by the Commission. This is accomplished through a joint body known as the Interdepartment Radio Advisory Committee (IRAC). It is made up of the major Government users of radio. The Commission is not a member but is represented at joint meetings in a liaison capacity.

The Commission conducted 3,000 informal engineering studies and processed 6,400 formal proposals submitted to the IRAC Frequency Assignment Subcommittee during the year. This reflects an approximate drop of 10 percent in frequency proposals in both engineering studies and total items appearing on the subcommittee agenda.

Experimental proposals, on the other hand, continue to increase. A total of 1,127 was processed, involving the use of frequencies for research and development of electronic equipment for civil use as well as military-sponsored operations.

The Commission handled 216 cases of interference between Government and non-Government stations. Most of these cases resulted from abnormal propagation conditions. There were also scattered instances of interference resulting from equipment failures such as off-frequency operation, spurious signals, and harmonics. When discovered, these are rectified so far as possible.

A new coordination problem is receiving the attention of the Commission and other Federal agencies. It is known as the site problem or the proximity problem. In most cases it has little to do with the actual operating frequency of a station; instead, it is caused by two or more stations operating essentially at the same location. With the rapid increase in the use of radio, it is not uncommon to find a dozen or more stations grouped on a mountain top. The signals of stations in close proximity sometimes combine so as to produce beats resulting in interference. This problem can become particularly severe where relatively high powers are employed. Harmonics, well within current tolerances, can add to the confusion. It is sometimes possible to predict mathematically that these interfering signals may occur, but more often the problem is discovered only after a station goes on the

air. Although technical remedies can usually be taken, they are often very difficult and expensive. The Commission is seeking to determine whether site coordination as well as frequency coordination may be necessary in domestic spectrum management. However, there are some services which now permit close proximity of antennas. Accordingly, in view of the mounting problems with aviation, the grouping of these antennas suggests operation without compromising radio service.

Common Carrier Services

DOMESTIC TELEPHONE

General

The telephone industry continued its rapid expansion during calendar 1957. About 3.43 million telephones were added to bring the nationwide total to 63.6 million, an increase of 5.7 percent over 1956. The total gross industry investment increased about 13.8 percent to exceed \$22 billion. Annual gross revenues exceeded \$7 billion, or 8.9 percent over 1956. Average daily local and toll calls increased about 5.3 and 7.5 percent, respectively. Private line telephone and telegraph revenues increased about 17.5 percent, while TWX (teletypewriter exchange service) rose about 6.8 percent.

About 75 percent of all independently owned telephones and 92 percent of Bell System telephones are now dial operated. Bell expanded its direct distance dialing service, and today some 5 million subscribers can dial their own toll calls to about 30 million other telephones, while another 10 million can dial nearby toll calls.

Consolidated net income applicable to American Telephone & Telegraph capital stock totaled \$829,779,296 in 1957, an increase of 9.8 percent over 1956. Earnings per share decreased from \$13.16 to \$13.00, with the average number of shares outstanding increasing about 6.4 million. The expansion of the Bell System is illustrated by the following table (figures as of December 31) :

Year	Telephones	Plant book cost	Revenues	Employees
1950.....	35,343,440	\$10,101,521,562	\$3,261,528,032	523,251
1955.....	46,218,000	15,340,459,000	5,297,043,000	615,895
1956.....	49,438,000	17,074,206,000	5,825,298,000	638,103
1957.....	52,262,494	19,116,977,000	6,313,833,000	640,868

Services and Facilities

Construction of 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 the "SAGE" system and other important 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, military targets, and new bypass routes contiguous to target areas, was continued. Additional channels were constructed on existing radio relay systems, while a number of cables were provided to integrate various radio, cable, or open wire routes.

During fiscal 1958 the Commission authorized Bell construction projects totaling about \$188.5 million. Included was about \$75.5 million for new radio relay systems or the addition of channels on existing systems totaling about 50,289 radio relay channel miles. The new major radio relay systems totaled about \$23 million, and included new systems between Memphis and St. Louis, between Atlanta and Cincinnati, between Salt Lake City and Pocatello, between Fargo and Billings, between Helena and Spokane, between Fargo and the Canadian border on a new route to Winnipeg, between Kansas City and Omaha, between Jackson and Baton Rouge, between Montgomery and Birmingham, and between Houston and Bulverde, near San Antonio. Construction of bypass radio routes around St. Louis, Kansas City and Minneapolis, to cost about \$7 million, was also approved.

Toward the close of the fiscal year Bell applied for authority to construct a new type TH radio relay system between Denver and Salt Lake City. This system has 8 radio channels in each direction, of which 6 may be assigned to handle traffic and 2 for protection. Each radio channel has a capacity of 1,860 telephone circuits and a complete TH system will handle 13,320 telephone circuits.

New cable and open wire construction, and the installation of carrier equipment for use in conjunction with cable, open wire, and radio relay routes, totaling about \$113 million, accounted for the remainder of the authorized Bell projects. Included was conversion of 6,156 tube-miles of coaxial cables from type L1 to L3 to triple its capacity, and construction of 1,914 sheath miles of new cables.

During fiscal 1958, independent telephone companies also expanded the use of microwaves to provide additional toll telephone circuits. The Commission granted authorizations for 25 new independent company systems estimated to cost \$2.5 million.

By the close of the fiscal year, Bell had over 187,000 channel miles of radio relay in service, of which about 64,400 miles were being used for the nationwide TV program network. An additional 18,000 TV program-miles were being provided by coaxial cable. These facilities interconnected directly some 366 television stations. An additional 15 TV stations were connected to the network by means of Bell off-air pickup and microwave relay, while 170 other stations received network programs by picking up the signals of the connected stations.

The Long Lines Department of A. T. & T., which provides the

bulk of the interstate toll facilities, had over 32 million circuit-miles in service at the close of the fiscal year, of which about 11 million were derived from radio relay and a similar quantity from coaxial cable.

New automatic toll dialing offices were placed in service during 1957 at Tulsa, Wayne (Pa.), Des Moines, Birmingham, Louisville, San Bernardino, Wichita, and Miami to bring the Bell total to 52.

Discontinuance of service.—The Commission granted seven applications to discontinue service during fiscal 1958, each of which involved the continuance of service by another company.

Speed of service.—The Bell System reported further strides in expediting toll calls. The average speed of completion during 1957 was reduced to 72 seconds.

Acquisitions and consolidations.—The Commission received 19 applications during fiscal 1958 to acquire the property of another telephone company. Fifteen of these, together with two held over from 1957, were granted without public hearing. Of the 4 pending at the close of the year, 1 involved an application by Wisconsin Telephone Co. to acquire the Menomonee Falls Telephone Co. and the Lisbon Telephone Corp. Pursuant to request by the United States Independent Telephone Association, a public hearing was held on that application.

Interlocking directorates.—The Commission granted 11 applications for individuals to act as interlocking directors and 1 application for a finding that a company owns more than 50 percent of the outstanding stock of another company.

Common carrier microwave radio frequency problems.—To satisfy vital national defense frequency requirements, a frequency reallocation effected by Commission order on April 16, 1958, precluded further common carrier radio assignments in the frequency bands 890–940 and 3500–3700 megacycles and provided certain restrictions on prior authorized operating facilities in these bands. The Commission is attempting to determine what action, if any, can be taken to alleviate the resulting hardships created for common carriers in relation to their message telephone, data transmission, and other operations.

Microwave facilities for closed-circuit TV.—The demand for TV service in economic fringe areas has spurred the public and industry to find solutions. Responses to the problem have taken various forms. In some cases a community antenna TV system (CATV) has erected a receiving antenna at some favorable reception point—usually a hilltop or mountain top—to amplify the signal and retransmit it over a closed circuit coaxial cable system to the homes of individual subscribers. Some CATV systems have contracted for microwave trans-

mission of programs by common carriers from a distant point at which the signals can be received off-the-air to a point where the signals are fed into the local cable distribution system.

In addition to the problem relating to the competitive economic impact of CATV systems on regular TV stations, community antenna TV operations involve consideration of certain jurisdictional and policy questions. In a Memorandum Opinion and Order of April 2, 1958 (in the Matter of *Frontier Broadcasting Co. v. Laramie Community TV Co.*), the Commission concluded that it does not possess licensing or regulatory jurisdiction over CATV systems. A petition for reconsideration was pending at the close of the year.

A Commission inquiry (docket 12443), initiated May 22, 1958, requested comments on 14 issues relating to the impact of CATV, translators, repeaters, and satellites on the orderly development of TV broadcasting.

Pending disposition of its inquiry, the Commission deferred final action on 39 pending applications for additional common carrier facilities of this sort, 6 of which were filed by Bell companies. These would provide new TV service to 21 communities, some of which are alleged to be without any TV service. They involve proposed expenditure for microwave facilities in excess of \$1.2 million.

Previously, the Commission had authorized a total of 77 point-to-point microwave stations to bring TV service (via CATV systems) to 79 communities. Of these, 15 are held by 3 Bell companies to provide service to 4 communities and the remaining 62 by 28 specialized common carriers to serve 75 communities. These microwave facilities represent an investment of over \$2.5 million.

Domestic public land mobile radio service.—The growth of the Domestic Public Land Mobile Radio Service in the populous areas has been considerably impeded during the past few years by a shortage of available frequencies. This situation was slightly alleviated when the Commission, effective December 13, 1957 (docket 11995), established a new radio channel under the zone allocation plan for use by telephone company highway mobile systems and allocated 2 additional frequencies for 1-way signaling service. These frequencies were made available as a consequence of Western Union's abandonment of its telecar (mobile) facsimile radio service. On February 12, 1958, the Commission, by further action in the same docket, split the radio channels above 150 megacycles which previously were available for 2-way communication systems in the land mobile service. This action will not immediately alleviate the aforementioned frequency shortage, since the new channels derived by channel splitting will not become generally available until November 1, 1963. Still pending was a proposal in the same docket to reallocate 1 megacycle of frequency

space from broadcast remote pickup and 1 megacycle of space from Citizens Radio Service for common carrier land mobile radio use.

A consolidated hearing (dockets 12155-12159) was held involving 5 applicants in the Los Angeles area to establish new 2-way facilities in the Domestic Public Land Mobile Radio Service. Four of the applicants received grants after the fifth withdrew.

Grants made without hearing to applicants at Louisville (docket 11878), Ridgewood, N. J. (docket 11932), and Bakersfield, Calif. (docket 11596), were protested by existing stations in those areas. An initial decision of April 7, 1958, looked to denial of the Louisville protest; the Commission on March 19, 1958, announced its intention to affirm denial of the Ridgewood protest; and on February 12, 1958, it denied the Bakersfield application. In addition, two protests involving grants made without hearing to applicants at Brooklyn, N. Y., and Hamden, Conn., respectively, were denied for failure to comply with statutory requirements. Three other grants in Detroit, Seattle, and Wichita were protested. However, the permittees decided not to proceed and the protests were dismissed.

Commission policy in reviewing applications of miscellaneous common carriers in the Domestic Public Land Mobile Radio Service is codified in section 21.511 of the rules and provides that, when a station applies for a renewal of license, it shall show that, during the preceding license period (3 years) at least an average of 50 percent of the mobile units have been used by persons not directly or indirectly controlled by the applicant. This rule was designed to insure that a common carrier service was actually rendered to the public and was not subordinated to the private requirements of the licensee.

Licenses for miscellaneous common carrier stations providing 2-way and 1-way signaling service expired on April 1, 1957. A review of their applications for renewal revealed that 34 were not rendering public service. Eight applications were dismissed for failure to respond to letters; 2 applicants voluntarily discontinued operations; applications of 14 others were renewed upon demonstration that they had achieved the required public use of their facilities. The remaining 10 were designated for hearing (dockets 12183-12192). Eight of these were renewed prior to hearing upon satisfactory showing, and two were renewed after hearing.

Forty-two new miscellaneous common carrier land mobile radio systems for 2-way communication service were granted during the year, in addition to 18 new radio systems for 1-way signaling (radio-paging) service. At the year's close, 316 2-way communications systems held licenses, and permits for 25 new systems were outstanding. At that time there were also 91 licensed 1-way signaling stations and 9 new stations under construction.

Forty new land mobile radio systems were authorized for general communications common carriers (telephone companies) for two-way land mobile radio service. As of June 30, 1958, there were 359 such systems licensed and 36 new systems under construction. During the year, several independent telephone companies tried out fully dial-operated land mobile radio systems which were developed by various radio equipment manufacturers.

Rural radiotelephone service.—The Rural Radio Service is intended to provide domestic public communication to points where it is not practical to construct wire lines. Ninety-three new stations were authorized during the year. At its close, there were 293 licensed stations and 14 new stations under construction. Of the total, 33 were central office stations, 70 were interoffice stations and 204 were rural subscriber stations. This represents a growth of 38 percent during the last fiscal year. Additional frequencies, shared with other radio services, were made available to this service in Puerto Rico and the Virgin Islands.

Public radiotelephone service to vessels.—After extensive hearings on applications of Wisconsin Telephone Co., Ohio Bell Telephone Co. and Michigan Bell Telephone Co. for new VHF public class III-B coast stations at Milwaukee, Green Bay, Cleveland, Toledo, Hancock, Port Huron, Escanaba, East Tawas, and Marquette (dockets 11268-11270 and 11375-11380), an initial decision of August 7, 1957, recommended their denial. They had been protested by Lorain County Radio Corp. and Central Radio Telegraph Co. Decision was pending.

On July 6, 1956, the Commission acted (docket 11374) to delete the frequencies 6240 and 6455 kilocycles for use on the Mississippi River and connecting inland waters but, upon petitions by interested parties, stayed its action. After hearings during fiscal 1958 to determine the justification for permitting the use of these frequencies in derogation of the international radio regulations, a final decision of April 24, 1958, cancelled that part of the 1956 action which would have deleted the frequencies as of February 1, 1957. This action was taken on the basis of evidence that such operation was causing no harmful interference to foreign or domestic stations and was essential to an expanding industry serving the national economy.

Of the domestic public land mobile radio systems authorized to render service to vessels in areas where VHF public coast service is generally not available, 11 were licensed to miscellaneous common carriers and 105 were authorized to telephone companies.

Developmental domestic public aeronautical service.—In order to develop engineering and operational data relative to providing public radiotelephone service aboard private and commercial aircraft, which is a prerequisite to the Commission's establishment of a domestic

public aeronautical radio service on a regular basis, licenses were issued to the Illinois and Michigan Bell Telephone companies, on a developmental basis, for radio facilities to operate in the 450-460 megacycle band in the vicinity of Chicago and Detroit, respectively. Authorized to participate in those tests were 10 aircraft radio installations for the telephone companies and 27 installations aboard private and commercial aircraft.

No frequencies have yet been specifically allocated for such a service on a regular basis. However, reports indicate the tests were satisfactory and that the public demand for such service on a regular basis is substantial. As a consequence, A. T. & T. on behalf of the Bell System has petitioned the Commission for further rulemaking in docket 11995 to reallocate 2 megacycles of spectrum space to the domestic public radio services for establishment of a domestic public aeronautical service on a regular basis.

Rates and Tariffs

Private line service rates.—The general investigation which the Commission instituted on March 7, 1956, with respect to the lawfulness of rates and regulations of A. T. & T. and Western Union for private-line services and channels (dockets 11645 and 11646) continued during the fiscal year with hearings commencing February 18, 1958. On April 16, 1958, the Commission consolidated in these proceedings Docket 12194, relating to the justness and reasonableness of the charges of A. T. & T. for channels for data transmission. On June 25, 1958, it ordered a 15 percent interim reduction in revenues from private-line telephone grade service rates. On September 24, 1958, it suspended for 3 months proposed increased rates for private-line teletypewriter service for A. T. & T. and Western Union. Both companies subsequently filed further revised rates which were permitted to become effective December 2.

Bell System lease-maintenance service.—The 1957 annual report referred to the Commission's order of March 27, 1957, suspending new tariff schedules filed by A. T. & T. providing rates and regulations for the leasing and maintenance of equipment used by private mobile communication systems and ordering an investigation and hearing. Hearings were held during fiscal 1958 on the issue as to whether A. T. & T.'s contemplated service constitutes a common carrier communication service subject to Commission jurisdiction. On March 26, 1958, A. T. & T. asked for a determination of the issues as to its service prior to inquiring into matters relating to the present and proposed lease-maintenance operations of the other Bell companies. Further hearings were postponed pending Commission action on this motion. See also "Safety and Special Radio Services".

Off-the-air pickup TV transmission channels.—Hearings in the investigation instituted by the Commission on March 13, 1957, into the lawfulness of revised tariff schedules filed by A. T. & T. providing new rates and regulations for off-the-air pickup TV transmission channels (docket 11956), were continued without date by the hearing examiner on July 19, 1957, pending Commission action on an A. T. & T. petition to terminate the proceeding.

Tariff filings.—As of June 30, 1958, there were on file 802 telephone tariffs of 485 telephone carriers. During the year, 15,594 new or revised tariff schedules were received as well as 17 applications requesting special tariff permission.

Other Regulatory Matters

Depreciation.—During fiscal 1958, the Commission revised depreciation rates previously prescribed for 7 Bell companies, including 2 multistate companies serving 7 States. The new rates reflect both upward and downward adjustments in rates for the individual classes of plant. Due to a relatively heavy impact of obsolescence upon several categories of plant, however, the overall effect of the revised rates was a net increase of approximately 5.7 percent in annual depreciation charges by the companies involved.

The Commission also prescribed depreciation rates for telephone instruments and other categories of station equipment of each of the 23 Bell companies. This was necessary in connection with new rules of accounting for station equipment which the Commission adopted during fiscal 1957.

Depreciation expense charges of telephone companies continued to increase generally due to the increase in plant facilities. In the case of the 23 Bell companies, these charges aggregated \$814,742,000 during calendar 1957. This amount represents a further increase over 1956 because it includes for the first time depreciation charges resulting from the changes in accounting for station equipment. The additional amount, however, was largely offset by a reduction in current maintenance expense of substantially the same magnitude that would have prevailed under the old accounting rules for station equipment.

Separation procedures.—A general revision of the Telephone Separations Manual, which sets forth the procedures used by companies to separate and apportion their investment and expenses between interstate and intrastate operations, was completed by the Commission in October 1957 in cooperation with the National Association of Railroad and Utilities Commissioners. The revised manual incorporates basic changes which have been made in the procedures since the manual was first issued in 1947 and reflects technical revisions neces-

sitated by changes in the art of telephony and current regulatory requirements.

Western Electric earnings and prices.—The Commission, also in cooperation with NARUC, continued its review of the prices, earnings, and costs of Western Electric Co. Data developed are reported quarterly and annually to the various telephone regulatory commissions to assist them in their consideration of Western's prices insofar as they affect the revenue requirements of the Bell companies affiliated with Western.

In connection with its investigation of Bell private-line rates and regulations (docket 11645), the Commission had A. T. & T. present evidence on the reasonableness of Western Electric prices and profits.

Pensions and relief.—Pension plans of most Bell companies continued without change, except that certain companies have reduced the minimum service requirements with respect to sickness death benefits.

For the Bell System, including manufacturing and research activities, pension and other benefit costs (including Federal taxes for social security benefits) amounted to \$340 million in 1957 compared to \$312 million in 1956. The pension funds of these companies at December 31, 1957, aggregated about \$2.6 billion, a net increase of \$218 million. At the end of 1957 there were 22,783 men and 22,224 women receiving service pensions.

The earnings of the Bell companies' pension funds have been about 3 percent since 1954. The interest rate assumed for actuarial purposes remained at 3 percent, except that one company increased the rate to 3¼ percent. Certain of the Bell companies have amended their existing investment instructions to the trustee of the pension funds so as to authorize investment in common stocks to the extent of 10 percent of the fund. Previously, all Bell companies except one had restricted investment of the funds to debt securities.

Group life insurance coverage has been further extended and now includes most of the Bell employees.

Original cost accounting.—Accounting for a number of current acquisitions of plant was handled during the year, including the disposition of amounts in excess of original cost. It was determined that original cost accounting is applicable to acquisitions of plant from certain nontelephone public utility companies where the acquired plant is integrated into the telephone system of the purchaser.

Continuing property records.—Limited reviews and studies were made of the continuing property records of 4 Bell companies. Continuing property records maintained for central office equipment and the pricing of partial retirements of buildings, central office equip-

ment, and large private branch exchanges continued to receive attention.

Field studies and reviews.—Studies were made of certain of the accounts, records, and accounting procedures of 7 Bell companies. Attention was given, among other matters, to accounting for additions to and retirements of telephone plant, the establishment and maintenance of continuing property records, accounting for station apparatus and station connections, accounting for items included in materials and supplies, and costs associated with private line services. See also "Private line service rates".

A study is currently in progress which will trace the history and development of the General Telephone System from the date of its organization in 1935 to the present time.

Uniform systems of accounts.—A petition by General Telephone Corp., filed in 1956 on behalf of its operating telephone subsidiaries, requested an amendment of the system of accounts for large telephone companies to provide that amounts recorded as income tax expense should be unaffected by a taxpayer's decision to use one of the types of liberalized depreciation permitted by section 167 of the Internal Revenue Code of 1954 for tax purposes but not for accounting purposes. Proposed rulemaking (docket 11913) of January 17, 1957, requested comments as to appropriate amendments to all systems of accounts prescribed by the Commission. Numerous replies were received from State regulatory commissions, communication carriers, public accounting firms, and a labor union, and final action was pending. Only a few of the smaller telephone companies subject to the Commission's accounting jurisdiction are using liberalized depreciation. All these companies are "normalizing" income tax expense for accounting purposes as contemplated by the General Telephone Corp. petition pending resolution of the accounting questions presented in the rulemaking proceeding.

A. T. & T., on behalf of itself and the Bell companies, requested the Commission to amend the system of accounts for large telephone companies with respect to the accounting for amounts charged customers at the termination of service when such amounts are designed to cover the loss of investment in the particular case. The request is that the particular category of termination charges be made creditable to the depreciation reserve rather than to revenue accounts. It was under consideration at the close of the year.

The systems of accounts for telegraph carriers were amended (docket 12269) with respect to the accounting prescribed for costs of installation, equipment changes, and similar services, and the charges to customers in that connection. The provision that these costs, when accompanied by a lump-sum charge to customers in full

or partial reimbursement, should be charged to expense was changed to provide for capitalization of them as a part of the cost of plant.

Other telegraph accounting problems receiving attention relate to clearing accounts, improvements to leased premises, capitalization of overhead expenses and the accrual of interest during construction.

Preservation of records.—Under consideration at the close of the year was a request by RCA Communications, Inc., for waiver or amendment of certain provisions of the rules governing preservation of carrier records. The change requested is a relaxation of the rules to permit, after 5 years, microfilming of journal and cash vouchers together with supporting papers. The original records would be destroyed as a space conservation measure.

DOMESTIC TELEGRAPH

General

The Western Union Telegraph Co., the Nation's domestic telegraph system, serves the public through some 22,000 offices and a modern, highly mechanized network over which messages speed to destination, without manual retransmission, by electronic and pushbutton reperforator switching methods. The new system, which has greatly improved the capacity and efficiency of telegraph service, is part of Western Union's landline telegraph plant representing an investment of some \$351 million. These facilities are supplemented by teleprinter and facsimile (deskfax) equipment for electromechanical terminal handling of record communications for approximately 55,000 major telegraph customers.

Western Union's public message service accounts for 69 percent of its total landlines revenue. Its private line telegraph services are second with 15 percent. Though Western Union's leased private-line service revenues of over \$36 million in calendar 1957 continued to increase in fiscal 1958, the Bell System still handles the major part of the Nation's private-line telegraph business and also operates a teletypewriter exchange service (TWX), both of which compete directly with Western Union.

The telegraph company's private-line revenue increased approximately 14 percent in calendar 1957 over 1956, as compared with 19.7 percent in 1956. Bell's comparable percents of increase for its private-line telegraph service were 17.6 and 19.2, respectively. Its aggregate telegraph service revenues, including TWX, increased 13.2 percent in 1957, as compared with 14.1 percent in 1956. Bell's share of total landline telegraph revenues increased from 32.9 percent in 1956 to 35.1 percent in 1957.

Western Union also provides telegraphic money order service, commercial news (stock ticker and commodity prices) service, and various other nonmessage services.

Western Union's gross landline operating revenues for calendar 1957 totaled \$245,549,000 and exceeded the previous high in 1956 by more than \$7 million or approximately 3 percent. The increase resulted chiefly from higher telegraph rates effective in the latter part of 1956 and from continued growth in private-line service. Domestic message volume declined by 5 percent, from 151,600,000 messages in 1956 to 143,947,000 in 1957. The company's systemwide net income, including ocean-cable operations, was \$14,194,000 in calendar 1957 after Federal income tax provision. Comparable 1956 systemwide net income amounted to \$14,208,000.

Western Union's quarterly dividend was raised from 25 to 30 cents a share, effective July 15, 1957, the third increase since 1950. Dividends paid during 1957 were the highest in more than 25 years.

On June 1, 1958, Western Union concluded new wage agreements which will add, in the aggregate, approximately \$10,838,000 to its operating expenses on an annual basis. In consequence, Western Union obtained increased rates for certain services which are discussed under "Domestic telegraph rates."

Western Union, in the latter part of 1957, negotiated an agreement with The Chase Manhattan Bank of New York to assure availability of funds for near-term capital requirements. It enables the company to borrow up to \$10 million on notes maturing December 1, 1959, subject to extension at the company's option to December 1, 1960.

Western Union continued to follow a program of diversification to keep abreast of developments in electronics and allied fields. By the end of the fiscal year, it had acquired substantial interests in 5 companies associated with its own expanding development and research activities.

Services and Facilities

Modernization expenditures.—Western Union expended \$6,352,000 on modernization and plant improvement in 1957. This compares with \$6,267,000 in 1956. Total expenditures through 1957 were \$75,624,000. Following are program expenditures for 1957 and prior years, including projected expenditures on an estimated basis:

	Prior to 1957	During 1957	Subsequent to 1957 (estimated)	Total
Reperforator switching.....	\$36, 140, 000	\$1, 530, 000	\$6, 400, 000	\$44, 070, 000
Radio beam.....	3, 067, 000	1, 864, 000	8, 960, 000	13, 831, 000
Carrier equipment.....	24, 085, 000	2, 662, 000	6, 000, 000	32, 747, 000
Miscellaneous.....	5, 980, 000	296, 000	600, 000	6, 876, 000
Total.....	69, 272, 000	6, 352, 000	21, 900, 000	97, 524, 000

Reperforator switching.—Western Union continued to improve the operating efficiency of its reperforator switching system which pro-

vides for high-speed automatic and semiautomatic transmission of telegrams on a nationwide basis. More modern selective switching replaced earlier type reperforator switching centers at a number of larger tributary offices. A major step in the company's automation and mechanization program was taken in March 1958 when a number of Detroit telegraph customers were connected directly into the national reperforator network through their printing telegraph machines. The customers' teleprinter circuits terminated formerly in the central telegraph office where their messages were retransmitted manually. The new system eliminates manual retransmission and thereby provides faster and more efficient service.

A new program of installing page teleprinters on local receiving positions was initiated at Western Union's 15 high-speed message centers and it is estimated that, within a year, page reception will have displaced practically all teleprinters used for this purpose. Reception on page printers eliminates the gumming function inherent in tape printer operation and results in higher productivity and faster handling. Further improvements are being effected by special application of page teleprinters. At larger message centers, groups of trunk lines are being terminated in unattended page printers of a new high-speed "burster" type developed by the company. As each message arrives, the page machine automatically bursts (or tears) it off, ejects it from the machine and deposits it on a moving belt leading to a routing position. At smaller centers, another special page teleprinter is being installed which receives messages in both perforated tape and page form, thus permitting direct switching to customer's teleprinter, delivery by facsimile, or physical delivery as indicated.

Radio beam.—Operational service was started April 1, 1958, on the extension of the Western Union microwave system from Pittsburgh to Cincinnati and Chicago. Of the initial 60 intercity voice bands made available, 43 are now in multichannel teleprinter service. The net leased facility savings in rentals will approximate \$240,000 annually. The extension of the radio beam to Chicago will provide over 500,000 channel miles, about 90 percent of which will be available for leasing to industry and Government.

Expansion is now underway to develop to full capacity the 32 voice bands on the New York-Philadelphia section of the Western Union radio relay system. This project is expected to be completed during 1958. Photogrammetric survey to determine tower heights for extensions of microwave facilities to Kansas City via St. Louis, and from Chicago eastward to Detroit and Cleveland, was completed in the spring of 1958. Relay sites for these extensions are now being purchased.

Carrier equipment.—The company added 201,000 telegraph channel miles during the year, so that as of June 30, 1958, there were 4,327,000 such miles in operation. Sixty percent of this mileage was derived on voice frequency facilities leased from the Bell System at an annual rental of \$3,600,000. Western Union carrier equipment is used to derive the telegraph channels from the leased voice frequency facilities. The voice frequency bands, in many instances, provide as many as 20 telegraph channels.

Private wire systems.—Private wire and facsimile systems, leased by Western Union to industry and Government, continued to grow. During calendar 1957, resulting revenue increased by approximately 14 percent. Facilities used in this service totaled 2,533,251 miles, an increase of 152,351.

The second of 5 new fully automatic message centers for the Air Force was put into service at Sacramento in June. All five centers are scheduled for completion by the end of 1958. Western Union has also contracted for the construction and sale of similar electronic automatic communications equipment for use at Air Force overseas bases. This will permit the rapid and automatic exchange of messages among Air Force bases throughout the world.

An extensive private wire system designed for use in reporting admissions of hospital patients was installed for the Blue Cross hospital service. The high-speed, 18,000-mile network interconnects Blue Cross offices in 86 cities coast-to-coast, including 5 in Canada. Another system, linking 83 cities in the United States, Canada, and Mexico, was installed for United Press International for the distribution of sports news.

The number of companies using private wire systems for data transmission purposes, as well as for the movement of ordinary communications, continued to grow. Special systems were engineered for companies in the aeronautics, metals, insurance, and construction fields.

Western Union's various types of leased facsimile systems, known as "intrafax," are now producing annual revenue of more than \$1 million. The service, only 4 years old, is growing at a steady pace with more than 1,700 units using nearly 10,000 miles of circuits now in operation. Special types of facsimile equipment have been developed for leasing, such as "ticketfax." Ticketfax transmits a ticket in seconds and has been used by the Pennsylvania Railroad. A modified form has been under trial in stock brokerage service. The growth of intrafax will be increased with the installation of a 12,000-mile leased facsimile network for the Air Force for transmitting weather maps. It will link 49 stations coast-to-coast.

Facsimile and teleprinter tielines.—At the end of fiscal 1958, there were 33,700 "deskfax" tielines in service in 155 cities. The pro-

gram of extending this system of facsimile pickup and delivery of telegrams looks to 3,950 additional installations in customers offices during the next 12 months. Tieline service is also furnished with teleprinter equipment to 20,900 telegraph patrons. A small percentage of deskfax tielines represents replacement of tape teleprinter tieline installations, usually due to the patron's preference for the facsimile equipment and mode of operation. Approximately 1,000 teleprinters released from tieline service have been reassigned to meet requirements for special service and events, for seasonal use, and to provide supplemental spare equipment to facilitate the maintenance of service.

The program of furnishing larger users of telegraph with direct tieline connections into the Western Union reperforator system was continued during 1958, and 92 such teleprinter links were added. This brought the total number to approximately 350. Based upon field surveys, equipment is being earmarked to provide direct connections for 80 more heavy users of telegraph service.

In addition to the benefits of more convenient and speedier service, customers having direct wire connections with telegraph offices receive a discount of 20 cents on each prepaid domestic message in excess of 50 a month.

Electronic data processing.—Western Union, in fiscal 1958, inaugurated a nationwide electronic data processing system using its public message network for the automatic, high-speed transmission, by perforated tape, of the company's own multimillion-dollar payrolls, equipment inventories, and other statistical information. The data processing system uses 17,000 miles of public message network. The need by business firms for transmission of large quantities of data by telegraph is a subject of research and development by Western Union. This research is dealing currently with the transmission of data at higher speeds in private data processing systems and development of reliable error-detecting equipment, a fundamental requirement in most data transmission systems.

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 correspondents throughout Canada 24 hours a day for instant, automatic, two-way telegraph communication at special time-distance rates. It is operated jointly by Western Union and the Canadian National and Canadian Pacific telegraph companies. During the initial trial period, the service will be available to 100 subscribers in New York City who will be able to communicate directly with some 1,500 business firms in 21 major Canadian cities. The experience gained from the New York City

installation should aid the company in determining the desirability of extending TELEX to the other cities in this country. (For TELEX charges see "Rates and tariffs.")

Supplementation and extension of wire facilities.—The Commission approved nine Western Union applications for the supplementation and extension of wire facilities. The requests involved the leasing of 1,044,000 telegraph channel miles at an annual rental of \$1,240,000 and the construction of 53,900 additional miles and associated equipment at a cost of approximately \$5,245,000. The company estimated that approximately 90 percent of these facilities would be required to meet the rapidly increasing needs of customers for private wire telegraph services and the remainder would be used for extension of lines and improvement of message telegraph and other services.

Curtailment of service.—At the beginning of the fiscal year there were pending before the Commission 78 applications by Western Union for authority to discontinue, reduce, or impair service. During the year, 1,015 applications were filed, all but 1 by Western Union, as compared with 931 applications the previous year. Of the 1958 total, 965 were granted, 3 were granted in part, and 13 were withdrawn. As of June 30, 1958, there were 112 such applications pending.

Approximately two-thirds of the applications filed in fiscal 1958 requested authority to close agency offices generally handling negligible amounts of traffic, such as telephone-operated agencies and railroad-operated agencies closed as a result of action by the railroads or renegotiation of the railroad contracts. The bulk of the remaining applications sought to close or reduce hours of service at company-operated main and branch offices. As a general rule, substitute service was made available in all cases where offices were closed or hours reduced.

Western Union's program of providing its customers with direct wire connections, by deskfax and teleprinter, is diminishing the need for public street offices, especially those whose primary function is the delivery and pickup of relatively small volume of telegrams. Savings effected by office closures and hour reductions from 1947 through 1957 are estimated by Western Union to be about \$9 million a year.

Speed of service.—Western Union is required by the Commission to conduct daily studies of the speed of service accorded messages at the 25 largest telegraph cities and to report monthly summaries. Its reports show the average office relay drag (time required for a message to pass through a large message center) and the average origin-to-destination speed (interval between the time a message is filed by sender and the time it is delivered to addressee, or first attempt). A

comparison of the average speed of service in minutes reported by Western Union for the past 8 fiscal years follows:

Fiscal year	Message center	Origin to destination delivered by—		
		Telephone	T'el'line	Messenger
1951.....	8.7	41.2	37.9	45.4
1952.....	8.5	41.6	37.5	45.1
1953.....	8.4	43.0	37.8	46.2
1954.....	8.4	43.7	37.9	47.2
1955.....	7.3	39.6	34.4	43.0
1956.....	7.5	39.1	34.1	43.0
1957.....	7.6	39.5	34.3	43.5
1958.....	7.6	39.7	33.9	43.5

On June 18, 1958, the Commission proposed to amend subpart B of part 64 of the rules relating to domestic telegraph speed-of-service studies. This is deemed desirable because of changes in operating procedures resulting from technological developments. Among other things, it would increase the number of cities from 25 to 75 at which speed-of-service studies would be made.

