of this Commission stating the reasons why the exemption is requested. A list of these departments, agencies, or administrations that have filed requests shall be published in the FEDERAL REGISTER. The Commission may take action with respect to those requests 30 days after publication. The Commission action shall be published in the FEDERAL REGISTER. However, the Commission may grant, on less than the normal notice period or without notice, special temporary authority, not to exceed 90 days, for governmental departments, agencies, or administrations that wish to qualify for interconnection of equipment or security devices pursuant to this section. Requests for such authority shall state the particular fact and circumstances why authority should be granted on less than the normal notice period or without notice. In such cases, the Commission shall endeavor to publish its disposition as promptly as possible in the FEDERAL REGISTER.

(Secs. 4, 5, 303, 48 Stat. 1066, 1068, 1082, as amended (47 U.S.C. 154, 155, 303) (47 U.S.C. 151, 154(i), 154(j), 201–205, 218, 220, 313, 403, 412, and 5 U.S.C. 553)

[40 FR 20841, Mar. 31, 1980, as amended at 49 FR 21734, May 23, 1984; 49 FR 48719, Dec. 14, 1984; 50 FR 48208, Nov. 22, 1985; 51 FR 937, Jan. 9, 1986; 51 FR 16689, May 6, 1986; 61 FR 42387, Aug. 15, 1996; 61 FR 52324, Oct. 7, 1996; 62 FR 24587, May 6, 1997; 62 FR 47371, Sept. 9, 1997]

EFFECTIVE DATE NOTE: At 62 FR 47371, Sept. 9, 1997, §68.2 was amended by adding paragraph (l), effective Oct. 5, 1997.

§ 68.3 Definitions.

As used in this part:

AIOD data channel simulator: A test circuit that simulates a telephone line during the idle and data-receiver-attached conditions of central office AIOD circuits. The schematic of Figure 68.3(g) is illustrative of the type of circuit that will be required; alternative implementations may be used provided that the same dc voltage and current characteristics and ac impedance characteristics will be presented to the AIOD equipment under test. When used, the simulator circuit shall be operated over the entire range of resistance, polarities and voltage limits indicated in Figure 68.3(g). Whenever dc current is changed, sufficient time shall be allocated for the current to reach a steady-state condition before continuing the test.

AIOD leads: Terminal equipment leads at the interface solely to transmit Automatic Identified Outward Dialing (AIOD) data from a PBX to the public switched telephone network or to switched service networks (e.g. EPSCS) so that a telephone company can provide a PBX customer with a detailed monthly bill identifying long distance usage by individual PBX stations, tie trunks or the attendant. Data on the channel is transmitted in only one direction, from the PBX to the central office, and consists of a trunk number and a station number for each outgoing call. Two-way dc simplex signaling, as defined for the terminal equipment by the data channel simulator circuit, is used to coordinate the transmitting and receiving functions. One or more pairs of AIOD leads, each designated T (AI) and R (AI) to distinguish them from other tip and ring leads, may appear at an interface, depending on the number of central offices that process AIOD calls for the PBX. However, unless otherwise stated, these leads at the interface should be treated as telephone connections as defined in (x) of this section or as tip and ring where the term ''telephone connection'' is not used.

Auxiliary leads: Terminal equipment leads at the interface, other than telephone connections and leads otherwise defined in these Rules, which leads are to be connected either to common equipment or to circuits extending to central office equipment.

Central-office implemented telephone: A telephone executing coin acceptance requiring coin service signaling from the central office.

Channel equipment: Equipment in the private line channel of the telephone network that furnishes telephone tip and ring, telphone tip 1 and ring 1, and other auxiliary or supervisory signaling leads for connection at the private line channel interface (where tip 1 and ring 1 is the receive pair for 4-wire telephone connections).

Coin-implemented telephone: A telephone containing all circuitry required to execute coin acceptance and related functions within the instrument itself

and not requiring coin service signaling from the central office.

Coin service: Central office implemented coin telephone service.

Companion terminal equipment: Companion terminal equipment represents the terminal equipment that would be connected at the far end of a network facility and provides the range of operating conditions that the terminal equipment which is being registered would normally encounter.

Continuity leads: Terminal equipment continuity leads at the network interface designated CY1 and CY2 which are connected to a strap in a series jack configuration for the purpose of determining whether the plug associated with the terminal equipment is connected to the interface jack.

Demarcation point: The point of demarcation and/or interconnection between telephone company communications facilities and terminal equipment, protective apparatus or wiring at a subscriber's premises. Carrier-installed facilities at, or constituting, the demarcation point shall consist of wire or a jack conforming to subpart F of part 68 of the Commission's rules. ''Premises'' as used herein generally means a dwelling unit, other building or a legal unit of real property such as a lot on which a dwelling unit is located, as determined by the telephone company's reasonable and nondiscriminatory standard operating practices. The ''minimum point of entry'' as used herein shall be either the closest practicable point to where the wiring crosses a property line or the closest practicable point to where the wiring enters a multiunit building or buildings. The telephone company's reasonable and nondiscriminatory standard operating practices shall determine which shall apply. The telephone company is not precluded from establishing reasonable classifications of multiunit premises for purposes of determining which shall apply. Multiunit premises include, but are not limited to, residential, commercial, shopping center and campus situations.

(a) *Single unit installations.* For single unit installations existing as of August 13, 1990, and installations installed after that date the demarcation point shall be a point within 30 cm (12 in) of the protector or, where there is no protector, within 30 cm (12 in) of where the telephone wire enters the customer's premises, or as close thereto as practicable.

(b) *Multiunit installations.* (1) In multiunit premises existing as of August 13, 1990, the demarcation point shall be determined in accordance with the local carrier's reasonable and non-discriminatory standard operating practices. Provided, however, that where there are multiple demarcation points within the multiunit premises, a demarcation point for a customer shall not be further inside the customer's premises than a point twelve inches from where the wiring enters the customer's premises, or as close thereto as practicable.

(2) In multiunit premises in which wiring is installed after August 13, 1990, including major additions or rearrangements of wiring existing prior to that date, the telephone company may establish a reasonable and nondiscriminatory practice of placing the demarcation point at the minimum point of entry. If the telephone company does not elect to establish a practice of placing the demarcation point at the minimum point of entry, the multiunit premises owner shall determine the location of the demarcation point or points. The multiunit premises owner shall determine whether there shall be a single demarcation point location for all customers or separate such locations for each customer. Provided, however, that where there are multiple demarcation points within the multiunit premises, a demarcation point for a customer shall not be further inside the customer's premises than a point 30 cm (12 in) from where the wiring enters the customer's premises, or as close thereto as practicable.

