® BLACK BOX Catalogue Ltd
The Source for Connectivity
TSU2048

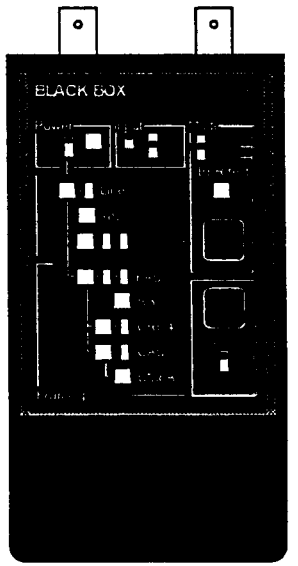
E1
Monitor & Tester

TECHNICAL: (0118) 931 2233
SALES: (0118) 965 5100
FAX: (0118) 931 1727
ADDRESS: 15 Cradock Road, Reading, Berkshire RG2 0JT
WEB: www.blackbox.co.uk

E1 MONITOR & TESTER

TSU2048
G703/G704 Monitor & Tester

- Speed 2.048Mb - G703 Interface
- G.704 Framing Analysis
- BERT (PRP15) generator/checker
- Master and Slave Timing options
- Adjustable Sensitivity: 0 to -11 or -43dB
- High Impedance Monitor Mode
- 75Ω or 120Ω matching options
- Battery powered -typically 16hours
- Size: 65×120×22mm



Line Specifications

Matching:	75Ω or 120Ω
Return Loss:	>15dB (51kHz to 3.072MHz)
Dynamic Range:	0 to -11db or 0 to -43dB
Isolation typically:	3kV transmit to receive
Transmit:	pulse amplitude and masks to G.703
Test Pattern:	Unframed PRP15 (2^{15}-1) - Inverted

Bit Error Rate Test Mode

Connectors

The BNC connector immediately above the Power switch is the Input or Receive connector.

The connector above the Mode switch is the Output or Transmit BNC

HDB3 Line Signal Detector

This provides a means of testing circuits with an unframed data pattern. This test may be run either end-to-end, using a pair of testers, or with a remote loop, using a single tester. With the switch in BERT mode, the tester initially transmits continuous HDB3 zeros until valid incoming carrier is detected. The TSU2048 then generates the standard unframed PRP-15 test pattern (2^{15}-1 pseudo-random bit sequence), and can generate on command either single bit errors or a steady stream-of errors at a rate of E-6 (2 errors per second). It will then check the received PCM signals for the presence of the PRP15 pattern-green LED indicates synchronisation, bit errors-yellow LED, and a BER worse than 1 in 1000-red LED.

The user can select either Master or Slave timing options for the BERT test allowing the tester to operate over a wide range of network configurations.

G.704 Monitoring is disabled when the TSU2048 is operating in BERT mode.

When testing for a period of time the momentary switch can be used to latch any error conditions to ON until reset. This allows the user to be absent whilst tests are being performed in conditions where a single error is unacceptable.

Note

The TSU2048 uses the same PRP test as certain X21 testers. As this unit incorporates an LCD display, it can be used at the other end of a link, where an X21 interface exists to count errors. If another type of tester is used, remember that the test pattern transmitted by the TSU2048 is an inverted 2^{15}-1 test pattern in accordance with ITU recommendations.

G704 Framing monitoring

Connections & Set-up

Fit a 'T' piece to the input BNC connector (the one above the power switch) . Connect the TSU2048 between the equipment and network interfaces.

Switch the unit to Monitor mode using the Mode switch.

Set the impedance switch to Hi-Z to prevent any loading problems and set the sensitivity switch to Hi

G.704 framing monitor

In this mode, the TSU2048 checks the incoming PCM signals for the G.704 framing structure. This test will normally be used to monitor live circuits carrying traffic and will therefore normally use Hi-Z line bridging, though 75Ω or 120Ω matching can be selected if required.

LED's show the presence of, and errors in, the framing signal (FAS), channel-associated signalling (CAS), and cyclic redundancy check (CRC-4). An FAS error rate of greater than 1 in 1000 is also indicated.

