

Federal Communications Commission

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Cable Television,” 2003, IBR approved for § 15.123.

(4) ANSI/SCTE 65 2002 (formerly DVS 234): “Service Information Delivered Out-of-Band for Digital Cable Television,” 2002, IBR approved for § 15.123.

(5) SCTE 40 2003 (formerly DVS 313): “Digital Cable Network Interface Standard,” 2003, IBR approved for § 15.123.

(6) ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz,” 2003, IBR approved for § 15.31, except for sections 4.1, 5.2, 5.7, 9 and 14.

(7) CEA–542–B: “CEA Standard: Cable Television Channel Identification Plan,” July 2003, IBR approved for § 15.118.

(8) EIA–608: “Recommended Practice for Line 21 Data Service,” 1994, IBR approved for § 15.120.

(9) EIA–744: “Transport of Content Advisory Information Using Extended Data Service (XDS),” 1997, IBR approved for § 15.120.

(10) EIA–708–B: “Digital Television (DTV) Closed Captioning,” 1999, IBR approved for § 15.122.

(11) Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, “Information Technology Equipment—Radio Disturbance Characteristics—Limits and Methods of Measurement,” 1997, IBR approved for § 15.109.

(12) ANSI C63.17–1998: “Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices”, 1998, IBR approved for § 15.31.

(13) CEA–766–A: “U.S. and Canadian Region Rating Tables (RRT) and Content Advisory Descriptors for Transport of Content Advisory Information using ATSC A/65–A Program and System Information Protocol (PSIP),” April 2001, IBR approved for § 15.120.

(c) The following materials are freely available from at least one of the following addresses: Consumer Electronics Association, 2500 Wilson Blvd., Arlington, VA 22201 or at <http://www.ce.org/publicpolicy>: Uni-Dir-PICS-I01-030903: “Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma,” 2003, IBR approved for § 15.123.

[68 FR 66732, Nov. 28, 2003, as amended at 68 FR 68546, Dec. 9, 2003; 69 FR 18803, Apr. 9, 2004; 69 FR 54034, Sept. 7, 2004; 69 FR 59534, Oct. 4, 2004; 69 FR 57861, Sept. 28, 2004]

Subpart B—Unintentional Radiators

§ 15.101 Equipment authorization of unintentional radiators.

(a) Except as otherwise exempted in §§ 15.23, 15.103, and 15.113, unintentional radiators shall be authorized prior to the initiation of marketing, as follows:

Type of device	Equipment authorization required
TV broadcast receiver	Verification.
FM broadcast receiver	Verification.
CB receiver	Declaration of Conformity or Certification.
Superregenerative receiver	Declaration of Conformity or Certification.
Scanning receiver	Certification.
Radar detector	Certification.
All other receivers subject to part 15	Declaration of Conformity or Certification.
TV interface device	Declaration of Conformity or Certification.
Cable system terminal device	Declaration of Conformity.
Stand-alone cable input selector switch	Verification.
Class B personal computers and peripherals	Declaration of Conformity or Certification. ¹
CPU boards and internal power supplies used with Class B personal computers.	Declaration of Conformity or Certification. ¹
Class B personal computers assembled using authorized CPU boards or power supplies.	Declaration of Conformity.
Class B external switching power supplies	Verification.
Other Class B digital devices & peripherals	Verification.
Class A digital devices, peripherals & external switching power supplies.	Verification.
Access Broadband over Power Line (Access BPL)	Certification.
All other devices	Verification.

(b) Only those receivers that operate (tune) within the frequency range of 30–960 MHz, CB receivers and radar detectors are subject to the authorizations shown in paragraph (a) of this section. However, receivers indicated as being subject to Declaration of Conformity that are contained within a transceiver, the transmitter portion of which is subject to certification, shall be authorized under the verification procedure. Receivers operating above 960 MHz or below 30 MHz, except for radar detectors and CB receivers, are exempt from complying with the technical provisions of this part but are subject to §15.5.

(c) Personal computers shall be authorized in accordance with one of the following methods:

(1) The specific combination of CPU board, power supply and enclosure is tested together and authorized under a Declaration of Conformity or a grant of certification;

(2) The personal computer is authorized under a Declaration of Conformity or a grant of certification, and the CPU board or power supply in that computer is replaced with a CPU board or power supply that has been separately authorized under a Declaration of Conformity or a grant of certification; or

(3) The CPU board and power supply used in the assembly of a personal computer have been separately authorized under a Declaration of Conformity or a grant of certification; and

(4) Personal computers assembled using either of the methods specified in paragraphs (c)(2) or (c)(3) of this section must, by themselves, also be authorized under a Declaration of Conformity if they are marketed. However, additional testing is not required for this Declaration of Conformity, provided the procedures in §15.102(b) are followed.

(d) Peripheral devices, as defined in §15.3(r), shall be authorized under a Declaration of Conformity, or a grant of certification, or verified, as appropriate, prior to marketing. Regardless of the provisions of paragraphs (a) or (c) of this section, if a CPU board, power supply, or peripheral device will always be marketed with a specific personal computer, it is not necessary to obtain a separate authorization for

that product provided the specific combination of personal computer, peripheral device, CPU board and power supply has been authorized under a Declaration of Conformity or a grant of certification as a personal computer.

(1) No authorization is required for a peripheral device or a subassembly that is sold to an equipment manufacturer for further fabrication; that manufacturer is responsible for obtaining the necessary authorization prior to further marketing to a vendor or to a user.

(2) Power supplies and CPU boards that have not been separately authorized and are designed for use with personal computers may be imported and marketed only to a personal computer equipment manufacturer that has indicated, in writing, to the seller or importer that they will obtain a Declaration of Conformity or a grant of certification for the personal computer employing these components.

(e) Subassemblies to digital devices are not subject to the technical standards in this part unless they are marketed as part of a system in which case the resulting system must comply with the applicable regulations. Subassemblies include:

(1) Devices that are enclosed solely within the enclosure housing the digital device, except for: power supplies used in personal computers; devices included under the definition of a peripheral device in §15.3(r); and personal computer CPU boards, as defined in §15.3(bb);

(2) CPU boards, as defined in §15.3(bb), other than those used in personal computers, that are marketed without an enclosure or power supply; and

(3) Switching power supplies that are separately marketed and are solely for use internal to a device other than a personal computer.

(f) The procedures for obtaining a grant of certification or notification and for verification and a Declaration of Conformity are contained in subpart J of part 2 of this chapter.

[54 FR 17714, Apr. 25, 1989, as amended at 61 FR 31050, June 19, 1996; 63 FR 36602, July 7, 1998; 64 FR 4997, Feb. 2, 1999; 67 FR 48993, July 29, 2002; 70 FR 1373, Jan. 7, 2005]

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§ 15.102 CPU boards and power supplies used in personal computers.

(a) Authorized CPU boards and power supplies that are sold as separate components shall be supplied with complete installation instructions. These instructions shall specify all of the installation procedures that must be followed to ensure compliance with the standards, including, if necessary, the type of enclosure, e.g., a metal enclosure, proper grounding techniques, the use of shielded cables, the addition of any needed components, and any necessary modifications to additional components.

(1) Any additional parts needed to ensure compliance with the standards, except for the enclosure, are considered to be special accessories and, in accordance with § 15.27, must be marketed with the CPU board or power supply.

(2) Any modifications that must be made to a personal computer, peripheral device, CPU board or power supply during installation of a CPU board or power supply must be simple enough that they can be performed by the average consumer. Parts requiring soldering, disassembly of circuitry or other similar modifications are not permitted.

(b) Assemblers of personal computer systems employing modular CPU boards and/or power supplies are not required to test the resulting system provided the following conditions are met:

(1) Each device used in the system has been authorized as required under this part (according to § 15.101(e), some subassemblies used in a personal computer system may not require an authorization);

(2) The original label and identification on each piece of equipment remain unchanged;

(3) Each responsible party's instructions to ensure compliance (including, if necessary, the use of shielded cables or other accessories or modifications) are followed when the system is assembled;

(4) If the system is marketed, the resulting equipment combination is authorized under a Declaration of Conformity pursuant to § 15.101(c)(4) and a compliance information statement, as described in § 2.1077(b), is supplied with

the system. Marketed systems shall also comply with the labelling requirements in § 15.19 and must be supplied with the information required under §§ 15.21, 15.27 and 15.105; and

(5) The assembler of a personal computer system may be required to test the system and/or make necessary modifications if a system is found to cause harmful interference or to be noncompliant with the appropriate standards in the configuration in which it is marketed (see §§ 2.909, 15.1, 15.27(d) and 15.101(e)).

[61 FR 31050, June 19, 1996]

§ 15.103 Exempted devices.

The following devices are subject only to the general conditions of operation in §§ 15.5 and 15.29 and are exempt from the specific technical standards and other requirements contained in this part. The operator of the exempted device shall be required to stop operating the device upon a finding by the Commission or its representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected. Although not mandatory, it is strongly recommended that the manufacturer of an exempted device endeavor to have the device meet the specific technical standards in this part.

(a) A digital device utilized exclusively in any transportation vehicle including motor vehicles and aircraft.

(b) A digital device used exclusively as an electronic control or power system utilized by a public utility or in an industrial plant. The term *public utility* includes equipment only to the extent that it is in a dedicated building or large room owned or leased by the utility and does not extend to equipment installed in a subscriber's facility.

(c) A digital device used exclusively as industrial, commercial, or medical test equipment.

(d) A digital device utilized exclusively in an appliance, e.g., microwave oven, dishwasher, clothes dryer, air conditioner (central or window), etc.

(e) Specialized medical digital devices (generally used at the direction of or under the supervision of a licensed health care practitioner) whether used in a patient's home or a health

care facility. Non-specialized medical devices, i.e., devices marketed through retail channels for use by the general public, are not exempted. This exemption also does not apply to digital devices used for record keeping or any purpose not directly connected with medical treatment.

(f) Digital devices that have a power consumption not exceeding 6 nW.

(g) Joystick controllers or similar devices, such as a mouse, used with digital devices but which contain only non-digital circuitry or a simple circuit to convert the signal to the format required (e.g., an integrated circuit for analog to digital conversion) are viewed as passive add-on devices, not themselves directly subject to the technical standards or the equipment authorization requirements.

(h) Digital devices in which both the highest frequency generated and the highest frequency used are less than 1.705 MHz and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Digital devices that include, or make provision for the use of, battery eliminators, AC adaptors or battery chargers which permit operation while charging or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, do not fall under this exemption.

(i) Responsible parties should note that equipment containing more than one device is not exempt from the technical standards in this part unless all of the devices in the equipment meet the criteria for exemption. If only one of the included devices qualifies for exemption, the remainder of the equipment must comply with any applicable regulations. If a device performs more than one function and all of those functions do not meet the criteria for exemption, the device does not qualify for inclusion under the exemptions.

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(c) The provisions of paragraphs (a) and (b) of this section do not apply to digital devices exempted from the technical standards under the provisions of § 15.103.

(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.

(e) In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the

Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

[54 FR 17714, Apr. 25, 1989, as amended at 68 FR 68546, Dec. 9, 2003]

§ 15.107 Conducted limits.

(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

(b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	79	66
0.5–30	73	60

(c) The limits shown in paragraphs (a) and (b) of this section shall not

apply to carrier current systems operating as unintentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current systems containing their fundamental emission within the frequency band 535–1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535–1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in § 15.109(e).

(d) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

[54 FR 17714, Apr. 25, 1989, as amended at 57 FR 33448, July 29, 1992; 58 FR 51249, Oct. 1, 1993; 66 FR 19098, Apr. 13, 2001; 67 FR 45670, July 10, 2002]

§ 15.109 Radiated emission limits.

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (microvolts/meter)
30–88	100
88–216	150
216–960	200
Above 960	500

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength (microvolts/meter)
30–88	90
88–216	150
216–960	210
Above 960	300

(c) In the emission tables above, the tighter limit applies at the band edges. Sections 15.33 and 15.35 which specify the frequency range over which radiated emissions are to be measured and the detector functions and other measurement standards apply.

(d) For CB receivers, the field strength of radiated emissions within the frequency range of 25–30 MHz shall not exceed 40 microvolts/meter at a distance of 3 meters. The field strength of radiated emissions above 30 MHz from such devices shall comply with the limits in paragraph (a) of this section.

(e) Carrier current systems used as unintentional radiators or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under part 18 of this chapter, shall comply with the radiated emission limits for intentional radiators provided in §15.209 for the frequency range of 9 kHz to 30 MHz. As an alternative, carrier current systems used as unintentional radiators and operating in the frequency range of 525 kHz to 1705 kHz may comply with the radiated emission limits provided in §15.221(a). At frequencies above 30 MHz, the limits in paragraph (a), (b), or (g) of this section, as appropriate, apply.

(f) For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in §15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this section.

(g) As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, “Information Technology Equipment—Radio Disturbance Characteristics—Limits and Methods of Measurement” (incorporated by reference, *see* §15.38). In addition:

(1) The test procedure and other requirements specified in this part shall continue to apply to digital devices.

(2) If, in accordance with §15.33 of this part, measurements must be performed above 1000 MHz, compliance above 1000 MHz shall be demonstrated with the emission limit in paragraph (a) or (b) of this section, as appropriate. Measurements above 1000 MHz may be performed at the distance specified in the CISPR 22 publications for measurements below 1000 MHz provided the limits in paragraphs (a) and (b) of this section are extrapolated to the new measurement distance using an inverse linear distance extrapolation factor (20 dB/decade), e.g., the radiated limit above 1000 MHz for a Class B digital device is 150 uV/m, as measured at a distance of 10 meters.

(3) The measurement distances shown in CISPR Pub. 22, including measurements made in accordance with this paragraph above 1000 MHz, are considered, for the purpose of §15.31(f)(4) of this part, to be the measurement distances specified in this part.

(4) If the radiated emissions are measured to demonstrate compliance with the alternative standards in this paragraph, compliance must also be demonstrated with the conducted limits shown in §15.107(e).

