

Bell System

PUB 41001

TECHNICAL REFERENCE

30 - BAUD

PRIVATE LINE CHANNELS
INTERFACE SPECIFICATION
DECEMBER 1967



Bell System Data Communications

TECHNICAL REFERENCE

**30-Baud Private Line Channels
Interface Specification**

December, 1967

ENGINEERING DIRECTOR - TRANSMISSION SERVICES



NOTICE

This specification is specifically intended for technical consultants and designers of metering, supervisory control, miscellaneous signaling and business machine equipment to be used with the Bell System 30 Baud Channel Service. The right to revise this specification for any reason, such as conformity with USASI, EIA, or other standards, or to utilize new advances in the state of technical arts is expressly reserved. Liability for difficulties arising from unknown or unforeseen technical limitations is disclaimed.

If additional details on the interface and its operation are needed, please contact:

Engineering Director – Transmission Services
American Telephone and Telegraph Company
195 Broadway
New York, New York 10007

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30-Baud Private Line Channels

Interface Specification

1. GENERAL

1.1 Introduction

The purpose of this specification is to define the interface between the 30-Baud Private Line Channel and a Customer-Provided Terminal (CPT).

The 30-Baud Private Line Channel is capable of transmitting direct-current "mark-space" or "binary" signals at rates up to 30-Bauds for metering, supervisory control, and miscellaneous signaling purposes. The term "Baud" is a unit of signaling speed derived from the duration of the shortest signaling element. The signaling speed in Bauds is equal to the reciprocal of the shortest element length in seconds to be transmitted. Thus, the 30-Baud channel may not be used for transmission of signal elements whose nominal duration is less than 33.3 milliseconds. Within the speed capability of the channel, transmission is code and speed insensitive. These channels are not suitable for transmission of alternating current tones.

These channels are furnished for one-way operation on a two-wire basis, and for half-duplex (two-way, nonsimultaneous) operation or for full duplex (two-way, simultaneous) operation on a four-wire basis at the interface. Metallic continuity, end-to-end, however, is not a requirement of this channel and will generally not be available.

1.2 Background and Philosophy

The 30-Baud channel has evolved over the years primarily to meet the need for a low speed signaling channel with a contact closure input and an output sufficient to drive electro-mechanical relays. Current rather than voltage is the significant parameter. The 62.5 ma mark, 0 ma space neutral current loop, is the arrangement most commonly available, but there is also some use of 20 ma mark signal levels to hold down the cost of providing the service. Therefore, it is suggested that CPT equipment using these channels be designed to work with either level of marking current; either directly or by a wiring option.

1.3 Variations from Standard Arrangements

In low speed signaling systems where an arrangement, which is not compatible with this specification is required, or additional service features are desired, special arrangements must be made with the local Telephone Company representatives. In some of these systems it may be determined that either a tariff other than the 30-Baud Channel applies or a special contract with the Telephone Company is required. An example of such a special arrangement might be for an interface that is described in the Electric Industries Association specification RS-232-B.

2. DESCRIPTION

2.1 Physical

Normally, a terminal block having 6-32 screws will be provided by the Telephone Company to serve as an interface between the 30-Baud Channel and the CPT. Figure 1 shows typical send-only, receive-only, half duplex, and full-duplex interface arrangements.

The channel side of the interface terminal block will appear as one or two pair of wires connecting to the serving telephone office or to transmission equipment supplied by the Telephone Company and located on the customer's premises. The need for and type of transmission equipment will be determined by the Telephone Company. Space for this equipment shall be provided by the customer.

The CPT side of the interface should consist of one pair of wires connected to the input of the CPT and one pair of wires connected to the output of the CPT as shown in Figure 1.

2.2 Power Requirements

In systems where the Telephone Company provides transmission equipment at the interface, the customer must provide a source of continuous 117 volt, 60 Hz ac power from a non-switched outlet. The equipment supplied by the Telephone Company will work properly over a voltage range of 105 to 129 volts and a frequency

deviation of ± 0.45 Hz. The power receptacle provided must accept a U-blade ground type plug and supply a valid ground to the ground pin. The power consumption will not exceed 70 watts per channel. Where transmission equipment is not provided, the customer does not need to provide any power for the 30-Baud Channel.