(3) In multiunit premises with more than one customer, the premises owner may adopt a policy restricting a customer's access to wiring on the premises to only that wiring located in the customer's individual unit that serves only that particular customer.

Digital milliwatt: A digital signal that is the coded representation of a 0 dBm, 1000 Hertz sine wave.

Direct connection: Connection of terminal equipment to the telephone network by means other than acoustic and/or inductive coupling.

E&M leads: Terminal equipment leads at the interface, other than telephone connections and auxiliary leads, which are to be connected to channel equipment solely for the purpose of transferring supervisory signals conventionally known as Types I and II E&M and schematically shown in Figures 68.3(e)(i) and 68.3(a)(ii).

Encoded analog content: The analog signal contained in coded form within a digital signal.

Equivalent power: The power of the analog signal at the output of a zero level decoder, obtained when a digital signal is the input to the decoder.

Essential Telephones: Means only coin-operated telephones, telephones provided for emergency use, and other telephones frequently needed for use by persons using such hearing aids.

Harm: Electrical hazards to telephone company personnel, damage to telephone company equipment, malfunction of telephone company billing equipment, and degradation of service to persons other than the user of the subject terminal equipment, his calling or called party.

Hearing aid compatible: Except as used at §§68.4(a)(3) and 68.414, the terms hearing aid compatible or hearing aid compatibility are used as defined in §68.316, unless it is specifically stated that hearing aid compatibility volume control, as defined in §68.317, is intended or is included in the definition.

Inband signaling private line interface: The point of connection between an inband signaling voiceband private line and terminal equipment or systems where the signaling frequencies are within the voiceband. All tip and ring leads shall be treated as telephone connections for the purposes of fulfilling registration conditions.

Instrument-implemented telephone: A telephone containing all circuitry required to execute coin acceptance and related functions within the instrument itself and not requiring coin service signaling from the central office.

ISDN Basic Rate Interface: A two-wire interface between the terminal equipment and ISDN BRA. The tip and ring leads shall be treated as telephone connections for the purpose of fulfilling registration conditions.

ISDN Primary Rate Interface: A four-wire interface between the terminal equipment and 1.544 Mbps ISDN PRA. The tip, ring, tip-1, and ring-1 leads shall be treated as telephone connections for the purpose of fulfilling registration conditions.

Local area data channel (LADC) leads: Terminal equipment leads at the interface used to transmit and/or receive signals which may require greater-than-voiceband frequency spectrum over private line metallic channels designated Local Area Data Channels (LADC). These leads should be treated as ''telephone connections'' as defined in this section or as tip and ring connections where the term ''telephone connection'' is not used.

Local area data channel simulator circuit: A circuit for connection in lieu of a Local Area Data Channel to provide the appropriate impedance for signal power tests. The schematic of Figure 68.3(k) is illustrative of the type of circuit that will be required over the given frequency ranges. When used, the simulator shall be operated over the appropriate range of loop resistance for the equipment under test, under all voltages and polarities that the terminal under test and a connected companion unit are capable of providing.

Longitudinal voltage: One half of the vector sum of the potential difference between the tip connection and earth ground, and the ring connection and earth ground for the tip, ring pair of 2-wire and 4-wire connections; and, additionally for 4-wire telephone connections, one half of the vector sum of the potential difference between the tip 1 connection and earth ground and the ring 1 connection and earth ground for the tip 1, ring 1 pair (where tip 1 and ring 1 are the receive pair).

Loop simulator circuit. A circuit that simulates the network side of a 2-wire or 4-wire telephone connection during testing. The required circuit schematics are shown in Figure 68.3(a) for 2-wire loop or ground start circuits, Figure 68.3(b) for 2-wire reverse battery circuits, Figure 68.3(c) for 4-wire loop or ground start circuits, Figure 68.3(d) for 4-wire reverse battery circuits, and

Figure 68.3(j) for voiceband metallic channels. Figure 68.3(i) is an alternative termination for use in the 2-wire loop simulator circuits. Other implementations may be used provided that the same dc voltage and current characteristics and ac impedance characteristics will be presented to the equipment under test as are presented in the illustrative schematic diagrams. When used, the simulator shall be operated over the entire range of loop resistance as indicated in the figures, and with the indicated polarities and voltage limits. Whenever loop current is changed, sufficient time shall be allocated for the current to reach a steady-state condition before continuing testing.

Make-busy leads: Terminal equipment leads at the network interface designated MB and MB1. The MB lead is connected by the terminal equipment to the MB1 lead when the corresponding telephone line is to be placed in an unavailable or artificially busy condition.

Message register leads: Terminal equipment leads at the interface used solely for receiving dc message register (MR) pulses from a central office at a PBX so that message unit information normally recorded at the central office only is also recorded at the PBX. Signaling on the channel is by the application of battery and open conditions applied at the central office. No ac signaling is applied either by the PBX or by the central office. One or more pairs of MR leads, each designated T (MR) and R (MR) may appear at an interface depending on the number of PBX–CO trunks (one MR channel per PBX–CO trunk). However, unless otherwise stated, these leads at the interface should be treated at telephone connections as defined in paragraph (x) of this section or as tip and ring where the term ''telephone connection'' is not used.

Message register signaling channel simulator: A circuit that simulates a telephone line (2-wire or single conductor) and a central office message register battery feed circuit used to convey message register information from the central office to a PBX. The schematic of Figure 68.3(h) is illustrative of the type of circuit that will be required; alternative implementation may be used provided that the same dc voltage and current characteristics and ac impedance characteristics will be presented to the message register equipment under test. When used, the simulator circuit shall be operated over the entire range of resistance and voltage values indicated in Figure 68.3(h). Whenever dc current is changed, sufficient time shall be allocated for the current to reach a steady-state condition before continuing the test.

Metallic voltage: The potential difference between the tip and ring connections for the tip, ring pair of 2-wire and 4-wire connections and additionally for 4-wire telephone connections, between the tip 1 and ring 1 connections for the tip 1, ring 1 pair (where tip 1 and ring 1 are the receive pair).

Multi-port equipment: Equipment that has more than one telephone connection with provisions internal to the equipment for establishing transmission paths among two or more telephone connections.

Network port: An equipment port of registered protective circuitry which port faces the telephone network.

