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FIREBERD® 6000

Communications Analyzer



TTC™

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Protect your Network with the FIREBERD® 6000

The FIREBERD 6000 Communications Analyzer brings advanced testing capabilities to today's data networks, enabling you to maximize your testing capabilities and minimize your training costs. Whether your test requirements include Async or ATM testing, physical layer and data link layer analysis, or generation and measurement of the jitter tolerance of your T1 or 2M circuits, the FIREBERD 6000 gives you the power to analyze most network interfaces found within your network.

With an intuitive, menu-driven test methodology, the FIREBERD 6000 performs traditional bit error analysis, frame and cell generation, along with signal, performance and timing measurements. The FIREBERD 6000 is fully programmable, with customized printouts, programmable user patterns, frequency synthesizer, and user-defined flow control. It's a great way to protect your network.

Highlights

Many Capabilities, One Instrument

- Perform bit error, signal and performance analysis on datacom, T1/FT1, 2M/Nx64, DDS, E3 and T3 services
- Perform analog tests with VF and wideband Transmission Impairment Measurement Set (TIMS) tests on analog and digital transmission lines with the TIMS-45 Lid.
- Complete jitter generation and measurements on T1, 2M and 64 kb/s circuits
- Monitor and generate traffic on ATM and frame relay networks



Customize Your Testing Needs

- Recall up to ten of your most frequently used test scripts with the push of a button
- Choose the configuration settings that you require and the FIREBERD 6000 filters and prints the results

Save Time with Automation and Remote Testing

- Automate your testing routine with Dynamic Script Generator software
- Maximize your FIREBERD 6000's ability as a frame relay solution with NetAnalyst.
- Reduce response time and extend the reach of your field technicians with Distributed Test Manager (DTM) software which enables you to perform remote testing from your PC

One Tester You Can Count On

- Support your testing needs for years to come with the FIREBERD 6000's industry-leading three-year warranty and field-tested reliability

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At Home in Any Test Environment

The FIREBERD 6000 performs in-service monitoring and loopback, end-to-end, and out-of-service testing. Convenient and powerful, the FIREBERD 6000 sets the standard for physical and service layer analysis.



In the Field

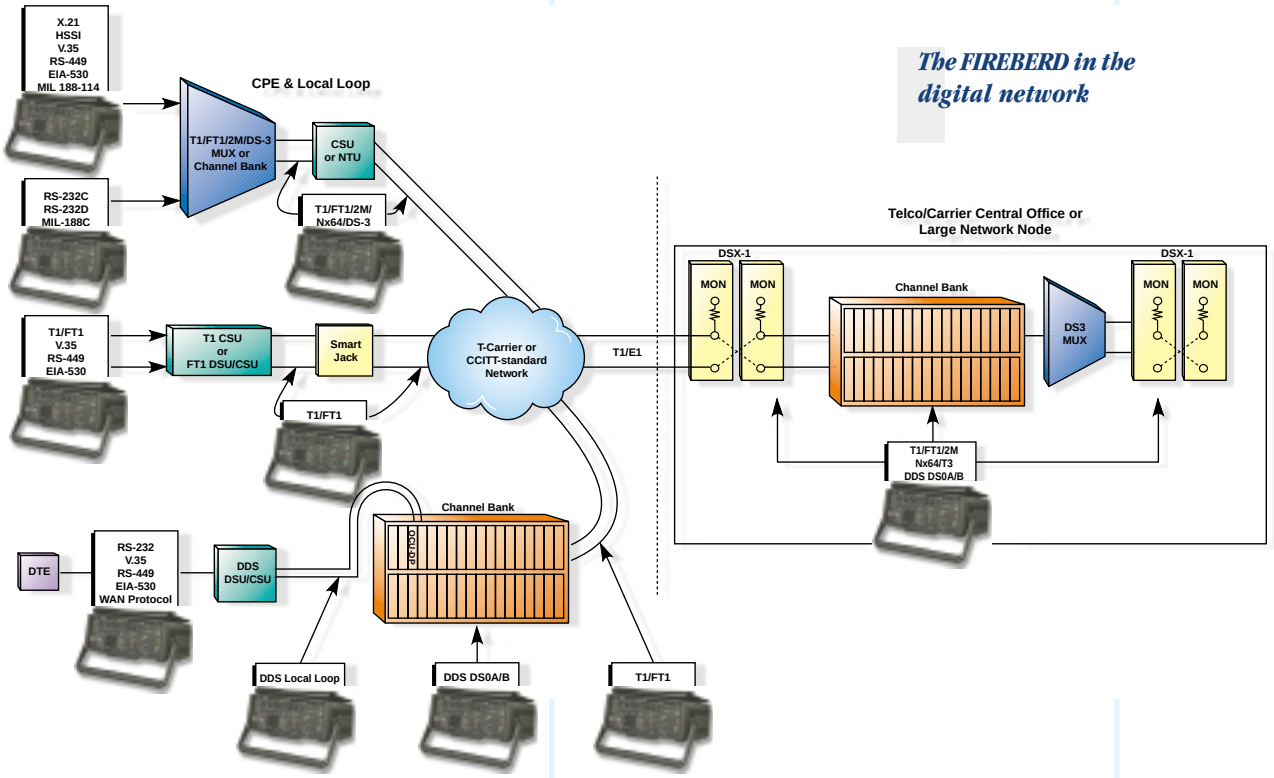
A single field service package meets a wide array of test requirements. Whether troubleshooting, benchmarking, or installing circuits, the FIREBERD 6000 is an indispensable tool for getting the job done quickly. The FIREBERD 6000's menu-driven design keeps setup time to a minimum—you can even store and recall your most frequently used configurations with the push of a button. The front-panel display lets you monitor key test results at a glance, and the optional integrated lid printer gives you hard copy documentation of all your findings. And because the FIREBERD 6000 offers such an extensive array of measurements and alarm reports, you can accurately find problems the first time and eliminate the need for a second trip.