(h) Radar detectors shall comply with the emission limits in paragraph (a) of this section over the frequency range of 11.7–12.2 GHz.

[54 FR 17714, Apr. 25, 1989, as amended at 56 FR 373, Jan. 4, 1991; 58 FR 51249, Oct. 1, 1993; 66 FR 19098, Apr. 13, 2001; 67 FR 48993, July 29, 2002; 69 FR 2849, Jan. 21, 2004]

§ 15.111 Antenna power conduction limits for receivers.

(a) In addition to the radiated emission limits, receivers that operate

(tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nanowatts.

(b) CB receivers and receivers that operate (tune) in the frequency range 30 to 960 MHz that are provided only with a permanently attached antenna shall comply with the radiated emission limitations in this part, as measured with the antenna attached.

§ 15.113 Power line carrier systems.

Power line carrier systems, as defined in §15.3(t), are subject only to the following requirements:

(a) A power utility operating a power line carrier system shall submit the details of all existing systems plus any proposed new systems or changes to existing systems to an industry-operated entity as set forth in §90.63(g) of this chapter. No notification to the FCC is required.

(b) The operating parameters of a power line carrier system (particularly the frequency) shall be selected to achieve the highest practical degree of compatibility with authorized or licensed users of the radio spectrum. The signals from this operation shall be contained within the frequency band 9 kHz to 490 kHz. A power line carrier system shall operate on an unprotected, non-interference basis in accordance with §15.5 of this part. If harmful interference occurs, the electric power utility shall discontinue use or adjust its power line carrier operation, as required, to remedy the interference. Particular attention should be paid to the possibility of interference to Loran C operations at 100 kHz.

(c) Power line carrier system apparatus shall be operated with the min-

imum power possible to accomplish the desired purpose. No equipment authorization is required.

(d) The best engineering principles shall be used in the generation of radio frequency currents by power line carrier systems to guard against harmful interference to authorized radio users, particularly on the fundamental and harmonic frequencies.

(e) Power line carrier system apparatus shall conform to such engineering standards as may be promulgated by the Commission. In addition, such systems should adhere to industry approved standards designed to enhance the use of power line carrier systems.

(f) The provisions of this section apply only to systems operated by a power utility for general supervision of the power system and do not permit operation on electric lines which connect the distribution substation to the customer or house wiring. Such operation can be conducted under the other provisions of this part.

[54 FR 17714, Apr. 25, 1989; 54 FR 32339, Aug. 7, 1989]

§ 15.115 TV interface devices, including cable system terminal devices.

(a) Measurements of the radiated emissions of a TV interface device shall be conducted with the output terminal(s) of the device terminated by a resistance equal to the rated output impedance. The emanations of a TV interface device incorporating an intentional radiator shall not exceed the limits in §15.109 or subpart C of this part, whichever is higher for each frequency. Where it is possible to determine which portion of the device is contributing a particular radio frequency emission, the emissions from the TV interface device portion shall comply with the emission limits in §15.109, and the emissions from the intentional radiator shall comply with subpart C of this part.

(b) Output signal limits:

(1) At any RF output terminal, the maximum measured RMS voltage, in microvolts, corresponding to the peak envelope power of the modulated signal during maximum amplitude peaks across a resistance (R in ohms) matching the rated output impedance of the

TV interface device, shall not exceed the following:

(i) For a cable system terminal device or a TV interface device used with a master antenna, 692.8 times the square root of (R) for the video signal and 155 times the square root of (R) for the audio signal.

(ii) For all other TV interface devices, 346.4 times the square root of (R) for the video signal and 77.5 times the square root of (R) for the audio signal.

(2) At any RF output terminal, the maximum measured RMS voltage, in microvolts, corresponding to the peak envelope power of the modulated signal during maximum amplitude peaks across a resistance (R in ohms) matching the rated output impedance of the TV interface device, of any emission appearing on frequencies removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency on which the TV interface device is operated shall not exceed the following:

(i) For a cable system terminal device or a TV interface device used with a master antenna, 692.8 times the square root of (R).

(ii) For all other TV interface devices, 10.95 times the square root of (R).

(3) The term *master antenna* used in this section refers to TV interface devices employed for central distribution of television or other video signals within a building. Such TV interface devices must be designed to:

(i) Distribute multiple television signals at the same time;

(ii) Distribute such signals by cable to outlets or TV receivers in multiple rooms in the building in which the TV interface devices are installed; and,

(iii) Distribute all over-the-air or cable signals.

NOTE: Cable-ready video cassette recorders continue to be subject to the provisions for general TV interface devices.

(c) A TV interface device shall be equipped with a transfer switch for connecting the antenna terminals of a receiver selectively either to the receiving antenna or to the radio frequency output of the TV interface device, subject to the following:

(1) When measured in any of its set positions, transfer switches shall comply with the following requirements:

(i) For a cable system terminal device or a TV interface device equipped for use with a cable system or a master antenna, as defined in paragraph (b)(3) of this section, the isolation between the antenna and cable input terminals shall be at least 80 dB from 54 MHz to 216 MHz, at least 60 dB from 216 MHz to 550 MHz and at least 55 dB from 550 MHz to 806 MHz. The 80 dB standard applies at 216 MHz and the 60 dB standard applies at 550 MHz. In the case of a transfer switch requiring a power source, the required isolation shall be maintained in the event the device is not connected to a power source or power is interrupted. The provisions of this paragraph regarding frequencies in the range 550 MHz to 806 MHz are applicable as of June 30, 1997.

(ii) For all other TV interface devices, the maximum voltage, corresponding to the peak envelope power of the modulated video signal during maximum amplitude peaks, in microvolts, appearing at the receiving antenna input terminals when terminated with a resistance (R in ohms) matching the rated impedance of the antenna input of the switch, shall not exceed 0.346 times the square root of (R).

(iii) Measurement to determine compliance with the transfer switch limits shall be made using a connecting cable, where required, between the TV interface device and the transfer switch of the type and length:

(A) Provided with the TV interface device,

(B) Recommended in the instruction manual, or

(C) Normally employed by the consumer.

(2) A TV interface device shall be designed and constructed, to the extent practicable, so as to preclude the possibility that the consumer may inadvertently attach the output of the device to the receiving antenna, if any, without first going through the transfer switch.

(3) A transfer switch is not required for a TV interface device that, when connected, results in the user no longer having any need to receive standard over-the-air broadcast signals via a separate antenna. A transfer switch is not required to be marketed with a

cable system terminal device unless that device provides for the connection of an external antenna. A transfer switch is not required for a device that is intended to be used as an accessory to an authorized TV interface device.

(4) An actual transfer switch is not required for a TV interface device, including a cable system terminal device, that has an antenna input terminal(s); provided, the circuitry following the antenna input terminal(s) has sufficient bandwidth to allow the reception of all TV broadcast channels authorized under part 73 of this chapter and: For a cable system terminal device that can alternate between the reception of cable television service and an antenna, compliance with the isolation requirement specified in paragraph (c)(1)(i) of this section can be demonstrated; and, for all other TV interface devices, the maximum voltage appearing at the antenna terminal(s) does not exceed the limit in paragraph (c)(1)(ii) of this section.

(5) If a transfer switch is not required, the following label shall be used in addition to the label shown in § 15.19(a):

This device is intended to be attached to a receiver that is not used to receive over-the-air broadcast signals. Connection of this device in any other fashion may cause harmful interference to radio communications and is in violation of the FCC Rules, part 15.

(d) A TV interface device, including a cable system terminal device, shall incorporate circuitry to automatically prevent emanations from the device from exceeding the technical specifications in this part. These circuits shall be adequate to accomplish their functions when the TV interface device is presented, if applicable, with video input signal levels in the range of one to five volts; this requirement is not applicable to a TV interface device that uses a built-in signal source and has no provisions for the connection of an external signal source. For devices that contain provisions for an external signal source but do not contain provisions for the input of an external baseband signal, e.g., some cable system terminal devices, compliance with the provisions of this paragraph shall be demonstrated with a radio frequency input signal of 0 to 25 dBmV.

(e) For cable system terminal devices and TV interface devices used with a master antenna, as defined in paragraph (b)(3) of this section, the holder of the grant of authorization shall specify in the instruction manual or pamphlet, if a manual is not provided, the types of wires or coaxial cables necessary to ensure that the unit complies with the requirements of this part. The holder of the grant of authorization must comply with the provisions of § 15.27. For all other TV interface devices, the wires or coaxial cables used to couple the output signals to the TV receiver shall be provided by the responsible party.

(f) A TV interface device which is submitted to the Commission as a composite device in a single enclosure containing a RF modulator, video source and other component devices shall be submitted on a single application (FCC Form 731) and shall be authorized as a single device.

(g) An external device or accessory that is intended to be attached to a TV interface device shall comply with the technical and administrative requirements set out in the rules under which it operates. For example, a personal computer must be certificated to show compliance with the regulations for digital devices.

(h) Stand-alone switches used to alternate between cable service and an antenna shall provide isolation between the antenna and cable input terminals that is at least 80 dB from 54 MHz to 216 MHz, at least 60 dB from 216 MHz to 550 MHz and at least 55 dB from 550 MHz to 806 MHz. The 80 dB standard applies at 216 MHz and the 60 dB standard applies at 550 MHz. In the case of stand-alone switches requiring a power source, the required isolation shall be maintained in the event the device is not connected to a power source or power is interrupted. The provisions of this paragraph are applicable as of June 30, 1997.

(i) Switches and other devices intended to be used to by-pass the processing circuitry of a cable system terminal device, whether internal to such a terminal device or a stand-alone unit, shall not attenuate the input signal more than 6 dB from 54 MHz to 550 MHz, or more than 8 dB from 550 MHz

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to 804 MHz. The 6 dB standard applies at 550 MHz. The provisions of this paragraph are applicable June 30, 1997.

[54 FR 17714, Apr. 25, 1989, as amended at 57 FR 33448, July 29, 1992; 59 FR 25341, May 16, 1994; 61 FR 18509, Apr. 26, 1996]

§ 15.117 TV broadcast receivers.

(a) All TV broadcast receivers shipped in interstate commerce or imported into the United States, for sale or resale to the public, shall comply with the provisions of this section, except that paragraphs (f) and (g) of this section shall not apply to the features of such sets that provide for reception of digital television signals. The reference in this section to TV broadcast receivers also includes devices, such as TV interface devices and set-top devices that are intended to provide audio-video signals to a video monitor, that incorporate the tuner portion of a TV broadcast receiver and that are equipped with an antenna or antenna terminals that can be used for off-the-air reception of TV broadcast signals, as authorized under part 73 of this chapter.

(b) TV broadcast receivers shall be capable of adequately receiving all channels allocated by the Commission to the television broadcast service.

(c) On a given receiver, use of the UHF and VHF tuning systems shall provide approximately the same degree of tuning accuracy with approximately the same expenditure of time and effort: *Provided, however,* That this requirement will be considered to be met if the need for routine fine tuning is eliminated on UHF channels.

(1) *Basic tuning mechanism.* If a TV broadcast receiver is equipped to provide for repeated access to VHF television channels at discrete tuning positions, that receiver shall be equipped to provide for repeated access to a minimum of six UHF television channels at discrete tuning positions. Unless a discrete tuning position is provided for each channel allocated to UHF television, each position shall be readily adjustable to a particular UHF channel by the user without the use of tools. If 12 or fewer discrete tuning positions are provided, each position shall be adjustable to receive any channel allocated to UHF television.

NOTE: The combination of detented rotary switch and pushbutton controls is acceptable, provided UHF channels, after their initial selection, can be accurately tuned with an expenditure of time and effort approximately the same as that used in accurately tuning VHF channels. A UHF tuning system comprising five pushbuttons and a separate manual tuning knob is considered to provide repeated access to six channels at discrete tuning positions. A one-knob (VHF/UHF) tuning system providing repeated access to 11 or more discrete tuning positions is also acceptable, provided each of the tuning positions is readily adjustable, without the use of tools, to receive any UHF channel.

(2) *Tuning controls and channel readout.* UHF tuning controls and channel readout on a given receiver shall be comparable in size, location, accessibility and legibility to VHF controls and readout on that receiver.

NOTE: Differences between UHF and VHF channel readout that follow directly from the larger number of UHF television channels available are acceptable if it is clear that a good faith effort to comply with the provisions of this section has been made.

(d) If equipment and controls that tend to simplify, expedite or perfect the reception of television signals (e.g., AFC, visual aids, remote control, or signal seeking capability referred to generally as tuning aids) are incorporated into the VHF portion of a TV broadcast receiver, tuning aids of the same type and comparable capability and quality shall be provided for the UHF portion of that receiver.

(e) If a television receiver has an antenna affixed to the VHF antenna terminals, it must have an antenna designed for and capable of receiving all UHF television channels affixed to the UHF antenna terminals. If a VHF antenna is provided with but not affixed to a receiver, a UHF antenna shall be provided with the receiver.

(f) The picture sensitivity of a TV broadcast receiver averaged for all channels between 14 and 69 inclusive shall not be more than 8dB larger than the peak picture sensitivity of that receiver averaged for all channels between 2 and 13 inclusive.

(g) The noise figure for any television channel 14 to 69 inclusive shall not exceed 14 dB. A TV receiver model is considered to comply with this noise figure if the maximum noise figure for

channels 14–69 inclusive of 97.5% of all receivers within that model does not exceed 14 dB.

(1) The responsible party shall measure the noise figure of a number of UHF channels of the test sample to give reasonable assurance that the UHF noise figure for each channel complies with the above limit.

(2) The responsible party shall insert in his files a statement explaining the basis on which it will rely to ensure that at least 97.5% of all production units of the test sample that are manufactured have a noise figure of no greater than 14 dB.

(3) [Reserved]

(4) In the case of a TV tuner built-in as part of a video tape recorder that uses a power splitter between the antenna terminals of the video tape recorder and the input terminals of the TV tuner or a TV broadcast receiver that uses a power splitter between the antenna terminals of two or more UHF tuners contained within that receiver, 4 dB may be subtracted from the noise figure measured at the antenna terminals of the video tape recorder or TV broadcast receiver for determining compliance of the UHF tuner(s) with the 14 dB noise figure limit.

