

2000 Test Pad™

2209 T1/T3 Field Services Module



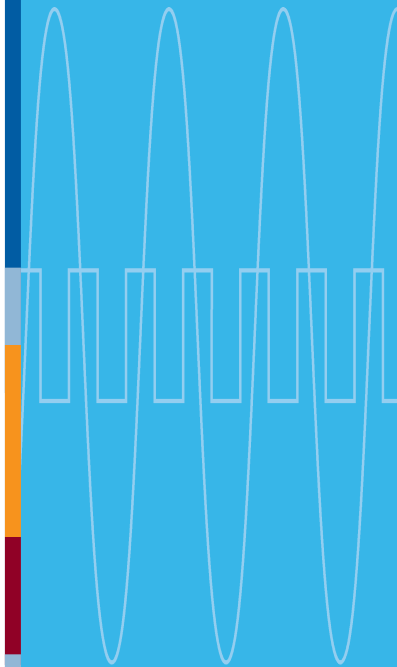
Product Highlights

- Easy-to-use, touch-screen graphical user interface (GUI) simplifies and expedites testing
- Modular 2000 Test Pad architecture enables up-to-date support for established and emerging technologies in a single platform
- Engineered for the field with rugged construction, lightweight design, and battery-powered operation
- Dual PCMCIA slots support easy installation of future upgrades and bring added testing functionality and versatility
- Automated testing features minimize training costs and testing complexity
- Combined with DS1, DS3, ISDN PRI, and voice features, the 2209 is an all-in-one solution for high-speed testing TDM services

Application Highlights

- Isolate and troubleshoot physical layer problems associated with data or other advanced services without taking channels out of service
- Verify proper network routings and signal delays to ensure all fractional T1 channel signals are terminated properly and with the correct timing
- Monitor network voice quality and signaling
- Test the ability of a PBX/Switch to handle incoming calls
- Verify or troubleshoot ISDN PRI service by placing and receiving calls and analyzing decodes
- Qualify DS3 circuits with an array of BER testing patterns
- Analyze DS1 tributaries at DS3 access points
- Sectionalize repeatered T1 and HDSL circuits with embedded 16 bit smart repeater and HDSL loopcodes

From climate-controlled vaults to weather-beaten rooftops, field technicians need to travel lightly—and quickly—to keep data and voice networks up and running. The 2000 Test Pad's 2209 T1/T3 Field Services Module is a smart, handheld instrument that delivers a full range of troubleshooting power. Quick, intuitive, and weighing only 5 pounds, the 2209 provides comprehensive FT1, DS1, DS3, and ISDN PRI testing capabilities. It is the solution providers demand to maintain existing voice and data network systems and install new revenue producing services.



Function Highlights

- DS1 signal analysis and BER testing with standard and advanced stress patterns including 55 Octet and T1 Daly
- Dual DS1 receivers for in-service monitoring and drop-and-insert testing
- DS3 BER testing analysis with patterns for both M13 and C-bit framing
- Drop DS1 channels from a DS3 signal for testing or monitoring
- Monitor, place, or receive calls over T1 voice trunks and analyze signaling bits
- Transmit and measure tones on individual PCM channels
- ISDN PRI call placement and receipt, backup D-Channel and NFAS testing, and layer 3 Q.931 result
- VT100 Emulation for equipment configuration and results monitoring

The 2209 T1/T3 Field Services Module provides a full range of signal, alarm, and timing test functionality to ensure proper performance at the physical level of T1 and T3 network connections. It also provides the ability to place, receive and monitor voice calls on PCM based and ISDN PRI trunks. The new TestMATE automated T1 BER testing option enables both experienced and novice technicians to quickly and accurately install and maintain T1 networks.