The speed, quality, and adequacy of telegraph service are an important part of the regulatory function and, to the extent that the budget permits, studies and on-the-spot investigations are made to determine service conditions. These studies and inspections have had a salutary effect on the offices inspected and on service generally. During the year, investigations of on-the-ground service conditions were limited principally to inspections by Common Carrier Bureau field offices in New York, St. Louis, and San Francisco of some 190 telegraph offices located in or near those cities. Commission field engineering personnel assisted by making routine inspections of the speed-of-service performance at 35 Western Union offices and agencies. The bureau headquarters reviewed telegraph service conditions in general at certain of the larger message centers and made a limited number of inspections of service performance following the closure of branch offices.

Rates and Tariffs

Domestic telegraph rates.—On July 1 and 14, 1958, Western Union filed revised tariff schedules, effective August 1 and on subsequent dates in 1958, increasing rates for interstate message telegraph, press, money order, and miscellaneous services. The revised rates are expected to produce about \$10 million additional revenue a year to offset a \$10,838,000 annual increase in operating expenses resulting from wage contracts negotiated in June of 1958. The overall average effect is an increase in the cost of these telegraph services to the public approximating 7 percent.

See "Private line service rates" in telephone section concerning the proceeding in dockets 11645-6 and 12194 involving both Western Union and A. T. & T.

Effective May 15, 1958, a new Western Union tariff established rates and regulations for TELEX service between New York, N. Y., and certain points in Canada. It provides for a nonrecurring charge of \$15 for installing the station equipment, a monthly service fee of \$35 per station, plus the transmission usage charges. The usage charges are based on units called "pulses" recorded on automatic metering devices. Each pulse is charged for at a fixed rate of 2½ cents. Twenty pulses are charged for each call, plus pulses based on the duration of the connection and the distance between the cities involved. The charge for a 1-minute TELEX call, for example, from New York City to Montreal, a distance of 300 miles, is 87½ cents. Similarly a 1-minute TELEX call from New York City to Victoria, B. C., 2,500 miles, the most distant point, costs \$1.25. (For further description of TELEX service see "Services and Facilities.")

Western Union amended its tariff schedules, effective March 29, 1958, establishing rates and regulations applicable to new items of Plan 55 Automatic Switching Equipment, which were designed to meet the requirements of the Air Force for use in 5 switching centers in its domestic telegraph communications network.

It was reported last year that Western Union had requested increased and revised divisions of charges for its domestic landline handling of international telegraph message traffic, and that the Commission instituted an investigation (docket 11953), among other things, into the lawfulness of the charges for domestic telegraph service and international traffic; of the classifications, practices, and regulations affecting such charges; and the divisions of charges applicable to the landline handling of international traffic by Western Union within the continental United States. Public hearings were continued during the latter half of 1957 and the first part of 1958. In July 1958, the Commission increased charges for international message telegrams by about \$4,200,000 a year, effective August 1, of which Western Union will receive about \$2,260,000.

Leased facilities services.—As reported during the past 2 years, the Commission instituted an investigation (docket 11646) into the lawfulness of the charges, classifications, regulations, and practices in connection with the leased facilities services of Western Union, which was consolidated with investigations of all private-line services of the Bell System (except broadcast transmission). During the year, hearings were continued in examining the voluminous cost material and rate proposals submitted by the carriers. (For further details see "Domestic Telephone.")

Tariff schedules.—During the year, carriers filed 802 pages of domestic telegraph tariff material and 25 applications for permission to file tariff schedules effective on less than 30 days notice.

INTERNATIONAL TELEGRAPH AND TELEPHONE

General

Ten telegraph carriers and one telephone carrier provided a rapid, efficient wire and radio communication service between the United States and the rest of the world.

Telegraph service between the United States and overseas and foreign points was offered by 4 cable and 6 radio carriers. Radiotelephone and cable service was furnished by A. T. & T. to 122 points around the globe, service having been initiated during the year to Afghanistan, Bulgaria, Martinique, St. Helena, and Netherlands New Guinea. Radiotelegraph service to ships at sea was furnished by a number of radiotelegraph carriers while A. T. & T. offered high seas radiotelephone service to ships equipped for this service.

The volume of international message telegraph traffic increased for the fourth consecutive year, attaining a new postwar high of 607,538,047 words for calendar 1957. This was 9,022,951 words (1.5 percent) more than the previous high year of 1956. Likewise, the volume of overseas telephone calls reached a new high of 2,166,938, an increase of 18.9 percent over 1956. Revenues from such service (including associated landline charges) climbed to \$21,551,668, which was 20.9 percent higher than the previous year. Calendar 1957 was the first full year the transatlantic telephone cables were in service and transatlantic calls increased 33 percent over the previous year. The cable to Hawaii was placed in service in October 1957 and calls to Hawaii rose 17.7 percent during that calendar year.

Gross operating revenues reported by 9 cable and radio carriers (1 small cable carrier does not report) offering telegraph service between the continental United States and overseas and foreign points totaled \$76,845,286 for calendar 1957. This was an increase of \$3,372,837 or 4.6 percent. Gross operating revenues from message telegraph traffic increased \$768,524 or 1.4 percent. In the same period, gross revenues from such special services as international teletypewriter exchange service (TELEX or TEX), leased channel service, and other communication services increased 17.2 percent. International teletypewriter exchange service, in particular, continued its phenomenal growth, the number of calls increasing 86.3 percent during 1957 to a total of 263,728.

The increase in gross revenues of the international telegraph carriers was more than offset by an 8.9 percent increase in expenses.

As a result, net revenues in 1957 were \$10,586,526, which represented a decrease of \$2,024,208 or 16.1 percent as compared with 1956 revenues. The international carriers, as of December 31, 1957, had a gross investment in communications plant and equipment of \$149,439,860, an increase of \$9,621,830 or about 6.9 percent over 1956, and a net investment, after depreciation allowances, of \$69,371,677.

International conferences.—The Commission was represented at the meeting of study group 2/1 of the International Telegraph and Telephone Consultative Committee (CCITT) in December 1957 in Geneva, Switzerland (which prepared recommendations with respect to international telegraph message classifications and rate structures, word count, and operating regulations), and the meeting of study group 8 of the CCITT in May 1958, in Poland (which studied the requirements and possibilities of a new telegraph alphabet that could be applied to telegraph printers to provide all the symbols and functions of standard typewriters). The decisions reached by the study groups were in general agreement with the positions of the United States delegations.

The Commission participated in the preparatory work and meeting of the Administrative Telegraph and Telephone Conference in Geneva in September 1958. The United States proposals for the revision of the International Telegraph Regulations (Paris 1949) have been sent to the International Telecommunications Union for publication and distribution to all members of the ITU.

International Services

Telegraph.—At the close of fiscal 1958, direct telegraph service by means of radio was being provided by 6 United States companies to 84 foreign countries and the territories of Hawaii and Puerto Rico. Direct telegraph service by means of submarine cables is provided between the United States and European, Caribbean, and South American countries by four companies. Practically every country in the world is served by interconnection between these radio and cable systems and systems in foreign countries. In the Pacific, the only submarine cables now being operated by United States companies are the telephone cables to Hawaii and Alaska which also handle nonmessage telegraph services.

There is an increasing proportion of the customer-to-customer types of services on which charges are levied on a time basis. These services include international teletypewriter exchange services called **TELEX** or **TEX** and the leased-line types of services. One submarine cable company renders a similar service called **IMCO**, which is charged on either a "per character" or on a time basis. The companies continue

to increase and improve their facilities for handling these customer to customer services.

Western Union and Commercial Cable Co., which operate cables between the United States and France, have offices in Havre and Paris under long term concessions from the French Government. The French Administration of Posts, Telegraphs and Telephones has notified these companies that, effective September 1, 1958, their operation in France must terminate. Western Union and Commercial are presently negotiating for French operation of the companies' facilities in that country and for divisions of tolls on the traffic routed over the facilities.

The British Government recently granted cable landing licenses for a period of 25 years to Western Union and Commercial for their cable terminals in the United Kingdom.

Telephone.—In the international telephone field the repeated type of submarine cable is the most important development in recent years. Twin cables of this type are now in operation between the United States and Great Britain (via Canada), Cuba, Hawaii, and Alaska. In addition, it is expected that similar cables will soon be placed in service to France and to Puerto Rico.

Although a large volume of telephone traffic is being handled by these cables, the need for standby radio facilities, the impracticality of providing direct cable service to other than high volume points, and the continuing increase in volume of telephone traffic require that radiotelephone facilities be maintained and improved. At the close of the fiscal year the telephone carrier was in process of adding high power amplifiers at its New York radio station for improving service to Europe. Sixty foreign countries and the Territories of Puerto Rico and Hawaii are now being served by direct radiotelephone circuits.

During the fiscal year regular radiotelephone service was inaugurated over "scatter" circuits between Florida and Cuba, and between Puerto Rico and the Dominican Republic.

Docket Cases

Puerto Rico applications.—Oral argument was held April 7, 1958 on exceptions of RCA Communications, Inc. (RCAC), to a supplemental initial decision looking toward a grant of the applications of Mackay Radio & Telegraph Co., Inc., 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 an emergency basis (docket 10056).

Western Union divestment.—On July 9, 1958, the Commission adopted a final decision ordering Western Union to present by December 31, 1958, a plan for divestment of its international telegraph operations under which divestment would be effected within 6 months after approval of the plan by the Commission. This decision has been appealed by Western Union to the United States Court of Appeals for the Second Circuit. Divestment is required by section 222 of the act as a condition to the merger of Western Union and Postal Telegraph. In 1943 when the Commission approved the merger (docket 6517) it ordered Western Union to divest its international telegraph operations within 1 year. From 1943 to 1952 annual extensions of time were granted upon petitions by Western Union alleging that after the exercise of due diligence it was unable to divest within the time specified. In 1952 the Commission instituted an investigation (docket 10151) into all the matters relating to the divestment requirement and held extensive hearings thereon during 1952-1954. The proceeding culminated in the final decision referred to above.

Far East traffic.—Hearings were concluded February 13, 1958, on complaint of RCAC, alleging that Western Union was illegally handling traffic to various Far Eastern points over its cable system via London, which traffic RCAC claims should be distributed only to international telegraph carriers entitled to share in traffic destined to area C under the terms of the international formula (dockets 11364 and 11663). The matter was awaiting an initial decision.

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 Commission decision.

Mackay offer of free TELEX equipment.—On May 12, 1958, Mackay petitioned to withdraw its exceptions to an initial decision holding unlawful certain tariff revisions offering to furnish automatic teleprinter equipment without charge to users of its TELEX service in the gateway cities and Honolulu (docket 11900). On July 30, 1958, the Commission granted this petition and made the initial decision final.

International telegraph rates.—As noted in the 1957 report, Western Union, in November 1956, requested increased and revised divisions of charges for its domestic land line handling of international telegraph message traffic. On March 13, 1957, the Commission ordered an investigation into, among other things, the lawfulness of the divi-

sions of charges for the land line handling of international telegraph traffic by Western Union inside the United States, and the lawfulness of the charges for international telegraph traffic (docket 11953). After hearing, an initial decision was issued July 23, 1958, which, on motion of various parties, was made final on July 30. It increased charges for international message telegrams by about \$4.2 million.

Radiotelephone service to Hawaii.—This proceeding involved mutually exclusive applications of The American Telephone and Telegraph Co. (docket 11954) and of RCAC, (docket 11955) to communicate by radiotelephone with Hawaii from their respective transmitting stations in the vicinity of San Francisco. Hearings were concluded July 30, 1957. An initial decision of April 2, 1958, looked toward granting the A. T. & T. applications and denying those of RCAC except the latter's request for authority to provide nonmessage radiotelephone services to Hawaii via its proposed Bolinas, Calif., radiotelephone station. Exceptions were filed by RCAC and the matter is awaiting oral argument.

Western Union practices under international formula.—Hearings on requests of American Cable & Radio Corp. and RCAC that the Commission rule upon the lawfulness under section 222 of the act and the international formula of certain Western Union practices in soliciting and routing outbound international telegraph message traffic have been, by agreement of the parties, postponed indefinitely to permit them to attempt to arrive at a stipulation as to the relevant facts (dockets 9369 and 11298).

Circuits to Turkey and Israel.—As reported previously, applications of Mackay and RCAC to communicate with Ankara, Turkey (docket 10360), have been consolidated with 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). However, at the request of the parties, no date has been set for these hearings.

Western Union-Globe and Tropical contracts.—On November 13, 1957, the Commission approved an agreement concerning damages to be paid to the Commercial Pacific Cable Co. (which is no longer in business) arising out of certain contracts between Western Union and Globe Wireless, Ltd., and Tropical Radio Telegraph Co., for the exchange of international telegraph traffic filed with Western Union, which contracts had previously been held illegal (docket 9292), and terminated the proceeding (a damage settlement had already been approved for the other complainants).

Canadian traffic transiting United States.—This proceeding involved complaint that Western Union was in violation of both the

international and the Canadian formulas by failing to transfer to RCAC certain traffic destined for transpacific points which Western Union received from Canadian National Telegraphs (dockets 10984 and 11873). The parties reached an agreement and RCAC filed a motion to dismiss. On November 13, 1957, the Commission dismissed the complaint and terminated the proceeding.

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 appendix 2 of the international formula. Mobile Marine Radio has asked that no action be taken on its petition pending the outcome of these negotiations.

Tariff Schedules, Contracts, and Miscellaneous Reports

During fiscal 1958, international telegraph carriers filed 1,049 tariff schedules, 48 applications for permission to file tariff schedules effective on less than statutory notice, 217 division of tolls statements, 120 reports of negotiations with foreign administrations and carriers, 996 contracts and amendments to contracts in compliance with requirements of the act and the rules and regulations.

Rate Level and Structure

With the exception of a few minor adjustments, the rates for telegraph messages from the United States and its possessions to foreign and overseas points remained unchanged during fiscal 1958. As a result of British Government action, the rates for messages from the United Kingdom to the United States were increased, making the rate level higher than in the reverse direction. On traffic from other overseas or foreign points to the United States and its possessions, there were a few increases resulting from so-called surcharges authorized or imposed by some Latin American countries.

Other Regulatory Matters

Relief and pensions.—For purposes of determining the effect of pension cost upon operating expenses, the Commission continued its general studies of the pension and benefit plans of the international telegraph carriers.

Depreciation.—Further progress was made, in cooperation with the carriers, in developing data to be used as a basis for prescribing depreciation rates for the remaining carriers, as required by section 220 (b) of the act, and in reviewing the previously prescribed depre-

ciation rates, but no depreciation rates were prescribed in fiscal 1958. The carriers' depreciation accounting practices, depreciation charges, and their booked depreciation reserves were reviewed to ascertain their reasonableness for ratemaking purposes. There were no indications that revisions of the prescribed depreciation rates were necessary.

Continuing property records.—Except for limited adjustments which are under review, substantial compliance with the Commission's rules which require the establishment of satisfactory property records was effected in fiscal 1958 by all carriers except one. Continued reviews were made of the other carriers' property records to ascertain the regulatory effectiveness, as well as the need for revisions, of such records. They indicated that the records were being maintained satisfactorily.

Accounting compliance.—The Commission continued its general studies and field reviews of the carriers' accounts and accounting practices with the view of determining their compliance with the Commission's rules. Substantial compliance was indicated.

STATISTICS

General

Annual reports were filed by 460 common carriers and 6 controlling companies for the calendar year 1957. Considerable financial and operating data taken principally from these reports are published annually in a volume entitled "Statistics of the Communications Industry in the United States" (see appendix list of Commission publications sold by the Superintendent of Documents). 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 by common carriers included those from 82 telephone carriers and 369 miscellaneous (nontelephone company) land mobile radiotelephone carriers. Of the 82 telephone carriers, 50 offered mobile radiotelephone service, including 21 carriers not otherwise subject to the reporting requirements of the Commission. The reports of the 369 miscellaneous carriers show that their operating revenues for 1957 totaled \$2.6 million. More than half of these carriers reported operating losses for 1957.

Selected financial and operating data concerning telephone carriers for 1957 as compared to 1956 are shown in the following table:

Telephone carriers¹

Item	1956	1957	Percent of increase or (decrease)
Number of carriers.....	56	54	
Book cost of plant (as of Dec. 31).....	\$18,081,317,347	\$20,316,808,742	12.36
Depreciation and amortization reserves.....	4,332,266,533	4,607,305,839	6.35
Net book cost of plant.....	13,749,050,814	15,709,502,903	14.26
Local service revenues.....	3,554,189,627	3,852,221,038	8.39
Toll service revenues.....	2,276,537,652	2,469,212,216	8.46
Total operating revenues.....	6,122,272,522	6,641,626,045	8.48
Operating expenses and operating taxes.....	4,547,931,559	4,914,791,480	8.07
Provision for Federal income taxes.....	733,974,937	792,742,538	8.01
Net operating income after all taxes.....	840,366,026	934,092,027	11.15
Net income.....	782,753,906	861,415,613	10.05
Dividends declared.....	563,287,333	626,288,906	11.18
Company telephones:			
Business.....	15,568,852	16,303,803	4.72
Residence.....	37,103,938	39,536,434	6.56
Number of calls originating during the year:			
Local ²	81,437,603,661	87,851,859,049	(3)
Toll ²	2,901,364,425	3,137,306,177	(3)
Number of employees at end of October.....	683,020	686,959	.58
Male.....	263,396	272,519	3.46
Female.....	419,624	414,440	(1.24)
Total compensation for the year.....	\$2,954,335,788	\$3,121,679,345	5.66

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 1957, due to enlargement of numerous local calling areas.

The Commission is empowered by the Communications Act to require the filing of reports only by "fully subject" telephone companies. These include most of the larger companies (accounting for over 90 percent of the industry revenues) but exclude the great majority of the 4,000 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 1957 totaled \$7.2 billion with book cost of plant at December 31, 1957, of \$22.4 billion, and 759,000 employees.

Telephone by States

There were approximately 63,600,000 telephones in use in the United States at the beginning of the calendar year 1958 (excluding approximately 200,000 private line telephones). Of this number 52,300,000 were owned by American Telephone & Telegraph and its principal telephone subsidiaries (Bell System), 1,630,000 by Bell associated companies in the Connecticut and the Cincinnati, Ohio areas, and 9,670,000 by independent telephone companies.

A tabulation follows:

State	Total number of telephones	Distribution of telephones			
		By ownership		By type of service	
		Bell System	All other	Business	Residence
Alabama.....	708,600	613,300	95,300	186,900	521,700
Arizona.....	321,500	311,000	10,500	115,300	206,200
Arkansas.....	356,600	273,600	83,000	105,900	250,700
California.....	6,451,600	5,244,000	1,207,000	1,984,000	4,467,600
Colorado.....	654,900	635,400	19,500	206,900	448,000
Connecticut.....	1,140,900	24,600	1,116,300	316,700	824,200
Delaware.....	190,000	190,000		55,000	135,000
District of Columbia.....	581,400	579,300	2,100	278,100	303,300
Florida.....	1,507,500	1,027,400	480,100	517,400	990,100
Georgia.....	972,400	841,000	131,400	288,000	684,400
Idaho.....	198,500	157,600	40,900	53,900	144,600
Illinois.....	4,122,400	3,484,200	638,200	1,247,700	2,874,700
Indiana.....	1,624,700	1,033,400	591,300	407,200	1,217,500
Iowa.....	1,025,700	652,700	373,000	218,600	807,100
Kansas.....	793,900	634,200	159,700	191,600	602,300
Kentucky.....	684,000	467,700	216,300	175,200	508,800
Louisiana.....	884,300	841,800	42,500	241,800	642,500
Maine.....	280,800	253,100	27,700	76,300	204,500
Maryland.....	1,108,800	1,089,100	19,700	291,100	817,700
Massachusetts.....	2,097,500	2,093,400	4,100	593,900	1,503,600
Michigan.....	2,989,100	2,690,900	298,200	768,700	2,220,400
Minnesota.....	1,215,900	950,400	265,500	300,300	915,600
Mississippi.....	352,500	339,000	13,500	98,100	254,400
Missouri.....	1,534,500	1,287,600	246,900	416,000	1,118,500
Montana.....	220,700	189,300	31,400	61,000	159,700
Nebraska.....	513,800	263,200	250,600	127,000	386,800
Nevada.....	93,800	44,900	48,900	39,100	54,700
New Hampshire.....	194,500	185,000	9,500	51,000	143,500
New Jersey.....	2,560,100	2,512,400	47,700	676,800	1,883,300
New Mexico.....	229,900	191,000	38,900	87,800	142,100
New York.....	7,896,900	7,336,900	560,000	2,523,700	5,873,200
North Carolina.....	947,800	622,600	425,200	269,800	678,000
North Dakota.....	166,700	110,000	56,700	41,900	124,800
Ohio.....	3,663,100	2,414,800	1,248,300	931,100	2,732,000
Oklahoma.....	777,900	686,500	91,400	230,700	547,200
Oregon.....	629,700	504,500	125,200	177,200	452,500
Pennsylvania.....	4,533,200	3,819,400	713,800	1,130,800	3,402,400
Rhode Island.....	312,100	302,600	9,500	85,300	226,800
South Carolina.....	452,300	340,800	111,500	128,100	324,200
South Dakota.....	194,900	148,800	46,100	48,200	143,700
Tennessee.....	953,100	836,900	116,200	250,400	702,700
Texas.....	2,931,700	2,454,600	477,100	902,100	2,029,600
Utah.....	304,200	287,800	16,400	84,500	219,700
Vermont.....	118,100	103,700	14,400	31,800	86,300
Virginia.....	1,114,100	900,400	213,700	323,500	790,600
Washington.....	1,063,300	845,300	218,000	302,700	760,600
West Virginia.....	478,600	427,400	51,200	120,200	358,400
Wisconsin.....	1,359,700	1,005,600	354,100	366,000	983,700
Wyoming.....	112,700	102,800	9,900	35,400	77,300
United States.....	63,620,900	52,252,500	11,368,400	18,160,700	45,460,200

Domestic Telegraph Carrier

The following table sets forth financial and operating data relating to the domestic land line operations of The Western Union Telegraph Co. for the calendar year 1957 as compared to 1956. The data pertaining to its cable operations are included in tables showing data of international telegraph carriers.

The Western Union Telegraph Co.¹

Item	1956	1957	Percent of increase or (decrease)
Book cost of plant (as of Dec. 31)	\$332,726,471	\$350,859,633	5.45
Depreciation and amortization reserves	141,489,718	147,334,384	4.13
Net book cost of plant	191,236,753	203,525,249	6.43
Message revenues	192,473,810	194,248,819	.92
Total operating revenues	238,361,660	245,548,609	3.02
Operating expenses, depreciation, and other operating revenue deductions	219,231,379	228,219,321	4.10
Net operating revenues	19,130,281	17,329,288	(9.41)
Provision for Federal income taxes	² 8,665,000	² 5,993,000	(10.08)
Net income	12,059,604	12,911,194	7.06
Net income (land line and cable systems)	14,207,510	14,194,036	(.09)
Dividends (land line and cable systems)	8,326,395	7,165,272	15.08
Number of revenue messages handled ³	151,599,945	143,946,655	(5.05)
Number of employees at end of October	37,754	36,467	(3.41)
Total compensation for the year	\$153,624,446	\$159,157,308	3.80

¹ Represents data for land line operations. Figures covering cable operations are included in tables below showing data of international telegraph carriers.

² Reflects estimated reductions in Federal income tax liability of \$1,248,000 and \$1,768,000 in 1956 and 1957, 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 estimated reductions in Federal income tax liability of \$477,600 and \$303,600 in 1956 and 1957, respectively, arising from the use 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 9,604,000 in 1956, and about 9,724,000 in 1957).

International Telegraph Carriers

Financial and operating statistics relating to the United States international telegraph carriers for the calendar year 1957 are here shown as compared with similar figures for 1956. Statistics pertaining to radiotelegraph and ocean cable carriers are shown separately.

International telephone carriers

Item	1956	1957	Percent of increase or (decrease)
Number of carriers	10	9	-----
Book cost of plant (as of Dec. 31)	\$139,818,030	\$149,439,860	6.88
Depreciation and amortization reserves	77,620,657	80,068,183	3.14
Net book cost of plant	62,188,373	69,371,677	11.55
Message revenues:			
Domestic ¹	2,487,600	2,500,804	.53
Transoceanic	49,855,926	50,399,799	1.09
Marine	1,719,825	1,931,272	12.29
Total operating revenues	73,472,449	76,845,286	4.59
Operating expenses, depreciation, and other operating revenue deductions	60,861,715	66,258,760	8.87
Net operating revenues	12,610,734	10,586,526	(16.05)
Provision for Federal income taxes	5,782,600	5,385,905	(6.86)
Net income	6,185,942	5,200,790	(14.29)
Dividends declared ²	1,483,670	1,783,670	20.22
Number of revenue messages handled:			
Domestic ³	154,265	152,641	(1.05)
Transoceanic	23,776,149	24,143,486	1.54
Marine	1,105,356	1,156,680	4.64
Number of employees at end of October	11,306	11,502	1.73
Total compensation for the year	\$41,288,294	\$41,993,931	(*)

See notes after "Ocean cable carriers."

Radiotelegraph carriers

Item	1956	1957	Percent of increase or (decrease)
Number of carriers.....	7	6	
Book cost of plant (as of Dec. 31).....	\$45,450,062	\$53,115,420	16.87
Depreciation and amortization reserves.....	19,603,028	21,287,387	8.59
Net book cost of plant.....	25,847,034	31,828,033	23.14
Message revenues:			
Domestic ¹	2,285,729	2,306,364	.90
Transoceanic.....	26,525,460	27,196,393	2.53
Marine.....	1,719,825	1,931,272	12.29
Total operating revenues.....	39,102,062	41,403,043	5.88
Operating expenses, depreciation, and other operating revenue deductions.....	31,039,618	33,378,493	7.54
Net operating revenues.....	8,062,444	8,024,550	(.47)
Provision for Federal income taxes.....	4,307,600	3,770,905	(12.46)
Net income.....	4,057,682	5,435,284	33.95
Dividends declared.....	600,000	900,000	50.00
Number of revenue messages handled:			
Domestic ²	50,111	57,533	14.81
Transoceanic.....	12,951,547	13,672,370	5.57
Marine.....	1,105,356	1,156,680	4.64
Number of employees at end of October.....	5,241	5,401	3.05
Total compensation for the year.....	\$24,819,044	\$24,118,840	(4)

See notes after "Ocean cable carriers".

Ocean cable carriers (including Western Union cable operations)

Item	1956	1957	Percent of increase or (decrease)
Number of carriers.....	3	3	
Book cost of plant (as of Dec. 31).....	\$94,367,968	\$96,324,440	2.07
Depreciation and amortization reserves.....	58,026,629	58,780,796	1.30
Net book cost of plant.....	36,341,339	37,543,644	3.31
Message revenues:			
Domestic ¹	201,871	194,440	(3.68)
Transoceanic.....	23,330,466	23,203,406	(.55)
Total operating revenues.....	34,370,387	35,442,243	3.12
Operating expenses, depreciation and other operating revenue deductions.....	29,822,097	32,880,267	10.25
Net operating revenues.....	4,548,290	2,561,976	(43.67)
Provision for Federal income taxes.....	1,475,000	1,615,000	9.49
Net income.....	2,128,280	485,506	(77.19)
Dividends declared ²	883,670	883,670	
Number of revenue messages handled:			
Domestic ³	104,154	95,108	(8.69)
Transoceanic.....	10,824,602	10,471,116	(3.27)
Number of employees at end of October.....	6,065	6,101	.59
Total compensation for the year.....	\$16,469,250	\$17,875,091	8.54

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 land line operations of that company and are excluded from this table.

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

⁴ Not comparable because 1956 figure includes 8 months' compensation of about 700 employees transferred Aug. 31, 1956, to a nonreporting entity upon the merger of 2 reporting carriers.

International Telegraph and Telephone Traffic

During calendar 1957 a total of 607,538,000 words were handled into and out of the United States by international cable and radiotelegraph carriers. In the outbound direction, 311,650,000 words were transmitted, while 295,888,000 were inbound. There were also

during calendar 1957 1,092,000 telephone calls outbound from the United States and 1,054,000 calls inbound, excluding calls handled directly from United States possessions to overseas points. The word volume of international telegraph traffic and the number of telephone calls between the United States and each of the principal countries of the world during calendar 1957 are set forth in the following table.

United States—International telegraph (radio and cable) traffic in words, and telephone calls (radio and cable), 1957 (includes traffic transiting the United States)

Country	Telegraph traffic— number of words (in thousands)		Telephone traffic— number of calls (in thousands)	
	Outbound from the United States	Inbound to the United States	Outbound from the United States	Inbound to the United States
<i>Europe, Africa, and the Near East</i>				
Ascension Island (Bahrain telephone relay).....			(?)	(?)
Albania.....	73	105		
Algeria.....	198	187		
Arabia.....	1,114	1,107	1	3
Austria.....	1,812	1,106	7	4
Belgian Congo.....	367	264		
Belgium.....	4,862	3,894	9	7
British East Africa.....	456	406		
British West Africa.....	581	603		
Cyprus.....	129	141		
Czechoslovakia.....	634	806		
Denmark.....	1,985	1,289	5	4
Egypt.....	2,868	3,780	1	2
Ethiopia.....	262	220		
Finland.....	546	536	1	(?)
France.....	15,717	15,350	44	39
French West Africa.....	161	184		
Germany.....	16,987	13,903	91	56
Greece.....	2,241	1,728	3	3
Hungary.....	419	636		
Iceland.....	252	265	1	2
Iran.....	1,201	1,027		
Iraq.....	876	936		
Ireland.....	973	943		
Israel.....	2,829	2,481	3	2
Italy.....	12,985	9,467	18	11
Lebanon.....	1,291	1,578		
Liberia.....	715	808		
Libya.....	265	175		
Luxembourg.....	127	101		
Madagascar.....	144	122		
Morocco—French.....	539	514		
Morocco—Tangier.....	281	379		
Netherlands.....	7,661	6,345	12	11
Norway.....	3,060	2,034	4	3
Persian Gulf.....	523	562		
Poland.....	1,198	1,275	1	3
Portugal.....	1,299	988	2	1
Rhodesia.....	199	213		
Roumania.....	390	296		
Spain.....	3,659	2,432	7	9
Sweden.....	4,115	3,655	7	5
Switzerland.....	8,679	5,340	20	20
Syria.....	300	209		
Transjordania.....	344	625		
Trieste, Free Territory of.....	132	106		
Tunisia.....	150	132		
Turkey.....	1,549	1,764	2	4
Union of South Africa.....	2,731	2,801	1	2
U. S. S. R.....	4,140	3,966	(?)	1
United Kingdom.....	51,501	51,725	110	121
Yugoslavia.....	1,078	910		
All other places.....	918	1,653		
Total.....	167,516	152,142	350	313

See footnotes on page 69.

United States—International telegraph (radio and cable) traffic in words, and telephone calls (radio and cable), 1957 (includes traffic transiting the United States)—Continued

Country	Telegraph traffic— number of words (in thousands)		Telephone traffic— number of calls (in thousands)	
	Outbound from the United States	Inbound to the United States	Outbound from the United States	Inbound to the United States
<i>West Indies, Central, North, and South America</i>				
Argentina.....	7, 121	8, 270	12	13
Aruba.....			1	1
Bahamas.....	1, 525	1, 490	38	24
Barbados.....	318	239	1	1
Bermuda.....	1, 116	1, 172	24	11
Bolivia.....	949	680		
Brazil.....	10, 624	10, 013	16	18
British Guiana.....		258		
British Honduras.....	173	162		
Canada.....	10, 476	13, 689		
Canal Zone.....	738	603		
Chile.....	3, 387	2, 277	5	5
Colombia.....	4, 812	4, 512	12	22
Costa Rica.....	1, 035	757	4	4
Cuba.....	7, 607	10, 680	229	284
Curacao.....			1	2
Dominican Republic.....	1, 767	1, 549	9	10
Ecuador.....	1, 685	1, 012	2	1
French West Indies.....	101	69		
Guatemala.....	1, 798	1, 915	6	8
Haiti.....	980	1, 022	3	3
Honduras Republic.....	873	854	4	5
Jamaica.....	1, 429	1, 175	12	11
Mexico.....	2, 078	1, 502		
Netherlands West Indies.....	1, 141	1, 141		
Nicaragua.....	1, 040	721	4	6
Other British West Indies.....	278	188		
Panama.....	1, 633	1, 175	13	16
Paraguay.....	314	234		
Peru.....	2, 746	2, 349	5	6
Puerto Rico.....	5, 774	5, 073	72	75
Salvador.....	1, 103	929	4	4
Surinam.....	194	127	(2)	(2)
Trinidad.....	1, 075	869	2	3
Uruguay.....	2, 084	1, 901	2	2
Venezuela.....	12, 731	15, 657	18	21
Virgin Islands.....	382	346		
All other places.....	151	100		
Total.....	91, 496	94, 688	499	561
<i>Asia and Oceania</i>				
Afghanistan.....	359	82		
Australia.....	4, 377	3, 393	5	7
Burma.....	716	207		
Ceylon.....	737	429		
China (excluding Hong Kong).....	129	51	(2)	(2)
Formosa.....	1, 556	1, 340	2	3
Guam.....	434	549	6	6
Hawaii.....	5, 733	4, 837	135	106
Hong Kong.....	2, 174	1, 966	3	5
India.....	5, 082	4, 427		
Indochina.....	788	962		
Indonesia.....	1, 945	3, 567	(2)	1
Japan.....	15, 997	13, 453	69	27
Korea.....	1, 386	1, 966	4	7
Malaya, Federation of.....	1, 621	1, 146	(2)	1
New Caledonia.....	234	23		
New Zealand.....	1, 350	1, 126	1	1
Okinawa.....	524	667	11	3
Pakistan.....	1, 550	1, 857		
Philippines.....	4, 644	5, 252	7	13
Society Islands.....	115	03		
Thailand (Siam).....	957	1, 036		
All other places.....	384	176		
Total.....	52, 601	48, 605	243	180
Unknown destination or origin.....	37	453		
Grand total.....	311, 650	295, 888	1, 092	1, 054

Common Carrier Applications

Nearly 4,600 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, 1957	Received	Disposed of	Pending June 30, 1958
<i>Radio facilities</i>				
Domestic:				
Point-to-point microwave radio stations.....	172	1,849	1,821	200
Local TV transmission stations.....	1	36	37	-----
Rural radio stations.....	36	204	225	15
Domestic public land mobile radio stations.....	69	790	797	62
Developmental stations.....	5	56	43	18
Registration of Canadian radio station licensees.....	-----	38	38	-----
International:				
Fixed public telegraph.....	9	186	193	2
Fixed public telephone.....	2	57	58	1
International control.....	-----	13	8	5
Subtotal.....	294	3,229	3,220	303
<i>Wire facilities</i>				
Telephone extensions.....	7	238	238	7
Telegraph extensions.....	-----	40	40	-----
Telephone reductions.....	1	7	7	1
Telegraph reductions.....	71	1,023	982	112
Subtotal.....	79	1,308	1,267	120
<i>Miscellaneous</i>				
Interlocking directorates.....	1	15	16	-----
Submarine cable landing licenses.....	-----	4	4	-----
Petitions or motions (nondocket).....	-----	10	10	-----
Renewals.....	20	-----	20	-----
Subtotal.....	21	29	50	-----
Total.....	394	4,566	4,537	423

¹ The data on telephone calls include the number of overseas calls handled via radio and via North Atlantic, Cuban and Hawaiian telephone cables. A. T. & T. reports its volume of overseas telephone traffic transmitted to, and received from, each point of communication, which may be either (1) the foreign country and overseas point of destination or origin of the call, or (2) an intermediate country or overseas point through which the call is relayed onward. Therefore, the number of calls reported herein with respect to a particular place is not necessarily the number of calls originating or terminating with that place. Where no calls are shown for certain countries or overseas points it indicates that no direct cable or radiotelephone service was provided therewith in 1957. Any calls that may have been handled with such countries during 1957 are included in the traffic of the intermediate country through which indirect service was rendered. Service with Canada and Mexico is by means of wire lines and with Alaska by means of wire lines, radio, and ocean cable. No data are readily available on the number of calls exchanged with such countries or territory.

