

# Model 404e

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## Multi-Purpose Universal HDSL Tester HDSL (292KHZ.) ISDN BRI (U-Interlace) - SDSL (384KHZ.)



A Hand-Held Combination Tester for the Telecom Field Technician

A powerful tool for testing:

- E1/Fractional E1 Digital Circuits
- Wideband Analog Transmission Impairment
- DataCom both Synchronous and Asynchronous

AST, ISO, IEC, ANSI, NCSL, MIL-STD by [www.raeservices.com](http://www.raeservices.com)

Ameritac Corporation is an ISO 9001:2000 Certified Company

## DIGITAL

A Full Function 2.048MBPS E1 and FE1 Tester

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The image displays several screenshots of the Model 404e digital tester's graphical user interface (GUI). The central screenshot shows the 'MEASUREMENT DISPLAY' menu with options for ERROR SUMMARY, S10 ERRORS, PULSE SHAPE, BIT ERRORS, FAS ERRORS, PCI SIGNAL, CRC RECEIVE, and CRC BIT STATUS. To the right is the 'CHANNEL SELECT RM1' menu with a grid of channel selection buttons (1-24) and 'ALL ON'/'ALL OFF' options. Below the central menu is a 'BIT ERROR COUNT HISTOGRAM' showing a bar chart for a sample of 60. To the right of the histogram is the 'ERROR SUMMARY' screen displaying real-time error counts: BIT ERRS (000000 bits), CODE ERRS (000000 bits), FAS ERRS (000000 frames), and CRC RECV (000000 bits). Below this is the 'TEST STATUS' screen showing 'TEST IN PROG', 'ET 00:00:00', 'RT N/A', 'S10 2011', 'S10 ERROR', 'LINE SOURCE', 'S10 17/7', 'S10 10/1', 'MODE', 'QRSS', 'SETUP', 'INSERT', 'PCHT 0003', and 'HOLD'. To the right is the 'LINE CONFIGURATION' screen with 'EX CLK', 'REC', 'S10 TEST', 'TRM', 'FRAME ZONE', 'PCHT', 'LINE CODE', 'HDB3', 'M-BLOCK', and '0 0B' options. Below the histogram is the 'SELECT SEND PATTERN (PAGE 1)' menu with options for QRSS and various patterns like 2^9-1, 2^23-1, 1:1, 2^11-1, ALL 1's, 1:7, 2^15-1, ALL 0's, G85-OCTET, 2^20-1, 2 IN 8, and NEXT PAGE. To the right is the 'ERROR SETUP' menu with 'CONTINUOUS' (001) and 'BURST OF' (0050) options. A large watermark 'Communication & Repair Services.com' is overlaid diagonally across the screenshots.

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

### Digital Tester

The digital test functionality of the Model 404e allows a wide range of testing on framed or unframed 2.048Mbps E1 circuits. Two RS232C ports are provided in order to allow bidirectional drop and insert testing. The unit can terminate the line, simultaneous pattern generation and pattern measurement or monitor the line for BER, pattern, ABCD bit status, and TS16 frame synchronization and CRC errors. The Model 404e is compatible with unframed PCM as well as PCM30 and PCM31 framing with HDB3 encoding.

### Enhanced Digital (optional)

With the Enhanced Digital option, an E1 telephone is added with dial, talk & listen capability on any user selected E1 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. The Enhanced Digital option provides a graphical display of pulse shape with the G.703 or a user set table Mask.

### Physical Layer Testing

The Model 404e measures the actual 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.

### Datacom (optional)

Extensive pattern generation and detection with G.821 bit error rate reporting are provided. V.35, RS232, RS449 and EIA530 interfaces are provided in the Model 404e. Errors can be injected into the data one bit at time or in bursts. The Model 404e also reports the presence of both Transit and Receive clocks to make troubleshooting fast and easy.

### AutoTesting with AM440

Model 404e test analog measurements automatically with AM440 Remote Test Partner placed at the other end of the wire. LVL/FREQ/NOISE are examples of auto tests performed with the Model 404e-400 and the AM440.

NIST, ISO, IEC, ANSI, NCSL, MIL-STD by [www.raeservices.com](http://www.raeservices.com)



**DIGITAL SPECIFICATIONS**

(Continued)  
**Enhanced Digital Technical Specifications** (Option No. 25-0250e)  
**Additional:** Bit Patterns  
 1 - 128 Octal User Defined Patterns (5)

**Histogram Display**

Tabular or Graphical Histograms of

Errors

Severely Error

Unavailable

Sync Loss Seconds

Frame Slips

**Physical Line Measure****Pulse Shape Measure**

Measurements: Graphical Display, Pulse Width, Rise Time, Fall Time, Overshoot, Undershoot  
**Range:** +1 to -3dBm  
**Masks:** G.703, user

