TAS 100 Series
Telephone Network Emulators

TAS 100 is the World's Most Popular Family of Modem & Fax Test Instruments

For years, TAS 100 Series Telephone Network Emulators have been the choice of leading data communications equipment manufacturers and evaluators worldwide. TAS 100 now gives you all of the tools necessary to test the latest and most complex modem and fax modulation schemes. TAS 100 assures high product quality and eliminates costly and embarrassing field failures by providing a comprehensive set of testing capabilities. The investment in a TAS 100 Series Telephone Network Emulator can return many times its cost by eliminating product repairs and lost sales due to poor product quality.

The latest member of the TAS 100 Series family, the TAS 192 thoroughly tests all types of modems. TAS 192 meets and exceeds the requirements of the latest EIA/TIA industry testing standards, including TSB 37A. Enhanced frequency response characteristics provide a more accurate test bench for V.34 and V.34+ modems. TAS 192 also emulates conditions typically associated with local network connections, including short transmission delay and low trunk loss. Modem performance in one of today's most common applications, Internet access over local telephone lines, can now be accurately evaluated. TAS 192 also contains a wide range of other impairments to fully exercise modem performance in a variety of real-world conditions.

TAS 100 Provides a Thorough, Accurate Test for any Device that Communicates over Voice-Bandwidth Telephone Networks

All TAS 100 Series models emulate a complete, end-to-end telephone connection and can be configured to represent 2-wire dial, 2-wire private, and 4-wire private lines. The units can also be configured as 4-wire at one station and 2-wire at the other station to facilitate testing cellular modems and remote access servers. In addition, the TAS 192 can be configured with a new line mode to allow two units to be cascaded together to simulate the effects of digital loop carrier (DLC) systems and private branch exchange (PBX) environments on modem performance. TAS 100 also includes programmable control of network configuration, central office (exchange) configuration, analog transmission impairments, digital facility impairments such as PCM and robbed bit signalling, and delay and echo levels.

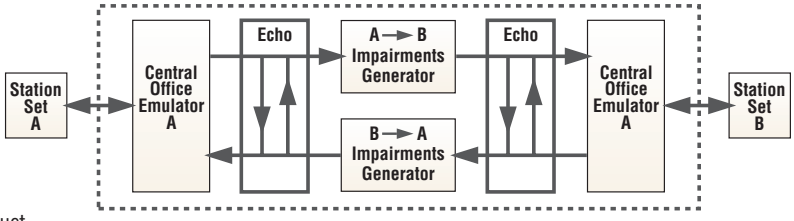
TAS 100 provides the mix of critical features required for thorough evaluation in a compact, easy-to-use package. Designers can drama-tically reduce development testing time and costs. Manufacturers can detect and stop defective products before they reach the field. Product evaluators can select between data communications products based on real-life performance, not just the specification sheet.

In short, TAS 100 helps you to insure the quality of your modem, fax, or other data communications products.

Every TAS 100 Series Telephone Network Emulator lets you quickly and easily evaluate communications equipment performance with respect to:

- Central office conditions such as loop current, ring voltage, call progress tones, etc.
- Transmission impairments such as attenuation, gain distortion, group delay distortion, PCM distortion, robbed-bit signalling, and much more
- Satellite delay and echo

TAS 100 is the easy way to test modems, fax machines, telephone sets, and more!



TAS 100 Series provides bidirectional impairments and echo emulation for accurate results and adherence to current modem testing standards.

Applications:

- Product Development
- Engineering Test
- Quality Assurance
- Manufacturing Test /QC
- Service/Repair Depot Test
- Independent Product Evaluation
- End-User Evaluation/Analysis
- Education & Training

TAS 100 tests and evaluates data communications products such as:

- Modems
- Communications Protocol Software
- Telephone Sets
- Transmission Measuring Equipment

TAS 100 also tests and evaluates products that contain modems, such as:

- Credit Card Verification Terminals
- Automatic Teller Machines
- Facsimile Machines
- Stock Transaction Terminals
- Remote Data Entry Terminals

SPIRENT Communications

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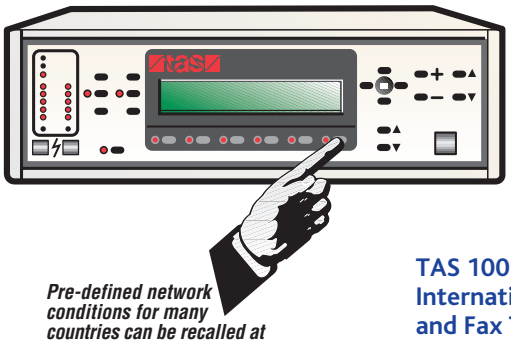
TAS 100 Series Telephone Network Emulators



Pre-defined network conditions for many countries can be recalled at the touch of a button!

