

FCC AND ELECTRICAL INTERFERENCE

INTRODUCTION

The Federal Communications Commission has been controlling the generation of electrical interference which interfered with communications, for many years. As communications equipment became more complex and utilized larger segments of the spectrum, and the spectrum became more crowded with radiation from electronic, industrial, commercial and consumer equipment, the FCC has increased the scope and effectiveness of its regulations. On October 1, 1970, the rules requiring manufacturers, vendors, and shippers of electronic devices to meet FCC electromagnetic interference regulations have become effective.

The new rules implemented a 1968 law empowering the FCC to make reasonable regulations governing the interference potential of certain devices. The purpose of the new rules is to require compliance with equipment standards by manufacturers, importers and distributors of RF devices, as well as by users.

RF devices subject to FCC authority and included under the amended rules range from the many kinds of radio transmitters used in the broadcasting, common carrier, marine, aviation and land mobile services to restricted radiation devices such as radio receivers, CATV systems, and low power communication devices such as wireless microphones, phonograph oscillators, radio controlled garage door openers, radio controlled models and toys. Also included are industrial, scientific and medical equipment such as ultrasonic industrial heating, medical diathermy, radio frequency stabilized arc welders and miscellaneous equipment.

Exempted from the 1968 law are carriers transporting radio frequency devices but not trading in them, devices manufactured solely for export, and devices to be used by the U.S. Government.

At the time of this publication, a number of rule makings are pending, but it cannot be anticipated when the final rules will be adopted. Thus, attention is called to the following rule-making proceedings:

DOCKET NO. 19183: Inquiry into performance of television broadcast receivers and location of FM transmitters to alleviate interference to television reception. Adopted: March 24, 1971 (No Change)

DOCKET NO. 19185: Amendment of the Commission's Rules and Regulations to provide for the licensing of auditory training devices for the partially deaf in the bands 72-73 and 75.4-76 MHz. Adopted: July 6, 1972

(These rules were adopted as Subpart G, Sections 15.331 to 15.375 inclusive. A petition for reconsideration is pending.)

DOCKET NO. 19231: Amendment of Part 15 of the Commission's Rules to exclude from the duty cycle requirement biomedical radio telemetry systems operating above 70 MHz. Adopted: May 5, 1972

(These rules were adopted as Subpart G, Sections 15.216 to 15.218 inclusive.)

DOCKET NO. 19268: Comparable Television Tuning Regulation. Adopted: September 7, 1972

(These rules were adopted as Subpart G, Section 15.68(d).)

DOCKET NO. 19281: Amendment of Part 15 of the Commission's Rules to regulate the operation of a Class I TV device—a new restricted radiation device which produces an RF carrier modulated by a TV signal, and Amendment of Part 1 to provide a fee schedule for type approval of such devices. Adopted: September 8, 1971 (No Change)

(Rules expected to be released by the end of December, 1972)

DOCKET NO. 19092: Carrier-Current Radio Systems Operating Pursuant to Section 15.7 of the Commission's Rules and Low Power Communications Devices Operating Pursuant to Subpart E of Part 15 of the Commission's Rules. Adopted: March 24, 1971 (No Change)

DOCKET NO. 19356: Amendment of Parts 0 and 2 of the rules relating to equipment authorization of RF devices. Adopted: November 24, 1971.

(Proposes to revise the procedural rules for obtaining a grant of type approval, type acceptance or certification.)

DOCKET NO. 19357: Amendment of Part 2 of the Commission's Rules to prescribe regulations governing the identification of RF devices being marked. Adopted: December 27, 1971.

(Proposes to require marking of the shipping containers in order to readily determine whether the equipment complies with FCC requirements.)

The following information consists of bulletins (condensed) issued by the FCC to help industry to understand the regulations.

RECEIVER CERTIFICATION REQUIREMENTS

(BULLETIN OCE 24, November, 1972)

Receiver certification was initiated on February 1, 1956, as a result of rules promulgated by the Commission on December 21, 1955. Originally voluntary on the part of the manufacturer, certification was made mandatory on October 1, 1970. At about the same time, on August 1, 1970, the Commission put into effect a program requiring the payment of a fee for each receiver model that is certificated. The fee is in two parts: a FILING FEE that must accompany the application and a GRANT FEE due after the receiver has been certificated.

The receiver certification program applies to all receivers that operate in the range 30-890 MHz. Each model must be separately certificated. Certification is granted contingent on the payment of the required grant fee.

What Is A Model: A receiver model is a unique number assigned by the manufacturer or person requesting the certification to an apparatus or device for receiving electrical waves, signals, etc. If a change is made in the circuitry so that the characteristics required to be measured and reported to the Commission are changed, the new assembly is considered a different model and a new model number must be assigned.

The model number for which certification is requested must be identical to the model number that will be inscribed on the receiver. There is no objection to the use of a model numbering system which includes in the model number, digits or letters to indicate marketing or production information, such as color of the cabinet; however, each such model is considered a separate receiver model which requires individual model certification and filing and grant fees.

Identical Receivers With Different Trade Names or Model Numbers. If a receiver model will be distributed under different model numbers or under trade names (regardless of whether the same model number is used) each model number and/or trade name is considered a separate receiver and requires separate certification and filing and grant fees.

Multiband Receivers: FM and TV: Administratively, it has been decided to count a combination FM-TV (with or without other bands) broadcast receiver as two receiver models.

FM and Other: A combination of FM with any other band such as police or aeronautical, but not including TV, is considered as one receiver model requiring a filing fee.

Other Combinations: Other combinations bearing a single model number, such as a receiver combining an aeronautical band and a police band, will also be considered as a single receiver model requiring a filing fee.

Transceivers: For such combinations, an application must be filed for certification of the receiver part of the equipment, and an application must be filed for type acceptance of the transmitter part of the equipment. These applications should be submitted simultaneously but under separate cover to facilitate handling.

Application For Certification: Application for certification shall be filed on Form 722. In addition to the required fee, the application must contain all the information required by Subpart C of Part 15—particularly that required by 15.69(e) and 15.70. Failure to furnish all the required information will delay action on the application. The following items have frequently been found incomplete:

- description of receiver function and circuit
- description of measurement procedure
- description of measurement facilities
- report of measurement

Description Of Receivers: Section 15.69(e)(3) requires a description of the receiver. For TV and FM receivers, it is sufficient to state that the receiver is a TV or an FM receiver. If it uses non-standard IF (other than 41.25/45.75 MHz for TV and other than 10.7 MHz for FM) the actual IF should be stated.

For a multiband broadcast receiver (an FM, AM or AM/FM receiver with additional short wave or communication bands, the description of the other bands should include:

- function of each band
- tuning range of each band
- IF used in each band

For a communications receiver, the description should include:

- the service in which the receiver will be operated
- the function of the receiver
- the tuning range
- IF(s) used
- the fundamental frequency of all oscillators in the receiver
- a block diagram indicating the frequency at each block

Measurement Procedure: The measurement procedure used by the applicant must be acceptable to the Commission. For the measurement of oscillator radiation from FM and TV receivers, three procedures have been found acceptable and are listed in 15.75:

- IEEE 213
- IEEE 187
- IEC 106 and 106A
- EIA RS-378

If one of these procedures is used, the application should so state. If any other procedure is used, it should be described in detail, so that a determination of acceptability can be made. With slight modifications, the above listed procedures can be used to measure radiation from other types of receivers. In such cases, it will be sufficient to indicate what procedure was used and the modifications that were made.

The oscillator measurement procedures listed above, *with some modification*, can be used to measure radiation from other types of receivers. Commonly, the antenna used with the receiver and the set-up of the receiver on the test site must be modified. If one of these methods is used, the statement re measurement procedure should indicate the standard used and should *describe the modifications* that were made.

In all other cases, describe the procedure in detail, including:

- how the receiver was set up for testing
- the antenna that was attached to the receiver
- how the receiver under test was manipulated
- how the measuring set and its antenna were set up
- how the measuring antenna was manipulated
- a diagram of the test set-up, if this has not been furnished separately with the description of applicant's measurement facilities.

Report Of Radiated Measurements: For FM receivers, measurements should be made with the receiver tuned to at least three points: one each at the top, the middle and the bottom end of the tuning range. For each point measurements should be made covering the range 25 to 1000 MHz. The report must state the frequency to which the receiver was tuned. For each frequency to which the receiver was tuned, the report must list the frequency and amplitude of all signals within 20 dB of the limit. It must also include a statement that the frequency range 25-1000 MHz was scanned, and all other signals were more than 20 dB below the limit.

For TV receivers, measurements should be made of the oscillator frequency for each VHF channel and of the UHF oscillator frequencies listed in 15.63. The report should indicate that the spectrum was scanned for harmonics of the oscillator in each case and should report those harmonics which are within 20 dB of the levels specified in 15.63.

For FM and TV receivers, a report of measurements on an industry standardized reporting form will be acceptable as meeting the above conditions.

For Communication Receivers and Communication Bands on Multiband Receivers: Most such receivers are designed to be operated fixed tuned to a single frequency. However, they are capable of being set up on any frequency over a substantial band. Accordingly, measurements should be made with the re-

ceiver tuned to at least the minimum number of frequencies specified in the schedule below:

Tuning Range of Each Band	Number of Frequencies	Location in Tuning Range
1 MHz	1	Middle of tuning range
1 to 10 MHz	2	One near top of tuning range One near bottom of tuning range
over 10 MHz	3	One near top One near middle One near bottom of tuning range

For other tunable receivers, make measurements with the receiver tuned to each of three points: top, middle and bottom of the tuning dial. At each point measurements should be made over the range 0.45 to 1000 MHz and each significant emission should be reported.

Measurement Facilities: A description must be filed of the measurement facilities used to measure receivers for certification. To facilitate handling, this description should be submitted as a separate document and should include the following information:

- Location of the site
- physical description of the site, preferably supported by photographs
- description of supporting structures used in the measurement
- list of measuring equipment used
- information concerning the calibration of the measuring equipment

This description should be supplemented every time there is a change in the information supplied to the Commission.