In the Network Control Center

Because the FIREBERD 6000 lets you monitor all field offices and switch nodes from a central location with DTM remote control software, you can find and fix network problems before they disrupt service. The FIREBERD 6000's LEDs update you to the condition of your network and alert you to potential problems.



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The FIREBERD in the digital network

Packet Network Testing

Perform analysis of your circuits and equipment during deployment and provisioning of your network by generating frame relay and ATM traffic. Perform analysis on lost frames or cells by generating fixed or variable loads of traffic over multiple virtual channels to verify the service that your customers demand. The capability to test the physical layer and data link layer in a single platform provides the information to troubleshoot the most complex problems.

In-Service monitoring

Monitor live data at various access locations, from resistor-isolated DSX monitor points to a bridge on a four-wire access point, without disturbing revenue-generating traffic. Ideal for routine maintenance, the FIREBERD 6000 offers a variety of in-service measurements, including bipolar violations, timing and level analysis, frame errors, and CRC errors.

End-To-End Testing

Quickly isolate any problem to a specific direction by analyzing the performance of an entire digital link in both directions. Full-duplex end-to-end testing also serves as an excellent analysis of all circuits and equipment within your network.

Loopback Testing

Enjoy the convenience of using a single FIREBERD 6000 to perform out-of-service testing. Loopback testing is ideal as a quick check of circuit performance or when isolating faulty equipment. The FIREBERD 6000 supports all standard TI, E1, DDS, and data communications loopbacks.

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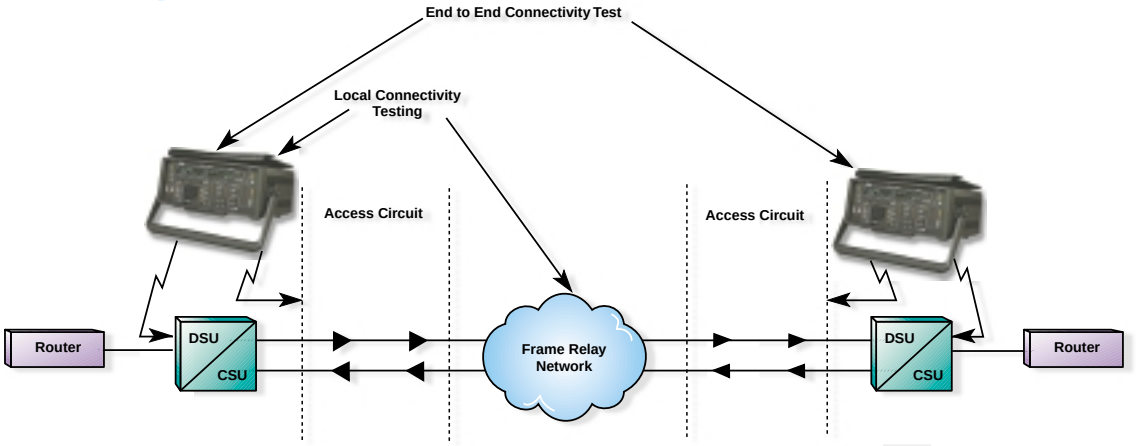
Frame Relay Testing