TAS 100 Puts the World's Telephone Networks at Your Fingertips

Pre-defined network conditions for many countries can be recalled at the touch of a button! TAS 100 also includes pre-defined transmission impairments conditions according to published Electronic Industries Association (EIA) specifications. Non-volatile storage is provided for user-defined test conditions.

TAS 100 Complies With U.S. and International Standards for Modem and Fax Testing

The TAS 100 Series meets or exceeds impairment generation specifications put forth by EIA/TIA, ITU (CCITT), Nippon Telephone and Telegraph (NTT), AT&T, Bell System, RITT (China), and U.S. Department of Defense. Built-in ROM files include setups for standard test conditions to assure compliance with existing and emerging test standards.

No Other Solution Packs So Much Testing Power Into A Single, Compact Enclosure

TAS 100 Series Telephone Network Emulators give you complete, bi-directional impairments emulation (models 182 and 192) and fully automatic, dual central office emulation, all in one compact package. Unidirectional impairments models (151) are upgradable to full impairments without adding additional boxes.

TAS 100 Is Easy To Set Up and Easy To Use

All TAS 100 operations are accessible via easy to use front panel menus. TAS 100 also provides a straightforward, logical set of remote commands to facilitate remote control via RS-232 or GPIB. If you're designing your own automatic test software, you'll find that programming the TAS 100 is a breeze.

TAS 100 Employs Advanced Digital Signal Processing Technology Throughout for Unsurpassed Accuracy, Repeatability, and Reliability

The TAS 100 Series provides precise, all-digital emulation of transmission impairments and call progress tones for precisely repeatable test results. Digital processing yields extremely low background noise, so you get accurate test results even at the lowest signal levels. Digital processing also yields high reliability, because the overall component count is kept to a minimum.

All-digital impairments mean rock-solid compatibility among TAS 100 family members. TAS 100 impairments are compatible with IEEE 743-1984 specifications to facilitate easy verification of emulator performance using standard measuring equipment.

Built-In Diagnostic Routines Insure the Integrity of Your Test Results

Built-in diagnostics check the performance of all TAS 100 subsystems. TAS 100 executes a complete set of self-diagnostics auto-matically upon power-up, and upon user command.

The Icing on the Cake... Advanced Measurement and Monitor Features!

The convenient Network Status Monitor shows call progress status at a glance. TAS 100 also includes several measurement functions to allow complete evaluation of DCE performance.

These include:

- True-RMS Level Meter
- Dialed Digit Monitor/Display
- Scope Monitor Port
- Audio Monitor

TAS 100 is the Heart of a Powerful Series of Advanced Automatic Modem Test Systems:

TAS 100 Series Telephone Network Emulators are designed to work with other TAS products to provide complete solutions for testing modems, fax machines, and a host of other data communications equipment. The TAS 100GT Series Automatic Modem Test Systems provide a comprehensive, automatic solution for testing and evaluating virtually all types of modems, including V.34 and V.34+. Each TAS 100GT system includes:

- TAS 100 Series Telephone Network Emulator
- TAS Gemini Dual Terminal Emulator
- TASKIT® Lab Suite for Windows Automatic Modem Test Software
- TAS 240 Voiceband Subscriber Loop Emulator (optional)
- TAS 3508A Modem Test Switch (optional)

With TAS 100GT, you can immediately begin testing and evaluating modems. Each 100GT system includes TASKIT Lab Suite for Windows, which consists of TASKIT/Auto and TASKIT for Windows instrument control programs. TASKIT/Auto executes automatic modem test procedures while the TASKIT instrument control programs provide interactive, menu-driven control of each instrument in the test station. TASKIT Lab Suite for Windows also includes pre-defined test procedures based on the latest modem industry standards, including EIA/TIA TSB 37A and TSB 38.

TAS 100GT Series Automatic Modem Test Systems provide a complete solution for testing virtually all modem types.

