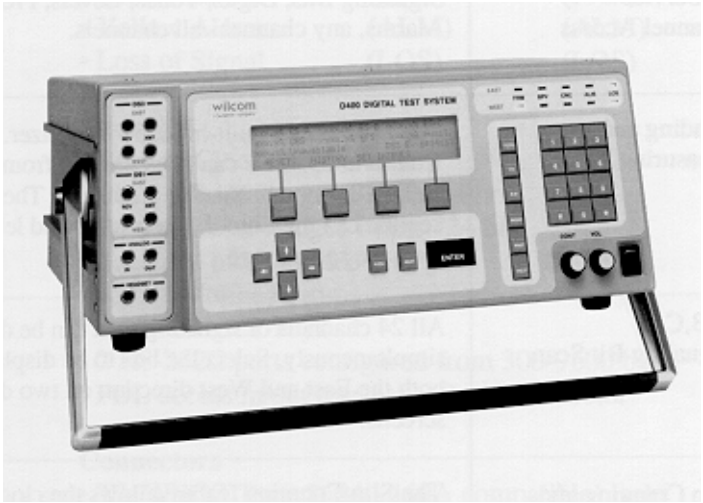
digital test system

D400/D450

Features

- Flash PROMs Allow New Software Downloads via Dial-up Connection — **no** more PROM replacement
- Expandable Architecture — Built-in expansion slots
- Advanced User Interface featuring a 4-line, 160 Character Backlit Supertwist Display
- Speaker Output — Voice conversation monitored simultaneously in both directions
- History file permits multiple storage of measured events



Description

If you've been waiting for the perfect digital test set, then wait no longer! The Wilcom **D400 Digital Test System** ushers in a new era in transmission testing. By providing a complete set of T1 Test functions today while looking ahead to your testing needs of tomorrow the D400 removes one major drawback found in other test sets — obsolescence.

Rest easy knowing you can purchase only those test functions that are required immediately. Then as your testing needs grow, simply purchase the option cards and software packages that meet your new demands. Installation is easy, performed by you or through our factory. To make installation of option software as simple as possible, the D400 includes *Flash* PROMS. Using *Flash* PROMS allows downloading of new system software by dial-up modem connection. Therefore, physically changing the PROMS is no longer a concern. In a world of ever changing technology, the D400 is definitely a safe investment.

The **D400 Digital Test System** is designed with expansion in mind. Its rugged chassis can accommodate a wide selection of option cards (e.g. BERT testing, DS3 Drop & Insert, DTMF/MF signaling, DDS & Factional T1, FDL Access, SLC-96 Derived Data Link access) and two processor enhancements (e.g. memory expansion, internal dial-up modem). Back panel connection plates provide the capability to add any type of future connector — including 75 Ω coaxial, RS-232C, and fiber optic. The 75 watt power supply has enough muscle to support all currently available and future option cards, and the Intel 80188-based processor has memory and capacity to spare.

The **D400 Digital Test System** is available in two versions: a bench test set version, the D400 with five expansion slots and a field test set version, the D450 with two expansion slots. Both base units are complete in-service T1 test sets. Their full-duplex drop and insert capabilities allow simultaneous channel testing in both directions. The two channel tone synthesizers and receivers provide noise and frequency measurements from 0 to 3990 Hz. Bit patterns can be sent and displayed in both directions simultaneously. The A/B/C/D signaling bits of all 24 channels can be scanned and displayed on screen. Loop timing and frame slip counting is performed. Plus all the performance monitoring features are included so tariffed service requirements can be checked and verified. This makes the D400 and D450 base units complete DS1 test sets unto themselves.

Several optional accessories are available, including the D555 Non-Intrusive Probe used for testing T1 anywhere on twisted pair, a thermal printer, and a padded carrying case. Shipped with every unit is a comprehensive manual and the D400 EZ Test Index, a quick step-by-step guide to test setup.

