Data Format	Serial, binary, asynchronous		
Operation	Fast Speed (PEP):	Adaptive duplex	
	Slow Speeds:	Full duplex	
Data Rates	Fast Speed (PEP):	Up to 18,000 bps, depending on line quality	
	Slow Speeds:	300, 1200 and 2400 bps	
Compatibility	Any PEP Modem in Fast mode		
	Bell 103 and 212A, V.22 and V.22 bis in slow speeds		
Interface	RS232 Serial Port		
Modulation	18,000 bps	Dynamically Adaptive Multicarrier QAM (DAMQAM)	
	2400 bps	QAM	
	1200 bps	Differential Phase-Shift Keyed (DPSK)	
	300 bps	Frequency-Shift Keyed (FSK)	

Frequencies 18,000 bps Up to 512 carriers at every 78 Hz in the 0 to 4000 Hz bandwidth

	Originate mode:		Answer mode:	
1200/2400 bps	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.
	1200 Hz (carrier)	2400 Hz (carrier)	2400 Hz (carrier)	1200 Hz (carrier)
	Guard tones for V.22 and V.22 bis: 550 Hz or 1800 Hz			
300 bps	Tx Freq.	Rx Freq.	Tx Freq.	Rx Freq.
	1070 Hz = space	2025 Hz = space	2025 Hz = space	1070 Hz = space
	1270 Hz = mark	2225 Hz = mark	2225 Hz = mark	1270 Hz = mark

Flow Control	Software flow control using Xon/Xoff commands or HF Enq/Ack protocol, and hardware flow control using RS232 signals
Receiver Sensitivity	— 45 dBm
Frequency Offset	± 7 Hz tolerance
Power Requirements	120 VAC (+ 10% – 15%) / 60 Hz @ 0.5 Amp. max.
	230 VAC (+ 10% – 15%) / 50 Hz @ 0.25 Amp. max.
FCC Compliance	Meets requirements of FCC Part 68 direct interface and Part 15, Subpart J, Class B devices

Temperature	Operating:	10° C to 50° C	Storage: — 40° C to 65° C
Physical Characteristics	Height: 2¼ inches	Depth: 12¾ inches	
	Width: 8¾ inches	Weight: 6 pounds	

Indicator Lights

FST	Fast mode (PEP)	SD	Send data
SLW	300, 1200 and 2400 bps modes	CTS	Clear to send
OH	Off hook	DTR	Data terminal ready
RD	Receive data	MR	Modem ready

TrailBlazer®

High-Speed Standalone Modem for Dial-Up Communications

General Description

The TrailBlazer® modem provides error-free transmission of asynchronous data over dial-up lines at speeds of up to 18,000 bits per second, without data compression. This speed is 15 times faster than other commonly used dial-up modems. The modem operates with any asynchronous device with a serial RS232 interface, and plugs into a standard AC wall outlet. Based on a patented design, TrailBlazer combines a multicarrier modulation scheme, digital signal processing and packet technologies to provide a dramatic increase in through-put using voice-grade, dial-up telephone lines.

The TrailBlazer m... ually analyzes the q... line and minutely ad... transmission rate by... or decreasing the n... riers used and the n... bits per carrier tran... function, combined... correction, provides... taneous error detec... connection and err... transmission. Using... Duplex™ technique,... Blazer modem dyna... responds to the asy... data flow patterns t... acteristic of commu... between microcomp... mainframes.
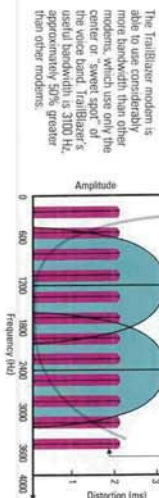
Asynchronous data transmission at up to 18,000 bps, without data compression.

Dial-up connection on ordinary telephone lines.

Automatic error detection and correction as integrated functions.

Interactive operation.

Compatible with Hayes command set.

300, 1200 and 2400 bps FULL DUPLEX mode for Bell 103, 212A/V.22 and V.22 bis compatibility.

Available with a wide range of high-speed communications software packages.

Real-time line analysis, accessible by the user as a diagnostic tool.

Remote modem access for central site control.

Adaptive duplex to maximize asymmetric traffic flow.

Leased-line operation.

Software-defined architecture.

Auto dial and auto answer.

Automatic speed selection at time of connection.

Non-volatile memory for storing up to 10 telephone numbers and all of the modem settings.

Call progress monitoring and reporting.

Software and hardware data flow control.

Description of Features

High-Speed Transmission Over Dial-Up Lines

TrailBlazer is the first modem which operates at speeds of up to 18,000 bps, asynchronously and error-free, over ordinary, dial-up telephone lines. This speed is accomplished with the Packetized Ensemble Protocol ("PEP") which uses a multiple carrier modulation scheme to maximize the data-carrying capacity of the telephone bandwidth. TrailBlazer allows sophisticated and critical high-speed applications to operate over the public-switched network, in many cases eliminating the need for expensive, dedicated lines.

