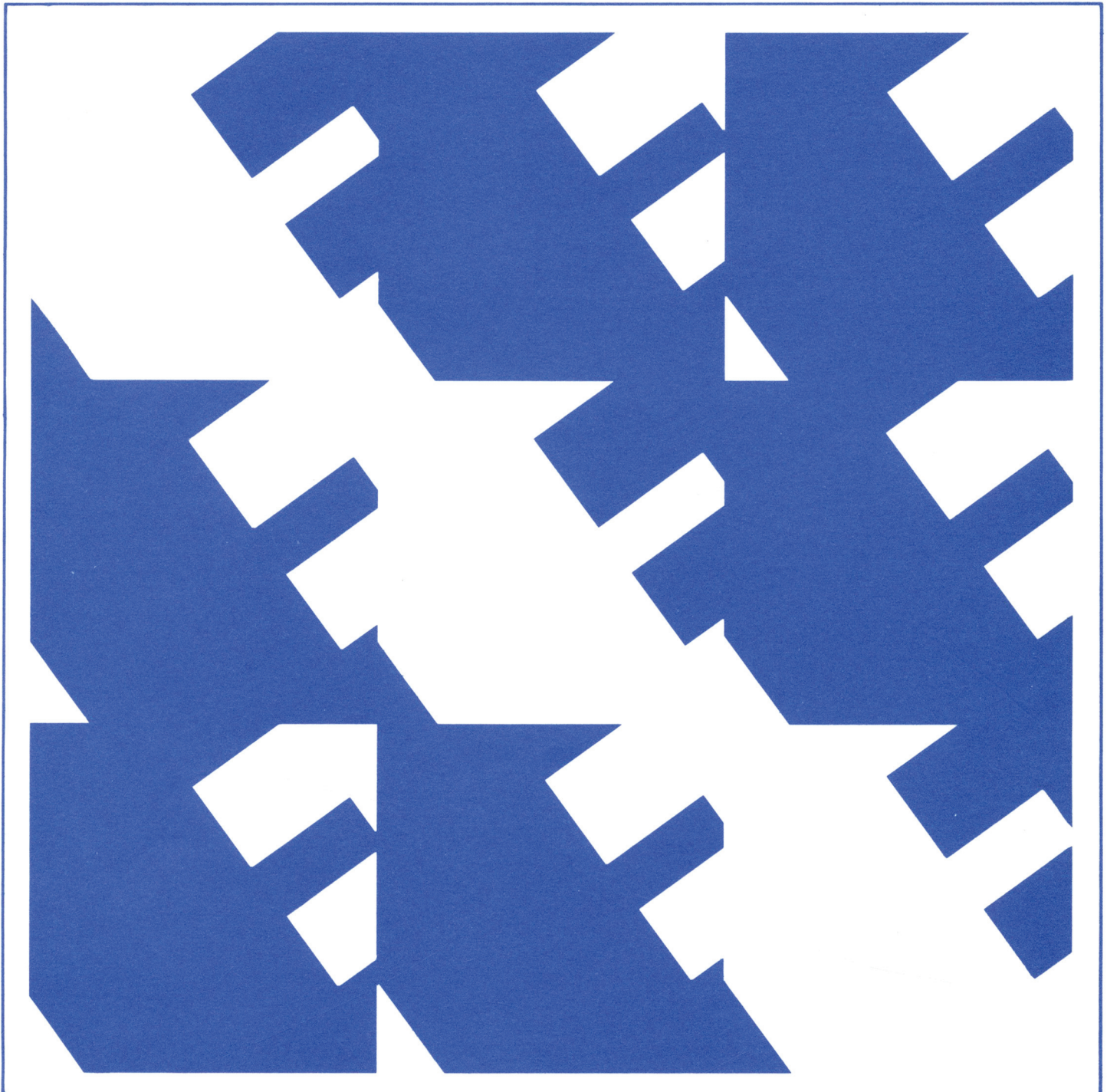


IEEE Standard Functional Methods and Equipment for Measuring the Performance of Dial-Pulse (DP) Address Signaling Systems

IEEE Std 753-1983



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IEEE Standard Functional Methods and Equipment for Measuring the Performance of Dial-Pulse (DP) Address Signaling Systems

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Foreword

(This Foreword is not a part of IEEE Std 753-1983, IEEE Standard Functional Methods and Equipment for Measuring the Performance of Dial-Pulse (DP) Signaling Address Systems.)

The rapidly expanding growth of national and international telecommunication, the increasingly sophisticated application of new technologies, and the increasing interconnection of new devices with the telecommunication network have imposed more stringent requirements on all elements comprising the network. Consequently, it is essential that effective means for evaluating the address signaling performance of telecommunications equipment and channels be established. In order to assure that such efforts yield meaningful and repeatable results, capable of being used for comparisons of similar equipment, to assure the maximum effective performance of devices connected to the telecommunication network, and to assure the maximum overall performance of the network, it is essential that agreed techniques of measurement and general test equipment specifications be standardized.