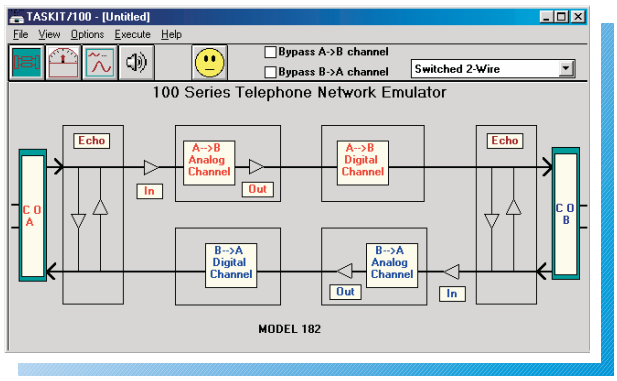
The Gemini Dual Terminal Emulator is by far the most advanced solution available for testing modem bit-error rate, file transfer throughput, call setup, and call connect reliability. Gemini is the only data analyzer that gives you complete end-to-end testing in one compact package. Control of Gemini is integrated into TASKIT/Gemini software menus.

The TAS 240 Voiceband Subscriber Loop Emulator (VSLE) provides advanced loop emulation features for testing echo-cancelling modems and high-speed fax devices. TAS 240 accurately emulates subscriber loop conditions to allow thorough evaluation of modem performance in the presence of real-world loop loss and impedance characteristics. TAS 240 includes RS-232 and GPIB control interfaces for easy inclusion in custom automatic test procedures. TASKIT/240 provides integrated control of the TAS 240.

The TAS 3508A Modem Test Switch works with the TAS 100 to provide automatic modem selection for development, manufacturing, or evaluation test applications. TAS 3508A includes RS-232 and GPIB remote control interfaces for easy integration into the test station. TASKIT/Auto provides control options for the TAS 3508A.

New TASKIT® / 100 for Windows Software:

The powerful new TASKIT/100 for Windows software provides an easy-to-use graphical interface that gives point-and-click control of all TAS 100 Series Telephone Network Emulators. TASKIT/100 for Windows makes it easy to create and save test network configuration files.



TASKIT/100 for Windows software provides point-and-click control of all TAS 100 Series Telephone Network Emulators, including the new TAS 192.

TAS 100 Series Telephone Network Emulators

Tas 100 Series At-A-Glance

Convenient Network Status Monitor shows network mode and call progress states at a glance.

Large, easy-to-read display presents all menu information in a consistent format.

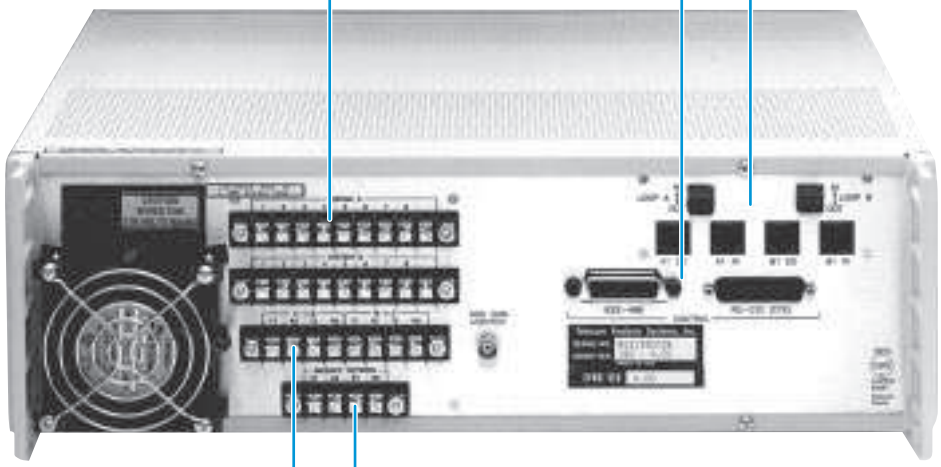
At the touch of a single button, you can perform an AGC operation or bypass impairments in either transmission direction.

TAS 100 provides easy-to-use menus for A→B and B→A impairments, central office settings, signal measurement functions, system configuration options, and file save and recall.

All network interface signals are available at rear panel terminal strips as well as front panel RJ45 connectors.

