

*Finisar*

**NEW!**

Up to 2.5 Gb/s Protocol Independent

# **GTX-B** Bit Error Rate Tester

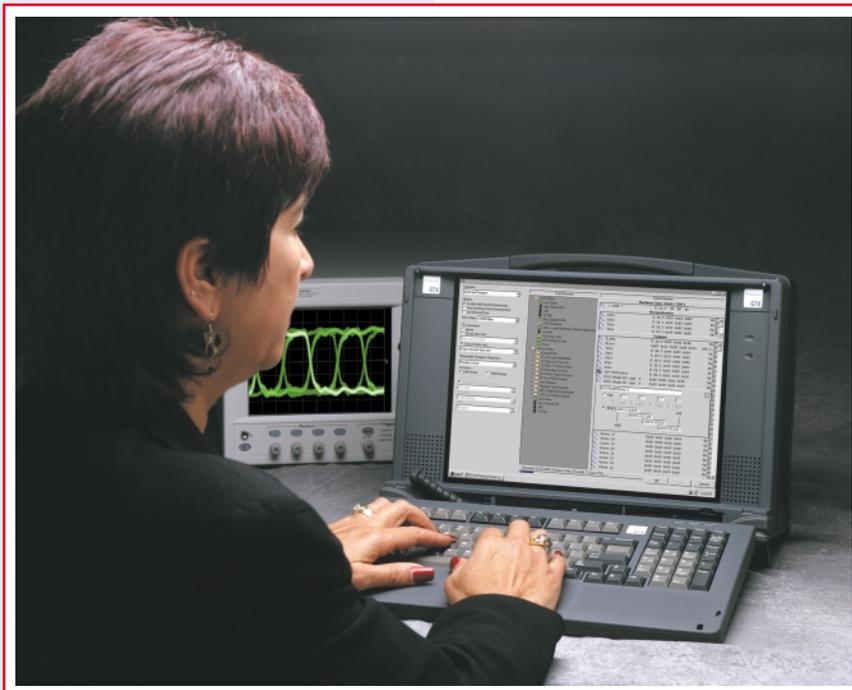
*The Extended Physical Layer Verification System*

- Create eye pattern signals for jitter analysis
- Send legal or illegal 10B patterns
- Bit error rate test at 1.0625, 1.25, 2.125 & 2.5 Gb/s

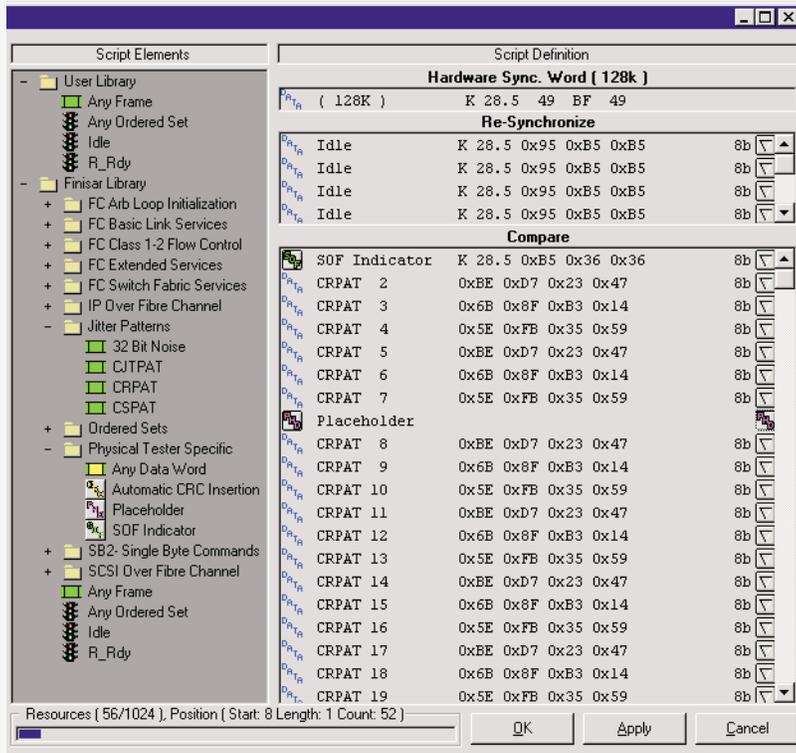
**M**anufacturers need to verify the physical layer functionality of connectors, cables, GBICs, optical modules and transceivers. It is also necessary to test serializer/deserializer, encoder/decoder, link state machine, and add/drop retiming circuitry. The GTX-B combines bit error rate testing, eye pattern signal synchronization and versatile pattern generation in a single instrument. This is a front line tool for physical layer verification of Fibre Channel™, Gigabit Ethernet™ and InfiniBand™ gigabit/second devices.