(h) *Digital television reception capability.* TV broadcast receivers are required only to provide useable picture and sound commensurate with their video and audio capabilities when receiving digital television signals.

(i) *Digital television reception capability implementation schedule.* (1) Responsible parties, as defined in §2.909 of this chapter, are required to equip new TV broadcast receivers that are shipped in interstate commerce or imported from any foreign country into the United States and for which they are responsible to comply with the provisions of this section in accordance with the following schedule:

(i) Receivers with screen sizes 36" and above—50% of all of a responsible party's units must include DTV tuners effective July 1, 2004; 100% of such units must include DTV tuners effective July 1, 2005.

(ii) Receivers with screen sizes 25" to less than 36"—50% of all of a responsible party's units must include DTV tuners effective July 1, 2005; 100% of

such units must include DTV tuners effective March 1, 2006.

(iii) Receivers with screen sizes less than 25"—100% of all such units must include DTV tuners effective March 1, 2007.

(iv) Other video devices (video-cassette recorders (VCRs), digital video recorders such as hard drive and DVD recorders, etc.) that receive television signals—100% of all such units must include DTV tuners effective March 1, 2007.

(2) For purposes of this implementation schedule, screen sizes are to be measured diagonally across the picture viewing area.

(3) Responsible parties may include combinations of DTV monitors and set-top DTV tuners in meeting the required percentages of units with a DTV tuner if such combinations are marketed together with a single price.

(4) The requirement to include digital television reception capability in new TV broadcast receivers does not apply to devices such as mobile telephones and personal digital assistants where such devices do not include the capability to receive TV service on the frequencies allocated for broadcast television service.

(j) For a TV broadcast receiver equipped with a cable input selector switch, the selector switch shall provide, in any of its set positions, isolation between the antenna and cable input terminals of at least 80 dB from 54 MHz to 216 MHz, at least 60 dB from 216 MHz to 550 MHz and at least 55 dB from 550 MHz to 806 MHz. The 80 dB standard applies at 216 MHz and the 60 dB standard applies at 550 MHz. In the case of a selector switch requiring a power source, the required isolation shall be maintained in the event the device is not connected to a power source or power is interrupted. An actual switch that can alternate between reception of cable television service and an antenna is not required for a TV broadcast receiver, provided compliance with the isolation requirement specified in this paragraph can be demonstrated and the circuitry following the antenna input terminal(s) has sufficient band-width to allow the reception of all TV broadcast channels authorized under this chapter. The provisions

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of this paragraph regarding frequencies in the range 550 MHz to 806 MHz are applicable as of June 30, 1997.

(k) The following requirements apply to all responsible parties, as defined in § 2.909 of this chapter, and any person that displays or offers for sale or rent television receiving equipment that is not capable of receiving, decoding and tuning digital signals.

(1) Such parties and persons shall place conspicuously and in close proximity to such television broadcast receivers a sign containing, in clear and conspicuous print, the Consumer Alert disclosure text required by paragraph (k)(3) of this section. The text should be in a size of type large enough to be clear, conspicuous and readily legible, consistent with the dimensions of the equipment and the label. The information may be printed on a transparent material and affixed to the screen, if the receiver includes a display, in a manner that is removable by the consumer and does not obscure the picture, or, if the receiver does not include a display, in a prominent location on the device, such as on the top or front of the device, when displayed for sale, or the information in this format may be displayed separately immediately adjacent to each television broadcast receiver offered for sale and clearly associated with the analog-only model to which it pertains.

(2) If such parties and persons display or offer for sale or rent such television broadcast receivers via direct mail, catalog, or electronic means, they shall prominently display in close proximity to the images or descriptions of such television broadcast receivers, in clear and conspicuous print, the Consumer Alert disclosure text required by paragraph (k)(3) of this section. The text should be in a size large enough to be clear, conspicuous, and readily legible, consistent with the dimensions of the advertisement or description.

(3) *Consumer alert.* This television receiver has only an analog broadcast tuner and will require a converter box after February 17, 2009, to receive over-the-air broadcasts with an antenna because of the Nation's transition to digital broadcasting. Analog-only TVs should continue to work as before with cable and satellite TV services, gaming

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consoles, VCRs, DVD players, and similar products. For more information, call the Federal Communications Commission at 1-888-225-5322 (TTY: 1-888-835-5322) or visit the Commission's digital television Web site at: <http://www.dtv.gov>.

[54 FR 17714, Apr. 25, 1993, as amended at 59 FR 25341, May 16, 1994; 61 FR 30532, June 17, 1996; 67 FR 63294, Oct. 11, 2002; 70 FR 38804, July 6, 2005; 70 FR 75743, Dec. 21, 2005; 72 FR 26560, May 10, 2007; 73 FR 5681, Jan. 30, 2008]

§ 15.118 Cable ready consumer electronics equipment.

(a) All consumer electronics TV receiving equipment marketed in the United States as cable ready or cable compatible shall comply with the provisions of this section. Consumer electronics TV receiving equipment that includes features intended for use with cable service but does not fully comply with the provisions of this section are subject to the labelling requirements of § 15.19(d). Until such time as generally accepted testing standards are developed, paragraphs (c) and (d) of this section will apply only to the analog portion of covered consumer electronics TV receiving equipment.

(b) Cable ready consumer electronics equipment shall be capable of receiving all NTSC or similar video channels on channels 1 through 125 of the channel allocation plan set forth in CEA-542-B: "CEA Standard: Cable Television Channel Identification Plan," (incorporated by reference, *see* § 15.38).

(c) Cable ready consumer electronics equipment must meet the following technical performance requirements. Compliance with these requirements shall be determined by performing measurements at the unfiltered IF output port. Where appropriate, the Commission will consider allowing alternative measurement methods.

(1) *Adjacent channel interference.* In the presence of a lower adjacent channel CW signal that is 1.5 MHz below the desired visual carrier in frequency and 10 dB below the desired visual carrier in amplitude, spurious signals within the IF passband shall be attenuated at least 55 dB below the visual carrier of the desired signal. The desired input signal shall be an NTSC visual carrier modulated with a 10 IRE flat field with

color burst and the aural carrier which is 10 dB below the visual carrier should be unmodulated. Measurements are to be performed for input signal levels of 0 dBmV and +15 dBmV, with the receiver tuned to ten evenly spaced EIA IS-132 channels covering the band 54 MHz to 804 MHz.

(2) *Image channel interference.* Image channel interference within the IF passband shall be attenuated below the visual carrier of the desired channel by at least 60 dB from 54 MHz to 714 MHz and 50 dB from 714 MHz to 804 MHz. The 60 dB standard applies at 714 MHz. In testing for compliance with this standard, the desired input signal is to be an NTSC signal on which the visual carrier is modulated with a 10 IRE flat field with color burst and the aural carrier is unmodulated and 10 dB below the visual carrier. The undesired test signal shall be a CW signal equal in amplitude to the desired visual carrier and located 90 MHz above the visual carrier frequency of the desired channel. Measurements shall be performed for input signals of 0 dBmV and +15 dBmV, with the receiver tuned to at least ten evenly spaced EIA IS-132 channels covering the band 54 MHz to 804 MHz.

(3) *Direct pickup interference.* The direct pickup (DPU) of a co-channel interfering ambient field by a cable ready device shall not exceed the following criteria. The ratio of the desired to undesired signal levels at the IF passband on each channel shall be at least 45 dB. The average ratio over the six channels shall be at least 50 dB. The desired input signal shall be an NTSC signal having a visual carrier level of 0 dBmV. The visual carrier is modulated with a 10 IRE flat field with color burst, visual to aural carrier ratio of 10 dB, aural carrier unmodulated. The equipment under test (EUT) shall be placed on a rotatable table that is one meter in height. Any excess length of the power cord and other connecting leads shall be coiled on the floor under the table. The EUT shall be immersed in a horizontally polarized CW field of 100 mV/m at a frequency 2.55 MHz above the visual carrier of the EUT tuned channel. Measurements shall be made with the EUT tuned to six EIA IS-132 channels, two each in

the low VHF, high VHF and UHF broadcast bands. On each channel, the levels at the IF passband due to the desired and interfering signals are to be measured.

(4) *Tuner overload.* Spurious signals within the IF passband shall be attenuated at least 55 dB below the visual carrier of the desired channel using a comb-like spectrum input with each visual carrier signal individually set at +15 dBmV from 54 to 550 MHz. The desired input signal is to be an NTSC signal on which the visual carrier is modulated with a 10 IRE flat field with color burst and the aural carrier is unmodulated and 10 dB below the visual carrier. Measurements shall be made with the receiver tuned to at least seven evenly spaced EIA IS-132 channels covering the band 54 MHz to 550 MHz. In addition, spurious signals within the IF passband shall be attenuated at least 51 dB below the visual carrier of the desired channel using a comb spectrum input with each signal individually set at +15 dBmV from 550 to 804 MHz. Measurements shall be made with the receiver tuned to at least three evenly spaced EIA IS-132 channels covering the band 550 MHz to 804 MHz.

(5) *Cable input conducted emissions.* (i) Conducted spurious emissions that appear at the cable input to the device must meet the following criteria. The input shall be an NTSC video carrier modulated with a 10 IRE flat field with color burst at a level of 0 dBmV and with a visual to aural ratio of 10 dB. The aural carrier shall be unmodulated. The peak level of the spurious signals will be measured using a spectrum analyzer connected by a directional coupler to the cable input of the equipment under test. Spurious signal levels must not exceed the limits in the following table:

From 54 MHz up to and including 300 MHz-	26 dBmV
From 300 MHz up to and including 450 MHz-	20 dBmV
From 450 MHz up to and including 804 MHz-	15 dBmV

(ii) The average of the measurements on multiple channels from 450 MHz up to and including 804 MHz shall be no greater than -20 dBmV. Measurements shall be made with the receiver tuned

to at least four EIA IS–132 channels in each of the above bands. The test channels are to be evenly distributed across each of the bands. Measurements for conducted emissions caused by sources internal to the device are to be made in a shielded room. Measurements for conducted emissions caused by external signal sources shall be made in an ambient RF field whose field strength is 100 mV/m, following the same test conditions as described in paragraph (c)(3) of this section.

(d) The field strength of radiated emissions from cable ready consumer electronics equipment shall not exceed the limits in §15.109(a) when measured in accordance with the applicable procedures specified in §§15.31 and 15.35 for unintentional radiators, with the following modifications. During testing the NTSC input signal level is to be +15 dBmV, with a visual to aural ratio of 10 dB. The visual carrier is to be modulated by a 10 IRE flat field with color burst; the aural carrier is to be unmodulated. Measurements are to be taken on six EIA IS–132 channels evenly spaced across the required RF input range of the equipment under test.

NOTE: The provisions of paragraphs (a) through (d) of this section are applicable as of June 30, 1997.

[59 FR 25341, May 16, 1994, as amended at 61 FR 18509, Apr. 26, 1996; 65 FR 64391, Oct. 27, 2000; 68 FR 68546, Dec. 9, 2003; 69 FR 2849, Jan. 21, 2004; 69 FR 57861, Sept. 28, 2004]

§ 15.119 Closed caption decoder requirements for analog television receivers.

(a) Effective July 1, 1993, all TV broadcast receivers with picture screens 33 cm (13 in) or larger in diameter shipped in interstate commerce, manufactured, assembled, or imported from any foreign country into the United States shall comply with the provisions of this section.

NOTE: This paragraph places no restriction on the shipping or sale of television receivers that were manufactured before July 1, 1993.

(b) *Transmission format.* Closed-caption information is transmitted on line 21 of field 1 of the vertical blanking interval of television signals, in accordance with §73.682(a)(22) of this chapter.

(c) *Operating modes.* The television receiver will employ customer-selectable modes of operation for TV and Caption. A third mode of operation, Text, may be included on an optional basis. The Caption and Text Modes may contain data in either of two operating channels, referred to in this document as C1 and C2. The television receiver must decode both C1 and C2 captioning, and must display the captioning for whichever channel the user selects. The TV Mode of operation allows the video to be viewed in its original form. The Caption and Text Modes define one or more areas (called “boxes”) on the screen within which caption or text characters are displayed.

NOTE: For more information regarding Text mode, see “Television Captioning for the Deaf: Signal and Display Specifications”, Engineering Report No. E-7709-C, Public Broadcasting Service, dated May 1980, and “TeleCaption II Decoder Module Performance Specification”, National Captioning Institute, Inc., dated November 1985. These documents are available, respectively, from the Public Broadcasting Service, 1320 Braddock Place, Alexandria, VA 22314 and from the National Captioning Institute, Inc., 5203 Leesburg Pike, Falls Church, VA 22041.

(d) *Screen format.* The display area for captioning and text shall fall approximately within the safe caption area as defined in paragraph (n)(12) of this section. This display area will be further divided into 15 character rows of equal height and 32 columns of equal width, to provide accurate placement of text on the screen. Vertically, the display area begins on line 43 and is 195 lines high, ending on line 237 on an interlaced display. All captioning and text shall fall within these established columns and rows. The characters must be displayed clearly separated from the video over which they are placed. In addition, the user must have the capability to select a black background over which the captioned letters are displaced.

(1) *Caption mode.* In the Caption Mode, text can appear on up to 4 rows simultaneously anywhere on the screen within the defined display area. In addition, a solid space equal to one column width may be placed before the first character and after the last character of each row to enhance legibility.

The caption area will be transparent anywhere that either:

(i) No standard space character or other character has been addressed and no accompanying solid space is needed; or,

(ii) An accompanying solid space is used and a "transparent space" special character has been addressed which does not immediately precede or follow a displayed character.

(2) [Reserved]

(e) *Presentation format.* In analyzing the presentation of characters, it is convenient to think in terms of a non-visible cursor which marks the screen position at which the next event in a given mode and data channel will occur. The receiver remembers the cursor position for each mode even when data are received for a different address in an alternate mode or data channel.

