

# Model 404

## Multi-Purpose Universal HDSL Tester

HDSL (292kHz.) - HDSL (196kHz.)  
ISDN BRI (U-Interface) - SDSL (384kHz.)



A Hand-Held Combination Tester for the Telecom Field Technician

A powerful tool for testing:

- T1/Fractional T1 Digital Circuits
- Wideband Analog Transmission Impairment
- DataCom both Synchronous and Asynchronous

**Ameritec**

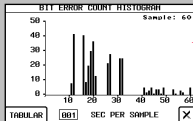
Ameritec Corporation is an ISO 9001:2000 Certified Company

# DIGITAL

## A Full Function 1.544MBPS T1 and FT1 Tester

MEASUREMENT DISPLAY	
<input checked="" type="radio"/> ERROR SUMMARY	<input type="radio"/> S18 ERRORS
<input type="radio"/> BIT ERRORS	<input type="radio"/> S17 ERRORS
<input type="radio"/> CODE ERRORS	<input type="radio"/> ALARMS
<input type="radio"/> FAS ERRORS	<input type="radio"/> PCH SIGNAL
<input type="radio"/> CRC RECEIVE	<input type="radio"/> CRS BIT STATUS
X	

CHANNEL SELECT RM1							
1 X	2 X	3 X	4 X	5 X	6 X	7 X	8 X
9 X	10 X	11 X	12 X	13 X	14 X	15 X	16 X
17 X	18 X	19 X	20 X	21 X	22 X	23 X	24 X
ALL ON		ALL OFF		X			



ERROR SUMMARY	NEXT	AUTO	MORE
MEASUREMENT DISPLAY PAGE 1 EXPECTED PATT. HEAD			
BIT ERRORS	000000	bits	
CODE ERRORS	000000	bits	
FAS ERRORS	000000	frames	
CRC RCV	000000	bits	
TEST DURATION	00:00:00	ET	00:00:00
CRS BIT STATUS	00	BY	00
QRSS	00	SETUP	INSERT

LINE CONFIGURATION						
A	M	D	E	TX CLK		
PCM1 TOR	Sh: 1			REC		
	TEST			DSX TEST		
				DSX		
				FRAME FORMAT		
				ESF		
				LINE CODE		
				B8ZS		
				IN. BULKY OUT		
				0 0B		
A	B	C	D	E	F	RECALL

SELECT SEND PATTERN (PAGE 1)	
<input checked="" type="radio"/> QRSS	<input type="radio"/> 3 IN 24
<input type="radio"/> 2*9-1	<input type="radio"/> 2*23-1
<input type="radio"/> 2*11-1	<input type="radio"/> ALL 1's
<input type="radio"/> 2*15-1	<input type="radio"/> ALL 0's
<input type="radio"/> 2*20-1	<input type="radio"/> 2 IN 8
	NEXT PAGE
X	

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

ERROR SETUP		
<input checked="" type="radio"/> BIT	<input type="radio"/> CODE	<input type="radio"/> FAS
<input type="radio"/> CRC	<input type="radio"/> NFAS	
ERROR TYPES: ENABLED FOR INSERTION		
<input checked="" type="radio"/> CONTINUOUS	001	# 6
<input type="radio"/> SINGLE		
<input type="radio"/> BURST OF	0050	

### Digital Tester

The digital test functionality of the Model 404 allows a wide range of testing on framed or unframed 1.544Mbps T1 circuits. Two TX/RX 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 BERT patterns, ABCD bit status, and SLC® 96 alarm maintenance and message decode. The Model 404 is compatible with unframed PCM as well as D4 and ESF framing with B8ZS or AMI encoding.

### Enhanced Digital (optional)

With the Enhanced Digital option, a T1 telephone is added with dial, talk & listen capability on any user selected T1 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.

### T1 Physical Layer Testing

The Model 404 measures the actual T1 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 404. Errors can be injected into the data one bit at time or in bursts. The Model 404-400 also reports the presence of both Transit and Receive clocks to make troubleshooting fast and easy.

### AutoTesting with AM440

Model 404 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 404 and the AM440.



**DIGITAL SPECIFICATIONS (continued)**

Input Impedance: Bridge: 1000 ohm or Greater  
Term: 100 ohm ±5% bal.  
DSX-Mon: 100 ohm ±5% - assumes 2 x 430 ohm Source

Input Sensitivity: ±3dBx to -35dBx

Store and Recall: 40 Line Configuration Stores  
40 Test Configuration Stores

System Clock: T1: 1.544 000Hz ±10PPM

LED Indicators: Signal: Pulses, Frame Sync, Pattern Sync  
Trouble: Lo Density, Excess Errors, AIS (All 1's), RAL OOF, COFA Zeros, Framing SF, ESF, SCL#06  
Code: 8B25, AMI

**Enhanced Digital Technical Specifications (Option No. 25-0250)**

Additional Bit Patterns:  
1 - 128 Octet User Defined Patterns (5)  
Histogram Display  
Tabular and Graphical Histograms of:  
Errors  
Errored Seconds  
Severely Errored Seconds  
Unavailable Seconds  
Sync Loss Seconds  
Frame Slips

