TAS Series II *Digital*
Telephone Network Emulator

Series II *Digital* – the first Public Switched Telephone Network (PSTN) emulator designed for the Internet Age.

The Series II *Digital* Telephone Network Emulator is the latest generation of the world's most advanced telephone network emulators. Series II *Digital* tests any type of device that communicates via the PSTN, including modems, remote access servers, fax machines, and other subscriber voice/data equipment.

The TAS Series II family is the worldwide standard for PSTN emulation. Now Series II *Digital* adds important new capabilities for testing the latest modem and fax technologies. Series II *Digital*:

- Provides a wealth of new transmission impairment conditions for V.90 ("56K") modems, V.34 modems, and V.34 fax. Many of these conditions, which occur on real networks, can prevent modems from operating at the highest speeds.
- Emulates the impairments associated with local Internet Service Provider (ISP) access. ISP access through a local exchange is currently the most popular modem application, and transmission impairments in the local exchange can hamper the efficiency of these connections.
- Includes several "network sections" to effectively model end-to-end networks that include a Private Branch Exchange (PBX) and/or Digital Loop Carrier (DLC) system in tandem with the PSTN. These tandem connections can have a significant negative effect on data transmission performance.
- Provides several digital interfaces for testing remote access server equipment and for interfacing to digital network terminals.

Series II Digital - The first PSTN emulator designed for the Internet Age.

Major Features:

- Emulates local exchange transmission impairments that are essential for effective testing of V.90 ("56K") modems
- Emulates tandem PSTN/PBX/DLC connections for thorough testing of V.90 fallback, V.34 fax, and V.34 modems.
- Provides several digital interfaces (T1, E1, ISDN PRI & BRI, TDM bus) for testing remote access server equipment.
- Effectively emulates local, transcontinental, and intercontinental connections.
- Emulates both alpha and beta type mu-law PCM Codecs, as required by TIA PN-3857
- Meets and exceeds current and emerging EIA/TIA and ITU telephone network emulation and modem testing requirements.
- Universal Central Office™ emulates virtually any local exchange or PBX format.
- Advanced Digital Signal Processing (DSP) architecture provides unprecedented accuracy, repeatability, and dynamic range.
- Field-proven modular architecture can adapt to evolving test requirements.
- Integrates easily with other TAS instruments and software to provide complete automatic test systems.

Applications:

- Product Development
- Design Verification Test
- Production Test
- Product Evaluation
- Quality Assurance
- Standards Conformance
- Competitive Analysis

SPIRENT Communications

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TAS Series II *Digital* Telephone Network Emulator

Series II *Digital* emulates a wide range of transmission impairments and signaling conditions in a convenient laboratory setting. Test conditions are accurate and repeatable, so equipment performance problems can be isolated and eliminated at the earliest possible stage. Series II *Digital* increases product quality and drastically reduces embarrassing and costly failures. The result – communications products get to market faster with a better chance of success.

Comprehensive test coverage is the key to effective testing, and Series II *Digital* produces the broadest range of test conditions available anywhere. Series II *Digital* uses advanced Digital Signal Processing (DSP) techniques to achieve unmatched precision and accuracy. Test conditions comply with EIA/TIA and ITU standards, but also go far beyond standards requirements to provide maximum test capability. The field-proven, modular Series II *Digital* architecture can evolve to meet changing requirements, so your test system investment is protected. Best of all, Series II *Digital* works with other TAS instruments and software to give complete, automatic testing solutions.