² Less than 500 calls.

³ Represents international-classification traffic which originated at overseas points and was destined to Canada (outbound from the United States), and international-classification traffic which originated in Canada and was destined to overseas points (inbound to the United States). This traffic was handled between such points and Canada by United States carriers via the United States.

⁴ Represents international-classification traffic which originated at overseas points and was destined to Mexico (outbound from the United States), and international-classification traffic which originated in Mexico and was destined to overseas points (inbound to the United States). This traffic was handled between such points and Mexico by United States carriers via the United States.

Safety and Special Radio Services

GENERAL

The safety and special radio services comprise the largest number of radio stations authorized by the Commission. Stations in these services contribute to the safety of life and property and serve industrial and business operations. They embrace virtually all radio transmitting activities licensed by the Commission with the exception of broadcast, common carrier, and experimental operations.

At the end of the fiscal year, there were more than 437,000 authorizations in these services covering use of about 1,400,000 transmitters. These facilities are grouped into four general classes:

Safety services—marine, aviation, police, fire, forestry-conservation, highway maintenance, special emergency, State guard, local government, disaster communications, and point-to-point in Alaska.

Industrial services—power, petroleum, forest products, special industrial, business, manufacturers, relay press, motion picture, and radio-location-land.

Land transportation services—railroad, motor carrier, taxicab, and automobile emergency.

Miscellaneous services—amateur and citizens.

These services have continued to expand, as indicated in the statistical tables at the end of this chapter. The number of authorizations has nearly doubled in the past 5 years. Since spectrum space is limited, grants are made for shared use of frequencies. Such sharing requires a high level of compliance with regulations governing the operation of these stations to achieve the most efficient usage of the available spectrum space. This, in turn, places an increasing importance on the functions of enforcement.

Over 212,000 applications were filed in these services during fiscal 1958, representing an increase of nearly 27,000 or 14 percent over the preceding year. Continuous efforts are being made to improve techniques in processing applications to reduce the handling time.

Activities in the safety and special services during the year were highlighted in several important areas. A series of significant rule-making proceedings were completed involving channel splitting to make more frequencies available for these services. At the same time, the following new radio services were created: **Manufacturers**

Radio Service, Business Radio Service, Telephone Maintenance Radio Service, and Local Government Radio Service. One present service, the Low Power Industrial Radio Service, will be absorbed by the new Business Radio Service.

Overall policy questions as to the use of frequencies above 890 megacycles for point-to-point operations by safety and special services licensees (docket 11866) have entailed special studies and consideration. Likewise, the Commission's inquiry regarding the allocation of frequencies between 25 and 890 megacycles (docket 11997) has elicited detailed and complex comments from those concerned.

There was also increased activity in connection with various inter-governmental and industry coordinating groups concerning technical and policy matters relating to the safety and special services.

PRIVATE MICROWAVE SYSTEMS

Most of the authorizations for private point-to-point microwave systems are now granted on a developmental basis for a period of 1 year, subject to renewal. By far, the greatest percentage of systems year, subject to renewal. By far, the greatest percentage of systems most cases, they combine fixed and mobile operations. One petroleum chain extends from Texas to New York, a distance of 1,700 miles. The railroads also utilize microwave along their rights-of-way.

Private microwave systems are harnessed to many different purposes by licensees in connection with their industrial and safety operations. For example, they operate unattended equipment; open and close valves; record pressure, temperature, engine speed, rate of processing and other data; telemeter voltage, current and power; locate line faults, and perform other supervisory functions. Police departments employ microwave to coordinate their activities. Railroads utilize it for signaling and traffic control. In some cases, microwave transmits TV signals in connection with forest service and police operations, and radar usage on land and water also involves some incidental microwave utilization.

Determinations to be made by the Commission in docket 11866, involving the allocation of frequencies in the bands above 890 megacycles, will have a profound effect upon the future of private microwave systems. The hearing in that proceeding was completed and the record was closed on November 15, 1957. Comments were submitted by nearly 200 parties, more than 160 persons presented oral testimony, 166 exhibits were filed, and there are over 5,000 pages of hearing record.

This hearing was the first step in a general investigatory proceeding concerning the allocation of frequencies above 890 megacycles. Its purpose was to obtain data on all phases of the operation of

existing and proposed communication systems. Evidence was obtained on present and future needs for frequencies, engineering standards, conditions of eligibility, shared use of frequencies, interference possibilities, need for interconnections with common-carrier landline telephone systems, and to determine the extent to which these frequencies should be allocated between common carriers and prospective private users.

MARINE RADIO SERVICES

Safety at Sea

Safety convention.—The International Convention for the Safety of Life at Sea is accepted by 45 countries, including the United States. This agreement embodies uniform principles and rules to promote safety of life and property at sea, including compulsory radio requirements. The convention now in force is the one concluded at London in 1948. A conference to revise the present convention is scheduled to convene in London in 1960. The Commission is participating actively in the preparatory work for that session.

Intergovernmental Maritime Consultative Organization.—The IMCO was created on March 17, 1958, by 21 nations, including the United States. It provides means for continuing cooperation among governments in the field of regulation and practices relating to technical matters affecting international shipping, and encourages the general adoption of the highest practicable standards in matters concerning maritime safety and efficiency of navigation. IMCO will be the central bureau in the maritime safety field of all matters regarding adoption and amendment of the convention.

Communications Act.—Provisions of the London convention are incorporated in title III, part II, of the Communications Act. Under these provisions, approximately 50 passenger ships and approximately 1,330 cargo ships of United States registry are compulsorily equipped with radiotelegraph, while approximately 70 United States cargo ships of between 500 and 1,600 gross tons have compulsory radiotelephone.

Title III, part III, of the Communications Act, which became effective March 1, 1957, requires United States vessels transporting more than six passengers for hire while navigating in the open sea or in tidewater adjacent or contiguous to the open sea to be fitted with an efficient radiotelephone installation. During the year, a number of bills were introduced in Congress which would relax this requirement in varying degrees.

Great Lakes agreement.—In general, ships of all countries navigating the Great Lakes, which are of 500 gross tons and upward, which are passenger carrying vessels over 65 feet in length, or which, if

under 500 gross tons, are engaged in towing operations, are subject to an agreement between the United States and Canada for promoting safety on the Great Lakes by means of radio. This pact, which became effective November 13, 1954, requires each subject vessel to carry radiotelephone with at least one certified operator.

VHF radiotelephony for navigational communication.—The House Committee on Merchant Marine and Fisheries, in its report of January 3, 1957, recommended voluntary radiotelephone installations on the bridges of United States oceangoing ships as a means of promoting safety at sea by affording rapid and direct means of communication between navigating officers. Since 1952, Commission rules have permitted bridge-to-bridge communication inasmuch as they provide for licensing low-powered, short-range, compact VHF radiotelephone equipment on ships. Nonetheless, in furtherance of the committee's recommendation, the Commission on July 30, 1957, urged all interested persons to submit comments concerning rule changes which might facilitate the installation of bridge VHF radiotelephone equipment. Following consideration of the resulting suggestions, the Commission, on April 2, 1958, established a regulatory policy pertaining to VHF bridge radiotelephone facilities, implemented by amendments of parts 7 and 8 of its maritime rules.

By these actions, operational evaluation of a VHF single-channel ship-to-ship radiotelephone facility for the exchange of navigational information and related safety communications, and for associated communication with locks, bridges, and shore radiolocation stations, may be conducted under developmental station licenses. To facilitate this trial operation, without deviation from established basic regulatory policy, certain limitations, supplementary conditions, and deviations from existing rules were authorized or imposed. A petition requesting reconsideration was pending at the end of the year.

Exemption from compulsory radio requirements.—Exempted from ship radiotelegraph requirements during the year were 5 United States passenger ferry vessels making international voyages solely on inland waters, 13 other United States vessels (including 5 renewals), and 1 British Virgin Islands vessel, all on condition that they comply with radiotelephone requirements. Two United States vessels were exempted unconditionally from the ship radiotelegraph requirements. Sixteen emergency radiotelegraph exemptions were granted, largely so that vessels could continue voyages to ports where defective radio equipment could be repaired or replaced.

Of 532 applications under title III, part III, for radiotelephone exemptions for individual vessels, 59 were granted unconditionally, 19 were granted in part, 391 were denied, 18 were dismissed, and 45 were pending. Two applications for such exemption for classes of

vessels were denied, and one was still under consideration. One hundred and sixteen temporary radiotelephone exemptions were issued, mostly for the purpose of giving the applicants additional time to procure and install new equipment or modify existing equipment.

Distress studies.—Studies of distress communications pursuant to section 4 (o) of the Communications Act for the purpose of insuring and maintaining maximum usage of marine radio facilities for the safety of life and property have been limited by a lack of personnel. However, information received by the Commission indicates that during fiscal 1958 the international radiotelegraph distress signal (SOS) was used at least 216 times throughout the world. It was employed by or on behalf of 26 United States vessels and 153 vessels of foreign registry. An automatic alarm signal which alerts ship radio operators, not actually on duty at the time, to distress calls was used effectively in a number of cases.

Radar.—At the close of the fiscal year 3,659 United States vessels were equipped with, and licensed to operate, ship radar stations.

Shore radar (developmental) stations, at Long Beach and Los Angeles, were being used primarily to assist in the piloting of ships entering and leaving the harbors. At Double Bayou, Tex., and Grand Isle, La., shore radar (developmental) stations were in operation largely to aid navigation of vessels in connection with construction projects and oil-well drilling.

Nine shore-based radiolocation-training and/or radiolocation-test stations were being used to train and qualify persons in the effective use of maritime radiolocation, and for testing maritime radiolocation apparatus.

Technical Developments and Studies

Type-acceptance program.—A total of 77 types of shipboard radiotelephone transmitters have been type accepted under part 8 for operation on frequencies below 30 megacycles. The rules have been amended so as to defer the mandatory usage of such type accepted transmitters until January 1, 1959. Leased transmitters licensed prior to that date are among those which will become subject to type acceptance at a later date. Requirements for suppression of spurious emissions in the vicinity of the assigned frequency have been revised for ship stations to the highest practicable degree consistent with the attendant considerations of cost and technical complexity.

Tests of vertical antennas.—Interest was shown in the use of vertical main antennas by compulsory radiotelegraph equipped ships of United States registry, and tests were made to determine the effective-

ness of such antenna systems. Economy in the operation of merchant ships may result.

Radio Technical Commission for Marine Services.—The Commission continued its support of RTCM by furnishing an electronics engineer as executive secretary, office space, and the services of other personnel on its special committees. The special committees are organized to study marine telecommunication problems and make recommendations. The RTCM is composed of Government agencies and non-Government organizations. Its objective is the resolution of maritime telecommunication problems by mutual agreement. Much of its work has a bearing on United States positions on maritime matters at international conferences.

Special RTCM committees are studying such subjects as requirements for a standard system of long-distance electronic aids to navigation for international maritime use; interference due to intermodulation products in the VHF maritime service; present and future requirements for marine services which utilize frequency space; electronic equipment for a nuclear-powered passenger-cargo ship; installation of bridge-to-bridge direct radiotelephonic communication; selective calling devices for use in the international VHF marine service; and technical characteristics of single sideband maritime radiotelephone equipment.

Marine Radio Communication Systems

Coast stations.—At the fiscal year close, public coast and limited coast stations, other than those in Alaska, providing communication service to ship stations were as follows:

Frequency band and range	Public	Limited	Frequency band and range	Public	Limited
Telephony in 2-3-mc. band (medium range).....	51	4	HF telephony (long range) .. Telegraph, LF, MF, HF	4	2
VHF telephony (short range).....	46	296	(medium to long range).....	28	3

Marine fixed stations.—These stations are established on offshore oil-well drilling platforms and are used primarily for safety purposes and secondarily for business communications. The number of stations licensed is 69.

Operation in 152-162 megacycle band.—The Commission is revising its frequency allocation plan so that it will be consistent with the Baltic-North Sea VHF Maritime Mobile Agreement of 1957 and permit United States and European vessels to engage in international VHF communication in the 152-162 megacycle band.

Ship-shore radiotelephone.—The Commission's rules were amended, effective July 1, 1957, to provide for ship-shore radiotelephone use

of the frequency 2638 kilocycles, to serve the safety and operational communication needs primarily of pleasure boats on interior waters. One of the conditions for assignment of this frequency is that the use of very high frequencies be not feasible. Thus far, 2 public coast stations have been licensed to use this frequency, 1 at Cartersville, Ga., and the other at Nashville. In addition, construction permits have been granted for stations at Lake Whitney, Tex., and Flowery Branch, Ga.

The hours of operation of the frequency pair 2550 kilocycles (coast)-2158 kilocycles (ship) for use at Tampa were limited to day only from April 1 to December 15 annually, with unlimited hours of use from December 15 to April 1 annually, and the frequency pair 2466 kilocycles (coast)-2009 kilocycles (ship) was made available at Tampa on a 24-hour basis.

The Commission, after hearings in July of 1957, canceled that part of its order of July 6, 1956, which would have deleted, as of February 1, 1957, the frequencies 6240 and 6455 kilocycles from use on the Mississippi River and connecting inland waters (except the Great Lakes) and authorized their continued use.

The Coast Guard advised that it would protect the distress frequency 2182 kilocycles in lieu of 2670 kilocycles, and the Commission's rules were amended to reflect this change. Non-Government vessels had been permitted to use 2670 kilocycles for radiotelephone distress calls until 2182 kilocycles was effectively guarded.

On January 8, 1958, the Commission denied Mobile Marine Radio's petition to make available for assignment Mississippi River frequencies for use by class I-B public coast stations to be located in the Gulf of Mexico area.

The Commission made available for assignment the public coast station radiotelephone frequency 8761.8 kilocycles in Hawaii and, concurrently, deleted the public coast station radiotelephone frequency 8550 kilocycles, thereby completing its program of carrying out the maritime mobile portions of the Geneva Agreement (1951) in the frequency bands between 4000 and 18000 kilocycles.

Application of the Texas Highway Department for a land station at the Galveston causeway, to communicate with vessels navigating the intracoastal canal in connection with the opening and closing of a drawspan bridge, was granted in the Maritime Mobile Service, under rule waiver. In keeping with Commission policy regarding the use of VHF for short range communication, the requested Government frequency 2350 kilocycles was assigned until September 10, 1959, and vessels were authorized to transmit to this station on 2738 kilocycles. Vessels desiring passage through the waterway after that date must be equipped with VHF if communication is desired with the bridge.

The Commission, on April 16, 1958, reallocated a portion of the 3000–3246-megacycle maritime radar band in the interest of national defense. Transmitters in ship radio navigation stations (including ship radar stations) authorized to operate on frequencies between 3100 and 3246 megacycles as of that date may continue to be used for operation on the same vessel provided that any renewal of the authorization shall be subject to the condition that no protection be given from any interference caused by emission from United States Government stations operation in the 3100–3246-megacycle band. The 3000-to-3100-megacycle portion of the band continues to be available for assignment as heretofore.

Developmental authorizations.—The Lorain County (Ohio) Radio Corp. was granted special temporary authorizations for developmental testing of the “dualex” teleprinter communication system. The testing includes the transmission of weather and hydrographic information to ships on the Great Lakes. Special temporary station authorization was also made to the same company for developmental testing of a facsimile communications system on the Great Lakes. The purpose is to determine the value of recorded communications as compared with voice communications for commercial ship administration and also for weather and, possibly, navigational information. Globe Wireless, Ltd., licensee of the *SS Angelo Petri*, received a developmental license for that vessel to test a single sideband transmitter with suppressed carrier and single sideband with full carrier inserted on high frequency radiotelephones.

Alaskan Public Fixed and Maritime Stations

Radio communication in Alaska.—Alaskan communities depend largely on radiotelephone and radiotelegraph communication for safety and business purposes because extensive wire line facilities are not available. The main intra-Alaska communication trunklines are operated by the Alaska Communications System (ACS) under the Department of Defense. The Commission maintains liaison with the ACS in coordinating these facilities to serve the public interest. At the close of the fiscal year there were, exclusive of Government stations, 1,054 Alaska public fixed and public coast stations in that prospective new State.

Proposed use of single sideband in Alaska.—For the first time, single sideband equipment has been specified in applications pertaining to stations in the Alaska fixed service. Three applications proposing to add single sideband equipment to stations already licensed with conventional double sideband equipment were received.

Study of duplicate facilities in Alaska.—The Commission has not completed its study of the problem of duplication of public facilities

in Alaska. Industrial concerns have indicated a need to operate stations (which, under the rules, would have to be public stations) at locations where public facilities, either Government or non-Government, are already established. Under present rules only a single Alaska public fixed or public coast station will be authorized to serve any area whose point-to-point or ship-shore communication needs can be adequately served by either a Government (ACS) or a non-Government station. Pending further study, with the cooperation of the ACS, certain industrial firms have been granted short-term licenses for safety and business communication.

AVIATION SERVICES

General

The Commission is responsible for regulating and licensing non-Government aviation use of radio. Employment of radio for aviation communication and navigation is continuously expanding. For administrative purposes, aviation radio facilities are grouped into broad classes of ground and airborne stations. These stations include aircarrier, private aircraft, aeronautical en route, aeronautical fixed, operational fixed, aeronautical advisory, aeronautical utility mobile, airdrome control, flight test, flying school, radionavigation, aeronautical public service aircraft, and Civil Air Patrol. The total number of such authorizations exceeds 62,000 and includes over 81,000 transmitters.

Aviation Organizations and Conferences

The Commission continued to participate in the work of various coordinating groups concerned with aviation technical and policy matters. Rapid technological advances and changing operational requirements in the aviation telecommunications field necessitate continuing liaison with other agencies and organizations. Among these groups are the Air Coordinating Committee (ACC), the International Civil Aviation Organization (ICAO), and the Radio Technical Commission for Aeronautics (RTCA).

Air Coordinating Committee

The ACC is a Federal interdepartmental committee, responsible to the President, charged with coordinating Government aviation policies. It was established to examine and make recommendations on aviation matters affecting more than one participating agency. In view of the Commission's direct responsibilities in the field of aviation telecommunications, it is a member of the ACC and is represented on many of the subordinate components, such as the Executive Council; Technical Division; Airspace Division; Aeronautical Com-

munications and Electronic Aids Subcommittee; Airdrome, En Route, and Ground Aids Subcommittee, and the Air Traffic Control and Navigation Panel.

Some of the major ACC activities in which the Commission participated during the year were formulation of policies for the guidance of United States representatives to the ICAO, and preparation of United States positions for 2d South American-South Atlantic regional air navigation meeting; the 4th European-Mediterranean air navigation meeting; the 6th session of the Communications Division and the special COM Division meeting to prepare for the 1959 ITU Administrative Radio Conference; preparation of a search and rescue procedures manual; preparation for ICAO special communications operations, rules of the air meeting to reach conclusions on short-distance navigation aids; recommendation of a frequency to be used for search and rescue scene of action activities; preparation of a memorandum of agreement between the broadcast and aviation interests regarding erection of tall antennas; a review of the national policy on electronic long-distance aids to navigation, and recommendations for aeronautical single sideband system characteristics.

Radio Technical Commission for Aeronautics

The RTCA is a nonprofit cooperative association of Government and industry organizations concerned with aeronautical telecommunications matters. Its general membership, known as the assembly, is composed of more than 100 agencies and organizations. Membership is voluntary.

The Commission is represented on the RTCA executive committee and on many of its special committees organized to handle specific technical problems. During the year the Commission participated in special technical committees on the following subjects: Frequency utilization plan for the band 108-132 megacycles; frequency requirements for common system air traffic control; minimum performance requirements for airborne electronic equipment for the transition period common system; minimum performance standards—self-contained navigation aids; and characteristics of aeronautical single sideband systems.

International Civil Aviation Organization

The ICAO, a specialized agency of the United Nations, has a membership of 71 countries and was formed to foster the planning and development of international air transport. During 1958, Commission representatives were members of United States delegations to 3 ICAO conferences.

Rule Amendments

The rules governing the aviation services (part 9) must be revised frequently in order to keep abreast of the continuing expansion of the aviation industry and refinement of operational techniques and procedures.

Rulemaking projects completed during fiscal 1958 resulted in the frequency 127.3 megacycles being made available for international en route operations on the east coast of the United States; improvement of Civil Air Patrol efficiency through frequency and other rule changes; simplification of aircraft station identification requirements; extension to 1963 of use of the 420-460-megacycle band for radio-navigation purposes; clarification of the rules governing the operation of aeronautical fixed point-to-point facilities, and the temporary availability of the frequency bands 8750-8850 and 9750-9850 megacycles to airborne "doppler" radar devices which, without ground assistance, provide certain navigational information to pilots.

Rulemaking initiated or continued during the same period included issuance of further proposals with respect to the single sideband technique of radio transmission; revision of requirements governing the posting of aircraft and ground station authorizations; and establishment of a new class of station—aeronautical search and rescue mobile station—to provide coordinated air-ground search and rescue communication.

Air Carrier Aircraft Stations

There are approximately 3,000 such stations authorized aboard commercial aircraft transporting passengers or cargo for hire.

Private Aircraft Stations

These stations are operated aboard pleasure and business type aircraft. They number approximately 45,000.

Aeronautical Public Service Stations

Public service aircraft stations are used for communication between aircraft in flight and the public telephone system, through the facilities of public coast stations. They total about 350.

Aeronautical En Route and Aeronautical Fixed Stations

Aeronautical en route stations provide operational control communication with aircraft at terminals and while in flight. Aeronautical fixed stations are used for point-to-point communication pertaining to the safe, expeditious, and economical operation of aircraft. In the continental United States, aeronautical fixed radio stations are used primarily as backup circuits for landline facilities; however, in international operations, and in areas where landline facilities are

not adequate, they provide primary service. There are some 1,800 authorizations in this group.

Operational Fixed Stations

The approximately 40 operational fixed stations are used for point-to-point communication links, such as control and relay circuits to remote transmitter and receiver sites.

Aeronautical Advisory Stations

These ground stations are used primarily to provide advisory communication with aircraft regarding the condition of runways, types of fuel available, weather data, wind conditions, and other pertinent information. They may be used, on a secondary basis, for special service communication relating to the efficient portal-to-portal transit of occupants of the aircraft. Additionally, some of the more than 900 advisory stations communicate with private aircraft engaged in organized civil defense activities.

Aeronautical Utility Mobile Stations

Utility mobile stations are installed aboard maintenance, crash, fire, and other vehicles operating on airdromes. They are used for communication between control towers and vehicles in normal airport operations as well as in times of emergency. There are approximately 220 such stations.

Airdrome Control Stations

These stations are used by control-tower operators primarily for directing the safe and efficient flow of air traffic into and out of airports. They also provide communication with aeronautical mobile utility stations installed in maintenance and emergency vehicles at airports. They number about 40.

Flight Test Stations

Flight test stations are employed for air-ground communication in connection with the testing of aircraft or its major components. In addition to radiotelephony, telemetered data may be transmitted from aircraft under test to ground stations for monitoring and recording. Nearly 250 authorizations for such stations are outstanding.

Flying School Stations

These stations are authorized for use by flying schools and soaring societies for the instruction of students and the promotion of safety of life and property. There are approximately 58 such stations licensed.

Radionavigation Stations

These stations are used to perform a variety of air navigation functions and also to make it possible to land at airports by means of instruments. Over 300 such stations are licensed in connection with the operation of radio beacons and ranges, localizers, glide-path facilities, and ground-control approach systems.

Civil Air Patrol Stations

These stations handle air-ground, base-mobile, and point-to-point communication in connection with search, rescue, training, and other activities for which the Civil Air Patrol is responsible. They number approximately 11,000.

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 26,000, representing more than 304,000 transmitters.

Rule Changes

The principal changes in the rules governing these services during the year had as their objective the providing of additional channels to accommodate the increasing numbers of licensees and potential licensees. Inasmuch as no additional spectrum space was available to the public safety services, accomplishment of this purpose required more efficient use of the spectrum space previously allocated. This was done by taking advantage of technical developments in equipment design by means of which transmissions can now use narrower frequency channels.

This program was realized to a considerable degree by splitting channels in the public safety mobile bands above 42 megacycles. In a series of rulemaking proceedings, the Commission reallocated spectrum space in the 46-50-megacycle band to the Government in exchange for compensatory space in the 150.8-152-megacycle band; split the public safety channels in the 42-50-, 150.8-162-, and 450-460-megacycle bands; determined most of the service allocations of the additional frequencies made available in these bands; established a new Local Government Radio Service by using some of the split channels; and advanced to August 1, 1958, the date for mandatory compliance by new systems with the new narrow-band technical standards necessitated by channel splitting. The date was moved up so as to make the split channels available earlier. Other interrelated technical provisions were adopted to permit orderly transition of

existing systems from wide-band to narrow-band operation prior to November 1, 1963.

As a result, each of the public safety services (except the State Guard) has been allocated split channels which augment the total number of frequencies available to it on an exclusive basis. There still remains to be determined the service allocations of some of the frequencies gained by splitting the 42-50- and 152-162-megacycle bands.

The rules were modified to restrict permissible communications in the Police, Fire, Forestry-Conservation, and Highway Maintenance Services to those essential to official business. Licensees desiring to continue communication beyond the scope permitted would be eligible in the newly established Local Government Radio Service, wherein communication essential to any official activity of the licensee is permitted.

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. In addition to the usual base and mobile systems, there is an increasing use by police of microwave systems for point-to-point links and control circuits to remote transmitter and receiver sites. Nearly 12,500 police authorizations involve the use of over 166,000 transmitters.

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. A typical fire radio system consists of both base and mobile stations. The mobile stations include, in addition to equipment on fire vehicles, both lightweight, low-powered packsets and the new pocket-sized receivers carried by individual firemen. By use of the latter, the chief at a fire can direct his men within or around a burning building. More than 4,700 fire authorizations cover over 58,000 transmitters.

Forestry-Conservation Radio Service

This service provides communication networks essential to the prevention, detection, and suppression of forest fires and the conservation of natural resources and wildlife. In addition to public entities, persons or organizations charged with specific forestry-conservation activities may be licensed under certain conditions. Such sys-

tems are basically the same as police and fire radio networks. The more than 3,200 forestry-conservation authorizations represent about 33,600 transmitters.

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. This service has nearly 2,600 authorizations for over 27,000 transmitters.

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; school-bus 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. More than 3,300 special emergency authorizations cover over 13,000 transmitters.

Local Government Radio Service

The Local Government Radio Service, which was created during the year, will permit governmental entity licensees to transmit communications essential to their official activities. 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.

It is anticipated that this new service will particularly help small governmental subdivisions having limited funds because it permits, for the first time, the use of a radio system for the transmission of all essential official communications of such licensees. Also, inasmuch as the rules do not prohibit governmental entities from being licensed at the same time in the Local Government Radio Service and the more specific services such as police and fire, larger governmental units should likewise benefit. Under an authorization in this service, they would be permitted to transmit essential communications not authorized for stations licensed in the public safety services and, at the same time, continue their other stations solely for emergency operations.

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 the control of the governor or highest

official of the creating governmental entity. 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 and the State Guard begins to discharge duties usually performed by the National Guard.

DISASTER COMMUNICATIONS SERVICE

This service furnishes communication facilities in the 1750-to-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

Part 16 of the Commission's rules provides for the use of radio by industries engaged in land transportation to persons and things, namely: Motor carriers, railroads, taxicab operators, and individuals or associations operating emergency automobile road service vehicles. There are over 48,000 such authorizations covering more than 341,000 transmitters.

During fiscal 1958, various rule parts were amended in response to changing land transportation requirements. These changes stemmed not only from the increase in number of licensees and a corresponding increase in channel loading of the available frequencies, but also from the need by various transporters for new and additional uses of radio not heretofore provided for by the rules.

The Commission has for some time recognized that the number of channels available to these essential services has been generally inadequate to accommodate the ever increasing demand. In this connection a number of rule changes relating to the split-channel proceedings were adopted for the purpose of obtaining additional operating frequencies by reducing channel spacing. These rule changes specify frequencies available to each service, establish new technical standards for equipment, set the dates when licensees will be required to use equipment meeting the new technical standards, and spell out

provisions governing the assignment and usage of the additional frequencies provided.

Frequencies in the 450-460-megacycle band have been available to various land transportation services for a number of years on a yearly developmental basis only. As a result of information obtained from the operation of numerous of these developmental systems, it was possible to provide for licensing stations operating in this band on a regular basis and establish technical requirements for the equipment used.

Prior to the 1958 rule amendments, 4 pair of frequencies in the 450-460-megacycle band were available to the motor carrier and railroad services on shared basis, and 5 and 1 pair, respectively, to the taxicab and automobile emergency services. Now, 5 and 2 pair are available on an exclusive basis to the motor carrier and railroad services, respectively, and 10 and 2 pair on an exclusive basis to the taxicab and automobile emergency services, respectively.

Provision is made for the continued use by motor carriers of those frequencies in the 450-460-megacycle band formerly available to both the motor carriers and railroads but now assigned only to the railroads. This use by motor carriers may continue in a particular area until such time as the railroads seek the frequency in the same area, but in no case after April 1, 1963.

Additionally, the Commission, in its split-channel proceedings concerning the 152-162-megacycle band, adopted rules which also affect the land transportation services. The frequency space available to the railroad service was reduced, but distinct portions of the space given up by that service was earmarked for possible use by the motor carrier service. Other rule amendments provide for the use of additional frequencies in this band (made available by reducing the channel width) by stations in the taxicab and railroad services and, further for the first time, permit the use of frequencies in the 152-160-megacycle band by stations in the automobile emergency service operated by public garages. A pending proposal, if adopted, would, for the first time, give a substantial number of frequencies in the same band to motor carriers.

As a result of the 1958 rule amendments, a total of 55 frequencies in the 150-162-megacycle band are now available to the railroad service, in lieu of the previous 39 frequencies. Seven frequency pair in the same band are available to the taxicab service, as compared to four previously. Also, three frequencies each in this band are provided on an exclusive basis to automobile service clubs and public garages, plus three more which they can use on a shared basis.

Following adoption of rule amendments in 1958, industry in general indicated a desire to accelerate the dates of mandatory compli-

ance with the new technical standards applicable to equipment used in the land transportation and other services. Accordingly, the Commission made further rule changes effective August 1, 1958, to provide maximum opportunity for early utilization of newly assignable frequencies provided by the channel splitting.

Since land transportation frequencies are open to licensees in the particular service only on a shared basis, it is imperative that applicants cooperate in the selection of a suitable frequency. Formerly, many applicants indicated failure to cooperate with others in the respective areas in selecting frequencies. This made it necessary to request further information, causing considerable delay in processing. Consequently, the rules were amended during fiscal 1958 to set forth more clearly that applicants must show the basis upon which a particular frequency has been selected and that the applicant has, in fact, coordinated his selection.

Some land transportation industries have used speed measuring devices referred to as "radar" for a number of years. They have been licensed on a developmental basis using frequencies in the 2450-2500-megacycle band only. Such frequencies limited the use of these devices to measuring objects traveling at comparatively high speeds. Accordingly, following the availability of more suitable frequencies in the 10500-10550-megacycle band for Government and non-Government radiolocation stations, the land transportation rules were amended during fiscal 1958 to permit the use of frequencies in the latter band for the operation of speed measuring devices on a developmental basis. Also, the rules were amended so as to license speed measuring devices operating on frequencies in the 2450-2500-megacycle band on a regular basis.

Although the former land transportation rules permitted emergency communication related directly to the safety of life or the protection of property during a national disaster in which normal communication facilities are disrupted, there were no express provisions for civil defense communication, including tests and drills. So, rule changes in fiscal 1958 clarify the scope of communication which may be engaged in by stations in the land transportation services during civil defense exercises and national emergencies. The amended rules provide that messages transmitted in connection with civil defense operations must relate to the particular activity which formed the basis for the licensees' eligibility, except that stations licensed in the taxicab service also may be used for more general communication concerning a civil defense agency activity.

Some problems involving the land transportation services still to be resolved are reflected in a number of proposed rule changes. One concerns the use of base and mobile stations operating on a coopera-

tive basis. Another is the power limitation that should be imposed on stations using frequencies in the 450-460-megacycle band. The communication range of stations using frequencies in this band is, to a large extent, determined by local conditions such as antenna height, the nature of the terrain, and the presence of buildings or other structures presenting reflective surfaces. While power authorization should be adequate to meet the operational requirements of the various services, it is also necessary that the permissible power limit be kept to a minimum for the purpose of avoiding unnecessary interference.

Motor Carrier Radio Service

This service is available to persons who provide a common or contract motor carrier transportation service. It includes truckers engaged in intra or interurban operations and common carriers of passengers operating buses and streetcars. Approximately 2,230 authorizations covering approximately 41,800 transmitters were in this service by the end of fiscal 1958.

The number of frequencies in the 43-44-megacycle band available to truckers and carriers of passengers was changed by rule amendments to meet more adequately the present and anticipated requirements of the two groups. It is believed that the total number of frequencies now available to this service, plus the additional frequencies in the 150-162-megacycle band as proposed, will meet to a large extent the rapidly expanding requirements for spectrum space by this important industry.

Railroad Radio Service

The rules governing this service provide for the use of radio by railroad common carriers, including railroad-owned express companies furnishing the public a passenger or freight service. During the year the rules were amended to permit a licensee to install mobile units in vehicles of other persons who are furnishing to the railroad, under contract, a facility or service which the licensee would be eligible to do himself.

It is contemplated that requirements for additional frequencies stemming from increased usage of radio by railroad express agencies will be met by the use of frequencies in the 450-460-megacycle bands which were made available on a regular and exclusive basis to the railroad radio service by rule amendments adopted during fiscal 1958. Because of their comparatively short communication range, frequencies in this band are particularly suitable for such use since the railroad express agencies generally function on a local basis in metropolitan areas.

Frequencies in the 152-162-megacycle band, which have a greater communication range, are considered more suitable for the railroads which need communication facilities coordinated on a systemwide basis.

At the close of the year there were over 2,200 railroad authorizations with over 65,000 transmitters.