The GTX-B offers needed flexibility in composition of scripts, patterns generated, bit rates, metrics reported and isolation of error causing patterns. Start scripting from a provided library of Fibre Channel frames and Ordered Sets with editing at the 8B or 10B level. The specified edits are used to generate an output and compare list of words. Continuously loop through the transmitted list utilizing a synchronizing pulse per loop to aid in debug with an oscilloscope or logic analyzer. Bit error test with standard jitter patterns or use dynamic counters to run through all possible data values.

A 1/20th bit clock output from the GTX-B supports observing an eye pattern revealing jitter characteristics of the target. Use an external clock source to vary the primary clock rate and observe the effects on the eye pattern. Sweep through a small range of clock rates to synthesize received clock variance while testing phase locked loop acquisition characteristics.

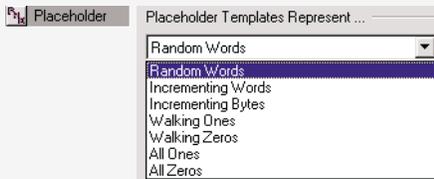


# GTX-B Bit Error Rate Tester

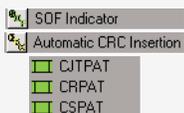


## Script with predefined and custom elements

- Send a 1K x 40-bit word long script containing:
  - ▶ Any bit pattern
  - ▶ 10-bit legal or illegal characters
  - ▶ Any 4-character words in 8B hex or control/data (KD) format
- Send a script loop forever or stop on an error
- Bit compare legal traffic and illegal traffic with run rates less than seven bits
- Send bit patterns with any desired run rate with the compare receiver off
- Create scripts including add/drop re-synchronization words and compare words
- Drag & drop Finisar Library or user-saved elements into the script
- Edit and add custom library elements
- Automatic placeholder elements include 8B or 10B versions of:

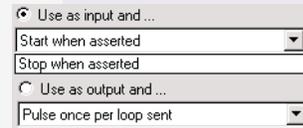


- Fibre Channel enhanced features include:
  - ▶ Over 300 Fibre Channel frames and ordered set elements included in the library
  - ▶ Three frame compliant standard jitter patterns, CJTPAT, CRPAT, CSPAT
  - ▶ An automatic CRC script element that can dynamically calculate the CRC value
  - ▶ Automatic selection of the correct disparity Fibre Channel EOF



## Synchronize with other instruments

Trigger-in to start or stop data generation or trigger-out per loop



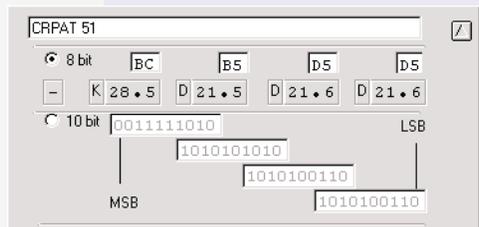
Trigger In/Out

## Vary the clock

Simulate crystal drift by substituting an external clock within 1% of the protocol center frequency



Reference bit clock/20 In



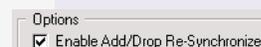
## Define in 8B or 10B

- Edit 8- or 10-bit words
- Enter Gigabit Ethernet and InfiniBand patterns
- Modify Fibre Channel ordered sets or words in a frame

## Intelligent Re-synchronization

- Re-synchronize if a bit is lost rather than toggled
- Re-synchronize on independently-timed circuits that add/drop words
- Can be disabled for 100% bit compare needs