Automatic Error Detection and Correction

When operating in Fast (PEP) mode, the TrailBlazer modem adds to each assembled data packet a 16-bit cyclical redundancy check (CRC) which is used by the receiving modem to ensure that only error-free data is delivered to the user. Any retransmission required to correct errors occurs instantaneously, and is transparent to the user. All error detection and correction is done by the modem, and does not require additional computer resources.

The TrailBlazer modem is able to use considerably more bandwidth than other modems, which use only the center or "sweet spot" of the voice band. TrailBlazer's useful bandwidth is 3100 Hz, approximately 50% greater than other modems.

Amplitude / Frequency (Hz) / Distortion (ms) / Conventional Modem Carriers / TrailBlazer Modem Carriers

Real-Time Line Analysis

A unique feature of the TrailBlazer modem is its ability to analyze and take advantage of the entire telephone bandwidth using a patented multicarrier modulation technique call DAMQAM™. This feature is a significant improvement over other modems which use only a single- or dual-carrier modulation technique.

Each time a call is placed, the TrailBlazer modem measures the signal-carrying capacity of the dial-up channel relative to line impairments it has identified. TrailBlazer then determines 1) which carriers are usable, 2) how many bits can be transmitted per carrier given the line conditions and 3) what data flow demands exist at each end of the connection. This line analysis is completely internal to the TrailBlazer, unlike other modems which require a separate product to perform this function.

Five Modems in One

The TrailBlazer modem operates in five modes: 300 bps (Bell 103), 1200 bps (Bell 212A and V.22), 2400 bps (V.22 bis) and up to 18,000 bps (using the PEP protocol). The modem automatically recognizes the speed of the other modem and sets its speed accordingly.

Minimal Fall-Back

Based on its continual line analysis, the TrailBlazer modem dynamically adapts to line conditions for the duration of the call, with a minimal fall-back of less than 100 bps at a time to maximize data throughput. This capability is a significant improvement over other high-speed modems, which fall back by cutting their transmission rate in half to 4800 bps or 2400 bps. Dynamic line analysis not only enables the TrailBlazer to achieve higher throughputs on AT&T and Bell circuits, but also allows successful operation over lower-cost and diverse circuits provided by other common carriers.

Interactive Operation

The TrailBlazer modem incorporates a [...] mission technique using short and lon[...] ets. Short packets are used to minimi[...] time for interactive applications. Large [...] are used to satisfy requirements for la[...] data transfer. The optimum packet size [...] ically determined by the modem, and i[...] transparent to the user.

Self-Test and Internal Diagnostics

The TrailBlazer modem automatically p[...] internal logic tests, memory tests, and [...] back checks. In addition, TrailBlazer pr[...] data transmission statistics as signal-l[...] ratios, data rate, frequency offset mea[...] data flow analysis, and number of retr[...] packets. Users can access these statis[...] given time through the modem registe[...]

Communications Software

A full range of popular communication [...] packages are optimized and available [...] at the high speeds of the TrailBlazer m[...] PC-PC, PC-minicomputer, and PC-main[...] cations. A list of authorized FastLane [...] Developers is available from your loca[...] representative.

Remote Access

Users can send commands to remote modems as if the commands were entered at the remote site. This is useful in changing the parameters of a remote modem or testing remote modems from a local site. Remote access and command facilitates the set-up and testing of geographically-dispersed networks from a central site.

Adaptive Duplex

The performance of the TrailBlazer modem is tailored to match asymmetric data flows commonly found in today's corporate networks where only a few characters are generated at the terminal site and a reply of several thousand characters is received from the host. By employing a data flow technique called Adaptive Duplex, TrailBlazer can

The proliferation of desktop computer networks, the increased sophistication of applications, and the economic and quality issues surrounding the public telephone system are accelerating the need for more sophisticated modems that can communicate at high speeds, error-free, over dial-up lines.

The TrailBlazer modem enhances current applications in such areas as micro-to-mainframe links, information retrieval services, electronic mail and full-screen data transfer.

automatically assess the data flow of t[...] and receiver. Based on prevailing requ[...] at any given time, the modem dynamic[...] the allocation of transmission capacity [...] of data flow to match the traffic load i[...] direction.

Line Cost Savings

Users will realize substantial line cos[...] productivity gains with the TrailBlazer mod[...] Compared with a 1200 bps modem, th[...] is cost-justified in six months through [...] time savings alone when used to sen[...] disk or equivalent amount of data per[...]

New applications that become fea[...] dial-up basis with the TrailBlazer mod[...] high-resolution graphics, videotex, so[...] button, and LAN gateways to public s[...] networks.