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## Multi-Function T1/E1/Datacom Tester

T1 (1.544MHZ.) - E1 (2.048MHZ.)  
Datacom (RS232, V.35, RS449, 530)



A Hand-Held Combination Tester for the Global Field Technician  
A powerful tool for testing:

- T1/Fractional T1 Digital Circuits
- E1/Fractional E1 Digital Circuits
- DataCom both Synchronous and Asynchronous

AST, ISO, IEC, ANSI, NCSL, MIL-STD by [www.raeservices.com](http://www.raeservices.com)  
Ameritec Corporation is an ISO 9001:2000 Certified Company

## DIGITAL

A Full Function 1.544MBPS/2.048MBPS T1/E1 Tester

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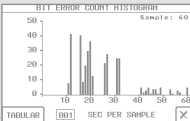
MEASUREMENT DISPLAY

<input checked="" type="checkbox"/> ERROR SUMMARY	<input type="checkbox"/> SLD ERRORS	<input type="checkbox"/> PULSE SHAPE
<input type="checkbox"/> ERASE	<input type="checkbox"/> SIGNAL	<input type="checkbox"/> SIGNAL
<input type="checkbox"/> FAS ERRORS	<input type="checkbox"/> PCM SIGNAL	
<input type="checkbox"/> CRC RECEIVE	<input type="checkbox"/> CAS BIT STATUS	

CHANNEL SELECT RX1

<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input checked="" type="checkbox"/> 5	<input checked="" type="checkbox"/> 6	<input checked="" type="checkbox"/> 7	<input checked="" type="checkbox"/> 8
<input checked="" type="checkbox"/> 17	<input checked="" type="checkbox"/> 18	<input checked="" type="checkbox"/> 19	<input checked="" type="checkbox"/> 20	<input checked="" type="checkbox"/> 21	<input checked="" type="checkbox"/> 22	<input checked="" type="checkbox"/> 23	<input checked="" type="checkbox"/> 24

ALL ON  ALL OFF



ERROR SUMMARY

MEASUREMENT DISPLAY PAGE 1 EXPECTED PATT. REQS	NEXT	AUTO	MORE
BIT ERRORS: 000000 bits			
CODE ERRORS: 000000 bits			
FAS ERRORS: 000000 frames			
CRC RXD: 000000 bytes			

TEST DURATION: 00:00:00 RT H/R

GRSS (SETUP/INSERT) BY 883

LINE CONFIGURATION

Block diagram showing connections between A, B, and C ports.

Buttons: 1A, 1B, 1C, 1D, 1E, 1F, READ

SELECT SEND PATTERN (PAGE 1)

<input checked="" type="checkbox"/> GRSS	<input type="checkbox"/> 3 IN 24
<input type="checkbox"/> 2*9-1	<input type="checkbox"/> 2*23-1
<input type="checkbox"/> 2*11-1	<input type="checkbox"/> ALL 1's
<input type="checkbox"/> 2*15-1	<input type="checkbox"/> ALL 0's
<input type="checkbox"/> 2*20-1	<input type="checkbox"/> 2 IN 8

NEXT PAGE

The Models 404-4 are  
Hand-Held Multipurpose Telecom  
Field Testers that Offer a Touch  
Screen Graphical User Interface for  
extreme ease of use.

ERROR SETUP

<input checked="" type="checkbox"/> BIT	<input type="checkbox"/> CODE	<input type="checkbox"/> FAS
<input type="checkbox"/> CRC	<input type="checkbox"/> INFAS	

ERROR TYPE(S) ENABLED FOR INSERTION

CONTINUOUS 001 # 6

SINGLE

BURST OF 0050

### Digital Tester

The digital test functionality of the Model 404-4 allows a wide range of testing on framed or unframed 1.544Mbps T1 or 2.048Mbps E1 circuits. Two TX/RX ports are provided in order to allow bidirectional drop and insert testing. The shift can terminate the line (simultaneous pattern generation and pattern measurement) or monitor the line for BERT patterns, ABCD bit status, and SLDs 96 align maintenance and message decode. The Model 404-4 is compatible with unframed PCM as well as G.703 and ESF framing with B3ZS or AMI encoding for T1 circuits and PCM30/31 and HDB3 encoding for E1 circuits.