Non-system premises wiring: Wiring that is used with up to four-line business and residence services, located at the subscriber's premises.

(a) *Fully protected non-system premises wiring.* Non-system premises wiring which is electrically behind registered (or grandfathered) equipment or protective circuitry which assures that electrical contact between the wiring and commercial power wiring or earth ground will not result in hazardous voltages at the telephone network interface.

(b) *Unprotected non-system premises wiring:* All other non-system premises wiring.

Off-premises line simulator circuit: A load impedance for connection, in lieu of an off-premises station line, to PBX (or similar) telephone system loop start circuits (Figure 68.3(f)) during testing. The schematic diagram of Figure 68.3(f) is illustrative of the type of circuit which will be required; alternative implementations may be used provided that the same dc voltage and current characteristics and ac impedance characteristics will be presented

to the equipment under test as are presented in the illustrative schematic diagram. When used, the simulator shall be operated over the entire range of loop resistances as indicated in Figure 68.3(f), and with the indicated polarities. Whenever loop current is changed, sufficient time shall be allocated for the current to reach a steady-state condition before continuing testing.

Off-premises station interface: The point of connection between PBX telephone systems (or similar systems) and telephone company private line communication facilities used to access registered station equipment located off the premises. Equipment leads at this interface are limited to telephone tip and ring leads (designated T(OPS) and R(OPS)) where the PBX employs loop-start signaling at the interface. Unless otherwise noted, all T(OPS) and R(OPS) leads shall be treated as telephone connections for purposes of fulfilling registration conditions.

One-port equipment: Equipment which has either exactly one telephone connection, or a multiplicity of telephone connections arranged so that no transmission among such telephone connections, within the equipment, is intended.

Power connections: The connections between commercial power and any transformer, power supply rectifier, converter or other circuitry associated with registered terminal equipment or registered protective circuitry. The following are not power connections.

(a) Connections between registered terminal equipment or registered protective circuitry and sources of non-hazardous voltages (see § 68.306(b)(4) for a definition of non-hazardous voltages).

(b) Conductors which distribute any power within registered terminal equipment or within registered protective circuitry.

(c) Green wire ground (the grounded conductor of a commercial power circuit which is UL-identified by a continuous green color).

Private line channel: Telephone company dedicated facilities and channel equipment used in furnishing private line service from the telephone network for the exclusive use of a particular party or parties.

Private Radio Services: Means private land mobile radio services and other communications services characterized by the Commission in its rules as private radio services.

PSDS Type II Analog Mode Loop Simulator Circuit: A circuit simulating the network side of the two-wire telephone connection that is used for testing terminal equipment to be connected to the PSDS Type II loops. Figure 68.3(m) shows the type of circuit required. Other test circuit configurations may be used provided they operate at the same DC voltage and current characteristics and AC impedance characteristics presented in the illustrated circuit. When utilized, the simulator should be operated over the entire range of loop resistances, and with the indicated voltage limits and polarities. Whenever the loop current is changed, sufficient time shall be allowed for the current to reach a steady-state condition before continuing testing.

Public Mobile Services: Means air-to-ground radiotelephone services, cellular radio telecommunications services, offshore radio, rural radio service, public land mobile telephone service, and other common carrier radio communications services covered by part 22 of title 47 of the Code of Federal Regulations.

Public Switched Digital Service Type I (PSDS Type I): This service functions only in a digital mode. It employs a transmission rate of 56 Kbps on both the transmit and receive pairs to provide a four-wire full duplex digital channel. Signaling is accomplished using bipolar patterns which include bipolar violations.

Public Switched Digital Service Type II (PSDS Type II): This service functions in two modes, analog and digital. Analog signaling procedures are used to perform supervisory and address signaling over the network. After an end-to-end connection is established, the Switched Circuit Data Service Unit (SCDSU) is switched to the digital mode. The time compression multiplexing (TCM) transmission operated at a digital transmission speed of 144 Kbps to provide full-duplex 56 Kbps on the two-wire access line.

Public Switched Digital Service Type III (PSDS Type III): This service functions

only in a digital mode. It uses a time compression multiplexing (TCM) rate of 160 Kbps, over one pair, to provide two full-duplex channels—an 8 Kbps signaling channel for supervisory and address signaling, and a 64 Kbps user data channel on a two-wire access line.

Registered protective circuitry: Separate, identifiable and discrete electrical circuitry designed to protect the telephone network from harm, which is registered in accordance with the rules and regulations in Subpart C of this part.

Registered terminal equipment: Terminal equipment which is registered in accordance with the rules and regulations in Subpart C of this part.

Ringdown private line interface: The point of connection between ringdown voiceband private line service and terminal equipment or systems which provide ringing (20 or 30 Hz) in either direction for alerting only. All tip and ring leads shall be treated as telephone connections for the purposes of fulfilling registration conditions. On 2-wire circuits the ringing voltage is applied to the ring conductor with the tip conductor grounded. On 4-wire circuits the ringing voltage is simplexed on the tip and ring conductors with ground simplexed on the tip (1) and ring (1) conductors.

Secure Telephones: Means telephones that are approved by the United States Government for the transmission of classified or sensitive voice communications.

Specialty adapters: Adapters that contain passive components such as resistive pads or bias resistors typically used for connecting data equipment having fixed-loss loop or programmed data jack network connections to key systems or PBXs.

Subrate digital service: A digital service providing for the full-time simultaneous two-way transmission of digital signals at synchronous speeds of 2.4, 4.8, 9.6 or 56 kbps.

Switched Circuit Data Service Unit (SCDSU): A CPE device, with PSDS functionality, located between the Network Interface and the data terminal equipment. (It also is sometimes referred to as Network Channel Terminating Equipment).

System premises wiring: Wiring which connects separately-housed equipment entities or system components to one another, or wiring which connects an equipment entity or system component with the telephone network interface, located at the customer's premises and not within an equipment housing.

(a) *Fully protected systems premises wiring.* Premises wiring which is either:

(1) No greater than 15 meters (50 feet) in length (measured linearly between the points where it leaves equipment or connector housings) and registered as a component of and supplied to the user with the registered terminal equipment or protective circuitry with which it is to be used. Such wiring shall either be pre-connected to the equipment or circuitry, or may be so connected by the user (or others) if it is demonstrated in the registration application that such connection by the untrained will not result in harm, using relatively fail-safe means.

(2) A cord which complies with the previous subsection either as an integral length or in combination with no more than one connectorized extension cord. If used, the extension cord must comply with the requirements of §68.200(h) of these Rules.