Taxicab Radio Service

The rules of eligibility for this service provide for use of radio by persons engaged in furnishing to the public for hire a nonscheduled land transportation service not operated over regular routes or between established terminals. Over 4,700 authorizations cover the operation of 100,700 transmitters.

Frequencies in both the 150-162- and the 450-460-megacycle bands available to this service were substantially increased by rule amendments adopted during fiscal 1958 in the split-channel proceedings. Use of the additional frequencies in the 150-162-megacycle band derived from reducing the bandwidths are available to this service only in standard metropolitan areas of 50,000 or more population. The additional 450-460-megacycle channels, made possible by the same means, are retained by this service without restriction as to the area in which they may be used. The heavy channel loading of the frequencies which have been available to this service as the result of both the continued increase in the number of licensees and the expansion of existing systems has demonstrated the industry's requirements for the additional frequencies.

As a result of rule amendments in 1958, the taxicab service now has 7 and 10 pair of frequencies in the 150-162- and 450-460-megacycle bands, respectively. Before that it had 4 pair in the first mentioned band and 5 pair in the other.

Automobile Emergency Radio Service

Public garages operating emergency road service vehicles and associations of automobile owners providing a similar service to its members are eligible to hold authorizations in this service. At the end of fiscal 1958 there were nearly a thousand authorizations outstanding covering nearly 9,000 transmitters.

A 1958 rule amendment which will be of substantial benefit to the automobile emergency service provides for replacement of the two 35-megacycle frequencies by several frequencies in the 150-162-megacycle band. Frequencies in the former band are subject to long-range interference, thereby rendering them useless over considerable periods of time. Public garages, which were the primary users of the 35-megacycle frequencies, now have a total of 3 frequencies in the 150-162-megacycle band on a shared basis with automobile associa-

tions. Three frequencies in this band were also made available to associations of automobile owners on an exclusive basis. Because of the increase in the number of frequencies now assigned to this service, it is anticipated that many persons who were reluctant to operate radio facilities on the 35-megacycle frequencies will now apply for authorizations in the other band.

Additionally, the rule of eligibility was clarified to include persons who operate garages engaged in repair work of major nature on motor vehicles for the general public, and who also operate vehicles for towing or making on-the-spot emergency repair.

CITIZENS RADIO SERVICE

This service is described in the Commission's rules (part 19) as one which provides for the operation of radio communication facilities for personal or business use. Citizens licenses may be used for communication, radio signaling, control of objects and devices, and other purposes not specifically prohibited by the rules.

Any citizen 18 years of age is eligible to hold an authorization in this service, as well as State, Territorial, or local governmental entities, or any organization or association operating by authority of such governmental bodies, including civil defense groups.

During the year, the Commission deleted a provision that persons eligible for licenses in any other service were not eligible for a license in the Citizens Service. Also deleted was a provision permitting applicants for class A and class B stations to file their applications at the Commission's engineering field offices. The amended rules require that except for applications for class C station authorizations proposing to employ type-approved equipment or crystal-controlled equipment, all other citizens applications must be submitted to the Commission's office at Washington.

Another 1958 amendment clarifies the permissible scope of communications during civil defense exercises and actual emergencies, and prescribes procedures to be followed.

A revised application form, adopted in September of 1958, requires a statement as to what the citizens station will be used for, including certification that it will not be employed for illegal purposes.

At the end of the year there were proposed amendments, stemming from the split-channel proceedings and in the interest of efficiency of spectrum utilization, which would delete the availability of frequencies in the 460-470-megacycle band with the exception of ten 50-kilocycle channels available to class A stations and the single frequency of 465 megacycles which would be available to class B stations only. However, the proposed changes would provide for additional frequencies in the 27-megacycle band which are presently

available to amateurs. Also included are proposed changes in permissible power and frequency tolerance. Unlike the present rules, which provide that the class of station be indicated on the authorization, without a specific frequency being shown, the proposals would require that specific frequencies be assigned and indicated on the authorizations.

At the close of fiscal 1958 approximately 38,600 authorizations in the citizens service were outstanding for the operation of approximately 125,000 transmitters, including those used by paging systems and for radio control of model airplanes, model boats, garage doors, and other devices.

INDUSTRIAL RADIO SERVICES

General

The 1958 fiscal year saw the creation of three new industrial radio services, the absorption of one by another, and the substantial modification of still another. Thus, on August 1, 1958, a Manufacturers Radio Service, a Telephone Maintenance Radio Service, and a Business Radio Service took their places alongside the Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, and Industrial Radiolocation Services. On the same date, a new set of rules governing the Special Industrial Service became effective, and the Low Power Industrial Service was absorbed by the new Business Radio Service.

These amendments and important changes affecting the availability of frequencies were stimulated, in large measure, by the Commission's objective to keep the industrial services closely tailored to industry's known and anticipated requirements for radio, and to relieve, to the greatest extent possible, the frequency congestion which prevails in most of these services. In the 8 industrial services in existence at the close of the fiscal year, approximately 40,000 stations were authorized to operate a total of nearly 417,000 transmitters.

Major Problems and Accomplishments

Considerable energy has been directed to concluding rulemaking begun in April of 1957 in docket 11991. The proposals advanced in this proceeding were intended to implement the Commission's action of the previous September (docket 11253) which established a basic policy for reducing separations between assignable frequencies in the 152-162-megacycle band. In addition, they were designed to provide additional frequencies for the industrial services by modified channel spacing and assignment in the 27.23-27.28-, 162-174-, and 450-470-megacycle bands, and to promote greater and more equitable utilization of these frequencies.

The proceedings in docket 11991, together with related proceedings in dockets 11959, 11990, and 11992-11995, constitute one of the most significant rulemaking activities in the safety and special land mobile services in nearly 10 years. Virtually every segment of private and public endeavor was represented by the comments filed. In docket 11991 alone there were over 150 original and reply comments, many of which exceeded 100 pages in length.

Before dispositive action in docket 11991 could be begun, the needs of the Federal Government for spectrum space in the 25-50-megacycle range for stations utilizing the technique of forward propagation by isospheric scatter [FPIS] had reached a point where immediate action by the Commission became necessary. Accordingly, as noted elsewhere in this report, the Commission reallocated for Government use the frequency bands 46.6-47.0 and 49.6-50.0 megacycles. As a result, the industrial services lost a total of 10 of its best primary frequencies, on some of which as many as 8,000 transmitters had been authorized.

Because the industrial services' share of the replacement space (150.8-152 megacycles) reallocated from Government to non-Government use was not considered adequate to fully compensate these services for the frequencies lost, the Commission modified a previous position and proposed some channel-splitting in the 25-50-megacycle band. As finally adopted, it provided for eventual mandatory adherence in this band to the narrow-band standards which has been developed in docket 11253. In that connection, the Commission instituted another major rulemaking proceeding (docket 12169) looking toward the distribution of the frequencies reallocated from Government to non-Government usage in the 150.8-152-megacycle range.

On December 18, 1957, the Commission made partial disposition of the matters at issue in docket 12169 by adopting rules which supplemented the frequency tables of many of the radio services, including industrial. In doing so, however, it ordered two 90-kilocycle blocks of spectrum space (46.51-46.60 and 49.51-49.60) reallocated to the international fixed public and aeronautical fixed services for FPIS use after 1959, which resulted in the industrial services losing an additional two primary frequencies. Other proposals in docket 12169 of substantial interest to the industrial services have not been acted on. They include one relating to the use of tone-actuated "squelch" systems and another concerning the possibility of limiting the access to 25-50-megacycle frequencies to applicants having wide-area communication requirements.

Substantial progress having been made in docket 12169, the Commission was able to consider the problems in docket 11991. Accordingly, just prior to the close of the fiscal year, it made substantial

disposition of this proceeding, effective August 1, 1958. In general, it adopted the original proposals. One major change, principally inspired by the comments, resulted in a retention of the Special Industrial Service in modified form, even though a Business Service was created. Among the activities eligible in the retained Special Industrial Service are agriculture, heavy construction, mining, petroleum service, ready-mixed concrete, and fuel delivery. All standard metropolitan area restrictions have been eliminated. The Commission considered and sought to satisfy most of the frequency-changeover problems inherent in the scatter reallocations. In general, it apportioned available frequencies among the Special Industrial and Business Services with the purpose of facilitating the lowest possible changeover costs to all licensees affected by such scatter reallocations.

Because the new Business Service provides eligibility for "any person engaged in a commercial activity," the Commission anticipates that it will be popular with persons otherwise not eligible in the industrial services, and also with persons seeking relief from interference situations which sometimes occur in the so-called protected services. For example, it is expected that in the petroleum-producing area many companies will turn to the Business Service if a shortage of petroleum frequencies eventually occurs.

The Manufacturers Service was created to meet the need for reliable radio communication to aid in production control, security activities, and localized materials handling. In a minor departure from its original proposal, the Commission established a separate service—to be known as the Telephone Maintenance Radio Service—for communications common carriers having requirements for radio facilities in connection with construction and maintenance activities.

Other Developments

Two other rulemaking proceedings with impact on the industrial services now are in process. In one (docket 12088), the Commission has proposed that the rules governing the Power Service be amended to permit gas utility companies licensed thereunder to utilize their radio stations in connection with supplying liquified petroleum gas to customers located beyond existing gas distribution lines. In the other proceeding (docket 12221), the Commission has proposed the adoption of technical standards to govern single sideband systems operating on frequencies below 10 megacycles.

AMATEUR RADIO SERVICE

General

The Amateur Radio Service is defined in current international radio regulations as: "A service of self training, intercommunication,

and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest."

At the present time, there are approximately 185,000 amateur authorizations for stations and operators of different grades. This is more than twice the number 8 years ago.

Amateurs repeatedly volunteer their services to furnishing communication in all types of emergencies. During the year over a hundred known instances of such aid were reported in connection with floods, tornadoes, hurricanes, snowstorms, fires, location of lost persons, and highway, railroad, and aircraft mishaps. In addition, as a service to the public, amateurs handle communications for their community civil defense organizations through the Radio Amateur Civil Emergency Service (RACES). This service provides for continuation of amateur activity for civil defense during a time of war emergency when other amateur activity must cease. Peacetime activities of the RACES include communication service during periods of natural disasters and emergencies. At the end of the year, 993 approved RACES communication plans were reflected in over 7,600 RACES station authorizations.

Self-styled "hams" have rendered much assistance to the International Geophysical Year program. Where international law has permitted, thousands of messages have been relayed by amateurs between the IGY scientists and supporting personnel at remote and faraway places and their families at home. One group of amateurs is regularly transmitting a facsimile newspaper to the isolated stations in Antarctica.

From the beginning of the IGY earth satellite program, amateurs have been reporting their reception of satellite radio signals, including observations of time, signal strength, recordings, and precision tracking information.

Another IGY contribution by amateurs is the observation and reporting of unusual radio wave transmission conditions including long-distance "scatter" propagation and meteor trail reflections.

Rule Changes

Several changes in the amateur rules were made during the year. Included were amendment of the notification requirements for portable and mobile amateur station operation; provision for the use of the word "exercise" in RACES practice messages; removal of the bands 1875-1900 and 1900-1925 kilocycles from the amateur service to provide for expansion of the loran system of radio navigation; the temporary allocation of the 420-460 megacycle band to the aero-

nautical radionavigation (altimeter) service on a shared basis with the 420-450-megacycle amateur band was extended 5 years; and, because of national defense requirements, all of the amateur bands between 220 and 10,500 megacycles were reallocated. The 3300-3500-megacycle band was exchanged for the 3500-3700-megacycle band, with all bands in the latter available to the amateur service on a shared basis with the radiopositioning service, subject to amateur usage not causing harmful interference to the Government radiopositioning service.

A petition to increase the areas of amateur operator examinations under Commission supervision was denied, but a proposal to include the novice and technician class operators in the category which may be called in for an examination under Commission supervision was under consideration. Other pending proceedings include proposals to restrict to A1 the emission which may be used in the lower 100 kilocycles of the 50- and 144-megacycle bands; establish the United States position at the forthcoming 1959 international radio conference as the same sharing and shifting of amateur bands between 220 and 10500 megacycles as in effect domestically; shift the 21,000-22,000-megacycle amateur band to 22,000-23,000 megacycles and permit assignment of amateur frequencies to contract developmental stations; delete the 26.96-27.23-megacycle band from amateur availability in favor of the citizens service; and make the amateur bands from 7 to 148 megacycles available for use by amateurs outside United States territory.

Other Matters

The processing of amateur applications with the least practical delay requires a continuous effort to minimize activities not essential to this purpose. One factor diverting attention from the basic task is many requests by applicants seeking expedited issuance of licenses, special call signs, waiver of license renewal requirements, and the like. In an effort to reduce such requests, the Commission is trying to impress upon all amateur groups the fact that the rules, in fairness to all, preclude most individual pleas for special consideration.

ENFORCEMENT

In comparison with previous years, there was a substantial increase for the safety and special services in the number of marine forfeitures, station license suspensions, and show-cause orders looking toward revocations of licenses.

Four large cargo vessels and three of the masters thereof were notified of incurrance of forfeitures amount to \$37,300 for violations

of title III, part II of the act; 60 smaller ships and their masters were notified of incurrance of forfeitures aggregating \$30,600 for violations of part 5. (Forfeitures are subject to mitigation or remission by the Commission upon adequate showing.)

Twenty licenses of stations in the safety and special services were suspended, 2 of which were scheduled for hearing, and 32 other stations were ordered to show cause why their licenses should not be revoked. Licenses of 4 other stations were revoked, 1 after a hearing. These four revocations were based upon show cause orders issued during the previous year. Seventeen show-cause orders were dismissed during the year, including one issued the previous year. In 8 of these cases the licensees were admonished that more care must be taken in future operations to assure compliance with the applicable rules and regulations. Sixteen show cause orders were pending at the close of the year. Five cases were referred to the Department of Justice with a recommendation for prosecution.

Along with the imposition of administrative sanctions, efforts were continued to acquaint radio station licensees with their responsibilities and the necessity for strict compliance with the Commission's rules and regulations in order to assure efficient and maximum usage of an already crowded radio spectrum.

LEGAL AND REGULATORY PROBLEMS

Because of the myriad of interests involved, the safety and special services are beset by many legal and regulatory problems. Some affect the field as a whole; others involve a particular service or group of services. In general, these problems are legislative and judicial in nature, ranging from interpretation of the Commission's rules, the Communications Act, other Federal statutes, international treaties, and court decisions, to rulemaking, cross-service regulatory policies, application processing, and legislation having impact on these services.

Special considerations were involved in the proceedings concerning the allocation of frequencies above 890 megacycles (docket 11866) and the allocation of frequencies between 25 and 890 megacycles (docket 11997), noted elsewhere in this report.

Particular problems are posed by the consent decree of January 24, 1956, involving American Telephone & Telegraph Co. and its subsidiaries which is mentioned in the "Common Carrier" chapter. Many of the safety and special licensees lease their equipment from the Bell System companies under an arrangement for maintenance of that equipment by the leasing telephone company. Since the

decree imposes restrictions upon the continuance of Bell's lease-maintenance activities and is not explicit as to the variations which may occur in radio station authorizations, the Commission must consider its effect in the processing of such applications.

Among other things, questions have arisen whether certain Bell companies are subsidiaries of A. T. & T. within the meaning of the decree; whether the decree permits the assignment of existing lease-maintenance contracts so that a telephone company could continue to execute such contracts; and whether a telephone company is permitted to lease and maintain additional equipment resulting from the expansion of a currently licensed radio communication system.

These specific questions have been presented to the Commission for determination by virtue of formal protests under section 309 (c) of the act in the cases of the Connecticut Water Co. and Woolridge Bros., Inc. (dockets 12323-4), and Angelo Tomasso and the New Haven Register (dockets 12407-8). On December 3, 1958 the Commission held that the consent decree had been violated in the first mentioned case.

In addition, A. T. & T. has filed a tariff seeking to have the Commission regulate lease-maintenance activities as a communications common carrier service (docket 11972). Inasmuch as the licensing problems entailed would concern the safety and special services primarily, regulatory and policy considerations are under study.

The situation is further complicated by State actions. The Pacific Telephone & Telegraph Co. filed a tariff with the California Public Utilities Commission covering lease-maintenance activity. The Supreme Court of California has upheld a decision of the California Public Utilities Commission approving such tariff and accepting the activity as subject to State regulation.

STATISTICS

Stations in Safety and Special Radio Services

At the close of fiscal 1958, stations authorized in the Safety and Special Radio Services exceeded 437,000 (exclusive of experimental). This is an increase of about 52,000 over the number in 1957. For these purposes, separate license, construction permit, or combination construction permit and license has been counted as one station. Therefore, in many cases, a station includes a base transmitter and several mobile units. Following is a comparison of station authorizations at the close of fiscal years 1957 and 1958:

Class of station	June 30, 1957	June 30, 1958	Increase or (decrease)
Amateur and disaster services:			
Amateur.....	160,000	179,314	19,314
Disaster.....	347	380	33
RACES.....	5,561	7,668	2,107
Total.....	165,908	187,362	21,454
Aviation services:			
Aeronautical and fixed group.....	2,497	3,122	625
Aircraft group.....	33,753	48,037	14,284
Aviation auxiliary.....	230	254	24
Aviation radionavigation.....	342	327	(15)
Civil Air Patrol.....	12,877	10,944	(1,933)
Total.....	40,699	62,684	12,985
Industrial services:			
Forest products.....	1,513	1,648	135
Industrial radiolocation.....	184	218	34
Low power industrial.....	1,861	2,333	472
Motion picture.....	60	71	11
Petroleum.....	6,899	7,151	252
Power.....	10,617	11,320	703
Relay press.....	121	130	9
Special industrial.....	14,456	17,107	2,651
Total.....	35,711	39,978	4,267
Land transportation services:			
Automobile emergency.....	765	962	197
Citizens.....	27,931	38,611	680
Highway truck.....	606	503	(103)
Interurban passenger.....	62	59	(3)
Interurban property.....	1,034	1,386	352
Railroad.....	2,007	2,265	258
Taxicab.....	4,842	4,733	(109)
Urban passenger.....	109	110	1
Urban property.....	167	172	5
Total.....	37,523	48,801	1,278
Marine services:			
Alaskan group.....	909	1,054	145
Coastal group.....	316	434	118
Marine auxiliary group.....	104	92	(12)
Marine radiolocation land.....	21	23	2
Ship group.....	62,494	70,911	8,417
Total.....	63,844	72,514	8,670
Public safety services:			
Fire.....	3,280	4,725	905
Forestry-conservation.....	2,959	3,264	305
Highway maintenance.....	2,131	2,580	449
Police.....	11,501	12,450	949
Public safety (combined).....	110	158	48
Special emergency.....	2,727	3,325	598
State guard.....	22	10	(12)
Total.....	23,270	26,512	3,242
Grand total.....	375,955	437,851	51,896

Transmitters in Safety and Special Radio Services

More than 1,407,000 transmitters were authorized in the Safety and Special Radio Services as of January 1, 1958, which was an increase of over 243,000 from the corresponding figure in 1957. A comparative breakdown follows:

Class of station	Land or fixed transmitters	Mobile station transmitters	Total transmitters
Amateur and disaster services:¹			
Amateur.....	176,660		176,660
Disaster.....	380		380
RACES.....	7,526		7,526
Total.....	184,566		184,566
Aviation services:			
Aeronautical and fixed group.....	7,249		7,249
Aircraft group.....		59,199	59,199
Aviation auxiliary.....	51	1,291	1,342
Aviation radionavigation land.....	387		387
Civil air patrol.....	4,197	8,961	13,158
Total.....	11,884	69,451	81,335
Industrial services:			
Forest products.....	1,424	13,589	15,013
Industrial radiolocation.....	105	442	547
Low power industrial.....	4	25,324	25,328
Motion picture.....	52	646	698
Petroleum.....	8,909	39,094	47,903
Power.....	8,981	124,058	133,039
Relay press.....	98	1,487	1,585
Special industrial.....	15,697	178,781	192,478
Total.....	35,170	381,421	416,591
Land transportation services:			
Automobile emergency.....	945	8,047	8,992
Citizens.....		125,000	125,000
Highway truck.....	385	6,615	7,000
Interurban passenger.....	7	720	727
Interurban property.....	1,312	24,337	25,649
Railroad.....	2,440	62,790	65,230
Taxicab.....	4,801	95,934	100,735
Urban passenger.....	111	2,829	2,940
Urban property.....	144	5,336	5,480
Total.....	10,145	331,608	341,753
Marine services:			
Alaskan group.....	2,152		2,152
Coastal group.....	613		613
Marine auxiliary group.....	641		641
Marine radionavigation land.....	24		24
Ship group.....	189	75,000	75,189
Total.....	3,619	75,000	78,619
Public safety services:			
Fire.....	4,173	54,212	58,385
Forestry-conservation.....	6,672	26,946	33,618
Highway maintenance.....	2,316	25,227	27,543
Police.....	10,239	156,500	166,739
Public safety (combined).....	4,359	201	4,560
Special emergency.....	3,230	9,892	13,122
State guard.....	195	238	433
Total.....	31,184	273,216	304,400
Grand total.....	276,568	1,130,696	1,407,26

¹ Represents the number of licensed stations since no factual transmitter count is available in these services.

Applications in Safety and Special Radio Services

More than 212,000 applications for stations in the Safety and Special Radio Services were received in fiscal 1958. This is an increase of over 26,000 applications for that year. The following table compares the number of applications received in each service during the past 2 years:

Class of station	Received 1957	Received 1958	Increase or (decrease)
Amateur and disaster services:			
Amateur.....	93, 116	103, 650	10, 534
Disaster.....	53	100	107
RACES.....	2, 900	2, 663	(237)
Total.....	96, 069	106, 473	10, 404
Aviation services:			
Aeronautical and fixed group.....	2, 076	1, 994	(82)
Aircraft group.....	20, 112	24, 375	4, 263
Aviation auxiliary group.....	182	188	6
Aviation radionavigation land.....	175	179	4
Civil air patrol.....	4, 020	4, 691	671
Total.....	26, 585	31, 427	4, 862
Industrial services:			
Business.....	0	178	178
Forest products.....	896	798	(98)
Industrial radiolocation.....	106	213	107
Low power industrial.....	988	1, 211	223
Motion picture.....	30	28	(2)
Petroleum.....	3, 561	3, 635	74
Power.....	4, 099	5, 211	1, 112
Relay press.....	53	81	28
Special industrial.....	8, 458	10, 048	1, 590
Total.....	18, 191	21, 403	3, 212
Land transportation services:			
Automobile emergency.....	564	705	141
Citizens.....	3, 167	5, 276	2, 109
Highway Truck.....	106	191	85
Interurban passenger.....	30	21	(9)
Interurban property.....	872	840	(32)
Railroad.....	1, 075	1, 181	106
Taxicab.....	3, 218	2, 963	(255)
Urban passenger.....	82	73	(9)
Urban property.....	225	212	(13)
Total.....	9, 339	11, 462	2, 123
Marine services:			
Alaskan group.....	767	383	(384)
Coastal group.....	444	210	(234)
Marine auxiliary group.....	49	109	60
Marine radiolocation land.....	10	32	22
Ship group.....	23, 330	27, 437	4, 107
Total.....	24, 600	28, 171	3, 571
Public safety services:			
Fire.....	1, 539	2, 194	605
Forestry-conservation.....	1, 174	1, 704	530
Highway maintenance.....	1, 387	1, 771	384
Police.....	5, 562	6, 038	476
Public safety (combined).....	153	168	15
Special emergency.....	1, 393	1, 745	352
State guard.....	3	11	8
Local government.....	0	13	13
Total.....	11, 261	13, 644	2, 383
Grand total.....	186, 025	212, 580	26, 555

Broadcast Services

TELEVISION (TV) BROADCAST SERVICE

TV Expansion

Though unresolved problems impede the continued expansion of the Nation's competitive TV service, noteworthy progress has been made in the 6 years since the present TV allocation plan and engineering standards were adopted looking toward at least 1 TV service in every area, at least 1 local TV station in the largest possible number of communities, and multiple TV services in as many communities and areas as possible.

It is estimated that over 90 percent of the population is now within service range of at least 1 TV station and that over 75 percent are within range of 2 or more stations. It is also reported that over 83 percent of all homes have 1 or more TV receivers and that over 46 million TV sets are in use. In addition, this Nation is claimed to be the only one having regular TV color service.

As of June 5, 1958, there were 501 commercial TV stations (419 VHF and 82 UHF) and 31 educational TV stations (25 VHF and 6 UHF) on the air in 308 communities. As of that date, a total of 663 commercial stations (461 VHF and 202 UHF) and 53 educational stations (32 VHF and 21 UHF) had been authorized. Applications for 122 commercial stations (89 VHF and 33 UHF) and 15 educational stations (6 VHF and 9 UHF) were then pending. In addition, there were TV translator stations which are discussed under a separate heading in this chapter.

In 1952, when the present TV allocation plan and standards were adopted, only 108 commercial stations (all VHF) were in operation and only 63 communities had 1 or more local stations. The number of TV receivers in use at that time was about 15 million.

TV Problems

In recent years it has been evident that, despite positive advances in the development of TV service, many factors are deterring a fuller attainment of the Commission's objectives for a nationwide competitive TV service. Many people live beyond the effective range of operating stations. Additional numbers have only a single service, which in some instances is of doubtful quality. Numerous commu-

nities do not yet have a local outlet, and in many of the larger markets the opportunity for the growth of multiple, competing TV stations has been limited.

A chief deterrent, over which the Commission has no control, stems from the high costs of construction, programming, and operation of TV stations. It is generally recognized, however, that the greatest difficulties are encountered in achieving successful operation of stations in the UHF band. Since there are only 12 channels in the VHF bands, it was contemplated in 1952 that extensive use of the 70 channels in the UHF band would be required to attain a nationwide TV service. However, UHF stations have had great difficulty in getting established and in competing with VHF stations. The head-start by the VHF system, the present disparity in performance between UHF and VHF transmitting and receiving equipment, and the small number of sets in use and being manufactured that are capable of receiving both UHF and VHF signals are the principal reasons for the difficulties experienced by UHF stations. Other factors, such as the preference of advertisers and other program sources for VHF and UHF outlets, have flowed from the principal reasons and aggravate the UHF difficulties.

In November of 1955, the Commission instituted a proceeding in docket 11532 to consider whether revisions of the TV allocation system might remove hindrances to the further expansion of TV service. Several hundred comments filed by TV broadcasters and other elements of the industry proposed an extensive array of remedies. Their scope varied widely, ranging from channel reassignments affecting a single city to major revisions affecting the entire country. The methods proposed included such diverse and mutually inconsistent approaches as conversion to an all-VHF system or an all-UHF system, or continued use of both bands under various conditions. Some proposals envisaged possibility of obtaining more VHF channels, the use of the present 12 VHF channels under reduced spacings, or both. Some contemplated revising the technical standards and policies; others advocated their maintenance.

After considering the relative merits of these comments and proposals, the Commission on June 26, 1956, outlined a long-range and interim course of action which it believed was in the public interest to pursue.

Long-Range Program

As a long-range consideration, the Commission decided that a thorough analysis should be made of the possibilities of making basic changes in the TV allocation structure to increase opportunities for improvement and expansion. This study is still in progress.

Of all the suggested solutions in docket 11532, the Commission was of the view that the proposal to change all or a substantial portion of TV broadcasting to UHF ultimately would, if feasible, have certain advantages. It felt that if UHF transmission and reception could be substantially improved, if VHF channels could be deleted without an overall loss of service, and if the difficulties inherent in so major a frequency shift could be overcome, many of the current problems would be eliminated. Under an all-UHF system, stations would be able to compete on a much more comparable basis technically and competitive opportunities among broadcasters, the networks, and other program and revenue sources would be enhanced. Moreover, the receiver incompatibility problem would vanish.

The Commission concluded that a thorough exploration should be made of this long-range aspect and, as a first step, decided that a program of research was needed to obtain factual information on the full technical potentialities of UHF so that its capacity to supplant VHF broadcasting in whole or in substantial part could be evaluated. Accordingly, the Commission invited several industry organizations to assist in this program and also asked interested parties to submit comments and data on a continuing basis while study of long-range solutions was in progress.

Television Allocations Study Organization.—The Television Allocations Study Organization (TASO) was formed in January of 1957, following a meeting initiated by the Commission in September of 1956, with five representative segments of the TV industry (the National Association of Broadcasters, Electronic Industries Association, Joint Council on Educational Television, Committee for Competitive Television, and Association of Maximum Service Telecasters, Inc.).

TASO has as its principal objective the development of technical information and engineering principles concerning UHF and VHF service. Six panels were created to deal with particular parts of the general program, and various committees within these panels to handle specific matters.

The nature of the work of these panels, which is still in progress, may be gathered from the following brief description of their tasks: Panel 1 is appraising the performance of transmitters, transmitting antennas, and other transmitter equipment for both VHF and UHF broadcasting. Panel 2 is making the same sort of an appraisal of the performance of receiving equipment. Panel 3 is observing and measuring the relative performance of VHF and UHF receiving equipment and comparing picture quality and signal strength. Panel 4 is studying wave propagation in the VHF and UHF bands and gathering additional data by field measurements. Panel 5 is prepar-

ing propagation curves and analyzing pertinent technical factors needed to establish standards for acceptable service in both bands. Panel 6 is evaluating picture quality under different conditions of signal strength, interference, and electrical noise.

More than 230 engineers from some 131 different concerns have served on the several TASO panels and their numerous committees and subcommittees. Commission staff members are participating on the panels as observers.

TASO is expected to issue its final report by the end of the calendar year. The findings will provide valuable tools for the Commission's continuing long-range study and interim efforts to overcome the barriers to expansion of TV service.

Interim Program

Recognizing that the long-range allocation study and the implementation of any overall measures might take considerable time, possibly several years, the Commission decided that, in the interim, it would be desirable to consider deintermixture (separation of VHF and UHF assignments) in individual communities where it could be shown that this would augment opportunities for the construction and successful operation of additional stations and increase program services to the public. Deintermixture can be achieved either by increasing the number of local VHF assignments, where feasible and possible, or, alternatively, by removing local VHF assignments and substituting UHF channels.

Consequently, at the conclusion of the general allocation proceeding in June of 1956, the Commission inaugurated rulemaking looking toward deintermixture in certain cities. These and subsequent proceedings are reviewed under "Deintermixture."

While the Commission has devoted much time to the consideration of deintermixture proposals, it has also considered many requests for rulemaking not involving deintermixture which looked to additional channel assignments and reassignments to improve the TV situation in numerous communities and areas. These included proposals for shifting UHF and VHF assignments from one city to another and dropping in UHF and VHF assignments where they would not affect the balance of existing or foreseeable TV operations in the communities concerned. Typically, these channel reassignments and "drop-ins" have involved communities where either no station had yet been built or where local stations were either all UHF or all VHF. At the year's end, requested reassignments had been granted in 44 cases and denied in 4 cases. Thirteen additional proposals were pending.

Deintermixture.—In the last 2 years the Commission, after study of local circumstances, determined that deintermixture would im-

prove the TV situation in 12 communities and areas. After appropriate proceedings, Springfield and Peoria, Ill.; Elmira, N. Y., and Walla Walla, Wash., were made all UHF communities. Further proceedings are required before Evansville, Ind., and Fresno, Calif., can be made all UHF. In six other cases, VHF channels were added to Norfolk-Portsmouth-Newport News, Va.; Albany-Schenectady-Troy, N. Y.; New Orleans, La.; Charleston, S. C.; Duluth and Minnesota-Superior, Wis., and Miami, Fla. The Commission was unable to conclude that the advantages of deintermixture would counterbalance the attendant disadvantages and therefore denied proposals concerning Hartford, Conn.; Madison, Wis.; Columbia, S. C.; Erie, Pa., Champaign, Ill.

In other rulemaking proceedings involving Moses Lake, Wash., and Lafayette, Ind., proposals for the assignment of VHF channels were denied because they would have created a VHF-UHF intermixture situation. Under consideration at the year's end were proposals to add additional VHF channels to Providence, R. I.; Columbus, Ga.; Baton Rouge, La., and Winston-Salem-High Point-Greensboro, N. C. Since then, the additional VHF channel to Providence was denied and one was added to Winston-Salem-High Point-Greensboro but is subject to a petition for reconsideration. The Commission considered and denied requests for rulemaking on deintermixture proposals involving St. Joseph, Tenn.; Clearfield, Pa.; Charlotte and Raleigh, N. C.; Spartanburg, S. C.; Biloxi, Miss., and Fort Smith, Ark. At the close of the year requests for deintermixture rule making were under consideration for Corpus Christi, Tex.; Sacramento, San Francisco, Bakersfield and Fresno, Calif.; Birmingham and Montgomery, Ala., and Rochester, Syracuse and Elmira, N. Y.

Mileage separations.—The Commission's interim program of selective deintermixture and other channel reassignments has been facilitated by relaxation on July 19, 1956, of rules governing the method of measuring minimum spacings between cochannel and adjacent channel stations. Previously, the controlling distance was measured between an existing station transmitter or the post office of the city in which the new assignment was proposed. Finding that in some instances these distances fell below the minimum by a small margin, the Commission revised its rules to permit measuring distances between transmitter sites to meet minimum separation requirements. This has afforded needed flexibility and has permitted the assignment of new channels to communities and the reassignment of channels in a number of cases which previously would not have been possible.

Satellite stations.—In August of 1954 the Commission inaugurated a policy of considering applications for new TV stations even though no provision for local programs was proposed. The purpose was to increase incentive for installing TV stations in the smaller markets by eliminating the cost of studio equipment and local programming. These stations are commonly called satellite stations, although the term is not used in the Commission's rules or tabulations. They are licensed as regular TV stations and are required to meet the same technical and other rules which apply to regular TV stations except that they are not required to originate local programming and may limit their broadcasts to duplicating the programs of other stations. They may at any time, however, originate local programs, and a number of the UHF and VHF stations authorized on this basis are now providing a limited amount of local programming.

Translator stations.—Rules were adopted in May of 1956 to provide for the licensing of translator stations as a means of extending TV service to small communities and areas beyond the normal service range of regular TV stations. This new type of station uses relatively inexpensive, low-powered equipment to receive signals of distant TV stations (VHF, UHF, or other translator stations), convert (translate) them to one of the upper 14 UHF TV channels (channels 70-83) which it has been assigned, and retransmit them in areas needing TV service.

The past year saw increasing interest in TV translator operation. At its end, 156 translators had been authorized as compared to 74 in 1957, and 92 were on the air, as compared to 41 the year previous. For many people, this was their first TV service. In some areas more than one translator is in use, thus making additional TV service available.

It is estimated that about \$875,000 has been invested in TV translator facilities and that over 180,000 all-channel TV receivers or UHF converters have been purchased for use in areas served by translators. In some places translators are operated by local governmental bodies, community groups or by private concerns and, in other places, by regular TV broadcast station licensees desiring to improve their coverage. There is no fixed maximum on the number of translators which can be licensed to a single entity. Thus, community groups, by establishment of three translators, have permitted the reception of all the TV national networks in areas otherwise without service.

Experience with TV translators reveals that they are dependable and capable of providing good reception out to an average distance of 15 to 20 miles. The maximum power of translators has been increased from 10 to 100 watts.