DOES MY TRANSMITTER NEED A LICENSE?

(OCE Bulletin 11
March 1972)

"Do I need a license for this transmitter? It uses so little power." The answer depends on many conditions. This bulletin explains when a license is required and when a transmitter may be operated without a license.

Electromagnetic Compatibility: When a radio transmitter is operated, RF energy is emitted into the surrounding space. This energy may cause interference. To avoid causing interference, the equipment must be carefully designed, the frequency must be carefully selected, and the transmitter must be operated under suitable safeguards. The condition under which a generator of RF energy - be it transmitter or other device - can operate in the vicinity of other radio equipment without upsetting or interfering with the radio operations of its neighbors is called *Electromagnetic Compatibility*.

Eavesdropping Prohibited: FCC Rules adopted in 1966 prohibit the use of any radio transmitter for eavesdropping, whether licensed or operated without a license under Part 15. (See 2.701 and 15.11). This prohibition does not apply to law enforcement officers operating under lawful authority.

Citizens Radio Service: Low power transmitters may be operated under a license in the Citizens Radio Service (FCC Rules Part 95) for personal or business communications (short distance only) subject to the limitations in Part 95. A Citizens Radio Station, or any unit thereof, may communicate only with other units of the same station or with units of another Citizens Radio Station.

The 27 MHz band in the Citizens Radio Service is limited to use for the remote control of objects or devices by radio (Class C stations) or for voice communications (Class D stations). Frequencies in the 460-470 MHz band are also available for the above uses by Class A or Class B stations, but are subject to different limitations.

SS Bulletin No. 1001 (available upon request) and FCC Rules Part 95 contain detailed information concerning licensing procedure, technical requirements and permissible communications.

Other Licensed Operation: Low power transmitters may be licensed under other Parts of the FCC Rules when the equipment is to be used for communications in a specific activity to which the regulations apply. See Parts 81 and 83 for licensing in the Marine Services; Part 87 for use and licensing in the Aviation Services; Part 89 for licensing in an industrial or business enterprise; Part 93 for licensing in land transportation activities; and Part 21 for licensing in the Domestic Public Radio Services.

Equipment used under these Parts must generally be type accepted for licensing. Type acceptance of equipment is based on representations and test data submitted to the Commission by the manufacturer or the prospective licensee. The lists of type accepted equipment are revised periodically, and are available for inspection at the Commission's offices in Washington, D.C., and at each of its field offices. Procedure for type acceptance of equipment is contained in Subpart F or Part 2 of the Commission's Rules.

Nonlicensed Operation: Subpart E of Part 15, *LOW POWER COMMUNICATION DEVICES*, provides for operation without a license of devices such as wireless microphones, phonograph oscillators, telemetering transmitters, radio garage door controls, and other similar miniature transmitters. Operation without a license is subject to these three general conditions:

1. That no harmful interference is caused to licensed operations.
2. That the transmitter complies with the technical specifications in Subpart E of Part 15.
3. That the device is tagged with a label certifying that it complies with these requirements.

Note that only certain frequencies may be used. Note also the list of prohibited frequencies. Other sections of these rules list the maximum signal level that may be emitted or the maximum power and antenna length that may be used.

There are no restrictions on the type of modulation that may be used or on frequency stability. Care must be taken, however, that the signals transmitted by the device stay within the designated band. The device may be used for any legitimate endeavor. An operator's permit is not required for operation of a low power communication device. Call letters are not assigned for use of low power communication devices; they are assigned to licensed stations only.

A certifying label attesting that the transmitter complies with Part 15 must be attached to each low power communication device before operation is permissible. Conscientious and informed manufacturers normally test prototype transmitters for compliance with Part 15 and attach labels to devices offered for sale. Purchasers of low power transmitters intended for operation without a license under Part 15 should make sure that the devices which they purchase carry the manufacturer's certifying label.

Wireless Microphone: A wireless microphone is a low power communication device that contains a microphone (an electroacoustic transducer for converting sound waves into corresponding electric current or voltage variations), a transmitter modulated by the microphone, and a radiating element. The modulated output of the wireless microphone is fed into its associated amplifier by electromagnetic radiation instead of wires.

A magnetic pick-up or the pick-up on a record player is not considered to be a microphone.

Telemetering Transmitters: Another use for low power transmitters is in telemetering. This is a form of communication in which information collected by various sensing devices is transmitted to a nearby receiver-recorder. Telemetering transmitters are generally used in places where it is impossible or very costly to connect the sensing device to the recorder by cable or where the connecting wires would constitute a hazard. In industry, for example, telemetering transmitters have been used to record the readings of strain gauges attached to the rotors of large machines. In medical research, they have been used to record physiological data—heart action, blood pressure, respiratory rate, body temperature—of human and animal subjects while in motion.

Radio Controls for Garage Door Openers: One way of opening a garage door without getting out of the automobile is to use a radio control activated motor to open the door. The transmitter, in the car, is designed to emit a short RF pulse

which is coded with one or more tones. Coding is used to provide a degree of security and to minimize interference to other controls in the vicinity.

(a) **Licensed Use:** The transmitter may be licensed as a Class C Citizens Radio Station for operation on specified frequencies in the 27 Mc/s band. Ask for SS Bulletin No. 1001 for details of such operation.

(b) **Nonlicensed Use:** The radio control for a garage door opener may be operated without a license pursuant to the provisions of Subpart E of Part 15. See 15.201 through 15.238. If the radio control operates above 70 Mc/s, no radiation, either from the transmitter or receiver part of the control, may fall in the prohibited frequency bands listed in 15.211. Just as with other devices operated pursuant to Part 15, if the radio control causes harmful interference, its operation must be stopped and may not be resumed until the harmful interference has been eliminated (15.3, 15.4, 15.222).

Field Disturbance Sensor: A field disturbance sensor is a restricted radiation device which establishes a radio frequency field in its vicinity and detects changes in that field resulting from movement of persons or objects within the radio frequency field.

Receivers Associated with Miniature Transmitter: In addition to interference which may be caused by transmitters, interference may also result from receiver oscillator radiation. Harmful interference from radio receivers is just as real and just as damaging as harmful interference from transmitters. Receivers associated with miniature transmitters must also comply with FCC Rules (Subpart C, Part 15). If the receiver operates in the range 30-890 Mc/s, it must bear a seal certifying that it complies with the FCC Rules.

OPERATION IN THE BAND 535-1600 kHz WITHOUT AN INDIVIDUAL LICENSE (OCE 12 February 1972)

Introduction

The band 535-1600 kHz is allocated for broadcast stations. However, under the provisions of Part 15 of the Commission's Rules, a *Low Power Communication Device* or a *Carrier Current System* may be operated in this band without an individual license on the condition that

- No harmful interference is caused to licensed operations, and
- The technical and other requirements of Part 15 are met.

Harmful Interference

Harmful interference is defined by the Commission as any emission, radiation, or induction which endangers a radionavigation or a safety service, or which seriously degrades, obstructs, or repeatedly interrupts other licensed radio services. Since this discussion deals with operation in the AM band (535-1600 kHz), the operator must take particular care to protect the broadcast service.

Due to the physical laws of radio propagation on frequencies in the AM band, operation with low power and a small antenna is inherently short range. Thus it is possible to set up operating conditions in the AM band that will protect the broadcast service and still provide a reasonable operating range for the owner of a low power communication device.

This cannot be done in the FM band (88-108 MHz). Conditions in this band are completely different and long range transmission is possible even with extremely low power—a fact that is well known and well documented. In the face of this physical phenomenon, the Commission has not found it possible to set up operating conditions on the FM band that would provide a reasonable operating range. Accordingly operation in the FM band is strictly prohibited.

See Information Bulletin No. 17-G for a more detailed discussion of the interference problem. For a discussion of radio wave propagation and transmission range of radio signals, the reader should refer to text books on the subject of radio available in libraries. Index search under the term radio wave propagation should lead to desired information.

Low Power Communication Device

Part 15 permits two types of operation in the AM band. One type uses radiation of radio waves; the other uses carrier current techniques.

To emit radio waves, a miniature transmitter called a LOW POWER COMMUNICATION DEVICE is connected to a small antenna. Part 15 imposes a limit of 100 milliwatts on the power input. The antenna must not be longer than 10 feet which includes the length of the antenna proper *plus* the length of the transmission line *plus* the length of the ground lead, if used. The rules also require that any RF energy emitted by the device on frequencies below 50 kHz or above 1600 kHz be suppressed at least 20 dB below the unmodulated carrier. Finally, the rules impose a special requirement on transmitters that get their power from the regular AC power. This special requirement is that the RF energy fed back into the power lines must not be greater than 200 microvolts when measured from either line to ground with the transmitter grounded and also when it is not grounded. Operation without regard to power or antenna length is also possible provided such operation does not exceed the field strength determined by the formula in 15.202.

However whichever set of technical specifications is used, *the operator may not cause harmful interference and must immediately stop operating when notified that he is causing harmful interference.*

The technical specifications imposed by Part 15 are purposefully designed to limit the coverage that may be obtained in order to protect the broadcast service. Consequently one should not expect to obtain radio coverage beyond about 300 feet. In fact, coverage beyond 300 feet is usually an indication that the operation does not conform to these limits and violates the Part 15 Rules. Requests for permission to operate outside these limits will not be granted. Relaxing these technical limits to permit extended coverage, greatly increases the interference potential to the broadcast service and cannot be permitted.

The operator of a low power communication device is urged to read the Part 15 regulations appended to this bulletin. Attention is particularly invited to the requirement for certification in 15.227 and 15.228.

Carrier Current Operation

The second type of operation permitted by Part 15 is described as carrier current operation. In this form of operation the transmitter output is coupled into the AC power network in the building. The RF energy is carried along the wires to every AM receiver that is plugged into this network. Usually, the RF energy does not go beyond the power transformer.