Section 2 of this standard provides brief descriptions of applicable dial pulse address signaling techniques and definitions of the related signaling parameters that affect performance. Section 3 describes the classes of instruments intended to measure the parameters presented in Section 2. It also provides details on the techniques necessary to perform these measurements. Section 4 provides performance and operating requirements for the test equipment that will satisfy this standard. Section 5 contains information describing typical signaling modes and test methods.

Suggestions for improvement of this standard will be welcome. They should be sent to the Secretary

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IEEE Standard Functional Methods and Equipment for Measuring the Performance of Dial-Pulse (DP) Address Signaling Systems

1. Introduction

1.1 Scope and Limitations. The scope of this standard is two-fold. First, to establish and define requirements for methods which can be used to measure the performance of dial-pulse address signaling systems used with voice frequency telecommunications equipment. Second, to establish functional requirements for test equipment needed to make the measurements. Such standard conditions as will be possible with these methods and means are mandatory if consistent and repeatable test results are to be obtained.

This standard will be limited to the parameters of dial-pulse signaling systems used in the North-American network that affect addressing performance. These parameters shall be measured at appropriate access points within the telecommunications switching system, on associated local subscriber loops, on trunks interconnecting switching systems, or on station apparatus. Measurements of supervisory signals or of the time relationship between supervisory and dial-pulse address signals, are not included.

Signaling systems other than dial pulse (for example, single frequency in-band or out of band) which results in a dial-pulse address may require testing using methods and equipment covered by this standard.

1.2 Purpose. It is essential that appropriate standards be established for determining and evaluating address-signaling performance characteristics of telecommunications equipment. Furthermore, it is critical that uniform measurement methods be associated with the testing of compliance with these performance standards. It is these testing specifications which are addressed in this standard.

The basic requirements of this standard will tend to ensure uniform and meaningful equipment specifications, performance character-

istics, and test results. It is vital that the industry embrace and employ these requirements.

1.3 References

- [1] ANSI/ASTM D21-97-1968, (R1979) Standard Test Methods for Adhesion of Organic Coatings.¹
- [2] ANSI/IEEE Std 4-1978, IEEE Standard Techniques for High-Voltage Testing.
- [3] ANSI/IEEE Std 455-1976, IEEE Standard Test Procedure for Measuring Longitudinal Balance of Telephone Equipment Operating in the Voice Band.
- [4] ANSI/IEEE Std 488-1978, IEEE Standard Digital Interface for Programmable Instrumentation.
- [5] EIA RS-232-C-1969, (R1981) Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange.²
- [6] EIA RS-449-1977, General Purpose 37-Position 9-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange.
- [7] IEC 320-1981, Appliance Couplers for Household and Similar General Purposes.³
- [8] IEC 536-1976, Classification of Electrical and Electronic Equipment with regard to Protection Against Electrical Shock.

¹ ANSI documents are available from the Sales Department, The American National Standards Institute, 1430 Broadway, New York, NY 10018.

² EIA Standards are available from Electronic Industries Association, 2001 Eye Street, N.W. Washington, DC 20006.

³ IEC Publications are available in the US from American National Standards Institute, 1430 Broadway, New York, NY 10018.

2. General Information

2.1 Signaling Methods. The requirements of this standard establish and define methods that shall be used to measure the address-signaling performance of systems employing dial-pulse signaling. These requirements also stipulate criteria for the test instruments that shall be used to perform these measurements.

Address signaling is the transmission of information that identifies the intended destination of a message in a switched network communication system. The different techniques of dial-pulse address signaling included in this standard are:

- (1) Loop signaling
- (2) Battery and ground signaling
- (3) E and M signaling
- (4) SF signaling
- (5) DX signaling

2.1.1 Loop Signaling (Telephony). A form of dial pulsing in which the current path to be interrupted is formed by a pair of conductors (loop) connecting the transmitting and receiving circuits. Normally, the receiving circuit powers the loop, while the transmitting circuit simply interrupts the current.

2.1.2 Battery and Ground Signaling (Telephony). A variation of loop signaling in which

the power source of the receiving circuit is supplemented by an additional source at the transmitting circuit for the purpose of range extension.

2.1.3 E and M Signaling (Telephony). A technique for transferring information between a trunk circuit and a separate signaling circuit over leads designated E and M. The M lead transmits to the signaling circuit, and the E lead receives from the signaling circuit.