(3) Wiring located in an equipment room with restricted access, provided that this wiring remains exposed for inspection and is not concealed or embedded in the building's structure, and that it conforms to §68.215(d).

(4) Electrically behind registered (or grandfathered) equipment, system components or protective circuitry which assure that electrical contact between the wiring and commercial power wiring or earth ground will not result in hazardous voltages or excessive longitudinal imbalance at the telephone network interface.

(b) *Protected system premises wiring requiring acceptance testing for imbalance.* Premises wiring which is electrically behind registered (or grandfathered) equipment, system components or circuitry which assure that electrical contact between the wiring and commercial power wiring will not result in hazardous voltages at the telephone network interface.

(c) *Unprotected system premises wiring.* All other premises wiring.

Telephone connection: Connection to telephone network tip and ring leads for 2-wire and 4-wire connections and, additionally, for 4-wire telephone connections, tip 1 and ring 1 leads and all connections derived from these leads. The term ''derived'' as used here means that the connections are not separated from telephone tip and ring or from telephone tip 1 and ring 1 by a sufficiently protective barrier. Part 68 Rules that apply specifically to telephone network tip and ring pairs shall also apply to telephone network tip 1 and ring 1 pairs unless otherwise specified. In 4-wire connections, leads designated tip and ring at the interface are for transmitting voice frequencies toward the network and leads designated tip 1 and ring 1 at the interface are for receiving voice frequencies from the network.

Telephone network: The public switched network and those private lines which are defined in §68.2(a) (2) and (3).

Terminal port: An equipment port of registered protective circuitry which port faces remotely-located terminal equipment.

Test Equipment: Equipment connected at the customer's premises that is used on the customer's side of the network interfaces to measure characteristics of the telephone network, or to detect and isolate a communications fault between a terminal equipment entity and the telephone network. Registration is required for test equipment capable of functioning as portable traffic recorded or equipment capable of transmitting or receiving test tones; except registration is not required for devices used by telephone companies solely for network installation and maintenance activities such as hand-held data terminals, linesmen's handsets, and subscriber line diagnostic devices.

Tie trunk transmission interfaces.

(a) 2-Wire: A 2-wire transmission interface with a path that is essentially lossless (except for 2dB switched pad operation, or equivalent) between the interface and the 2-wire or 4-wire, transmission reference point of the terminal equipment.

(b) 4-Wire lossless: A 4-wire transmission interface with a path that is essentially lossless (except for 2dB switched pad operation, or equivalent) between the interface and the 2-wire or 4-wire transmission reference point of the terminal equipment; and

(c) 4-Wire Conventional Terminating Set (CTS): A 4-wire interface with a path to the transmission reference point that has a conventional terminating set providing 2-wire to 4-wire conversion with approximately 4dB of loss and having no gain elements. This device's loss will be referred to as a ''nominal'' 4dB, but in no case is it allowed to be less than 3dB.

(d) Direct Digital Interface: An interface between a digital PBX and a digital transmission facility.

(e) Digital Tandem 4-Wire Interface: A 4-wire digital interface between digital terminal equipment and a digital transmission facility operating at 1.544 Mbps or subrate connecting terminal equipment that provide tandem connections.

(f) Digital Satellite 4-wire Interface: A 4-wire digital interface between digital terminal equipment and a digital transmission facility operating at 1.544 Mbps or subrate connecting terminal equipment that does not provide tandem connections to other digital terminal equipment.

Voiceband metallic private line channel interface: The point of connection between a voiceband metallic private line channel and terminal equipment or systems where the network does not provide any signaling or transmission enhancement. Registered terminal equipment or systems may use convenient signaling methods so long as the signals are provided in such a manner that they cannot interfere with adjacent network channels. All tip and ring leads shall be treated as telephone connections for the purpose of fulfilling registration conditions.

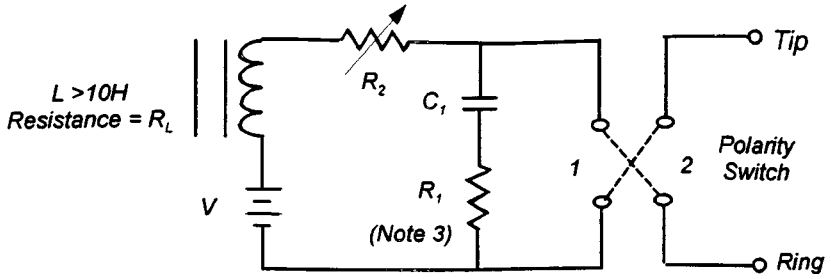
Zero level decoder: A decoder that yields an analog level of 0 dBm at its output when the input is the digital milliwatt signal. See Figure 68.3(l).

1.544 Mbps digital CO 4-wire interface: A 4-wire digital interface between digital terminal equipment and a digital transmission facility operating at 1.544 Mbps connecting to a serving central office.

1.544 Mbps digital service: A full-time dedicated private line circuit used for

the transmission of digital signals at a speed of 1.544 Mbps.

LOOP SIMULATOR FOR LOOP START AND GROUND START CIRCUITS



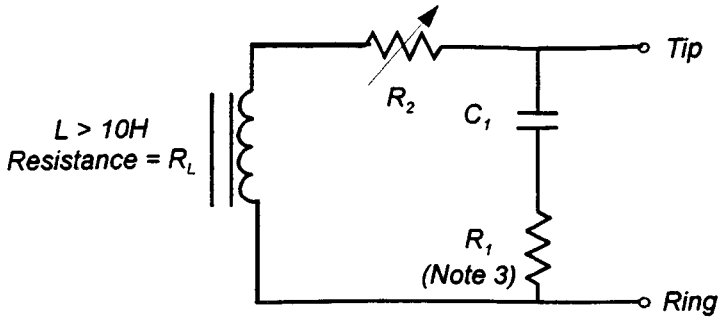
C_1 = 500 mfd -10% + 50% R_1 = 600 ohms +/- 1%

Condition	V - Volts	Switch Position for Test	$R_2 + R_L$
1	Min 42.5 Max 56.5	Both	Continuously variable over 400 to 1740 ohms
2	105	2	2000 ohms

1. Means shall be used to generate, at the point of tip and ring connections to the terminal equipment or protective circuitry, the paramenters of dc line current and ac impedance which are generated by the illustrative circuit depicted above (as appropriate for the equipment under test).
2. In the Longitudinal Balance Limitations, Section 68.310, the use of the "dc portion of the loop simulator circuit" is specified. In such case components of R_1 and C_1 should be removed.
3. Tests for compliance may be made with either R_1 = 600 ohms or R_1 replaced by the alternative configuration shown in Figure 68.3(i).