Built-in GPIB and RS-232 control ports make it easy for you to include TAS 100 in your own automatic test system.

New! TAS 100 now provides ports for quick and easy connection to the TAS 240 Loop Emulator.



Four-wire path breakout capability allows you to insert other equipment into the transmission path.

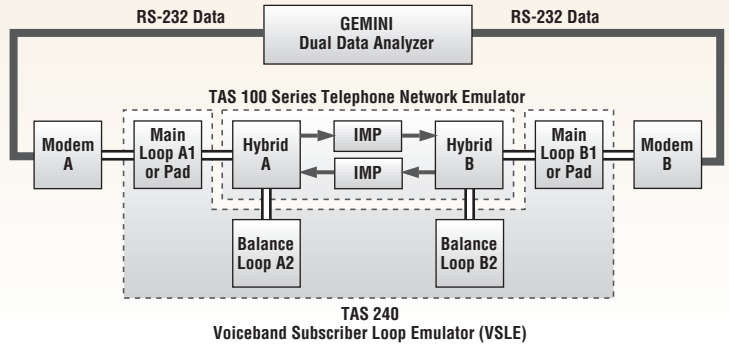
TAS 100 provides external hybrid balance ports: essential for interfacing to a loop emulator for complete characterization of high-speed echo cancelling modems.

TAS 100 Series Applications

TAS 100 can be applied as a standalone telephone network emulator, or as part of an automatic test system. TAS 100 can be used to test any product that communicates over the public switched telephone network (PSTN). Simply replace the real network with the TAS 100 Series Telephone Network Emulator and start testing!

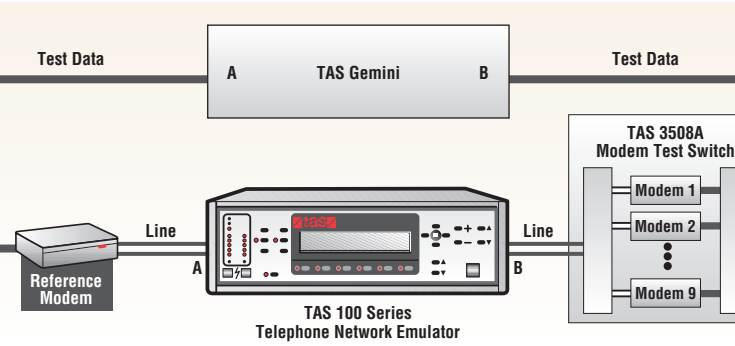
Modem Evaluation

TAS 100 is the heart of a powerful, advanced, automatic modem test system. Test modems to the latest industry standards.



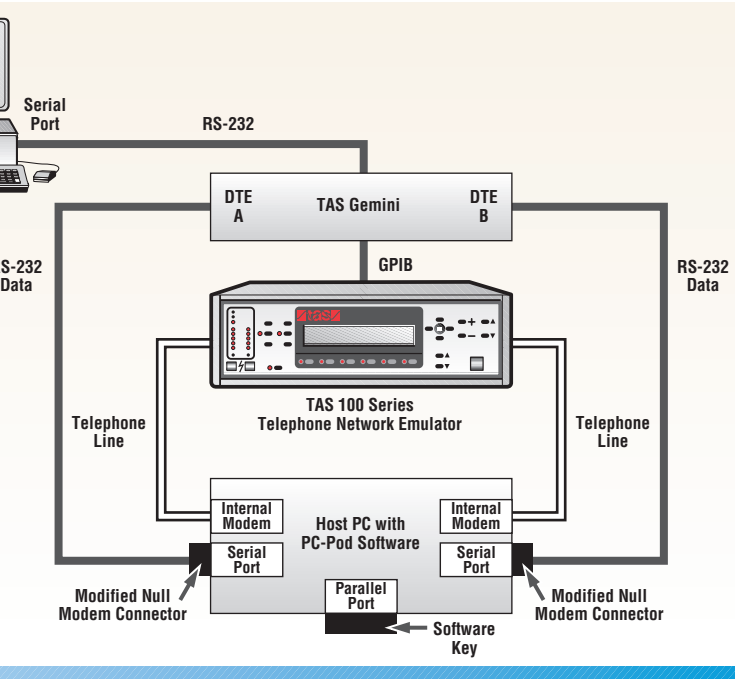
Modem Manufacturing Test

TAS provides cost-effective, complete solutions for manufacturing test of modems and FAX devices.



