FCC REGULATIONS

The FCC has been quite active during 1979 in controlling the propagation of electromagnetic interference. This has been through the clarification, expansion, and revision of existing rules, and the issuance of new rules. Unfortunately, space limitations prevent us from presenting all of the new regulations. However, in this section, we will cover those which we feel will have the largest impact on the broad electronics industry.

The most important rule was released on October 11, 1979 as Docket No. 20780, as an amendment of Part 15 to redefine and to clarify the rules governing restricted radiation devices. In essence, this docket states that all electric devices which generate or use RF energy in excess of 10 kHz must meet new conducted and radiated emission requirements. The rule applies to all equipment manufactured after June 30, 1980.

The docket containing the test procedures to go along with Docket 20780 will be issued by the FCC as a proposed rule. This will allow, and in fact invite, industry to submit comments and recommendations. This flexibility, of course, does not apply to 20780 which is now law.

Since the proposed testing rule will not be issued until the first quarter of 1980, it was not available for inclusion here. However, the FCC states that it will probably follow the LEBEMA test procedure for large items and ANSI C63.4 for small items.

Copies of these related dockets can be obtained by contacting:

Mr. Art Wall
Office of Science & Technology
FCC
Washington, DC 20554
Phone: (202) 632-7095

Highlights of Docket No. 20780 are presented below:

DOCKET NO. 20780

On April 14, 1976, the commission adopted a Notice of Proposed Rule Making in this proceeding to redefine and clarify the rules in Part 15 governing low power communication devices and the general requirements for a restricted radiation device in Section 15.7. Examples of devices subject to general requirements in Section 15.7 include: computers, RF power supplies, electronic games, carrier current systems, campus radio stations, electronic watches, calculators, tape recorders.

For the reasons given below, the Commission is adopting herein regulations, which we consider minimal, to reduce the intereference potential of electronic computing equipment. Because of the complex issues and the numerous devices covered in this proceeding, the Commission is restricting this First Report and Order to electronic computing equipment; other aspects of this proceeding, e.g. campus radio systems, carrier current systems, etc., will be considered in subsequent Commission actions.

A computing device, as defined and used herein, is any electronic device or system that uses digital techniques. More precisely, it is an electronic product that intentionally generates and uses radio frequency energy in excess of 10,000 cycles (or pulses) per second. The definition is intentionally broad so that it will cover any electronic device used for computations, control, operations, transformations, recording, filing, sorting, storage, retrieval, and transfer. Specifically excluded are transmitters, receivers and any other device separately regulated under some other part of the Commission's Rules. Examples of computing devices include, but are not limited to: business and personal computers, data processing equipment, digital weighing scales, switching power supplies, electronic games including coin operated games, electronic cash registers, digital watches, pocket calculators, digital clocks.

Restricted radiation device, the subject of the proceeding, is defined in Section 15.4(d) of the Commission's Rules. Simply stated, it includes any device that generates and uses radio frequency (RF) energy. It includes devices that are used to radiate this energy (miniature transmitters) as well as devices not intended to radiate (receivers, computers). The list of restricted radiation devices is almost unending since many devices include an oscillator (in the case of the computer — a clock that operates at RF). Most persons understand and have no problem interpretating this definition; however, the general requirement for a restricted radiation device in Section 15.7, for a device which is not regulated elsewhere in the rules, appears to redefine the applicability of the definition. This is where the problem of interpretation has caused some consternation over the years.

The Commission in this proceeding proposed a single set of limits for all devices, both commercial and consumer, that fall under the general requirements for a restricted radiation device. For the reasons given below, the Commission is persuaded to relax the limits for a computing device operated in commercial environments. We will, however, retain the proposed limit, with some relaxation at the higher frequencies, for a computing device operated primarily in the home or widely distributed to the general public. A consumer computer is defined in Section 15.4(p) of the rules as a Class B computing device; whereas, a commercial computer is defined in Section 15.4(o) as a Class A computing device.

Computers complying with the more liberal Class A limits will be required to have a label advising the user that his computer complies with the Class A limits, that operation of the computer in a residential environment may cause interference to radio and TV reception and that correcting the interference problem, if necessary, will be at his expense. Compliance with either Class A or Class B limits will not guarantee that the computer will not cause interference to radio communications. In instances where a computer is in juxtaposition to a susceptible receiver, interference may occur. In an effort to educate the user, we are requiring the manufacturer to include instructional information to the user about eliminating interference. For most computers, the manufacturer merely determines compliance with the appropriate limits before marketing the equipment. Personal computers and other equipment discussed in paragraphs 29 to 31 below, however, will be required to be certificated by the Commission as a prerequisite for marketing. The regulations for computing devices are in Appendix B, attached.