**Single Channel Monitor**

Monitor: Any Voice Channel

Decode: DTMF, Pulse

Signaling States: Onhook, Offhook

Modes: User

Channel Select: Direct Enter, Scroll

**E1 Telephone**

Signaling States: Onhook, Offhook, Wink, Flash

Modes: User

Dial: DTMF, Pulse

Push To Talk

Channel Select: Direct Enter, Scroll

Analog Measurements

Send:

Signal: Quiet, 1020Hz, Variable Frequency,

Slope: Sweep, Return Loss Noise

Level Range: +3dBm to -40dBm

Resolution:  $\pm 0.1$ dB

Accuracy:  $\pm 0.2$ dB

Frequency:

Range: 200 to 3500Hz

Resolution:  $\pm 1$ Hz

Accuracy:  $\pm 1$ Hz

Receive:

Level:

Range: +3 to -40dB

Resolution:  $\pm 1$ Hz

Accuracy:  $\pm 0.2$ dB

Frequency:

Range: 200 to 3500Hz

Resolution:  $\pm 1$ Hz

Accuracy:  $\pm 1$ Hz

CMR:

Range: +3 to -40dB

Resolution:  $\pm 1$ dB

Accuracy:  $\pm 1$ dB

Return Loss

ERL, SRL (L), SRL (H)

Range: 0 to 40dB

Resolution:  $\pm 0.1$ dB

Accuracy:  $\pm 0.3$ dB

**DATACOM SPECIFICATIONS****INTERFACES**

V28RS22

EIA530RS530A:

V.35

V.36/RS449

Includes DataCom Software, Emulates DCE, DTE

Maximum Data Speed: 40,000, 1200, 2400, 4800

Flow Control: RTS/CTS, XON/XOFF, DTR/DSR

Error Indict: Bit Error, either displayed or stored

Storage: RAM or Diskette

**ANALOG SPECIFICATIONS****LEVEL FREQUENCY****Transmitter**

Var Mode: 20Hz to 4000Hz in Steps or Direct Numeric Entry

1020Hz Mode: 1020Hz Fixed

Slope Mode: 304, 1020, 2004 or 3004Hz

Step Dwell: 0.1 to 999.9 sec.

Sweep Mode: Start Freq: 20Hz to 4000Hz

Stop Freq: 20Hz to 4000Hz

Stop Size: 1Hz to 199.9kHz

Step Dwell: 0.1 to 999.9 sec.

SF Skip: 2130 to 2430Hz

Frequency Accuracy:  $\pm 0.1\%$

Level Range: -50 to +10dBm

Resolution: 0.1dB

Accuracy:  $\pm 1$  to -19dBm @ 1000Hz to 1020Hz the accuracy will be within  $\pm 0.1$  dB @ 600 - 1900 Ohms

600/900 Ohms

1001/35 Ohms

300/10 Ohms

100/5 Ohms

50/2 Ohms

20/1 Ohms

10/0.5 Ohms

5/0.2 Ohms

2/0.1 Ohms

1/0.05 Ohms

0.5/0.02 Ohms

0.2/0.01 Ohms

0.1/0.005 Ohms

0.05/0.002 Ohms

0.02/0.001 Ohms

0.01/0.0005 Ohms

0.005/0.0002 Ohms

0.002/0.0001 Ohms

0.001/0.00005 Ohms

0.0005/0.00002 Ohms

0.0002/0.00001 Ohms

0.0001/0.000005 Ohms

0.00005/0.000002 Ohms

0.00002/0.000001 Ohms

0.00001/0.0000005 Ohms

0.000005/0.0000002 Ohms

0.000002/0.0000001 Ohms

0.000001/0.00000005 Ohms

0.0000005/0.00000002 Ohms

0.0000002/0.00000001 Ohms

0.0000001/0.000000005 Ohms

0.00000005/0.000000002 Ohms

0.00000002/0.000000001 Ohms

0.00000001/0.0000000005 Ohms

0.000000005/0.0000000002 Ohms

0.000000002/0.0000000001 Ohms

0.000000001/0.00000000005 Ohms

0.0000000005/0.00000000002 Ohms

0.0000000002/0.00000000001 Ohms

0.0000000001/0.000000000005 Ohms

0.00000000005/0.000000000002 Ohms

0.00000000002/0.000000000001 Ohms

0.00000000001/0.0000000000005 Ohms

0.000000000005/0.0000000000002 Ohms

0.000000000002/0.0000000000001 Ohms

0.000000000001/0.00000000000005 Ohms

0.0000000000005/0.00000000000002 Ohms

0.0000000000002/0.00000000000001 Ohms

0.0000000000001/0.000000000000005 Ohms

0.00000000000005/0.000000000000002 Ohms

0.00000000000002/0.000000000000001 Ohms

0.00000000000001/0.0000000000000005 Ohms

0.000000000000005/0.0000000000000002 Ohms

0.000000000000002/0.0000000000000001 Ohms

0.000000000000001/0.00000000000000005 Ohms

0.0000000000000005/0.00000000000000002 Ohms

0.0000000000000002/0.00000000000000001 Ohms

0.0000000000000001/0.000000000000000005 Ohms

0.00000000000000005/0.000000000000000002 Ohms

0.00000000000000002/0.000000000000000001 Ohms

0.00000000000000001/0.0000000000000000005 Ohms

0.000000000000000005/0.0000000000000000002 Ohms

0.000000000000000002/0.0000000000000000001 Ohms

0.000000000000000001/0.00000000000000000005 Ohms

**and Sweep Mode****NOISE**

Transmitter: Quiet Termination

Receiver:

Range: +9 to -65dBm

Resolution: 1dB

Accuracy: Same as Receiver Above

Filters: 400Hz Lo Pass, 1020Hz Band Pass, 3000Hz Hi Pass

Other Specifications: Same as "Noise" Above

Transmitter: 1020Hz (Holding Tone)

Receiver:

Range: +9 to -65dBm

Resolution: 1dB

Accuracy: Same as Receiver Above

Filters: 400Hz Lo Pass, 1020Hz Band Pass, 3000Hz Hi Pass

Other Specifications: Same as "Noise" Above

As Holding Tone Level is Less Than 40dB Above The Noise Level

**NOISE TO GROUND**

Transmitter: Quiet Termination

Receiver:

Range: +35 to -39dBm

Resolution: 1dB

Accuracy:  $\pm 1.5$ dB

Filters/Detector: - Same as "Noise" Above

**SIGNAL TO NOISE RATIO**

Transmitter: 1020Hz (Holding Tone)

Receiver:

Signal Range: -40 to -10dBm

Noise Range: -65 to -30dBm

Ratio Range: 10 to 50dB

Accuracy:

$\pm 1$ dB @ 10 to 20dB

$\pm 0.5$ dB @ 20 to 30dB

$\pm 0.2$ dB @ 30 to 50dB

Noise below -70dBm has accuracy  $\pm 0.5$  dB except when using Pseudo Noise (PN)

**IMPULSE NOISE (3 LEVEL)**

Transmitter: Quiet Termination

Receiver:

Min. Threshold: 20dBm

Threshold: 20dBm to 20dBm @ 6dB

Accuracy:  $\pm 1$ dB

Timer: 0.1 to 99.99 sec or Continuous

Max Coverage: Sweep of three Counters

Dead Time: 1 to 20ms

**IMPULSE NOISE WITH TONE**

Transmitter: 1020Hz (Holding Tone)

Receiver: Match Filter 995 to 1025Hz  $\pm 50$ dB

Other Specifications: Same as "Impulse Noise" Above

**RETURN LOSS 2W OR 4W**

Transmitter: 32Hz to 4kHz Band Limited White Noise or Sine Wave  $\pm 10$  to -20dBm

Receiver:

Measurement: Simultaneous ERL, SRL (Lo), SRL (Hi)

Range: 0 to 40dB (2-Wire), 0 to 50dB (4-Wire)

Resolution: 0.1dB

Accuracy:  $\pm 0.5$ dB

Transhybrid Loss Compensation (TLP): -99.9 to +99.9dB

Detector: RMS

DROPOUTS

Dropouts Threshold: 12dB

Accuracy:  $\pm 1$ dB

**DC LOOP VOLTAGE****Receiver**

Range: 0 to  $\pm 120$  VDC

Accuracy:  $\pm 1$  Volt

**RING VOLTAGE/FREQUENCY****Receiver**

Range: 10 to  $\pm 120$  VAC, 20 to 1000Hz

Resolution:  $\pm 1.5\%$

Accuracy:  $\pm 1.5\%$

**Power DTMF**

Duration: 60/60 On or Off Minimum

Twist: 9dB Maximum

Display: Up to 22 Digits

Display Mode: Fill and Hold or FFO

**GENERAL**

Input: 2- or 4-Wire

Impedance (Terminate): 135, 150, 600, 900 or 1200ohms (Complex A available, Contact factory)

Response Impedance (Bridge):  $\pm 50$  ohm, Bridging Loss

$\pm 0.2$ dB

Transmit Source Impedance: Open, 135, 150, 600, 900 or 1200 ohm

DC Blocking: 200 VDC

BALANCE:  $\pm 0.0$ dB @ 50 to 120Hz Decreasing

600 Ohm to 120Hz

4-Wire Loss:  $>30$ dB

Power: 2W (Tx Pair) DC = 200 ohm,

$>20$  ohm

Signaling: DTMF from Full 16 Button Keypad

Monitor: Built-In Speaker with Selection of Transmit, Receiver or Measure Monitor

Talk: Built-In Microphone with Push-to-Talk

Stores/Recall: 40 User Defined Test Sequences and 40 User Defined Line Configurations

**PHYSICAL**

Power: Internal Rechargeable NiMH Battery Pack

Battery Life: 6 Hours (average)

Ext. Power/Recharge: 115/230 VAC Adapter, Optional

12 VDC Cigarette Lighter Adapter

Weight: 1.5kg

Size: 126x48

Dimensions: 198 x114 x 58mm