(1) *Screen addressing.* Two kinds of control codes are used to move the cursor to specific screen locations. In Caption Mode, these addressing codes will affect both row and column positioning. In Text Mode, the codes affect only column positioning. In both modes, the addressing codes are optional. Default positions are defined for each mode and style when no addressing code is provided.

(i) The first type of addressing code is the Preamble Address Code (PAC). It assigns a row number and one of eight "indent" figures. Each successive indent moves the cursor four columns to the right (starting from the left margin). Thus, an indent of 0 places the cursor at Column 1, an indent of 4 sets it at Column 5, etc. The PAC indent is non-destructive to displayable characters. It will not affect the display to the left of the new cursor position on the indicated row. Note that Preamble Address Codes also set initial attributes for the displayable characters which follow. See paragraph (h) of this section and the Preamble Address Code table.

(ii) The second type of addressing code is the Tab Offset, which is one of three Miscellaneous Control Codes. Tab Offset will move the cursor one, two, or three columns to the right. The character cells skipped over will be unaffected; displayable characters in these

cells, if any, will remain intact while empty cells will remain empty, in the same manner that a PAC indent is non-destructive.

(2) [Reserved]

(f) *Caption Mode.* There are three styles of presenting text in Caption Mode: roll-up, pop-on, and paint-on. Character display varies significantly with the style used, but certain rules of character erasure are common to all styles. A character can be erased by addressing another character to the same screen location or by backspacing over the character from a subsequent location on the same row. The entire displayed memory will be erased instantly by receipt of an Erase Displayed Memory command. Both displayed memory and non-displayed memory will be entirely erased simultaneously by either: The user switching receiver channels or data channels (C1/C2) or fields (F1/F2) in decoders so equipped; the loss of valid data (see paragraph (j) of this section); or selecting non-captioning receiver functions which use the display memory of the decoder. Receipt of an End of Caption command will cause a displayed caption to become non-displayed (and vice versa) without being erased from memory. Changing the receiver to a non-captioning mode which does not require use of the decoder's display memory will leave that memory intact, and the decoder will continue to process data as if the caption display were selected.

(1) *Roll-up.* Roll-up style captioning is initiated by receipt of one of three Miscellaneous Control Codes that determine the maximum number of rows displayed simultaneously, either 2, 3 or 4 contiguous rows. These are the three Roll-Up Caption commands.

(i) The bottom row of the display is known as the "base row". The cursor always remains on the base row. Rows of text roll upwards into the contiguous rows immediately above the base row to create a "window" 2 to 4 rows high.

(ii) The Roll-Up command, in normal practice, will be followed (not necessarily immediately) by a Preamble Address Code indicating the base row and the horizontal indent position. If no Preamble Address Code is received, the base row will default to Row 15 or,

if a roll-up caption is currently displayed, to the same base row last received, and the cursor will be placed at Column 1. If the Preamble Address Code received contains a different base row than that of a currently displayed caption, the entire window will move intact (and without erasing) to the new base row immediately.

(iii) Each time a Carriage Return is received, the text in the top row of the window is erased from memory and from the display or scrolled off the top of the window. The remaining rows of text are each rolled up into the next highest row in the window, leaving the base row blank and ready to accept new text. This roll-up must appear smooth to the user, and must take no more than 0.433 second to complete. The cursor is automatically placed at Column 1 (pending receipt of a Preamble Address Code).

(iv) Increasing or decreasing the number of roll-up rows instantly changes the size of the active display window, appropriately turning on or off the display of the top one or two rows. A row which is turned off should also be erased from memory.

(v) Characters are always displayed immediately when received by the receiver. Once the cursor reaches the 32nd column position on any row, all subsequent characters received prior to a Carriage Return, Preamble Address Code, or Backspace will be displayed in that column replacing any previous character occupying that address.

(vi) The cursor moves automatically one column to the right after each character or Mid-Row Code received. A Backspace will move the cursor one column to the left, erasing the character or Mid-Row Code occupying that location. (A Backspace received when the cursor is in Column 1 will be ignored.)

(vii) The Delete to End of Row command will erase from memory any characters or control codes starting at the current cursor location and in all columns to its right on the same row. If no displayable characters remain on the row after the Delete to End of Row is acted upon, the solid space (if any) for that row should also be erased to conform with the following provisions.

(viii) If a solid space is used for legibility, it should appear when the first displayable character (not a transparent space) or Mid-Row Code is received on a row, not when the Preamble Address Code, if any, is given. A row on which there are no displayable characters or Mid-Row Codes will not display a solid space, even when rolled up between two rows which do display a solid space.

(ix) If the reception of data for a row is interrupted by data for the alternate data channel or for Text Mode, the display of caption text will resume from the same cursor position if a Roll-Up Caption command is received and no Preamble Address Code is given which would move the cursor.

(x) A roll-up caption remains displayed until one of the standard caption erasure techniques is applied. Receipt of a Resume Caption Loading command (for pop-on style) or a Resume Direct Captioning command (for paint-on style) will not affect a roll-up display. Receipt of a Roll-Up Caption command will cause any pop-on or paint-on caption to be erased from displayed memory and non-displayed memory.

(2) *Pop-on.* Pop-on style captioning is initiated by receipt of a Resume Caption Loading command. Subsequent data are loaded into a non-displayed memory and held there until an End of Caption command is received, at which point the non-displayed memory becomes the displayed memory and vice versa. (This process is often referred to as “flipping memories” and does not automatically erase memory.) An End of Caption command forces the receiver into pop-on style if no Resume Caption Loading command has been received which would do so. The display will be capable of 4 full rows, not necessarily contiguous, simultaneous anywhere on the screen.

(i) Preamble Address Codes can be used to move the cursor around the screen in random order to place captions on Rows 1 to 15. Carriage Returns have no effect on cursor location during caption loading.

(ii) The cursor moves automatically one column to the right after each character or Mid-Row Code received. Receipt of a Backspace will move the

cursor one column to the left, erasing the character or Mid-Row Code occupying that location. (A Backspace received when the cursor is in Column 1 will be ignored.) Once the cursor reaches the 32nd column position on any row, all subsequent characters received prior to a Backspace, an End of Caption, or a Preamble Address Code, will replace any previous character at that location.

(iii) The Delete to End of Row command will erase from memory any characters or control codes starting at the current cursor location and in all columns to its right on the same row. If no displayable characters remain on a row after the Delete to End of Row is acted upon, the solid space (if any) for that element should also be erased.

(iv) If data reception is interrupted during caption loading by data for the alternate caption channel or for Text Mode, caption loading will resume at the same cursor position if a Resume Caption Loading command is received and no Preamble Address Code is given that would move the cursor.

(v) Characters remain in non-displayed memory until an End of Caption command flips memories. The caption will be erased without being displayed upon receipt of an Erase Non-Displayed Memory command, a Roll-Up Caption command, or if the user switches receiver channels, data channels or fields, or upon the loss of valid data (see paragraph (j) of this section).

(vi) A pop-on caption, once displayed, remains displayed until one of the standard caption erasure techniques is applied or until a Roll-Up Caption command is received. Characters within a displayed pop-on caption will be replaced by receipt of the Resume Direct Captioning command and paint-on style techniques (see below).

(3) *Paint-on.* Paint-on style captioning is initiated by receipt of a Resume Direct Captioning command. Subsequent data are addressed immediately to displayed memory without need for an End of Caption command.

(i) Preamble Address Codes can be used to move the cursor around the screen in random order to display captions on Rows 1 to 15. Carriage Returns have no effect on cursor location during direct captioning. The cursor

moves automatically one column to the right after each character or Mid-Row Code is received. Receipt of a Backspace will move the cursor one column to the left, erasing the character or Mid-Row Code occupying that location. (A Backspace received when the cursor is in Column 1 will be ignored.) Once the cursor reaches the 32nd column position on any row, all subsequent characters received prior to a Preamble Address Code or Backspace will be displayed in that column replacing any previous character occupying that location.

(ii) The Delete to End of Row command will erase from memory any characters or control codes starting at the current cursor location and in all columns to its right on the same row. If no displayable characters remain on the row after the Delete to End of Row is acted upon, the solid space (if any) for that element should also be erased.

(iii) If the reception of data is interrupted during the direct captioning by data for the alternate caption channel or for Text Mode, the display of caption text will resume at the same cursor position if a Resume Direct Captioning command is received and no Preamble Address Code is given which would move the cursor.

(iv) Characters remain displayed until one of the standard caption erasure techniques is applied or until a Roll-Up Caption command is received. An End of Caption command leaves a paint-on caption fully intact in non-displayed memory. In other words, a paint-on style caption behaves precisely like a pop-on style caption which has been displayed.

(g) *Character format.* Characters are to be displayed on the screen within a character "cell" which is the height and width of a single row and column. The following codes define the displayable character set. Television receivers manufactured prior to January 1, 1996 and having a character resolution of 5x7 dots, or less, may display the allowable alternate characters in the character table. A statement must be in a prominent location on the box or other package in which the receiver is to be marketed, and information

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must be in the owner’s manual, indicating the receiver displays closed captioning in upper case only.

CHARACTER SET TABLE

Special Characters

These require two bytes for each symbol. Each hex code as shown will be preceded by a 11h for data channel 1 or by a 19h for data channel 2. For example: 19h 37h will place a musical note in data channel 2.

HEX	Example	Alternate	Description
30	®	See note ¹	Registered mark symbol
31	°		Degree sign
32	½		½
33	¿		Inverse query
34	™	See note ¹	Trademark symbol
35	¢		Cents sign
36	£		Pounds Sterling sign
37	♪		Music note
38	à	A	Lower-case a with grave accent
39			Transparent space
3A	è	E	Lower-case e with grave accent
3B	â	A	Lower-case a with circumflex
3C	ê	E	Lower-case e with circumflex
3D	î	I	Lower-case i with circumflex
3E	ô	O	Lower-case o with circumflex
3F	û	U	Lower-case u with circumflex

¹NOTE: The registered and trademark symbols are used to satisfy certain legal requirements. There are various legal ways in which these symbols may be drawn or displayed. For example, the trademark symbol may be drawn with the “TM” next to the “M” or over the “M”. It is preferred that the trademark symbol be superscripted, i.e., XYZTM. It is left to each individual manufacturer to interpret these symbols in any way that meets the legal needs of the user.

Standard characters

HEX	Example	Alternate	Description
20			Standard space
21	!		Exclamation mark
22	“		Quotation mark
23	#		Pounds (number) sign
24	\$		Dollar sign
25	%		Percentage sign
26	&		Ampersand
27	’		Apostrophe
28	(		Open parentheses
29	)		Close parentheses
2A	á	A	Lower-case a with acute accent
2B	+		Plus sign
2C	,		Comma
2D	-		Minus (hyphen) sign
2E	.		Period
2F	/		Slash
30	0		Zero
31	1		One
32	2		Two
33	3		Three
34	4		Four
35	5		Five
36	6		Six
37	7		Seven
38	8		Eight
39	9		Nine
3A	:		Colon

HEX	Example	Alternate	Description
3B	;		Semi-colon
3C	<		Less than sign
3D	=		Equal sign
3E	>		Greater than sign
3F	?		Question mark
40	@		At sign
41	A		Upper-case A
42	B		Upper-case B
43	C		Upper-case C
44	D		Upper-case D
45	E		Upper-case E
46	F		Upper-case F
47	G		Upper-case G
48	H		Upper-case H
49	I		Upper-case I
4A	J		Upper-case J
4B	K		Upper-case K
4C	L		Upper-case L
4D	M		Upper-case M
4E	N		Upper-case N
4F	O		Upper-case O
50	P		Upper-case P
51	Q		Upper-case Q
52	R		Upper-case R
53	S		Upper-case S
54	T		Upper-case T
55	U		Upper-case U
56	V		Upper-case V
57	W		Upper-case W
58	X		Upper-case X
59	Y		Upper-case Y
5A	Z		Upper-case Z
5B	[		Open bracket
5C	é	E	Lower-case e with acute accent
5D	]		Close bracket
5E	í	I	Lower-case i with acute accent
5F	ó	O	Lower-case o with acute accent
60	ú	U	Lower-case u with acute accent
61	a	A	Lower-case a
62	b	B	Lower-case b
63	c	C	Lower-case c
64	d	D	Lower-case d
65	e	E	Lower-case e
66	f	F	Lower-case f
67	g	G	Lower-case g
68	h	H	Lower-case h
69	i	I	Lower-case i
6A	j	J	Lower-case j
6B	k	K	Lower-case k
6C	l	L	Lower-case l
6D	m	M	Lower-case m
6E	n	N	Lower-case n
6F	o	O	Lower-case o
70	p	P	Lower-case p
71	q	Q	Lower-case q
72	r	R	Lower-case r
73	s	S	Lower-case s
74	t	T	Lower-case t
75	u	U	Lower-case u
76	v	V	Lower-case v
77	w	W	Lower-case w
78	x	X	Lower-case x
79	y	Y	Lower-case y
7A	z	Z	Lower-case z
7B	ç	C	Lower-case c with cedilla
7C	±		Division sign
7D	Ñ		Upper-case N with tilde
7E	ñ	Ñ	Lower-case n with tilde
7F	■		Solid block

(h) *Character Attributes*—(1) *Transmission of Attributes*. A character may be transmitted with any or all of four attributes: Color, italics, underline, and flash. All of these attributes are set by control codes included in the received data. An attribute will remain in effect until changed by another control code or until the end of the row is reached. Each row begins with a control code which sets the color and underline attributes. (White non-underlined is the default display attribute if no Preamble Address Code is received before the first character on an empty row.) Attributes are not affected by transparent spaces within a row.

(i) All Mid-Row Codes and the Flash On command are spacing attributes which appear in the display just as if a standard space (20h) had been received. Preamble Address Codes are non-spacing and will not alter any attributes when used to position the cursor in the midst of a row of characters.

