Overview

GL's new tProbe™ is an enhanced version of our popular USB-based T1 E1 VF Analyzer/Emulator. This hardware incorporates all the features of the previous analyzer such as portability, USB interface, remote accessibility, scripting, and a vast collection of optional applications. tProbe™ was introduced with the following important enhancements:

- **T1 E1 Pulse Shape, Jitter Measurement Analysis and Jitter Generation**
- **Software selectable T1 or E1 interface along with Drop and Insert**
- **tProbe™ FXO and FXS board** – Allows simulating FXO and FXS ports; FXO port to simulate a two-wire FXO device such as a telephone or a fax machine and the FXS port on tProbe™ to emulate a 2-wire FXS service such as a telephone wall jack.
- **tProbe™ Datacom Analyzer board** – Supports V.24, V.35, V.36, RS-449, RS-232C, RS-485, EIA-530 and EIA-530A interfaces and can be configured as DTE or DCE to test Channel Service Unit (CSU) and Data Service Unit (DSU) entities.
- **Capable of simulating as well as encoding and demodulating fax calls over T1/E1 lines using Fax Simulator and FaxDD™**
- **TDM, ISDN, SS7 – High Density Voice**
- **VoIP, Frame Relay, Multi Link Frame Relay, PPP and Multi-Link PPP, HDLC**
- **Windows® and Linux Drivers for Open Source Applications**
- **“Cross-port Through” and “Cross-port Transmit” Modes – these configurations make cabling with Drop/Insert and Fail-Safe Inline Monitoring very easy**
- **Improved circuitry for very accurate Digital Line Level measurements**
- **Ethernet Interface for future standalone operation**
- **Easy calibration**
- **Forward thinking hardware design for future daughter board expansion applications**
- **Enhanced VF Drop and VF Insert Capabilities using 3.5mm Balanced (stereo) or Unbalanced (Mono) physical connections.**

Main Features

- **Compatible with Windows® XP, 7 and 8 operating systems and user friendly real-time software**
- **Most all “basic applications” and “special applications” are available for tProbe™ T1 E1 analyzer including comprehensive Analysis / Emulation of Voice, Digits, Tones, Fax, Modem, Raw Data, Protocol, Analog, Digital, and Echo Testing**
- **Call Recording, Generation, & Monitoring for hundreds to thousands of calls in one platform**
- **Lightweight (1.24 lbs) & small footprint (6.05" x 5.55" x 1.60")**

For more details, visit [www.gl.com/tProbe.html](http://www.gl.com/tProbe.html)

GL's offers other popular forms of T1 E1 analysis hardware such as:
- **Octal/Quad T1 E1 Analyzer Boards** - 8/4 port PCIe based cards for higher scalability and performance,
- **Dual Express T1/E1 (PCIe) Boards** - high-density dual T1 or E1 boards with newer PCIe (x1) bus interface, Portable USB T1 E1 Analyzer with Dual T1 E1 ports & smallest form factor,
- **Universal T1 E1 Analyzer Boards** - a dual port PCI based T1 E1 analyzer offering higher speed and smaller dimensions. Please call us for more information,

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### Basic and Optional Applications

#### Basic Software

**VF Options**
- Speaker
- Drop and Insert
- VF In / Out TS settings

**Monitoring Options**
- Monitor T1/E1 Line
- Byte Values & Binary Byte Values
- Signaling bits, Power Level, DC Offset, & Frequency
- Multi-frames, and Real-time Multi-frames
- T1/E1 Data as Real-time Bitmap
- Time-slot Window
- ASCII Timeslot Display
- Oscilloscope & Power Spectral
- Active Voice Level

**Intrusive Testing**
- Bit Error Rate Test
- Enhanced Bit Error Rate
- ATM BERT
- Transmit Tone
- Transmit Gaussian Noise
- Transmit Multiframe
- Transmit Signaling Bits
- Precision Delay Measurement
- Rx-to-Tx Loop back
- Error Insertion