PC Bus Modem Test

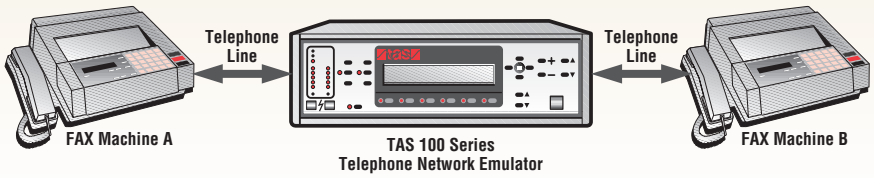
TAS PC-Pod™ software accessory makes testing PC internal modems a snap. PC-Pod™ shuttles data between modem ports and serial ports, so that bus modems can be tested by standard data analyzers such as TAS Gemini.



TAS 100 Series Applications

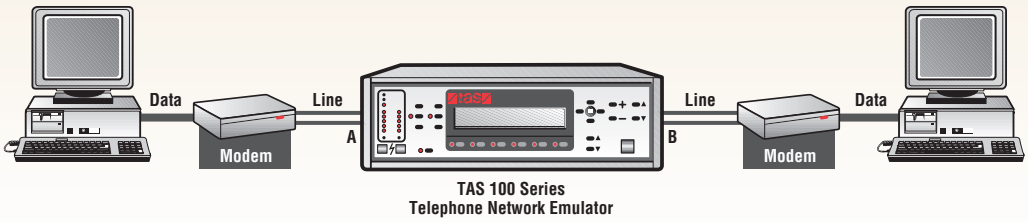
FAX Testing

TAS 100 is the choice of FAX manufacturers worldwide. TAS 100 accurately simulates network conditions to allow thorough evaluation of FAX image quality and call setup performance.



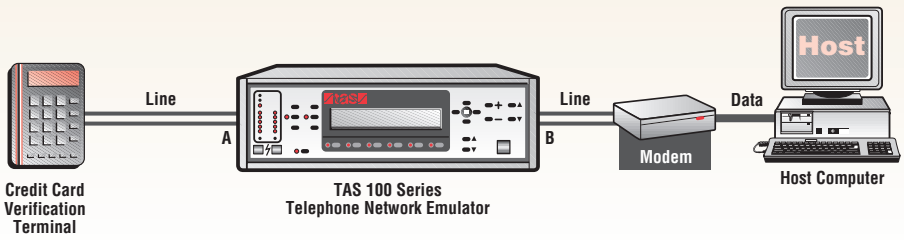
Communication Software Evaluation

TAS 100 lets you evaluate real-world performance of communication software. Facilitates thorough evaluation of protocol error recovery, throughput, and data compression performance.



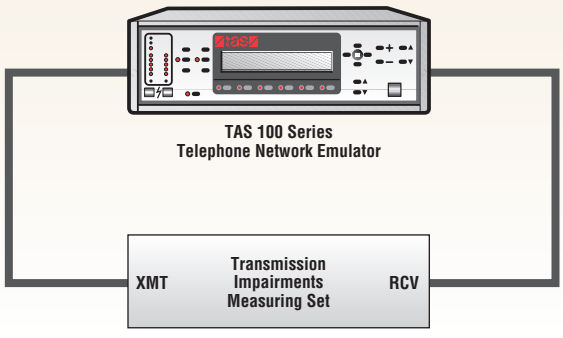
Testing Systems with Embedded Modems

Evaluate performance of products that contain modems, such as credit card verification terminals and point of sale terminals.



Transmission Measuring Set Evalualtion

TAS 100 makes it easy to verify proper operation and accuracy of transmission measuring sets.



TAS 100 Series Selection Guide:

The TAS 100 Series consists of four models. These models differ only in their impairments emulation capabilities. All of the models have equal central office emulation capabilities. The TAS 100 Series Selection Guide provides a comparison of the various models.