(ii) The color attribute has the highest priority and can only be changed by the Mid-Row Code of another color. Italics has the next highest priority. If characters with both color and italics are desired, the italics Mid-Row Code must follow the color assignment. Any color Mid-Row Code will turn off italics. If the least significant bit of a Preamble Address Code or of a color or italics Mid-Row Code is a 1 (high), underlining is turned on. If that bit is a 0 (low), underlining is off.

(iii) The flash attribute is transmitted as a Miscellaneous Control Code. The Flash On command will not alter the status of the color, italics, or underline attributes. However, any color or italics Mid-Row Code will turn off flash.

(iv) Thus, for example, if a red, italicized, underlined, flashing character is desired, the attributes must be received in the following order: a red Mid-Row or Preamble Address Code, an italics Mid-Row Code with underline bit, and the Flash On command. The character will then be preceded by three spaces (two if red was assigned via a Preamble Address Code).

(2) *Display of attributes*. The underline attribute will be displayed by drawing a line beneath the character in the same color as the character. The flash

attribute will be displayed by causing the character to blink from the display at least once per second. The italic attribute must be capable of being displayed by either a special italic font, or by the modification of the standard font by slanting. The user may be given the option to select other methods of italic display as well. The support of the color attributes is optional. If the color attributes are supported, they will be displayed in the color they have been assigned. If color attributes are not supported, the display may be in color, but all color changes will be ignored.

(i) *Control codes*. There are three different types of control codes used to identify the format, location, attributes, and display of characters: Preamble Address Codes, Mid-Row Codes, and Miscellaneous Control Codes.

(1) Each control code consists of a pair of bytes which are always transmitted together in a single field of line 21 and which are normally transmitted twice in succession to help insure correct reception of the control instructions. The first of the control code bytes is a non-printing character in the range 10h to 1Fh. The second byte is always a printing character in the range 20h to 7Fh. Any such control code pair received which has not been assigned a function is ignored. If the non-printing character in the pair is in the range 00h to 0Fh, that character alone will be ignored and the second character will be treated normally.

(2) If the second byte of a control code pair does not contain odd parity (see paragraph (j) of this section), then the pair is ignored. The redundant transmission of the pair will be the instruction upon which the receiver acts.

(3) If the first byte of the first transmission of a control code pair fails the parity check, then that byte is inserted into the currently active memory as a solid block character (7Fh) followed by whatever the second byte is. Again, the redundant transmission of the pair will be the controlling instruction.

(4) If the first transmission of a control code pair passes parity, it is acted upon within one video frame. If the next frame contains a perfect repeat of

the same pair, the redundant code is ignored. If, however, the next frame contains a different but also valid control code pair, this pair, too, will be acted upon (and the receiver will expect a repeat of this second pair in the next frame). If the first byte of the expected redundant control code pair fails the parity check and the second byte is identical to the second byte in the immediately preceding pair, then the expected redundant code is ignored. If there are printing characters in place of the redundant code, they will be processed normally.

(5) There is provision for decoding a second data channel. The second data channel is encoded with the same control codes and procedures already described. The first byte of every control code pair indicates the data channel (C1/C2) to which the command applies. Control codes which do not match the data channel selected by the user, and all subsequent data related to that control code, are ignored by the receiver.

MID-ROW CODES

Data channel 1	Data channel 2	Attribute description
11 20	19 20	White.
11 21	19 21	White Underline.
11 22	19 22	Green.
11 23	19 23	Green Underline.
11 24	19 24	Blue.

MID-ROW CODES—Continued

Data channel 1	Data channel 2	Attribute description
11 25	19 25	Blue Underline.
11 26	19 26	Cyan.
11 27	19 27	Cyan Underline.
11 28	19 28	Red.
11 29	19 29	Red Underline.
11 2A	19 2A	Yellow.
11 2B	19 2B	Yellow Underline.
11 2C	19 2C	Magenta.
11 2D	19 2D	Magenta Underline.
11 2E	19 2E	Italics.
11 2F	19 2F	Italics Underline.

MISCELLANEOUS CONTROL CODES

Data channel 1	Data channel 2	Mnemonic	Command description
14 20	1C 20	RCL	Resume caption loading.
14 21	1C 21	BS ...	Backspace.
14 22	1C 22	AOF	Reserved (formerly Alarm Off).
14 23	1C 23	AON	Reserved (formerly Alarm On).
14 24	1C 24	DER	Delete to End of Row.
14 25	1C 25	RU2	Roll-Up Captions—2 Rows.
14 26	1C 26	RU3	Roll-Up Captions—3 Rows.
14 27	1C 27	RU4	Roll-Up Captions—4 Rows.
14 28	1C 28	FON	Flash On.
14 29	1C 29	RDC	Resume Direct Captioning.
14 2A	1C 2A	TR ...	Text Restart.
14 2B	1C 2B	RTD	Resume Text Display.
14 2C	1C 2C	EDM	Erase Displayed Memory.
14 2D	1C 2D	CR ...	Carriage Return.
14 2E	1C 2E	ENM	Erase Non-Displayed Memory.
14 2F	1C 2F	EOC	End of Caption (Flip Memories).
17 21	1F 21	TO1	Tab Offset 1 Column.
17 22	1F 22	TO2	Tab Offset 2 Columns.
17 23	1F 23	TO3	Tab Offset 3 Columns.

PREAMBLE ADDRESS CODES

	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15
First byte of code pair:															
Data Channel 1	11	11	12	12	15	15	16	16	17	17	10	13	13	14	14
Data Channel 2	19	19	1A	1A	1D	1D	1E	1E	1F	1F	18	1B	1B	1C	1C
Second byte of code pair:															
White	40	60	40	60	40	60	40	60	40	60	40	40	60	40	60
White Underline	41	61	41	61	41	61	41	61	41	61	41	41	61	41	61
Green	42	62	42	62	42	62	42	62	42	62	42	42	62	42	62
Green Underline	43	63	43	63	43	63	43	63	43	63	43	43	63	43	63
Blue	44	64	44	64	44	64	44	64	44	64	44	44	64	44	64
Blue Underline	45	65	45	65	45	65	45	65	45	65	45	45	65	45	65
Cyan	46	66	46	66	46	66	46	66	46	66	46	46	66	46	66
Cyan Underline	47	67	47	67	47	67	47	67	47	67	47	47	67	47	67
Red	48	68	48	68	48	68	48	68	48	68	48	48	68	48	68
Red Underline	49	69	49	69	49	69	49	69	49	69	49	49	69	49	69
Yellow	4A	6A	4A	6A	4A	6A	4A	6A	4A	6A	4A	4A	6A	4A	6A
Yellow Underline ...	4B	6B	4B	6B	4B	6B	4B	6B	4B	6B	4B	4B	6B	4B	6B
Magenta	4C	6C	4C	6C	4C	6C	4C	6C	4C	6C	4C	4C	6C	4C	6C
Magenta Underline	4D	6D	4D	6D	4D	6D	4D	6D	4D	6D	4D	4D	6D	4D	6D
White Italics	4E	6E	4E	6E	4E	6E	4E	6E	4E	6E	4E	4E	6E	4E	6E
White Italics Underline	4F	6F	4F	6F	4F	6F	4F	6F	4F	6F	4F	4F	6F	4F	6F
Indent 0	50	70	50	70	50	70	50	70	50	70	50	50	70	50	70
Indent 0 Underline	51	71	51	71	51	71	51	71	51	71	51	51	71	51	71
Indent 4	52	72	52	72	52	72	52	72	52	72	52	52	72	52	72

PREAMBLE ADDRESS CODES—Continued

	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15
Indent 4 Underline	53	73	53	73	53	73	53	73	53	73	53	73	53	73	53
Indent 8	54	74	54	74	54	74	54	74	54	74	54	74	54	74	54
Indent 8 Underline	55	75	55	75	55	75	55	75	55	75	55	75	55	75	55
Indent 12	56	76	56	76	56	76	56	76	56	76	56	76	56	76	56
Indent 12 Underline	57	77	57	77	57	77	57	77	57	77	57	77	57	77	57
Indent 16	58	78	58	78	58	78	58	78	58	78	58	78	58	78	58
Indent 16 Underline	59	79	59	79	59	79	59	79	59	79	59	79	59	79	59
Indent 20	5A	7A	5A	7A	5A	7A	5A	7A	5A	7A	5A	7A	5A	7A	5A
Indent 20 Underline	5B	7B	5B	7B	5B	7B	5B	7B	5B	7B	5B	7B	5B	7B	5B
Indent 24	5C	7C	5C	7C	5C	7C	5C	7C	5C	7C	5C	7C	5C	7C	5C
Indent 24 Underline	5D	7D	5D	7D	5D	7D	5D	7D	5D	7D	5D	7D	5D	7D	5D
Indent 28	5E	7E	5E	7E	5E	7E	5E	7E	5E	7E	5E	7E	5E	7E	5E
Indent 28 Underline	5F	7F	5F	7F	5F	7F	5F	7F	5F	7F	5F	7F	5F	7F	5F

NOTE: All indent codes (second byte equals 50h–5fh, 70th–7fh) assign white as the color attribute.

(j) *Data rejection.* The receiver should provide an effective procedure to verify data. A receiver will reject data if the data is invalid, or if the data is directed to the data channel or field not selected by the user. Invalid data is any data that fails to pass a check for odd parity, or which, having passed the parity check, is assigned no function.

(1) If a print character fails to pass a check for parity, a solid block (7Fh) should be displayed in place of the failed character. In addition, valid data can be corrupted in many ways and may not be suitable for display. For example, repeated fields, skipped fields and altered field sequences are all possible from consumer video equipment and might present meaningless captions.

(2) The receiver will ignore data rejected due to being directed to a deselected field or channel. However, this will not cause the display to be disabled.

(k) *Automatic display enable/disable.* The receiver shall provide an automatic enable/disable capability to prevent the display of invalid or incomplete data, when the user selects the Caption Mode. The display should automatically become enable after the receiver verifies the data as described in paragraph (j) of this section. The display will be automatically disabled when there is a sustained detection of invalid data. The display will be re-enabled when the data verification process has been satisfied once again.

(1) *Compatibility with Cable Security Systems.* Certain cable television security techniques, such as signal

encryption and copy protection, can alter the television signal so that some methods of finding line 21 will not work. In particular, counting of lines or timing from the start of the vertical blanking interval may cause problems. Caption decoding circuitry must function properly when receiving signals from cable security systems that were designed and marketed prior to April 5, 1991. Further information concerning such systems is available from the National Cable Television Association, Inc., Washington, DC, and from the Electronic Industries Association, Washington, DC.

(m) *Labelling and consumer information requirements.* The box or other package in which the individual television receiver is to be marketed shall carry a statement in a prominent location, visible to the buyer before purchase, which reads as follows:

This television receiver provides display of television closed captioning in accordance with §15.119 of the FCC rules.

Receivers that do not support color attributes or text mode, as well as receivers that display only upper-case characters pursuant to paragraph (g) of this section, must include with the statement, and in the owner's manual, language indicating that those features are not supported.

(n) *Glossary of terms.* The following terms are used to describe caption decoder specifications:

(1) *Base row:* The bottom row of a roll-up display. The cursor always remains on the base row. Rows of text

roll upwards into the contiguous rows immediately above the base row.

(2) *Box*: The area surrounding the active character display. In Text Mode, the box is the entire screen area defined for display, whether or not displayable characters appear. In Caption Mode, the box is dynamically redefined by each caption and each element of displayable characters within a caption. The box (or boxes, in the case of a multiple-element caption) includes all the cells of the displayed characters, the non-transparent spaces between them, and one cell at the beginning and end of each row within a caption element in those decoders that use a solid space to improve legibility.

(3) *Caption window*: The invisible rectangle which defines the top and bottom limits of a roll-up caption. The window can be 2 to 4 rows high. The lowest row of the window is called the base row.

(4) *Cell*: The discrete screen area in which each displayable character or space may appear. A cell is one row high and one column wide.

(5) *Column*: One of 32 vertical divisions of the screen, each of equal width, extending approximately across the full width of the safe caption area as defined in paragraph (n)(12) of this section. Two additional columns, one at the left of the screen and one at the right, may be defined for the appearance of a box in those decoders which use a solid space to improve legibility, but no displayable characters may appear in those additional columns. For reference, columns may be numbered 0 to 33, with columns 1 to 32 reserved for displayable characters.

(6) *Displayable character*: Any letter, number or symbol which is defined for on-screen display, plus the 20h space.

(7) *Display disable*: To turn off the display of captions or text (and accompanying background) at the receiver,

rather than through codes transmitted on line 21 which unconditionally erase the display. The receiver may disable the display because the user selects an alternate mode, e.g., TV Mode, or because no valid line 21 data is present.

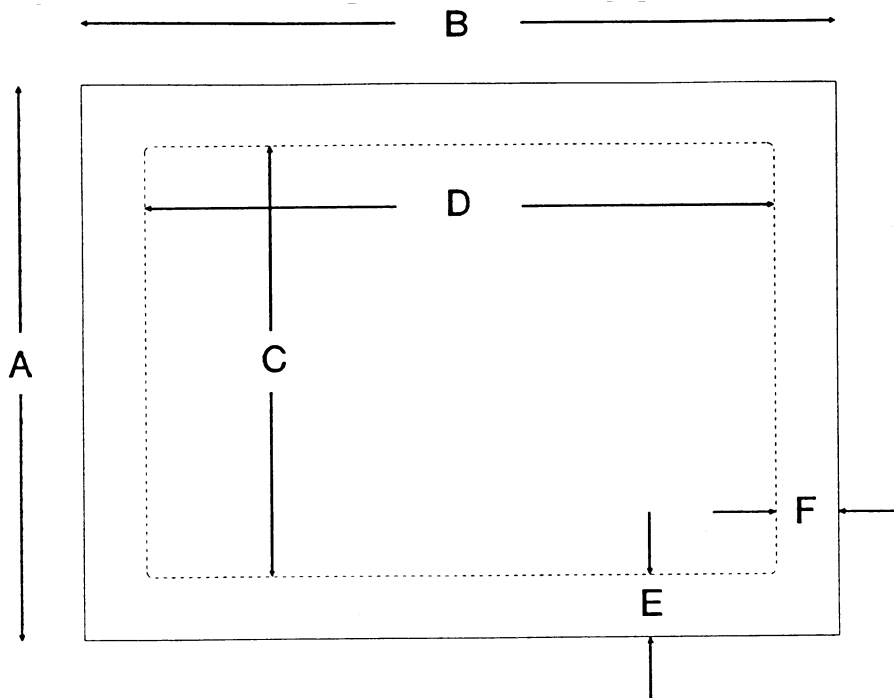
(8) *Display enable*: To allow the display of captions or text when they are transmitted on line 21 and received as valid data. For display to be enabled, the user must have selected Caption Mode or Text Mode, and valid data for the selected mode must be present on line 21.