Limits for broadband conducted emanations as well as the test procedures using the relatively new line impedance stabilization network (LISN) of 50 ohm/50 μH will be the subject of a new Notice of Proposed Rule Making to be released shortly. During the pendency of the proceeding for

test procedures and broadband conducted limits, measurements may be made using the test procedures in the new NPRM in the interim. It is anticipated that the new proceeding should be finalized before July 1, 1980.

Several of the commenters raised questions as to which network should be used in measuring conducted emanations from the equipment under test back into the public utility power network. Internationally, a 50 ohm/50 μH line impedance stabilization network (LISN) is beginning to have wide acceptance. This is supported nationally by ANSI/C63. It is also the network that is proposed by the Commission in Docket 20718. On the other hand, IEEE Standard 213 which has been accepted by the Commission for a number of years as a measurement standard for line conducted measurements, calls for a 50 ohm/5μH network. Above 2 MHz there is no difference in the measured emanations using either network. At approximately 500 kHz, the IEEE 50Ω/5 μH LISN gives results that are approximately 6 dB more stringent than the new network. This 6 dB is more than offset by 8 dB relaxation across the entire frequency band 0.45 to 30 MHz. For these reasons, the 50Ω/50μH LISN will be proposed in the forth coming Notice of Proposed Rule Making mentioned above.

While the Commission recognizes the advantage of making measurements in a shielded enclosure, we also recognize that large errors can arise due to the creation of standing waves due to reflections from the walls of the enclosure. We must, therefore, insist that radiated measurements be made at an open field test site which has been tested and found suitable for these type of measurements. The basic criterion for measuring radiated emanations is that the same results can be obtained if measured at another location. Therefore, we will accept measurements at other locations, provided the persons making the measurements can make a positive showing that the results can be correlated to those made in an open field. It should be stressed that the limits adopted herein are based on measurements of radiated emanations made under open field test conditions, such as those proposed in FCC Docket 21371.

In general, the measurement procedures will follow the methods in Section X of the CBEMA Report, CBEMA/ESC5/77/29. Briefly, measurements shall be made in an open field or on a test site that produces results that can be correlated to open field test results. Measurements shall be made with a spectrum analyzer using a dipole antenna. Alternatively, measurement may be made with the instrumentation recommended by CISPR in their publications 1, 2, and 3 when significant broadband emissions are observed emanating from the computer. Measurements shall be made around the device under test, rotating search antenna and varying its height to search for maximum emissions. Line conducted measurements shall be made with 50Ω/50μH LISN. In view of the fact that most parties have not had an opportunity to comment on the test procedures, the Commission will institute a new proceeding to obtain comments on the test procedures for computers. As indicated above, it is anticipated that the test procedures will be adopted before July 1, 1980. Until then, the proposed test procedures may be used. All computing equipment as defined herein, which is manufactured after July 1, 1980, must comply with this technical standard.

Certain Class B computing equipment listed in 15.834 require certification by the Commission as a prerequisite for legal marketing. An application for certification for such an equipment may be filed at any time. A grant of certification will be issued as soon as processing of the application is completed.

Computing equipment manufactured prior to July 1, 1980 is not subject to these specific technical standards but is subject to the non-interference requirement in 15.3.

There is no prohibition against the sale and resale after July 1, 1980 of equipment manufactured prior to July 1, 1980 subject only to the non-interference requirement of 15.3

The following is excerpted directly from the new rules. However, it has been reorganized for clarity.

Section 15.803 Noninterference requirement

Notwithstanding the compliance with the technical specifications in this Part, the operation of each computing device is subject to the general conditions of Section 15.3 The operator of a computing device may be required to stop operating his device upon a finding that the device is causing harmful interference and it is in the public interest to stop operation until the interference problem has been corrected.

Section 15.810 Class A computing device: radiation limit

Emanations from a Class A computing device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified in the table below. The method for determining compliance with these limits shall be in accordance with the test procedures for a Class A computing device in Subpart I of this Part.

Frequency (F) (MHz)	Distance (meters)	Field Strength (μV/m)
30-88	30	30
88-216	30	50
216-1000	30	70

NOTES: (1) The tighter limit shall apply at the edge between the two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

(3) F is the frequency in Megahertz of the emission under investigation.