**Windows Client / Server**
- w/ Remote access to T1/E1 server using Clients - C++, TCL, C#
- Dual VF Tx/Rx

#### Optional Software

**Protocol Analysis**
- ISDN, HDLC, SS7, CAS, GSM, GPRS, UMTS, GR303,
- Frame Relay, ATM, PPP, TRAU, CDMA, DCME, T1,
- E1 Maintenance Data Link (SaHDLC and SSM), SS1
- Facility Data Link, VSx, Fax, Modem

**Protocol Emulation**
- ISDN, SS7, ISUP Conformance Scripts, GSM Abis,
- GSM A, MAP, FXO FXS, CAP, INAP, MLPPP, CAS
- TRAU, SS1, Multi-link Frame Relay Emulation
- Inverse Multiplexing over ATM

**WCS Modules**
- Tx/Rx files, digits, Protocol Emulation
- Multi-channel BERT,
- DSP operations, Dynamic DSP capability
- FAX Emulation over T1/E1 and Analog Lines
- FXO FXS Simulation

**Record / Playback Files**—Manual, Automated

**Capture, Analysis, & Emulation** - DTMF / MF / MFCR2, Digits, Tones, Voice, Fax, Modem, Raw Data

**Voice Band Analysis Software**

**Call Data Records**

**Multi-Channel Emulation**

**Jitter Generation, Jitter Measurement, & Pulse Mask**

**Protocol Identifier, Traffic Classifier**

- Measure Loop Delay/ERL
- Delay Attenuate Timeslots
- Digital Echo Canceller Simulator
- Audio Processing Utility (APU)

**Signal Transitions Recording**

**Real-time Strip Chart**

**Real-time Multichannel Audio Bridge**

**Multiplex / Demultiplex Software**

**Network Surveillance, Voice Quality Testing**

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**Future applications include…**
- 10/100 Ethernet Interface for standalone embedded applications
- Standalone Embedded Processor Flash and Platform Flash (SDRAM 512 MByte)
- Additional Daughter Boards planned include ADSL, Octal T1 E1, T1 E1 Switch, etc.
## tProbe™ – Specification

### Physical Interface

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB Connector</td>
<td>(1) USB TYPE B Jack</td>
</tr>
<tr>
<td>Ethernet Connector</td>
<td>(1) RJ-45 10/100 Ethernet Jack</td>
</tr>
<tr>
<td>T1/E1 Connectors</td>
<td>(2) RJ-48c Jack</td>
</tr>
<tr>
<td>Audio Connectors</td>
<td>(4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (TX &amp; RX)</td>
</tr>
<tr>
<td>External Clock Connector</td>
<td>(1) MCX Coaxial Jack</td>
</tr>
<tr>
<td>External Power Connector</td>
<td>(1) Coaxial DC Power Jack (mates with 5.5mm x 2.1mm coaxial plug)</td>
</tr>
<tr>
<td>Onboard RAM</td>
<td>SDRAM – 512MB</td>
</tr>
</tbody>
</table>

### External Power Requirements

- **Power Adapter Requirements**: +5V @ 2A Max Power to the Center Ring

### T1/E1 Line Interface

- **Framing Formats**: Unframed, D4 (T1), ESF(T1), ESF(J1), CAS (E1), FAS(E1), CRC4
- **Line Code Format**: AMI, B8ZS (T1) or HDB3 (E1)
- **Internal Clock Specification**: Standard: +/- 3ppm Optional: +/- 1ppm
- **Output Clock Source**: Internal (+/- 1 ppm or 3 ppm), Recovered, External Clock
- **T1 Output Level**: T1: 3.0V Base to Peak Selectable 0-655Ft Pulse Equalization Setting; Tx Capability - DSX-1 Outputs (to 655 feet)
- **E1 Output Level**: E1: 3.0V ± 0.3V Base to Peak
- **Input Level**: 75 mV to 6V base to peak or -30 dBsx to -6 dBsx
- **Line Built OUT Selections**: 0dB, -7.5dB, -15dB, -22.5dB – for T1 only Loopback
- **Loopback**: Normal (Outward and Inward), Cross-Port Transmit Loopback, Cross-Port Through Loopback