Figure 68.3(a)

Loop Simulator for Reverse Battery Circuits



C_1 = 500 mFd -10% + 50%

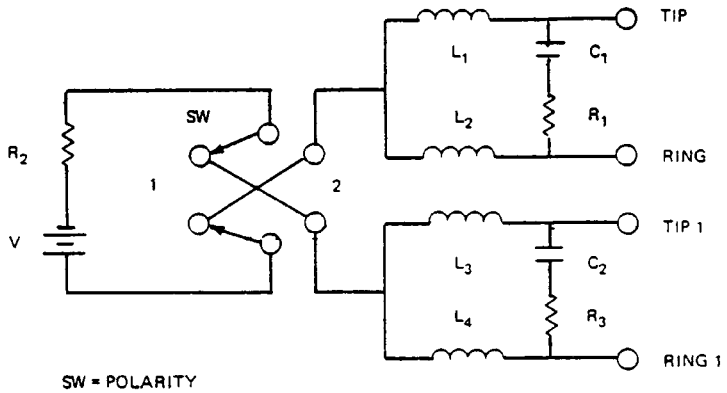
R_1 = 600 ohms +/- 1%

Notes for Figure 68.3(a) apply also to this drawing

$R_2 + R_L$
Continuously variable over 400 to 2450 ohms

Figure 68.3(b)

LOOP SIMULATOR CIRCUIT FOR 4-WIRE
LOOP START AND GROUND START



SW = POLARITY SWITCH

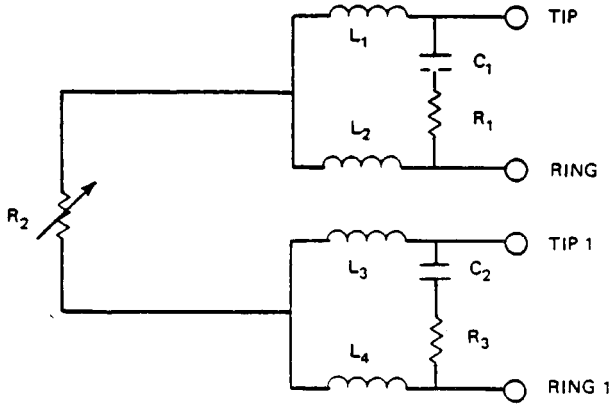
$L_1 = L_2 = L_3 = L_4 \geq 5H$ (RESISTANCE = R_{L1}, R_{L2}, R_{L3}, R_{L4})
$R_1 = R_3 = 600$ OHMS, ± 1%
$C_1 = C_2 = 500\mu FD$, −10%, + 50%

CONDITION	V VOLTS		SWITCH POSITION FOR TEST	$R_2 + R_L$ *
1	MIN 42.5	MAX 56.5	BOTH	CONTINUOUSLY VARIABLE OVER 400 TO 1740 Ω
2	105		2	2000Ω

$$R_L = \frac{R_{L1} R_{L2}}{R_{L1}+R_{L2}} + \frac{R_{L3} R_{L4}}{R_{L3}+R_{L4}}$$

FIGURE 68.3(C)

LOOP SIMULATOR CIRCUIT FOR 4-WIRE REVERSE BATTERY CIRCUITS



$L_1 = L_2 = L_3 = L_4 \geq 5H$ (RESISTANCE = R_{L1}, R_{L2}, R_{L3}, R_{L4})
$R_1 = R_3 = 600$ OHMS, ± 1%
$C_1 = C_2 = 500\mu FD$, -10%, + 50%

$R_2 + R_L$
CONTINUOUSLY VARIABLE OVER 400 TO 2450Ω

$$R_L = \frac{R_{L1} R_{L2}}{R_{L1} + R_{L2}} + \frac{R_{L3} R_{L4}}{R_{L3} + R_{L4}}$$

FIGURE 68.3(D)