Ordering Information

Advanced Telephone Network Emulators

TAS 1200D1 Telephone Network Emulator

Provides comprehensive central office emulation and impairment emulation for advanced functional testing of V.90 and V.34 server and subscriber modems. Includes the following:

- **TAS 1200D** Telephone Network Emulator
- **TAS 1200-DFE** Digital Facility Emulation module
- **TAS 1200-DNS** Digital Network Selection module
- **TAS S2W-31X** TASKIT/Series II for Windows

TAS 1200D2 Telephone Network Emulator

Provides comprehensive central office emulation and impairment emulation for advanced functional testing of V.90 and V.34 server and subscriber modems. Also provides coverage for TSB37-A applications. Includes the following:

- **TAS 1200D** Telephone Network Emulator
- **TAS 1200-DFE** Digital Facility Emulation module
- **TAS 1200-DNS** Digital Network Selection module
- **TAS 1200-ANS** Analog Network Selection module
- **TAS S2W-31X** TASKIT/Series II for Windows

TAS 1200D3 Telephone Network Emulator

Provides comprehensive central office emulation and impairment emulation for advanced functional testing of V.90 and V.34 server and subscriber modems for U.S. and international applications. Includes the following:

- **TAS 1200D** Telephone Network Emulator
- **TAS 1200-DFE** Digital Facility Emulation module
- **TAS 1200-DNS** Digital Network Selection module
- **TAS 1200-ANS** Analog Network Selection module
- **TAS S2W-EPAL** Extended PCM/ADPCM Links module
- **TAS S2W-31X** TASKIT/Series II for Windows

TAS 1200L2 Telephone Network Emulator

Provides central office emulation and digital impairment emulation for basic functional testing of V.90 modems. Includes the following:

- **TAS 1200L** Telephone Network Emulator
- **TAS 1200-DFE** Digital Facility Emulation module
- **TAS S2W-31X** TASKIT/Series II for Windows

Options and Accessories

- TAS 1200-DFE Digital Facility Emulation Module
- TAS 1200-DNS Digital Network Section Module
- TAS 1200-EPAL Extended PCM/ADPCM Links Module
- TAS 1200-ANS Analog Network Section Module
- TAS 1200-0 Extra Operations Manual Set
- TAS 1000-HC Hard Shipping Case
- TAS 1000-RM Rack Mount Handles

Companion Products

- TASKIT/Series II for Windows Software
- TAS Gemini™ Dual Data Analyzer
- TAS Gemini-PC™ Software
- TAS 240 Voiceband Subscriber Loop Emulator
- TAS 3508A Modem Test Switch
- TAS PC-POD™ for Windows Software
- TAS LIA-01 Line Interface Adapter

TAS Series II *Digital* Specifications

Universal Central Office (UCO) Emulation

General

Modes	2-wire switched 2-wire auto-switched 2-wire private line 4-wire private line 4-wire private/2-wire switched
Nominal Input Impedance	600 +/-30 ohms
Nominal Output Impedance	600 +/-30 ohms
Internal Hybrid Balance Impedance	604 +/- 6 ohms
Trans-Hybrid Loss	40 dB min.

Constant Current Generator

Current Range	10 to 126 mA, 2 mA steps

Constant Voltage Generator

Voltage Source Choices	45 or 54 Volts
Loop Resistance	low (300 ohms) or high (1400 ohms)

Ring Generator

Level	1 to 100 Volts, 1 Volt steps
AC Source Impedance	2100 ohm typical
Frequency	14.0 to 120.0 Hz
Cadence	up to 3 on/off stages

Call Switching Delay	1 to 60,000 msec
Dial Tone Delay	1 to 60,000 msec
On-Hook Delay	1 to 255 msec

Call Progress Signalling Tones

Pre-Defined Countries	Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Great Britain, Greece, Hong Kong, India, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan, Thailand, United States
Pre-Defined Call Signalling Tones	Primary Dial, Secondary Dial, Recall Dial, International Dial, Ringing, Busy, Receiver Off Hook, Congestion, Special Information, Warning, Confirmation, Call Waiting, Recording, Executive Override, Intercept, Pay, Function Acknowledgment, Number Unobtainable, Call in Progress, Prompt

Custom Call Progress Signalling Tones

Tone Types	constant, cadence, burst
Modulation Options	amplitude modulated frequency modulated
Tone Frequency	50.0 Hz to 3400.0 Hz
Tones per Signal	1 to 4
Tone Level	0 to -50.0 dBm
Tone On/Off Time	0 to 60,000 msec, 1 msec steps