### T1/E1 Physical Layer Testers

The Model 404-4 measures the actual T1 or E1 frequency and level to verify basic signaling integrity.

### Error Display

Real time error counters of framing, code, logical and CRC errors are kept for the duration of the test. Individual error type displays can be accessed each showing errored seconds, error free seconds, degraded minutes and other pertinent G.821 data.

### Enhanced Digital (optional)

With the Enhanced Digital option, a T1 or E1 telephone is added with dial, talk & listen capability on any user selected voice channel. The Enhanced Digital option provides VF testing of any user selected channel including voiceband level, frequency, noise and return loss.

Real-time error counters are augmented by histograms so that the distribution of errors during a test can be studied.

The Enhanced Digital option augments the standard patterns with 5 user programmed long patterns which can be as short as 1 byte or as long as 128 bytes.

Finally, the Enhanced Digital option provides a graphical display of pulse shape with the G.703 or a user set table Mask.

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# DATACOM

A Full Functional Datacom Tester

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BIT ERRORS NEXT AUTO  
 MEASUREMENT DISPLAY  
 DTE NOT READY  
 DCE NOT READY  
 NO DCE BELK  
 DCE LOOPEED  
 DCE REMOTELY LOOPEED  
 DCE IN TEST MODE  
 NO TX RESPONSE  
 WAITING FOR RI  
 SEND PATT SEND ERROR CONFIGURATION  
 QRSS [SETUP] [INSERT] [V-30] [DTE]

1/F STATE AUTO  
 MEASUREMENT DISPLAY  
 DTE NOT READY  
 DCE NOT READY  
 NO DCE BELK  
 DCE LOOPEED  
 DCE REMOTELY LOOPEED  
 DCE IN TEST MODE  
 NO TX RESPONSE  
 WAITING FOR RI  
 SEND PATT SEND ERROR CONFIGURATION  
 QRSS [SETUP] [INSERT] [V-30] [DTE]

SET DURATION  
 CORRECTED PATT  
 [OK] [CANCEL]

DATACOM CORE CONFIGURATION  
 V-30 INTERNAL  
 INTERFACE CLOCK  
 DTE NORMAL N=64K  
 DTE/DCE CLOCK INVERT RATE  
 SYNC N =   
 MODE

1/F STATE AUTO  
 MEASUREMENT DISPLAY  
 DTE NOT READY  
 DCE NOT READY  
 NO DCE BELK  
 DCE LOOPEED  
 DCE REMOTELY LOOPEED  
 DCE IN TEST MODE  
 NO TX RESPONSE  
 WAITING FOR RI  
 SEND PATT SEND ERROR CONFIGURATION  
 QRSS [SETUP] [INSERT] [V-30] [DTE]

MEASUREMENT DISPLAY  
 INTER-FACE STATE  
 BIT ERRORS  
 CONTROL LEADS

SET ERROR SETUP  
 [OK] [CANCEL]

## Datacom

Extensive pattern generation and detection with G821 bit error rate reporting are provided. V.35 RS232, RS449 and EIA530 interfaces are provided in the Model 404-4. Errors can be injected into the data one bit at time or in bursts. The Model 404-4 also reports the presence of both Transmitter and Receiver errors to make troubleshooting fast and easy.

## Global Test Set

For applications involving the testing of T1, E1 and datacom circuits, the 404-4 is the ideal test set. One button configuration allows the user to easily change the unit's mode of operation and thereby eliminate the need for multiple single-purpose test sets.

### DIGITAL SPECIFICATIONS (T1) ERROR MEASUREMENTS

**Transmitter**  
 Bit Patterns: 2<sup>n</sup>-1, 2<sup>n+1</sup>-1, 2<sup>n+2</sup>-1, 2<sup>n+3</sup>-1, ORSS, 2<sup>n+2</sup>-1, All 1s, All 0s, 2 in 8, 3 in 24, 1, 1, 1, 5 Octet, User1, User2, User3 (24 Bit)  
**Error Inject:** Type: BIT, B/PV and Frame Errors in Any Combination  
**Mode:** Single, Burst (up to 999) or Continuous from 1X10<sup>-3</sup> to 999X10<sup>-6</sup>