### Transmit

- **T1/E1 Interface**: ANSI: T1.403.1995, T1.231-1993, T1.408
- **Hardware Compliance**: AT&T: TR54016, TR62411
- **ITU**: G.703, G.704, G.706, G.736, G.775, G.823, G.932, I.431, O.151, Q.161
- **ITU-T**: Recommendation I.432-03/93
- **B-ISDN User-Network Interface-Physical Layer Spec**: ETSI: ETS 300 011, ETS 300 166, ETS 300 233, CTR12, CRT4
- **Japanese**: JTG.703, JTI.431, JJ-20.11 (CMI Coding Only)
- **BERT Pattern Generation**: Pseudorandom patterns: (63) 2^6-1, (511) 2^9-1, (2047) 2^11-1, (32767) 2^13-1, (1048575) 2^20-1, (8388607) 2^23-1, QRSS.
- **Hardware Compliant**: T1 In-Band Loop Code Generation and Detection
  - Fixed patterns: All Ones, All Zeros, 1:1, 1:7, 3 in 24, User Defined 24-Bits
  - Hardware Compliant: User pattern of up to 32 bits in length
- **Alarm Insertion**: Blue, Yellow, Remote, Distant Multiframe
- **Hardware Compliant**: Bit 7 Zero Suppression
  - D4 Yellow: 1 in S bit of frame 12
  - AIS-CI Code, ESF-RAI CI Code
  - Receive Carrier Loss: 0’s for 2047 or 255 bits (For E1 only)
- **Error Insertion**: BPV, Bit Error, Frame Error, CRC Errors, Burst Frames, Fixed Error Rate, Random Error Rate, auto logic from 10^{-6} to 10^{-9} for selectable 56K or 64Kps channels.
- **Drop and Insert**: Any contiguous set of digital timeslots and/or audio input
- **Facility Data Link**: T1 ESF Mode: Transmit/Receive Messages, Bit-Oriented Messages, and Files.
- **Zero Suppression**: B7 Stuffing, Transparent, & B8ZS (T1)
- **Signaling Frequency Offset**: Robbed-Bit or Clear Channel
- **Loopback**: T1: +/- 615Hz
- **Loopback**: E1: +/- 615Hz
# tProbe™ – Specification (Contd...)