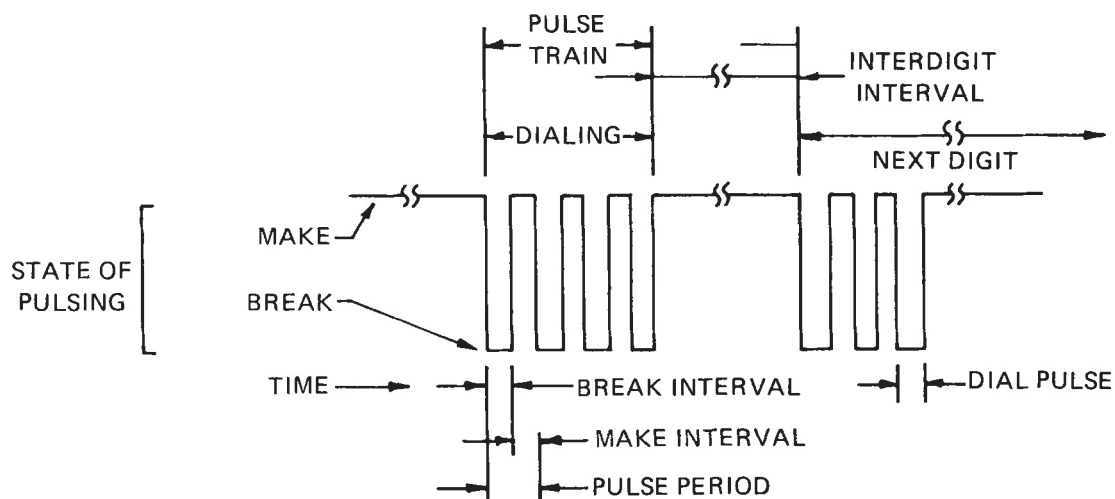
2.1.4 Single Frequency (SF) Signaling (Telephony). A method of conveying dial pulse and supervisory signals over a facility using the presence or absence of a single frequency (usually 2600 Hz). The tone is commonly present during the idle state.

2.1.5 DX Signaling (Telephony). A technique used on physical trunk facilities between switching systems that employs a balanced symmetrical circuit at both ends to convert and transmit E and M signals.

The detailed descriptions of signaling modes are included in 5.2.

2.2 Definitions. The parameters and characteristics of dial-pulse signaling that are addressed in this standard are defined as follows: (see Fig 1).

Fig 1
Dial-Pulsing Definitions



break, % break (telephony). In dial-pulse signaling, that portion of the signal in which the dialing contacts are open (broken). % break is the ratio of break time to the total pulse period (make + break) time.

contact bounce (telephony). The intermittent and undesired opening of contacts during the closure of open contacts or opening of closed contacts. An irregular wavefront during transition from one state to the other is implied.

dial pulse (telephony). A momentary interruption or change in the direct-current path of a signaling system to provide address information.

dial pulsing (telephony). A means of transmitting the address telephone number over a direct-current path. The current is interrupted, at the transmitting end, in a regular, momentary pattern. The number of interruptions corresponds to the digit being transmitted.

interdigit interval (telephony). In dial-pulse signaling, an extended make interval used to separate and distinguish successive dial-pulse address digits.

make, % make (telephony). In dial-pulse signaling, make is that portion of the signal in which the dialing contacts are closed (made). % is the ratio of make time to the total pulse period (make + break) time.

pulse period (telephony). The time from the start of one break interval of a dial pulse in a train until the start of the next break interval. Milliseconds is the preferred unit of time to express the duration of the pulse period.

pulse ratio (telephony). The percentage of the total dial-pulse period during which the circuit is in each of the two interval states. This ratio is customarily expressed as % break (preferred) or % make.

pulse speed (telephony). The number of dial pulses occurring per unit of time. Pulses per second (pls/s) is the preferred unit to express pulse speed.

pulse train (telephony). In dial-pulse signaling, a series of contiguous pulses of undetermined length.

signal threshold (telephony). The current or voltage value representing a transition between

make and break states. The threshold may be expressed either as an absolute value (for example, 15 mA or 21 V) or as a percentage deviation between steady-state conditions (for example, the value which is 70% of the difference between make and break values, added to the off-hook value). Signaling detectors having hysteresis will have different signal threshold values for the make-break and break-make transition.

slope detector (telephony). A circuit that provides a means of accurately measuring the open and closed intervals of a contact even though the contact may be shunted by a contact protection network or measured from the far end of a metallic loop, or both.

spurious pulse (telephony). The intermittent and undesired change of state in a circuit from its on-hook condition (spurious make) or off-hook condition (spurious break) lasting more than 1 ms.

3. Instrument Requirements

3.1 Introduction. Requirements which shall be employed when measuring the performance of dial-pulse address signaling systems are presented here. Specific requirements on ranges, accuracies, and stabilities are established, and, where appropriate, methods of testing for the requirements are suggested. Also included are the general descriptions of the different classes of measurement instruments and the operating environmental conditions for these devices.

3.2 Classes of Instruments

3.2.1 Limited-Performance Instruments (Class 1). Class 1 Instruments are intended primarily for field application. Therefore, portability, rugged construction, and ease of operation shall be major considerations in their design. These instruments offer accuracy acceptable for basic parameter measurement.

3.2.2 General-Purpose Instruments (Class 2). Class 2 Instruments are intended primarily for preservice, routine maintenance, and diagnostic