ANSI/SMPTE 207M-1997
Revision of
ANSI/SMPTE 207M-1992

SMPTE STANDARD

for Television — Digital Control Interface — Electrical and Mechanical Characteristics

1 General

1.1 Scope

This standard defines the electrical and mechanical characteristics of an interface system comprised of a general-purpose communication channel and interface device(s) used for the transfer of data and digital control signals between equipment utilized in the production, post-production, and/or transmission of visual and aural information. It is intended that the communication channel and device(s) described in this standard be part of an overall equipment interface, allowing interconnection of programmable and nonprogrammable control and accessory equipment as required to configure an operational system with a defined function. The standard is also intended to allow rapid reconfiguration of a system providing more than one defined function utilizing a given group of equipment.

1.1.1 The electrical and mechanical specifications set forth in this standard are intended for use in both fixed plant and field operational environments. These specifications take into account the requirement to function reliably without causing undue interference with other signals normally found in these environments.

1.1.2 This standard defines the electrical and mechanical characteristics of the communication channel and the associated interface device(s), to the exclusion of design specifications, performance requirements, safety requirements, and the communications protocol used in or by such equipment.

1.1.3 The primary intent of this standard is to establish an electrical and mechanical interface and communication channel for the purpose of interconnecting equipment by external means. This standard, or sections thereof, may be applied to the interconnection of elements within an item of equipment.

1.2 Definitions

For the purposes of this standard, the following definitions shall apply:

1.2.1 equipment: Either a single device which connects to the interface system or a group of interconnected devices, providing a specified operational function, having one common connection to the interface system.

1.2.2 interface bus: Refers to the communication channel.

1.3 Object

The intent of this standard is to:

– Define a general-purpose interface system for use in the environment specified in 1.1;

– Specify equipment-independent electrical, mechanical, and functional interface characteristics which permit equipment to connect and communicate unambiguously via the interface system;

– Specify terminology and definitions related to the electrical and mechanical portion of the interface system;

– Enable the interconnection of independently manufactured equipment into a single functional system;

– Permit equipment with a wide range of operational capabilities to be connected to the interface system simultaneously;

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– Define a system which is user configurable;

– Define a system based on readily obtainable standard components.

1.4 Interface system overview

1.4.1 This standard applies to systems, or portions of systems, which have the following characteristics:

– A full-duplex four-wire communications channel is utilized;

– A nominal maximum bus length of 1220 m (4003 ft);

– Data is transmitted asynchronously, bit serial/word serial;

– Standard transmission rate on the interface bus is 38.4 kilobits per second (kb/s);

– Data exchange between devices is digital (as distinct from analog).

1.4.2 The function of the interface system is to provide an effective communications link over which messages are carried in an unambiguous way among a group of interconnected devices.

1.4.3 The interface system described in this standard assigns one of two operational characteristics to all devices:

1.4.3.1 Bus controller

Each interface system contains one bus controller which supervises all tributaries in the system. This supervision is exercised through the use of interface protocol. The bus controller may also perform one or more functions in the operational plant in addition to its interface supervision. Although only one bus controller may be part of any particular interface system, it is recognized that an operational plant may make use of more than one interface system.

1.4.3.2 Tributary

A tributary transfers messages to and from an operational device via the interface system as specified in the interface system protocol. A tributary communicates messages through the interface bus only via the bus controller.

1.4.4 The basic message paths and the bus structure shall be as follows:

The basic message path utilizes asynchronous, bit serial/word serial transmission via a balanced wire pair.

The interface bus may be utilized in either point-to-point or multipoint configuration including but not limited to:

– A point-to-point bus connecting one tributary to a bus controller;

– A multipoint bus connecting multiple tributaries to a single bus controller.

The interface bus is a four-wire configuration which will effect two-way communication using a separate wire pair for each transmission direction; communication between tributaries is accomplished through the bus controller.

1.4.5 The data word and BREAK character utilized by the interface system shall be as follows:

The standard serial data word includes an eight-bit data byte; the complete serial data word consists of one start bit (SPACE), eight data bits (ONE BYTE), a parity bit (EVEN), and one stop bit (MARK). The least significant bit is transmitted first.