Successful frame relay deployment begins with the proven transmission test capability of the FIREBERD 6000. With the Frame Relay Option, you can easily perform frame relay turn-up and troubleshooting tests over a permanent virtual circuit (PVC). The Frame Relay Option is compatible with the T1/FT1, 2M/Nx64, DDS, HSSI, V.35, X.21, RS-449, and most other FIREBERD 6000 interface modules.

The FIREBERD 6000 can test at both the User-to-Network Interface (UNI) and the Network-to-Network Interface (NNI)—including out-of-service and in-service testing. With the FIREBERD 6000 Frame Relay Option, you can easily perform a ping test to determine end-to-end PVC connectivity and to measure round trip delay.

Highlights

- Perform lost-frame analysis
- Perform test frame generation (fixed rate and burst modes for emulating specific traffic patterns), while controlling the status of the FECN, BECN, C/R, and DE bits
- Transmit InARP packets and provide replies to incoming InARP packets
- Transmit ICMP echo ("ping") packets and provide echo replies to incoming ICMP echo packets
- Perform link management emulation (ANSI T1.617 Annex D, ITU Q.933 Annex A, and LMI)
- Gather PVC status messages and determine PVC state (i.e., active, inactive, new, or deleted)
- Emulate the network side or CPE side of a UNI (unidirectional polling); an NNI frame relay switch, including both bi-directional polling and full status message interpretation
- Display physical and data link layer results simultaneously
- Collect frame relay statistics on one specific data link connection identifier (DLCI) or on all DLCIs
- Monitor frame relay performance and link management statistics at the UNI and NNI



Perform extensive frame relay testing with speeds up to 8Mb/s.

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Frame Relay Testing with NetAnalyst

TTC provides a centralized frame relay testing solution by integrating NetAnalyst Test Management Software with the FIREBERD 6000. NetAnalyst, a component of TTC's Service Optimization Framework, is a client/server GUI-based software package that provides remote test solutions to enhance the provisioning and troubleshooting process for service providers. Combining NetAnalyst with TTC's industry standard test hardware offers service providers a complete, centralized test and monitoring solution.

Highlights

- Provides consistent user interface to a variety of TTC hardware
- Supports Automated Scheduled Testing, including the ability to e-mail test results
- Facilitates distributed testing from a network operations center or other location
- Supports custom integration with other operation support system (OSS) software applications
- Improves efficiency by helping to pinpoint problems prior to a field service dispatch

ATM Testing

With the DS1/DS3 Interface Module and 2M/34M Interface Module, you can use your FIREBERD 6000 to test DS1/DS3 and 2M/34M ATM at the edge of the network and perform end-to-end testing from many edge device inputs that access the ATM network. This allows you to verify that devices converting non-ATM traffic to ATM traffic are functioning properly.

Adding the capability to test at the ATM layer, transmission convergence (TC) sublayer, and ATM adaptation layer (AAL) to its extensive transmission test capabilities, the ATM Interface Module makes the FIREBERD 6000 your tool from installation to ongoing maintenance. The FIREBERD 6000's intuitive, menu-driven front panel makes both in-service and out-of-service ATM testing simple.

Highlights

- Generate constant bit rate (CBR) traffic based on peak cell rate
- Generate variable bit rate (VBR) traffic based on peak cell rate, sustained cell rate, and maximum burst size
- Perform quality of service (QoS) analysis including cell loss ratio, cell error ratio, cell misinsertion rate, cell transit delay, and cell delay variation
- Obtain statistics at the ATM layer, AAL, TC layer, and physical layer (e.g., total cell count, OAM cell count, AAL CRC errors, average PDU length, PLCP alarms, PLPC errors, receive frequency, and DS1/DS3 alarms)
- Characterize the latency of your network with round trip delay measurements
- Perform GCRA "leaky bucket" conformance analysis
- Transmit over three VPI/VCIs simultaneously (one primary channel, two background channels)
- Scan and store all active VPI/VCIs on the link
- Generate correctable and uncorrectable HEC Errors
- Generate or monitor OAM cells

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T1 and FT1 Testing

The T1/FT1 Module enables you to analyze the entire range of T1 and FT1 services regardless of data rates and formats, with features like level and current measurements, G.821 performance measurements, voice applications, and jitter generation and measurement. You can perform Nx56 kb/s or Nx64 kb/s bit error rate (BER) analysis without disrupting live traffic on the remaining channels. The ESF data link far-end Performance Report Message Option lets you monitor and report on far-end status, as defined by the ANSI T1.403 standard.