REGISTERED TERMINAL EQUIPMENT
ON "A" SIDE OF INTERFACE

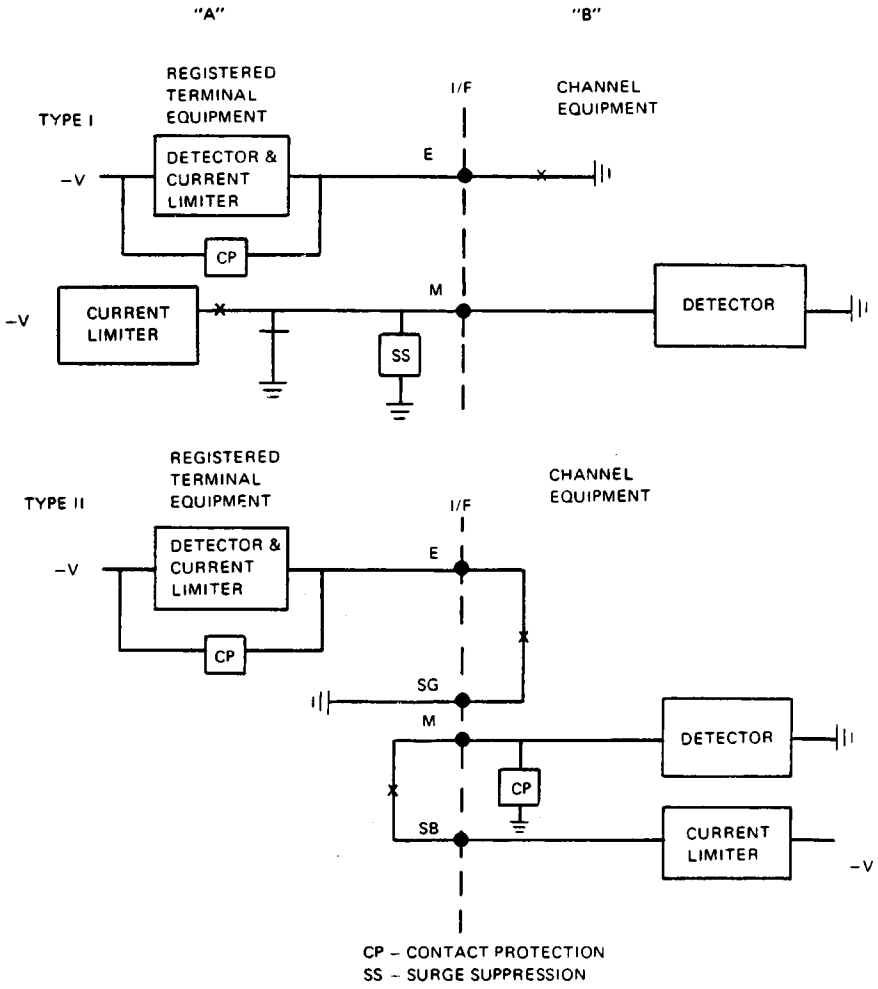


FIGURE 68.3 (e) (i)
E&M TYPES I & II SIGNALING

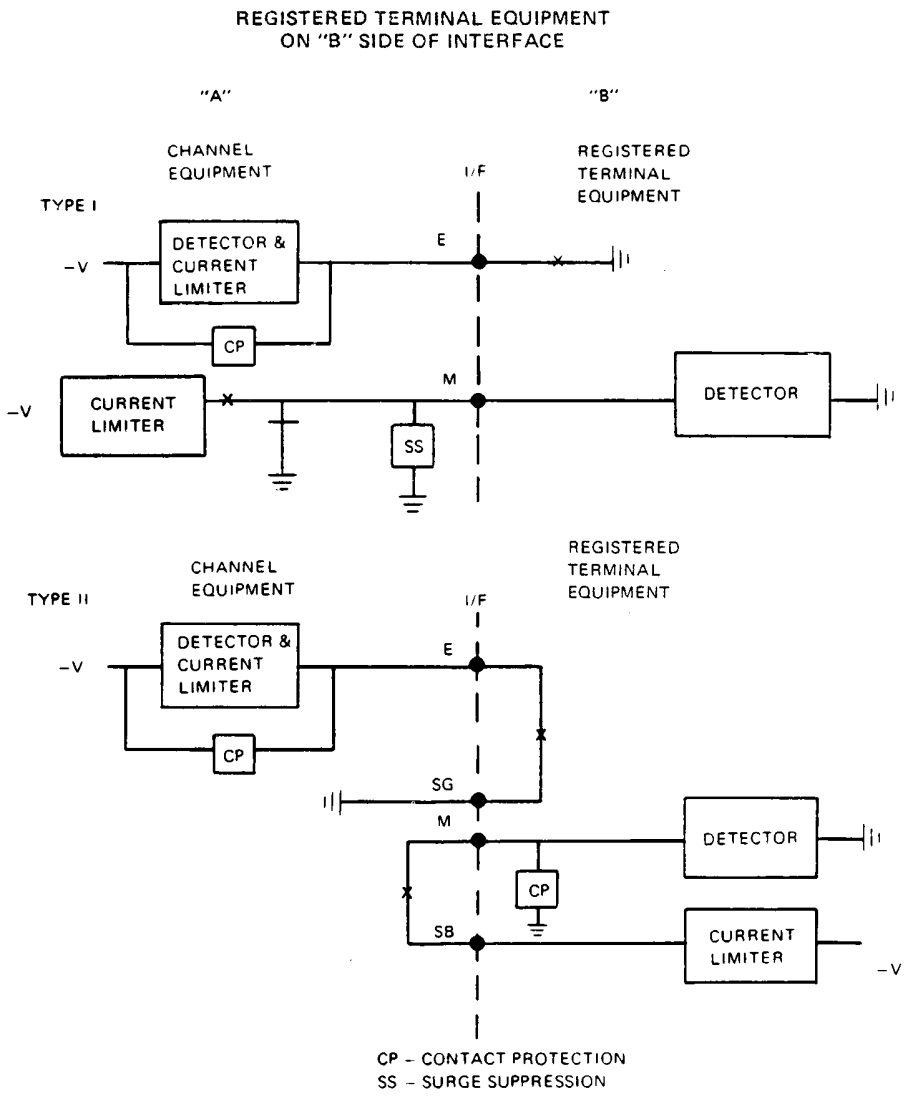
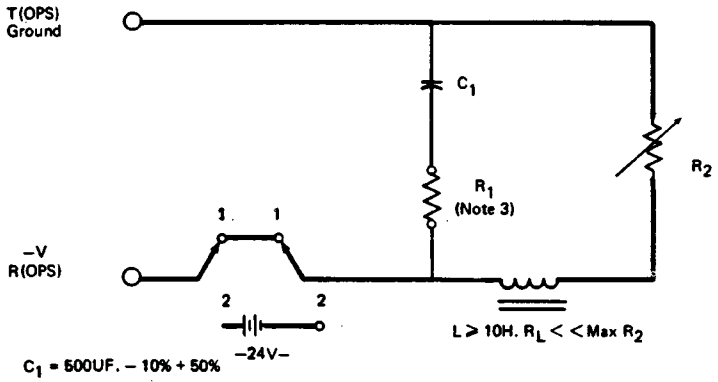


FIGURE 68.3 (e) (i)
E&M TYPES I & II SIGNALING

- 8 -

OFF-PREMISES LOOP SIMULATOR



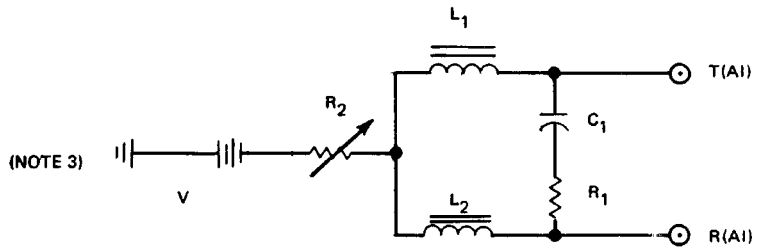
Condition	Switch Position For Test	$R_2 + R_L$ Continuously Variable Over The Following Range		
		Class A	Class B	Class C
1	1	R_L To 200Ω	R_L To 800Ω	R_L To 1800Ω
2	2	Not Applicable	200 To 2300Ω	900 To 3300Ω

The minimum dc current present for all resistance ranges of conditions 1 and 2 shall be 16 ma.

NOTES:

1. Means shall be used to generate, at the point of tip (T OPS) and ring (R OPS) connections to the PBX, the range of resistance and impedance which are employed by the illustrative circuit depicted above.
2. In the longitudinal balance limitations, Section 68.310, the use of the "dc portion of the line simulator" is specified. In such case, components R_1 and C_1 above shall be removed.
3. Tests for compliance may be made with either R_1 = 600 ohms or R_1 replaced by the alternative termination shown in Figure 68.3(i).