**T1 Physical Line Measure**

Pulse Shape Measure:  
Measurements: Graphical Display, Pulse Width, Rise Time, Fall Time, Overshoot, Undershoot  
Range: +1 to -3dBx  
Masks: DSX, NI, User

**Single Channel Monitor**

Monitor: Any Voice Channel  
Decode: DTMF, MF, Pulse  
Signaling States: Onhook, Offhook  
Modes: FXS Loop Start, E&M, SWS6, User  
Channel Select: Direct Enter, Scroll

**T1 Telephone**

Signaling States: Onhook, Offhook, Wink, Flash  
Modes: FXS Loop Start, E&M, SWS6, 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: ±0.1dB  
Accuracy: ±0.2dB

Frequency: Range: 200 to 3500Hz  
Resolution: ±1Hz  
Accuracy: ±1Hz

Receive: Level: Range: +3 to -40dBm  
Resolution: ±1Hz  
Accuracy: ±0.2dB

Frequency: Range: 200 to 3500Hz  
Resolution: ±1Hz  
Accuracy: ±1Hz

CMsg: Range: +3 to -40dB  
Resolution: ±1dB  
Accuracy: ±1dB

Return Loss: Accuracy: ±1dB  
ERL: SRL (Lo), SRL (Hi)  
Range: 0 to 10dB  
Resolution: ±0.1dB  
Accuracy: ±0.3dB

**DATACOM SPECIFICATIONS****INTERFACES**

V28RS232  
EIA530EIA530A:  
V.35  
V.36/RS449  
Includes: Datalog Software, Emulates DCE, DTE  
Maximum Data Speed: 300, 600, 1200, 2400, 4800, 9600, 192K, 38.4K, 48K  
N64 baud where N can be 1 to 32 for 4.8K baud  
Error Inject: Bit Error either single or burst

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

Var Mode: 20Hz to 400kHz in Steps or Direct Numeric Entry  
1020Hz Mode: 1020Hz Fixed  
Slope Mode: 404, 1020, 2800Hz  
Step Dwell: 0.1 to 999.9 sec.

Sweep Mode: Start Freq: 20Hz to 400kHz  
Stop Freq: 20Hz to 400kHz  
Step Size: 1Hz to 199.9kHz

Step Dwell: 0.1 to 999.9 sec.  
SF Slip: 2450 to 2750Hz  
Frequency Accuracy: ±0.1%

Resolution: -50 to +10dBm  
Resolution: 0.1dB  
Accuracy: AI = 10dBm to -19dBm @ 1004Hz to 1020Hz the accuracy will be within ±0.1 dBm @ 600-1900 Ohms  
600900 Ohms

200Hz 204Hz 208Hz 400kHz

+10dBm	±0.2	±0.3	±1.2
-40dBm	±0.5	±0.5	±1.5
-50dBm			

100/135 Ohms

400Hz 14Hz 200kHz 400kHz			
+10dBm	±0.5	±0.4	±1.2
-40dBm	±0.9	±1.0	±1.5
-50dBm			

20Hz 204Hz 208Hz 200Hz

+10dBm	±0.5	±0.2	±1.0
-50dBm	±0.5	±0.2	±1.2
-65dBm			

Detector: Average  
Filters: 400Hz Lo Pass, 15kHz Lo Pass, 60Hz HI Pass  
Frequency Measure  
Range: 20Hz to 400kHz  
Resolution/Accuracy: ±0.1% of reading + 1 count  
Sensitivity: -65 to +10dBm with SIN Ratio >20dB  
Frequency Response: Graphical or Tabular Plot of Level vs Frequency while in Level/Frequency Mode

Receiver  
Level Range: -64.9 to -10dBm  
Resolution: 0.1dB  
Accuracy: Accuracy is ± 0.1dB @ 1004 to 1020Hz @ 0 to -20dBm

20Hz 204Hz 208Hz 200Hz

+10dBm	±0.5	±0.2	±1.0
-50dBm	±0.5	±0.2	±1.2
-65dBm			

Detector: Average  
Filters: 400Hz Lo Pass, 15kHz Lo Pass, 60Hz HI Pass  
Frequency Measure  
Range: 20Hz to 400kHz  
Resolution/Accuracy: ±0.1% of reading + 1 count  
Sensitivity: -65 to +10dBm with SIN Ratio >20dB  
Frequency Response: Graphical or Tabular Plot of Level vs Frequency while in Level/Frequency Mode

**and Sweep Mode**

**NOISE**  
Transmitter: Quiet Termination  
Receiver  
Range: +25 to -99dBm  
Resolution: 1dB  
Accuracy: Same as Receiver Above  
Filters: 400Hz Lo Pass, C message Program  
±0.4 Flat, "D": 3.4kHz, 15kHz Flat, 50kb, 60Hz Pass  
Detector: RMS or Quasi-peak  
**NOTCH NOISE (NOISE WITH TONE)**  
Transmitter: 1020Hz (Holding Tone)  
Receiver  
Notch: 995 to 1025Hz ±50dB