Highlights

- Perform comprehensive bit error rate testing (BERT) with the T1/FT1 Module's full selection of BERT patterns
- Identify circuit troubles quickly with test results such as bit error rate, pattern and timing slips, voltage level, simplex current, and round-trip transmission delay
- Test frame relay, in-band, out-of-band, and V.54 loopback
- Test unframed, D4, ESF, or SLC-96® circuits encoded in AMI or B8ZS format
- Replace a CSU at the customer premises during troubleshooting and installation
- Detect network synchronization problems or improper multiplexer configuration for in-service loop timing, and verify end-to-end network synchronization (out of service)
- Measure jitter at the rate of 1.544 Mb/s; generate jitter at a single frequency or automatically sweep jitter over the frequency range

DS3 Testing

The DS3 Module thoroughly tests your 45 Mb/s circuits and equipment and lets you troubleshoot difficult problems quickly. One FIREBERD 6000 equipped with this module can analyze any T3 format, making the FIREBERD 6000 an all-in-one test instrument for unframed, M13, or C-bit parity environments. With frame, BPV, and parity results, you can monitor your network while it's up and running.

Highlights

- Perform full DS3 BERT
- Insert errors or BPVs at programmable rates or individually, so you can easily analyze the protection switching recovery time of your DS3 equipment and simulate transmission impairments
- Use one FIREBERD 6000 to transmit and decode FEAC bit sequences (including alarm conditions and loopbacks), and perform bit error analysis

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2M and Nx64 Testing

Keep your E1 (2M) network running smoothly with features like complete G.821 performance analysis, automatic histograms, delay and timing measurements, signal analysis, and jitter testing. When equipped with the 2M/Nx64 Module, the FIREBERD 6000 offers complete G.821 bit error analysis, with more than 60 test results that enable full correlation between errors and their specific causes. You can perform Nx64 kb/s or Nx56 kb/s analysis from any 2M circuit access point and take advantage of an auto-configuration feature that immediately identifies how Nx64 kb/s circuits and equipment are configured.

Highlights

- Test Nx64 kb/s or Nx56 kb/s from any access point on a 2M circuit. Select contiguous or non-contiguous timeslots, independently select Tx and Rx timeslots, and program idle codes
- Use extensive BERT capabilities
- Obtain network status with multiple measurements: FAS word errors, REBEs, received FAS word, timing slips, code errors, MFAS word errors, received NFAS word, network jitter, CRC errors, 2M alarms, and received MFAS word
- Perform both level measurements and timing slip analysis
- Test unframed, framed, and both CRC-4 and TS-16 (MFAS) multiframed formats
- Maximize network utilization during testing by inserting patterns on selected timeslots without disrupting traffic on remaining channels
- Monitor and transmit voice and ABCD signaling bits to verify the quality of VF circuits
- Use a referenced 2M signal to identify timing slips
- Measure jitter at the rate of 2M; generate jitter at a single frequency or automatically sweep jitter over the frequency range

34M Testing

Equipped with a 34M Interface Adapter, the FIREBERD 6000 can thoroughly test your 34 Mb/s circuits and equipment. Using this module, a single FIREBERD 6000 can analyze any 34M format, including unframed, G.751, or G.832, concentrating on basic signal analysis, frame analysis, G.826 test results, and bit error analysis. With these results, you can monitor you network's performance while it's up and running. And when out-of-service testing is required, the FIREBERD 6000 calculates measurements so you can complete any test quickly and keep costly down time to a minimum.