Figure 68.3(f)



$L_1 = L_2 \geq 5H$

$R_1 = 600\Omega \pm 1\%$ (NOTE 2)

$C_1 = 500\mu F, -10\%, +50\%$

OPERATING STATE	V. VOLTS MAX.	V. VOLTS MIN.	$R_2 + R_L$.* OHMS (NOTE 5)
1	+3 (NOTE 4)	−3 (NOTE 4)	600-1400
2	+3	−3	600-1400
3	−59.5	−39.5	300-1400

$$*R_L = \frac{R_{L1}R_{L2}}{R_{L1}+R_{L2}}$$

NOTES:

1. Means shall be provided to generate, at the point of T(AI) and R(AI) connections to the PBX, the dc line current and impedance values that are employed by the illustrative circuit depicted above.

2. For signal power measurements in 68.308 (d) and (e) other than voiceband metallic and in the 3995 to 4005 hertz band, use resistive terminations specified in place of R_1.

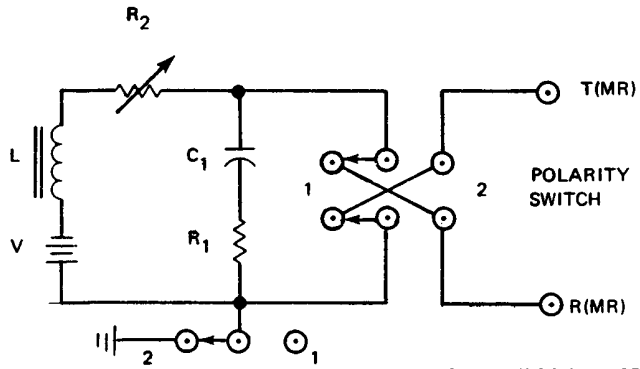
3. Ground lead should be bonded to simplex signaling ground of registered terminal equipment.

4. The ±3-volt battery shall be used to extend the range of total battery applied to an overall circuit. Thus, if the registered terminal equipment condition provides -42.5 to -56.5 volts, the overall circuit (simulator and PBX AIOD) shall be tested over a range of -39.5 to 59.5 volts.

5. Continuously variable over the range specified.

FIGURE 68.3 (g)

AIOD DATA CHANNEL SIMULATOR CIRCUIT



CONDITION	V, VOLTS		POLARITY SWITCH POSITION	MODE SWITCH POSITION	$R_2 + R_L$ OHMS (NOTE 4)
	MIN	MAX			
1	42.5	56.5	BOTH	1	250-1450
2	39.5	59.5	BOTH	2	250- 850
3	63.5	83.5	BOTH	1	1450-2650

NOTES:

1. Means shall be used to generate, at the point of T(MR) and R(MR) connections to the PBX, the range of resistance and impedance values that are employed by the illustrative circuit depicted above.

2. Mode switch position 1 is for metallic return operation; mode switch position 2 is for ground return operation.

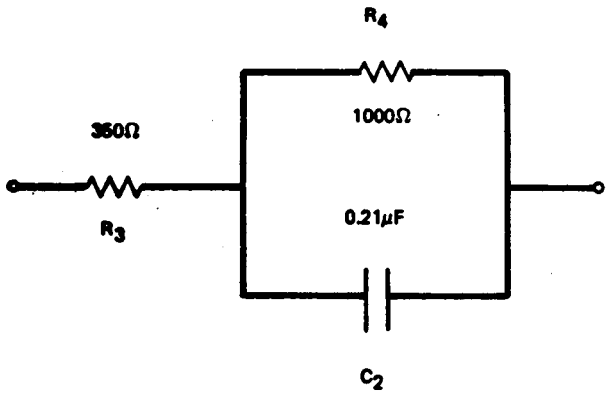
3. For signal power measurements specified in 68.308, use Figures 68.308 (b) and (c) for R_1.

4. Continuously variable over range shown.

FIGURE 68.3 (h)

MESSAGE REGISTER SIGNALING CHANNEL SIMULATOR

ALTERNATIVE TERMINATION



$R_3 = 350\Omega \pm 1\%$

$R_4 = 1000\Omega \pm 1\%$

$C_2 = 0.21\mu F \pm 1\%$

NOTE:

When this alternative termination is used during signal power compliance testing, it replaces R_1 (600Ω) in the loop simulator circuit.

Figure 68.3(i)

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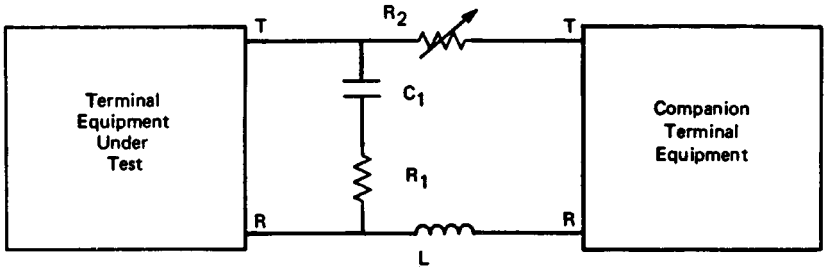
LOOP SIMULATOR CIRCUIT VOICEBAND METALLIC CHANNELS



