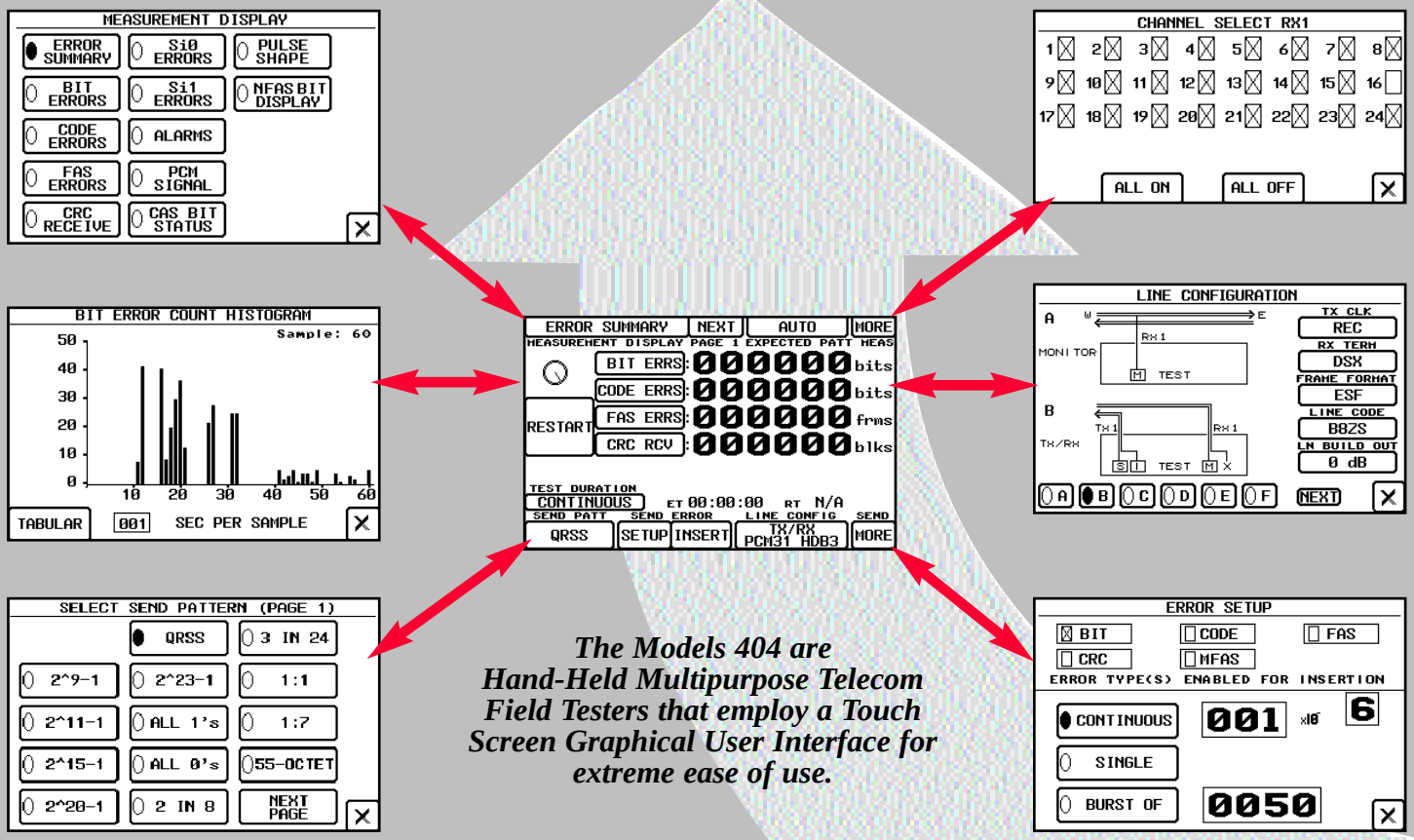
Ameritec

Model 404 Family of Products

DIGITAL
A Full Function 1.544MBPS T1 and FT1 Tester



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

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

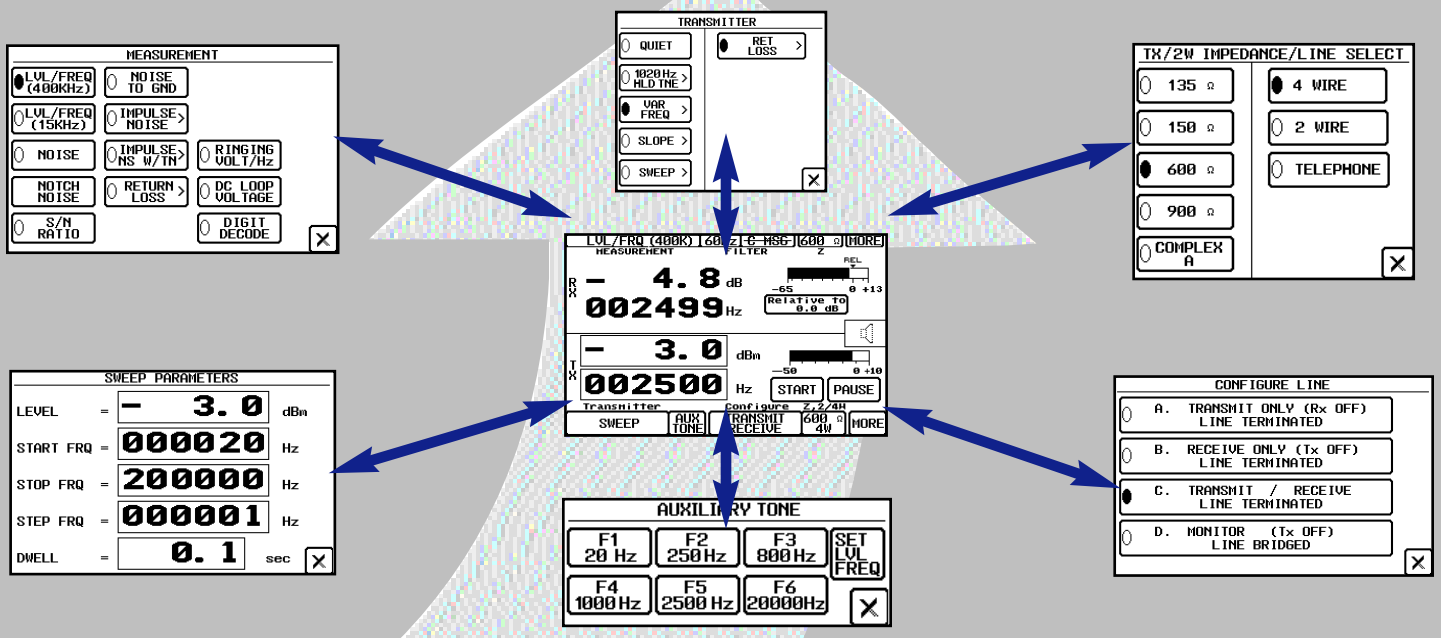
Real time error counters of framing, code, logical and CRC errors are kept for the duration of the test. Individual error type displays can be accessed each showing errored seconds, error free seconds, degraded minutes and other pertinent G.821 data.

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.

ANALOG

A Full Functional Analog Transmission Impairment Tester



Analog Testing

In analog mode the unit provides a wide variety of industry standard measurements to accomplish transmission impairment testing on 2 or 4-Wire dedicated or dial-up analog circuits.

Wideband

The 400kHz bandwidth of the instrument makes it ideal for qualifying metallic digital circuits which use an analog carrier such as ISDN BRI (“U” interface) and 4-Wire HDSL circuits.

Full Duplex Operation

The internal measurement functionality and signal generator functionality may be used separately at each end of a transmission line or simultaneously as would be the case when doing a loopback test from one end of the line.

The display provides both a digital and analog readout of the measurement, or the results may be printed on the optional printer.

DIGITAL SPECIFICATIONS

ERROR MEASUREMENTS

Transmitter