Highlights

- Analyze unframed, G.751, or G.832, framing formats
- Maintain your network by monitoring live traffic with fame, code errors, and signal results
- Perform G.826 in-service monitoring, or obtain out-of-service results
- Insert errors at programmable rates, in bursts, or individually

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High Speed Serial Interface (HSSI) Testing

The growth in popularity of fractional T3 and E3 frame relay service, especially among Internet service providers (ISPs), many CSU/DSUs are now providing a HSSI interface to the customer, providing access to these high-speed links. In addition, both switch and router manufacturers are providing HSSI access, to allow customers to seamlessly access these fractional T3 and E3 links. The FIREBERD 6000 provides HSSI transmission testing and frame relay test capability for high-speed links and accommodates turn-up testing for these applications and more.

Highlights

- Perform Bit Error Rate Testing (BERT) on out-of-service high-speed links
- Characterize the latency of your network
- Isolate network components using local data terminating equipment (DTE), local line (LA), and remote line (LB) loopbacks
- Perform frame relay testing with a load rate up to 8Mb/s on a line rate from 56kb/s to 52Mb/s (requires Option 6010/6011)
- Emulate high-speed DTE equipment

Data Communications Testing

With the FIREBERD 6000, you can test an array of interface standards, including RS-232/V.24, EIA-530, V.35/306, X.21, RS-449/422/423, and MIL-188C at speeds up to 15 Mb/s. The V.35/306/RS-449/X.21 Module fully supports end-to-end and loopback testing, with built-in remote and local loopback modes.

The Recovered Clock Option operates with DTE/DCE interfaces at rates of 520 kb/s or less and allows the FIREBERD 6000 to recover timing (and proceed with data analysis) by extracting a clock from the receiver data. This provides a powerful method of differentiating timing problems from transmission problems.

Highlights

- Supports all standard loopback, clock recovery, and clock/data inversion tests
- Provides comprehensive BERT capability
- Identifies and compensates for improper received inverted data with built-in data inversion detection and correction
- Supports balanced and unbalanced modes
- Allows complete flow-control troubleshooting, with user-controllable signaling leads (CTS, RTS, DTR, and DSR), LED status indicators, and CTS-RTS delay measurement
- Features software-selectable DTE and DCE emulation and six different operating modes with the V.35/306/RS-449/X.21 Module

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DDS Testing

For testing at a D4 channel bank, the DDS DS0A/B Module enables the FIREBERD 6000 to analyze DDS subrate circuits, with DS0A, DS0B, and clear channel compatibility for all data rates. The module provides complete loopback support, which allows a DDS circuit to be completely sectionalized in either direction using alternating and latching loopbacks. For testing DDS four-wire facilities to the customer premises, the DDS Local Loop Module emulates a DSU/CSU at all data rates, including 64 kb/s clear channel service. Unique stress and signal capabilities provide quick detection of marginal circuits and equipment. You can perform frame relay testing from any DDS access point—both the DDS DS0A/B Module and the DDS Local Loop Module are completely compatible with the FIREBERD 6000's Frame Relay Option.

Highlights

- Perform comprehensive BERT
- Test and maintain the digital cards of a D4 channel bank such as an OCU-DP, DSU-DP, and DS0-DP
- Test the DSU/CSU or four-wire facility of a DDS circuit at the customer premises
- Test the entire range of DDS service from 2.4 kb/s to 64 kb/s, with or without secondary channel
- Sectionalize circuit problems using comprehensive loop-code generation and auto response
- Detect excessive signal attenuation and sealing current problems on the four-wire local loop
- Send or report network condition codes with byte encoder and result display