	Model			
Feature	**150**	**151**	**182**	**192**
Front Panel Menus	●	●	●	●
GPIB and RS-232 Control	●	●	●	●
Central Office Emulation	●	●	●	●
Network Status Monitor	●	●	●	●
Signal Level Measurement	●	●	●	●
Dialed Number Display & Report	●	●	●	●
DTMF & Dial Pulse Detection	●	●	●	●
Input & Output AGCs	●	●	●	●
Attenuation	●	●	●	●
Echo	●	●	●	●
Satellite Delay	○	●	●	●
White Noise	○	●	●	●
Gain and Delay Distortion	○	●	●	●
Intermodulation Distortion	○	○	●	●

	Model			
Feature	**150**	**151**	**182**	**192**
Frequency Offset	○	○	●	●
Phase Jitter	○	○	●	●
Impulses	○	○	●	●
Gain Hits	○	○	●	●
Phase Hits	○	○	●	●
Single Frequency Interface	○	○	●	●
Amplitude Jitter	○	○	●	●
PCM Emulation: # of links	0	1	3	3
Robbed Bit Signalling Emulation	○	●	●	●
TIA TSB-37A Test Files	○	○	●	●
Bidirectional Impairments	○	○	●	●
Enhanced Delay Emulation	○	○	○	●
Enhanced TIA Gain and Delay Curves	○	○	○	●

TAS 100 Series Ordering Information:

TAS 100 Series Models:

TAS 192 Telephone Network Emulator
TAS 182 Telephone Network Emulator
TAS 151 Telephone Network Emulator
TAS 150 Telephone Network Emulator

TAS 100 Series Accessories:

TAS 100-0	Extra Operations Manual
TAS 100-RM	Rack Mount Kit
TAS LIA-01	Line Interface Adaptor
TAS 100-HC	Hard Shipping Case
TAS 100-SC	Soft Carrying Case

TAS 100 Series Telephone Network Emulators

TAS 100 Series Specifications

Impairments Generator

Input Level Range	+7.0 dBm to -23.0 dBm
Output Level Range	0.0 dBm to -50.0 dBm
PCM	
Number of Links	0-3
Sampling Rate	8.0 kHz
Sample Coding	none, mu-law, or A-law
Position	before or after analog impairments
Robbed Bit Signalling	
Bits Affected	least significant bit of every 6th PCM sample
Pattern	alternating 1/0
White Noise	
Level Calibration Choices	C-message, 3.0 kHz flat, psophometric
Level Range	20.0 dBrn to 90.0 dBrn
Intermodulation Distortion	
2nd Order Range	20 dB to 55 dB below signal
3rd Order Range	20 dB to 55 dB below signal
Type	expansive or compressive
Frequency Shift	
Offset	-19.75 to 19.75 Hz
Phase Jitter	
Level Range	0.0 to 45.0 degrees p-p
Frequency Range	0.0 to 300.0 Hz
Gain Hits	
Level Range	-20.0 to +6.0 dB
Risetime Range	0.2 to 990 msec.
Duration Range	1.0 to 20000 msec.
Interval Range	0.1 to 320.0 sec.
Phase Hits	
Level Range	0.0 to 90.0 degrees
Risetime Range	0.2 to 990 msec.
Duration Range	1.0 to 20000 msec.
Interval Range	0.1 to 320.0 sec.
Impulse Noise	
Type	IEEE Standard
Level Range	0.0 to 55.0 dB below signal
Interval Range	0.1 to 320.0 sec.
Calibration	C-notched
Amplitude Jitter	
Level Range	0.0 to 98.0%
Frequency Range	0.0 to 300.0 Hz
Single Frequency Interference	
Frequency Range	0.0 to 3400.0 Hz
Level Range	0.0 to 50.0 dB below signal output level

Gain Distortion

Note: *Gain Distortion characteristics are independent of group delay distortion characteristics. TAS 192 contains only the gain distortion characteristics listed in bold. Those TAS 192 gain distortion characteristics have better frequency responses at the upper and lower edges of the voiceband than the same gain distortion characteristics in other TAS 100 Series models.*

Filter Type	Digital FIR
Gain Distortion Characteristics	**Flat, AD1-7**, "V.FAST"/ ITU Cable-1, Cable-2, and Cable-3, JAPAN 1-7, RITT (China), TR50150 (True Voice), TAS 3002, SEG 3002, Bell C1, Bell C2, Bell C4, CCITT 1020, CCITT M1025, CCITT M1040, EIA A, EIA B, EIA C, CONUS MD, CONUS MV, CONUS PD, CONUS PV, DOD NSB, DOD NTB, EUROPEAN MD, EUROPEAN MV, EUROPEAN PD, EUROPEAN PV, CCITT R.28