C_1 = 500μF -10%, +5%
R_1 = 600 OHMS ± 1%
L > 10H., Resistance = R_L

$R_2 + R_L$
Continually Variable From R_L To R_X

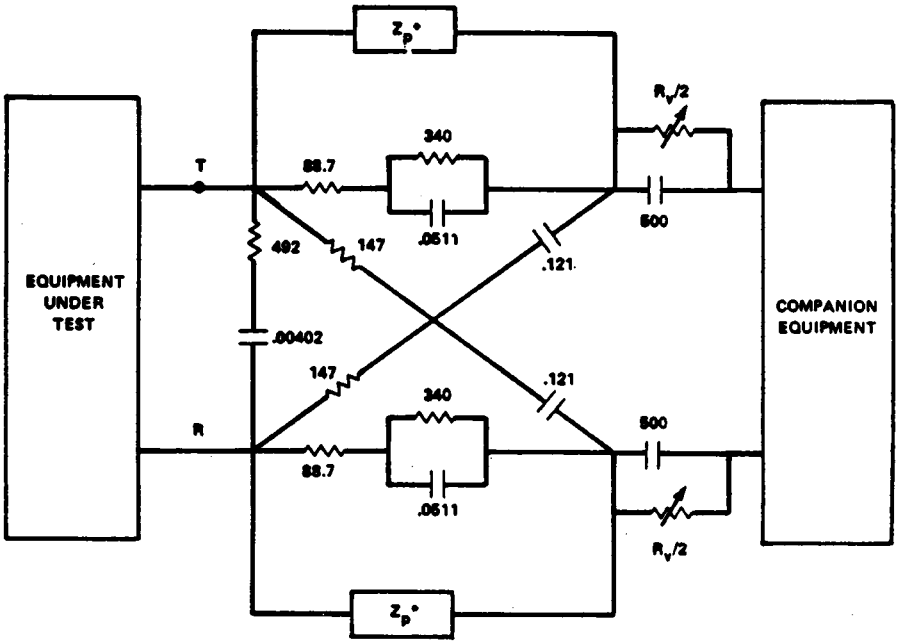
Where: R_X = Signaling Range Of Terminal Equipment Under Test And,
$R_L << R_X$

NOTES:

1. For Longitudinal Balance Measurements (Section 68.310), The DC Portion Of The Loop Simulator Should Be Provided By Removing R_1 And C_1. Companion Terminal Equipment Grounds (Including Power Supplies) Must Be Isolated From Longitudinal Balance Circuit Grounds.

Figure 68.3 (j)

10a



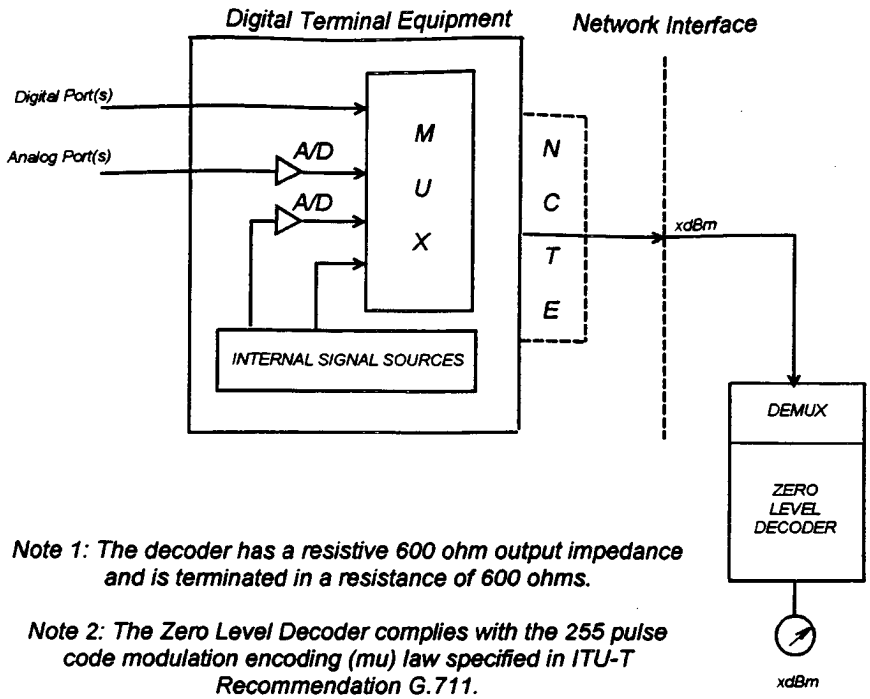
RESISTANCES (OHMS), CAPACITANCES (μF) TOLERANCES ± 2%

$R_v + R_p$ = 50 THRU 3000 OHMS

*Z_p = MAGNITUDE OF THE LOW PASS FILTER IMPEDANCE $\begin{cases} < & 25\ \Omega\ DC \\ > & 3\ K\Omega\ 10\ Hz - 6\ Hz \end{cases}$

(R_p) ½ = DC RESISTANCE OF LOW PASS FILTER $Z_p \parallel 428.7\ \Omega$

FIGURE 68.3 (K) LADC IMPEDANCE SIMULATOR FOR METALLIC VOLTAGE TESTS.

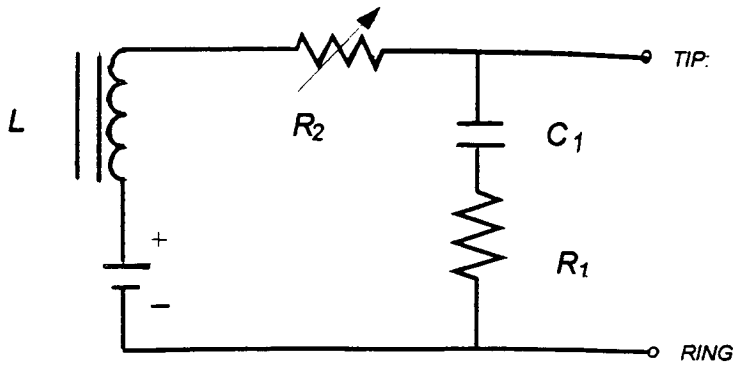


Note 1: The decoder has a resistive 600 ohm output impedance and is terminated in a resistance of 600 ohms.

Note 2: The Zero Level Decoder complies with the 255 pulse code modulation encoding (mu) law specified in ITU-T Recommendation G.711.

ZERO-LEVEL DECODER TEST CONFIGURATION FOR SUBRATE AND 1.544 MBPS DIGITAL CHANNELS

Figure 68.3 (l)



$L \geq 10H$ (Resistance = R_L)

R_1 = 600 ohms +/- 1%

C_1 = 500mF, -10%, +50%

TEST CONDITIONS FOR ANALOG MODE

V (volts)		R2 + RL (ohms)
Min	Max	continuously variable
36	46	610 to 1510

SIMULATOR CIRCUIT FOR PSDS IN ANALOG MODE Fig 68.3(m)

[45 FR 20841, Mar. 31, 1980, as amended at 46 FR 40192, Aug. 7, 1981; 49 FR 21734, May 23, 1984; 49 FR 48720, Dec. 14, 1984; 50 FR 48208, Nov. 22, 1985; 51 FR 937, Jan. 9, 1986; 54 FR 21430, May 18, 1989; 55 FR 28629, July 12, 1990; 58 FR 44907, Aug. 25, 1993; 61 FR 42186, Aug. 14, 1996; 61 FR 42387, Aug. 15, 1996; 61 FR 52324, Oct. 7, 1996; 62 FR 36464, July 8, 1997]