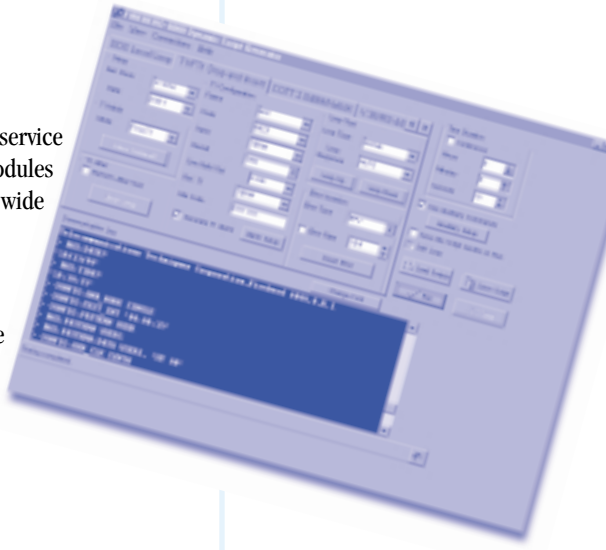
TIMS-45 Analog Lid Option

The TIMS-45 Option enables you to perform both VF and wideband TIMS tests on analog and digital transmission lines with your FIREBERD 6000. New filters and a frequency range between 50 Hz and 300 kHz enable you to test high-bit-rate digital subscriber line (HDSL), DDS, and ISDN circuits. The TIMS-45 integrates into the lid of the FIREBERD 6000 so you can use it anywhere. The large screen enables you to view all test setups and results at a glance. You can print test results to any printer with the RS-232 port. With the external power adapter, you can even use the lid as a stand-alone tester.

Software

Distributed Test Manager (DTM)

The DTM Option enables you to perform remote testing from your PC, expanding the field service capabilities of the FIREBERD 6000 into network control centers. Compatible with all interface modules and mainframe options, Windows®-based DTM software makes your PC a cost-effective platform for wide area transmission tests and extends the reach of your field technicians.



Dynamic Script Generator (DSG)

Developed to operate on the user-friendly Windows® 95 and Windows® NT platforms, the Dynamic Script Generator allows you to generate and run multiple scripts in succession on your PC to control and gather information from your FIREBERD 6000.

Highlights

- Supports testing of T1/FT1, 2M/Nx64, V.35/306, RS-449, X.21, EIA-530 and DDS
- Enables rapid test setup and execution with less work for the technician
- Allows test scripts to be created and shared among technicians
- Permits information retrieval and analysis on your PC

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IEEE-488.2 Remote Control Option

The FIREBERD IEEE-488.2 Remote Control Option gives you the ability to control your FIREBERD 6000 via computer for automated testing. Ideal for the manufacturing environment, the option lets you control as many as 15 devices with a single controller.

LabVIEW® Drivers

LabVIEW® drivers available free from National Instruments® Corporation enable you to communicate with your FIREBERD 6000 through the IEEE-488 (GPIB) interface. Using LabVIEW with your computer allows you to send and receive information from a variety of test instruments, including voltmeters and oscilloscopes, and display the results on your computer. And you can speed up your automated testing using predefined test scripts—the graphical interface makes programming simple.

ISU 6000-4 and ISU 6000-8 Interface Switching Units

ISUs offer maximum convenience when using more than two interfaces by enabling you to switch among up to eight different interface modules. Select these interfaces from the FIREBERD 6000's front panel or under remote control for added versatility. ISUs can be rack-mounted in a standard 19" rack.



Rack Mounts

A variety of sturdy rack mounts are available for both plastic case and metal case FIREBERD 6000 mainframes and printers, standard at 19". A rack mount extension kit expands available space to 23".



Printers

- **PR-45A Lid Printer**

  The PR-45A Lid Printer is a thermal, dot matrix printer that mounts in the lid of the FIREBERD 6000A with a spring-loaded hinge and receives power from the mainframe. The PR-45A features alphanumeric and graphical printout capability.

- **PR-35 Rack Mount Printer**

  The PR-35 is a rack mountable printer with all of the features of the PR-45A. It can be rack mounted in a standard 19" rack or, using extenders, installed in a 23" rack.

- **PR-2000A Thermal Printer (MC-6000 Rackmount Only)**

  The PR-2000A Thermal Printer is an alphanumeric, non-impact thermal printer that prints the full ASCII character set with up to 20 characters per line. This printer may be rack mounted along with the FIREBERD 6000 in the MC-6000 Rack Mount unit. An RS-232 cable is included, to allow direct connection to the FIREBERD 6000's built-in RS-232 interface.