Group Delay Distortion

Note: *Group Delay Distortion characteristics are independent of gain distortion characteristics. TAS 192 contains only the group delay distortion characteristics listed in bold. Those TAS 192 group delay distortion characteristics have better frequency responses at the upper and lower edges of the voiceband than the same group delay distortion characteristics in other TAS 100 Series models.*

Filter Type	Digital IIR
Group Delay Distortion Characteristics	**Flat, EDD1, TAS-1**, JAPAN 1-7, RITT 1-2 (China), TAS 3002, SEG 3002, Bell C1, Bell C2, Bell C4, CCITT M1020, CCITT M1025, EIA 1-5, CONUS MD, CONUS MV, CONUS PD, CONUS PV, DOD NSB, DOD NTB, EUROPEAN MD, EUROPEAN MV, EUROPEAN PD, EUROPEAN PV, CCITT R.28
Propagation Delay	
Range	0 to 1599.875 msec.
Resolution	125 µsec.
Echo	
Far Echo Attenuation Level	-20.0 to +30.0 dB
Near Echo Attenuation Level	-10.0 to +40.0 dB

Central Office Emulation

General	
Operating Modes	2-wire switched (loop start), 2-wire auto-switched, 2-wire private line, 4-wire private line, 4-wire private/2-wire switched, site A 2-wire switched (*), site B 2-wire switched (*)

** The site A 2-wire switched and site B 2-wire switched central office operating modes are present only in the TAS 192. These operating modes have been added to support connecting two TAS 192 units together to simulate digital loop carrier (DLC) facilities and private branch exchange (PBX) environments.*

Central Office Emulation - *continued*

Auxiliary Signalling	Reverse battery
Nominal Input Impedance	600 ohms, ±30 ohms
Hybrid Balance Impedance	604 ohms, ±6 ohms or external
Loop Current Source	
Range	8 to 120 mA in 8 mA steps
Polarity	tip to ring, ring to tip
Ring Generator	
Level	1 to 100 Vrms (open circuit), 1V steps
Frequency	14.0 to 75.0 Hz
Cadence	1-3 ON intervals, 1-3 OFF intervals
Ring ON/OFF Intervals	0 to 10,000 msec.
Source Impedance	2100 ohms typical
Network Signalling Tones	
Tones Supported	primary and secondary dial tones, busy, audible ringing
Dial Tone/Audible	
Ring Cadence	1-3 ON intervals, 1-3 OFF intervals
Busy Cadence	1 ON intervals, 1 OFF interval
ON/OFF Intervals	0 to 10,000 msec.
Tone Frequency	100.0 to 720.0 Hz
Touch Tone Detection	
Detection Range	0.0 to -25.0 dBrn
Max. Invalid Tone Duration	20.0 msec.
Max. Interdigit Pause	40.0 msec.
Max. Dropout	20.0 msec.
Dial Pulse Detection	
Make/Break Interval Range	10 to 90 msec.
Min. Interdigit Pause	300 msec.
Call Progress Parameters	
Max. Digits in Telephone Number	15
Switching Delay	1 to 25,000 msec.
Off Hook Delay	2 to 25,000 msec.
On Hook Delay	1 to 255 msec.
Disconnect Signalling	
Signal Options	no signal, busy tone, dial tone
Delay Before Signal	1 to 30,000 msec. in 1 msec. steps

Signal Level Measurements

Range	+10.0 to -50.0 dBrn
Resolution	0.1 dB
Accuracy	±0.4 dBm
Measurement Points	input and output of each transmission channel

Control Interfaces

Interfaces Provided	RS-232 (DTE) and IEEE-488 (GPIB)
Serial Control Port Parameters	
Bit Rates	1200, 2400, 4800, 9600 bps
Format	asynchronous
Bits/Char	7 or 8
Parity	even, odd, none
Stop Bits	1, 1.5, 2

AC Line

Voltage	115/ 230 VAC (selectable) +10%, -13%
Frequency	48 to 63 Hz
Max. Power Dissipation	100 Watts

Operating Environment

Temperature	0 to 50° C (32 to 122° F)
Humidity	10 to 90%, non-condensing

Dimensions and Weight

Height	5.22 inches
Width	17.08 inches
Depth	14.44 inches
Weight	25 pounds

SPIRENT Communications

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