(9) *Element*: In a pop-on or paint-on style caption, each contiguous area of cells containing displayable characters and non-transparent spaces between those characters. A single caption may have multiple elements. An element is not necessarily a perfect rectangle, but may include rows of differing widths.

(10) *Erase Display*: In Caption Mode, to clear the screen of all characters (and accompanying background) in response to codes transmitted on line 21. (The caption service provider can accomplish the erasure either by sending an Erase Displayed Memory command or by sending an Erase Non-Displayed Memory command followed by an End of Caption command, effectively making a blank caption “appear”.) Display can also be erased by the receiver when the caption memory erasure conditions are met, such as the user changing TV channels.

(11) *Row*: One of 15 horizontal divisions of the screen, extending across the full height of the safe caption area as defined in paragraph (n)(12) of this section.

(12) *Safe caption area*: The area of the television picture within which captioning and text shall be displayed to ensure visibility of the information on the majority of home television receivers. The safe caption area is specified as shown in the following figure:



The dimensions of the above figure shall be as follows:

Label	Dimensions	Percent of television picture height
A	Television picture height	100.0
B	Television picture width	133.33
C	Height of safe caption area	80.0
D	Width of safe caption area	106.67
E	Vertical position of safe caption area.	10.0
F	Horizontal position of safe caption area.	13.33

(13) *Special characters*: Displayable characters (except for “transparent space”) which require a two-byte sequence of one non-printing and one printing character. The non-printing byte varies depending on the data channel. Regular characters require unique one-byte codes which are the same in either data channel.

(14) *Text*: When written with an upper-case “T”, refers to the Text Mode. When written with a lower-case “t”, refers to any combination of displayable characters.

(15) *Transparent space*: Transmitted as a special character, it is a one-column-wide space behind which program video is always visible (except when a transparent space immediately precedes or follows a displayable character and solid box is needed to make that character legible).

[56 FR 27201, June 13, 1991, as amended at 57 FR 19094, May 4, 1992; 58 FR 44893, Aug. 25, 1993]

§ 15.120 Program blocking technology requirements for television receivers.

(a) Effective July 1, 1999, manufacturers of television broadcast receivers as defined in section 15.3(w) of this chapter, including personal computer systems meeting that definition, must ensure that one-half of their product models with picture screens 33 cm (13 in) or larger in diameter shipped in interstate commerce or manufactured in the United States comply with the

provisions of paragraphs (c), (d), and (e) of this section.

NOTE: This paragraph places no restrictions on the shipping or sale of television receivers that were manufactured before July 1999.

(b) Effective January 1, 2000, all TV broadcast receivers as defined in §15.3(w), including personal computer systems meeting that definition, with picture screens 33 cm (13 in) or larger, measured diagonally, or with displays in the 16:9 aspect ratio that are 19.8 cm (7.8 in) or greater in height and digital television receivers without an associated display device shipped in interstate commerce or manufactured in the United States shall comply with the provisions of paragraphs (c), (d), and (e) of this section.

(c) *Transmission format.* (1) Analog television program rating information shall be transmitted on line 21 of field 2 of the vertical blanking interval of television signals, in accordance with §73.682(a)(22) of this chapter.

(2) Digital television program rating information shall be transmitted in digital television signals in accordance with §73.682(d) of this chapter.

(d) *Operation.* (1) Analog television receivers will receive program ratings transmitted pursuant to EIA-744: “Transport of Content Advisory Information Using Extended Data Service (XDS)” (incorporated by reference, see §15.38) and EIA-608: “Recommended Practice for Line 21 Data Service” (incorporated by reference, see §15.38). Blocking of programs shall occur when a program rating is received that meets the pre-determined user requirements.

(2) Digital television receivers shall react in a similar manner as analog televisions when programmed to block specific rating categories. Effective March 15, 2006, digital television receivers will receive program rating descriptors transmitted pursuant to industry standard EIA/CEA-766-A “U.S. and Canadian Region Rating Tables (RRT) and Content Advisory Descriptors for Transport of Content Advisory Information using ATSC A/65-A Program and System Information Protocol (PSIP),” 2001 (incorporated by reference, see §15.38). Blocking of programs shall occur when a program rat-

ing is received that meets the pre-determined user requirements. Digital television receivers shall be able to respond to changes in the content advisory rating system.

(e) All television receivers as described in paragraph (a) of this section shall block programming as follows:

(1) *Channel Blocking.* Channel Blocking should occur as soon as a program rating packet with the appropriate Content Advisory or MPAA rating level is received. Program blocking is described as a receiver performing all of the following:

- Muting the program audio.
- Rendering the video black or otherwise indecipherable.
- Eliminating program-related captions.

(2) *Default State.* The default state of a receiver (i.e., as provided to the consumer) should not block unrated programs. However, it is permissible to include features that allow the user to reprogram the receiver to block programs that are not rated.

(3) *Picture-In-Picture (PIP).* If a receiver has the ability to decode program-related rating information for the Picture-In-Picture (PIP) video signal, then it should block the PIP channel in the same manner as the main channel. If the receiver does not have the ability to decode PIP program-related rating information, then it should block or otherwise disable the PIP if the viewer has enabled program blocking.

(4) *Selection of Ratings.* Each television receiver, in accordance with user input, shall block programming based on the age based ratings, the content based ratings, or a combination of the two.

(i) If the user chooses to block programming according to its age based rating level, the receiver must have the ability to automatically block programs with a more restrictive age based rating. For example, if all shows with an age-based rating of TV-PG have been selected for blocking, the user should be able to automatically block programs with the more restrictive ratings of TV-14 and TV-MA.

(ii) If the user chooses to block programming according to a combination of age based and content based ratings the receiver must have the ability to

automatically block programming with a more restrictive age rating but a similar content rating. For example, if all shows rated TV-PG-V have been selected for blocking, the user should be able to block automatically shows with the more restrictive ratings of TV-14-V and TV-MA-V.

(iii) The user should have the capability of overriding the automatic blocking described in paragraphs (e)(4)(i) and (4)(ii) of this section.

[63 FR 20133, Apr. 23, 1998, as amended at 68 FR 68546, Dec. 9, 2003; 69 FR 2849, Jan. 21, 2004; 69 FR 59534, Oct. 4, 2004; 73 FR 5682, Jan. 30, 2008; 74 FR 63079, Dec. 2, 2009]

§15.121 Scanning receivers and frequency converters used with scanning receivers.

(a) Except as provided in paragraph (c) of this section, scanning receivers and frequency converters designed or marketed for use with scanning receivers, shall:

(1) Be incapable of operating (tuning), or readily being altered by the user to operate, within the frequency bands allocated to the Cellular Radiotelephone Service in part 22 of this chapter (cellular telephone bands). Scanning receivers capable of “readily being altered by the user” include, but are not limited to, those for which the ability to receive transmissions in the cellular telephone bands can be added by clipping the leads of, or installing, a simple component such as a diode, resistor or jumper wire; replacing a plug-in semiconductor chip; or programming a semiconductor chip using special access codes or an external device, such as a personal computer. Scanning receivers, and frequency converters designed for use with scanning receivers, also shall be incapable of converting digital cellular communication transmissions to analog voice audio.

(2) Be designed so that the tuning, control and filtering circuitry is inaccessible. The design must be such that any attempts to modify the equipment to receive transmissions from the Cellular Radiotelephone Service likely will render the receiver inoperable.

(b) Except as provided in paragraph (c) of this section, scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency

bands that are 38 dB or lower based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

(c) Scanning receivers and frequency converters designed or marketed for use with scanning receivers, are not subject to the requirements of paragraphs (a) and (b) of this section provided that they are manufactured exclusively for, and marketed exclusively to, entities described in 18 U.S.C. 2512(2), or are marketed exclusively as test equipment pursuant to §15.3(dd).

(d) Modification of a scanning receiver to receive transmissions from Cellular Radiotelephone Service frequency bands will be considered to constitute manufacture of such equipment. This includes any individual, individuals, entity or organization that modifies one or more scanners. Any modification to a scanning receiver to receive transmissions from the Cellular Radiotelephone Service frequency bands voids the certification of the scanning receiver, regardless of the date of manufacture of the original unit. In addition, the provisions of §15.23 shall not be interpreted as permitting modification of a scanning receiver to receive Cellular Radiotelephone Service transmissions.

(e) Scanning receivers and frequency converters designed for use with scanning receivers shall not be assembled from kits or marketed in kit form unless they comply with the requirements in paragraph (a) through (c) of this section.

(f) Scanning receivers shall have a label permanently affixed to the product, and this label shall be readily visible to the purchaser at the time of purchase. The label shall read as follows: **WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.**

(1) “Permanently affixed” means that the label is etched, engraved, stamped, silkscreened, indelible printed or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic or other material fastened to

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the equipment by welding, riveting, or permanent adhesive. The label shall be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable. The label shall not be a stick-on, paper label.

(2) When the device is so small that it is not practicable to place the warning label on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user and shall also be placed on the container in which the device is marketed. However, the FCC identifier must be displayed on the device.

[64 FR 22561, Apr. 27, 1999, as amended at 66 FR 32582, June 15, 2001]

§ 15.122 Closed caption decoder requirements for digital television receivers and converter boxes.

(a)(1) Effective July 1, 2002, all digital television receivers with picture screens in the 4:3 aspect ratio with picture screens measuring 13 inches or larger diagonally, all digital television receivers with picture screens in the 16:9 aspect ratio measuring 7.8 inches or larger vertically and all separately sold DTV tuners shipped in interstate commerce or manufactured in the United States shall comply with the provisions of this section.

NOTE TO PARAGRAPH (a)(1): This paragraph places no restrictions on the shipping or sale of digital television receivers that were manufactured before July 1, 2002.

(2) Effective July 1, 2002, DTV converter boxes that allow digitally trans-

mitted television signals to be displayed on analog receivers shall pass available analog caption information to the attached receiver in a form recognizable by that receiver's built-in caption decoder circuitry.

NOTE TO PARAGRAPH (a)(2): This paragraph places no restrictions on the shipping or sale of DTV converter boxes that were manufactured before July 1, 2002.

(b) Digital television receivers and tuners must be capable of decoding closed captioning information that is delivered pursuant to EIA-708-B: "Digital Television (DTV) Closed Captioning" (incorporated by reference, see § 15.38).

(c) *Services.* (1) Decoders must be capable of decoding and processing data for the six standard services, Caption Service #1 through Caption Service #6.

(2) Decoders that rely on Program and System Information Protocol data to implement closed captioning functions must be capable of decoding and processing the Caption Service Directory data. Such decoders must be capable of decoding all Caption Channel Block Headers consisting of Standard Service Headers, Extended Service Block Headers, and Null Block headers. However, decoding of the data is required only for Standard Service Blocks (Service IDs <-6), and then only if the characters for the corresponding language are supported. The decoders must be able to display the directory for services 1 through 6.

(d) *Code space organization.* (1) Decoders must support Code Space C0, G0, C1, and G1 in their entirety.

		C 0		G 0				C 1		G 1							
B7-b4		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b3-b0	0	NUL	EXT1	SP	0	@	P	`	p	CW0	SPA	NBS	°	À	Ð	à	ð
	1			!	1	A	Q	a	q	CW1	SPC	¡	±	Á	Ñ	á	ñ
	2			"	2	B	R	b	r	CW2	SPL	¢	²	Â	Ò	â	ò
	3	ETX		#	3	C	S	c	s	CW3		£	³	Ã	Ó	ã	ó
	4			\$	4	D	T	d	t	CW4		¤	´	Ä	Ô	ä	ô
	5			%	5	E	U	e	u	CW5		¥	µ	Å	Õ	å	õ
	6			&	6	F	V	f	v	CW6		¦	¶	Æ	Ö	æ	ö
	7			'	7	G	W	g	w	CW7	SWA	§	·	Ç	×	ç	÷
	8	BS	P16	(	8	H	X	h	x	CLW	DF0	"	,	È	Ø	è	ø
	9			)	9	I	Y	i	y	DSW	DF1	©	¹	É	Ù	é	ù
	A			*	:	J	Z	j	z	HDW	DF2	ª	º	Ê	Ú	ê	ú
	B			+	;	K	|	k	{	TGW	DF3	«	»	Ë	Û	ë	û
	C	FF		,	<	L	\	l	|	DLW	DF4	¬	¼	Ì	Ü	ì	ü
	D	CR		-	=	M	]	m	}	DLY	DF5	-	½	Í	Ý	í	ý
	E	HCR		.	>	N	^	n	~	DLC	DF6	®	¾	Î	Þ	î	þ
	F			/	?	O	_	o	¸	RST	DF7	¸	¿	Ï	ß	ï	ÿ
		C 2		G 2				C 3		G 3							
	0			TSP								␣					
	1			NBTS	‘												
	2			P	’												
	3				“												
	4				”												
	5			...													
	6							1/8									
	7							3/8									
	8							5/8									
	9				™			7/8									
	A			Š	š			|									
	B							|									
	C			Œ	œ			|									
	D			SM				—									
	E							¸									
	F			ÿ				|									

Table 1 DTVCC Code Set Mapping

(2) The following characters within code space G2 must be supported:

- (i) Transparent space (TSP).
- (ii) Non-breaking transparent space (NBTS).
- (iii) Solid block ().
- (iv) Trademark symbol (™).
- (v) Latin-1 characters Š, Œ, š, œ, ÿ.