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Product Information

FIREBERD 6000

	Model No.	*Description*
Mainframes		
	FB6000A	FIREBERD 6000 (Plastic Case)
	FB6000R	FIREBERD 6000 (Remote Control only)
	MC6000	FIREBERD 6000 (Metal Case)
Mainframe Options		
	6001	DS1Wideband Jitter Measurement
	6002	DS1 Jitter Spectral Analysis
	6003	DS1 Jitter Generation
	6004	Clock Recovery
	6005	IEEE-488 Remote Control
	6006	Precision Time Base
	6007	G.703 Wideband Jitter Measurement and Generation
	6008	G.703 Jitter Spectral Analysis
	6009	ANSI T1.403 PRMs
	6010	Frame Relay New Unit Option
	6011	Frame Relay Factory Upgrade
	220-V	Setting
Interface Modules [1]		
	42522	V.35/306/RS-449/X.21 DTE/DCE
	41400	RS-449/530/MIL DTE/DCE
	42219A	HSSI
	40202	V.35/306 DTE/DCE
	40200	RS-449 (422/423) DTE/DCE
	41440A	T1/FT1 Drop and Insert
	41945	T3 Transmission Test
	43440	DS1/DS3 ATM
	41800	CCITT 2.048M/Nx64 kb/s Drop and Insert
	31812	34 Mb/s Interface Adapter
	31650	2M/34M ATM Interface
	30608	CCITT G.703 64 kb/s
	30524	CCITT G.703 8448 kb/s
	41075	ISDN S/T TE (Euro/NI-1)
	30678	DDS DSOA/B
	41131B	DDS Local Loop
	42242	Diphase
	31910	High Speed TTL Interface Adapter (up to 52 Meg)
	40204	Lab (TTL, up to 10 Meg)
Accessories		
	RM-6000A	Rack Mount for plastic case (19")
	RM-MC6000	Rack Mount for metal case (23" extenders)
	PR-2000A	Thermal Compact Rack Mount Printer (for MC6000 only)
	PR-45	Integrated Thermal Printer (for FB6000A only)
	PR-35	Rack Mounted Printer



[1] Software upgrades may be necessary. Check with TTC for necessary software revision.

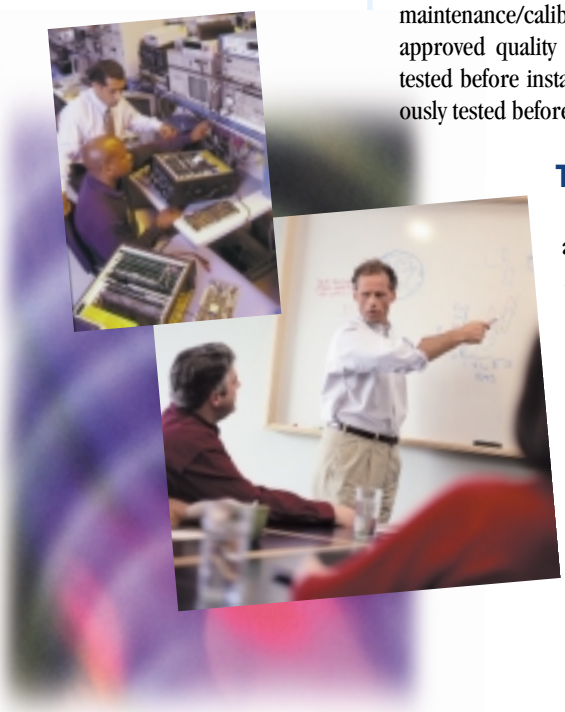
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Customer Care

When you buy a TTC product, you are getting not just a world-class test instrument, but also unsurpassed TTC service.

Warranty and Repair Service

TTC service excellence starts with an industry-leading three-year warranty on all mainframes[1]. We also offer extended warranty options, as well as customized maintenance/calibration plans. As part of our ISO-9001 approved quality system, all components are screen-tested before installation and each instrument is rigorously tested before being shipped.



Technical Support

To complement our instruments and systems, TTC offers superior technical support. In North America our engineers offer expert consultation on any technical problem from 8 a.m. to 8 p.m. Monday through Friday, ET (1-800-638-2049 or 301-353-1550). In Europe, technical support is provided through our UK office (44-1189-759696). In Asia, call our Hong Kong office (852-2892-0990).

Training

The right technical training can make you more productive and your FIREBERD 6000 more effective. Whether your goal is to shorten installation time, reduce downtime, or increase productivity, TTC's instructors can provide practical, hands-on training tailored to meet your needs, at any location you designate.

Thank you for your interest in the FIREBERD 6000. If you have any questions about TTC or about the FIREBERD 6000's features, specifications, and capabilities, call 1-800-638-2049, or +1-301-353-1550 to talk to your local sales engineer, or visit us on the Internet at www.ttc.com.

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

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TTC™

OPTIMIZING NETWORK PERFORMANCE

ISO 9001 CERTIFIED

CE

FB6000-A-6/00

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We buy equipment

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Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

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