Caller ID Emulation

Information Format	per Bellcore TR-TSY-000031, Issue 3, January 1990, Bellcore, TR-NUT-00003, Issue 2, October 1997
Transmission Format	FSK

Number of Call Progress Intervals	1-6

Telephone Number

Length	1 to 20 digits per interval (up to 100 digits total)
Digits Supported	0-9 # * ABCD

DTMF Dialing Analysis

Digit Duration	0 to 65,535 msec
Min., Max., Avg. Interdigit Time	0 to 65,535 msec
Received Digits	up to 100 digits

Pulse Dialing Analysis

Min., Max. Avg. Make Interval	0 to 255 msec
Min., Max., Avg. Break Interval	0 to 255 msec

Digital Facility Emulation (DFE) Option

Digital Interfaces	T1, T1 PRI, E1, E1 PRI, ISDN BRI, TDM

Impairments

# Robbed Bit Signalling Links	0-6
Digital Attenuation	
# Links	2
Level	0- 6 dB in 1 dB steps, user-programmable
Analog Level Control	+7 to -23 dB
Transmission Delay	
Range	0 to 1 second
Step Size	125 msec
Non-Linear Distortion	
2nd Order Level	20 to 70 dB below signal
3rd Order Level	20 to 70 dB below signal
Type	Compressive
Receive Codec Filter Response	Selectable
Transmit Codec Filter Response	Selectable
PCM Codec Type	alpha or beta
Trans-Hybrid Loss	0 to 50 dB

TAS Series ll *Digital* Telephone Network Emulator

TAS Series II *Digital* Specifications - *Continued*

Digital Network Section (DNS) Option

# Sections	2
Transmission Impairments	
Delay	0 to 1000 msec, 0.125 msec steps
IMD	
2nd Order	20.0 to 70.0 dB below signal
3rd Order	20.0 to 70.0 dB below signal (measured with 0 dB input power level using 4-tone measurement technique)
Loss Control	0 dB to 10.0 dB loss (10 dB dynamic range)
Echo	0.0 to 40.0 dB, in 0.1 dB steps
Noise	15 to 40 dBrn (-75dBm to -50dBm)
PCM/ADPCM Impairments	
Number of Links Simulated	0-2
Sampling Rate	8 kHz
PCM Coding	mu-Law or A-Law
Link Rates	64 kbps PCM 40 kbps ADPCM (CCITT G.723) 32 kbps ADPCM (CCITT G.721) 24 kbps ADPCM (CCITT G.723) 16 kbps ADPCM
Robbed Bit Signalling	Least significant bit from frame 1/7 and 4/10. 16 patterns from 0000-1111

Extended PCM/ADPCM Links (EPAL) Option

PCM/ADPCM Impairments	
Number of Links Simulated	0-2
Sampling Rate	8 kHz
PCM Coding	mu-Law or A-Law
ADPCM Rates	32 kbps (ECI and OKI) 24 kbps (OKI)
Frame Slips	Positive or Negative

Analog Network Section (ANS) Option

Impairments	Gain Distortion Group Delay Distortion White Noise Intermodulation Distortion (IMD) Phase Jitter Frequency Shift Amplitude Jitter Single Frequency Interference (SFI) Channel Interruptions Gain Hits Phase Hits Delay

General

Quiescent Conditions (all impairments "off")	
Idle Channel Noise	< 10 dBrnC (-80dBm)
Phase Jitter	< 0.2 degrees
Amplitude Jitter	< 0.2 percent
Delay	0.5 msec (A to B), 0.5 msec (B to A)
2nd Order Distortion	< -70.0 dBm
3rd Order Distortion	< -70.0 dBm
Signal to Total Distortion	> 64 dB (measured in one direction with 0 dBm signal input)
Remote Control Interfaces	RS-232, GPIB
Power Requirements	
Voltage	115/230 VAC
Frequency	48 to 63 HZ
Dissipation	200 watts max.
Operating Environment	
Temperature	0 to 50 degrees C
Humidity	10 to 90%, non-condensing
Dimensions and Weight	
Height	8.75"
Width	16.88"
Depth	16.70"
Weight	34 lbs.

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