The 2209 is a full featured test set that is optioned to your specifications



Applications

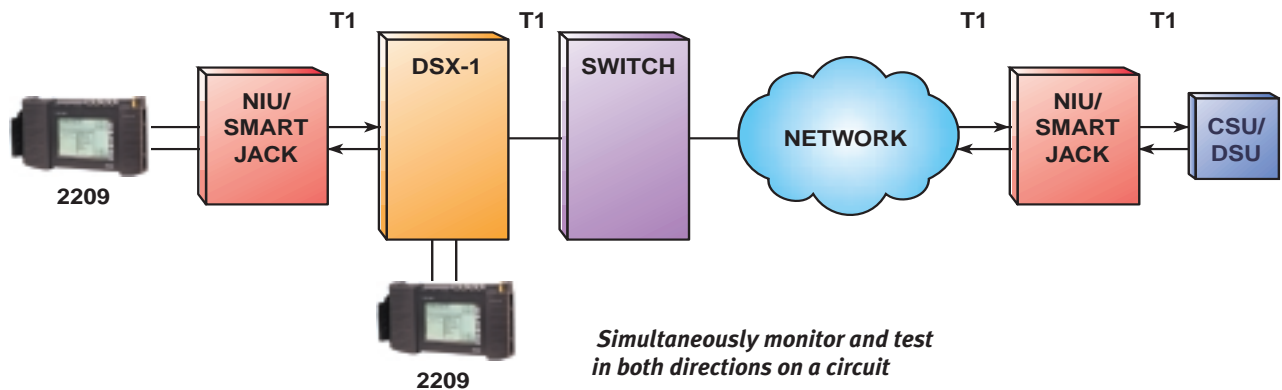
The 2209 is designed to simplify testing of today's complex networks. Programmed with highly integrated applications for in-service and out-of-service testing, the 2209 tests at both the pipeline and service levels to ensure that your network is performing as advertised. Applications include:

DS1 Physical Layer Testing

Whether provisioning or troubleshooting T1 service, the first step is to verify proper circuit operation throughout the network by testing the physical layer. Typical requirements include BER testing, signal, alarm, and timing tests to ensure proper performance of T1 network connections.

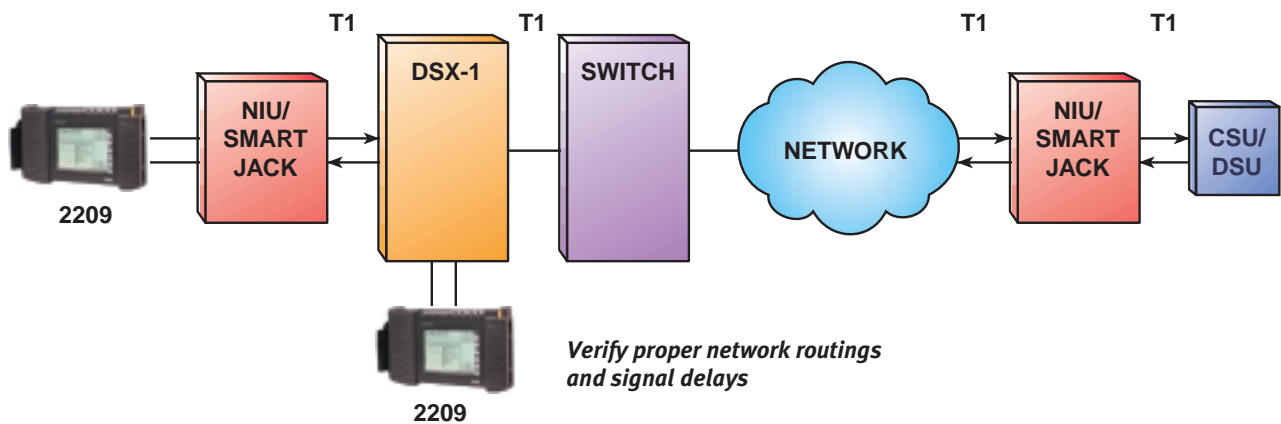
BER testing is typically conducted from the customer premises at an NIU or HTU-R. To identify and sectionalize circuit problems from network equipment faults, the 2209 provides the capability to monitor and perform BER testing in both directions of a circuit simultaneously. The use of standard or user-programmable loopcodes to loop-back network equipment allows for further sectionalization of network troubles. In addition to commonly used BER patterns such as QRSS, the 2209 also offers several industry-recommended advanced stress patterns, including 55 Octet and T1 Daly to ensure network performance.

Advanced timing analysis allows the technician to pinpoint signal delays, timing slips, and mismatches between switch and remote equipment.



