SECTION 2
INSTRUMENT DESCRIPTION

2.1 INTRODUCTION

This section describes the FIREBERD 4000 Communications Analyzer physical characteristics, front panel switches and indicators, and rear panel switches and indicators.

2.2 PHYSICAL DESCRIPTION

The FIREBERD 4000, shown in Figure 1-1, is transportable, easy to set up, and easy to use. The FIREBERD 4000 front panel controls and indicators are clearly marked and conveniently located for quick recognition and access during set-up and testing. The vacuum fluorescent display provides easy-to-read menus and analysis results. The menus and analysis results lists are categorized to make retrieval and access simple.

The adjustable handle rotates 285° for easy handling, storage, and front panel viewing. The front panel is designed to allow the FIREBERD to be placed facedown for installing interface modules and other options in the rear panel slot(s). The hinged cover provides protection of the front panel, additional storage space for cables, or houses the optional thermal printer.

The unit weighs less than 19 pounds, when fully configured, and measures approximately 6" high, 14" wide, and 12" deep. The case is available in either a high-impact plastic or heavy-gauge metal.

The rear panel provides connections for: (1) an external printer for collecting mainframe configurations and analysis results printouts; (2) a remote terminal or computer for remote control operation; and (3) testing EIA RS-232-C/CCITT V.24 and MIL-STD-188C compatible systems. A standard interface slot accommodates modular interfaces, allowing the FIREBERD access to a variety of interface circuits. An optional second interface slot (Option 4001) can be added, so that two interfaces can be installed and either interface selected. The rear panel also has retractable standoffs which safeguard the rear panel and allow the FIREBERD to be placed on end during testing. Power is supplied to the unit through the rear panel and can be selected for 120 or 240 VAC operation. The fuse and power switch are also located on the rear panel.

With the appropriate equipment rack mounts, the FIREBERD 4000 can be mounted in a test bay for permanent installations. The FIREBERD is also capable of individually selecting and configuring up to 16 data interfaces when the interfaces are installed in up to four ISU-6000 Interface Switching Units. This configuration provides the ability to test a wide variety of circuits from different interface connections and mainframe configurations.

2.3 FUNCTIONAL DESCRIPTION

The FIREBERD 4000 Communications Analyzer is a multifunction analyzer that uses modular interfaces to access a wide variety of circuits for analysis. Selecting an optional interface, installed in the rear panel interface slot, or the internal RS232 Interface allows the FIREBERD 6000 to connect to a circuit and perform in-service analysis or out-of-service BER (bit error rate) testing. All controls for configuring the FIREBERD 4000 are located on the front panel and are grouped according to function.

Menus, messages, and configuration information are displayed on the front panel on an 80-character, vacuum fluorescent display. The display window is divided in half, with the left half providing configuration information, such as interface selection and other configuration settings. The right half of the display permits two analysis result to be displayed at one time.

After configuring the FIREBERD 4000 for the test to be performed, attach the circuit to be tested to the selected interface. Observe the LEDs located at the right of the FIREBERD front panel. The MK (Mark) and SP (Space) LEDs illuminate when the corresponding signal activity is detected. If a pattern is being transmitted and DATA is set for the same pattern, the SYNC (pattern synchronization) LED, located below the SP LED, illuminates when pattern synchronization is declared.

NOTE: Depending on the interface selected and the type of testing being performed not all of these LEDs will necessarily be illuminated. For example, the FRAME SYNC (frame synchronization) LED illuminates when frame synchronization is achieved only on frame-compatible interfaces.

After connection and full synchronization has been achieved, pressing the RESTART switch clears all accumulated results and starts another test period.

Using the four ANALYSIS RESULTS rocker switches (two for CATEGORY and two for RESULT SELECT), the accumulated results from the selected category can be scrolled through. Pressing the DISPLAY HOLD switch allows the displayed result values to be halted. The LED in the DISPLAY HOLD switch illuminates to indicate that the displayed result values are not the current values. This allows the operator to view all accumulated result values that were current at that point in time. Even though the displayed result values are halted, the current values continue to accumulate. Pressing the DISPLAY HOLD switch again extinguishes the LED in this switch and updates the result values to their current value.