Booster operation.—“Booster” operation is another technique for extending service to small, remote areas which the Commission is examining in current rulemaking proceedings in dockets 11331 and 12116.

TV boosters use apparatus to receive the signals of an outside regular TV station and to amplify and retransmit them for local reception. They differ from TV translators in that the signals received from a parent station are retransmitted on the same channel used by the parent station.

Experimental data obtained from a booster operation in conjunction with station WATR on UHF channel 53 in Waterbury, Conn., indicate that the use of boosters to fill in “shadows” (areas of weak signals caused by natural or manmade obstruction) within the normal service area of UHF stations is less complicated than similar use in the VHF bands. This is because conventional UHF receiving antennas are able to discriminate between the signals retransmitted by a booster and the signals of the originating station much more easily than do more complex and expensive receiving antennas in the VHF bands.

While no provision has yet been made for licensing boosters on a regular basis, the Commission has under study in docket 11331 proposed rules which would permit UHF stations to make limited use of boosters to reach unserved spots within their grade A service areas.

“Repeater” stations.—Consideration is being given in docket 12116 to the feasibility of authorizing a low power repeater-type of booster station in both the VHF and UHF bands within limits which would permit them to render adequate service in areas where the signals of regular TV stations cannot be satisfactorily received.

Community Antenna TV Systems

Community antenna TV systems have been installed in numerous communities and areas where the direct reception of regular TV stations is nonexistent or unsatisfactory. It is estimated that over 550 such systems are in operation, and trade reports indicate that some half a million people receive their service.

CATV systems employ receiving antennas for off-the-air pickup of the signals of regular TV stations for relay by cable or wire to customers paying for the service. In some instances, the signals of distant TV stations are transmitted by microwave facilities furnished by common carriers and fed into the local cable distribution system.

CATV systems do not transmit over the air for direct reception by the general public, and their operation does not require authorization by the Commission. However, they are subject to Commission

rules which prescribe limitations on their radiations in order to prevent interference to licensed radio and TV services.

On April 2, 1958, the Commission held that its regulatory jurisdiction does not extend to CATV systems.

Impact of Satellite, Translator, Booster, and CATV Operations

On May 22, 1958, the Commission launched a factfinding inquiry in docket 12443 to evaluate the actual and potential impact on the growth of the TV broadcast service by satellite, translator, booster, and community antenna operations.

While the use of these various kinds of facilities provides a means of extending TV service to small communities lacking local stations and to areas beyond the range of satisfactory TV service, all of them pose problems, in greater or lesser degree, relating to their competitive impact on regular TV stations, as well as other problems peculiar to each type of facility. The matter is further complicated by the fact that these systems augment the service of TV stations. Before endeavoring to reach conclusions as to how these problems should be dealt with and the policies which would best serve the public interest, the Commission felt that study of their economic impact was necessary and interested parties were invited to submit comments. These are under study.

Noncommercial Educational TV

On July 16, 1958, the Commission assigned a second educational TV channel [now channel 16] to Pittsburgh, Pa. This is the first city to be given two such assignments. It was done by rulemaking on request by Metropolitan Pittsburgh Educational Station which has been operating station WQED there on channel 13 since April of 1954. WQED said that it needed the second channel to provide a specialized educational service to industries and professions in the area and to enlarge the educational programs it now provides for classroom and home instruction. There is no prohibition on a licensee from operating more than one educational station in the same area if the local situation warrants.

Counting the new educational reservation at Pittsburgh, this brings the total number of TV channels reserved for noncommercial educational use to 257 (86 VHF and 171 UHF). This is 15 more than first allocated in 1952. As of June 5, 1958, there were 31 educational stations on the air (25 VHF and 6 UHF). Fifty-three (32 VHF and 21 UHF) construction permits for additional educational stations were outstanding, and 15 (6 VHF and 9 UHF) applications for new stations were pending. At the same time last year, 24 educational TV stations (19 VHF and 5 UHF) were on the air.

During the year the Commission considered a number of proposals to make unused educational reservations available for commercial use either by deleting the reserved channels or substituting another channel. The Commission's policy has been to retain the educational reservation where there has been an active interest on the part of educators and educational institutions and where affirmative plans for the utilization of the educational channel have been taken. This is in accord with the original basis upon which the educational reservations were made. In reserving TV channels for educational use in 1952 the Commission recognized that educational interests faced financial and other difficulties not encountered by commercial interests and that they require more time to prepare for TV operation. It felt, however, that it would not be in the public interest to continue unused reservations for an excessively long period and that they should be reviewed from time to time.

On September 25, 1957, the Commission concluded that the idle VHF educational reservation at Eugene, Oreg., should be made available for commercial use. No showing was made in this rulemaking proceeding that the educational interests had taken any action looking toward use of the educational channel, and in view of the demonstrated immediate need for an additional commercial station at Eugene, it was not believed that continued retention of the educational reservation was warranted, especially since the area is now served by a new educational TV station at Corvallis.

This is the third time the Commission has unreserved unused VHF educational channels. Previous actions affected Weston, W. Va., and College Station, Tex. In the College Station case, the VHF channel reservation was replaced by a UHF channel for education, and the VHF channel was assigned to Bryan-College Station, Tex., for commercial use.

Petitions to unreserve or change educational reservations were denied in proceedings affecting Jacksonville, Fla. (August 1, 1957); Durham, N. C. (December 11, 1957); Hartford, Conn. (February 12, 1958); San Antonio, Tex. (February 26, 1958), and Denton, Tex. (June 4, 1958), when it was shown that educators in those communities were working to take advantage of their reservations.

On March 21, 1958, a VHF channel was reserved for education at Carbondale, Ill., because of the need shown by local educational interests. A petition to change channel 8 at Waycross, Ga., from commercial to educational use was under consideration at the year end.

Subscription TV

On October 17, 1957, the Commission issued its first report in the rulemaking proceeding (docket 12279) which had been inaugurated

in February of 1955 to consider proposals for the broadcast of some TV programs for which a direct charge would be paid by viewers. In that report the Commission concluded that it had jurisdiction to authorize subscription TV operations if it were found to be in the public interest to do so. It added, however, that before judgment could be made concerning definite establishment of a toll-TV service it would be desirable to observe the operation in limited trials under circumstances which would insure the continued availability of free programming to the communities in which these trials might be conducted. Final decision concerning the conduct of any trial would depend on the Commission's evaluation of specific proposals to be submitted in conformity with conditions set out in the report.

Hearings on subscription TV were conducted by the House Interstate and Foreign Commerce Committee in January of 1956. On February 6, 1958, that committee adopted a resolution expressing its belief that subscription TV authorizations should not be granted unless and until the Communications Act is amended to specifically empower it. The Senate Interstate and Foreign Commerce Committee on February 19, 1958, recommended Senate adoption of a similar resolution, on which the Senate has taken no action.

In view of the possible adoption of prohibiting or limiting legislation, as evinced by the introduction of numerous bills on this subject in both houses, the Commission, on February 26, 1958, issued a second report announcing that the status quo would be maintained until after the adjournment of the 85th Congress. In July, the House Interstate and Foreign Commerce Committee informed the Commission that it would not be possible to conduct further hearings on this subject during that session, and requested that the Commission continue to maintain the status quo until after the 1st session of the 86th Congress so that it would have had an opportunity to hold hearings and consider the desirability of adopting legislation on this subject.

On July 24, 1958, the Commission informed the House committee that the present status would be maintained as requested; that, meanwhile, the Commission would accept and process any proposals for trial subscription TV operations which might be submitted, but would withhold grants for the period designated. Only one application was received during the year, but it did not meet the prescribed trial requirements.

TV Table of Assignments

TV channels are allocated to communities throughout the country in accordance with certain technical standards and principles on the basis of a fixed table of assignments adopted in 1952. TV applicants

are required to apply for channels assigned to the communities listed in the table. However, provision is made for changes in the table, and it has been amended several hundred times.

During the year, the Commission acted on proposals in 26 rule-making proceedings which resulted in table changes. Rulemaking also involved a number of other proposals for changes which the Commission found did not warrant adoption. At the end of the year, 12 proceedings for changes in the table were outstanding and approximately 30 petitions for other changes were under consideration. Many of the pending proposals seek complex chain-action changes in assignments of many communities and involve policy, legal and technical problems, especially where deintermixture is sought.

Consideration was given during the year in docket 12005 to a proposal for allocating commercial TV channels largely on the basis of individual applications, as AM broadcast frequencies are assigned, rather than by the present allocation table. On October 10, 1957, the Commission decided that the present procedure for assigning TV channels should not be changed. It felt that general deletion of the allocation table would be inappropriate while the current study of possible basic changes in the TV allocations structure is in progress.

TV Test Signal

TV broadcasters and other segments of the industry have been experimenting with various types of TV test signals and studying the problems connected with their utilization. Test signals are transmitted during the interval when no picture is being sent and are used to check transmissions and equipment. Rulemaking was commenced in April of 1957 to consider whether a standard TV test signal should be adopted and whether it should be required of all stations or made optional. At the same time, TV stations were given blanket authority to transmit test signals during programing so that they would be in a better position to file comments and data in this proceeding.

TV Frequency and Modulation Monitors

On May 28, 1958, the Commission postponed for another year—to June 1, 1959—the effective date of the rules requiring TV stations to have type-approved frequency and modulation monitors at the station whenever the transmitter is in operation. In light of the continued development of more stable frequency control circuits in all types of broadcast transmitters, the Commission is reviewing its requirements regarding continuously operating frequency monitors to ascertain whether they are still needed to insure that stations keep within the prescribed frequency tolerances.

TV Agreements With Canada and Mexico

An agreement with Canada concerns the assignment of VHF and UHF stations within 250 miles of the border. An existing agreement with Mexico relates only to VHF assignments along the Mexican border. However, during November 1957 a pact was drafted which became effective July 16, 1958. It governs UHF assignments within 200 miles of that border.

STANDARD (AM) BROADCAST SERVICE

AM Marches On

At the close of fiscal 1958, the number of authorized AM broadcast stations had climbed to 3,353. This was a gain of 115 for the year as compared with 218 for the previous year. As has been the case for many years, most of the new grants were for daytime only operation. Of the 1958 total, 3,253 held operating authorizations, or 174 more than at the close of 1957. Pending applications for new stations totaled 412, which was 19 less than at the same time in 1957.

Clear Channel Reallocations

In April of 1958, the Commission completed its review of the lengthy and complex record in the clear channel proceeding (docket 6741) which had been inaugurated in 1954 to consider revisions of the rules governing the use of 47 AM frequencies which are designated as clear channels. These are channels on which the dominant class I-A and class I-B stations are given sufficient protection from cochannel and adjacent channel interference to enable them to render wide area service to remote communities and rural areas not reached by other AM stations.

Some of the parties to this proceeding proposed increasing the present 50 kilowatt maximum power for class I stations up to 500 or 750 kilowatts. Others favored retaining the present maximum power but relaxing the rules which up to now have precluded the nighttime operation of other stations on frequencies used by the 24 class I-A clear channel stations.

In further rulemaking, adopted April 15, 1958, the Commission stated its tentative conclusions, based on the present record, and invited comments on proposals to eliminate the exclusive nighttime use of 12 of the class I-A clear channels in New York, Chicago, Philadelphia, Pittsburgh, Rochester, Cleveland, Detroit, and St. Louis. The proposed reallocations look toward assigning additional class I stations in 12 western cities located in less well-served areas and, subsequent to the assignment of those stations, the possible additional assignment of class II stations on those channels to bring

a first primary or groundwave service to "white" areas, while affording protection to the class I stations on the channels.

The proposal contemplates no duplication of nighttime service on any of the remaining 24 class I-A channels. Their status quo would be maintained pending possible future consideration of proposals for higher power to enable stations on these channels to cover underserved areas. The Commission is giving high priority to the task of reaching final decision in this proceeding.

Daytime Skywave

In a separate proceeding (docket 8333), the Commission is considering the desirability of affording class I clear channel stations some degree of protection against interfering skywave signals from cochannel stations. Final decision awaited resolution of the problems raised in the next noted proceeding.

Extended Hours for Daytime Stations

Parties to this proceeding (docket 12274) submitted, during the spring and summer of 1958, voluminous comments on a proposal of the Daytime Broadcasters Association that stations now confined to operation between sunrise and sunset be permitted to operate from 5 a. m. or sunrise, whichever is earlier, to 7 p. m. or sunset, whichever is later.

On September 19, 1958, this petition was denied. The Commission concluded that, among other things, the population which would gain service by the proposal would be vastly exceeded by the population (particularly in the rural areas) which would lose service because of the additional interference that would result. This interference would also affect foreign stations in violation of international agreement. The Daytime Broadcasters Association petitioned for reconsideration.

Daytime Power Increase of Class IV Stations

New rules, effective July 7, 1958, provide for consideration of applications of class IV (local) AM stations for daytime only increases in power from the previous 250 watts maximum up to 1 kilowatt, with directional antennas if necessary, to afford previously required protection to cochannel stations. The use of directional antennas to enable closer spacing between class IV stations is specifically precluded.

Approximately 25 applications for increased power have been filed. However, action on them is being deferred until the rule change can be coordinated with other signatories to the North American Regional Broadcasting Agreement (NARBA) and the recently signed agreement between the United States and Mexico, both of which await Senate ratification.

NARBA, to which the United States became a party in 1950, places a 250-watt ceiling on the power of class IV stations, and the bilateral agreement signed January 29, 1957, by the United States and Mexico permits use of daytime power up to 1 kilowatt in all areas of the United States more than 62 miles from the Mexican border.

"Unique" Program Service

On November 7, 1957, the so-called unique program service rule was deleted. This rule afforded AM stations protection from interference in areas where they furnished a unique program service beyond their normally protected contours. Program service was held to be unique if 90 percent of the population of the area so served did not receive service from any other station. The Commission decided (docket 11896) that the rule had served little or no useful purpose, its provisions were too vague and indefinite to be of assistance in processing applications, it prompted uncertainty as to the protection to be afforded, it might discourage applicants for new and improved AM facilities and, in general, it was an unsatisfactory allocation tool.

North American Regional Broadcasting Agreement

Prior to 1930, interference to domestic AM broadcast service from foreign sources was no great problem. However, during the ensuing 10 years interference, particularly from Latin American countries, reached serious proportions. This situation was largely rectified in 1941 by the first North American Regional Broadcasting Agreement (NARBA). This agreement served its purpose during its term of 5 years, and was extended until 1949 by an interim agreement.

Before a new agreement could be negotiated, certain of the Latin American countries became dissatisfied with some of the terms and made a number of station assignments contrary to agreement which resulted in increased interference to certain stations in this country.

A new NARBA (1950) provided, in addition to reestablishing station assignment procedures, for correcting additional interference resulting from expiration of the interim agreement. Mexico is not signatory to the new pact. However, on January 29, 1957, after negotiations extending over several years, a bilateral agreement between this country and Mexico with respect to AM broadcasting was concluded.

To become effective, the 1950 NARBA must be ratified by three of its major signers—the United States, Canada, and Cuba. Cuba and Canada ratified it in 1951 and 1957, respectively. To date the United States has not, although the Senate Committee on Foreign

Relations held hearings in July of 1953, and again in July of 1958, on both NARBA and the separate United States-Mexico pact.

In the absence of an effective agreement with other North American countries regarding AM broadcasting, the Commission has adhered to a policy of making no new assignments or modifications which would be inconsistent with old or new agreements or understandings. The other countries have, in general, followed similar policies until recently. The result is that, while the interference to United States stations which developed upon expiration of the interim agreement has continued at a high level, a complete breakdown in coordinated assignment practices did not occur. However, there is increasing evidence that this voluntary conformation is slowly deteriorating to a point where even greater interference from foreign sources is to be expected unless these agreements can be made effective.

FREQUENCY MODULATION (FM) BROADCAST SERVICE

Commercial FM Continues Upswing

For the second consecutive year, commercial FM broadcast stations gained in number. Of 634 authorized stations at the end of the year, 548 were on the air. This is a gain of 74 and 18 respectively over the previous year.

New commercial grants increased from 40 in 1957 to 98 during the year. This is the largest number since 1948.

Fifty-seven applications for new commercial stations were pending as against 24 the year previous. Competition for new FM commercial outlets is reflected in the fact that 23 applications were in hearing.

Renewed interest in FM broadcast is due primarily to the ability of stations to augment their income through supplemental services and the possibility of extending such services through multiplex operation.

More applications for new commercial FM facilities were received from California than from any other State. The demand has exceeded the facilities available in some large cities and it has been necessary to designate applications for hearing in New York City, Philadelphia, Baltimore, Chicago, Los Angeles, and San Francisco. These are the first FM hearings since the late forties.

Six States do not now have any commercial FM stations. They are Idaho, Montana, North Dakota, South Dakota, Vermont, and Wyoming. No FM stations have ever been authorized in Alaska. Hawaii has 1 commercial station, Puerto Rico has 2, and 1 is authorized in the Virgin Islands but has not yet commenced operation.

Subsidiary Operations

Commercial FM stations may, pursuant to rules adopted by the Commission in March of 1955, obtain Subsidiary Communications Authorizations (SCA) to engage in certain types of specialized supplementary activities as an adjunct to their regular FM broadcast service. This subsidiary operation was authorized to enable FM licensees obtain additional revenue. SCA service is limited to special programming of music, news, time, weather reports, and similar subjects for reception by business and other subscribers for a fee. An example is supplying programs of a predominantly musical nature to commercial establishments. "Storecasting" is designed for retail establishments and "transitcasting" for public vehicles, such as buses and streetcars.

The Commission initially authorized FM stations to conduct functional music operations on a "multiplex" basis at any time, or on a temporary "simplex" basis outside of broadcast hours. When functional music programs are multiplexed, they cannot be heard on ordinary FM receivers since they are transmitted on a subchannel simultaneously with regular FM programs on the main channel. 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 (usually spoken matter) by means of an inaudible supersonic (beep) signal.

The Commission emphasized in 1955 that simplexing was being permitted for 1 year only because of the unavailability of multiplex equipment at that time and that, in order to protect FM broadcast, it was ultimately necessary for all functional music operations to be conducted on a multiplex basis. Because of the continued unavailability of multiplex equipment, simplexed operations were permitted until July 1, 1957. Multiplex equipment is now available in sufficient quantities to meet present needs and, therefore, no new authorizations for simplexing have been granted since that date. Extensions of authorization to continue simplex operations have been granted in cases where SCA holders are in the process of converting their receiving equipment from simplex to multiplex. These authorizations will expire October 1, 1958. As of July 30, 1958, 82 FM stations held SCA's for multiplex operation.

The Commission is now considering whether, in the light of SCA experience over the past 3 years, additional uses of multiplexing by FM broadcast stations to provide various subsidiary forms of communication services would be feasible and appropriate. Interest in expanding FM multiplexing has grown steadily. Many of the proposed new uses would mean additional revenue for FM broadcasters.

Some view multiplexing as an economical means of furnishing specialized radio communication services. Contemplated uses run the gamut from furnishing price quotations and stock market reports to providing doctor paging services and traffic light control.

On November 7, 1958, the Court of Appeals held the functional music rules invalid insofar as they exclude such operation on a simplex basis and remanded to the Commission the case brought by WFMF, Chicago, which had appealed Commission requirement that SCA licensees change from simplexing to multiplexing. The Commission has appealed.

Class B FM Allocation Plan Abandoned

There are two classes of commercial FM stations. Class A stations serve local communities and class B stations cover metropolitan or rural areas.

On May 28, 1958, the Commission proposed to abandon its tentative allocation plan for class B stations. This plan was established in 1945 as a temporary guide for allocating such stations geographically. It was not embodied in the rules. The Commission felt that the increasing number of FM applications can be more quickly processed by eliminating the frequent rulemaking proceedings which have been necessary to make changes in the class B allocation table. Accordingly, on July 31, 1958, it deleted this table, effective August 30.

Elimination of the allocation plan will mean that applications for class B stations may specify any channel which appears available for use in the area. Only 60 of the 100 FM channels are class B channels and were included in the allocation plan; the 20 class A channels and the 20 noncommercial educational channels were not included in any allocation plan and are assigned on a case-to-case basis.

Vertical Polarization for FM Stations

In August of 1957 the Commission instituted rulemaking on proposal to amend the technical rules to permit FM stations to employ vertical polarization for the purpose of improving FM reception on automobile receivers. After considering the comments filed, the Commission on January 3, 1958, decided not to adopt the proposal at this time and terminated the proceeding. It was of the view that the present rules, which provide for horizontal polarization and also permit circular or elliptical polarization, enable stations to add vertical polarized waves for the intended purpose.

Educational FM Still Climbs

Noncommercial educational FM stations continued their slow but steady growth. The 157 such authorizations at the end of the year

were 9 more than the year before, and the 147 on the air represented a gain of 12. Six applications for new educational FM outlets were pending as contrasted with 2 at the same time in 1957. There were 11 grants and 2 deletions during the year compared with 17 and 5 respectively the previous year.

The fact that an educational FM station can start with low power (10 watts), increasing power when desired, makes it the most economical type of broadcast station to build and operate for on-the-air educational programming.

INTERNATIONAL BROADCAST STATIONS

On July 23, 1958, the Commission authorized the first new international broadcast station since World War II. Located near Belmont, Calif., it will beam to Latin America. The only international broadcast station licensed by the Commission is at Scituate, Mass., plus an experimental operation at Cincinnati. All other international broadcast facilities in this country are Government stations operated by the United States Information Agency.

AUXILIARY BROADCAST SERVICES

All classes of broadcast stations are eligible to use low-powered transmitters for a variety of auxiliary purposes. The number of these authorizations has now reached 4,000, representing half a dozen types of adjunct services.

There are pickup stations to program events away from the studio, studio-transmitter link stations to connect studio and transmitter (the latter often miles away, usually on a mountain top or some other high elevation); and TV and FM intercity relay systems to carry programs from a distance in places where common carrier facilities are not available.

On July 30, 1958, the Commission finalized rulemaking to permit regular licensing of low-powered auxiliary stations for broadcast studio use in cueing, directing, and otherwise supervising programming. This permits communication with hidden miniature receivers worn by the performers, thus outmoding the conventional telephonic apparatus with cumbersome extension cords.

On July 31, 1958, the Commission liberalized its policy on the use of private relay systems by TV broadcasters to meet economic problems of small market or marginal TV station operation. It permits the use of such relay facilities between TV stations without regard to the availability of common carrier intercity TV transmission lines, but prohibits their interconnection with common carrier facilities.

EXPERIMENTAL BROADCAST SERVICES

These are the means provided by the Commission for industry to carry on programs of research and development to further radio uses and techniques. Information obtained from these operations benefits not only the industry but also provides data useful to the Commission in keeping pace with new developments. There were 834 such authorizations when the year closed.

Research licensees were active in several fields of TV. One program involves a low-power repeater station whose transmissions are vertically polarized, as contrasted with the horizontally polarized transmissions normally employed. Preliminary results indicate that such a repeater, operating on the same channel as its parent station, may possibly improve UHF coverage in mountainous terrain. In another case, an experimental VHF station, using a directional antenna mounted on the tower of a commercial UHF station, is obtaining data concerning the comparative operation of such stations.

Developmental activity related to single sideband transmissions by AM stations, multiplex transmissions by FM stations, and other aspects of aural broadcasting. A new broadcast technique known as "compatible single sideband transmission" is under investigation. While single sideband transmission is commonly utilized in other radio services as a means of conserving spectrum space, it has heretofore been impractical to apply it to AM transmission because of its distortion characteristics and the necessity, in some systems, of using specially designed receivers. Preliminary tests indicate that compatible transmissions may be received on standard receivers with comparatively little distortion. The results of continuing tests will determine whether such a system may be employed to reduce interference between existing AM stations.

GENERAL BROADCAST MATTERS

Network Study

The Commission was authorized by Congress during fiscal 1956 to conduct a study of radio and TV network broadcasting, and a special appropriation was provided for this purpose. A special network study staff was established within the Commission, under the direction of a network study committee of 4 Commissioners, to carry out the study. The staff report was completed on October 3, 1957. Entitled "Report on Network Broadcasting," it has been published by the Government Printing Office in the form of a report of the House Interstate and Foreign Commerce Committee (H. Rept. No. 1297, 85th Cong., 2d sess.) It is a comprehensive study of network practices in relations with stations and advertisers in the field of TV, as well as of the multiple ownership of TV stations. Its 737 pages

contain recommendations with respect to new Commission rules, modification and enforcement of existing rules, as well as new legislative authority.

The Commission held a public hearing to afford interested parties an opportunity to comment on the findings, conclusions, and recommendations of the staff report. Witnesses appeared before the Commission en banc to testify on behalf of the three major TV networks, a film network, several multiple TV station licensees, representative groups of affiliates of each of the TV networks, an independent TV station, stations represented by Columbia Broadcasting System and National Broadcasting Co. in national spot sales, the Station Representatives Association, the Committee on Competitive Television (representing UHF stations) and individual affiliates. Network study staff members also commented for the record on the testimony of the various parties. The hearing has been completed, and the Commission is considering what courses of action may be appropriate in the light of this record. A procedure has been arranged whereby a formal opinion will be obtained from the Department of Justice on the antitrust aspects of certain network practices discussed in the report.

One portion of the report, dealing with programing, has not been completed. This phase of the study was delayed by litigation arising from the unwillingness of certain independent TV film companies to provide financial data required by a questionnaire of the network study staff. The authority of the Commission to obtain the information was upheld by a district court. Completed responses to the questionnaires have now been received from most of the important companies engaged in this business. These responses are being analyzed, and additional research, including field trips and interviews, will be or are being undertaken with respect to various aspects of the programing study.

During fiscal 1957, the Commission was requested to testify concerning S. 376, a bill to give the Commission direct regulatory authority over networks. The Commission indicated that it has no authority directly over network organizations, but considerable authority to regulate network practices indirectly through its power to license and regulate individual stations engaged in network broadcasting. Since issues concerning direct regulation of networks are now before the Commission as part of its consideration of the network study report, the Commission has not taken a position with respect to S. 376.

Violations of Chain Broadcasting Rules

In the course of review of the files of the three TV networks by the network study staff, material was found which indicated possible

violations of the Commission's present chain broadcasting rules. Thirty-two TV stations were involved. The Commission directed inquiries to the networks and to 20 station licensees.

On the basis of the replies, the Commission between March and July 1958 took actions as follows: In 3 cases—1 involving an understanding between a network and a licensee that programs not taken by the licensee's stations would not be offered to other stations in the markets involved, and 2 cases involving understandings concerning the affiliate's rates for nonnetwork time—the Commission determined that a violation of the rules had occurred, and so informed the networks and licensees involved. In a number of other situations the Commission concluded that, while the material did not establish that an agreement was in violation of the rules, the conduct of the networks, in attempting to persuade the affiliated stations to enter into understandings which would violate the rules, was inconsistent with the intent and purpose of the rules. Letters to the networks and the licensees stated that, while the Commission does not contemplate further action in these matters at present, the networks and stations involved are expected to comply with the Commission's rules and the material concerning these matters would be associated with their files for further consideration if future operations warrant.

Broadcast Station Sales

The increasing activity in acquiring broadcast stations by purchase, noted in previous years, continued during fiscal 1958. Percentage-wise, the increase was not as great as in fiscal 1957. In that year, there was an increase of 22 percent over 1956. In 1958 the percentage increase over 1957 was 8 percent.

However, the prices paid for broadcast properties in 1958 indicated substantial increases over prices paid during prior years. What appears to be a new record for combined broadcast properties in a single market was reached when WCAU (AM, FM, and TV), Philadelphia, was sold to Columbia Broadcasting System for \$20 million.

Rules and Policies Concerning Programing

During the year the Commission deferred action on a number of applications for renewal of radio and TV station licenses because examination of the stations' past programing records and their proposed future programing presented a question as to whether their continuing operation would be in the public interest.

In most cases it also appeared that the stations' programing during the immediate past had not fulfilled representations made in earlier applications. Inquiries were directed to the licensees. In some of these situations, the replies indicated that their programing would be

in the public interest, and the licenses were renewed; other cases are still being studied.

The Commission also considered conduct by several TV licensees in two particular areas relating to programing. The first of these concerned the treatment of subscription TV. Beginning in February 1958, the Commission received complaints that the three national TV networks and a number of stations had, in programs and announcements, taken an editorial position against toll TV without making any effort to present the other viewpoint. It was alleged that this one-sided presentation was designed to influence congressional consideration of pay TV. As a result of inquiry, the Commission in four instances directed letters to stations informing them that their treatment of the issue did not meet the standard of fairness set forth in the Commission's "Report on Editorializing by Broadcast Licensees." As to the networks, it found that their treatment was not inconsistent with the report. The conduct of other licensees is still under consideration.

The second programing matter concerned the presentation of kinescope summaries of Kohler Co. strike hearings conducted by the Senate Select Committee on Labor and Management in the spring of 1958. They were televised on a live basis by WTTG, Washington. The Commission received complaints that kinescope summaries thereof had been paid for by the National Association of Manufacturers, distributed to numerous TV stations, and presented by them without any announcement (as required by the Communications Act and the Commission's rules) that the material had been furnished by the manufacturers' association. Upon inquiry, the Commission found that the NAM had paid for and secured the distribution of these kinescope summaries to 28 TV stations. To date, four of the stations have been advised that their failure to make the required announcements violated both the act and the rules.

Revision of programing portion of application form.—In February 1957, the Committee on Radio and Television Broadcasting of the Advisory Council on Federal Reports, one of the advisory committees of the Bureau of the Budget, submitted to the Commission certain proposed changes in section IV ("Statement of Program Service") of the FCC application form for renewal of license (form 303). After study, the Commission transmitted to the Budget Bureau certain contemplated changes which, in substance, favored some of the committee's suggestions but revised or rejected others. The proposed changes look to simplifying the reporting requirements and decreasing the time required to complete the form. On November 24, 1958, the Commission initiated a rulemaking proceeding in which it invited comments to these contemplated changes.

Political Broadcasts

Questions relating to the applicability of section 315 of the Communications Act become sharper and more complex. This section provides for "equal opportunities" in the use of broadcast station facilities by candidates for public office. The Commission's public notice of September 8, 1954, entitled "Use of Broadcast Facilities by Candidates for Public Office," has proved helpful to broadcasters and candidates in understanding the requirements of section 315. Because of the new situations and questions which have since been presented, the Commission on October 6, 1958, issued a revision of this notice.

An important development in the law of political broadcasting occurred during the year outside of the Commission. Under section 315, a broadcast licensee is forbidden to censor the contents of a broadcast by a legally qualified candidate for public office. In the case of *Port Huron Broadcasting Co.*, decided in 1948, the Commission held that this prohibition is absolute and prevents censorship by the station of any material in the broadcast, including matter which may be libelous. The question then arises as to whether the station, which cannot censor political broadcasts, should be freed from possible liability for libelous matter contained therein. In the *Port Huron* case the Commission expressed its view that the exemption of the licensee from such liability was inherent in the prohibition against censorship. This important question, however, was still not the subject of any judicial decision until April of 1958 when, in *Farmers Educational and Cooperative Union of America v. WDAY, Inc.* (89 N. W. 2d 102) the Supreme Court of North Dakota affirmed a judgment for the defendant radio station in a libel action based on statements contained in a political broadcast. The court held that where, as in that case, the station had called the libelous matter 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 exculpated from liability for the libel by the provisions of that section.

Advertising on Broadcast Stations

The Commission believes that, while the selection and presentation of advertising as well as other broadcast material are the responsibilities of the individual station licensees, the continued presentation over a station of advertising material which has been found by an authoritative body to be deceptive raises a question as to whether the station is operating in the public interest. Accordingly, early in 1957 a cooperative arrangement was worked out whereby the Federal Trade Commission, which has certain authority over false and misleading advertising in interstate commerce, informs the FCC of cases

in which advertising considered to be questionable has been broadcast over radio or TV stations. The FCC communicates such information to the licensees involved so that they may be fully informed.

Under this arrangement, during the period from March 1957 until July 1958 the Commission received from the FTC 26 documents involving questionable broadcast advertising, including stipulations, complaints, and cease-and-desist orders issued by that agency against various advertisers. The products involved included medical remedies, cosmetics, electric razors, storm windows, furs, and others. The stations listed by the FTC as carrying the questionable advertising totaled more than 300.

The Commission continues to refer to the FTC complaints received from the public which involve possible false or misleading advertising on the air.

"Stereophonic" Broadcasting

Various broadcast stations are testing a form of so-called "stereophonic" broadcasting.

The studio sound is picked up by 2 microphones placed in front of the sound source and separated by several feet. The outputs of these 2 microphones are transmitted separately and are heard separately in the home over 2 loudspeakers reaching the listener from 2 directions. Two transmission channels must be used, each being received separately.

In the past, most test broadcasts of this nature have been by jointly operated AM and FM stations in the same locality reproducing the same program on their respective channels. Combinatoin TV-AM or TV-FM broadcasts are now being demonstrated. To obtain such dual broadcast, the listener must, in each case, use 2 receivers (AM or FM in addition to the TV, as the case may be) placed far enough apart (normally 8 feet) so that the sound comes from both directions.

Also, a number of FM stations are experimenting, under developmental authority granted by the Commission, with dual FM channel transmission—one on the regularly assigned channel and the other on a multiplex subchannel. In this system, only 1 receiver is required, but a special adapter is necessary to extract the sound from the multiplex subchannel.

Stereophonic reproduction has long been used in motion pictures, and "hi fi" (high fidelity) recording systems. In the movie theaters, loud speakers placed at the sides of the auditorium give the required impression. In recorded music, special records, or tape recordings with 2 sound tracks, must be used, each feeding one of the loudspeakers in the home.

In a rule-making proceeding initiated July 2, 1958, for the purpose of considering widening the scope of subsidiary communication serv-

ices by FM broadcast stations, the Commission invited comments on, among other things, stereophonic utilization. This particular subject involves certain technical problems which are too involved to discuss here other than to indicate Commission concern for protecting the high fidelity characteristics of regular FM broadcast.

"Subliminal Perception"

During the latter part of 1957, the subject of "subliminal perception" or "subliminal projection" aroused considerable public interest. "Subliminal perception" has been defined as "the faculty of absorbing fleeting visual information without being consciously aware of it."

According to trade press reports at that time, "subliminal perception advertising" was tested in a motion picture theater, the test involving the flashing on the screen for 1/3000th of a second, every 5 seconds, of the name of a nationally known soft drink.

Advocates of this technique claim that the viewer is subconsciously aware of a message even though he is not conscious of having seen it and, therefore, the technique has possibilities as an advertising medium. According to proponents, if used on TV the message would be kept "subliminal" (i. e., below the viewer's level of conscious awareness) by regulation of "light intensity, exposure time, and other elements." On the other hand, considerable apprehension has been expressed that the viewer might be subjected to thoughts and actions without awareness thereof, contrary to the public interest.

There is no indication that any TV station has used this technique except one in Bangor, Maine, which experimented with it in station promotion (the station owner has described the experiment as not successful). The national TV networks have advised that they have not used it. Early in 1958, a Los Angeles station was reported as contemplating using it but, upon inquiry, the Commission was informed that the proposal had been dropped.

The Commission observed demonstrations of "subliminal projection" by two of the groups in that field in January and February of 1958 and is accumulating further information on the subject.