Other Specifications Same as "Noise" Above So Long As Holding Tone Level is Less Than 40dB Above The Noise Level

**NOISE TO GROUND**  
Transmitter: Quiet Termination  
Receiver  
Range: -40 to +129dBm  
Resolution: 1dB  
Accuracy: ±1.5dB

Filters/Detector: Same as "Noise" Above -  
**SIGNAL TO NOISE RATIO**  
Transmitter: 1020Hz (Holding Tone)  
Receiver  
Signal Range: -40 to +10dBm  
Noise Range: -25 to 70dBm  
Ratio Range: 10 to 50dB  
Accuracy:  
±1dB @ 10 to 40dB  
±2dB @ 40 to 45dB  
±3dB @ 45 to 50dB

Noise below -70dBm reduces accuracy to ±2dB except when using Pseudometric filter

**IMPULSE NOISE (3 LEVEL)**  
Transmitter: Quiet Termination  
Receiver  
Minimum Threshold: -60dBm  
Threshold Difference: 2, 3, 4 or 6dB  
Accuracy: ±1dB  
Time: 0.1 to 999.9 min. or Continuous  
Max Count: 999.9 each of three Counters  
Dead Time: 1 to 255ms.

**IMPULSE NOISE WITH TONE**  
Transmitter: 1020Hz (Holding Tone)  
Receiver: Notch Filter 995 to 1025Hz >50dB  
Other Specifications Same as "Impulse Noise" Above -

**RETURN LOSS 2W OR 4W**  
Transmitter: 32Hz to 4kHz Band Limited White Noise or Sine Wave @ -10 to -28dB  
Receiver  
Measurement: Simultaneous ERL, SRL (Lo), SRL (Hi)  
Range: 0 to 40dB (2-Wire), 0 to 50dB (4-Wire)  
Resolution: 0.1dB  
Accuracy: ±0.5dB  
Transhybrid Loss Compensation (TLP): -99.9 to -99.9dB  
Detector: RMS  
**DROUPTS**  
Droput Threshold: 12dB  
Accuracy: ±1dB

**DC LOOP VOLTAGE**

Receiver  
Range: 0 to +120 VDC  
Accuracy: ±1 Volt  
**RING VOLTAGE/FREQUENCY**  
Receiver  
Range: 10 to ±120 VAC, 20 to 1000Hz  
Accuracy: ±1 Volt, ±5%  
Resolution: **DECODE**

Type: DTMF  
Transmitter: -30dBm Minimum  
Duration: 60/60 On or Off Minimum  
Twist: 9dB Maximum  
Display: Up to 22 Digits  
Display Mode: Fill and Hold or FIFO

**GENERAL**  
Input: 2 or 4-Wire  
Receive Impedance (Terminate): 135, 150, 600, 900  
Receive Impedance (Bridge): >50K ohm, Bridging Loss <0.2dB  
Balance Source Impedance: Open, 135, 150, 600, 900  
DC Blocking: 20 dB

Transmit: >90dB @ 50 to 120Hz Decreasing  
6dB/Octave Above 120Hz  
Return Loss: >30dB  
Hold Circuit: 2w (Tx Pair) DC = 20 ohm, AC = >20K ohm

Signaling DTMF from Full 16 Button Keypad  
Monitor: Built-In Speaker with Selection of Transmit, Receive or Measure Monitor  
Talk: Built-In Microphone with Push-to-Talk  
Store/Recall: 40 User Defined Test Setups and 40 User Defined Line Configurations

**PHYSICAL**  
Power: Internal Rechargeable NiMH Battery Pack  
Battery Life: Six hours (approx.)  
Ext. Power/Recharge: 115/230 VAC Adapter, Weight: 1.56kg  
Size: 126x46

Dimensions: 198 x114 x 56mm  
Operating Temp: -20 to +50° Celsius  
Storage Temp: -30 to +70° Celsius  
Printer: Output port compatible with Ameritec Model AM-4XT-D Graphics Printer  
Line Connections:  
2 - or 4 - Wire Analog, 5' Analog Input Cable  
Assembly with Miniclip at User End  
\* Mates with ADC P1777 or Switchcraft TT253

**Ordering**  
The Model 404-40 is supplied standard with the following:  
Basic Unit (battery (8hrs or more life)  
Bantam Connector/s cables  
for Datalog Testing Mode  
AC Adapter  
Analog Input Cable with Clips  
Serial Input Cable  
One Touch Pen  
Instruction Manual  
Software  
Accessories:  
25-0250 Enhanced Digital (option)  
AM-4XT-D Accessory Printer  
(includes battery and connecting cable)  
26-0015 Replacement AM-4XT Printer Ribbon  
48-0047 Bantam to Bantam Cable-6FT  
48-0285 Replacement Analog Input Cable  
DCE/DTE Datalog Cables (Call for info)

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