(3) The substitutions in Table 2 are to be made if a decoder does not support the remaining G2 characters.

TABLE 2—G2 CHARACTER SUBSTITUTION TABLE

G2 Character	Substitute with
Open single quote (’), G2 char code 0x31.	G0 single quote (’), char code 0x27
Close single quote (’), G2 char code 0x32.	G0 single quote (’), char code 0x27

TABLE 2—G2 CHARACTER SUBSTITUTION TABLE—Continued

G2 Character	Substitute with
Open double quote (“), G2 char code 0x33.	G0 double quote (“), char code 0x22
Close double quote (”), G2 char code 0x34.	G0 double quote (“), char code 0x22
Bold bullet (•), G2 char code 0x35.	G1 bullet (•), char code 0xB7
Elipsis (. . .), G2 char code 0x25.	G0 underscore (_), char code 0x5F
One-eighth (1/8), G2 char code 0x76.	G0 percent sign (%), char code 0x25
Three-eighths (3/8), G2 char code 0x77.	G0 percent sign (%), char code 0x25
Five-eighths (5/8), G2 char code 0x78.	G0 percent sign (%), char code 0x25
Seven-eighths (7/8), G2 char code 0x79.	G0 percent sign (%), char code 0x25

TABLE 2—G2 CHARACTER SUBSTITUTION
TABLE—Continued

G2 Character	Substitute with
Vertical border (|), G2 char code 0x7A.	G0 stroke (|), char code 0x7C
Upper-right border (⌋), G2 char code 0x7B.	G0 dash (-), char code 0x2D
Lower-left border (⌌), G2 char code 0x7C.	G0 dash (-), char code 0x2D
Horizontal border (—), G2 char code 0x7D.	G0 dash (-), char code 0x2D
Lower-right border (⌋), G2 char code 0x7E.	G0 dash (-), char code 0x2D
Upper-left border (⌌), G2 char code 0x7F.	G0 dash (-), char code 0x2D

(4) Support for code spaces C2, C3, and G3 is optional. All unsupported graphic symbols in the G3 code space are to be substituted with the G0 underscore character (), char code 0x5F.

(e) *Screen coordinates.* Table 3 specifies the screen coordinate resolutions and limits for anchor point positioning in 4:3 and 16:9 display formats, and the number of characters per row.

TABLE 3—SCREEN COORDINATE RESOLUTIONS AND LIMITS

Screen aspect ratio	Maximum anchor position resolution	Minimum anchor position resolution	Maximum displayed rows	Maximum characters per row
4:3	75v×160h	15v×32h	4	32
16:9	75v×210h	15v×42h	4	42
Other	75v×(5×H)	15v×H*	4	1

*H = 32 × (the width of the screen in relation to a 4:3 display). For example, the 16:9 format is 1/3 wider than a 4:3 display; thus, H = 32 × 4/3 = 42.667, or 42.

(1) This means that the minimum grid resolution for a 4:3 aspect ratio instrument is 15 vertical positions × 32 horizontal positions. This minimum grid resolution for 16:9 ratio instrument is 15 vertical positions × 42 horizontal positions. These minimum grid sizes are to cover the entire safe-title area of the corresponding screen.

(2) The minimum coordinates equate to a 1/5 reduction in the maximum horizontal and vertical grid resolution coordinates. Caption providers are to use the maximum coordinate system values when specifying anchor point positions. Decoders using the minimum resolution are to divide the provided horizontal and vertical screen coordinates by 5 to derive the equivalent minimum coordinates.

(3) Any caption targeted for both 4:3 and 16:9 instruments is limited to 32 contiguous characters per row. If a caption is received by a 4:3 instrument that is targeted for a 16:9 display only, or requires a window width greater than 32 characters, then the caption may be completely disregarded by the decoder. 16:9 instruments should be able to process and display captions intended for 4:3 displays, providing all other minimum recommendations are met.

(4) If the resulting size of any window is larger than the safe title area for the corresponding display's aspect ratio, then this window will be completely disregarded.

(f) *Caption windows.* (1) Decoders need to display no more than 4 rows of captions on the screen at any given time, regardless of the number of windows displayed. This implies that no more than 4 windows can be displayed at any given time (with each having only one caption row). However, decoders should maintain storage to support a minimum total of 8 rows of captions. This storage is needed for the worst-case support of a displayed window with 4 rows of captioning and a non-displayed window which is buffering the incoming rows for the next 4-row caption. As implied above, the maximum number of windows that may be displayed at any one time by a minimum decoder implementation is 4. If more than 4 windows are defined in the caption stream, the decoder may disregard the youngest and lowest priority window definition(s). Caption providers must be aware of this limitation, and either restrict the total number of windows used or accept that some windows will not be displayed.

(2) Decoders do not need to support overlapped windows. If a window overlaps another window, the overlapped window need not be displayed by the decoder.

(3) At a minimum, decoders will assume that all windows have rows and columns “locked”. This implies that if a decoder implements the SMALL pen-size, then word-“un”wrapping, when shrinking captions, need not be implemented. Also, if a decoder implements the LARGE pen size, then word wrapping (when enlarging captions) need not be implemented.

(4) Whenever possible, the receiver should render embedded carriage returns as line breaks, since these carriage returns indicate an important aspect of the caption’s formatting as determined by the service provider. However, it may sometimes be necessary for the receiver to ignore embedded line breaks. For example, if a caption is to appear in a larger font, and if its window’s rows and/or columns are unlocked, the rows of text may need to become longer or shorter to fit within the allocated space. Such automatic reformatting of a caption is known as “word wrap.” If decoders support word-wrapping, it must be implemented as follows:

(i) The receiver should follow standard typographic practice when implementing word wrap. Potential breaking points (word-wrapping points) are indicated by the space character (20h) and by the hyphen character (2Dh).

(ii) If a row is to be broken at a space, the receiver should remove the space from the caption display. If a row is to be broken after a hyphen, the hyphen should be retained.

(iii) If an embedded return is to be removed, it should usually be replaced with a space. However, if the character to the left of the embedded return is a hyphen, the embedded return should be removed but NOT replaced with a space.

(iv) This specification does not include optional hyphens, nor does it provide for any form of automatic hyphenation. No non-breaking hyphen is defined. The non-breaking space (A0h in the G1 code set) and the non-breaking transparent space (21h in the G2 code

set) should not be considered as potential line breaks.

(v) If a single word exceeds the length of a row, the word should be placed at the start of a new row, broken at the character following the last character that fits on the row, and continued with further breaks if needed.

(g) *Window text painting.* (1) All decoders should implement “left”, “right”, and “center” caption-text justification. Implementation of “full” justification is optional. If “full” justification is not implemented, fully justified captions should be treated as though they are “left” justified.

(i) For “left” justification, decoders should display any portion of a received row of text when it is received. For “center”, “right”, and “full” justification, decoders may display any portion of a received row of text when it is received, or may delay display of a received row of text until reception of a row completion indicator. A row completion indicator is defined as receipt of a CR, ETX or any other command, except SetPenColor, SetPenAttributes, or SetPenLocation where the pen relocation is within the same row.

(ii) Receipt of a character for a displayed row which already contains text with “center”, “right” or “full” justification will cause the row to be cleared prior to the display of the newly received character and any subsequent characters. Receipt of a justification command which changes the last received justification for a given window will cause the window to be cleared.

(2) At a minimum, decoders must support LEFT_TO_RIGHT printing.

(3) At a minimum, decoders must support BOTTOM_TO_TOP scrolling. For windows sharing the same horizontal scan lines on the display, scrolling may be disabled.

(4) At a minimum, decoders must support the same recommended practices for scroll rate as is provided for NTSC closed-captioning.

(5) At a minimum, decoders must support the same recommended practices for smooth scrolling as is provided for NTSC closed-captioning.

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(6) At a minimum, decoders must implement the “snap” window display effect. If the window “fade” and “wipe” effects are not implemented, then the decoder will “snap” all windows when they are to be displayed, and the “effect speed” parameter is ignored.

(h) *Window colors and borders.* At a minimum, decoders must implement borderless windows with solid, black backgrounds (i.e., border type = NONE, fill color = (0,0,0), fill opacity =

SOLID), and borderless transparent windows (i.e., border type = NONE, fill opacity = TRANSPARENT).

(i) *Predefined window and pen styles.* Predefined Window Style and Pen Style ID’s may be provided in the DefineWindow command. At a minimum, decoders should implement Predefined Window Attribute Style 1 and Predefined Pen Attribute Style 1, as shown in Table 4 and Table 5, respectively.

TABLE 4—PREDEFINED WINDOW STYLE ID'S

Style ID #	Justify	Print direction	Scroll direction	Word wrap	Display effect	Effect direction	Effect speed	Fill color	Fill opacity	Border type	Border color	Usage
1	Left	Left-to-right	Bottom-to-top.	No	Snap	n/a	n/a	(0,0,0) Black.	Solid	None	n/a	NTSC Style PopUp Captions
2	Left	Left-to-right	Bottom-to-top.	No	Snap	n/a	n/a	n/a	Transparent.	None	n/a	PopUp Captions w/o Black Back-ground
3	Cntr	Left-to-right	Bottom-to-top.	No	Snap	n/a	n/a	(0,0,0) Black.	Solid	None	n/a	NTSC Style Centered PopUp Captions
4	Left	Left-to-right	Bottom-to-top.	Yes	Snap	n/a	n/a	(0,0,0) Black.	Solid	None	n/a	NTSC Style RollUp Captions
5	Left	Left-to-right	Bottom-to-top.	Yes	Snap	n/a	n/a	n/a	Transparent.	None	n/a	RollUp Captions w/o Black Back-ground
6	Cntr	Left-to-right	Bottom-to-top.	Yes	Snap	n/a	n/a	(0,0,0) Black.	Solid	None	n/a	NTSC Style Centered RollUp Captions
7	Left	Top-to-bottom.	Right-to-left	No	Snap	n/a	n/a	(0,0,0) Black.	Solid	None	n/a	Ticker Tape

TABLE 5—PREDEFINED PEN STYLE ID'S

Predefined style ID	Pen size	Font style	Offset	Italics	Underline	Edge type	Foregrnd color	Foregrnd opacity	Backgrnd color	Backgrnd opacity	Edge color	Usage
1	Strdr	0	Normal	No	No	None	(2,2,2) White.	Solid	(0,0,0) Black.	Solid	n/a	Default NTSC Style*

TABLE 5—PREDEFINED PEN STYLE ID'S—Continued

Predefined style ID	Pen size	Font style	Offset	Italics	Underline	Edge type	Foregrnd color	Foregrnd opacity	Backgrnd color	Backgrnd opacity	Edge color	Usage
2	Stndr	1	Normal	No	No	None	(2,2,2) White.	Solid	(0,0,0) White.	Solid	n/a	NTSC Style* Mono w/ Serif
3	Stndr	2	Normal	No	No	None	(2,2,2) White.	Solid	(0,0,0) Black.	Solid	n/a	NTSC Style* Prop w/ Serif
4	Stndr	3	Normal	No	No	None	(2,2,2) White.	Solid	(0,0,0) Black.	Solid	n/a	NTSC Style* Mono w/ o Serif
5	Stndr	4	Normal	No	No	None	(2,2,2) White.	Solid	(0,0,0) Black.	Solid	n/a	NTSC Style* Prop w/o Serif
6	Stndr	3	Normal	No	No	Uniform	(2,2,2) White.	Solid	n/a	Trans-parent.	(0,0,0) Black.	Mono w/o Serif, Bor-dered Text, No BG
7	Stndr	4	Normal	No	No	Uniform	(2,2,2) White.	Solid	n/a	Trans-parent.	(0,0,0) Black.	Prop. w/o Serif, Bor-dered Text, No BG

**NTSC Style*—White Text on Black Background

(j) *Pen size.* (1) Decoders must support the standard, large, and small pen sizes and must allow the caption provider to choose a pen size and allow the viewer to choose an alternative size. The STANDARD pen size should be implemented such that the height of the tallest character in any implemented font is no taller than $\frac{1}{15}$ of the height of the safe-title area, and the width of the widest character is no wider than $\frac{1}{32}$ of the width of the safe-title area for 4:3 displays and $\frac{1}{42}$ of the safe-title area width for 16:9 displays.

(2) The LARGE pen size should be implemented such that the width of the widest character in any implemented font is no wider than $\frac{1}{32}$ of the safe-title area for 16:9 displays. This recommendation allows for captions to grow to a LARGE pen size without having to reformat the caption since no caption will have more than 32 characters per row.

(k) *Font styles.* (1) Decoders must support the eight fonts listed below. Caption providers may specify 1 of these 8 font styles to be used to write caption text. The styles specified in the "font style" parameter of the SetPenAttributes command are numbered from 0 through 7. The following is a list of the 8 required font styles. For information purposes only, each font style references one or more popular fonts which embody the characteristics of the style:

- (i) 0—Default (undefined)
- (ii) 1—Monospaced with serifs (similar to Courier)
- (iii) 2—Proportionally spaced with serifs (similar to Times New Roman)
- (iv) 3—Monospaced without serifs (similar to Helvetica Monospaced)
- (v) 4—Proportionally spaced without serifs (similar to Arial and Swiss)
- (vi) 5—Casual font type (similar to Dom and Impress)
- (vii) 6—Cursive font type (similar to Coronet and Marigold)
- (viii) 7—Small capitals (similar to Engravers Gothic)

(2) Font styles may be implemented in any typeface which the decoder manufacturer deems to be a readable rendition of the font style, and need not be in the exact typefaces given in the example above. Decoders must include the ability for consumers to

choose among the eight fonts. The decoder must display the font chosen by the caption provider unless the viewer chooses a different font.

(1) *Character offsetting.* Decoders need not implement the character offsetting (*i.e.*, subscript and superscript) pen attributes.

(m) *Pen styles.* At a minimum, decoders must implement normal, italic, and underline pen styles.