Remote Control Operation

New rules adopted September 19, 1957, permit all AM and FM stations, upon a proper showing, to operate by remote control. Previously, only nondirectional aural stations with power not in excess of 10 kilowatts were permitted remote control. Improved remote control equipment and experimental demonstrations indicate that this type of operation, under certain conditions, will not lower the technical standards. Three 50-kilowatt stations and 4 stations using directional antennas have since obtained authority to operate by remote control.

Hearing Procedure

Proposed curb on "payoffs."—In an increasing number of broadcast cases designed for comparative hearing, applications are being amended or dismissed upon agreement for the payment of some consideration or merger of interests, leaving the remaining application unopposed for grant. The Commission is concerned that these practices may encourage the filing of marginal or "strike" applications in the hope of receiving consideration for amendment or dismissal of such applications, and that, in many instances, they may also represent an abuse of the hearing process. To discourage such practices, the Commission instituted rulemaking on June 26, 1958, looking toward revising 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 an application in hearing status, the applications of all parties to the agreement will be dismissed with prejudice.

"Cutoff" date change.—On October 24, 1957, the rules were amended to change the cutoff date for consolidating and designating mutually exclusive broadcast applications for hearing. The new rules provide that no application will be consolidated for hearing with a previously filed application or applications with which it is mutually exclusive unless it is substantially complete and tendered for filing not later than the close of business on the day preceding the date the previously filed application or applications are designated for hearing. Formerly, an application was consolidated for hearing with a previous mutually exclusive application or applications if it was filed within 10 days after public notice was given of the Commission's order designating the prior application or applications for hearing.

Problems.—The immensity of the workload of adjudicatory hearing matters is the major problem in the broadcast field. A principal reason for this is the inherent complexity of the determinations to be made coupled with the increased competition for the relatively scarce broadcast facilities that are available.

Another reason for the hearing workload is the provision of the Communications Act (sect. 309 (c)) for the filing of protests by parties in interest against nonhearing grants. Where the procedural requirements of the law are satisfied by a protest—which must be filed within 30 days of a grant without hearing—the only choice left to the Commission is to set the protested application for evidentiary hearing or, in an appropriate case, to hold oral argument on the protest as upon demurrer. While the number of protested grants subject to the evidentiary hearing process has been materially reduced by changes in the law giving the Commission a degree of latitude in determining whether to postpone the effectiveness of such grants

pending the outcome of hearings, protest hearings nevertheless remain a substantial part of the Commission's workload.

Interlocutory petitions and motions filed in broadcast adjudicatory cases likewise have contributed materially to the procedural volume. These arise primarily from such factors as efforts to amend applications subsequent to designation for hearing and contention that the issues specified by the Commission in hearing orders ought to be enlarged or changed. The problem of how best to deal with such interlocutory requests filed between the date of designation for hearing and final decision is a perplexing one and has engaged the Commission's attention for some time. With the increased influx of broadcast hearing cases during the past year the problem has been aggravated and the Commission is seeking methods of alleviation.

To expedite the hearing process as far as possible, the Commission has made an extended study of its rules of procedure and practice in which members of the bar have been consulted on a continuing basis. This study culminated during the past year with the issuance of a complete revision and recodification of part I of the rules governing practice and procedure. This, it is anticipated, will result in some diminution of the hearing paperwork which has in the past consumed an inordinate amount of time and effort. Among other things, the previous practice, which experience proved unwieldy, of requiring applicants in comparative cases to submit their affirmative cases in written form has been eliminated and left to the discretion of the parties. In addition, the time within which exceptions to examiners' initial decisions may be filed has been extended from 20 to 30 days, and where pleadings are served by mail an additional 3 days within which responses may be filed has been provided. It is hoped that the additional time periods will be of especial benefit to parties and counsel outside of Washington, and diminish the number of petitions for extensions of time. The revision should also clarify the procedural rules sufficiently to cut down on interlocutory requests involving their interpretation.

STATISTICS

Current Broadcast Authorizations

The 9,037 broadcast authorizations outstanding at the close of fiscal 1958 represented a net gain of 1,004 collectively for the year.

All domestic broadcast program outlets grew in number. AM showed the biggest growth of 115, making its total 3,353. Commercial TV increased by 14, giving it 665, and educational TV's gain of 4 brought its total to 53. TV translators gained 82, bringing their total to 156. Seventy-four additional commercial FM authorizations gave that service 634, and educational FM's gain of 9 brought its figure to 157. The international station figure remained at 2. Broad-

cast auxiliaries counted for the remaining 4,017, of which 3,087 were remote pickups.

Year end authorizations for the different classes of broadcast services were:

Class	June 30, 1957	June 30, 1958	Increase or (decrease)
Commercial AM.....	3,238	3,353	115
Commercial TV.....	651	665	14
Educational TV.....	49	53	4
TV Translator.....	74	156	82
Auxiliary TV.....	778	861	83
Experimental TV.....	18	17	(1)
Commercial FM.....	560	634	74
Educational FM.....	148	157	9
International.....	2	2	0
Remote pickup.....	2,461	3,087	626
Studio-transmitter-link.....	53	51	(2)
Developmental.....	1	1	0
Total.....	8,033	9,037	1,004

Status of Broadcast Authorizations

There were 4,862 AM, TV, and FM broadcast stations authorized at the close of the fiscal year 1958, of which 4,536 had authorizations to go on the air and 326 others held construction permits. A breakdown follows:

Class	Operating authorizations	Construction permits	Class	Operating authorizations	Construction permits
Commercial AM.....	3,253	100	Educational FM.....	147	10
Commercial TV.....	556	109	Total.....	4,536	326
Educational TV.....	32	21			
Commercial FM.....	548	86			

In addition, 92 TV translator stations (out of 156 granted) were operating, and 97 FM stations held subsidiary communications authorizations to engage in functional (background) music operations.

Broadcast Authorizations by States

A May 1, 1958, tabulation showed every State had AM and TV station authorizations, but six States (Idaho, Montana, North Dakota, South Dakota, Vermont, and Wyoming) had no FM stations.

Leading States in the matter of broadcast authorizations as a whole were California (329), Texas (320), Pennsylvania (245), and New York (225).

Topping the AM list were Texas (238), California (183), Florida (148), Pennsylvania (147), North Carolina (135), and New York (125).

The commercial TV list was also led by Texas (49), followed by Pennsylvania (39), California (36), and New York (32). The educational TV list was headed by New York (7), with Florida and

Ohio next (4 each). The most TV translator stations were in Oregon (26), California (21), and Arizona and Nevada (14 each).

In the commercial FM category, California led (76), followed by New York (50), Pennsylvania (46), and Ohio (43). Ohio had the most educational FM authorizations (13), with California and Indiana tying for second place (12 each).

Puerto Rico kept its lead in the most broadcast grants (39) in the Territories, had the most AM grants (31), and the only Territorial educational TV grant. Hawaii had the most commercial TV stations (7), also the only 2 educational FM stations in our possessions.

Following is the May 1, 1958, breakdown of broadcast authorizations by States and Territories:

	AM	FM		TV			Total
		Commer- cial	Educa- tional	Commer- cial	Educa- tional	Trans- lator	
Alabama.....	106	15	1	11	3	0	136
Arizona.....	47	4	1	9	0	14	75
Arkansas.....	61	4	1	6	0	0	72
California.....	183	76	12	36	1	21	329
Colorado.....	56	6	2	9	1	12	86
Connecticut.....	30	7	2	9	3	0	51
Delaware.....	9	3	0	1	0	0	13
District of Columbia.....	6	8	0	5	0	0	19
Florida.....	148	19	4	23	4	0	198
Georgia.....	124	14	1	13	2	0	154
Idaho.....	33	0	0	6	0	5	44
Illinois.....	94	35	8	25	2	0	164
Indiana.....	61	17	12	18	0	0	108
Iowa.....	65	8	4	12	1	0	90
Kansas.....	47	3	5	10	1	0	66
Kentucky.....	78	13	3	9	1	0	104
Louisiana.....	79	8	0	14	2	0	103
Maine.....	23	2	1	7	0	0	33
Maryland.....	35	13	2	6	0	0	56
Massachusetts.....	58	21	10	12	1	0	102
Michigan.....	95	21	5	19	2	0	142
Minnesota.....	63	6	0	11	1	5	86
Mississippi.....	72	1	1	11	0	0	85
Missouri.....	77	10	2	17	1	0	107
Montana.....	32	0	0	10	0	7	49
Nebraska.....	33	1	0	11	1	0	46
Nevada.....	17	1	0	6	0	14	38
New Hampshire.....	16	5	0	2	0	3	26
New Jersey.....	28	10	4	5	2	0	47
New Mexico.....	40	3	1	7	0	7	58
New York.....	125	50	10	32	7	1	225
North Carolina.....	135	38	4	17	1	0	195
North Dakota.....	19	0	0	9	0	0	28
Ohio.....	88	43	13	28	4	0	176
Oklahoma.....	55	3	4	14	2	1	79
Oregon.....	71	8	4	9	1	26	119
Pennsylvania.....	147	46	8	30	2	3	245
Rhode Islands.....	13	6	0	3	0	0	22
South Carolina.....	70	11	1	11	0	0	93
South Dakota.....	20	0	0	9	0	0	29
Tennessee.....	105	9	2	15	1	0	132
Texas.....	238	23	6	49	1	3	320
Utah.....	26	3	2	5	1	2	39
Vermont.....	14	0	0	1	0	0	15
Virginia.....	93	14	5	15	0	0	127
Washington.....	80	8	3	14	1	5	111
West Virginia.....	48	10	0	11	0	0	69
Wisconsin.....	75	11	9	16	2	0	113
Wyoming.....	22	0	0	5	0	11	38
Alaska.....	13	0	0	5	0	0	18
Guam.....	1	0	0	0	0	0	2
Hawaii.....	15	1	2	7	0	0	25
Puerto Rico.....	31	1	0	8	1	0	39
Virgin Islands.....	3	1	0	0	0	0	4

Broadcast Authorizations by Cities

The May 1, 1958, count showed that New York City had more AM, FM, and TV station authorizations than any other city (40), followed by Chicago (38), Los Angeles (36), and Philadelphia and San Francisco (30 each).

New York City also led in AM authorizations (17), with Chicago next (15).

Los Angeles kept its lead in commercial TV authorizations (8), with New York City and Chicago sharing second place (7 each) as last year.

Chicago and Los Angeles had the most commercial FM authorizations (14 each), with New York City next (13). Philadelphia kept its lead in the noncommercial educational FM field (4), with Boston following (3).

Following is the May 1, 1958, tabulation of the number of broadcast authorizations in particular cities. Most of these cities can also get outside broadcast service and, in turn, their own stations can be heard in neighboring communities:

	AM	FM		TV		Total
		Commer- cial	Educa- tional	Commer- cial	Educa- tional	
New York.....	17	13	2	7	1	40
Chicago.....	15	14	1	7	1	38
Los Angeles.....	12	14	2	8	0	36
Philadelphia.....	11	9	4	5	1	30
San Francisco.....	10	11	1	7	1	30
Boston.....	10	7	3	5	0	25
Miami.....	9	5	1	5	1	21
Detroit.....	6	9	1	4	1	21
New Orleans.....	11	3	0	5	1	20
Portland, Oreg.....	11	5	1	3	0	20
Denver.....	11	3	0	4	1	19
Washington.....	6	8	0	5	0	19
Minneapolis-St. Paul.....	11	3	0	4	1	19
Baltimore.....	9	4	1	5	0	19
Cleveland.....	7	7	1	4	0	19
Pittsburgh.....	7	4	1	6	1	19
Seattle.....	10	5	0	3	1	19
Atlanta.....	9	3	1	4	1	18
Houston.....	8	3	1	5	1	18
Cincinnati.....	6	3	0	4	1	17
Dallas.....	8	5	2	2	0	17
Birmingham.....	8	4	0	3	1	16
Phoenix.....	11	1	1	3	0	16
Jacksonville.....	9	3	0	3	1	16
Buffalo.....	6	4	1	4	1	16
San Antonio.....	9	3	0	4	0	16
Fresno.....	8	4	0	3	0	15
San Diego.....	6	6	0	3	0	15
St. Louis.....	8	1	1	4	1	15
Columbus, Ohio.....	6	3	2	3	1	16
Oklahoma City.....	7	2	1	4	1	15
Salt Lake City.....	8	3	0	3	1	15
Richmond.....	9	3	1	2	0	15
Milwaukee.....	7	2	0	5	1	15

Broadcasting Since 1949

The following table shows the number of authorized, licensed, and operating broadcast stations, and pending applications at the close

of the fiscal years for the past decade; also the number of stations deleted during the past 10 years:

Year	Grants	Dele- tions	Pending applica- tions	Licensed	CP's on air	Total on air	CP's not on air	Total author- ized
COMMERCIAL AM								
1949	200	55	382	1,963	43	2,006	173	2,179
1950	194	70	277	2,118	26	2,144	169	2,303
1951	116	35	270	2,248	33	2,281	104	2,385
1952	60	25	233	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

COMMERCIAL FM								
1949	57	212	65	377	360	737	128	865
1950	35	169	17	493	198	691	41	732
1951	15	91	10	524	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

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

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

TV TRANSLATOR								
1957	74	0	48	17	24	41	33	74
1958	88	6	34	92	0	92	64	156

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

Any departure in the relation of grants and deletions during the year to total authorizations at the end of the year results from reinstatement of some deleted authorizations and other considerations not detailed in this general table.

The term "on the air" covers stations actually operating or holding authorizations to operate. "CP's" refer to construction permits.

Broadcast Applications

Broadcast applications received during the year totaled 10,347, or 643 more than the year previous. A breakdown follows:

Class	On hand June 30, 1957	Received	Granted	Dismissed, denied or returned	Desig- nated for hearing	On hand June 30, 1958
TV						
New stations.....	135	198	130	51	66	95
Major changes.....	51	173	129	18	20	63
Transfers.....	19	105	98	12	1	14
Renewals.....	22	207	154	12	1	64
Licenses.....	80	286	237	12	3	114
Other.....	144	399	360	36	2	145
TV total.....	451	1,368	1,108	141	93	494
FM						
New stations.....	26	169	114	15	23	45
Major changes.....	8	140	109	12	2	25
Transfers.....	7	113	99	12	0	9
Renewals.....	63	252	209	14	0	92
Licenses.....	15	103	76	8	0	35
Other.....	28	217	193	17	0	35
FM total.....	147	994	800	78	25	241
AM						
New stations.....	322	371	102	92	114	412
Major changes.....	186	239	90	43	36	261
Transfers.....	70	741	644	66	3	102
Renewals.....	252	1,382	1,111	100	1	422
Licenses.....	82	496	436	34	0	109
Other.....	64	959	843	70	4	108
AM total.....	976	4,188	3,226	405	158	1,414
Auxiliary						
New stations.....	123	1,098	996	135	0	90
Major changes.....	23	334	278	41	0	38
Transfers.....	29	248	241	6	0	30
Renewals.....	113	837	635	39	0	276
Licenses.....	467	1,186	1,213	113	0	327
Other.....	10	94	98	5	0	6
Auxiliary total.....	765	3,797	3,461	339	0	762
Grand total.....	2,339	10,347	8,595	936	276	2,911

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

Broadcast Industry Financial Data

In the calendar year 1957, 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 \$1,461.5 million.

Total radio revenues rose 8 percent to \$518.3 million while TV revenues reached \$943.2 million, or 5 percent above 1956.

Total radio and TV profits of \$214.0 million in 1957 were 10 percent below 1956. Television broadcast profits of \$160.0 million were 16 percent lower and radio profits of \$54.0 million were 10 percent higher.

All Networks and Stations, 1956-57

Item	1956 (millions)	1957 (millions)	Percent in- crease or (decrease) in 1957
Total broadcast revenues.....	\$1,377.5	\$1,461.5	6.1
Radio ¹	480.6	518.3	7.8
Television.....	896.9	943.2	5.2
Total broadcast expenses.....	1,138.7	1,247.5	9.6
Radio.....	431.4	464.3	7.6
Television.....	707.3	783.2	10.7
Broadcast income (before Federal income tax).....	238.8	214.0	(10.4)
Radio.....	49.2	54.0	9.8
Television.....	189.6	160.0	(15.6)

¹ Radio includes AM and FM broadcasting.

Note. 1957 radio data cover the operations of 4 nationwide networks and 3 regional networks, 3,097 AM and AM-FM and 67 independent FM stations. Excluded are 59 stations whose reports were filed too late for tabulation. 1956 data are for the same networks and 2,916 AM and AM-FM and 51 independent FM stations. Excluded are 57 stations whose reports were filed too late for tabulation. 1957 TV data cover the operations of 3 networks and 501 stations. 1956 TV data cover the operations of 3 networks and 474 stations.

Nationwide Networks Only, 1956-57

[Including owned and operated stations]

Item	1956 (millions)	1957 (millions)	Percent in- crease or (decrease) in 1957
Total broadcast revenues.....	\$508.1	\$535.9	5.5
Radio.....	65.8	68.0	3.3
Television.....	442.3	467.9	5.8
Total broadcast expenses.....	423.1	466.6	10.3
Radio.....	66.2	69.4	4.8
Television.....	356.9	397.2	11.3
Broadcast income (before Federal income tax).....	85.0	69.3	(18.5)
Radio.....	(0.4)	(1.4)	
Television.....	85.4	70.7	(17.2)

Note 1: Radio data include the operations of 15 network-owned AM stations in 1956 and 17 in 1957.
Note 2: Television data include the operations of 15 network-owned stations in 1956 and 16 in 1957.

AM Radio¹ Broadcast Revenues, Expenses, Income and Investment, 1956-57

[In thousands]

Item	4 nationwide networks and their stations ²		3 regional networks and their stations ²		All other stations ²		Industry total	
	1956	1957	1956	1957	1956	1957	1956	1957
Total broadcast revenues.....	\$65,804	\$68,065	\$4,373	\$5,430	\$408,984	\$442,818	\$479,161	\$516,313
Total broadcast expenses.....	66,233	69,428	3,579	4,132	359,794	388,280	429,606	461,840
Broadcast income (before Federal income tax).....	(429)	(1,363)	794	1,298	49,190	54,538	49,555	54,473
Investment in tangible broadcast property:								
Original cost.....	17,048	17,170	1,682	1,658	278,764	309,368	297,494	328,196
Depreciation to date.....	9,832	10,069	1,115	1,178	137,295	155,617	148,242	166,862
Depreciated cost.....	7,216	7,101	567	482	141,469	153,751	149,252	161,334

¹ Excludes independently operated FM stations, 51 in 1956 and 67 in 1957. Also excludes 57 AM stations reporting too late to tabulate in 1956 and 59 in 1957.

² Includes the operations of 19 network-owned stations in 1956 and 21 in 1957.

³ Includes 2,897 stations in 1956 and 3,076 in 1957.

TV Broadcast Revenues, Expenses and Income, 1957

[In millions]

Item	3 networks and their 16 owned and operated TV stations	485 other TV stations	Total 3 networks and 501 TV stations
Revenues from the sale of time:			
Network time sales:			
Nationwide networks.....	\$287.7	\$106.5	\$394.2
Miscellaneous networks and stations.....			
Total network time sales.....	287.7	106.5	394.2
Nonnetwork time sales:			
National and regional advertisers.....	58.5	237.9	296.4
Local advertisers.....	23.4	154.7	178.1
Total nonnetwork time sales.....	81.9	392.6	474.5
Total time sales.....	369.6	499.1	868.7
Deduct—Commissions to agencies, representatives, etc.....	175.9	66.5	142.4
Net time sales.....	293.7	432.6	726.3
Revenues from incidental broadcast activities:			
Talent.....	144.5	11.5	156.0
Sundry broadcast revenues.....	29.7	31.2	60.9
Total incidental broadcast activities.....	174.2	42.7	216.9
Total broadcast revenues.....	467.9	475.3	943.2
Total broadcast expenses of networks and stations.....	397.2	386.0	783.2
Broadcast income (before Federal income tax).....	70.7	89.3	160.0

¹ Of this amount \$59.6 million is applicable to the total sale of network time.

FM Broadcast Revenues, Expenses and Income, 1956-57

Item	1956		1957	
	Number of stations	Amount (millions)	Number of stations	Amount (millions)
Total FM broadcast revenues				
FM stations operated by:				
AM licensees:				
Reporting no FM revenues.....	302		319	
Reporting FM revenues.....	119	\$1.0	113	\$1.1
Non-AM licensees.....	51	1.4	67	2.0
Total FM stations.....	472	2.4	499	3.1
Total FM broadcast expenses				
FM stations operated by non-AM licensees.....	51	1.8	67	2.5
Industry total.....		(¹)		(¹)
FM broadcast income (before Federal income tax)				
FM stations operated by non-AM licensees.....	51	(.4)	67	(.5)
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 if such data were readily available. In only a few instances did AM-FM licensees state they were unable to segregate the FM revenues.

(¹) Denotes loss.

Closed-Circuit Television

WIRED TV BOOMS

Closed-circuit television operation is having a widening and spectacular application in many fields.

Called CC-TV for short, it is used to send visual information by cable, special wire, or point-to-point radio. In most cases, these TV signals are confined to cable circuits for reception only by interconnected receivers.

On occasion, closed-circuit TV links different cities, but generally it is limited to a single building or a group of buildings. Such non-broadcast TV systems are serving many business, industrial, educational, entertainment, religious, professional, municipal, and other purposes. Current interest in CC-TV ranges, alphabetically, from A to T—from apartment houses and banks to theaters and toll TV cable systems.

The extent and variety of this nonbroadcast video activity is indicated by the following examples:

Medical

Initial impetus to closed-circuit TV was given by its employment for medical instruction. Its early use was for individual hospital courses, but it later enabled groups of physicians in different places to simultaneously watch and benefit from demonstrations of surgery and other medical treatment. What is more, doctors can now view some of these distant operations in color.

Education

CC-TV is providing many schools and colleges with an economic means of giving graphic instruction to different classes, often in different buildings, at the same time. In several places it is bringing educational programs from the schools to local community centers.

There was a public school CC-TV system in Pocatello, Idaho, in early 1956. The biggest localized classroom tie-in by closed-circuit TV is operating in Hagerstown, Md. Other extensive classroom CC-TV projects are underway in Chicago, St. Louis, and other cities. State systems are in prospect. Also, some schools employ CC-TV to keep a watchful eye on students in study halls.

Business**CC-TV business uses include—**

Visually talking to representatives throughout the country without any of them leaving their home cities. Some of these sales talks are in color.

Linking stockholders' meetings in different places.

Spotting shoplifters in department stores.

Verifying signatures of bank customers; visually exchanging bank records; and enabling motorists parked outside to deposit or withdraw money.

Making it possible for motorists to inquire about hotel accommodations and to register from their cars.

Watching for poachers on parking lots.

Supervising automobile driving operations.

Seeing and sizing up callers before they pass reception desks.

Conducting underwater fisheries research in Florida.

Testing prospective visual telephony.

And, for very small business, making baby sitting possible by remote control.

Industry**Industrial CC-TV use covers—**

Inspecting manual and mechanical operations.

Watching heat and pressure gages.

Supervising movement of material in process and preparation for shipment.

Detecting unnecessary chimney smoke.

Detecting forest fires.

Locating trouble in equipment.

Monitoring entrance gates and yard traffic.

Monitoring atomic energy processes.

Transportation

Railroads use CC-TV to check car numbers and inspect freight car running gear in switchyards; to speed issuances of reservations and tickets at passenger stations; and to police grade crossings.

Airports employ it to check aircraft; to watch planes take off and land; and to provide waiting passengers with information about plane arrivals and departures.

Parking lots find it useful in parking automobiles and in spotting their location when called for.

Shipping is provided with an additional "eye" for the flagship to watch boat movements in fishing operations.

Municipal**Municipal CC-TV uses enable—**

Law officers to view police lineups from outside positions and obtain fingerprint data from distant files.

Jailers to check up on prisoners in cells and workshops.

Highway officials to monitor speedway traffic.

Units to exchange auto registration and other information without moving central records.

Political

CC-TV has been utilized to open or otherwise assist political campaigns by making it possible to see as well as hear spokesmen at simultaneous dinners or rallies in different cities.

Entertainment

For many years some theaters have used common carrier cable and microwave facilities to bring them special live programs—mainly sports events—for big-screen viewing by theater audiences who pay for such exclusive televising.

Closed-circuit toll-TV service to the homes of subscribers was the subject of early experiments in Palm Springs, Calif., and elsewhere. The first regular service of this nature started at Cedar City, Utah, in early 1956. Bartlesville, Okla., began the first large-scale venture on September 3, 1957, but ceased operation June 6, 1958.

Exclusive CC-TV rights figured in the move of two major league baseball teams to the west coast.

Some large hotels and apartment houses offer patrons free non-broadcast video entertainment and other programs via closed circuit.

CC-TV is also used for nonpublic review (by advertisers and critics) of new network programs.

HOW CC-TV WORKS

Program material for aural broadcast (AM or FM) can be relayed over ordinary telephone lines. In fact, most network radio broadcasts are accomplished through the use of telephone company wire circuits connecting broadcast stations with the network studio. On the other hand, video program material, because of its more complicated nature, cannot be sent over ordinary telephone lines but requires coaxial cable or other special wire if not transmitted by air.

Wired CC-TV as such does not require a Commission license. It can use the telephone company's coaxial cable or point-to-point microwave radio systems for long-distance haulage, or special cable installed privately for local system operation. If common carrier facilities are used, the telephone company charges the user the rates prescribed in the telephone company's tariffs for such relay service. Where the common carrier facilities are used only in intrastate (within-State) operation, these local rates are not subject to Commission approval. In purely local CC-TV operations, where common carrier facilities are not employed, the cost is borne by the operator who makes a charge for any subscriber service involved.

Though they have much in common, closed-circuit toll TV should not be confused with CATV (community antenna TV) systems. Each furnishes televised programing. Both are nonbroadcast operations in that they do not transmit over the air for direct reception by the general public and, accordingly, do not come under the definition of "broadcasting" in the Communications Act. And both usually use coaxial cable to reach customers. However, community antenna TV systems differ from other CC-TV operation in that they employ receiving antennas for off-the-air pickup of TV broadcast stations for relay by cable to subscribers, whereas closed-circuit toll-TV systems, for their part, cable selected films and other special programs to their customers. Neither operation requires FCC authorization.

Closed-circuit toll-TV operation also differs from the proposed subscription-TV service which contemplates transmission over the air. The latter, since it would be radio transmission, would be subject to FCC authorization. Special programs would be transmitted in scrambled form to prevent their clear reception on regular TV receivers. A special adapter would be necessary to decode them for subscribers.

CC-TV transmission can normally be picked up only on TV receivers which are connected to the wired distribution system. Here a special receiver or adapter is usually not required, since the programs are ordinarily sent over the cable on frequencies which permit their reception on channels covered by commercial TV receivers.

Where CC-TV operation is confined to a single building, interior cable can be installed to connect up several rooms. Or it can be strung outside to link a group of buildings. In more extended operations, because of the cost factor, the cable is not usually buried in the ground, as are most of the common carrier coaxial lines. In such cases, the private cable is, under a mutual rental or other arrangement, normally suspended on the same poles which carry local power and telephone lines, or on poles erected for the purpose. To use pole facilities on streets or other public property, however, it is necessary to first obtain a franchise or other authorization from the municipality involved.

Since most closed-circuit TV operations depend upon private local cable distribution systems, the FCC has not exercised any jurisdiction over them other than to see that they, like other sources of possible radiation, do not interfere with radio (on-the-air) communication services.

CC-TV operation is not involved in the Commission's inquiry, begun May 22, 1958, into the impact of CATV and TV translator, satellite, and booster operation on the development of TV broadcasting, which is mentioned elsewhere in this report.

Field Engineering and Monitoring

GENERAL

The engineering field force functions as the eyes and the ears of the Commission. It carries out, at grassroots level, a variety of inspection, surveillance, enforcement, licensing, and other service functions.

Enforcement is effected through inspection and monitoring. Examinations are given to applicants for radio operator authorizations. Certain licenses are issued in the field. There is a continuous patrol of the radio spectrum to identify interfering or unlicensed signals. Investigations are made of illegal or improper radio operation, radio interference, and technical matters.

Commission field offices and monitoring stations are listed in the appendix to this report.

FIELD FACILITIES

Field Offices

Field engineering work is carried out by 24 district offices, 5 sub-offices, and 2 marine offices. The district and suboffices are located at strategic geographical points in the United States, Alaska, Hawaii, and Puerto Rico. The marine offices, which have responsibility for the Atlantic, gulf, and Pacific regions, are in areas of small boat concentrations (southern California and Florida). Mobile task forces operating out of the marine offices are responsible for enforcement of regulations affecting small-boat operators.

Field installations with their associated radio-equipped mobile investigative units form a coordinated system which makes it possible for any unit to obtain immediate assistance from the monitoring network in connection with an investigative problem.

Monitoring Stations

The Commission's field monitoring and direction finding facilities include 18 monitoring stations directed by a headquarters control center.

The Chillicothe, Ohio, monitoring station will move locally from its present leased quarters as soon as a new building can be built on Government land acquired by the Commission.

It is proposed to move the Millis, Mass., station to Canandaigua, N. Y., a better direction finding and monitoring site. Government land has been acquired and building funds will be included in the 1960 fiscal year budget.

The Lanikai, Hawaii, station occupies temporary quarters under an agreement with the Navy. A survey is being made to find a suitable permanent site.

The monitoring station at Laurel, Md., is threatened by the proposed construction of a new highway through the site.

Ten of the monitoring stations are primaries which maintain continuous surveillance of the radio spectrum. Eight are secondaries which supplement the primaries, but which do not have sufficient staff for continuous operation. All have high-frequency direction finders, and the stations near the seacoasts have, in addition, medium-frequency direction finders. Precise frequency measuring equipment and other specialized signal measuring equipment is also utilized.

Mobile Installations

Forty-two mobile direction finding investigative units are maintained at 28 field offices and 5 monitoring stations. They are specially equipped for tracking down unlicensed or unidentified stations and interference sources, and for investigating other radio irregularities.

The Commission now has two mobile TV enforcement units, each equipped with specialized precision measuring and analyzing instruments for observing the technical characteristics of TV transmissions. One travels throughout the Eastern United States and the other in the West in furthering compliance with TV technical standards.

A mobile microwave unit is based at San Francisco and another one at Philadelphia. They are equipped for special technical observations of microwave signals, including frequency measurements, and for investigating complaints of interference or unauthorized operation on microwave frequencies.

Eight test cars, shared among the 24 district offices, have special equipment for making electronic measurements and technical analysis of radio signals, thus permitting comprehensive checks of station performance. One example of the uses of these units is that of automatically making continuous chart roll recordings of field strength versus distance as the car is driven toward or around the station whose coverage pattern is being checked.

FUNCTIONS

Inspections

Ship.—The Commission is required by law to make an annual inspection of certain vessels and to issue certificates certifying that

they have met radio requirements. Due to budgetary and personnel restrictions, inspections are normally limited to this minimum requirement. Exceptions are special inspections to determine technical efficiency or to establish capability of ship radio equipment following mishap.

Curtailed ore shipments resulted in fewer Great Lakes vessels being inspected—459 in fiscal 1958 as compared to 496 the year previous.

An estimated 5,000 small vessels are subject to a new law which requires those transporting more than 6 passengers for hire either in the open sea or on adjacent tidewater to carry emergency radio-telephone equipment. During the year, 1,895 certificates were issued to such vessels, bringing the total of those certified to 1,925. Consequently, about 3,000 vessels must still be inspected. Also, since certification is only valid for 2 years, a continuing program will involve about 2,500 inspections per year.

A cooperative agreement with the foreign governments concerned has made it possible to effect a substantial reduction in the number of foreign vessels inspected by the Commission. This saving in time is being devoted to inspecting United States vessels which are required by law to be radio equipped.

The Commission continued its small-boat radio-enforcement program. The primary objectives are to enforce licensing compliance, eliminate profane and indecent language, reduce superfluous communications and improve use of the calling and distress frequencies. This is a three-pronged effort involving inspection of vessels, monitoring of ship radiotelephone channels and education of the numerous licensees who use the small-boat frequencies. It is of necessity a longrange program since 60,344 small boats throughout the United States and its territories hold radio licenses.

Broadcast.—The broadcast enforcement program in 1958 was limited to initial inspections of new AM, FM, and TV stations and sampling inspections of the older stations. Monitoring observations and measurements are made to prevent interference to other services by harmonics, superfluous emissions, or other technical deficiencies. This is particularly true in the case of directional broadcast stations where misadjustment of the pattern can affect coverage or cause interference to other cochannel stations. Also, antenna towers must be painted and lighted in accordance with specifications (see separate chapter on "Antennas").

In 1958 there was only a 4-percent increase in the number of broadcast stations inspected as compared with 1957, but the number of violation notices issued increased 25 percent. A special survey in June 1958 disclosed that 87 stations were cited as the result of in-

spections of 126 stations. Since none of these stations had been inspected for 5 years or more, it is evident that there is a deterioration in compliance when stations are not regularly inspected.

Other radio services.—It was possible to inspect only 5,655 stations other than ship, broadcast, and amateur during the year. Thus, a limited sampling program was used in determining the enforcement emphasis required. Whenever compliance with the regulations in a particular service is found to be poor, enforcement efforts are stepped up until the situation is corrected. This has been found to be the most effective method of enforcement with the limited field staff available for such work.

Enforcement actions.—As required by law, the Commission levies forfeitures against the owners and masters of compulsorily equipped vessels for major radio violations. Such forfeitures in fiscal 1958 are noted in the section of the "Safety and Special Radio Services" chapter of this report which deals with enforcement matters in that particular field.

The Commission has had considerable success during the initial phase of its campaign to stop the use of indecent and profane language over the marine radiotelephone frequencies. This drive has been a joint effort by the Coast Guard, the Federal Bureau of Investigation, United States attorneys, and the Commission. Five shrimp boat captains operating in the Gulf of Mexico were found guilty of violating the United States Code, fined \$500 each, given suspended sentences of 18 months and placed on probation for 5 years. A sixth was found guilty and given probation for 2 years while a seventh was found not guilty. Several cases involving violations in the western gulf area have been referred to the Department of Justice. Despite the fact that some small-boat captains fail to identify their vessels and give fictitious names, it has been possible for the Commission's field engineers to develop sufficient evidence to obtain convictions.

During the year 338 warning letters were issued to small boats and private aircraft for unlicensed radio operation. Such violations are often the result of carelessness or lack of understanding on the part of the owner. Therefore, a warning is given for the first offense but if the illegal operation continues the case is reported to the Department of Justice for prosecution.

Operator Examination and Licensing

Commercial.—One gage of the phenomenal growth of radio in the United States is the steady increase in the number of radio operators. The record for 1958 shows an overall gain of 15 percent as compared with 1957.

The term "commercial" is used by the Commission to classify all persons holding radio operator authorizations to operate transmitters as a part of their livelihood or vocation as distinguished from the amateur radio operator whose interest in radio technique is solely with a personal aim as an avocation and without pecuniary interest.