2.3 Environment

In systems where the Telephone Company provides transmission equipment at the interface, the ambient temperature should be in the range of 40° to 120°F and the relative humidity should be in the range of 20 percent to 95 percent.

3. INTERFACE ELECTRICAL CHARACTERISTICS

3.1 Channel Signals

The signals at the interface will be either 20 ± 1 milliamperes or 62.5 ± 2.5 milliamperes neutral signals (current – no current). The value of dc voltage selected by the Telephone Company to supply this current will vary depending on local conditions and the type of transmission equipment used. The tip (T) or ring (R) side of the send data (SD) terminals or receive data (RD) terminals may have a potential of 0 up to 135 volts dc to ground (positive or negative). From 24 volts up to 270 volts dc may exist across the SD terminals when the CPT send contact is open (station sending a space signal). Polarity is such that current flow through the CPT is from ring to tip; i.e., the ring side is positive with respect to tip. Identification of the terminals will be furnished by the Telephone Company who will also make the dc current adjustments.

3.2 Input of the CPT

The input (receive side) of the CPT should appear to the channel as a circuit having a fixed resistance of less than 150 ohms and an inductance of less than 0.5 Henry. (Non-inductive impedances are preferred as they cause less CPT send contact deterioration.) The receiving circuitry should be isolated from ground (leakage 1.0 megohm) and should not impress foreign voltages in excess of 1/2 volt on the interface terminals.

3.3 Output of the CPT

The output (send side) from the CPT should appear as a set of contacts of their electrical equivalent (isolated from ground) capable of repeatedly making and breaking a nominal 62.5 milliamperes at up to 270 volts dc. When the contacts are "open," the resistance across the contacts should be at least one megohm and when closed, the contact resistance should be less than 5 ohms. Any device used to monitor the output of the CPT should not insert more than 150 ohms and less than 0.5 Henry inductance in series with the send contacts. (Relays having dry reed contacts have not proven satisfactory for this application.) If mechanical or mercury wetted contacts are used, it is recommended that a spark suppression network be provided in the CPT to reduce electrical circuit noise and prevent excessive contact erosion. Nominal values of the spark suppression circuit components should be a resistance of 470 to 1000 ohms in series with a capacitance of 0.1 microfarad.

4. TRANSMISSION CHARACTERISTICS OF CHANNEL

4.1 Signal Distortion – Transition Displacement

For the purpose of this specification, transition displacement is defined as the time displacement of a mark-to-space or a space-to-mark transition from its ideal instant.

The random transition displacement, measured at the 50% point of the rising and falling waveform, caused by the channel normally will not exceed 10 milliseconds in either direction (early or late). The 10 millisecond value does not include any allowance for transition displacements introduced by a transmitting CPT. Figure 2 compares typical transmitted and received waveforms at the interface.

4.2 Propagation Time – Absolute Delay

Signal propagation time will vary depending on the particular type and length of the line facilities and type of transmission equipment (if any) provided at the interface. It is expected that the one-way propagation time will generally be less than 1/4 second.

Channel turnaround time, which is related to propagation time and is a function of the