Bit Patterns: 2^9-1, 2^{11}-1, 2^{15}-1, 2^{20}-1, QRSS, 2^{23}-1, All 1s, All 0s, 2 in 8, 3 in 24, 1:1, 1:7, 55 Octet, User1, User2, User3 (24 Bit)

Error Inject: Type: BIT, BPV and Frame Errors in Any Combination

Mode: Single, Burst (up to 999) or Continuous from $1X10^{-3}$ to $999X10^{-6}$

Error Analyzer

Measurement DIsplay: Alarms, PCM Signal, ABCD Bit Status and SLC® 96 Messages, Framing Errors, Bi-Polar Violation Errors, Bit Errors and CRC Errors

Bit Pattern Receiver: Manually Select Any Transmitted Pattern or Auto Detect

Detailed Error Measurement:

Measurement	Type: Framing	Bi-Polar	Logical Bit	CRC
# Errors	⊗	⊗	⊗	⊗
# Errored Seconds*	⊗	⊗	⊗	⊗
Bit Error Rate	X	X	X	X
Average BER	X	X	X	X
# Severely Errored Seconds*	⊗	⊗	⊗	⊗
#Available Seconds	⊗	⊗	⊗	⊗
# Unavailable Seconds	⊗	⊗	⊗	⊗
# Degraded Minutes*	-	X	-	-
# Sync Loss Seconds	⊗	-	⊗	-
Timing Slips	⊗	-	-	-
# Out of Frame	X	-	-	-
#Change Out of Frame/Alignment	X	-	-	-

• = G.821 Measurements

⊗ = Numeric Results Readout

X = Numeric Results Readout plus Optional (Option No. 25-0250) Additional Tabular or Graphical Histogram

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

Frame Slip Measure

Range: -99999 to +99999

Resolution: One Frame Slip

Bit Slip Measure

Range: ±193 bits

Error Criteria

Pattern Sync Loss: XXX in 4000 Bits, XXX 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

Pseudorandom Patterns: 100+n 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:

Range: +3dBsx to -40dBsx

Resolution: 0.1dBsx

Accuracy: ±1dB From +3 to -10dBsx, ±2dB From -10 to -20dBsx, ±3dB From -20 to -40dBsx