Fractional T1 Channel Testing

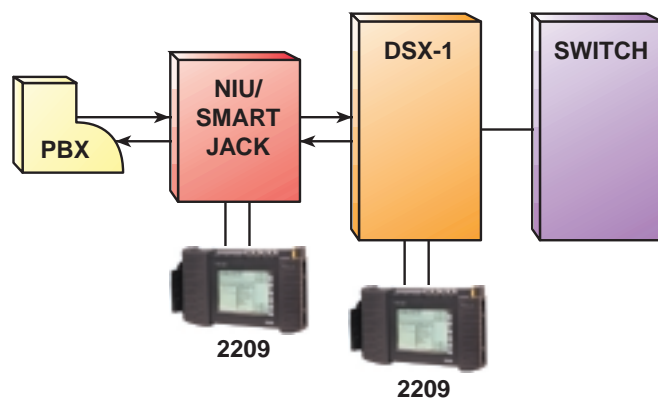
Qualification of fractional T1 service requires the verification of network routings and signal delays to ensure that all channel signals are terminated properly and with the correct timing. In rural locations or on the outer reaches of the service area, it is often critical to isolate single-circuit faults without disrupting the entire line.



VF Channel Access and PCM TIMS

When problems with voice service arise, the ability to quickly and effectively measure the quality of voice transmissions on the network circuit is required. By monitoring data or signaling bits, the 2209 can check and verify individual channels without disrupting network traffic. Transmitting and measuring tones on an individual PCM channel utilizing the 2209's in-service channel access affects only the channel under test—providing a further level of performance analysis without impacting other revenue generating channels. The 2209 provides TIMS measurements such as:

- Level
- Frequency
- Signal to Noise Ratio
- Noise (C-Message and C-Notch filters)



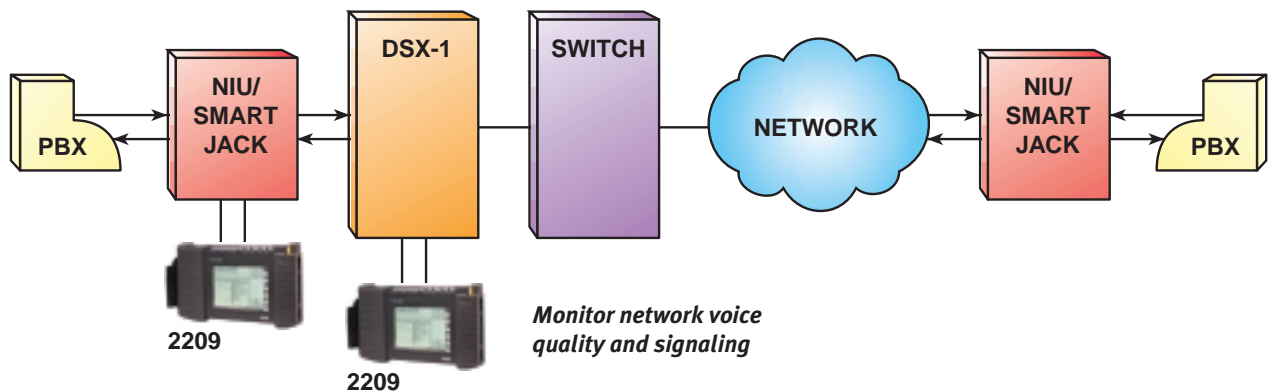
The 2209 quickly and effectively measures the quality of voice transmissions on the network circuit

Signaling

After the physical layer has been tested when provisioning or troubleshooting T1 voice trunks, it is also necessary to test the transmission and signaling performance of the circuit. This testing verifies the ability of a switch or PBX to handle incoming calls and ensures switch-to-switch communications. By placing, receiving, or monitoring voice calls, connectivity can be verified. The 2209 captures and displays digits, signaling events, and signaling bits to provide a more detailed level of analysis.

The 2209 also simultaneously displays physical layer results so comprehensive testing of the voice trunk can be completed in a matter of minutes. The 2209 provides signaling and voice results such as:

- DP, DTMF, MF digit recognition
- Inter-event/digit delay measurements
- Event/digit duration measurements
- Speaker/Mircophone or handset functionality for checking voice integrity
- Signaling (ABCD) bits