A BREAK character, comprising 17-21 bits SPACE followed by a subsequent return to the MARK condition, is utilized to synchronize all devices connected to the interface bus.

A SPACE in excess of 21 bits shall be treated as an ERROR condition.

2 Electrical characteristics

2.1 Interface circuit

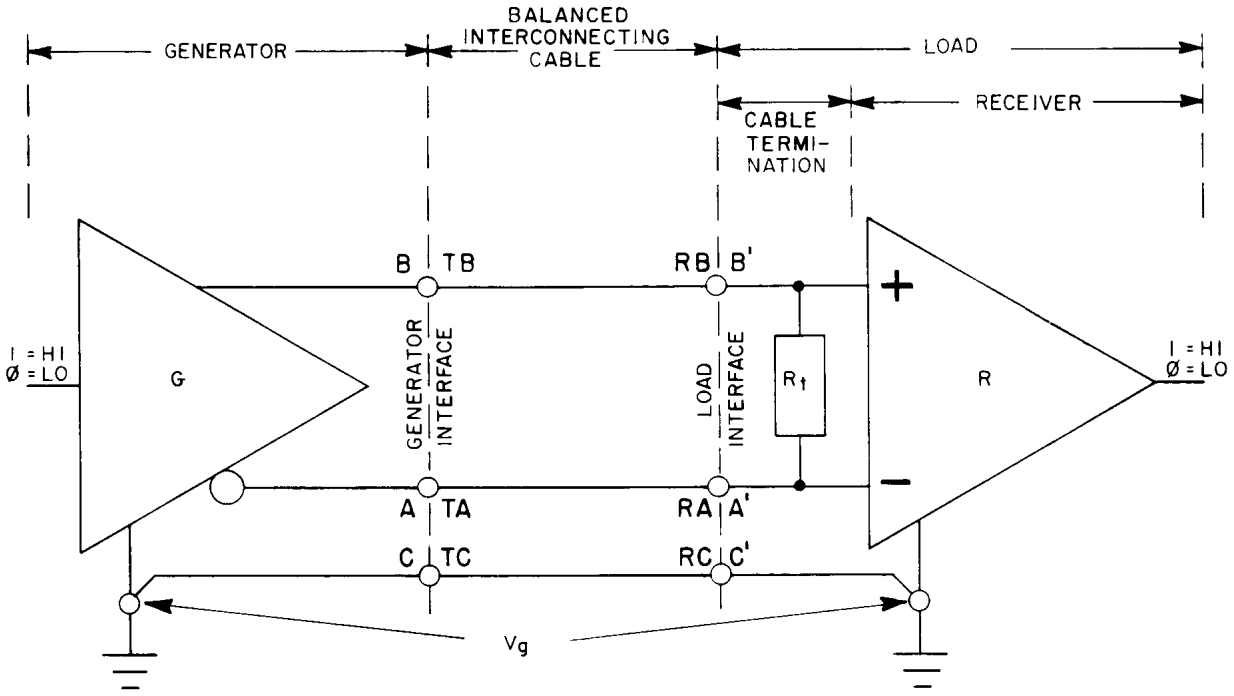
The balanced voltage digital interface circuit is shown in figure 1. The circuit consists of three parts: the generator, the balanced interconnecting cable, and the load. The load may consist of one or more receivers (R) and an optional cable termination resistance (R_t). The electrical characteristics of the generator

and receiver are specified in terms of direct electrical measurements while the interconnecting cable is specified in terms of its electrical and physical characteristics.

2.2 Generator characteristics

The electrical characteristics of the generator are specified in accordance with measurements described in 2.2.1 through 2.2.6 and illustrated in figures 2 and 3. A generator circuit meeting these requirements results in a low impedance (100 ohms or less) balanced voltage source producing a differential voltage applied to the interconnecting cable in the range of 2 to 6 volts. The signalling sense of the voltages appearing across the interconnecting cable are defined as follows:

The B terminal of the generator shall be positive with respect to the A terminal for a binary 1 (MARK) state.