Frequency Measure:

Range: 1.5 to 1.6MHz

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

Receiver

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, Deassign UPD, Looping Test, Activity UPD Req, Idle

SIGNALING BIT MONITOR or CONTROL

Monitor: Simultaneous Display of ABCD Signaling Bit Status for All 24 Channels

Control: Set AB (SF) or ABCD (ESF) bits for any channel(s)

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

Tx Clock: Internal, Derived From PCM1, Derived From PCM2

Framing: Unframed, D4, ESF, SLC®96

Line Connect: DSX Monitor, Bridge, Terminate

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: 1,544,000 ±100PPM

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: +3dBsx to -35dBsx
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 Zeros, AIS (All 1's), RAI, OOF, COFA, Errors
Framing: SF, ESF, SLC®96
Code: B8ZS, 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 -3dBsx
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, SW56, User
Channel Select: DIrect Enter, Scroll

T1 Telephone

Signaling States: Onhook, Offhook, Wink, Flash
Modes: FXS Loop Start, E&M, SW56, 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 with 3500Hz
Resolution: ±1Hz
Accuracy: ±1Hz
CMsg: Range: +3 to -40dB
Resolution: ±1dB
Accuracy: ±1dB
Return Loss ERL, SRL (Lo), SRL (Hi)
Range: 0 to 40dB
Resolution: ±0.1dB
Accuracy: ±0.3dB

DATACOM SPECIFICATIONS

INTERFACES

V.28/RS232
EIA530/EIA530A:
V.35
V.36/RS449
Includes Datacom Software, Emulates DCE, DTE
Maximum Data Speed: 300, 600, 1200, 2400, 4800, 9600, 19.2K, 38.4K, 48K
Nx64 baud where N can be 1 to 32 for 64K 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, 2804Hz
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 Skip: 2450 to 2750Hz
Frequency Accuracy: ± .01%
Level Range: -50 to +10dBm
Resolution: 0.1dB
Accuracy:
At + 10dBm to -19dBm @ 1004Hz to 1020Hz the accuracy will be within ± 0.1 dBm @600 -1900 Ohms 600/900 Ohms

	200Hz	20kHz	100kHz	400kHz
+10dBm	± 0.2	± 0.3	± 1.2	
-40dBm	± 0.5	± 0.5	± 1.5	
-50dBm				

100/135 Ohms

	400Hz	1kHz	200kHz	400kHz
+10dBm	± 0.5	± 0.4	± 1.2	
-40dBm	± 0.9	± 1.0	± 1.5	
-50dBm				

Receiver

Level Range: -64.9 to +10dBm
Resolution: 0.1dB
Accuracy: *Accuracy is ± 0.1dB @ 1004 to1020Hz @ 0 to- 20dBm*

	20Hz	200Hz	20kHz	200kHz
+10dBm	± 0.5	± 0.2	± 1.0	
-50dBm	± 0.5	± 0.2	± 1.2	
-65dBm				

Detector: Average
Filters: 400kHz Lo Pass, 15kHz Lo Pass, 60Hz Hi Pass
Frequency Measure
Range: 20Hz to 400kHz
Resolution/Accuracy: ±.01% of reading ± 1 count
Sensitivity: -65 to +10dBm with S/N 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 - 99dBrn
Resolution: 1dB
Accuracy: Same as Receiver Above
Filters: 400kHz Lo Pass, C message Program 3kHz 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 +129dBrn
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 Psophometric filter

IMPULSE NOISE (3 LEVEL)

Transmitter: Quiet Termination
Receiver
Minimum Threshold: -60dBm
Threshold Difference: 2, 3, 4 or 6dB
Accuracy: ±1dB
Timer: 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 -2dBm
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

DROPOUTS

Dropouts 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%

DIGIT DECODE

Receiver
Type: DTMF
Sensitivity: -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
Transmit Source Impedance: Open, 135, 150, 600, 900
DC Blocking: 200 VDC
Balance: >90dB @ 50 to 120Hz Decreasing 6dB/Octave Above 120Hz
Return Loss: >30dB
Hold Circuit: 2w (Tx Pair) DC = 200 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: 1264cc
Dimensions: 198 x114 x 56mm
Operating Temp: -20 to +50° Celsius
Storage Temp: -30 to +70° Celsius

Line Connections:
2- or 4- Wire Analog: 5' Analog Input Cable Assembly with Miniclips at User End
** Mates with ADC PJ777 or Switchcraft TT253*

Ordering

The Model 404-400 is supplied standard with the following:
Basic Unit w/battery (6hrs or more life)
Bantam Connectors/no cables for Datacom Testing Mode
AC Adapter
Analog Input Cable with Clips
Serial Input Cable
One Touch Pen
Instruction Manual
Softcase

Accessories

25-0250 Enhanced Digital (option)
48-0047 Bantam to Bantam Cable-6Ft.
48-0285 Replacement Analog Input Cable
DCE/DTE Datacom Cables (Call for Info)

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