<table>
<thead>
<tr>
<th>Receive</th>
<th>Display and Logging</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Impedance</strong></td>
<td>BERT Bit Errors, Bit Error Rate, Error Seconds, Error Free Seconds, %EFS, Severely Error Seconds, %SES, Degraded Minutes, %Dmin, Loss Pattern Sync Count, Loss of Sync Seconds, Available Seconds, %Available Seconds, Unavailable Seconds, Bipolar Violations, BPV Rate, BPV Seconds, BPV Free Seconds, Frame Errors, FE Rate, FE Seconds, FE Free Seconds, with Detailed logging into disk file.</td>
</tr>
<tr>
<td><strong>Terminations</strong></td>
<td>Alarms: Resync In Progress, Loss of Signal, Blue Alarm, Change of Frame Alignment, Bipolar Violation, Frame Error, Carrier Loss, Yellow Alarm, Out of Frame Events Counter, Error Super frame Counter, Bipolar Violations, Remote Alarm, Distant Multiframe Alarm, Signaling All Ones, CAS Multiframe Error, CRC4 Error.</td>
</tr>
<tr>
<td>T1 Input Frequency</td>
<td><strong>Alarm Detection</strong></td>
</tr>
<tr>
<td>1.544MHz +/- 20 KHz</td>
<td>T1 - D4 Yellow Alarm, ESF Yellow Alarm</td>
</tr>
<tr>
<td>E1 Input Frequency</td>
<td>Yellow Alarm (B2 Suppressed-2nd MSB)</td>
</tr>
<tr>
<td>2.048MHz +/- 20 KHz</td>
<td>Yellow Alarm (S-Bit)</td>
</tr>
<tr>
<td><strong>Frequency Measurement</strong></td>
<td>Yellow Alarm (00FF in FDL)</td>
</tr>
<tr>
<td>+/- 1ppm</td>
<td>Blue Alarm (Framed or Unframed All Ones)</td>
</tr>
<tr>
<td><strong>Error Detection</strong></td>
<td>E1 - Remote Alarm</td>
</tr>
<tr>
<td>Frame Error, CRC Error, BPV Error, Logic Error, Frame Alignment Error</td>
<td>Distant Multi-Frame Alarm</td>
</tr>
<tr>
<td>Hardware Compliant:</td>
<td>Signaling All Ones</td>
</tr>
<tr>
<td>* 10 or 24 bits for sync time</td>
<td>Unframed All Ones</td>
</tr>
<tr>
<td>* 2/4, 2/5, or 2/6 frame bit in error frame select</td>
<td>Hardware Compliant: J1 Yellow Alarm</td>
</tr>
<tr>
<td>* Frame error bit corruption for 1 or 3 frame bits</td>
<td><strong>Rx Termination</strong> High Impedance (&gt;50K Ohms) for Non-Intrusive Testing</td>
</tr>
<tr>
<td>* E-Bit Error</td>
<td>Software selectable 135, 150, 600, 900 Ohms for Intrusive Testing</td>
</tr>
<tr>
<td>* Line Code Violation</td>
<td>Provisional for external Microphone (Mic/HS) on VF ports connection</td>
</tr>
<tr>
<td><strong>Alarm Detection</strong></td>
<td><strong>Tx Termination</strong> 135, 150, 600, 900 Ohms</td>
</tr>
<tr>
<td>T1 - D4 Yellow Alarm, ESF Yellow Alarm</td>
<td><strong>Sampling Rates</strong> 8KHz, 16 KHz</td>
</tr>
<tr>
<td>Yellow Alarm (B2 Suppressed-2nd MSB)</td>
<td><strong>Datawidth (bits)</strong> Supports 8, 16, 20, 24, 32 Bit Data</td>
</tr>
<tr>
<td>Yellow Alarm (S-Bit)</td>
<td><strong>VF Tx Gains</strong> Supports –12 dB to +59 dB in 0.5dB Steps Gain (0.1 dB steps can also be accommodated in tProbe™)</td>
</tr>
<tr>
<td>Yellow Alarm (00FF in FDL)</td>
<td><strong>VF Rx Gains</strong> Supports –63.5 dB to +9 dB in 0.5dB Steps Attenuation (0.1 dB steps can also be accommodated in tProbe™)</td>
</tr>
<tr>
<td>Blue Alarm (Framed or Unframed All Ones)</td>
<td><strong>Connectors</strong> (4) 3.5 mm Balanced (Stereo) or Unbalanced (Mono) Audio Jacks (Tx &amp; Rx)</td>
</tr>
<tr>
<td>E1 - Remote Alarm</td>
<td><strong>Physical Dimensions</strong></td>
</tr>
<tr>
<td>Distant Multi-Frame Alarm</td>
<td><strong>Dimensions</strong> 6.05 inches (153.67mm) (L)</td>
</tr>
<tr>
<td>Signaling All Ones</td>
<td>5.55 inches (141.224mm) (W)</td>
</tr>
<tr>
<td>Unframed All Ones</td>
<td>1.60 inches (40.64mm) (H)</td>
</tr>
<tr>
<td>Hardware Compliant: J1 Yellow Alarm</td>
<td><strong>Weight</strong> 1.24 lbs. (0.56 kg)</td>
</tr>
</tbody>
</table>

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## Buyer’s Guide

- **PTE001** – tProbe™ T1 E1 Base Unit
- **PTA001** – tProbe™ Basic T1 Software
- **PEA001** – tProbe™ Basic E1 Software
- **SA000C** – High Stability Internal Clock Option

For complete buyers’ list visit [http://www.gl.com/t1e1applications.html#BuyerGuide](http://www.gl.com/t1e1applications.html#BuyerGuide)