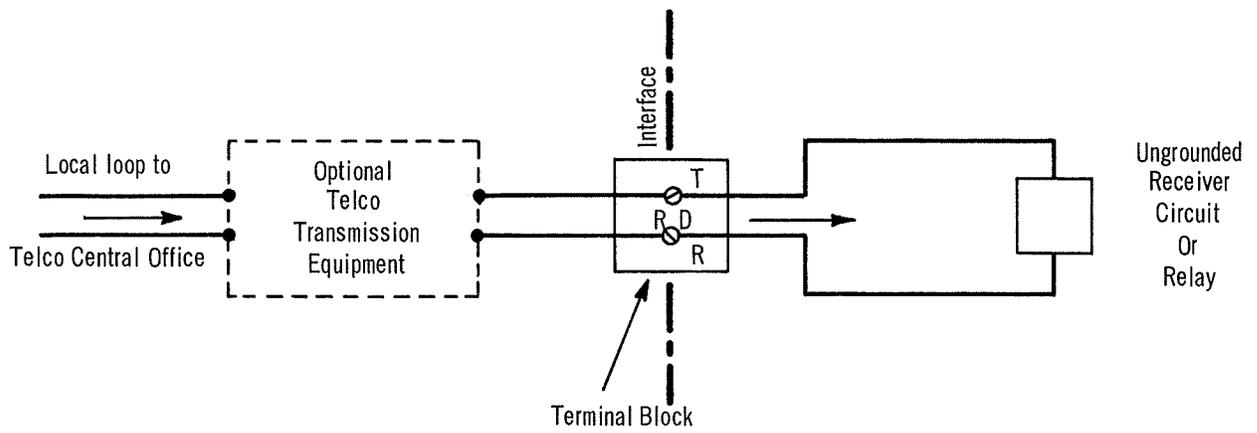
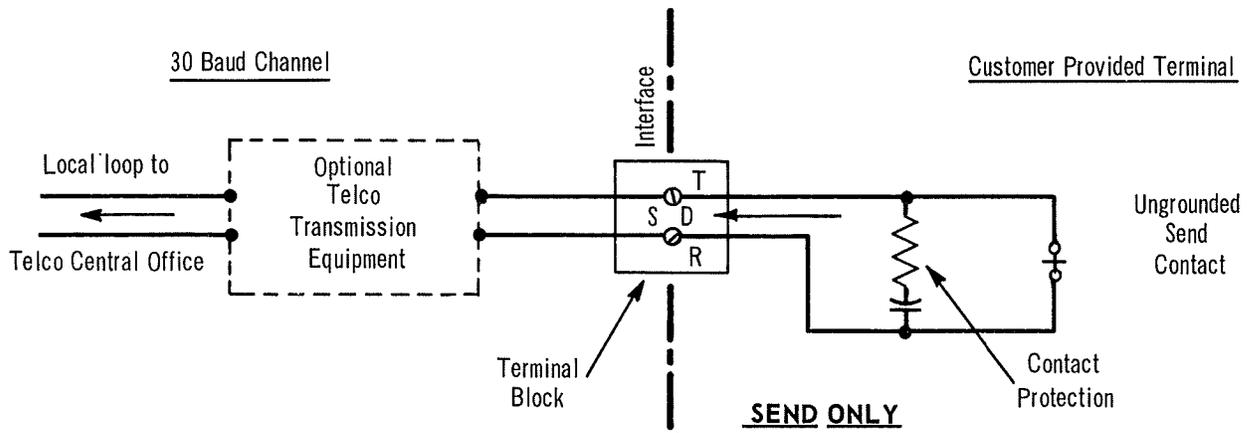
complexity and length of the channel, is not specified. If propagation time or turnaround time is an important factor in providing service, the local Telephone Company representative should be consulted for more exact information concerning a specific channel.

4.3 Channel Failure

No separate leads are brought out at the

interface to indicate when a channel failure or interruption occurs. If the channel goes into a steady spacing condition (no current on the RD leads), this indicates a channel failure and the CPT equipment may use this signal condition as a channel failure indication, if so desired. However, certain channel failure conditions may not cause a steady space to occur on the RD leads.