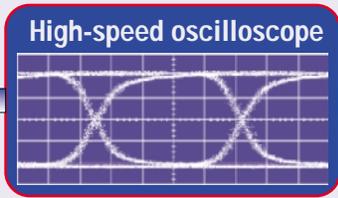
Intelligently Re-synchronize



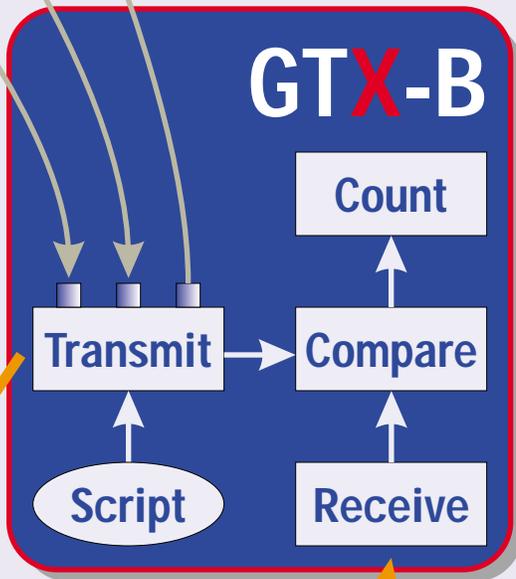
# The Extended Physical Layer Verification System

## Trigger eye diagrams

Use clock output signal for eye pattern measurements

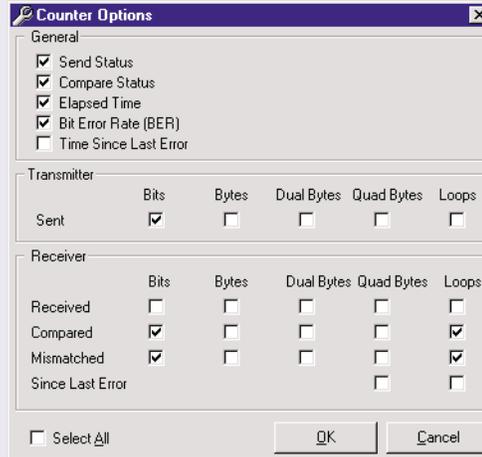


Reference bit clock/20 Out



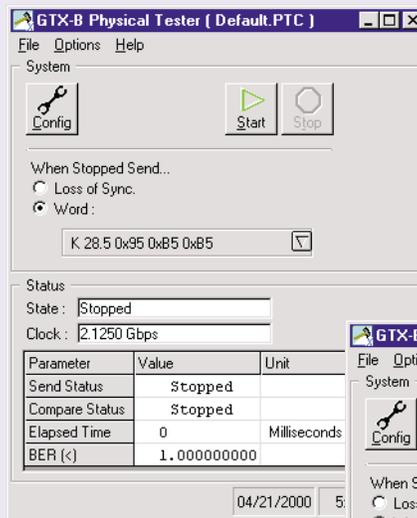
## Devices Under Test

Cables • GBICs  
Transceivers  
Optical Modules  
Backplanes • Chipsets



## Select metrics

- Choose the metrics you need
- Count:
  - ▶ Bits
  - ▶ Bytes
  - ▶ Words
  - ▶ Loops
- Monitor:
  - ▶ Sent
  - ▶ Received
  - ▶ Mismatched
  - ▶ Duration

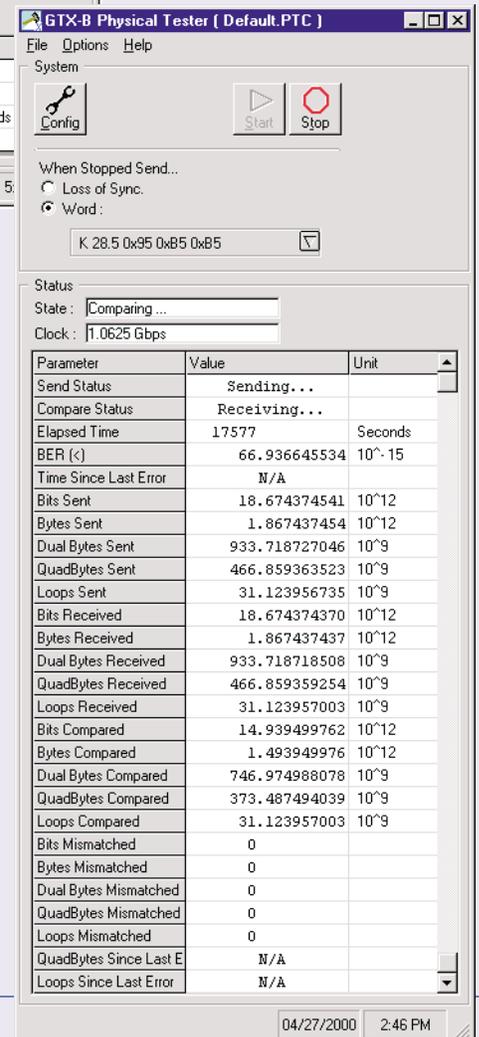


## Load and run script

- Load saved configurations
- Simple Start/Stop control

## See results

- Check Send/Receive Status
- Monitor bit error rate (BER)
- See mismatched counts of bits, bytes, words, and loops
- View running totals of:
  - ▶ Elapsed test time
  - ▶ Number of compared bits
  - ▶ Number of loop passes
  - ▶ Loops since last error
  - ▶ Seconds since last error
- Determine if errors are:
  - ▶ Bit toggle or bit slip
  - ▶ Single or repeated each loop
  - ▶ Caused by wiggling the cable