(4) Measurement for compliance with these limits may be made at a closer distance, provided the test results are compared with the limits at 30 meters using the relationship

$$E_{30} = Ed\left(\frac{d}{30}\right)$$

where, E_{30} = computed field strength in microvolts per meter at 30 meters.

Ed = measured field strength in microvolts per meter at the distance "d" meters.

Section 15.812 Class A computing device: conduction limit

All conducted emissions from a Class A device, or accessory connected thereto, intended to be connected to the power lines of a public utility shall not exceed the level of voltage specified in the table below. The procedure for determining compliance shall be in accordance with the test

procedure for measuring conducted voltage for such equipment in Subpart I of this Part.

Frequency (MHz)	Max. Voltage (μV)
0.45 – 1.6	1000
1.6 – 30	3000

NOTE: The tighter limit shall apply at the edge between the two frequency bands. Conducted limits in the frequency range of 10 to 450 kHz are under consideration.

Section 15.814 Class A computing device: verification requirement

A Class A computing device manufactured after July 1, 1980, shall be tested and verified by the manufacturer as being capable of complying with the specifications of this Subpart. Certification by the Commission is not required; however, the Commission reserves the right to request additional testing to verify compliance, and if necessary, to require certification by the Commission.

Section 15.816 Class A computing device: labelling equipment

Each Class A computing device shall have permanently attached in a conspicuous location for the user to observe a label with the following statements:

"This equipment complies with the requirements for a Class A computing device in FCC Rules Part 15 Subpart J. Operation of this device in a residential area may cause harmful interference requiring the user to take whatever steps may be necessary to correct the interference."

Section 15.818 Class A computing device: information to user

Information about the interference potential of this equipment to radio communications shall be provided to the user in a conspicuous place in the instruction manual, preferably on the first page and in large letters.

Section 15.830 Class B computing device: radiation limit

All emanations from a Class B computing device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified in the table below, when tested pursuant to the procedures for such a device in Subpart I of this Part.

Frequency (F) (MHz)	Distance (meters)	Field Strengths (μV/m)
30-88	3	100
88-216	3	150
216-1000	3	200

Section 15.832 Class B computing device: conduction limit

All radio frequency voltages conducted into the power mains of a public utility network from a Class B computing device/system or accessory connected thereto, shall not exceed 250 microvolts in the frequency range 0.45 to 30 MHz, when measured in accordance with the procedures for measuring conducted voltages for such equipment in Subpart I of this Part.

Section 15.834 Class B computing device: certification requirement

The following Class B computing devices manufactured after July 1, 1980 shall be certificated by the Commission in accordance with the procedures in Part 2 Subpart J of this Chapter:

(a) electronic games of all types
(b) personal computers, excluding personal calculators and digital watches.
(c) any device intended to be connected to a TV receiver or TV interface device.

All other Class B computing devices manufactured after July 1, 1980 shall comply with the technical specifications herein prior to marketing pursuant to Subpart I of Part 2 of this Chapter. The Commission reserves the right to require additional testing of a Class B computing device to verify compliance with these technical specifications and, if necessary, to require certification by the Commission.

Section 15.836 Class B computing device: labelling requirement

(a) A Class B computing device subject to certification by the Commission shall be identified pursuant to the requirements in Section 2.925 et seq. of this Chapter.

(b) A Class B computing device may, at the option of the manufacturer, have a label with the following statement on the equipment:

"This equipment has been tested and found to comply with the technical specifications in Part 15 of FCC Rules for a Class B computing device."

Section 15.838 Class B computing device: information to user

(a) Information shall be provided to the user of a Class B computing device about

— the interference potential of the device

— simple measures that can be taken by the user to correct the interference.

This information shall be included in a conspicuous place in the instruction manual. This is not required for an extemely low power, miniature computing device, such as an electronic digital watch.

DEFINITIONS

Class A computing device. A computing device that is intended for use in a commercial, industrial, or business environment. A computing device which is widely marketed for use by the general public is excluded from this class of computing device.

Class B computing device. A computing device that is widely marketed for use in a home or residential environment. Electronic games, personal computers, calculators, and similar electronic devices which are widely marketed for use by the general public are also covered by this definition.

The FCC has revealed that they received 13 petitions for reconsideration and that Docket 20780 may, after all, be changed. These changes probably will include a delay in effective date and more clarifications with respect to definitions. It is interesting to note that one of the petitions requested tighter limits.