For 6 of the 7 grades of commercial operator licenses, examinations are conducted regularly at 30 engineering field offices and at 56 other locations throughout the United States and Territories. All commercial operator licenses are issued by the field offices following a written examination except the restricted radiotelephone operator permit which is issued upon the applicant certifying in writing to his knowledge and ability with respect to certain matters.

A total of 306,698 applications were received. The engineering field offices issued 213,547 restricted radiotelephone operator permits and 41,177 licenses of higher grade.

Normally, written examinations for commercial radio operator licenses are given in English. During the year the Commission permitted a number of Puerto Rican applicants for radiotelephone third class operator permits who, because of their inability to read and write in English, to use their native language (Spanish) in their examination.

Action was taken to suspend the licenses of 18 commercial radio operators. In 5 cases the operators requested hearings and 4 such proceedings were completed during the year.

Five commercial operator applications were dismissed for failure to furnish information with respect to their alleged affiliation with subversive groups and four were dismissed for failure to furnish information relative to their alleged criminal records.

Amateur operator examinations.—Amateur radio operator examinations of the general and extra classes are given at the same places as examinations for commercial operators. The resultant papers, together with examinations of amateur classes which are supervised by volunteer examiners, are graded at the field offices but the licenses are, in general, issued in Washington.

Interim ship station licenses.—Ship radiotelephone station licenses are issued for 90-day periods by the field offices in order to avoid delay and to assist small vessels obtain immediate use of radio equipment. These interim grants are made in response to applications filed with the field office for later action by the Washington office in the matter of a regular license term. A total of 11,183 interim licenses were issued during the year.

Citizens station licenses.—A total of 7,106 licenses were issued in the field during the year to certain categories of Citizens Radio

Service stations employing type approved or crystal controlled equipment. However, all citizens licenses are now issued in Washington.

Investigations

Interference to radio reception.—Most engineering field investigations resulted from interference complaints by licensees and the general public, together with requests from other Government agencies for assistance in identifying interference sources.

Assistance by industry self-help groups in resolving complaints at the local level undoubtedly kept down the number requiring FCC attention. Complaints to the Commission involving TV reception totaled over 18,000, comprising nearly 80 percent of all its interference cases. The remainder covered the whole field of civilian and Government radio communication, including interference to aviation, maritime, and police radio services on which safety of life and property depended. The number of complaints involving industrial, scientific, and medical noncommunications equipment showed a small decrease.

Interference was caused occasionally by defects in licensed transmitters as in the following examples: In the vicinity of the international airport at San Juan, P. R., TV reception was interfered with by poor electrical connections in the antenna of a aeronautical beacon station. Interference to an aviation installation in Texas was caused by a defective multiplexer of a nearby FM broadcast station. In the San Francisco Bay area, interference to railroad radio communication resulted from a defective control relay on a locomotive radio transmitter.

The following instances illustrate interference caused by authorized radio stations for reasons other than technical defects: Two instances of interference to "Nike" installations on the west coast were due to vessels entering port and forgetting to turn off their radar installations. In the other case, the military post received interference from a nearby TV station because of insufficient shielding in the intermediate frequency sections of the "Nike" receivers.

Following are typical examples of interference from noncommunications equipment: An offender to an experimental radio station in California was found to be an electronic heater in a plywood manufacturing plant in Oregon. Interference to microwave apparatus in an electronics plant in Chicago was traced to radiation from vacuum tubes used for testing in the same plant. In Washington State a woman complained that her former husband living next door was causing TV interference to the entire neighborhood but, upon investigation, the source was found in a defective thermostat in the complainant's own electric blanket. At a Veterans' Administration

clinic in Boston, interference to a complicated recorder was blamed on a medical diathermy machine, but FCC engineers determined that the fault was in the recorder itself. Disruption of TV reception in a California area was caused by faulty thermostat relays controlling 200 cooling fans in brooder houses of a local chicken ranch.

Radio receivers, too, caused trouble. A broadcast receiver which had been left on while a Los Angeles family was vacationing became defective and retransmitted the programs of a broadcast station on the frequency of land mobile telephone stations. In a Denver neighborhood, interference to TV reception was traced to electrical discharges in a TV set that had been "souped up" with higher voltage to operate a larger picture tube.

Radiation from radio receivers of apparatus for remotely controlling garage doors in San Diego endangered naval radio communication there. This case was particularly difficult to solve because it was caused by scores of radiating garage-door openers in homes over a large section of the city. The Commission attacked the problem by seeking the cooperation of all persons concerned, including manufacturers, distributors, and users of the apparatus. After nearly a full year of effort, the radiation was eliminated.

Unlicensed operation.—FCC mobile investigative units located 142 unlicensed stations during fiscal 1958 as compared to 100 the previous year. Of the current total, 88 were unlicensed TV booster stations. Examples were:

Five unlicensed police transmitters were found to be operated by a police chief. The chief was warned of the consequences of continued unlicensed operation and was provided with forms to apply for the necessary licenses.

In a midwestern city a war-shocked veteran was discovered operating an unlicensed station on amateur frequencies. His father, not knowing that a license was required, explained that radio provided occupational therapy to his son. Subsequently, the son passed an amateur operator examination.

A wave of unlicensed broadcasting by teen-agers resulted from radio mail order houses and popular magazines advertising low-power radio communication kits intended for operation without a license. These "do it yourself" sets radiated excessively and caused interference when augmented with an antenna. In a Massachusetts town, youthful radio enthusiasts were found operating a "wireless broadcast" network built from kits. In Grand Rapids, Mich., four miniature transmitters were used by youths to broadcast phonograph records. At a western university, boys living in a dormitory operated phonograph oscillators as unlicensed transmitters to serenade the girls in a sorority house. Advertisers of low-power "broadcast kits" have been requested to include with their sets warnings that the devices may be operated only in compliance with part 15 of the Commission's rules.

False distress signals were transmitted in some cases of unlicensed operation. In one incident in Alaska, the offender was convicted of sending such a call from a parked airplane. Also in Alaska, a 12-year-old boy entered an unattended hydroplane and, while playing jet pilot, transmitted "My engine conked out, send 'copter to pick me up," etc. This resulted in fruitless relief efforts. In California two teen-age boys unknowingly transmitted false "SOS" calls while they were tinkering with surplus "Gibson Girl" lifeboat transmitters they had purchased from a store selling surplus Government property.

Monitoring and Direction Finding

Interference complaints.—The monitoring network assisted in the solution of interference by locating the source and determining the cause. The monitoring stations in general worked on long-range and widespread interference cases in contrast to the local-type cases requiring investigation by the mobile units. Monitoring cases handled during the year affected nearly all of the radio services. Additionally, and on a routine basis, monitoring assistance was furnished military and other Government agencies, and foreign countries. Some examples of interference cases handled by the monitoring network were:

Acting on a complaint from a domestic airline, the monitoring network identified the interfering signal as industrial heater radiation and placed the source in southern Indiana. An FCC mobile unit proceeded to the area and found the offending heater in a furniture factory.

A broadcast station complained that its programs were being smothered by a heterodyne caused by another station on the same channel being off-frequency. However, a precise measurement by a monitoring station showed that the complainant's own station was at fault.

A licensee in the international service complained of interference to transmissions from New York City to Frankfort, Germany. Neither the German nor the British monitoring services had been able to locate the source. FCC monitoring observations identified it as spurious emissions coming from the transmitter of another licensee at New York operating in the same service.

When the Navy requested FCC assistance to find and eliminate interference to one of its radio channels, the monitoring network placed the source near San Francisco and an FCC mobile unit traced the offending signal to an offshore vessel.

The British Monitoring Service requested FCC assistance in identifying a station disrupting reception at London of a fixed point-to-point station in Nairobi, Kenya. FCC efforts showed that the interfering station was operated by United States authorities in North Africa.

FCC monitors found that an industrial heater signal, causing interference to a Government agency in Florida and to a commercial point-to-point station in New York, was originating near Martinsville, Va. An investigative unit from the FCC Norfolk, Va., office then pinpointed the offending heater from among a number of industrial concerns in the area.

The Pennsylvania, North Carolina, and Wyoming State police all complained of interference to their VHF radio operations. FCC hearings showed that the interfering signal came from a broadcast studio-transmitter link station in West Germany. International negotiations resulted in antenna directivity changes at the German station which eliminated the trouble.

Monitoring observations confirmed by long-range bearings enabled the FCC to identify a foreign language broadcast station causing interference to Army radio facilities at San Francisco. The interference came from Radio Moscow.

The monitoring network identified a pulse signal causing severe interference to radio amateurs. It was traced to an experimental station in Puerto Rico which corrected the difficulty on notification.

Interference at Frankfurt, Germany, to an international radio circuit from New York was traced by the monitoring network to a station in India.

Spurious radiation from an amateur station in Pennsylvania played hob with airline radio circuits. A telephone call to the "ham" by the FCC monitoring net resolved the difficulty within 30 minutes.

Surveys.—The Commission's monitoring stations continued to observe the radio spectrum on a 24-hour basis to determine the extent of frequency occupancy and frequency usage for international reporting purposes.

They also continued obtaining engineering and frequency-usage data for use by the Commission and other Federal agencies in preparatory work for the 1959 Geneva Conference.

The Commission conducted 32 separate monitoring surveys during the year compared to 21 in 1957. Some of these cases required monitoring coverage of over 700 frequencies per monitoring station.

Search and rescue activities.—The Commission continued its traditional cooperation with the military and other Government agencies by providing direction-finder positions in search and rescue emergencies involving distressed planes and ships. Illustrative of this activity:

At the request of the Coast Guard, an FCC "fix" assisted that agency in reaching a small vessel running out of fuel and lost off the California coast.

In another instance, FCC bearings furnished the Coast Guard assisted a small schooner to reach port after having reported itself lost on an interisland trip out of Honolulu.

A hurricane reconnaissance plane near Bermuda requested assistance as it was unsure of its position. Two FCC "fixes" enabled the plane to orient itself.

The FCC monitoring net helped an Army plane which had abandoned its flight to Hawaii and was returning to the mainland because of a fire in one engine and faulty operation of another. The difficulty was complicated by a fuel supply estimated to be just short of enough for the return trip. FCC "fixes" were supplied via the Coast Guard on a continuing basis. The plane succeeded in reaching San Francisco.

A vessel lost in fog off Florida with its electronic navigational equipment inoperative but with its radio working was assisted by the Coast Guard with the aid of two FCC positionings.

An aircraft carrying 105 persons and in some difficulty because of navigational equipment trouble was furnished FCC "fixes" via the Civil Aeronautics Administration to enable it to check its position.

Assistance to Department of Defense.—Commission assistance to the Department of Defense by monitoring and tracking high-altitude weather balloons and floating hurricane detection buoys increased about 25 percent. This work was on a reimbursement basis and was performed mainly by engineering aid personnel especially recruited and trained by the Commission for the task.

Monitoring training program.—The Commission pursued its on-the-job training program at monitoring stations to prepare new personnel for this contractual work and also to fill needed vacancies in its regular monitoring staff. Additionally, the experienced monitoring personnel participated in the training program to maintain and advance their knowledge and skills. The complete training course for monitoring observers comprises 30 written assignments augmented by lectures and classroom instruction to include monitoring station techniques. A total of 131 employees received training under this program during the year.

Engineering Surveys and Measurements

The Commission's field engineers carry out numerous special engineering surveys and measurements in connection with monitoring and rule enforcement responsibilities. Technical data is also essential to Commission rulemaking, to formulating policies which must be based on sound field engineering data, and for use in international conferences.

Any natural phenomena which may affect propagation conditions over long periods of time are of vital concern to the Commission's allocations activities. For several months during and following the peak of the 11-year sunspot activity cycle, aural and field strength observations were made of long distance propagation of VHF signals. TV stations in England and France were at times heard by monitoring stations as far away as California, a distance of some 5,000 miles. The Lanikai, Hawaii, monitoring station made observations on VHF signals, above 40 megacycles, from as far east as Mississippi and as far west as Japan, in contrast to the normal less-than-200-mile range for such frequencies during normal sunspot activity.

As a continuing aid in allocation planning and rulemaking, an average of 12 field strength recorders were in operation day and night throughout the entire year on the AM and FM broadcast

bands, as well as on the VHF and UHF TV bands, recording without interruption the variations in signal strength of certain domestic radio and TV broadcast stations.

Field strength recordings were made of "ionospheric scatter" transmissions, a relatively new type of "beyond the horizon" transmission which permits very high frequencies to be used with great reliability over distances many times their normal line of sight range. This technique has opened up for long distance communication a portion of the spectrum previously usable only for short distances. Some observations were also made on the very low frequencies which are assuming added importance in long range navigation and in providing worldwide precision frequency and time comparisons essential to scientific progress.

Special technical observations and surveys during the year included measuring emission from radiating VHF receivers reportedly causing widespread interference to UHF TV reception; measuring spurious TV station emissions interfering with reception of another TV station; making radiation measurements on two transpacific liners using carrier current systems for distributing music and announcements throughout the vessels (excessive radiation could comprise a hazard to radio navigation); measuring radio frequency voltages induced in loading cranes at docks in Oakland, Calif., where such voltages proved very disconcerting to stevedores handling cargo with the radioactive cranes.

Observations were made of transmissions from the United States satellite Explorer, up to estimated distances of 4,500 miles, to obtain information helpful to possible future monitoring or special observations of signals from such sources.

Improvements in Field Technical Facilities

There were in operation 9 of the new high speed remotely controlled FCC-designed long range direction finders, installation of 2 more was in progress, and additional ones are being constructed.

Two handicaps in long range direction finding involve the difficulties introduced when propagation conditions are poor or when transmissions are brief. In order to further improve the performance of the new direction finders under such conditions, special bearing integrator devices, coupled with visual techniques, have been developed and are presently being constructed by FCC's Equipment Construction and Installation Branch at Powder Springs, Ga. The device automatically averages a rapid succession of radio bearings and displays the result on a cathode ray tube. Ability to select the visual integrator or the normal aural method, whichever is better suited for signal conditions at the moment, should increase the per-

centage of instances in which a good bearing can be obtained under adverse propagation conditions.

For observations and technical measurements of the extent to which radioteletype, facsimile, FM, or other complex emissions spread out in the spectrum, and to assure that such emissions do not spill over into channels assigned other stations, a program of providing suitable equipment for spectrum analysis and bandwidth measurements was continued. Four additional spectrum analyzers, with receivers specially modified by the Commission's laboratory, were among such facilities added. Progress was also made toward improved methods of making mobile observations of modulation levels of FM stations to assure high quality transmission and to reduce interference between stations.

Rapid communication to provide instant synchronization between the Commission's 18 direction finders is essential. To this end the Ambrose, Tex., monitoring station was added to the wire teletype system which now links 11 of the 15 continental monitoring stations. Also, the two Alaska stations—Anchorage and Fairbanks—were recently linked by a teletype line, thus affording communication even when one of the stations loses radio contact.

For effective work, investigative vehicle installations must be compact, rugged, highly versatile, and perform well under adverse conditions. The field mobile units are being further modernized as replacement becomes necessary, with emphasis on package type design to simplify installation and permit rapid interchange between vehicles when necessary.

In the interest of reducing the size and weight of equipment that must be carried by field engineers in areas where the mobile units cannot be used, a program of miniaturization is in progress. Among the items in which progress has been made are portable frequency measuring equipment and midget receiving equipment, wherein maximum use is made of transistors to reduce size and weight.

INDUSTRY SELF-HELP COORDINATION

Television Interference Committees

Commission-sponsored TVI (television interference) committees composed of amateur radio operators, TV set owners, dealers and repairmen, and others interested in contributing their technical talents and abilities as a public service in eliminating video interference in their communities, continued to operate effectively and to receive Commission help and encouragement during the year. Many difficult amateur interference cases were solved by these groups without requiring investigation by the Commission. At the end of the

year, 520 committees were operating in nearly every State, in the District of Columbia, the Hawaiian Islands, and Puerto Rico.

Cooperative Interference Committees

The CIC (Cooperative Interference Committee) program, another example of industry self-help activity sponsored by the Commission, continued to expand. Starting with a single committee in Los Angeles in 1954, the program had grown to include most industrial areas. Thirty-two committees are now located in major concentrations of radio activity throughout the country, including Hawaii and Puerto Rico. Each committee publishes a directory listing each member and his industry affiliation. The roster represents a cross-section of the radio industry in each locality so that a radio interference problem can generally be solved by referring it to the appropriate committee member. The compelling reason for the development of this program has been the mushrooming growth of the number of radio transmitters versus the limited staff of FCC field engineers.

Induction and Dielectric Heating Subcommittee

The Induction and Dielectric Heating Subcommittee of the American Institute of Electrical Engineers cooperated with the Commission in the study of interference caused by industrial heating equipment. In the New York City area the committee studied each industrial heater case to determine causes of excessive radiation and the most effective methods of eliminating the interference.

Electronic Industries Association

In the incidental and restricted radiation devices field, the Electronic Industries Association continued its efforts in aiding the Commission to determine necessary and practicable limits of radiation.

National Electrical Manufacturers Association

The Joint Industry Committee on High Frequency Stabilized Arc Welders of the National Electrical Manufacturers Association worked with the Commission in reducing interference caused by radiofrequency stabilized arc welding equipment. Information concerning arc welder cases investigated by FCC field engineers was periodically furnished this committee for that purpose. The NEMA continued to provide its pamphlet, "Recommended Installation and Test Procedures for High-Frequency Stabilized Welders," for inclusion by manufacturers with each sale of this equipment.

Society of the Plastics Industry

During the year another industry group offered to aid the Commission in controlling interference. The RF Interference Commit-

tee of the Society of the Plastics Industry, Inc., is now engaged in a program of education and self-regulation to help operators of electronic plastics heaters comply with the industrial heater rules. The committee cooperated with the Commission by studying each plastics heating interference case and making recommendations to the user of the heater as to the most effective means of reducing radiation and eliminating interference.

STATISTICS

The work of the field engineering force is reflected in the following fiscal year statistics:

Investigative statistics

	1957	1958
Number of Cooperative Interference Committees.....	27	32
Number of Television Interference Committees.....	473	520
Interference complaints received by FCC.....	23,695	22,715
Television interference complaints.....	19,798	18,722
Color TV interference complaints.....	43	35
Aural broadcast interference complaints.....	2,196	2,385
Industrial, scientific, and medical interference cases.....	170	121
Investigations by FCC.....	12,722	14,417
New unlicensed station cases.....	100	142
New unlicensed TV booster cases.....	43	88
New indecent or profane language cases.....	28	38

Monitoring statistics

	1957	1958
Alerts, unknown, or suspicious signals.....	9,280	11,256
Bearings on alerts.....	116,371	88,906
Emergency search and rescue Bearings.....	2,490	2,097
Monitoring citations for rule violations.....	14,255	13,040
Requests for monitoring coverage (noninterference cases):		
Field Engineering and Monitoring Bureau originations.....	136	171
Other FCC units.....	34	35
Other Government agencies.....	180	139
Amateurs.....	81	112
Commercial concerns.....	9	13
Foreign governments.....	31	38
Total.....	471	508
Contractual balloon and buoy bearings.....	46,080	60,140
Balloon and buoy positions evaluated.....	4,100	6,014
Types of major cases handled in Washington:		
Interference.....	1,526	1,622
Monitoring.....	452	481
Surveys.....	21	23
Special surveys.....	0	9
Contracts.....	5	5
Total Washington major cases.....	2,004	2,140
Total major cases (Washington and field).....	3,681	4,001
Total minor cases (Washington and field).....	7,340	12,256
Monitoring observations to International Frequency Registration Board:		
FCC.....	150,000	118,094
Commercial companies.....	16,393	25,813
Total.....	166,393	143,907
Monitoring items indexed:		
Identifications.....	71,545	84,256
Surveys.....	105,730	40,938
Total.....	177,275	125,194

Monitoring interference complaints

	1957	1958
United States Air Force.....	323	447
United States Army.....	92	55
United States Navy.....	82	100
United States Coast Guard.....	91	127
Civil Aeronautics Administration.....	36	35
Other Government agencies.....	51	53
Law enforcement agencies.....	48	43
Commercial airlines.....	119	86
Commercial concerns.....	689	660
Foreign governments.....	15	6
Total major interference cases.....	1,556	1,612
Miscellaneous (minor interference cases).....	3,804	4,002
Grand total.....	5,360	5,614

Field inspection activity

Class of station or service	United States ships		Foreign ships	
	1957	1958	1957	1958
<i>Compulsory ship stations</i>				
Number of authorized stations.....	1,755	1,698		
Number of inspections made:				
Vessels subject to title III, pt. II.....	1,317	1,115		5
Vessels subject to title III, pt. III.....	57	1,984		
Foreign vessels under Safety of Life at Sea Convention.....			313	233
Vessels under Great Lakes Agreement.....	496	459	5	
Portable lifeboat equipment at Coast Guard request.....	1,479	982		
Total ¹	3,319	4,540	318	238
Number of deficiency notices served.....	1,172	1,659	94	74
Number of violations corrected during inspection ²	2,982	2,603	368	278
Number of certificates of compliance issued.....	1,690	3,235	313	219
<i>Voluntary ship stations</i>				
Number of authorized stations.....	52,360	60,344		
Number of inspections made.....	2,611	1,773		
Number of deficiency notices served.....	1,515	993		
<i>Broadcast stations</i>				
Number of authorized stations.....	8,034	9,037		
Number of inspections made.....	1,097	1,118		
Number of violation notices served.....	593	741		
<i>All other radio stations (excluding ship and amateur service)</i>				
Number of authorized stations.....	149,781	178,886		
Number of inspections made.....	7,296	5,635		
Number of violation notices served.....	1,761	1,622		

¹ Includes estimated 5,000 title III, pt. III vessels.² Not including call backs to verify correction of violations.³ For which deficiency notices were not served.

Commercial radio operator licenses

Class of license	June 30, 1957	June 30, 1958	Increase or (decrease)
<i>Radiotelegraph</i>			
1st class.....	6,519	6,396	(123)
2d class.....	10,247	9,611	(636)
3d class.....	2,006	1,952	(54)
Temporary limited 2d class ¹	15	8	(7)
<i>Radiotelephone</i>			
1st class.....	61,502	61,739	237
2d class.....	40,803	45,216	4,413
3d class.....	34,526	41,027	6,501
Restricted permits ²	1,119,228	1,321,444	202,216
Aircraft authorizations ¹	29,454	13,461	(15,993)
Total.....	1,304,300	1,500,854	196,554

¹ Discontinued.² Issued for lifetime of operator.

Antennas

PROBLEMS

The mushrooming of transmitting and receiving antennas to handle the growth of communication over the air is accompanied by mounting related problems. Many of these are invited by the increasing height of radio antennas; others result from the abandonment of transmitting towers and still others are due to the erection of tall antennas for receiving purposes only. Their solution requires the mutual effort of the Federal agencies, the broadcast and aviation industries, and other interests concerned.

The Communications Act gives the FCC jurisdiction over towers used for the transmissions of all types of radio stations. For years the Commission has endeavored to see that these transmitting antennas are located off the air travel routes, and especially away from the airfields where they would be hazards to departing or arriving aircraft. Also, it has required the painting and illumination of all transmitter shafts exceeding 170 feet in height. The reason is that these towers, being of latticed construction, are less visible than solid structures such as buildings, water towers, smokestacks, and the like.

The advent of jet planes and still taller antennas pose new air safety considerations.

Still pending before the Commission is a proceeding stemming from its 1956 proposal that transmitting towers over 500 feet high be grouped locally on so-called antenna farms to further minimize danger to aviation. New York City, Los Angeles, and Miami are examples of voluntary concentration of TV antennas.

The concept of tall antenna grouping is complicated by additions, shifts, or other changes in TV channel assignments. In such cases the required mileage separation between stations narrows the selection of tower sites. This means particular problems for the applicant, such as the availability and price of land, zoning restrictions, access to site, service coverage, aeronautical hazard, etc.

The Commission does not now have control over abandoned transmitting towers, or antennas used for reception only. So, as a first step, it has asked Congress for remedial legislation to deal with abandoned transmitting towers.

An increasing number of transmitting towers have been left standing, and unused, by former licensees. They are located mostly in small communities. Local authorities generally do not require their removal, and they remain as potential threats to aircraft, particularly at night and under other conditions of low visibility. Consequently, the Commission is seeking authority to require their continued painting and lighting in the interest of air safety.

Also, the growth of community TV antenna systems and the erection by other groups and individuals of high antennas just for broadcast reception have brought new air traffic obstruction considerations. As a result, Congress is being requested to require that high receiving antennas, too, be painted and lighted as an additional aviation safeguard.

ANTENNA MARKING AND LIGHTING

Part 17 of the Commission's rules requires the painting and illumination of transmitting towers of 170 or more feet high. These structures are painted in alternate orange and white bands throughout their length and have automatic controlled flashing red beacons at the top and flashing red lights at different levels depending upon their height.

ANTENNA APPLICATION PROCESSING

Proposals for new or modified antennas which meet the criteria set forth in rules part 17 are approved by the Commission. All proposals for towers over 500 feet high, as well as others which involve possible threat to air navigation, are referred to respective regional airspace subcommittees of the Air Coordinating Committee, for special aeronautical study and recommendation. The ACC was created by the President to coordinate and make recommendations on civil and military aviation matters that affect more than one agency of the Government.

The number of antenna proposals processed by the Commission during fiscal 1958 totaled 14,726. Applications received from all services requiring antenna processing reached 14,758, exceeding the previous record high of 14,483 during fiscal 1957. The backlog of pending applications remained practically constant during the year, increasing from 421 to 453.

Antenna proposals referred by the Commission to the regional airspace subcommittees for special study decreased from 850 in 1957 to 806 in 1958. A contributing factor was the increasing practice of prospective applicants for broadcast and common carrier radio serv-

ices to submit antenna proposals to the regional subcommittees for preliminary study before filing formal applications with the Commission. Preliminary clearances by the airspace groups eliminate necessity for referring such proposals to them later and, consequently, reduces processing time by the FCC.

The Joint Industry-Government Tall Structures Committee completed its study of changes in criteria for determining whether proposed antenna structures will require special aeronautical study. Pursuant to that committee's recommendations, the Commission included the revised criteria as part of the pending proceeding in docket 11665 which proposes to amend part 17 to require applicants contemplating towers more than 500 feet in height to specify "antenna farm areas" or existing antenna structures or to demonstrate why their antennas cannot be so located.

Statistics

Statistics on application processing by the Commission's Antenna Survey Branch follow:

Applications processed by Antenna Survey Branch

Services	Pending July 1, 1957	Received in ASB	Cleared by ASB	Pending June 30, 1958
Broadcast:				
AM.....	47	750	746	51
FM.....	5	248	246	7
TV.....	53	806	833	26
International.....	0	1	1	0
Experimental.....	0	20	20	0
Total broadcast.....	105	1,825	1,846	84
Safety and Special Radio Services.....	302	12,264	12,235	331
Common carrier.....	14	669	645	38
Totals.....	421	14,758	14,726	453

Proposals referred to regional airspace subcommittees

Services	Pending at Airspace July 1, 1957	Sent to Airspace during year	Received from Airspace during year	Pending at Airspace June 30, 1958
Broadcast:				
AM.....	30	189	188	40
FM.....	0	26	21	5
TV.....	44	127	147	24
International.....	0	0	0	0
Experimental.....	0	1	1	0
Total broadcast.....	83	343	357	69
Safety and Special Radio Services.....	48	415	423	40
Common carrier.....	3	48	40	11
Totals.....	134	806	820	120

TALL TV TOWERS

Tall TV transmitting towers continue to increase both in number and height. As of August 15, 1958, there were 66 existing towers of a thousand feet or higher. This height can be appreciated when it is realized that the Washington Monument stands 555½ feet. Most of these TV towers are for VHF transmission.

Construction permits for 17 TV towers in excess of 1,000 feet were outstanding. Applications for 15 additional towers over that height were pending. The tallest antenna in operation is 1,610 feet, which is equivalent to the combined height of the Washington Monument and Empire State Building and makes it the world's tallest manmade structure.

A list of operating tall TV structures follows: Height is given in feet above ground. Some towers accommodate more than 1 station, such as the antennas of 6 TV stations in New York City which are grouped atop the Empire State Building.

Station	Location	Channel	Height
KWSW-TV	Roswell, N. Mex.	8	1,610
KWTV	Oklahoma City, Okla.	9	1,572
KETA		13	
WFAA-TV		8	
KRLD-TV	Dallas, Tex.	4	1,521
WTVD	Durham, N. C.	11	1,504
WABC-TV	New York, N. Y.	7	1,465
WABD		5	
WCBS-TV		2	
WOR-TV		9	
WPIX		11	
WRCA-TV		4	
KOCA	Enid, Okla.	5	1,356
WTEN	Vail Mills, N. Y.	10	1,356
WMT-TV	Cedar Rapids, Iowa	2	1,355
WJBF	Augusta, Ga.	8	1,292
WWTW	Cadillag, Mich.	13	1,282
WHDH-TV	Boston, Mass.	5	1,249
WTTV	Bloomington, Ind.	4	1,225
KMOX-TV	St. Louis, Mo.	4	1,214
WBZ-TV	Boston, Mass.	4	1,199
KQUL-TV	Houston, Tex.	11	1,196
KSLA-TV	Shreveport, La.	12	1,195
WLAC-TV	Nashville, Tenn.	5	1,179
KARK-TV	Little Rock, Ark.	4	1,175
KTHV		11	
KVOO-TV	Tulsa, Okla.	2	1,175
WRAL-TV	Raleigh, N. C.	5	1,160
KSD-TV	St. Louis, Mo.	5	1,159
KTBS-TV	Shreveport, La.	3	1,151
KTBC-TV	Austin, Tex.	7	1,137
KOTV	Tulsa, Okla.	6	1,133
KOED-TV		11	
WFIL-TV	Philadelphia, Pa.	6	1,116
WRCV-TV		3	
WBAP-TV	Fort Worth, Tex.	5	1,113
WISN-TV	Milwaukee, Wis.	12	1,105
KTVO	Kirksville, Mo.	3	1,101
WAGA-TV	Atlanta, Ga.	5	1,100
WHIO-TV	Dayton, Ohio	7	1,096
WMCT	Memphis, Tenn.	5	1,088
KXJB-TV	Valley City, N. Dak.	4	1,085
KWWL-TV	Waterloo, Iowa	7	1,083
KAKE-TV	Wichita, Kans.	10	1,079
KCRG-TV	Cedar Rapids, Iowa	9	1,079
WREC-TV	Memphis, Tenn.	3	1,077
WSB-TV	Atlanta, Ga.	2	1,076
KFJZ-TV	Fort Worth, Tex.	11	1,074
WHBQ-TV	Memphis, Tenn.	13	1,073

Station	Location	Channel	Height
WSOC-TV	Charlotte, N. C.	9	1,073
KARD-TV	Wichita, Kans.	3	1,071
WSAZ-TV	Huntington, W. Va.	3	1,069
WTAE-TV	Pittsburgh, Pa.	4	1,066
WWJ-TV	Detroit, Mich.	4	1,064
WJBK-TV	Detroit, Mich.	2	1,057
WNEM-TV	Bay City, Mich.	5	1,056
WFLA-TV	Tampa, Fla.	8	1,055
KCJB-TV	Minot, N. Dak.	13	1,053
KCMO-TV	Kansas City, Mo.	5	1,045
WITL-TV	Milwaukee, Wis.	6	1,044
WMVS-TV		6	
WKAR-TV ¹	East Lansing, Mich.	60	1,037
WHUM-TV ¹	Reading, Pa.	61	1,036
WTMJ-TV	Milwaukee, Wis.	4	1,035
KELO-TV	Sioux Falls, S. Dak.	11	1,032
WTAR-TV	Norfolk, Va.	3	1,029
WAVY-TV	Portsmouth, Va.	10	1,026
KMBC-TV	Kansas City, Mo.	9	1,025
WLWL	Indianapolis, Ind.	13	1,024
WJIM-TV	Lansing, Mich.	6	1,023
WFBM-TV	Indianapolis, Ind.	6	1,019
WFMJ-TV	Youngstown, Ohio	21	1,015
KCKT	Great Bend, Kans.	2	1,006
KOLN-TV	Lincoln, Nebr.	10	1,002
WFRV-TV	Green Bay, Wis.	5	1,002
WBEN-TV	Buffalo, N. Y.	4	1,001
WISH-TV	Indianapolis, Ind.	8	1,001

¹ Now off air.

Construction permits have been granted but construction is not completed on these additional tall TV towers:

Station	Location	Channel	Height
KENS-TV	San Antonio, Tex.	5	1,530
WOAI-TV		4	
WIS-TV	Columbia, S. C.	10	1,522
WSM-TV	Nashville, Tenn.	4	1,369
KRRB	El Dorado, Ark.	10	1,353
WDAY-TV	Fargo, N. Dak.	6	1,206
KCPP	St. Louis, Mo.	11	1,159
KCMT	Alexandria, Minn.	7	1,130
KMNF	Mankato, Minn.	12	1,116
WISC-TV	Madison, Wis.	3	1,104
WKBW-TV	Buffalo, N. Y.	7	1,076
WXYZ-TV	Detroit, Mich.	7	1,071
WLWA	Atlanta, Ga.	11	1,042
WTOL-TV	Toledo, Ohio	11	1,042
KTVL	St. Louis, Mo.	2	1,021
WGTV	Athens, Ga.	8	1,017
WJRT	Flint, Mich.	12	1,002
WSPD	Toledo, Ohio	13	1,002

The highest antennas proposed in pending TV applications are those of WHAS-TV, for a 1,859-foot tower on channel 11 at Louisville, Ky., and WLBT, for 1,529 feet on channel 3 at Jackson, Miss. An application by WSLA, channel 8, Selma, Ala., which, among other things, proposed increasing its antenna height to 1,993 feet, was denied by the Commission on September 3, 1958.

DIRECTIONAL ANTENNAS

Directional antennas are special towers which enable radio stations to control their service direction or pattern. They have long been

used in point-to-point communication to beam transmissions to particular reception areas.

As AM broadcast stations began to increase on shared frequencies, it became necessary to employ directional antennas to minimize interference between them, especially at night. By this means, an AM broadcaster can reduce radiation in certain directions—over the water or wasteland or toward another station—and concentrate it on the particular areas he wants to serve. Since 1937, directional antennas have helped new stations squeeze into the congested AM broadcast band. Arrays of directional antennas can produce “figure 8” and more complicated service patterns. One AM broadcaster employs nine such towers and keeps an extra one handy.

Only a few FM and TV stations have had to resort to directional antennas. However, its further use by those services is in prospect.

Radio Station Calls

THEIR PURPOSE

With millions of radio stations furnishing a variety of communication services throughout the world, it is necessary that their transmissions carry distinguishing calls. The latter are known as "call signs." In the case of broadcast stations, which use letters only, the term "call letters" is frequently used.

These calls have a threefold purpose. First, they identify the nationality of the station. Then they identify the type of station. And, further, they identify the particular station. In some non-broadcast services in our country, the combination of letters and numerals also indicates the area in which the station is located.

Since the early days of wireless telegraphy—which started with marine use—it has been essential that each radio station have a distinctive call. Under international agreement, the alphabet has, since 1927, been apportioned among the nations for basic call use. The United States, for example, is assigned three letters—N, K, and W—to serve as initial call letters for the exclusive use of its radio stations. It also shares the initial letter A with some other countries. The letter N is assigned largely to the Navy and Coast Guard, while the letters K, W, and A are assigned to other domestic stations, both Government and non-Government.