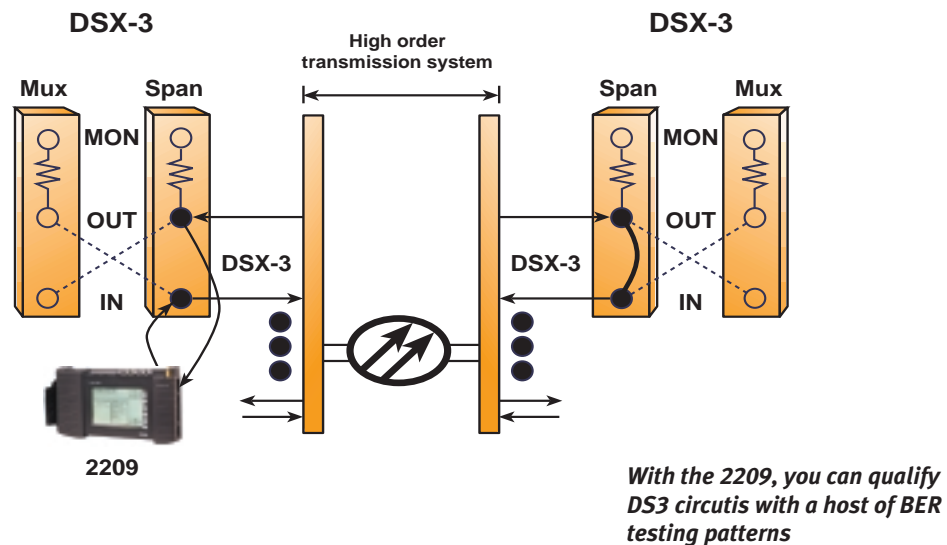
DS3 Testing

The first step in provisioning DS3 circuits is qualifying the physical layer. The 2209 gives technicians the ability to qualify DS3 circuits with an array of BER testing patterns for both M13 and C-bit framing and supports the verification of frame synchronization on the circuit.

For more comprehensive and flexible testing, it is also often necessary to insert test patterns or tones on single, multiple, or all DS1 channels within the DS3 circuit. The 2209 DS3 BER testing measurements include:

- DS3 FEAC loopback codes
- Advanced stress patterns
- Signal level and frequency
- Insertion of logic and frame errors

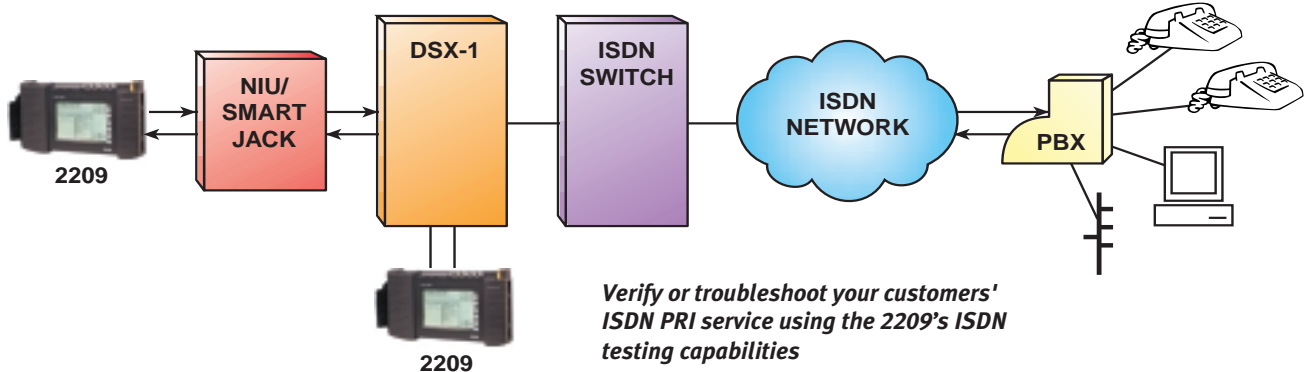
A final level of analysis is provided by dropping DS1 channels from the DS3 signal for testing or monitoring of the individual channels.



ISDN PRI Testing

After verifying the physical layer, testing during the provisioning of ISDN service is typically performed at the customer premises by emulating a TE device, such as a PBX, to place and receive voice and data calls. Call status results and progress reports provide an additional level of detail to ensure calls are successfully established. The reports are also useful for troubleshooting calls that are not established. When multiple PRI lines are in use at the same location, it is often necessary to perform back-up D-Channel and NFAS testing. By simultaneously providing the user with physical layer (T1), layer 2 (LAPD), and layer 3 (Q.931) results as well as plain text decodes, the 2209 provides an efficient means to verify or troubleshoot the ISDN PRI service. The 2209 tests PRI lines allowing the following:

- Test multiple call types including voice, 56K, 64K, Nx56K, Nx64K, and H0 to verify correct switch translations for both inbound and outbound calls.
- Test data services (calls) are tested using BER testing patterns
- Place and receive calls
- Receive call status results which provide a summary of calls
- Receive English decodes of layer 3 cause codes
- Receive full layer 3 Q.931 decodes, with the ability to print
- Place and receive calls on either T1 (secondary or primary) for NFAS configurations
- Switch from Standby D-Channel to Inservice D-Channel for verification of D-Channel back-up operation in NFAS configurations