# GTX-B Bit Error Rate Tester

## Specifications

### Transmitter Fixed Rates

- 1.0625 Gbit/sec
- 1.2500 Gbit/sec
- 2.1250 Gbit/sec
- 2.5000 Gbit/sec
- Frequency is  $\pm 100$  PPM

### Link Connections

Duplex GigaBit Interface Converter (GBIC) module. Options include DB9, HSSDC, 850nm SC multi-mode, 1310nm SC single-mode. For other options call factory.

### Trigger In/Out

BNC connector (TTL): as input to start data generation or stop compare; as output to pulse out once per loop sent.

### Clock/20 In

SMA connector: 50 $\Omega$ , 1 Vpp, AC coupled.  
53.1, 62.5, 106, or 125 MHz  $\pm 1\%$ .

### Clock/20 Out

SMA connector: 50 $\Omega$ , 1.5 Vpp, AC coupled.

### Operating Modes

- Send and Compare for BERT
- Send Only for PLL recovery and error testing
- Compare Only when two GTX-Bs are testing a long link with one at either end

### Scripts

Any legal or illegal 8- or 10-bit value, up to 40K bits may be used in a script. Specify patterns as 8B/10B words, as predefined frames from the frame library, as customized frames or as dynamic variables using the placeholder feature.

### Dynamic Placeholder

Replaces a quad byte entry with dynamically changing values within the traffic generated. A hardware resource is modified each time the script indexes to the placeholder. 8- or 10-bit placeholders are available for:

- Random Words
- Incrementing Bytes
- Incrementing Words
- Walking Ones
- Walking Zero

### Automatic Fibre Channel CRC

Replaces a quad byte entry with dynamically calculated 32-bit Cyclic Redundancy Check value.

## Simulate Loss of Bit, Byte or Words

Transmit any bit pattern in 40-bit increments for error detection verification. Use Send Only mode to simulate toggled bits, dropped bits, bit-shifted commas, or misplaced control characters. Simulate Loss of Sync conditions like Fibre Channel's four words with bit errors within eight words.

## Bit Error Rate Testing (BERT)

Transmit and compare legal patterns for bit error rate testing (BERT). Use Placeholders to dynamically alter word contents and CRC-32 values. Transmit and compare patterns with single bit errors per character.

## Automatic Re-Synchronization

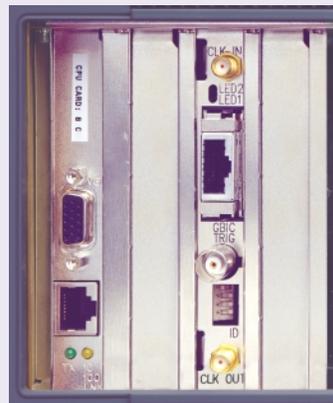
Use no re-synchronization for a locked bit pattern comparison or begin each loop with re-synchronization. Re-synchronization corrects for bit slippage or re-timer circuits that add or drop fill words between frames.

## Eye Diagram Support

Connect the clock/20 output signal from the GTX-B to a high-speed oscilloscope as the trigger input, and use a high-bandwidth probe for the displayed signal input.

## Logging Function

Results may be sampled at intervals of 1-999 seconds. The latest 1-999 result-records are retained. The user can specify a log file name and save the results after the operation has been stopped.



*The GTX-B is available fully configured in a range of rugged portable, desk, or server computers with the NT operating system. It is also available as a PCI card module. Up to four GTX-B modules, each operating independently, may reside in one PC. Two units may be paired for send and remote compare.*

*GTX 2 & 1 Gbit/sec Instrumentation Systems may be configured with GTX-A Fibre Channel Protocol Ana-*

*lyzers and GTX-B modules. Contact Finisar for configuration information.*

*Specifications, configurations, and availability subject to change without notice.*

**For a demonstration of the capabilities of Finisar instrumentation, call Finisar or your local sales representative.**