THEIR ASSIGNMENT

The Communications Act makes the Federal Communications Commission responsible for assigning calls to all radio stations in this country, with military exceptions. This is done on an individual station basis except in the case of Government stations, where blocks of appropriate calls are assigned for their use.

In general, call assignments are made from available call-letter groups. In other words, each service has a reserve of calls available for new stations, and assignments are made in the order in which a station is authorized to operate in its respective service.

BROADCAST CALLS

An exception is the case of program (AM, FM, and TV) broadcast stations. Since the start of broadcasting these stations have had the privilege of requesting particular call letters other than the initial letter. There has been a preference for letter combinations embodying initials of names, places, or slogans. Examples are: KNBC, San Francisco (National Broadcasting Co.); WCBS, New York (Columbia Broadcasting System); KABC, Los Angeles (American Broadcasting Co.); WABD, New York (Allen B. Dumont); WNYC, New York (New York City); WGN, Chicago ("World's Greatest Newspaper"); WCFL, Chicago (Chicago Federation of Labor); WACO (Waco, Tex.); KAGH, Crossett, Ark. ("Keep Arkansas Green Home"); WTOP, Washington ("Top of the Dial"); KFDR, Grand Coulee, Wash. (Franklin D. Roosevelt); WMMN, Fairmont, W. Va. (Matthew M. Neely); WXGI, Richmond (ex-GI); WQED, Pittsburgh (initials of Latin phrase applicable to education).

However, such requests can be accommodated only from letter combinations not yet assigned. If a new broadcast station makes no specific request, it is assigned an appropriate call by the Commission. Since 1946 the Commission has reserved no broadcast call letters on request prior to the granting of a construction permit.

Broadcast stations in this country are assigned call letters beginning with K or W. Generally speaking, those beginning with K are assigned to stations west of the Mississippi River and in the Territories and possessions, while those beginning with W are assigned broadcast stations east of that river. During radio's infancy, most of the broadcast stations were in the East. As inland stations developed, the Mississippi was made the dividing line between K and W calls. A few existing calls at variance with this system are due to the fact that their holders received them before the allocation plan was adopted.

In the early days, broadcast stations could be assigned three-letter calls. As their number increased, it was necessary—about the time of World War I—to add a fourth letter. The 4-letter combinations make about 50,000 assignments possible (if W, K, and N calls are included).

The advent of FM and TV in 1941 did not mean new call letters for all such stations. Since many FM and TV stations are operated by AM licensees in the same place, the general practice has been for the associated FM or TV station to simply add "-FM" or "-TV," as the case may be, to the call letters of the AM station. A TV transla-

tor station call sign contains the initial letter (K or W) followed by its assigned channel number and two letters assigned in order (not on request).

AMATEUR CALLS

Four-letter calls were not sufficient to take care of the large number of amateur radio stations. So a special system of letter and numeral combinations had to be worked out for the self-styled "hams."

Treaty limits amateur calls to not more than six symbols. An amateur call comprises a prefix (beginning with W or K), a digit, and a suffix. A simple example is W1AA. The prefix (W) indicates the nationality (in this case one within the continental limits of the United States). The digit (1) indicates location in 1 of the 10 radio districts (in this case New England). The suffix (AA) identifies the individual station. For outlying areas, the prefix K followed by another letter is used. Thus, KL7AAF would indicate an amateur station in Alaska.

Assignment of amateur calls is on a regular basis from yet unused calls rather than on a request basis. The Commission's files bulge with supplications for special calls to match initials, etc. Many "hams" yearn for two-letter calls, the pride of oldtimers. Though appreciating their interest, the Commission cannot grant most of these requests. Its assignment system was designed to be fair to all amateur and precludes individual favoritism.

Though amateur calls are for the purpose of identifying the station rather than the operator, the holder likes to regard his call as something personal. Often it appears on his correspondence, as well as a marker for his automobile. There is nothing to prevent this practice, and gravestones even bear cherished calls of amateurs who have sent their final signoff signal.

EXPERIMENTAL CALLS

Experimental radio stations are generally assigned calls beginning with the letter K, followed by another letter designating the radio district, followed by the number 2, followed by the letter X to indicate experimental, followed by a group of not more than two letters to identify the particular station.

OTHER CALLS

The call signal assignment pattern for other classes of radio stations can be summarized thus:

<i>Station</i>	<i>Call</i>
Coastal telegraph (United States and Alaska).	3 letters.
Coastal telephone:	
United States.....	3 letters.
Alaska.....	3 letters, 2 digits.
Aviation (land).....	3 letters, 1 digit.
Fixed.....	3 letters, 2 digits.
Land (other than aviation and coast)....	3 letters, 3 digits.
Mobile telegraph (other than ship and aircraft).	4 letters, 1 digit.
Mobile telephone (other than ship and aircraft).	2 letters, 4 digits.
Ship telegraph.....	4 letters.
Ship telephone.....	2 letters, 4 digits.
Aircraft telegraph.....	5 letters.
Aircraft telephone	Plane registration number.
Lifeboats and liferafts (telegraph).....	Call of parent ship or aircraft plus 2 digits.

GEOGRAPHIC PATTERN

The call signs of fixed, land, and radionavigation stations (except coast stations) indicate their geographic locations as follows:

<i>Calls</i>	<i>Location</i>
KAA to KBZ.....	Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota.
KCA to KDZ.....	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
KEA to KFZ.....	New Jersey and New York.
WEA to WFZ	
KGA to KBZ.....	Delaware, District of Columbia, Maryland, and Pennsylvania.
WGA to WHZ	
KIA to KJZ.....	Alabama, Georgia, Florida, Kentucky, North Carolina, South Carolina, Tennessee, and Virginia.
WIA to WJZ	
KKA to KLZ.....	Arkansas, Louisiana, Mississippi, New Mexico, Oklahoma, and Texas.
WKA to WLZ	
KMA to KNZ.....	California.
WMA to WNZ	
KOA to KPZ.....	Arizona, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.
WOA to WPZ	
KQA to KRZ.....	Michigan, Ohio, and West Virginia.
WQA to WRZ	
KSA to KTZ.....	Illinois, Indiana, and Wisconsin.
WSA to WTZ	
KUA to KVZ.....	Pacific areas.
KWA to KZZ.....	Alaska.
WWA to WWZ.....	Atlantic-Caribbean areas.

DISTRESS CALLS

Prior to the turn of the century there was no special radiotelegraph call for sea emergency. Only pioneer operator simply sent the letters "HELP" in code. In 1903 Italy suggested "SSSDDD" as an international radio emergency call. By 1904 a number of ships engaged in the Atlantic trade were equipped with "wireless," as radio was then known and they recruited land telegraph operators for sea duty. The latter resorted to the landline general call "CQ," meaning "attention all stations." In 1904 the Marconi company added the letter "D" to signify distress.

Meanwhile, German ships had been using "SOE" and, in 1906, that country recommended those letters as an international distress call. However, this combination was deemed unsatisfactory for radiotelegraphy because the final dot was often obliterated by static or other interference. The American delegation to an international conference suggested "NC," which is the call for help in flag signal.

The end result was that "SOS" came into use in 1906 by international agreement, though "CQD" continued to be employed by British ships for some years thereafter. "SOS" does not literally mean "Save Our Souls" or "Save Our Ship," as is sometimes claimed, any more than "CQD" meant "Come Quick, Danger." Such calls are based upon the speed and clarity with which they can be transmitted by radiotelegraph.

For radiotelephone purposes, the international distress call is the word "Mayday," which corresponds to a French term meaning "help me." This was a British proposal approved by an international convention in 1927. It has since been used by military as well as by civilian sea and air craft equipped with radiotelephony.

For obvious reasons, the Communications Act specifically bans transmission of false distress signals.

Research and Laboratory

TECHNICAL RESEARCH

General

There are a number of engineering problems before the Commission which apply to all radio services and require study so as to keep abreast with progress in the art and to provide for new uses of the radio spectrum insofar as possible. These problems are in various fields, such as radio wave propagation, uniform technical standards for the various services, control of interference from electrical and electronic devices, and study of the interference potential of the various licensed services.

The Communications Act also requires the Commission to study new uses for radio and provide for the experimental operation of new radio devices.

VHF and UHF Propagation Research

As a result of the widespread interest in VHF and UHF television allocations, much work has been done in obtaining information on the operation of TV stations in these bands. The industry, through the Television Allocations Study Organization (TASO) and the Association of Maximum Service Telecasters (AMST), assisted by the Commission's field and laboratory organizations, made numerous engineering surveys and measurements of field strengths of stations in different parts of the country, and provided material to the Commission from which new information applicable to allocations problems is being obtained.

Considerable attention is being given to developing improved systems and standards of measuring the area and grade of service provided by VHF and UHF stations, and new proposals, such as "polycasting" and "multicasting," have been investigated. These studies have an important bearing on efforts to improve service in areas where rugged terrain causes "shadows" in coverage.

Field strength recordings were made of 11 different TV and FM broadcast stations. Observations and recordings were also made of British TV stations during months when long-distance VHF transmissions were caused by high sunspot activity.

Among other topics investigated during the year were:

Application of various types of wave polarization to spectrum conservation problems.

Effects of transmitter and receiver antenna heights on TV service.

Interference and service propagation conditions in the gulf coast area (TV zone 3).

Interference to TV services by ionospheric scatter stations.

Comparisons of propagation curves proposed by the Central Radio Propagation Laboratory of the National Bureau of Standards (CRPL) with standard FCC curves.

AM Broadcast Propagation Research

The alltime high in the number of sunspots during the winter of 1957-58 made it advisable to continue the "sunspot cycle" recording program beyond the termination date previously planned. The task of analyzing recordings over a period of time corresponding to a complete sunspot cycle is well underway.

Research was completed and reported on the suppression performance of directional antenna systems, and on the reliability of skywave fields.

Government-Industry Cooperation

In order to be informed on the multitude of technical subjects related to the Commission's work and to cooperate with other organizations, it is necessary to spend a large amount of time participating in meetings of the various technical and scientific organizations of the Government and industry. Those groups include the Preparatory Committee for the International Radio Conference, the International Radio Consultative Committee, the Telecommunications Planning Committee, the Interdepartmental Council on Radio Propagation and Standards of the Central Radio Propagation Laboratory, the International Scientific Radio Union, the FCC Radio Propagation Advisory Committee, the Institute of Radio Engineers, the American Institute of Electrical Engineers, the Television Allocations Study Organization, the American Standards Association, the Electronic Industries Association, the National Association of Broadcasters, the Radio Technical Commission for Marine Services, the Radio Technical Commission for Aeronautics, and the Air Coordinating Committee.

Equipment Type Acceptance

Type acceptance of transmitters by the Commission is based on its evaluation of design and measurement data usually furnished by the manufacturer, but occasionally supplied by the applicant for license. This information is checked against the technical specifica-

tions of the rule parts for the services in which the transmitter is intended to be used. Compliance must be shown before type acceptance is issued. This procedure encourages use of well designed equipment which emits signals not containing an excessive amount of extraneous emissions which may cause interference to other stations. Provisions have been made for adequate amortization periods enabling continued operation of non-type-accepted equipment during the initial transition to type acceptance requirements.

Type acceptance is one of the Commission's administrative tools to reduce the possibilities of interference, thus increasing the efficiency of spectrum utilization. This program, in its third year, has gained industrywide recognition as a means of decreasing the Commission's workload, aiding the processing of applications, and providing the prospective licensee a reasonable assurance that the transmitter he proposes to operate conforms with the Commission's technical standards.

Eight of the Commission's individual rule parts make provisions for type acceptance of equipment, either as a requisite for licensing, or as a desirable course of action. Evidencing the growing recognition of type acceptance, during the year over 255 such applications were received, compared to 167 in 1957 and 106 in 1956. The majority involved transmitters used in the land or maritime mobile services. A list of both type-accepted and type-approved equipment is maintained at the Commission's field offices and in Washington, where it is available for public inspection. Copies may be loaned to individuals or groups for duplicating purposes.

The following table shows, as of June 30, 1958, the quantity of type-accepted transmitters for the various radio services:

Service	Type accepted	Manufacturers	Power range	Frequency range
TV broadcast.....	26	3	0.1 to 100 kw.....	54 to 890 mc.
Aural broadcast.....	243	17	0.1 to 50 kw.....	0.54 to 108 mc.
Nonbroadcast.....	1,350	79	0.2u. to 6.5 kw.....	1.6 to 12,000 mc.
Total.....	1,619	84	0.2 w. to 100 kw.....	0.54 to 12,000 mc.

These aggregate figures are less than the totals for the various radio services because many transmitters are type accepted for use in more than one service.

Technical Standards

As part of a continuing program for keeping the technical standards abreast of the current state of the art, Commission work during the year included further studies of transmitter and receiver per-

formance characteristics, particularly equipment used in the land mobile and broadcast services.

Investigations were conducted to provide the Commission with technical information on "subliminal telecasting" or "extrasensory TV," referred to in the "Broadcast" chapter.

A study was made of the possible use of cross-polarized transmissions by TV broadcast stations as a possible method of reducing interference between stations. Another interference reduction expedient, precise offset frequency, also received study.

Revised standards specifying spurious emission limitations were prepared for stations aboard ships. Harmonics and other extraneous radiation can cause interference and reduce efficiency of spectrum use. Accordingly, recommended standards on spurious emissions were drawn up in connection with the preparatory work for the 1959 International Radio Conference and the International Radio Consultative Committee (CCIR).

A summary of the United States TV standards (monochrome and color) was prepared by the Commission and presented by its representatives at a study group meeting of CCIR in Moscow, Russia.

Systems Studies

The study of emission bandwidth continued, with particular reference to the more complex emissions such as used on microwaves. Bandwidth is a vital factor in deciding frequency allocation needs for the various stations and services. More precise methods for determining bandwidth are sought in order to avoid inadvertent overlaps or gaps between emissions throughout the spectrum. Results of these studies were likewise used in preparatory work for the 1959 Geneva conference.

Frequency stability requirements for the respective classes of stations received extensive attention. Considered were the need for spectrum efficiency, economic factors, and the technical state of the art regarding frequency control of transmitters. Recommendations based on these studies were furnished the CCIR and the preparatory committees for the Geneva conference. This is important in spectrum allocations because the space allocated to a station must take into account the extent of frequency deviation due to instability.

Intermodulation interference to certain VHF ship radiotelephone channels caused by TV broadcast signals was studied in cooperation with the Radio Technical Commission for Marine Services, resulting in recommendations as to ways of preventing such interference.

Single Sideband

Considerable time was given to the development of standards looking toward the early use of single sideband radiotelephone com-

munication on frequencies below 25 megacycles. Single sideband radiotelephony, commonly referred to as "SSB," promises spectrum economy and equipment efficiency. Because of its relative complexity, final adoption requires intricate coordination of standards and rules affecting the various radio services using the high frequency spectrum.

Specialized single sideband operation has been experimented with by broadcast and land mobile stations. The resulting engineering data have been useful in evaluating the possible advantages of the system to the various radio services and, particularly, in preparing standards for use in the mobile service by both Government and non-Government users.

Experimental Radio Services

The Experimental Radio Services is the vehicle provided by the Commission to fulfill its obligation under the Communications Act to encourage the experimental uses of frequencies.

Typical of experimental operations are studies of upper atmosphere physics. Several of these investigations are to determine the height of the various reflecting layers in the ionosphere, which information is used in making HF propagation forecasts. Others investigate scatter phenomena—both "forward scatter," which is blossoming as a new mode of long range communication using VHF, and "back scatter," which is finding some use in determining the coverage of HF signals at large distances.

Auroral phenomena and "meteor burst ionization" are also being studied experimentally. Meteor burst communication holds promise of superseding VHF scatter communication. The latter is a method requiring tremendous amounts of power and supersensitive receivers, whereas meteor burst, operating in spurts when favorable patches of ionization are present, uses relatively low power. Many of these studies are being carried on as a part of United States participation in the International Geophysical Year.

HF and the VHF propagation characteristics are not the only aspects of wave propagation under study. One experimental permittee is investigating propagation characteristics at 8 kilocycles, which is a frequency just below the commonly accepted lower boundary of the radio spectrum. The antenna used for this study is a section of high voltage powerline several miles in length.

Other authorizations are used to investigate circuit characteristics, single sideband and narrow band FM techniques and split channel equipment characteristics. Still others provide communication for nonradio research projects, like a study of a rocket in flight where

radio facilities are used to transmit data, such as stress measurements or temperature, to some ground station for recording.

The experimental rules also provide for the development of new radio services, as well as new techniques and applications in existing services. One permittee is seeking to develop a lightweight low-power emergency transmitter for use aboard small ships. The Decca radionavigation system for aircraft is being tested on behalf of the Airways Modernization Board under an experimental license.

The Commission issues contract developmental authorizations for evolving new radio equipment for Government agencies. Thus, many of the important military developments in electronics are accomplished through FCC-licensed experimentation carried on by colleges, universities, manufacturing concerns, and private laboratories.

Another function of the experimental radio services is to provide short-term authorizations for field-strength surveys and equipment demonstrations to prospective purchasers of new radio equipment. The demand for this type of operation has increased approximately 400 percent in a little over 4 years and is still climbing. Experimental applications processed during the year totaled 2,854 as compared with 1,055 in 1952 and authorization increased from 369 to 834.

The biggest problem in administering the experimental services is finding frequencies which can be used for experimentation without disrupting any regular radio service. Specific frequencies which were formerly allocated exclusively for experimental purposes have long since been commandeered for important regular radio services. As a result, experimental operations must be on a shared basis with various radio services. This has two effects. First, the original coordination takes more effort than was required in the past. Second, it is frequently necessary to check several alternatives when the applicant's initial proposal turns out to be unworkable. This results in a greater effort in the processing and coordination of experimental applications.

Industrial, Scientific, and Medical Devices

Communication services are not the only occupants of the radio-frequency spectrum. Probably the most important of the non-communication uses is the group of industrial, scientific, and medical devices, commonly referred to as "ISM" equipment.

The medical devices are chiefly diathermy and the ultrasonic machines used for therapeutic purposes. Industrial devices include a wide variety of electronic heaters running the gamut of the radio-frequency spectrum from below 10 kilocycles, used for heat treating large gears and automobile crankshafts, through the VHF spectrum

used for "sewing" plastics and making plywood and furniture, etc., to the microwave region now being explored for use in processing the newer plastics such as "teflon." Other devices include radio frequency generators for removing superfluous hair (epilators), radio frequency stabilized arc welders, electronic food-cooking ovens both for commercial use and for the home, linear accelerators used to sterilize medical products and to preserve food, and accelerators for atomic research and production.

These devices all generate and use radio frequency energy. As a consequence, some of this energy is radiated and some is conducted into the powerlines. Both the radiated energy and the conducted energy can cause serious interference to radio communication unless precautions are taken to limit the amount of energy that leaks out.

Part 18 of the Commission's rules sets up standards to control the amount of energy that can be radiated or that can be conducted into the powerline. These rules have been in effect since 1947 and have been successful in practically eliminating diathermy interference. However, while interference from industrial radio frequency heaters has been reduced, it has by no means been eliminated.

There are several reasons why this interference problem is still acute. First, the use of radio frequency heaters is constantly increasing. It is reported that 80 percent of the plastics industry depends on this type of heating in one form or another. Secondly, the receivers used for broadcasting and for communication systems generally are becoming more and more sensitive; that is, they are designed to receive weaker signals than were received some 5 years ago. Thus, even though the radiation from the radio frequency heater is reduced, if the receiver sensitivity is increased in proportion, the interfering effect remains the same.

Finally, in the last few years, there have been developed a number of radio systems in which the signal causes some type of automatic response. Since no operator is present, these systems are particularly vulnerable to interfering signals. Typical examples are radiotelemetering and radionavigation systems.

The ISM regulations provide seven frequencies (the ISM frequencies) and associated tolerances on which unlimited radiation is permitted. On all other frequencies, radiation is strictly limited. Control over these devices is exercised in two ways. Medical diathermy, ultrasonic, and many other equipments that are sold as a package may be type approved by the Commission after testing at its laboratory. All other devices subject to part 18 must be certificated by the user or by the manufacturer. The certification procedure calls for measurements of radiated field strength. The

Commission is studying this measurement procedure with a view to simplifying its requirements.

Incidental and Restricted Radiation Devices

Aside from ISM devices, there are many other appliances that use radio frequency energy and are, therefore, capable of causing interference. This group includes carrier current communication systems, such as those used by the power companies for communication, for telemetering data to the control center, and for control purposes such as tripping circuit breakers. Carrier current techniques are also used for the distribution of broadcast-type programs within the environs of many educational institutions.

In this same category are radio controllers for garage doors, wireless microphones, and recordplayers, radio baby tenders, and radio controlled toys. Their variety is limited only by the imagination and ingenuity of their makers.

Finally, there is the matter of receiver radiation. Most radio receivers today use the superheterodyne circuit, which means that at least one oscillator, or radio frequency generator, is built into the set. TV receivers have, in addition, a radio frequency generator to produce the horizontal sweep and a radio frequency generator to produce the vertical sweep. If it is a color TV set, there is also a color carrier frequency generator. All of these generators are producing radio frequency energy, a part of which invariably leaks out of the set and is capable of causing interference.

Since 1938 the Commission has had a set of rules designed to regulate low-power radiating devices. These rules, however, did not originally apply directly to receivers. In 1955 regulations were adopted to limit the permissible radiation from receivers that tune between 30 and 890 megacycles and to require certification that these receivers comply with the rules. These rules apply only to new production. As the older receivers are retired from service, receiver radiation is expected to dwindle in importance.

At present, however, receiver radiation is a serious problem and requires strenuous efforts to cope with it. Some of this interference crops up in unexpected ways. For example, an FCC report on "Television Broadcast Receiver Harmonic Oscillator Radiation Interference" shows 19 locations where a second or third harmonic radiation from VHF television receivers is capable of causing interference to UHF reception. To resolve such a case in Milwaukee, the Commission proposed to shift a station on channel 19 to channel 18 which would have a chain reaction of requiring change of some six other UHF channels in that area.

LABORATORY

The Commission's laboratory is located near Laurel, Md. There a small staff tests equipments and communication systems in support of programs carried on by the Commission.

Type Approval of Equipment

The Commission requires that certain classes of electronic apparatus be tested in its laboratory before being marketed for widespread use. These include shipboard telegraph transmitters, lifeboat transmitters, and automatic alarm receivers which are important for the protection of life and property at sea. They are tested from the standpoint of assuring a maximum reliability of operation under adverse conditions.

Also tested in the Commission's laboratory are new models of monitoring equipment used by aural and TV broadcast stations to see that maximum transmission quality is obtained with minimum interference to other stations.

Another class of devices given laboratory test comprises those which perform various functions at some risk of causing interference to licensed radio and TV services, and where the operator or user may not be qualified to detect their possible interference. These embrace medical diathermy and ultrasonic equipment, epilators (hair removers), electronic neon signs, marine radars, personalized radio transmitters, electronic cooking ovens, and other items.

Issuance of a certificate of type approval by the Commission follows the successful test of a prototype of a device. The Commission and the manufacturer may then dispense with the burden of testing the many production units, provided that these are made identical in all respects with the one tested. A summary of type approval test activity during the year follows:

Class of equipment	Number tested	Number approved	Class of equipment	Number tested	Number approved
Marine radar.....	7	2	Medical diathermy.....	3	2
TV broadcast translator.....	2	1	Medical ultrasonic.....	10	8
TV broadcast monitor.....	4	3	Epilator.....	5	3
AM broadcast frequency monitor.....	2	2	Neon sign.....	3	1
AM broadcast modulation monitor.....	1	1	Electronic oven for home use.....	1	1
			Citizens radio transmitter.....	6	4

¹ This approval covers sale of the unit under labels of several manufacturers.

Radio Propagation Measurements

The laboratory provides the equipment techniques and calibrates the field strength recorders that are located in a number of FCC monitoring stations. In this connection, the laboratory made neces-

sary modifications and adjustments to 7 recording receivers, and made calibration tests at 3 monitoring stations.

The laboratory facilities and personnel cooperated with groups of TASO (industry's Television Allocations Study Organization) in surveys of TV service in the Harrisburg, Pa., and Springfield, Mass., areas.

Development and Calibration of Field Equipment

Also during fiscal 1958, the laboratory developed 10 artificial antennas for use by the Commission's field enforcement offices in measuring the output capability of ship telephone transmitters. Study was also made of the problems of an automatic station identification system for these transmitters. Four especially modified frequency spectrum analyzers were delivered to the monitoring stations, as were 11 receivers modified for use with the spectrum analyzers. Five field strength meters and six signal generators were calibrated and returned to field offices and monitoring stations.

Study of New Systems and Devices

Studies were made and observations were conducted of emissions from three AM broadcast stations experimentally transmitting a form of single-sideband signal.

In view of the interest in implications of subliminal television, some experimental studies were conducted in seeking to determine the limits to conscious recognition of a flashing TV word message.

Further experimental laboratory studies of TV cochannel interference were concerned with the problem of simultaneous interference to the desired station by signals from two other TV stations operating on the same channel.

At the request of the Post Office Department, tests were made of four devices to help determine whether they were improperly sold through the mails.

Standards Activities

The Commission cooperates with other bodies that are engaged in the development of industry standards of measurement of technical quantities, and with the development of international agreements on standards. During the year, laboratory personnel worked with the Television Allocations Study Organization, Institute of Radio Engineers, American Institute of Electrical Engineers, International Radio Consultative Committee, International Scientific Radio Union, and the American Standards Association.

Appendix

FIELD OFFICES

The Commission's field activities are largely of an engineering nature. Its Field Engineering and Monitoring Bureau maintains 24 district offices supplemented by 5 suboffices, 2 marine offices, and 18 monitoring stations. Its Common Carrier Bureau has three field offices.

A list of all Commission field installations and their locations follows:

FIELD ENGINEERING AND MONITORING BUREAU

<i>District offices</i>	<i>Address</i>
1.....	1600 Customhouse, Boston 9, 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.....	324 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.....	1425 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15-C U. S. Customhouse, San Diego 1, 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 Place NW., Washington 25, D. C.

Primary Monitoring Station

Allegan, Mich.
 Grand Island, Nebr.
 Kingsville, Tex.
 Millis, Mass.
 Santa Ana, Calif.
 Laurel, Md.
 Livermore, Calif.
 Portland, Oreg.
 Powder Springs, Ga.
 Lanikai, Oahu, Hawaii

Secondary Monitoring Station

Searsport, Maine
 Spokane, Wash.
 Douglas, Ariz.
 Fort Lauderdale, Fla.
 Ambrose, Tex.
 Chillicothe, Ohio
 Anchorage, Alaska
 Fairbanks, Alaska

COMMON CARRIER BUREAU

New York, N. Y., 90 Church St.
 St. Louis, Mo., 815 Olive St.
 San Francisco, Calif., 180 New Montgomery St.

PUBLICATIONS

The Commission's printed publications are available from the Superintendent of Documents, Washington 25, D. C., at nominal cost. They are not distributed by the Commission.

Included are weekly compilations of Commission decisions; also copies of rules and regulations governing the different classes of radio and other services. Each rule part covers a particular service. On the back page is a form which, when filled out and forwarded to the Commission, entitles the purchaser to receive any subsequent changes to the part or parts purchased until a complete revision is printed.

A list of these printed publications follows:

	<i>Title</i>	<i>Price</i>
Communications Act of 1934, with amendments and index, revised to May 1, 1954.....		\$0. 70
Packet No. 2, revised pages from May 1954 to September 1955.....		. 30
Packet No. 3, revised pages from September 1955 to February 1956..		. 15
Packet No. 4, revised pages from February 1956 to December 1956..		. 25
Federal Communications Commission reports (bound volumes of decisions and reports exclusive of annual reports):		
Vol. 5, Nov. 16, 1937, to June 30, 1938.....		1. 50
Vol. 6, July 1, 1938, to Feb. 28, 1939.....		1. 50
Vol. 11, July 1, 1945, to June 30, 1947.....		3. 75
Vol. 12, July 1, 1947, to June 30, 1948.....		3. 50
Vol. 13, July 1, 1948, to June 30, 1949.....		4. 25
Vol. 14, July 1, 1949, to June 30, 1950.....		4. 75
Vol. 22, pamphlets of selected decisions and reports, Jan. 1, 1957, to June 30, 1957.....		(1)
Vol. 23, pamphlets of selected decisions and reports, July 1, 1957 to Dec. 31, 1957.....		(1)
Vol. 24, pamphlets of selected decisions and reports, Jan. 1, 1958, to June 30, 1958.....		(1)
Vol. 25, pamphlets of selected decisions and reports, July 1, 1958 to		(1)

¹ Annual subscription price of the weekly pamphlets is \$6, with \$2.75 additional for foreign mailing. A small supply of individual pamphlets will be available on a first-come-first-served basis. The price will vary according to the number of pages but the average price will be 15 cents. Subscriptions cannot be backdated to include back issues and back issues will not be stocked for sale as such.

<i>Title</i>	<i>Price</i>
Code of FCC regulations as published in Federal Register, 1958 edition:	
Pts. 1 to 29.....	\$7. 50
Pts. 30 to end.....	4. 75
Annual reports of the Commission:	
17th Annual Report—fiscal year 1951.....	. 40
18th Annual Report—fiscal year 1952.....	. 40
19th Annual Report—fiscal year 1953.....	. 50
22d Annual Report—fiscal year 1956.....	. 50
23d Annual Report—fiscal year 1957.....	. 50
24th Annual Report—fiscal year 1958.....	(2)
(Reports for years unlisted are out of print and unavailable.)	
Statistics of the communications industry:	
For the year 1943.....	. 35
For the year 1945.....	. 50
For the year 1946.....	. 55
For the year 1947.....	. 75
For the year 1948, secs. A and B.....	1. 00
For the year 1950, common carrier only.....	. 50
For the year 1951, common carrier only.....	. 40
For the year 1952, common carrier only.....	. 50
For the year 1953, common carrier only.....	. 50
For the year 1954, common carrier only.....	. 50
For the year 1955, common carrier only.....	. 50
For the year 1956, common carrier only.....	. 50
Public Service Responsibility of Broadcast Licensees (Blue Book), 1946.....	. 40
Study Guide and Reference Material for Commercial Radio Operator Examinations, May 1955 edition.....	. 75
Network Broadcasting Report, Committee on Interstate and Foreign Commerce, 85th Cong., 2d sess., H. Rept. No. 1297, Jan. 27, 1958 (FCC Staff Network Study Report).....	2. 00
Rules and regulations:	
Pt. 0, Organization, Delegations of Authority, etc., October 1954 edition.....	. 15
Pt. 1, Practice and Procedure, February 1958 edition.....	. 25
Pt. 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, July 1957 edition. Lists frequency allocations by services, and international treaties and other agreements relating to radio.....	. 25
Pt. 3, Radio Broadcast Services, January 1956 edition:	
Covers major broadcast services; includes engineering standards, also TV allocation table.....	1. 50
Fig. M-3, Estimated AM Ground Conductivity of the United States (set of 2 maps).....	3. 50
Broadcast engineering charts, graphs, and figures from Pt. 3.....	1. 00
Pt. 4, Experimental and Auxiliary Broadcast Services June 1955 edition.....	. 15
Pt. 5, Experimental Radio Services, March 1953 edition.....	. 10
Pt. 6, International Fixed Public Radiocommunication Services, December 1956 edition.....	. 05
Pt. 7, Stations on Land in the Maritime Services, December 1957 edition.....	. 25

² In the process of printing; available at Superintendent of Documents at a later date.

<i>Title</i>	<i>Price</i>
Rules and regulations—Continued	
Pt. 8, Stations on Shipboard in the Maritime Services, December 1957 edition.....	\$0. 35
Pt. 9, Aviation Services, December 1955 edition.....	. 10
Pt. 10, Public Safety Radio Services, December 1957 edition.....	. 15
Pt. 11, Industrial Radio Services, August 1956 edition.....	. 20
Pt. 12, Amateur Radio Service, September 1956 edition.....	. 15
Pt. 13, Commercial Radio Operators, December 1954 edition.....	. 15
Pt. 14, Public Fixed Stations and Stations of the Maritime Services in Alaska, December 1957 edition.....	. 10
Pt. 15, Incidental and Restricted Radiation Devices, August 1957 edition.....	. 05
Pt. 16, Land Transportation Radio Services, September 1955 edition.....	. 10
Pt. 17, Construction, Marking, and Lighting of Antenna Structures, June 1953 edition.....	. 05
Pt. 18, Industrial, Scientific, and Medical Service, November 1957 edition.....	. 10
Pt. 19, Citizens Radio Service, September 1958 edition.....	. 10
Pt. 20, Disaster Communications Service, September 1955 edition....	. 05
Pt. 21, Domestic Public Radio Services, September 1956 edition....	. 20
Pt. 31, Uniform System of Accounts for Class A and Class B Telephone Companies, January 1957 edition.....	. 25
Part. 33, Uniform System of Accounts for Class C Telephone Companies, May 1948 edition.....	(3)
Pt. 34, Uniform System of Accounts for Radiotelegraph Carriers, October 1949 edition.....	. 20
Pt. 35, Uniform System of Accounts for Wire Telegraph and Ocean-Cable Carriers, October 1949 edition.....	. 25
Pt. 41, Telegraph and Telephone Franks, December 1947 edition....	. 05
Pt. 43, Reports of the Communication Common Carriers and Certain Affiliates, September 1953 edition.....	. 05
Pt. 45, Preservation of Records of Telephone Carriers, October 1950 edition.....	. 10
Pt. 46, Preservation of Records of Wire Telegraph, Ocean-Cable, and Radiotelegraph Carriers, October 1950 edition.....	. 10
Pt. 51, Occupational Classification and Compensation of Employees of Class A and Class B Telephone Companies, October 1951 edition..	. 05
Pt. 52, Classification of Wire-Telegraph Employees, July 1944 edition..	(4)
Pt. 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, August 1946 edition.....	(4)
Pt. 62, Applications to Hold Interlocking Directorates, April 1957 edition.....	(4)
Pt. 63, Extension of Lines and Discontinuance of Service by Carriers, October 1957 edition.....	(4)
Pt. 64, Miscellaneous Rules Relating to Common Carriers, July 1948 edition.....	(4)
Pt. 66, Applications Relating to Consolidation, Acquisition, or Control of Telephone Companies, January 1957 edition.....	(4)

³ Out of print.

⁴ Temporarily available, without charge, from the Commission.

The Commission has available various nonprinted information material concerning its fields of activity. Though none of these can be supplied in quantity, a single copy may be obtained upon individual request to the Secretary, Federal Communications Commission, Washington 25, D. C.

It is unable to furnish lists of radio stations but, upon request, will supply a fact sheet about commercial sources of such lists, also one on communications publications and services.

PAST AND PRESENT COMMISSIONERS

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:

<i>Commissioners</i>	<i>Politics</i>	<i>State</i>	<i>Terms of service</i>
*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-S. pt. 19, 1952

*Deceased.

<i>Commissioners</i>	<i>Politics</i>	<i>State</i>	<i>Terms of service</i>
*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
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-

*Deceased.