Wilcom

The Basic D400 Digital Test System

Feature	Description	Applications
In-Service Channel Access	Signaling Bits, Digits, Tones, Levels, Frequencies, Alarms, any channel - all channels.	In-Service testing of T1 or DLC, channel by channel, card by card, bit by bit, without service interruption.
Sending and Measuring Tones	The D400 has a built-in tone synthesizer. Any tone from 0 to 3990 Hz can be generated from +2.9 to -60.0 dBm on all 24 voice channels. The receiver section can measure the frequency and level of tones over the same range.	Uses include: measuring loss, simulating modem carrier tones, disabling echo cancellers, responder tests.
A,B,C,D Signaling Bit Scan	All 24 channels of signaling data can be displayed simultaneously. Select the bits to be displayed in both the East and West direction on two display screens.	This allows users to monitor active channels and compare signaling states in either direction. Provides immediate activity assessment.
Slip Counting and Line Frequency	The Slip Counting feature allows the clock rates of two T1 sources to be compared. Any differences are counted and accumulated. This allows users to determine if tariffed synchronization specifications are being met. A simultaneous display of the T1 line frequency leaves no doubt as to the source of trouble.	Isolates loop timing problems and verifies stratum 2 clock synchronization. Improperly synchronized networks experience occasional frame slips which cause momentary disruptions to channel data.
Monitoring of Voice or Test Tones	Monitoring of voice or test tones in either one or both directions simultaneously is possible through the volume-controlled speaker or through a headset.	Allows direct assessment of channels at the user level.
Measurement of PCM Offset	In addition to displaying frequency and level, the built-in tone receiver measures PCM offset on any channel.	In properly operating systems, PCM offset should be in the range of ±10 binary units for voice traffic. Excessive offset could indicate a faulty codec that could interfere with signal processing devices such as echo cancellers.
Sending and Receiving Channel Codes	Any user defined 8 bit code can be sent on any channel of a T1 span using this feature. The received channel can be displayed in a 1/0 code format.	This feature is useful for checking loopback and maintenance codes on data circuits, and in circuit identification.
CSU Loopback NI Loopback Smart Repeater Loopback	Activates or deactivates loopback features of Channel Service Units (CSUs) or Network Interface Units (NI or Smart jacks). Intelligent repeaters and CSUs can be looped back through entering user programmable codes for fault isolation. Fault isolation on a T1 line equipped with Smart Repeaters can be individually looped back through programmable codes.	To perform single-ended, out-of-service testing of a T1 circuit, it is usually necessary to loopback the far-end of a circuit. Channel Service Units (CSUs) contain built-in circuits that can detect a standard code sent over the T1 link. The CSU Loopback feature not only transmits the proper codes, but indicates when the CSU has attained loopback and reminds the user to disable the loopback when testing is complete.

Specifications for the D400 and D450

T1 Receiver
- 1.544 Mbps: ±130 pps
- Level range: ±3 V bipolar peak to peak
  ±75 mV

T1 Measurements
- T1 Line Frequency
- dBdsx
- dBm
- Vpp
- Frame Error Count
- BPV Count
- CRC-6 Error Count
- Slip Count
- Frame Error Rate
- BPV Rate
- CRC-6 Error Rate
- % Available Seconds
- % Errored Seconds
- % Error Free Seconds
- Available Seconds
- Errored Seconds
- Error Free Seconds
- Severely Errored Seconds
- Yellow Alarm

Channel Measurements
- Frequency range: 0 to 3990 Hz ±2 Hz
- Level range: +3.0 to -60.0 dBm
- Binary Coding: any 8-bit pattern
- PCM Offset: μ-255 law
- Signaling bits: 24 bit scan

Analog Input/Output
- 600 ohms, balanced, non-DC blocked +/-5%

T1 Source
- 1.544 Mbps ±5 ppm bipolar peak to peak
- AMI, B8ZS, BIT7 (bit 7 stuffing)
- SF, SF/CCIS, ESF, ESF/CCIS
- SLC Series 5, SLC 96
- Output Pulse ±3 volts bipolar peak to peak, -7.5 and -15dB LBO
- Drop and Insert is fail-safe if AC power fails

Channel Synthesizer
- Frequency range: 0 to 3990 Hz, in 10 Hz steps
- Level range: +3.0 to –60.0 dBm, 0.1 dB steps
- Binary Coding: any 8-bit pattern

Status Indicators

	T1	T3
• Frame Error	(FRM)	(FRM)
• Bipolar Violations	(BPV)	(BPV)
• CRC-6 Errors	(CRC)	(PAR)
• Yellow Alarm	(ALM)	(ALM)
• Loss of Signal	(LOS)	(LOS)

General
- Built-in Clock and Calendar
- Results Print Range: 1 min - 24 hrs.
- Results Reset Range: 1 min - 24 hrs.
- 3 factory-programmed set-ups
- 15 user-defined setups
- On-line HELP key
- 2 RS-232C ports configured from 300-9600 baud
- FDL access in/out rear panel 9-pin connector