Because some of the RF energy leaks off the wires, receivers in the building that are near the wires will also pick up the signals.

The rules impose a limit on the amount of RF energy that the system is permitted to emit. This limit is 15 microvolts per meter (uVm) at a distance of $\lambda/2\pi$. This distance may be computed in feet by dividing 157,000 by the frequency in kHz. The 15 uV/m limit must not be exceeded when measured at the specified distance from the transmitter or from any part of the wire network carrying the RF energy. See 15.7 for additional details.

Carrier current systems are not required to be certificated at present. However, in order to be sure that his operation continues to comply with the FCC requirements, the operator should make regular surveys, measurements of field strength around the installation, and keep the results of these surveys on file.

The FCC requires that a low power communication device be certificated to show that it has been tested and found to comply with the technical specifications in Part 15. The operator should make sure that his transmitter carries this certification label. In addition the operator should check his equipment from time to time to make sure that it continues to comply with these requirements.

Frequencies

The FCC does not designate the specific frequency to be used by a low power communication device. The operator of the device may select his own frequency in the band 535-1600 kHz. The operator must make sure however, that his selection of an operating frequency will not cause harmful interference to persons trying to receive broadcast signals.

PROCEDURE FOR MEASUREMENT OF THE UHF TUNING ACCURACY OF A TELEVISION RECEIVER INCORPORATING A 70-POSITION NON-MEMORY UHF DETENT TUNING SYSTEM

(BULLETIN OCE 30

April 1972)

The Commission has authorized the use of a 70-position, non-memory, UHF detent tuning system having a tuning accuracy of ± 3 MHz, as meeting the requirement for tuning comparability in a TV receiver. The text of the applicable regulation is contained in 15.68(d) of Part 15. This document describes a measurement procedure which is suitable for determination of the UHF tuning accuracy of a receiver which uses a 70-position tuning mechanism. Measurements pursuant to this procedure will be accepted by the Commission when used in applying for certification of a TV receiver containing a 70-position tuning mechanism.

Standard Test Conditions: Tests intended to be reported to the Commission, in support of a certification of compliance of a TV receiver with the comparable tuning requirements of Section 15.68, shall be carried out only with the 70-position tuning system properly installed in the receiver. Tests performed on a tuner not installed in a receiver, while useful to the manufacturer, will not be accepted by the Commission, since test results on the tuner outside the receiver can be expected to differ from those with the tuner installed in the receiver because of mechanical stresses, voltage and temperature variation, and other factors.

Standard voltage. The power supply that energizes the receiver shall be held at the nominal design value, plus or minus 2 percent.

Standard temperature. Tests shall be performed at an ambient temperature of $22 \pm 5^\circ \text{C}$.

Warmup. The TV receiver shall be allowed to warmup for at least 30 minutes before the start of measurements.

Automatic fine tuning. AFT (or AFC) if provided shall be disabled during the tests.

Equipment Required: A frequency-measuring means shall be provided, having an accuracy of at least 0.1 MHz. The means of coupling to the receiver shall be such that it shall have no more than 0.1 MHz effect upon the frequency being measured.

TEST PROCEDURE

Initial tuning. The UHF channel selector shall be set at channel 14 and the fine tuning control of the receiver shall be adjusted to bring the oscillator frequency within 0.25 MHz of the correct value.

(For receivers using the standard IF of 41 MHz, the oscillator frequency for channel 14 is 517 MHz).

During subsequent measurements, the fine tuning control shall not be readjusted nor shall this control be locked in position. It shall be free to move under any effect of the channel selector mechanism which may occur in actual use.

Measurements of accuracy of channel selection. The UHF channel selector shall be rotated toward channel 83, without reversing direction. Measurements shall be made at not less than 10 channels equally spaced from channel 14 to 83. A suggested list of channels is:

14	28	42	56	70	83
21	35	49	63	77	

At each of the selected channels, the oscillator frequency shall be measured without adjustment of the fine tuning or other controls of the receiver.

When channel 83 is reached, the process should be repeated moving from channel 83 to 14 again without readjusting the fine tuning or reversing the direction of rotation. Measurements should be made at the same channel settings previously selected. Thus there will be two frequency measurements for each channel except channel 83.

Report of measurements. Each oscillator frequency measured according to the above shall be converted to a frequency error, in MHz, which shall be used in reporting the data. The errors may be presented in tabular form, or they may be plotted on a graph. The sign of each error shall be given.

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EXTRACTS FROM PART 2 MARKETING RULES

SUBPART I—MARKETING OF RADIOFREQUENCY DEVICES

2.801 Radiofrequency device defined.

As used in this part, a radiofrequency device is any device which in its operation is capable of emitting radiofrequency energy by radiation, conduction or other means. Radiofrequency devices include, but are not limited to

- (a) The various types of radio communication transmitting devices described throughout this chapter.
- (b) The incidental and restricted radiation devices described in Part 15 of this chapter.
- (c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.
- (d) Any part or component thereof which in use emits radiofrequency energy by radiation, conduction or other means.

2.803 Equipment requiring Commission approval.

In the case of a radiofrequency device, which, in accordance with the rules in this chapter must be type approved, type accepted, or certificated prior to use, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease) or import, ship or distribute for the purposes of selling or leasing or offering for sale or lease, any such radiofrequency devices, unless, prior thereto, such device shall have been type approved, type accepted or certificated as the case may be.

2.805 Equipment that does not require Commission approval.

In the case of a radiofrequency device which, in accordance with the rules in this chapter must comply with specific technical standards prior to use, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease) or import, ship or distribute for the purposes of selling or leasing or offering for sale or lease, any such radiofrequency device, unless prior thereto such device complies with the applicable technical standards specified in the Commission's rules.

2.807 Statutory exceptions.

As provided by section 302(c) of the Communications Act of 1934, as amended, 2.803 and 2.805 shall not be applicable to:

- (a) Carriers transporting radiofrequency devices without trading in them.
- (b) Radiofrequency devices manufactured solely for export.
- (c) The manufacture, assembly, or installation of radiofrequency devices for its own use by a public utility engaged in providing electric service: *Provided, however,* That no such device shall be operated if it causes harmful interference to radio communications.
- (d) Radiofrequency devices for use by the Government of the United States or any agency thereof: *Provided, however,* That this exception shall not be applicable to any device after it has been disposed of by such Government or agency.

2.809 Exception for ISM equipment.

(a) Sections 2.803 and 2.805 shall not apply to the following ISM equipments:

- (1) Ultrasonic equipment as defined in 18.3(e) of this chapter which generates 2 kW or more of radiofrequency energy.
 - (2) Particle accelerators, e.g., cyclotrons, and other similar scientific equipment.
 - (3) Electro-crosion equipment.
 - (4) Sputtering equipment using RF energy.
 - (5) RF stabilized arc welders.
 - (6) Industrial heating equipment as defined in 18.3(c), of this chapter which generates 10 kW or more of RF energy.
- (b) Sections 2.803 and 2.805 shall not apply to industrial heating equipment as defined in 18.3(c) of this chapter which generates less than 10 kW of RF energy: *Provided, However:*
- (1) The vendor of such equipment has notified the purchaser/lessee in writing whether the equipment as delivered will meet the technical standards in Part 18 of this chapter, or whether the equipment must be installed in a screened enclosure before it may be operated.
 - (2) A copy of the notification shall be furnished to the Federal Communications Commission, Washington, D.C. 20554. Attention: Field Engineering Bureau.
 - (3) The copy of the notification furnished to the Commission shall include:

- Name and address of purchaser/lessee,
- Name of manufacturer,
- Type or model of the equipment delivered, and
- Nominal operating frequency and power.

(c) The equipment listed in paragraphs (a) and (b) of this section must meet the applicable certification or type approval requirement of Part 18 of this chapter before such equipment is operated.

2.811 Transmitters operated under Part 73.

Sections 2.803 and 2.805 shall not be applicable to a transmitter operated in any of the Radio Broadcast Services regulated under Part 73 of this chapter, provided the conditions set out in Part 73 of this chapter for the acceptability of such transmitter for use under licensing are met.

2.813 Transmitters operated in the Instructional Television Fixed Service.

Sections 2.803 and 2.805 shall not be applicable to a transmitter operated in the Instructional Television Fixed Service regulated under Part 74 of this chapter provided the conditions in 74.952 of this chapter for the acceptability of such transmitter for licensing are met.

**EXTRACTS FROM PART 15
RF DEVICES**

15.3 General condition of operation.

Persons operating restricted or incidental radiation devices shall not be deemed to have any vested or recognizable right to the continued use of any given frequency, by virtue of prior registration or certification of equipment. Operation of these devices is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by other incidental or restricted radiation devices, industrial, scientific or medical equipment, or from any authorized radio service.

15.4 General definitions.

a. *Radio frequency energy.* Electromagnetic energy at any frequency in the radio spectrum between 10 kHz and 3,000,000 MHz.

b. *Harmful interference.* Any emission, radiation or induction which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunication service operating in accordance with this chapter.

c. *Incidental radiation device.* A device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio frequency energy.

d. *Restricted radiation device.* A device in which the generation of radio frequency energy is intentionally incorporated into the design and in which the radio frequency energy is conducted along wires or is radiated, exclusive of transmitters which require licensing under other parts of this chapter and exclusive of devices in which the radio frequency energy is used to produce physical, chemical or biological effects in materials and which are regulated under the provisions of Part 18 of this chapter.

e.

f. *Low power communication device.* A low power communication device is a restricted radiation device, exclusive of those employing conducted or guided radio frequency techniques, used for the transmission of signs, signals (including control signals), writing, images and sounds or intelligence of any nature by radiation of electromagnetic energy.

EXAMPLES: Wireless microphone, phonograph oscillator, radio controlled garage door opener and radio controlled models. g.-h.

