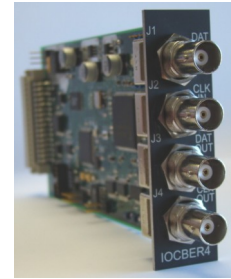# APOGEE LABS

IOCBER9
HIGH FREQUENCY TTL PCM SIMULATOR & BERT MODULE

IOCBER9

FEATURES

- Operates from 100 bps to 50 Mbps
  - ◊ Adjustable in 1 bps steps
  - ◊ Accuracy +/- 50 ppm
- Fully configurable PCM Simulator
- Selectable input / output Data and Clock polarities
- Error insertion capability
- Remote control capability
- Round trip Link Delay measurement

OVERVIEW

The IOCBER9 is the result of a requirement to verify telemetry systems with data other than standard random PRN patterns. The module is capable of generating and reading an IRIG-106 PCM pattern that contains fixed, random, or unique word data and performing a bit by bit analysis.

The transmitter generates a test data stream that includes a PCM sync pattern, subframe counter and general or unique word data for input to the system under test. The IOCBER9 has the capability to insert errors into the data stream to verify end-to-end test setup. The transmitter generates a fixed frequency or a varying or sweeping set of frequencies.

The recovered channel data from the system under test is then input to the IOCBER9 receiver section. Each receiver automatically synchronizes to the input stream (no operator intervention for bit alignment is required) and functions independently from the transmitter (for testing PCM received from a remote site). Bit analysis is applied to the received data and bit errors in the received stream are detected and counted. The processor section collects this information and formats it for the front panel display and remote readout.

The front panel provides information on total bits received, total bit errors received, total bit slips encountered, total ones in error, total seconds, and bit error rate (B.E.R.). When enabled, the round trip link delay is measured and displayed. Received bit rate is also displayed.

SPECIFICATIONS

TRANSMITTER

- Variable Word Length, 8 to 16 bits
- Variable Frame Length, 4 to 1024 words
- Variable Sub Frame Length, 0 to 65535 bits
- Rate: 100 bps to 50 Mbps in 1 bps steps (+/-50 ppm accuracy)
- 8 to 32 bit SYNC pattern length
- Unique or random general data word
- Unique word entered in Main Frame, Main Frame Super Com, Sub Frame, and Sub Frame Super Com
- Output: selectable data and clock polarity (normal / inverted); coded with 0° clock (min 40 / 60 symmetry); TTL, BNC connectors per signal
- Output Control: OFF, CLK only, CLK & DATA
- Error insertion: 1 bit slip; 1 bit error; 10e-3 BER
- Delay Marker (8 consecutive bit errors every 1 sec = D-MARK)

RECEIVER

- Variable Word Length, 8 to 16 bits
- Variable Frame Length, 4 to 1024 words
- Variable Sub Frame Length, 0 to 65535 bits
- Rate: 100 bps to 50 Mbps in 1 bps steps (+/-50 ppm accuracy)
- 8 to 32 bit SYNC Pattern Length
- Input: selectable source (local transmitter / external TTL input); chassis Internal Daisy Chain Bus; selectable data and clock polarity (normal / inverted); coded with 0° clock (min 30 / 70 symmetry); TTL connectors per signal
- Sync acquisition: automatic, adaptive loop versus closed loop error rate based
- Counter Measurements:

  Accum Mode Display
  - -bits received
  - -bits in error
  - -1-bits in error
  - -bit error rate
  - -errored seconds
  - -bit slips
  - -received bit rate in bps (+/-50 ppm accuracy)
- BER Measurement type:

RECEIVER (cont'd)

Accumulate mode: Counts until Operator performs Reset. A freeze-display control is provided to view intermediate results, counters continue to count in background mode.

Automatic reset: Counts errors for selected interval, then calculates & displays results 10^3 up to 10^{11} bit test lengths provided

- Link Delay Measurement (Insert: D-MARKS to enable)

  Auto-measure every 1 second

  Range: 0 to 9.99 seconds

  Resolution: 33ns +/- 1 bit time

  Accuracy: +/- 50 ppm +/- 1 bit time
- Receive Bit Rate

  Measures and Displays Selected Rx

FRONT PANEL DISPLAY FORMAT

- Setup and Operation on 8 pages
- Transmit and Receive sections configured independently
- Slips, Errored Seconds and Rx frequency are displayed as decimal
- BER, BITS, Errors and Error Frames displayed exponentially
- Control: reset to zero control is provided to restart tests

REMOTE CONTROL

- Via 10 BaseT Ethernet (optional) or RS-232

ENVIRONMENTAL

- Operating temperature: 0° to 50° C
- Relative humidity: 15% to 95%; non-condensing
- Altitude: Sea level to 10,000 feet

POWER

- +5V input / 3.75 watts

MEAN TIME BETWEEN FAILURES

- ~ 100,000 hours