Connectors
- T3: WECO Type 560A (440A compatible) jacks
- T1: WECO Type 310 or Bantam (miniature) jacks
- Analog: WECO Type 310 or Bantam jacks
- Headset: WECO Type 310 jacks

Environmental
- Operating Temperature Range: 0 - 40° C
- Relative Humidity: 0 - 90% non-condensing
- Storage Temperature: 0 - 70° C

Dimensions

	D400		D450	
• Width:	16.00 in	(40.64 cm)	16.00 in	(40.64cm)
• Height:	6.75 in	(17.145 cm)	6.75 in	(17.14cm)
• Length:	17.63 in	(44.78 cm)	11.00 in	(27.94cm)
• Weight:	22.84 lbs	(10.36 kg)	14.91 lbs	(6.76 kg)

Power Requirements
- 115 VAC, 50 - 60 Hz, 0.5 amp maximum
- Fuse : 1 amp slow blow

Standards

The D400 (where applicable) conforms to:

PUB 62411	ANSI T1.403-1989
PUB 54016	ANSI T1.503-1989
PUB 43801	ANSI T1.101-1987
CCITT G.821	ANSI T1.103-1987
TR-TSY-000008	ANSI T1.102-1987
	ANSI T1.104-1988
	ANSI T1.103a-1990

D400 OPTION CARDS:

Customize your D400 Digital Test System by inserting the option cards listed below. Insert one, two or all the cards into the D400 for complete digital testing, and there will still be room for future options ... making the D400 a smart, long term investment.

D401 BERT OPTION
- QRSS
- 3 in 24
- All ones
- 1 in 8,
- Programmable, and more...

D402 SIGNALING OPTION
- Draw dialtone
- Dial out
- Receive digits and analyze
- MF, DTMF, dial pulse

D403 DS3 DROP & INSERT OPTION
- In-service DS3 testing of DACs IV
- M13 multiplexer
- Embedded DS1s and DS0s

D404 DDS & FRACTIONAL T1 OPTION
- Latching and alternating loopback testing of DS0 and DS0 subrates
- Bit Error Rate Testing of DS0s
- MJU Control
- BERT of Fractional T1
- SRMU Testing *(See insert for specifications)*

D406 SLC 96 OPTION
- Emulates SLC 96 remote terminal
- Emulates central office terminal
- Provides ringing
- Tests individual channel cards
- In-service or out-of-service pre-cutover
- DDL Access
- Drop & Insert
- Modes I, II, III, and Series 5
- Full Channel Access.

D408 SLC 96 SIGNALING STATE ANALYZER OPTION CARD
- DDL Analysis of Call Originate
- DDL Analysis of Call Disconnect
- DDL Analysis of Forward Disconnect
- DDL Analysis for C-Field Timing
- DDL Analysis for Test Configuration
- DDL Signaling Bit Timing and more...

Ordering Information

D400 DIGITAL TEST SYSTEM BASE UNIT	PART NUMBER
Select one of the following:	
310 Jacks, AC Powered	30400010
Bantam Jacks, AC Powered	30400020
310 Jacks, -48V DC Powered	30400030
Bantam Jacks, -48V DC Powered	30400040

D450 DIGITAL TEST SYSTEM (2 EXPANSION SLOTS)	
Select one of the following:	
310 Jacks, AC Powered	30450010
Bantam Jacks, AC Powered	30450020
310 Jacks, -48V DC Powered	30450030
Bantam Jacks, -48V DC Powered	30450040

D400 OPTION CARDS	
D401 Bit Error Rate Test (BERT)	30401010
D402 MF/DTMF/DP Signaling	30402010
D403 DS3 Drop and Insert *	30403010
D404 DDS & Fractional T1	30404010
D406 SLC 96® Derived Data Link	30406010
D408 SLC 96 Signaling State Analyzer	30408010
D424 Modem Option	20027273

* Two D403 Option Cards are required for DS3 Bi-directional testing.

ACCESSORIES		
D555 Non-Intrusive Probe		30555020
Thermal Printer		30031722
Printer Cable		04802233
Printer Paper		06001757
Serial Cable (null modem)	M-F	30031422
	F-F	30031431
Bantam Patch Cords (6 ft.)		30031350
310 Patch Cords (6 ft.)		30030316
Padded D400 Carrying Case		30031730
Padded D450 Carrying Case		30030771

CLEI CODES	
D400 Digital Test System	T1TDE058AA
D450 Digital Test System	T1TDE068AA

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4/95
811-572-002

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