15.7 General requirement for restricted radiation devices.

Unless regulated under some other subpart of this part, any apparatus which generates a radio frequency electromagnetic field functionally utilizing a small part of such field in the operation of associated apparatus not physically connected thereto and at a distance not greater than

$$\frac{157,000}{F \text{ (kHz)}} \text{ ft.} \approx \frac{\lambda}{2\pi}$$

need not be licensed provided:

a. That such apparatus shall be operated with the minimum power possible to accomplish the desired purpose.

b. That the best engineering principles shall be utilized in the generation of radio frequency currents so as to guard against interference of established radio services, particularly on the fundamental and harmonic frequencies.

c. That in any event the total electromagnetic field produced at any point a distance of $\frac{157,000}{F \text{ (kHz)}} \text{ ft.}$

from the apparatus shall not exceed 15 microvolts per meter.

d. & e.

15.11 Prohibition against eavesdropping

a. No person shall use either directly or indirectly, a device operated pursuant to the provisions of this part for the purpose of overhearing or recording the private conversations of others unless such use is authorized by all of the parties engaging in the conversation.

b. Paragraph (a) of this section shall not apply to operations of any law enforcement officers conducted under lawful authority.

SUBPART B—INCIDENTAL RADIATION DEVICES

15.31 Operating requirements.

An incidental radiation device shall be operated so that the radio frequency energy that is radiated does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference.

SUBPART C — RADIO RECEIVERS

15.63 Radiation interference limits.

a. The radiation from all radio receivers that operate (tune) in the range 30 to 890 MHz, including frequency modulation broadcast receivers and television broadcast receivers, manufactured after the effective date specified in 15.72 shall not exceed the following field strength limits at a distance of 100 feet or more from the receiver:

Frequency of radiation (MHz)	Field strength ($\mu\text{V/m}$)
0.45 up to and including 25	See paragraph (b).
Over 25 up to and including 70	32.
Over 70 up to and including 130	50.
130-174	50-150 (linear interpolation).
174-260	150.
260-470	150-500 (linear interpolation).
470-1000	500 (see paragraph (c) below).

b. Pending the development of suitable measurement techniques for measuring the actual radiation in the band 0.45 to 25 MHz, the interference capabilities of a receiver in this band will be determined by the measurement of radio frequency voltage between each power line and ground at the power terminals of the receiver. This requirement applies only to radio receivers intended to be connected to power lines of public utility systems. For television broadcast receivers the voltage so measured shall not exceed 100 μV at any frequency between 450 kHz and 25 MHz inclusive. For all other receivers the voltage shall not exceed 100 μV at any frequency between 450 kHz and 9 MHz inclusive, 1000 μV for frequencies between 10 MHz and 25 MHz and linear increase from 100 μV to 1000 μV for frequencies between 9 MHz and 10 MHz.

c. For television broadcast receivers the limit in the band 470-1000 MHz shall be 350 $\mu\text{V/m}$, compliance being determined as follows:

1. Measurements shall be made at the following 10 frequencies in the band 470-1000 MHz.

MHz	MHz	MHz
520	700	850
550	750	900
600	800	931
650		

2. The average of the 10 measurements shall not exceed 350 μ V/m.

3. No measurement shall exceed 750 μ V/m.

15.68 All channel television broadcast reception: receivers manufactured on or after July 1, 1971.

a. *Effective date.* The requirements of this section, in addition to the requirements of 15.67, shall apply to 10 percent of the television receiver models produced by any domestic manufacturer, or exported to the United States by any foreign manufacturer, on or after July 1, 1971; 40 percent of the models produced (or exported to the United States) by any manufacturer on or after July 1, 1972; 70 percent of the models produced (or exported to the United States) by any manufacturer on or after July 1, 1973; and to all receivers manufactured (or exported to the United States) on or after July 1, 1974. They shall, in addition, apply to any receiver model manufactured (or exported to the United States) on or after January 1, 1972, and not manufactured prior to that date.

b. & c.

(d) Notwithstanding the provisions of paragraph (a) of this section and subject to the prohibition against emissions on the frequencies listed in 15.215 (c), the level of emission of RF energy from the receiver used with a radio control for a door opener shall not exceed the values listed below when measured in accordance with the procedures laid down in FCC Technical Division Report, T-7001, dated October 1, 1970.

Frequency (MHz)	Field strength at 100 ft (μ V/m)
Over 25 up to and including 70	32.
Over 70 up to and including 200	50.
200-1,500	50-500 (linear variation).
Over 1,500	500.

15.69 Certification of receivers.

a.1. & a.2.

a.3. No television broadcast receiver manufactured on or after July 1, 1971, which has not been certificated to comply with the requirements of 15.68(b) shall be shipped in interstate commerce or imported from any foreign country, for sale or resale to the public, unless on the date of shipment, the manufacturer of that receiver is in compliance with the schedule set forth in 15.68(a). This provision does not apply to carriers which transport television broadcast receivers without trading in them.

b. - d.

e.1. - e.9.

e.10. In the case of a television broadcast receiver designed to meet the requirements of 15.68, a description of the basic mechanism for tuning the VHF and UHF channels; a description of tuning aids provided for tuning VHF and UHF channels; at least two suitable 8" x 10" photographs, one showing the tuning controls on the outside of the cabinet, the other showing the tuning mechanism inside the cabinet; and a statement certifying that the receiver meets the requirements of 15.68.

f.

15.75 Measurement procedure.

a. Any measurement procedure acceptable to the Commission may be used to show compliance with the requirements of this subpart. A detailed description of the proposed measurement procedure, including a list of the test equipment to be used, shall be submitted to the Commission when requesting a determination regarding the acceptability of the proposed measurement procedure.

b.

15.80

c. In the case of measurements in the field, radiation in excess of 15 μ V/m at any frequency between 450 kHz and 25 MHz at the border of the property and more than 15 feet from any power line crossing this border under the control and exclusive use of the person operating or authorizing the operation of the receiver will be considered an indication of noncompliance with the radiation requirements of this subpart.

SUBPART D—COMMUNITY ANTENNA TELEVISION SYSTEMS

15.161 Radiation from a community antenna television system.

Radiation from a community antenna television system shall be limited as follows:

Frequency kHz	Distance (feet)	Field strength (μ V/m)
10-490.....	1,000	$\frac{2400}{F(kHz)}$
510-1600.....	100	$\frac{24000}{F(kHz)}$

For the purpose of this section, a sparsely inhabited area is that area within 1,000 feet of a community antenna television system where television broadcast signals are, in fact, not being received directly from a television broadcast station.

15.162 Demonstration of compliance.

The operator of each CATV system shall be responsible for insuring that each such system is designed, installed and operated in a manner which fully complies with the provisions of this subpart. Each system operator shall be prepared to show, upon reasonable demand by an authorized representative of the Commission, that the system does, in fact, comply with the rules.

SUBPART E—LOW POWER COMMUNICATION DEVICES

15.201 Frequencies of operation.

a. A low power communication device may be operated on any frequency in the bands 10-490 kHz, 510-1600 kHz and 26.97-27.27 MHz.

b. Other frequencies above 70 MHz may be used for operations of short duration in accordance with the requirements set forth in 15.211.

15.202 Radiation limitation below 1600 kHz.

A low power communication device which operates on any frequency between 10 and 490 kHz or between 510 and 1600 kHz shall limit the radiation so that the field strength does not exceed the value specified in the following table:

Frequencies (MHz)	Distance (ft.)	Radiation limits (μ V/m)	
		General requirement	Sparsely inhabited areas:
Up to and including 54.....	100	15	15
Over 54 up to and including 132.....	10	20	400
Over 132 up to and including 216.....	10	50	1,000
Over 216.....	100	15	15

15.203 Alternative requirement for operation on frequencies between 160 and 190 kHz.

In lieu of meeting the radiation limitation stated in 15.202, a low power communication device operating on a frequency between 160 and 190 kHz need only meet the following requirements:

- a. The power input to the final radio frequency stage (exclusive of filament or heater power) does not exceed one watt.
- b. All emissions below 160 kHz or above 190 kHz are suppressed 20 db or more below the unmodulated carrier.
- c. The total length of the transmission line plus the antenna does not exceed 50 feet.

15.204 Alternative requirement for operation on frequencies between 510 and 1600 kHz.

In lieu of meeting the radiation limitation stated in 15.202, a low power communication device operating on a frequency between 510 and 1600 kHz inclusive need only meet the following requirements:

- a. The power input to the final radio stage (exclusive of filament or heater power) does not exceed 100 milliwatts.

- b. The emissions below 510 kHz or above 1600 kHz are suppressed 20 dB or more below the unmodulated carrier.
- c. The total length of the transmission line plus the antenna does not exceed 10 feet.
- d. Low power communication devices obtaining their power from the lines of public utility systems shall limit the radio frequency voltage appearing on each power line to 200 microvolts or less on any frequency from 510 kHz to 1600 kHz. Measurements shall be made from each power line to ground both with the equipment grounded and with the equipment ungrounded.

15.211 Operation above 70 MHz.

(a) Except for telemetering devices and wireless microphones operated in accordance with 15.212 and 15.213, and radio controls for door openers operating in accordance with 15.215, a low power communication device manufactured on or after July 15, 1963, may be operated on frequencies above 70 MHz, provided it complies with all of the following conditions:

1. The radiated field on any frequency from 70 MHz up to and including 1000 MHz does not exceed the limits specified for receivers in 15.63.
2. The radiated field on any frequency above 1000 MHz does not exceed 500 microvolts per meter at a distance of 100 feet.

(3) The device is provided with means for automatically limiting operation so that the duration of each transmission shall not be greater than 1 second and the silent period between transmissions shall not be less than 30 seconds.

(4) The device shall be so constructed that there are no external or readily accessible controls which may be adjusted to permit operation in a manner inconsistent with the provisions of this paragraph.

b. Except for radio controls for door openers and for telemetering devices and wireless microphones operated in accordance with the requirements of 15.212 and 15.213, a low power communications device, manufactured before July 15, 1963, may be operated on any frequency above 70 MHz: *Provided*, it complies with all of the following conditions:

(1) The radiated field on any frequency from 70 MHz up to and including 1000 MHz does not exceed the limits specified for receivers in 15.63.