Technical Specifications

Physical Characteristics

Overall Dimensions:

7.5 x 11.5 x 2.25 in. (19 x 29.2 x 5.7 cm)

Weight:

4.25 lb. (1.93 kg), with battery

Environment

Temperature Range

Operating:

32°F to 122°F (0°C to 50°C)

Storage:

-40°F to 167°F (-40°C to 75°C)

Humidity:

10% to 90% relative humidity,
non-condensing

Power Requirements

AC Adapter:

100-220 at 60 Hz or

200-240 at 50 Hz VAC

to 19 VDC, 2.37 AMPS

Charging Time:

Maximum of 2 hours from full
discharge

Battery Type:

10.8 V NiMH

Operating Time:

Typically 3 hours on a full charge (DS1
operation only)

Typically 2 hours on a full charge (DS3
operation only)

Display

6-inch diagonal graphic LCD

color display

Input and Output Connectors

Bantam (4) and RS-232 (printer
operation)

Input Impedance

BRIDGE:

$\geq 1000\Omega$

TERM:

$100\Omega_{\pm 5\%}$

DSX-MON:

$100\Omega_{\pm 5\%}$

Receive Level

BRIDGE or TERM:

+6 to -35 dBdsx

DSX-MON:

+6 to -24 dBdsx (of resistive loss)

Line Build Out (LBO)

Range:

0, -7.5, -15.0, -22.5 dB

Accuracy:

± 1 dB at 772 kHz

Transmit Timing Sources

Internal Clock, Recovered Clock

Line Codes

AMI, B8ZS

DS3 Options

Input and Output Connectors

WECO 560A

Impedance

75Ω , nominal unbalanced to ground

Receiver (Single) Frequency

44.736 Mb/s \pm 300 ppm

Level (From Output or Monitor Jack)

HIGH:

Accepts nominal 1.2 Vp, 0 ft of cable
from high source

DSX:

Accepts nominal 0.6 Vp, 450 ft of cable
from high source

LOW:

Accepts nominal 0.3 Vp, 900 ft of cable
from high source

Transmitter (Single) Frequency

44.736 Mb/s \pm 20 ppm

Line Build Out (LBO)

HIGH:

Nominal 1.2 Vp signal meets ANSI
specification

T1.102-1993 and ITU-T G.703 when
subjected to 450 feet of cable loss

DSX:

Nominal 0.61 Vp signal meets ANSI
specification

T1.102-1993 and ITU-T G.703

LOW:

Nominal 0.31 Vp

Line Code

B3ZS

Ordering Information

User Interface Module

TTC2000-C 2000 Test Pad with color display
(includes kickstand, AC adapter/changer, hanging strap, and printer cable)

Application Modules

TB2209-DS1 2209 DS1 Communications Analyzer
TB2209-DS3 2209 DS1/DS3 Communications Analyzer

Additional Application Modules Available

2207 T1/T3 Wireless Field Services Module
2109 Copper Analyzer Module
2357 DSL Broadband Services Module
2230 E1/Data Communications Analyzer
2310 SONET Field Services Module
2416 SDH Field Services Module

Analyzer Options

TB2209-ASP Advanced Stress Patterns
TB2209-FT1 Fractional T1
TB2209-TIM VF PCM TIMS
TB2209-SIG Signaling
TB2209-PRI Primary Rate ISDN
TB2209-ILE Intelligent Line Equipment
TB2209-VT100 VT100 Emulation
TB2209-EXPERT TestMATE
TB2209-HDLC Fractional HDLC Option

Accessories

AC-31705 External Battery Charger
AC-31905 Cigarette Lighter Adapter/Charger
BA-014081 Replacement Battery
CC-44581 Carrying Case/Tilt Stand (includes adjustable strap)
CC-44605 Carrying Case, Large Soft
CC-45158 Carrying Case, Multi-Mode (soft)

Package Descriptions

2209-P1 Field Service Package
(Includes 2209 DS3, ASP, FT1, TIM, SIG, PRI, and VT100 options)
2209-P2 DS3/DS1 Package
(Includes 2209 DS3, ASP, FT1, TIM, and SIG options)
2209-P3 DS1 Package
(Includes 2209 DS1, ASP, FT1, TIM, and SIG options)

NOTE: Specifications, terms, and conditions are subject to change without notice.

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