

2 Functional Description

2.1 Introduction

This section describes the overall function of the Model 7300 Exbert T1 in monitoring and testing T1 facilities and equipment.

Figure 1 shows the Exbert T1 front panel and connector view. The main features of the Exbert T1 are a 32 character alphanumeric display, sync and alarm LEDs, transmit line buildout switches, impedance switch, audible alarm switch, functional operating keys, and transmit and receive signal connectors.

Using the **Function Key** and **Display Key**, the technician can select the test functions and the result measurements required. The setup modes allowed are:

- SF, ESF or DLC-96 framing
- AMI or B8ZS coding
- Low/medium/high stress test pattern generation, and Live Traffic mode
- CSU and network interface loop up/down codes
- Timed or continuous testing
- Printer port for hard copy of test results

The Exbert T1 gives the technician a large number of test measurement displays in an efficient and easy to understand format. The test measurements are:

- Logic errors
- Error rate
- Errored seconds
- % error free seconds
- Severely errored seconds
- Bi-polar violations
- BPV rate
- Frame errors
- Frame error rate
- CRC errors
- Frequency
- Volts peak-to-peak
- Elapsed test time.

The Exbert T1 uses LED displays to guide the technician through the function selection process. The instrument also uses LEDs to notify the technician of vital operating conditions of the T1 facility:

- Pattern and frame sync
- BPV and 3 consecutive severely errored seconds.

Transmit line buildout is adjustable in four increments from 0 to 30 dB (maximum). Logic errors can be indicated by

an audible alarm. Loop current test points are provided for volt meter access.

The key elements of the Exbert T1 are its **small size**, its **simplicity of operation**, and its **ability to perform the critical tests and measurements** required by telephone company T1 quality and availability specifications.

2.2 Operating Modes

The Exbert T1 is designed to provide two modes of operation: in service monitoring, and out of service testing. In service monitoring is accomplished by setting up the Exbert T1 to monitor the code and framing which the T1 facility is using. Out of service testing adds the additional step of choosing the test patterns to be used and selecting the level of signal buildout needed.

2.2.1 In Service Monitoring

Not all facility problems show themselves as an out of service condition. Often problems occur infrequently, based on the time of day or the data being sent. When the T1 facility is carrying traffic that can't be disturbed, or when out of service testing doesn't show the problem, in-service monitoring is the correct procedure to follow.

The Exbert T1 measures the quality of the T1 signal by looking at bi-polar violations, signal frequency and signal level, framing and CRC errors.

While monitoring a T1 signal, real time measurements are shown on the second line of the display. All results can be seen by stepping through the Menu Tree using the Display Key (and the Function Key). While the session is in process or after completion, results can be automatically or manually printed. A green LED shows frame sync.

2.2.2 Out of Service Testing

Out of service testing removes the T1 facility from normal service so that a pattern generator and receiver can test the line. The T1 line can be looped at the remote end so that the same test instrument can be both generator and receiver, or each end of the line can have its own test instrument allowing end-to-end testing of each side of the four-wire facility. Out of service testing is used for acceptance testing of a new facility, when a circuit is changed or re-routed, when in service monitoring shows frame losses, or when trouble is reported but in service monitoring gives no clear results. The Exbert T1 functions as the sole test unit in a loopback test, or with other test equipment as one side of an end-to-end test.