(2) The radiated field on any frequency above 1000 MHz does not exceed 500 microvolts per meter at a distance of 100 feet.

(3) The device is provided with means for automatically limiting operation to a duration of not more than 1 second, not to occur more than once in 30 seconds.

15.214 Alternative provisions for measuring devices.

a. A low power communication device used for measurement of the characteristics of materials may operate in the frequency bands listed in paragraph (c) pursuant to the provisions in this section.

b.

c. The device shall operate within the frequency bands:

15.215 Provisions for a radio control transmitter for a door opener.

(a) A low power communication device used for the radio control of a door opener may operate on any frequency above 70 MHz subject to the provisions of this section.

(b) The device may be used only for the purposes of opening or closing a door and may not be used for voice transmission or the transmission of any other type of message.

(c) Emission of RF energy from the transmitter, as well as from the receiver part of the control, shall not fall within any of the bands listed below:

MHz	MHz	GHz
73-75.4	608-614	10.68-10.70
108-118	960-1215	15.35-15.4
121.4-121.6	1400-1427	19.3-19.4
242.8-243.2	1535-1670	31.3-31.5
265-285	2690-2700	88-90
328.6-335.4	4200-4400	
404-406	4990-5250	

(d) Subject to the limitation in paragraph (c) of this section, emission of RF energy from the transmitter shall not exceed the levels given below when measured under open field conditions as prescribed in FCC Technical Division Report T-7001 dated October 1, 1970.

Frequency (MHz)	Field strength at 100 ft. (μV/m)
70-130	125.
130-174	125-375 (linear variation).
174-260	375.
260-470	375-1250 (linear variation).
Over 470	1250.

(e) The transmitter part of the control shall be activated only by a switch which will automatically deactivate the transmitter when released. The switch shall be of such quality to insure reliable operation for the expected life of the transmitter.

(f) The transmitter part of the radio control must be certificated pursuant to 15.260-15.266.

(g) The receiver part of the radio control shall be separately certificated pursuant to Subpart C of this part.

15.222 Interference from low power communication devices.

Notwithstanding the other requirements of this part, the operator of a low power communication device, regardless of date of manufacture, which causes harmful interference to an authorized radio service, shall promptly stop operating the device until the harmful interference has been eliminated.

15.235 Type approval.

(a) A manufacturer of a telemetering device or wireless microphone who desires to obtain type approval for his equipment may request permission to submit such equipment to the Commission for testing by following the procedure set out in Subpart F of Part 2 of this chapter, as modified by this section. The manufacturer shall furnish the following with his request for type approval:

- (1) A report of measurements showing that the equipment is capable of complying with the requirements of 15.212;
- (2) A statement that at least 10 units are proposed to be manufactured; and
- (3) A statement agreeing to include a reprint of Subparts A and E of this Part 15, current as of date of manufacture, with each unit offered for sale or resale to the public.

(b) To receive type approval, telemetering devices and wireless microphones must meet the following requirements:

- (1) The device must comply with the technical limitations of 15.212.
- (2) The design and construction of the equipment must give reasonable assurance of compliance with the requirements of 15.212 for at least 5 years under normal operation and with average maintenance.
- (3) The device must be so constructed that the adjustment of any control accessible to the user shall not cause operation in violation of 15.212.

15.236 Identification of type approved devices.

The Commission will assign a type approval number to each telemetering device or wireless microphone which is type approved. The type approval number and the following statement shall be permanently inscribed upon or permanently attached to each production unit as follows:

FCC Type Approval No. _____
Valid only when operated pursuant to FCC Rules, Part 15, and when used with antenna furnished by manufacturer.

15.237 Changes in type approved equipment.

No changes whatsoever may be made in a type approved telemetering device or wireless microphone, including the antenna, except on specific prior approval by the Commission.

15.238 Withdrawal of certificate of type approval.

- a. A certificate of type approval may be withdrawn if the type of equipment for which it was issued proves defective in service and, under usual conditions of maintenance and operation, such equipment cannot be relied on to meet the conditions set forth in this part for the operation of the type of equipment involved, or if any change whatsoever is made in the construction of equipment sold under the certificate of type approval issued by the Commission, without the specific prior approval of the Commission.
- b. - d. . . .

15.253 Report of measurements for a device operating pursuant to 15.214.

The report of measurements may be prepared by any engineer skilled in making and interpreting the measurements that are required and shall contain the following information.

- (a) Identification of the device(s) tested.
- (b) List of measuring equipment used showing manufacturer, model number and date when last calibrated.
- (c) Description of measurement procedure used. If a published standard was followed, reference to the standard is sufficient, provided any departure from such standard is described in detail.
- (d) Report of the measurements obtained on the fundamental, and on harmonic and other spurious signals emitted by the device. For this measurement, the frequency spectrum shall be scanned from the lowest frequency generated by the device to the 10th harmonic of the operating frequency.
- (e) Representative calculations used to determine field strength from the actual meter reading indicating the conversion factors used and their source.
- (f) The date the measurements were made.
- (g) The name and address of the engineer or technician who made the actual measurements, and the name and address of his employer, if any.
- (h) The signature and printed name and address of the engineer responsible for the report.

15.274 Interference from a radio control for a door opener.

- (a) Operation of a radio control for a door opener is subject to the general conditions of operation set out in 15.3 and 15.222.
- (b) The operator of a radio control for a door opener who is advised that his device is causing harmful interference to an authorized radio service shall promptly stop operating the device, and he shall not resume operation until the condition causing the harmful interference has been eliminated.

15.276 Date when certification of a radio control for a door opener is required.

- (a) A radio control for a door opener that operates above 70 MHz marketed on or after November 1, 1971, shall comply with the certification requirements of 15.215 and 15.260-15.266 inclusive.
- (b) No radio control for a door opener that operates above 70 MHz marketed prior to November 1, 1971, may operate after October 1, 1978, or such earlier date that may be specified by the Commission if the receiver thereof is found to be a source of harmful interference, unless the receiver has been certificated to demonstrate compliance with the provisions of 15.63(d) and the transmitter has been certificated to demonstrate compliance with the provisions of 15.215.

SUBPART F—FIELD DISTURBANCE SENSORS

15.301 Scope of this subpart.

This subpart provides rules governing the operation of restricted radiation devices which are used as field disturbance sensors. Typical examples of devices regulated by these rules are microwave intrusion sensors and devices that use RF energy for production line counting and sensing.

15.303 Restriction on operation.

No field disturbance sensor may be operated unless it has been certificated and labeled as complying with the requirements of this part.

15.305 General technical specification.

- a. A field disturbance sensor may be operated on any frequency

(including frequencies above 900 MHz) subject to the requirement that the field strength of emissions on the fundamental or on a harmonic or on other spurious frequencies shall not exceed 15 uV/m at a distance of $\lambda/2\pi$ from the sensor. The distance is equivalent in feet to 157 divided by the frequency in MHz.

- b. Alternative to paragraph (a) of this section, a field disturbance sensor may be operated on any frequency listed in 15.307 subject to the technical requirements set out in 15.307 and 15.309 of this part.

15.307 Permitted bands of operation.

The carrier frequency of a field disturbance sensor operating on one of the frequencies listed in 15.305(b) and any modulation components thereof shall be kept within the following band limits:

Nominal operating frequency (MHz)	Band Limits (MHz)
915	± 13
2450	± 15
5800	± 15
10,525	± 25
22,125	± 50

15.309 Emission limitations.

- a. For a field disturbance sensor operating within any frequency band listed in 15.307, the field strength of emissions on the fundamental shall be limited in accordance with the following:

Frequency (MHz)	Field Strength
915 } 2450 } 5800 }	50,000 uV/m at 100 ft.
10,525 } 22,125 }	250,000 uV/m at 100 ft.

- b. Spurious emissions (including emissions on a harmonic of any frequency listed in paragraph (a) of this section) shall be suppressed at least 50 dB below the level of the fundamental; however, suppression below 15 uV/m at 100 ft. is not required. For pulsed operation, measured field strength shall be determined from the averaged absolute voltage during a 0.1 second interval when field strength is at its maximum value. Below 1000 MHz, the measurement bandwidth shall comply with the requirements set out in the American National Standards Institute Specifications C63.2-1963 and C63.3-1964. Above 1000 MHz the measurement bandwidth shall be 5 MHz.

15.311 Interference from a field disturbance sensor.

- b. The operator of a field disturbance sensor who is advised that his sensor is causing interference to an authorized radio service shall promptly stop operating the sensor, and operation shall not be resumed until the condition causing the harmful interference has been eliminated.

15.313 Certification of a field disturbance sensor.

The procedure for certification of a field disturbance sensor is basically identical to the procedure for a radio control for a door opener.

15.315 Description of measurement procedure.

The report of measurements shall describe in detail the measurement procedure that was used. If a published standard was used, reference to the standard is sufficient, provided any departure from the standard is described in detail.

15.317 Frequency range over which measurements are required.

- a. For a field disturbance sensor operating below 100 MHz, the spectrum shall be scanned from the lowest frequency generated in the device up to 1000MHz. Field strength for all significant emissions shall be measured and reported.
- b. For a field disturbance sensor operating above 100 MHz the spectrum shall be scanned from the lowest frequency generated in the device up to 10 GHz, provided that for sensors operating on frequencies above 5 GHz, the spectrum shall be scanned to the highest frequency feasible, above 10 GHz. Field strengths of all significant emissions shall be measured and reported.