30 BAUD CHANNEL
INTERFACE ARRANGEMENTS



RECEIVE ONLY

Figure 1

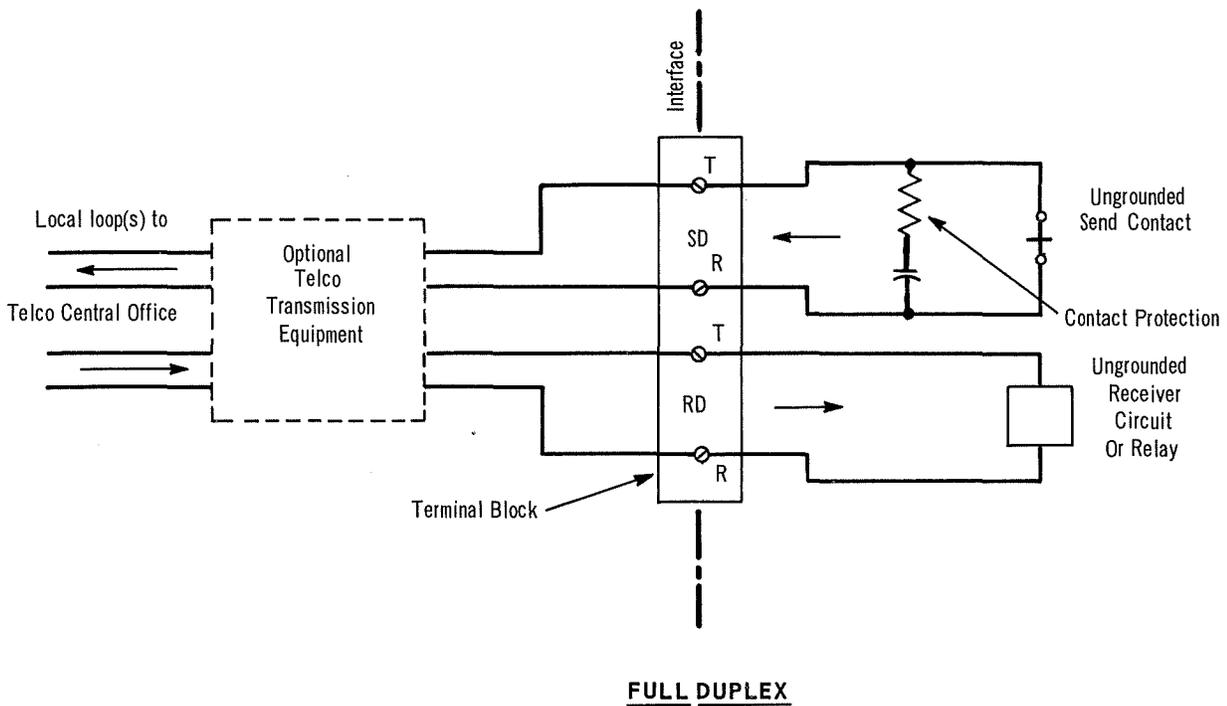
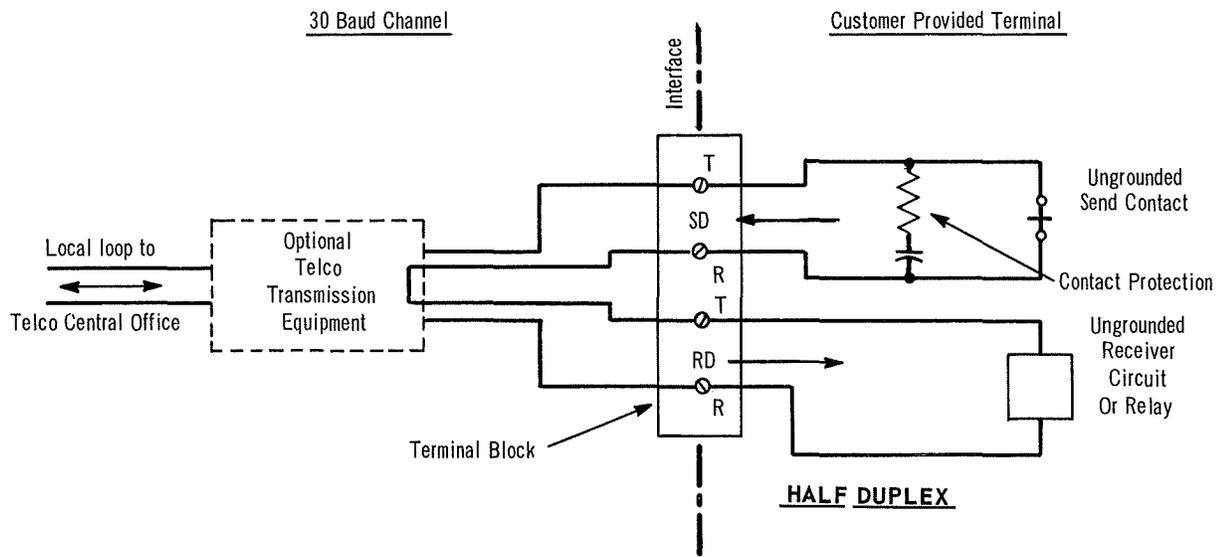
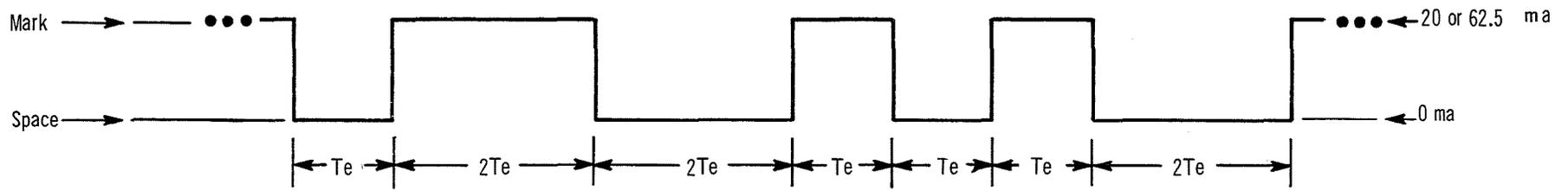
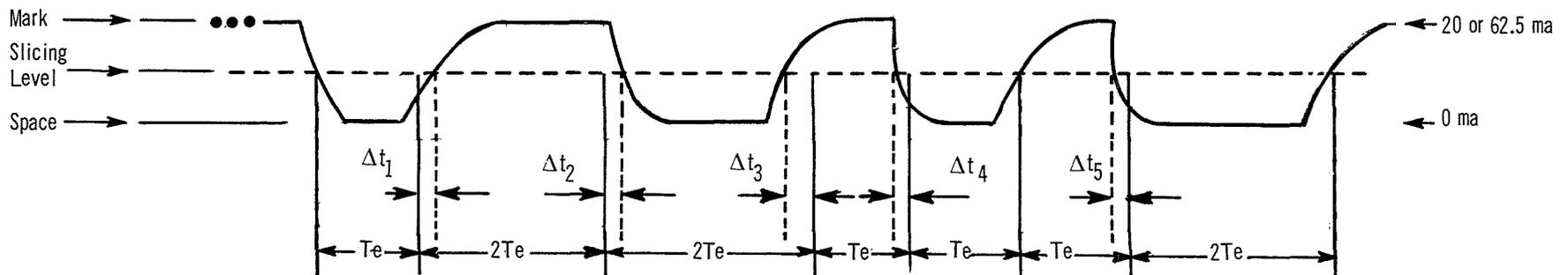


Figure 1
(Cont'd)



TRANSMITTED SIGNAL (UNDISTORTED)



RECEIVED SIGNAL (DISTORTED)

Notes:

- 1) T_e = Shortest element in the transmitted signal.
- 2) Δt = Transition displacement caused by the 30 baud channel.
- 3) Baud Rate = $\frac{1}{T_e}$ (in seconds)
- 4) Received waveform is generally not a square wave
- 5) Slicing level is assumed to be at the 50% point of the rising and falling waveform.

Figure 2

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AND
ADDITIONAL COPIES OF TECHNICAL REFERENCES**

- I. Bell System Technical Journals (BSTJ), Institute of Electrical and Electronics Engineers (IEEE), American Institute of Electrical Engineers (AIEE) and most other material from technical journals may be ordered from:

Engineering Societies Library
345 East 47th Street
New York, New York 10017

- II. Bell Telephone Laboratories, Inc., "Transmission Systems for Communications," Fourth Edition; and additional Technical References may be obtained in the following manner:

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