(n) *Foreground color and opacity.* (1) At a minimum, decoders must implement transparent, translucent, solid and flashing character foreground type attributes.

(2) At a minimum, decoders must implement the following character foreground colors: white, black, red, green, blue, yellow, magenta and cyan.

(3) Caption providers may specify the color/opacity. Decoders must include the ability for consumers to choose among the color/opacity options. The decoder must display the color/opacity chosen by the caption provider unless the viewer chooses otherwise.

(o) *Background color and opacity.* (1) Decoders must implement the following background colors: white, black, red, green, blue, yellow, magenta and cyan. It is recommended that this background is extended beyond the character foreground to a degree that the foreground is separated from the underlying video by a sufficient number of background pixels to insure the foreground is separated from the background.

(2) Decoders must implement transparent, translucent, solid and flashing background type attributes. Caption providers may specify the color/opacity. Decoders must include the ability for consumers to choose among the color/opacity options. The decoder must display the color/opacity chosen by the caption provider unless the viewer chooses otherwise.

(p) *Character edges.* Decoders must implement separate edge color and type attribute control.

(q) *Color representation.* (1) At a minimum, decoders must support the 8 colors listed in Table 6.

TABLE 6—MINIMUM COLOR LIST TABLE

Color	Red	Green	Blue
Black	0	0	0
White	2	2	2
Red	2	0	0
Green	0	2	0
Blue	0	0	2
Yellow	2	2	0
Magenta	2	0	2
Cyan	0	2	2

(2)(i) When a decoder supporting this Minimum Color List receives an RGB value not in the list, it will map the received value to one of the values in the list via the following algorithm:

(A) All one (1) values are to be changed to 0.

(B) All two (2) values are to remain unchanged.

(C) All three (3) values are to be changed to 2.

(ii) For example, the RGB value (1,2,3) will be mapped to (0,2,2), (3,3,3) will be mapped to (2,2,2) and (1,1,1) will be mapped to (0,0,0).

(3) Table 7 is an alternative minimum color list table supporting 22 colors.

TABLE 7—ALTERNATIVE MINIMUM COLOR LIST TABLE

Color	Red	Green	Blue
Black	0	0	0
Gray	1	1	1
White	2	2	2
Bright White	3	3	3
Dark Red	1	0	0
Red	2	0	0
Bright Red	3	0	0
Dark Green	0	1	0
Green	0	2	0
Bright Green	0	3	0
Dark Blue	0	0	1
Blue	0	0	2
Bright Blue	0	0	3
Dark Yellow	1	1	0
Yellow	2	2	0
Bright Yellow	3	3	0
Dark Magenta	1	0	1
Magenta	2	0	2
Bright Magenta	3	0	3
Dark Cyan	0	1	1
Cyan	0	2	2
Bright Cyan	0	3	3

(i) When a decoder supporting the Alternative Minimum Color List in Table 7 receives an RGB value not in the list (i.e., an RGB value whose non-zero elements are not the same value), it will map the received value to one of the values in the list via the following algorithm:

(A) For RGB values with all elements non-zero and different—e.g., (1,2,3), (3,2,1), and (2,1,3), the 1 value will be changed to 0, the 2 value will remain unchanged, and the 3 value will be changed to 2.

(B) For RGB values with all elements non-zero and with two common elements—e.g., (3,1,3), (2,1,2), and (2,2,3), if the common elements are 3 and the uncommon one is 1, then the 1 elements is changed to 0; e.g. (3,1,3) → (3,0,3). If the common elements are 1 and the uncommon element is 3, then the 1 elements are changed to 0, and the 3 element is changed to 2; e.g. (1,3,1) → (0,2,0). In all other cases, the uncommon element is changed to the common value; e.g., (2,2,3) → (2,2,2), (1,2,1) → (1,1,1), and (3,2,3) → (3,3,3).

(ii) All decoders not supporting either one of the two color lists described above, must support the full 64 possible RGB color value combinations.

(r) *Character rendition considerations.* In NTSC Closed Captioning, decoders were required to insert leading and trailing spaces on each caption row. There were two reasons for this requirement:

(1) To provide a buffer so that the first and last characters of a caption row do not fall outside the safe title area, and

(2) To provide a black border on each side of a character so that the “white” leading pixels of the first character on a row and the trailing “white” pixels of the last character on a row do not bleed into the underlying video.

(i) Since caption windows are required to reside in the safe title area of the DTV screen, reason 1 (above) is not applicable to DTVCC captions.

(ii) The attributes available in the SetPenAttributes command for character rendition (e.g., character background and edge attributes) provide unlimited flexibility to the caption provider when describing caption text in an ideal decoder implementation. However, manufacturers need not implement all pen attributes. Thus it is recommended that no matter what the level of implementation, decoder manufacturers should take into account the readability of all caption text against a variety of all video backgrounds, and should implement some

automatic character delineation when the individual control of character foreground, background and edge is not supported.

(s) *Service synchronization.* Service Input Buffers must be at least 128 bytes in size. Caption providers must keep this lower limit in mind when following Delay commands with other commands and window text. In other words, no more than 128 bytes of DTVCC commands and text should be transmitted (encoded) before a pending Delay command's delay interval expires.

(t) *Settings.* Decoders must include an option that permits a viewer to choose a setting that will display captions as intended by the caption provider (a default). Decoders must also include an option that allows a viewer's chosen settings to remain until the viewer chooses to alter these settings, including periods when the television is turned off.

[65 FR 58471, Sept. 29, 2000, as amended at 69 FR 2849, Jan. 21, 2004]

§ 15.123 Labeling of digital cable ready products.

(a) The requirements of this section shall apply to unidirectional digital cable products. Unidirectional digital cable products are one-way devices that accept a Point of Deployment module (POD) and which include, but are not limited to televisions, set-top-boxes and recording devices connected to digital cable systems. Unidirectional digital cable products do not include interactive two-way digital television products.

(b) A unidirectional digital cable product may not be labeled with or marketed using the term "digital cable ready," or other terminology that describes the device as "cable ready" or "cable compatible," or otherwise indicates that the device accepts a POD or conveys the impression that the device is compatible with digital cable service unless it implements at a minimum the following features:

(1) Tunes NTSC analog channels transmitted in-the-clear.

(2) Tunes digital channels that are transmitted in compliance with SCTE 40 2003 (formerly DVS 313): "Digital Cable Network Interface Standard" (in-

corporated by reference, *see* §15.38), provided, however, that with respect to Table B.11 of that standard, the phase noise requirement shall be -86 dB/Hz including both in-the-clear channels and channels that are subject to conditional access.

(3) Allows navigation of channels based on channel information (virtual channel map and source names) provided through the cable system in compliance with ANSI/SCTE 65 2002 (formerly DVS 234): "Service Information Delivered Out-of-Band for Digital Cable Television" (incorporated by reference, *see* §15.38), and/or PSIP-enabled navigation (ANSI/SCTE 54 2003 (formerly DVS 241): "Digital Video Service Multiplex and Transport System Standard for Cable Television" (incorporated by reference, *see* §15.38)).

(4) Includes the POD-Host Interface specified in SCTE 28 2003 (formerly DVS 295): "Host-POD Interface Standard" (incorporated by reference, *see* §15.38), and SCTE 41 2003 (formerly DVS 301): "POD Copy Protection System" (incorporated by reference, *see* §15.38), or implementation of a more advanced POD-Host Interface based on successor standards. Support for Internet protocol flows is not required.

(5) Responds to emergency alerts that are transmitted in compliance with ANSI/SCTE 54 2003 (formerly DVS 241): "Digital Video Service Multiplex and Transport System Standard for Cable Television" (incorporated by reference, *see* §15.38).

(6) In addition to the requirements of paragraphs (b)(1) through (5) of this section, a unidirectional digital cable television may not be labeled or marketed as digital cable ready or with other terminology as described in paragraph (b) of this section, unless it includes a DTV broadcast tuner as set forth in §15.117(i) and employs at least one specified interface in accordance with the following schedule:

(i) For 480p grade unidirectional digital cable televisions, either a DVI/HDCP, HDMI/HDCP, or 480p Y,Pb,Pr interface:

(A) Models with screen sizes 36 inches and above: 50% of a manufacturer's or importer's models manufactured or imported after July 1, 2004; 100% of such

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models manufactured or imported after July 1, 2005.

(B) Models with screen sizes 32 to 35 inches: 50% of a manufacturer's or importer's models manufactured or imported after July 1, 2005; 100% of such models manufactured or imported after July 1, 2006.

(ii) For 720p/1080i grade unidirectional digital cable televisions, either a DVI/HDCP or HDMI/HDCP interface:

(A) Models with screen sizes 36 inches and above: 50% of a manufacturer's or importer's models manufactured or imported after July 1, 2004; 100% of such models manufactured or imported after July 1, 2005.

(B) Models with screen sizes 25 to 35 inches: 50% of a manufacturer's or importer's models manufactured or imported after July 1, 2005; 100% of such models manufactured or imported after July 1, 2006.

(C) Models with screen sizes 13 to 24 inches: 100% of a manufacturer's or importer's models manufactured or imported after July 1, 2007.

(c) Before a manufacturer's or importer's first unidirectional digital cable product may be labeled or marketed as digital cable ready or with other terminology as described in paragraph (b) of this section, the manufacturer or importer shall verify the device as follows:

(1) The manufacturer or importer shall have a sample of its first model of a unidirectional digital cable product tested to show compliance with the procedures set forth in Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38) at a qualified test facility. The manufacturer or importer shall have any modifications to the product to correct failures of the procedures in Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38) retested at a qualified test facility.

(2) A qualified test facility is a facility representing cable television system operators serving a majority of the cable television subscribers in the United States or an independent laboratory with personnel knowledgeable

with respect to the standards referenced in paragraph (b) of this section concerning the procedures set forth in Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38).

(3) Subsequent to the testing of its initial unidirectional digital cable product model, a manufacturer or importer is not required to have other models of unidirectional digital cable products tested at a qualified test facility for compliance with the procedures of Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38). However, the manufacturer or importer shall ensure that all subsequent models of unidirectional digital cable products comply with the procedures in the Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38) and all other applicable rules and standards. The manufacturer or importer shall maintain records indicating such compliance in accordance with the verification procedure requirements in part 2, subpart J of this chapter. The manufacturer or importer shall further submit documentation verifying compliance with the procedures in the Uni-Dir-PICS-I01-030903: "Uni-Directional Receiving Device: Conformance Checklist: PICS Proforma" (incorporated by reference, *see* §15.38) to a facility representing cable television system operators serving a majority of the cable television subscribers in the United States.

(d) Manufacturers and importers shall provide in appropriate post-sale material that describes the features and functionality of the product, such as the owner's guide, the following language: "This digital television is capable of receiving analog basic, digital basic and digital premium cable television programming by direct connection to a cable system providing such programming. A security card provided by your cable operator is required to view encrypted digital programming.

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Certain advanced and interactive digital cable services such as video-on-demand, a cable operator's enhanced program guide and data-enhanced television services may require the use of a set-top box. For more information call your local cable operator."

[68 FR 66733, Nov. 28, 2003]

§ 15.124 DTV transition notices by manufacturers of televisions and related devices.

(a) Television receivers and related devices manufactured between April 1, 2009, and June 30, 2009, must include notices about the digital television (DTV) transition. Related devices covered by this requirement: All television broadcast receivers as defined in § 15.3(w); TV interface devices as defined in § 15.3(y); devices that record and/or display signals received from television broadcast receivers; and set-top boxes available for sale at retail that receive video programming provided by multi-channel video programming distributors.

(b) The notices required under paragraph (a) of this section must:

- (1) Be in clear and conspicuous print;
- (2) Convey at least the following information about the DTV transition:

(i) The nationwide switch to digital television broadcasting will be complete on June 12, 2009, but your local television stations may switch sooner. After the switch, analog-only television sets that receive TV programming through an antenna will need a converter box to continue to receive over-the-air TV. Watch your local stations to find out when they will turn off their analog signal and switch to digital-only broadcasting. Analog-only TVs should continue to work as before to receive low power, Class A or translator television stations and with cable and satellite TV services, gaming consoles, VCRs, DVD players, and similar products.

(ii) Information about the DTV transition is available from your local television stations, <http://www.DTV.gov>, or 1-888-CALL-FCC (TTY 1-888-TELL-FCC), and from <http://www.dtv2009.gov> or 1-888-DTV-2009 (TTY 1-877-530-2634) for information about subsidized coupons for digital-to-analog converter boxes; and

(3) Explain clearly what effect, if any, the DTV transition will have on the use of the receiver or related device, including any limitations or requirements associated with connecting a related device to a DTV receiver.

(c) This notice requirement applies to all responsible parties, as defined in § 2.909 of this chapter.

[73 FR 28732, May 19, 2008, as amended at 74 FR 8878, Feb. 27, 2009]

Subpart C—Intentional Radiators

§ 15.201 Equipment authorization requirement.

(a) Intentional radiators operated as carrier current systems, devices operated under the provisions of §§ 15.211, 15.213, and 15.221, and devices operating below 490 kHz in which all emissions are at least 40 dB below the limits in § 15.209 shall be verified pursuant to the procedures in Subpart J of part 2 of this chapter prior to marketing.

(b) Except as otherwise exempted in paragraph (c) of this section and in § 15.23 of this part, all intentional radiators operating under the provisions of this part shall be certificated by the Commission pursuant to the procedures in subpart J of part 2 of this chapter prior to marketing.

(c) For devices such as perimeter protection systems which, in accordance with § 15.31(d), are required to be measured at the installation site, each application for certification must be accompanied by a statement indicating that the system has been tested at three installations and found to comply at each installation. Until such time as certification is granted, a given installation of a system that was measured for the submission for certification will be considered to be in compliance with the provisions of this chapter, including the marketing regulations in subpart I of part 2 of this chapter, if tests at that installation show the system to be in compliance with the relevant technical requirements. Similarly, where measurements must be performed on site for equipment subject to verification, a given installation that has been verified to demonstrate compliance with the applicable standards will be considered to be in compliance with the provisions of