LEGEND

R_t	=	CABLE TERMINATION RESISTANCE
V_g	=	GROUND POTENTIAL DIFFERENCE
A, B	=	GENERATOR INTERFACE POINTS
A', B'	=	LOAD INTERFACE POINTS
C	=	GENERATOR CIRCUIT GROUND
C'	=	LOAD CIRCUIT GROUND

Figure 1 – Balanced digital interface circuit

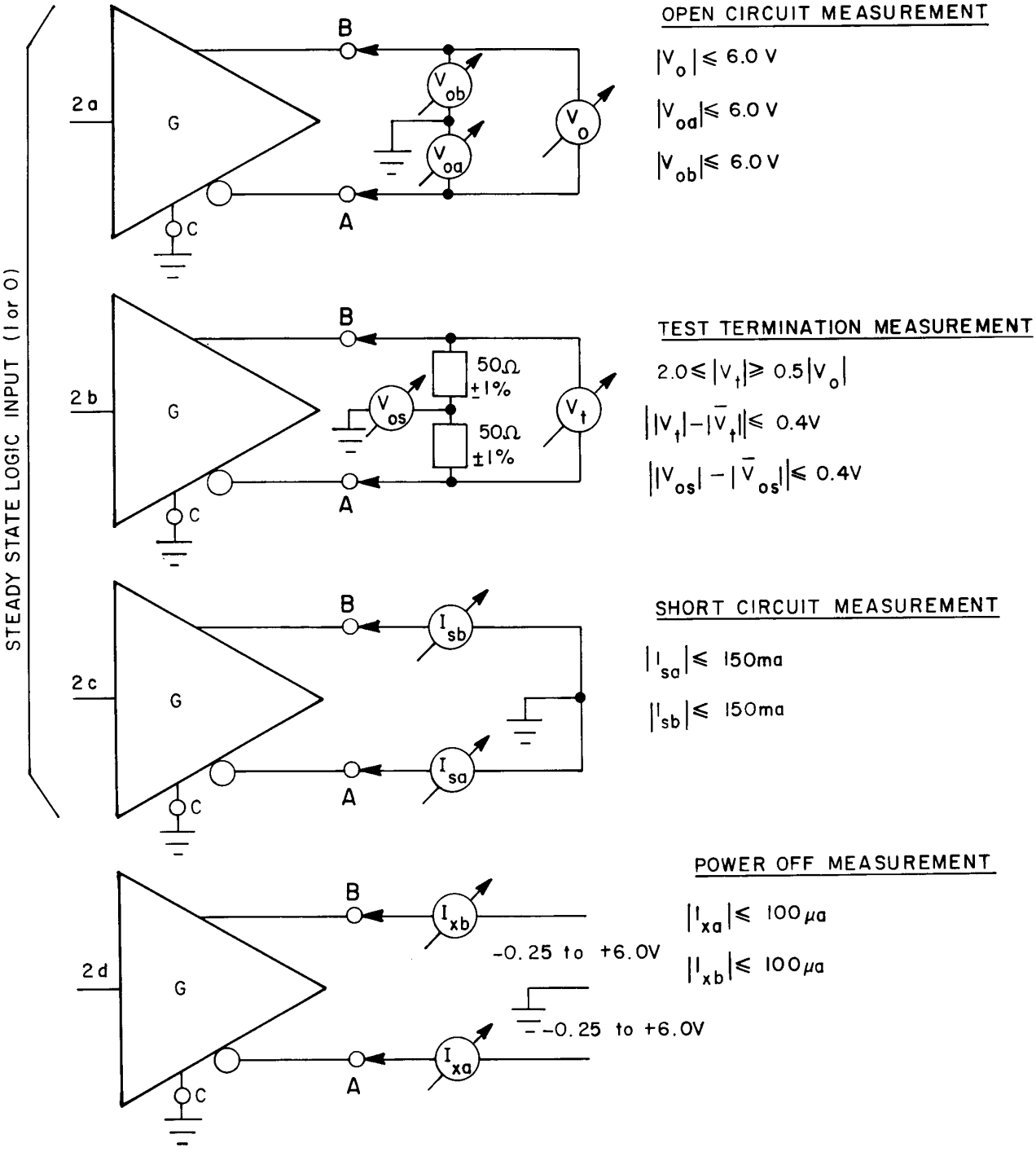


Figure 2 – Generator parameter measurement