**EXTRACTS FROM PART 18
I S M EQUIPMENT**

18.3 Definitions.

For purposes of the provisions of this part the following definitions in the industrial, scientific, and medical service shall be applicable:

- a.
- b. "Medical diathermy equipment" shall include any apparatus (other than surgical diathermy apparatus designed for intermittent operation with low power) which utilizes a radio frequency oscillator or any other type of radio frequency generator and transmits radio frequency energy used for therapeutic purposes.
- c. "Industrial heating equipment" shall include any apparatus which utilizes a radio frequency oscillator or any other type of radio frequency generator and transmits radio frequency energy used for or in connection with industrial heating operations utilized in a manufacturing or production process.
- d. Miscellaneous equipment shall include apparatus other than that defined in or excepted by paragraphs (b) and (c) of this section in which radio frequency energy is applied to materials to produce physical, biological, or chemical effects such as heating, ionization of gases, mechanical vibrations, hair removal and acceleration of charged particles, which do not involve communications or the use of radio receiving equipment.
- e. Ultrasonic equipment shall include any apparatus which generates radio frequency energy and utilizes that energy to excite or drive an electromechanical transducer for the production of sonic or ultrasonic mechanical energy for industrial, scientific, medical or other noncommunication purposes.
- f. "Industrial, scientific and medical equipment" (ISM equipment). Devices which use radio waves for industrial, scientific, medical or any other purposes including the transfer of energy by radio and which are neither used nor intended to be used for radio-communication.
- g. & h.

18.13 ISM frequencies and frequency tolerances.

The following frequencies are allocated for use by ISM equipment with the tolerance limits specified:

ISM frequency :	<i>Frequency tolerance</i>
13,560 kHz-----	± 0.78 kHz.
27,120 kHz-----	± 160.0 kHz.
40,680 kHz-----	± 20.0 kHz.
915 MHz-----	± 13 MHz.
2,450 MHz-----	± 50.0 MHz.
5,800 MHz-----	± 75.0 MHz.
22,125 MHz-----	± 125.0 MHz.

18.14 Operation on microwave frequencies.

Except for industrial heating equipment which is regulated by 18.101 through 18.122, inclusive, ISM equipment may be operated on the microwave ISM frequencies (915 MHz, 2450 MHz, 5800 MHz and 22,125 MHz) subject to the following conditions:

- a. The emission of radio frequency energy resulting from such operation shall be on the particular frequency and must not exceed tolerance limits associated with each such frequency as set forth in 18.13.
- b. The energy radiated and the bandwidth of emissions shall be reduced to the greatest extent practicable.
- c. No harmful interference shall be caused to authorized communication services from spurious or harmonic radiation. In the event of such harmful interference, operation of the ISM equipment causing such harmful interference shall cease and shall not be resumed until steps necessary to eliminate such interference have been taken.

SUBPART C—ULTRASONIC EQUIPMENT

18.71 Operation without a license

Ultrasonic equipment may be operated without a license: *Provided*, the design and operation complies with the technical limitations for such equipment: *And provided further*, That the equipment has been type approved by the Commission or has been certified pursuant to the requirements of 18.71 to 18.84 and the certificate is attached to the equipment or is promi-

nently posted in the room in which the equipment is being operated; except that ultrasonic equipment operating on frequencies below 90 kHz and generating less than 500 watts of radio frequency power may be operated without license, type approval or certification, if such equipment complies with all other applicable provisions of 18.71 to 18.84.

18.72 Technical limitations.

- a. Ultrasonic equipment shall be designed and constructed in accordance with good engineering practice with sufficient shielding and filtering to provide adequate suppression of emissions on frequencies outside the ISM frequency bands.
- b. Except for ultrasonic measurement equipment that operates over a continuous band of frequencies, the fundamental frequency of operation shall fall outside the frequency bands 490-510 kHz, 2170-2194 kHz, and 8354-8374 kHz.
- c. The varying conditions under which Ultrasonic equipment is operated shall not result in radiation exceeding the following limits:

Frequency	Distance <i>Feet</i>	Field $\mu V/m$
Up to and including 490 kHz.....	1,000	$\frac{2400}{\text{Frequency in kHz}}$
Over 490 kHz up to and including 1600 kHz.	100	$\frac{24000}{\text{Frequency in kHz}}$
Over 1600 kHz exclusive of frequencies in the ISM frequency bands.	100	15.

d. The operation of ultrasonic equipment on frequencies below 490 kHz using radio frequency power in excess of 500 watts shall be in compliance with the requirements of this section except that the maximum radiated field permitted may be increased as the square root of the ratio of the generated radio frequency power to 500 watts: *Provided*, that the radiated field shall in no case exceed the field permitted industrial heating equipment: *And provided further*, That equipment used in predominantly residential areas shall not be permitted the increase in field with power as indicated in this paragraph.

e. On any frequency above 490 kHz, the radio frequency voltage appearing on each power line shall not exceed 200 microvolts. On any frequency below 490 kHz, the radio frequency voltage appearing on each power line shall not exceed 1000 microvolts. Measurement shall be made from each power line to ground with the equipment itself both grounded and ungrounded.

18.73 Type approval.

a. Manufacturers of ultrasonic equipment desiring to obtain type approval for their equipment may request permission to submit such equipment to the Commission for testing by following the procedure set out in Part 2 of this chapter. The request shall include a statement that at least five units of the model to be submitted are scheduled for manufacture.

SUBPART D—INDUSTRIAL HEATING EQUIPMENT

18.101 Operation without a license.

Industrial heating equipment may be operated without a license: *Provided*, The design and operation of the equipment complies with the technical limitations in this part for such equipment: *And provided further*, That the equipment has been certified pursuant to the requirements of this part.

18.102 Technical limitations

- a. Industrial heating equipment shall be designed and constructed in accordance with good engineering practice with sufficient shielding and filtering to meet the requirements of this part.
- b. Industrial heating equipment may be operated on any frequency except frequencies in the bands 490-510 kHz, 2170-2194 kHz, and 8354-8374 kHz. Equipment operating on an ISM frequency may be operated with unlimited radiation on that frequency. Equipment operated on other frequencies must suppress radiation on the fundamental carrier frequency as well as other frequencies as required by this part.
- c. Industrial heating equipment designed for operation on an ISM frequency shall be adjusted to operate as close to that ISM frequency as practicable.

d. Radiation of radio frequency energy from any industrial heating equipment on any frequency below 5725 MHz, except ISM frequencies, shall be suppressed so that the radiated field strength does not exceed 10 microvolts per meter at a distance of one mile or more from the equipment.

e. Radiation of radio frequency energy from any industrial heating equipment on any frequency above 5725 MHz, except ISM frequencies, shall be reduced to the greatest practicable.

NOTE: The Commission will establish definite radiation limits for these frequencies as soon as information regarding equipment operating on these frequencies becomes available.

f. Filtering between the industrial heating equipment and power lines must be provided to the extent necessary to prevent the radiation of energy from power lines on frequencies other than ISM frequencies with a field strength in excess of 10 microvolts per meter at a distance of one mile or more from the industrial heating equipment and at a distance of 50 feet from the power line.

18.111 Form of certificate.

a. Certificates issued after April 30, 1961, for industrial heating equipment shall be executed on FCC Form 724 except as provided in paragraph b. of this section.

b.

18.114 Prototype certification permitted.

a. Provision for prototype certification is made on the basis that production units can be expected to exhibit the same radiation characteristics as those of the prototype. Acceptance of prototype certification is based on representations and field strength measurements made by the manufacturer of industrial heating equipment.

b.

18.119 Elimination and investigation of harmful interference.

a. The operator of industrial heating equipment that causes harmful interference shall promptly take appropriate measures to eliminate the harmful interference.

b. When notified by the Commission that his installation is causing harmful interference, the operator shall arrange for an engineer skilled in interference measurements and control techniques to make an investigation to ensure that the harmful interference has been eliminated. The Commission may require the engineer making the investigation to furnish proof of his qualifications.

c. & d.

18.120 Interference to a radionavigation or safety service.

a. If the operator of industrial heating equipment is notified by the Commission that operation of such equipment is endangering the functioning of a radionavigation or a safety service, he shall immediately cease operating the equipment.

b. - d.

18.121 Interference to other radio services.

a. If the operator of industrial heating equipment is notified by the Commission that operation of such equipment is obstructing or repeatedly interrupting an authorized radio service other than a radionavigation or safety service, he shall take prompt measures to eliminate the harmful interference but need not cease operation unless ordered to do so by the Commission.

b.-d.

SUBPART E--MEDICAL DIATHERMY EQUIPMENT

18.141 Operation on assigned frequencies.

A station license is not required for the operation of medical diathermy equipment on assigned frequencies provided such operation meets the following conditions:

a. Such operation must conform to the general condition set out in the guarantee or certificate required by paragraphs (c) and (d) of this section. Operation must be confined to one or more of the frequencies:

ISM frequency:	Frequency tolerance
13,560 kHz+6.78 kHz.
27,120 kHz+160.0 kHz.
40,680 kHz+20.0 kHz.
915 MHz+13.0 MHz.
2,450 MHz+50.0 MHz.
5,800 MHz+75.0 MHz.
22,125 MHz+125.0 MHz.

b. Such operation may be without regard to the type or power of emission being radiated. Spurious and harmonic radiations on frequencies other than those specified above shall be suppressed so that such radiations do not exceed a strength of 25 microvolts per meter at a distance of 1,000 feet or more from the medical diathermy equipment causing such radiations.

c. - e.

18.142 Operation on unassigned frequencies.

A station license is not required for the operation of medical diathermy equipment on frequencies other than those specified in 18.141 a. provided such operation is in accordance with the general conditions of operation set out in the certification required in paragraph b. of this section, and meets the following conditions:

a. The equipment used in such operation shall be provided with a rectified and filtered plate power supply, power line filters and shall be provided with sufficient shielding so that the emission of radio frequency energy generated by such operation, including spurious and harmonic emissions, shall not exceed a strength of fifteen microvolts per meter at a distance of 1,000 feet or more from the medical diathermy equipment on frequencies other than those specified in 18.141 a. under any conditions of operation.

b.