Indicators are also provided to show the presence of a distant alarm (DA) or distant multi-frame alarm (DMFA).

The alarm indication signal (AIS) is similarly checked for and indicated.

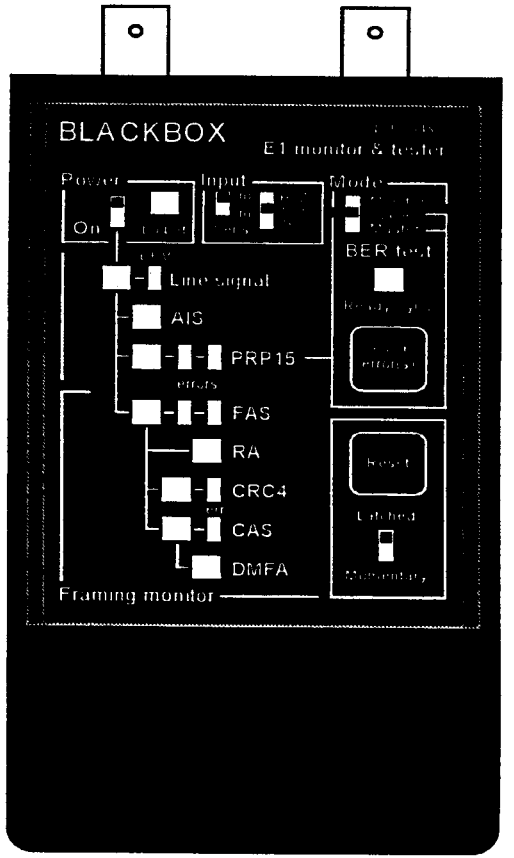
Error and alarm LED's (except DA) can be latched or momentary, according to the switch setting. A reset button is provided to clear latched indications

The error LED's can be latched to remain ON in the event of momentary errors being detected. Use Reset switch to cancel any captured errors or switch the unit back to momentary mode.

Note
Once the unit has identified a G704 frame sequence, it can only indicate losses of identified signals. If additional features are subsequently activated the unit must be reset in order to identify the additional components.

This does not apply to the Remote Alarm (RA) and Distant Multi-Frame Alarm (DMFA) indicators.

E1 MONITOR & TESTER



Switches

Power: Off/On
Hi/Lo: Sensitivity: Hi = -43dB, Lo = -11dB
Impedance Matching: 75Ω, 120Ω, High

Monitor Mode / Bert-master/ Bert-slave:

- *In Master TSU2048 originates the timing*
- *In Slave TSU2048 synchronises output to the clock of the received signals.*

Inject Errors (BERT mode only)
Latch / Momentary: controls LED functions
Reset: Cancels latched error indications

LED's

Lo Battery: ≤ 30 mins power remaining
Rdy/Synch: Test pattern Synch / test pattern output (Flashing: transmit '0's, Solid: transmit PRP)
Line Signal: HDB3 signal detector (Green = valid signals, red = no HDB3 signals)
BPV: Bi-polar violations detected
AIS: All ones detected
PRP: Pattern Synch/Errors/ Error Rate $\leq 10^3$
FAS: Frame Synch / Errors/ Error Rate $\leq 10^3$
RA: Remote Alarm detection ON/OFF

CRC4 detected / **CRC4** errors
CAS detected / **CAS** errors

DMFA: Distant Multiframe Alarm ON / OFF

Line

Matching: 75Ω or 120Ω
Return Loss >15dB (51kHz to 3.072mhz)
Dynamic Range: 0 to -11db or 0 to -43dB
Isolation typically 3kV transmit to receive
Transmit pulse amplitude and masks to G.703
Test Pattern PRP15 (2^{15}-1) – Unframed and inverted (as per ITU recommendations)

Physical

Size 65×120×22mm (excluding connectors)
Weight 140g (5oz) approx. (including batteries)
Case ABS to UL-94H

Power

Source 2 × AA cells (MnAlk recommended)
Life typically 16 hours
Lo bat flashes when less than 30mins of battery power life remaining when using Alkaline batteries