**Error Analyzer**  
 Measurement Display: Alarms, PCM Signal, ABCD Bit Status and SLC® 96 Messages, Framing Errors, Bit-Polar Violation Errors, Bit Errors and CRC Errors  
**Bit Pattern Receiver:** Manually Select Any Transmitted Pattern or Auto Detect

Deluxe Error Measurement:

Measurement	Framing	Bit-Polar	Logical	CRC
# Errors	Y	Y	Y	Y
# Error Bits	Y	Y	Y	Y
# Framing Errors	Y	Y	Y	Y
# Available Seconds	Y	Y	Y	Y
# Unavailable Seconds	Y	Y	Y	Y
# Unpaired Minutes	Y	Y	Y	Y
# Bytes Lost	Y	Y	Y	Y
String Size	Y	Y	Y	Y
# Out of Frame	Y	Y	Y	Y
# Change Out of Frame Alignment	Y	Y	Y	Y

**Frame Slip Measure**  
 Range: -99999 to +99999  
 Resolution: One Frame Slip  
**Bit Slip Measure**  
 Range: ±193 bits

**Error Criteria**  
 Pattern Sync Loss: XXXX in 4000 Bits, XXXX Operator Selectable From 001 to 255  
 Frame Sync Loss: Two out of Four, Two out of Five, Two out of Six, Operator Selectable  
 CRC Algorithm: CRC6

**Low Density:** Average One's Density Falls Below 12.5% or More Than 15 Consecutive Zeros are Received  
**Yellow Alarm:**

**SF Mode:** Bit Two of Every Channel is Low  
**ESF Mode:** Eight Ones Followed by Eight Zeros  
**Fixed Patterns:** 100 Consecutive Error Free Bits  
**Average Interval:** Ten Second Error Averaging Interval  
**T1 PHYSICAL LINE MEASURE**

### Simplex Current:

Range: 10 to 200 mA  
 Resolution: 1 mA  
 Accuracy: ±5%

### Level Measure:

Power: ±0.5dB to -40dBx  
 Resolution: 1dB  
 Accuracy: ±0.5dB From 0 to -10dBx  
 Range: -10 to -200dBx, ±0dB From -20 to -40dBx  
**Frequency Measure:**

Range: 1.5 to 16MHz  
 Resolution: 1Hz  
 Accuracy: ±10PPM

**T1 CSU EMULATE or CONTROL**  
 In Band: CSU, Network Facility 1, Network Facility 2, User Defined 1  
 Out Band: CSU Line, CSU Payload, Network, User Defined 1  
**SLC® 96 MONITOR**  
 Fields Displayed: Alarm 13 Frame/16 Frame (16 Bits), Protection (4 Bits), Maintenance (4 Bits)  
 Messages Decoded:

RT to LDS: Activity, Activity UPD, Looping Test, Assign UPD Req, Idle, No Alarm  
 LDS to RT: Trunk Assign, Trunk Deassign, Assign UPD, Disassign UPD, Looping Test, Activity UPD Req, Idle

**SIGNALING BIT MONITOR or CONTROL**  
 Monitor: Simultaneous Display of ABCD Signaling Bit Status for All 24 Channels

**GENERAL**  
 Idle Channel Control: Set idle channel bit pattern in Drop and Insert or Tx/Rx modes.

Modes: Bridge Monitor, Repeat Monitor, Tx/Rx, Drop and Insert, East, Drop and Insert West, CSU Emulate  
 T1 Clock: Internal, Derived From PCM1, Derived From PCM2

Line Code: AMI, B8ZS  
 Line Buildout: 0dB, -7.5dB, -15dB, -22.5dB  
 Channel Selection: All (Full T1) or Any One or More Contiguous or Non-Contiguous 56Kb or 64Kb Channels  
 Input Frequency: 1544,000 ±100PPM

NIST, ISO, IEC, ANSI, NCSL, MIL-STD by www.raeservices.com

Test Timer: Continuous or Timed - Timer Programmable From 00 Hour, 00 Min, 00 Sec. to 99 Hour, 59 Min, 59 Sec.

Y = Numeric Results Readout plus Optional (Option No. 25-0254) Additional Tabular or Graphical Histogram