SUBPART F--RF STABILIZED ARC WELDERS

18.181 Technical specifications.

a. The requirements of this part with respect to electric arc welding devices using radio frequency energy are suspended, subject to the provisions of paragraphs b.-e. of this section, until action is completed in the Docket No. 11467 proceeding with respect to these devices.

b. In the event of interference from electric arc welding devices using radio frequency energy to any authorized radio service, steps to remedy such interference shall promptly be taken c. & d.

e. Broad band type of emissions from arc welding equipment shall be measured by an instrument having performance characteristics similar to the "Proposed American Standards Specification for a Radio Noise Meter--0.15 to 25 Megacycles/second" dated March 1950, published by the American Standards Association Committee on Radio Electrical Coordination C63. Quasi-peak values of field strength shall be measured and used in determining compliance with 18.102. Instruments not having characteristics similar to the above-mentioned standards may be used provided suitable correlation factors are used to adjust the field strength readings to values which would be obtained with an instrument having the desired characteristics.

**SYMPOSIUM
ON
ELECTROMAGNETIC
COMPATIBILITY**

(See Page 36)

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LOCATION OF FIELD OFFICES

District Offices and their suboffices are located at the following addresses:

Radio district	Address of the Engineer in Charge
1	1600 Customhouse, Boston, Mass. 02109.
2	748 Federal Bldg., 641 Washington St., New York, N.Y. 10014.
3	1005 New U.S. Customhouse, Philadelphia, Pa. 19106.
4	Room 819, Federal Building, Baltimore, Md. 21201.
5	Room 400, Federal Building, Norfolk, Va. 23510.
6	1602 Gas Light Tower, 235 Peachtree Street NE., Atlanta, Ga. 30303. Suboffice: Post Office Box 8004, Room 238, Post Office Building, Savannah, Ga. 31402.
7	Room 919, 51 Southwest First Ave., Miami, Fla. 33130.
8	829 Federal Office Bldg., 600 South St., New Orleans, La. 70130. Suboffice: 439 U.S. Courthouse and Customhouse, Mobile, Ala. 36602.
9	New Federal Office Bldg., 515 Rusk Ave., Room 5636, Houston, Tex. 77002. Suboffice: 239 Federal Bldg., 300 Willow St., Beaumont, Tex. 77701.
10	1314 Wood St., Room 707, Dallas, Tex. 75202.
11	Room 1758, U.S. Courthouse, 312 North Spring Street, Los Angeles, Calif. 90012. Suboffice: Fox Theatre Bldg., 1245 Seventh Ave., San Diego, Calif. 92101.
12	323-A Customhouse, 555 Battery St., San Francisco, Calif. 94111.
13	314 Multnomah Building, 319 Southwest Pine Street, Portland, Ore. 97204.
14	8012 Federal Office Bldg., First Ave. and Marion, Seattle, Wash. 98104.
15	504 New Customhouse, Denver, Colo. 80202.
16	691 Federal Building and U.S. Courthouse, Fourth and Robert Streets, St. Paul, Minn. 55101.
17	1703 Federal Bldg., 601 East 12th St., Kansas City, Mo. 64106.
18	1872 New U.S. Courthouse and Federal Office Bldg., 219 South Dearborn St., Chicago, Ill. 60604.
19	1029 New Federal Bldg., Detroit, Mich. 48226.
20	328 Federal Bldg., Buffalo, N.Y. 14203.
21	502 Federal Bldg., Post Office Box 1021, Honolulu, Hawaii 96808.
22	Post Office Box 2987, 322-323 Federal Bldg., San Juan, P.R. 00903.
23	Post Office Box 644, Room 53, U.S. Post Office and Courthouse Bldg., Anchorage, Alaska 99501.
24	Room 216, M St. NW., Washington, D.C. 20554.

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(See Page 89)

PROGRESS IN THE REGULATORY CONTROL OF RADIO INTERFERENCE

(Condensed & edited from a paper presented by HERMAN GARLAN, Chief, RF Devices Branch, Office of Chief Engineer, Federal Communications Commission at the 1972 IEEE SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY, Chicago, Ill.)

There is more to spectrum management than the efficient assignment of frequencies. It covers three distinct areas:

- Control of frequency assignments and other parameters to licensed stations.
- Control of undesired emissions from deliberate generators of RF energy, whether a licensed station or an unlicensed device.
- Control of radio noise produced as a by product of normal operation from all types of electrical/electronic and other equipment.

CONTROL OF FREQUENCY ASSIGNMENTS

This is the area in which the FCC and its predecessor agencies have devoted most of their energy. Heretofore, this work was done manually. But technology has caught up and it is no longer possible to continue the work using manual methods. Accordingly, the FCC is shifting to computerized operations. The Chicago regional unit was the first unit to make the conversion. These units, using computer techniques, will assign frequencies, power, antenna height and directivity, and such other parameters as they find necessary, in order to accommodate the maximum number of stations with a minimum of interstation interference.

CONTROL OF RADIO NOISE

Radio noise includes RF energy that is produced as a by-product of normal operation by many electrical/electronic equipment. And in the form of static electricity discharges, radio noise can be produced by all kinds of machines with rotating members. These are devices that are not intended to generate RF energy. These devices we call INCIDENTAL RADIATION DEVICES. The FCC has not promulgated technical specifications for such devices—only a non-interference requirement (Section 15.31). Incidental radiation includes things as diverse as the thermostat in your wife's iron or heating pad as well as corona produced on high voltage power lines. It includes noise generated by the commutator motor in a vacuum cleaner as well as the interference produced by the ignition system in a gasoline fired engine—in automobiles, power lawn mowers, outboard motors, etc. The common arc welder, to be differentiated from the high frequency welder, falls in this category. So do gas discharge tubes as fluorescents.

The FCC now has the authority to regulate all of these devices with respect to their interference potential. Their policy at this time, however, is to put their trust in self regulation by industry. They have been proselytizing industry to adopt voluntary standards. The automobile industry is an outstanding example where this has been done. The power industry, in the design of new power lines, is another industry making a valiant effort to control the radio noise produced by these lines. However, the FCC recognizes the weakness and the failings of this approach. If the radio noise situation becomes worse, the Commission may move to exercise its jurisdiction in this area.

Readers are urged to pass this word about radio noise back to your employers and to your colleagues. If industry is not willing or is unable voluntarily to adopt appropriate standards to control radio noise, the Commission will eventually do so.

CONTROL OF UNDESIED RADIATION FROM DELIBERATE GENERATORS

Most engineers think of spurious and harmonic radiation from transmitters. Many also think of receiver oscillator radiation. Some may even go so far as to include garage door openers and these 100 milliwatt walkie-talkies used as toys by children. But there are many more devices and equipments that deliberately generate (and frequently radiate) RF energy.

There is a whole family of welding equipment—known in industry as high frequency welders. These welders are largely used in welding non-ferrous metals in an inert gas atmosphere. The secret of their success is a spark gap generator to produce RF energy which is fed, along with the welding current, to the torch. Unless carefully installed and properly grounded, these welders are a prolific source of undesired radiation—of RFI.

There is a piece of equipment that will be found in many beauty parlors. This equipment, known as an epilator, uses RF energy to destroy undesired hair on the face. (As you can see, the FCC gets into everyone's hair.) Be that as it may, the device deliberately generates RF energy and, unless properly designed and constructed, can be a source of RFI.

There is a whole host of security devices that use RF energy. Probably the most widely known is the radio "bug". This produces undesired radiation in more ways than one. However, under the proper safeguards, such devices are important in our present society and a place must be found for them.

Another source of undesired radiation is the signal radiated by a licensed station beyond the area that the licensee must serve.

PUBLIC LAW 90-379. SECTION 302 OF THE COMMUNICATIONS ACT.

In the case of DOD and aerospace, the interference generator and the device receiving the interference are nearly always both under the control of the same user. This is not the case in the problems facing the FCC. In the civilian sector the person operating a piece of interfering equipment seldom experiences the interference he is causing. Almost invariably he is bothering someone else. And almost invariably also this someone else can't do a thing about the interference that he is receiving.

Put this in terms of dollars and cents. When DOD orders a piece of equipment and requires interference suppression and testing, it accepts the added costs involved as necessary to protect its own operations even though the operation protected is removed in distance or organization from the source of the interference. However when the FCC imposes an interference suppression and testing requirement, the situation is quite different. In effect, the Commission is telling the manufacturer: "You must increase the cost of your product in order to protect a stranger, even though this price increase does not improve the performance of your product." In other words, the Commission is compelling the manufacturer to assume the cost of suppression—which is of course passed on as an increase in price to the purchaser—all in the name of promoting the general public good. Thus, the FCC is very much concerned with the economics of suppression.

DOD or NASA can see the benefit it will derive from the use of suppressed equipment, and it is willing, albeit reluctantly, to foot the bill for the additional cost. The cost of suppression in the civilian sector that is required by the FCC is quite comparable to the DOD & NASA costs. However, in the civilian case, the purchaser cannot see any advantage in the suppressed equipment since he does not benefit directly. On the contrary, his reaction frequently is: "Why should I pay for something to benefit the other guy?"

This is basically why the FCC must move slowly. Before they impose a requirement that will add to the cost of a product, they must be absolutely sure that the benefits to the general public will outweigh the burden of increased cost to the several purchasers of the suppressed product. The Commission must be sure that society as a whole will benefit even though a number of individuals may be penalized. Moreover, they must constantly be careful that their requirements do not price the device out of the market.

With this introduction, turn to Public Law 90-379. This law added Section 302 to the Communications Act of 1934—the organic legislation under which the FCC functions. The request for this legislation was submitted to Congress in 1958. It took ten years for the legislative process to run its course. Finally on July 5, 1968, this bill was signed into law. Section 302 is quite short. It gives the FCC authority to control the manufacture, sale and distribution of devices capable of causing harmful interference. The pertinent parts are:

“Sec. 302. (a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations governing the interference potential of devices which in their operation are capable of emitting radio frequency energy by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, shipment, or use of such devices.

“(b) No person shall manufacture, import, sell, offer for sale, ship, or use devices which fail to comply with regulations promulgated pursuant to this section.”

The Commission is authorized to regulate devices which in their operation emit radio frequency energy in sufficient degree to be *capable* of causing harmful interference to radiocommunications. Note that the Law does not limit itself to electronic/radio devices, or even to electrical/electronic devices. It encompasses all devices having an interference potential. The Law is designed to regulate the capability or potential of the device to produce interference. The FCC does not have to wait for interference actually to be caused. They can anticipate the problem and keep it from developing.

The regulations must be reasonable. The rule making process that they follow, with its provision for notice to the public and receipt of comments, is designed of course to insure just this. In any event, the regulations they adopt can be challenged in the courts where the question of reasonableness would be decided.

Public Law 90-379 prohibits the manufacture, the import, the sale, the offer for sale, the shipment or the use of subject device, unless such device complies with regulations promulgated by the FCC. This Law can prevent devices having an interference potential from being placed on the market. Thus instead of searching for thousands of devices which are causing interference, the FCC needs only deal with the manufacturer—thus protecting the innocent purchaser.

Finally the Law contains four specific exemptions.

a. Carriers transporting the device without trading in it are exempt.

b. Devices manufactured for export are exempt.

c. A utility that assembles and installs power equipment for its own use shall not be construed to be a manufacturer and is exempt to this extent. It is not exempt, however, from the technical specifications in so far as the utility is an operator of interference producing equipment.

d. The Law includes an admonitory statement which requires the Government to impose its own interference requirements so that the objectives of PL 90-379—the reduction of interference to radio reception—will be achieved.

SUBPART I OF PART 2—THE MARKETING REGULATIONS

Having received the necessary legislative authority, the FCC immediately turned to the talks of promulgating implementing regulations. A Notice of Proposed Rule Making (Docket No. 18426) was issued on January 15, 1969. Comments were received and studied. On May 13, 1970, marketing regulations were adopted. These regulations will be found in Subpart I of Part 2 of the FCC Rules (Section 2.801, *et seq.*).

There are two basic provisions. Section 2.803 makes it illegal to ship, sell, import or otherwise market a piece of equipment for which an FCC authorization (type approval, type acceptance or certification) is required, unless the equipment has in fact received such an authorization. Section 2.805 applies to equipment for which an FCC authorization is not required but for

which FCC technical specifications exist. Section 2.805 makes it illegal to market such equipment unless the equipment does in fact meet the applicable FCC specifications. Note that these regulations deal with shipment and sale, rather than manufacture of, interference capable equipment. The regulations were written in this manner based on the conclusions that adequate control over interference capable equipment can be achieved by prohibiting the marketing of equipment that does not comply with FCC specifications.

In addition to the statutory exemptions, the marketing regulations provide some additional exemptions chiefly for Industrial Scientific and Medical (ISM) equipment regulated by Part 18 of the rules. These exemptions were provided in the interest of expediting the adoption of the marketing rules since everyone realized that developing a suitable regulatory program for these exempted equipments would be a slow, drawn out process. Today—two years after the marketing rules were adopted—the FCC still doesn't know how to draft suitable regulations for these equipments. But they will soon try.

SUBPART F OF PART 2—PROCEDURE FOR OBTAINING AN EQUIPMENT AUTHORIZATION

Having promulgated the basic marketing regulations, the FCC looked at the procedures for obtaining the equipment authorization which the manufacturer must have before he can legally market his equipment. The Commission uses three different procedures: type approval, type acceptance and certification. Type approval is an authorization granted by the Commission based on an inspection and measurement of a prototype of the equipment in our laboratory. Type acceptance and certification are authorizations granted by the Commission based on a review of data furnished by the manufacturer. Type acceptance is used with transmitters that will be licensed; certification—with equipment operated without individual license under Parts 15 and 18 of our rules. The procedure to be used for any particular type of equipment is set out in the rules under which that equipment is operated.

When the FCC took a good look at these procedures, they were aghast. The procedures had been devised from 15 to 25 years ago to fit a specific problem at the time. They had been amended from time-to-time with relatively little coordination. As presently set out in Subpart F of Part 2, these procedures leave more unsaid than is stated. The procedure for certification is not even mentioned in Subpart F. In many cases, the current practice is in the minds of the individuals who act on these matters—not in the words in the regulations.

With equipment authorizations now mandatory on the manufacturer, this situation is intolerable. A rule making proceeding, Docket 19356, was therefore, instituted on November 24, 1971, to rectify this situation. This proceeding is intended to bring together in one place—Subpart F of Part 2 of the rules—all the procedural requirements relating to the equipment authorization program. The rules proposed spell out in detail how the manufacturer goes about applying for the necessary authorization. They also spell out the manufacturer's rights and obligations or responsibilities under this program—what the Commission expects of him and what he can expect of them.

Basically these rules provide for a bilateral procedure: the manufacturer applies for the authorization and the Commission makes the actual grant. This procedure had already been used for type approval and type acceptance. It is now extended to certification. What is new about this procedure is that a written application is now required on a form provided by the Commission.

This bilateral procedure is new for certification. The FCC has already implemented this procedure with considerable success with respect to receiver certification. The new rules promulgated under Part 15 during the last year all call for bilateral certification—for garage door openers, for intruder alarm devices which are called field disturbance sensors, and for the receivers used with wireless auditory training devices used in classes for the deaf and hard of hearing. The intention is to extend this bilateral certification procedure to all the equipment operated under Parts 15 and 18.

There are two aspects of these procedural rules—not directly related to the application itself—that are worth mentioning. First, it is proposed to delete the provision in the rules that—if an application for type acceptance is not acted on within thirty days, the application is automatically granted. This was put into the rules when type acceptance was voluntary on the part of the manufacturer to “sweeten the pill.” Now that type acceptance is mandatory, the sweetener is no longer necessary.

Secondly, the FCC is proposing to make a change in their regulations dealing with the release of technical information to the public. These rules, adopted to implement the Freedom of Information Law enacted in 1966 by Congress, now provide that technical information submitted with an application for equipment authorization is not routinely available for inspection. Disclosure of such information at present requires a persuasive showing as to the reason for inspection. The change proposed would make such information routinely available for inspection after the grant of the authorization unless a request for non-disclosure showing that the material contains trade secrets and like information is submitted with the material. The effective date of the authorization will, upon request, be deferred to accommodate the manufacturer’s marketing plans.

Although a substantial part of the comments received in this proceeding deals with the question of information disclosure, it is basically a legal question.

REVISION OF PARTS 15 AND 18

It should be obvious, however, that any new procedural rules that may be adopted, will require revision of Parts 15 and 18 to eliminate conflicting requirements. This action has already started. A preliminary draft for a revision of Part 15 is being prepared. The major change will be to extend bilateral certification to all devices now regulated by Part 15. The change will also spell out in greater detail what information will be required with the application for certification. There is at least one area in Part 15 that will present some problems—carrier current systems. In addition to the operations carried on by the power companies and the telephone companies, carrier current systems also include the carrier current broadcast operations on some 600 college campuses. As of the moment, it appears that bilateral certification may not be applicable to such systems—that some form of self-certification may have to be developed.

Revising Part 18 will pose a more difficult problem. Most medical diathermy and medical ultrasonic equipment is currently type approved and this procedure will not change. Domestic microwave ovens are also type approved. And this won’t change. The high frequency welders will undoubtedly be made subject to a bilateral certification. It is expected that the manufacturer will be required to furnish the user with instructions for installation and operation that will give reasonable assurance that when the welder is operated, it will comply with our technical specifications.

The difficult problem is posed by the RF heaters used in industry—the induction heaters that operate below the AM broadcast band, the glue setting machines, in the wood working field that operate at 3-30 MHz, and most of all, the plastic heaters that operate all over. The objective is to put the burden on the manufacturer to supply the purchaser/user with an equipment that complies with our technical specifications. Under the general concepts of our marketing regulations, the manufacturer is expected to make the determination of compliance before the equipment is shipped from his plant.

But how is this done if the equipment can be made to comply only if it is operated in a screened enclosure? Shall the FCC require the manufacturer of the heater also to furnish the screened enclosure thus increasing the cost of his product by a factor of 2 or 3? Or, which manufacturer is to be responsible for compliance if manufacturer A supplies the RF generator, manufacturer B supplies the press or electrodes, and Company C makes the installation?

Public Law 90-379
90th Congress, H. R. 14910
July 5, 1968

To amend the Communications Act of 1934, as amended, to give the Federal Communications Commission authority to prescribe regulations for the manufacture, import, sale, shipment, or use of devices which cause harmful interference to radio reception.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Communications Act of 1934, as amended, is further amended by adding thereto a new section 302 to read as follows:

“DEVICES WHICH INTERFERE WITH RADIO RECEPTION

“Sec. 302. (a) The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations governing the interference potential of devices which in their operation are capable of emitting radio frequency energy by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, shipment, or use of such devices.

“(b) No person shall manufacture, import, sell, offer for sale, ship, or use devices which fail to comply with regulations promulgated pursuant to this section.

“(c) The provisions of this section shall not be applicable to carriers transporting such devices without trading in them, to devices manufactured solely for export, to the manufacture, assembly, or installation of devices for its own use by a public utility engaged in providing electric service, or to devices for use by the Government of the United States or any agency thereof. Devices for use by the Government of the United States or any agency thereof shall be developed, procured, or otherwise acquired, including offshore procurement, under United States Government criteria, standards, or specifications designed to achieve the common objective of reducing interference to radio reception, taking into account the unique needs of national defense and security.”

Approved July 5, 1968.

LEGISLATIVE HISTORY

HOUSE REPORT No. 1108 (Comm. on Interstate & Foreign Commerce).

SENATE REPORT No. 1276 (Comm. on Commerce).

CONGRESSIONAL RECORD, Vol. 114 (1968):

Mar. 6, 12: Considered and passed House.

June 24: Considered and passed Senate.