If a printout of the current operating control settings or result values is desired, press the RESULTS or CONTROLS switch to generate the associated printout. Pressing the RESULTS switch generates a manual results printout listing a series of result values. Pressing the CONTROLS switch generates a printout of the current FIREBERD switch settings. This allows the unit configuration to be verified without having to scroll through all of the available SETUP categories. If desired, the unit configuration can be saved and named through the RECALL/STORE category operation. Press the SETUP CATEGORY switch to illuminate the LED next to the RECALL/STORE category. Press the softkey below the STORE menu item and then press the softkey below the number (0 to 9) where the configuration is to be stored. Additional information on the RECALL/STORE/NAME operation is contained later in this section.

The printout generated is determined by the following auxiliary menu selections.

    AUX PRI EVENT
    RESULT PRINT
    STATUS PRINT
    PRINTER
    RC/PRINT
    RS232

These auxiliary functions and others are described later in this section. Samples of different printouts can be found in Section 3.

2.4 SPECIFICATIONS

This section contains the specifications for the FIREBERD 4000 Communications Analyzer.

2.4.1 Operating Modes

Emulation:	DTE mode (connecting to DCE).
	DCE mode (connecting to DTE).
Mainframe configuration:	Full Duplex mode.
	Self-Loop mode.
Timing modes:	Synchronous timing.
	Asynchronous timing (internal EIA RS-232-C and MIL-STD-188C Interfaces, and optional MIL449).

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GENERATOR

2.4.2 Internal Clock Frequency Generator

Standard fixed frequencies: 300, 1200, 1800, 2400, 4800, or 9600 Hz, 19.2, 48, 56, 64, 128, 256, 512, or 704 kHz, 1.544 or 2.048 MHz.

Optional frequency synthesizer

Frequency range: 50 Hz to 15.000 MHz.

Accuracy and stability: ±5 ppm (±1 ppm optional)

Resolution: 5 significant digits for frequencies starting with 10 through 15. 4 significant digits on all other frequencies.

2.4.3 External Input Clock Timing

Connector: GEN CLK IN, BNC.

Input frequency range: 50 Hz to 15.000 MHz.

Input DC impedance: 10k ohms typical.

Input AC impedance: 60 ohms minimum.

Input signal range: 1.5 volts p-p to 25 volts p-p.

2.4.4 External Output Clock Timing

Connector: GEN CLK OUT, BNC.

Output frequency range: 50 Hz to 15.000 MHz.

Output load: 50 ohms minimum.

Output signal levels: TTL levels — 2.0 volts minimum high level, 0.4 volts maximum low level (50-ohm load).

2.4.5 Data Generator

Fixed patterns: Live, Mark Only, Space Only, 1:1 (Alternating Mark and Space), 1:7, 3IN24, or programmable 3-bit to 24-bit repeating pattern (synchronous only).

Pseudorandom patterns: 63, 511, 2047, 2^{15}-1, 2^{20}-1, 2^{23}-1, or QRSS.

Messages:	FOX message (Baudot, BCDIC, ASCII, or EBCDIC). Three user-programmable asynchronous messages of up to 2000 characters (synchronous operation with Option 4006 optional). Six T1 stress patterns (T1-1 to T1-6) or T1 digital milliwatt. Five DDS stress patterns (DDS-1 to DDS-5). Digitized 1020 Hz tone.
Asynchronous character format:	Character length — 5, 6, 7, or 8 bits. Parity — odd, even, or none. Stop Bits — 1, 1.5, or 2 bits.
Synchronous character format:	8-bit data with appropriate framing and control bits (with Option 4006 installed).
Error insertion:	Single error or fixed 10^{-3} bit error rate in generated data only.
Bit rates:	Asynchronous timing mode — 50 b/s to 20 kb/s. Synchronous timing mode — 50 b/s to 15 Mb/s.

RECEIVER

2.4.6 Timing Modes

Synchronous (1x bit rate clock received through data interface for bit rates from 50 b/s to 15 Mb/s).

Asynchronous (16x bit rate clock provided for USART for bit rates from 50 b/s to 20 kb/s).

Timing sources:	Data interface.
Indicators:	RECEIVER CLOCK PRES LED illuminates when receive clock is present.
	ALARMS CLOCK LOSS LED illuminates when receiver clock has been lost at least once.
	RCV DATA INVERT message appears when received data is inverted.
	RCV DATA LOSS message appears when received data is not detected.
	ASYNC FRAMING ERROR message appears when an asynchronous framing error occurs.

2.4.7 Data Analysis Measurements

Error analysis:	Bit, block, and character errors, average bit error rate, average block error rate, pattern losses, and pattern slips.
BER test interval:	10 seconds following pattern synchronization.
Block lengths:	10^2 to 10^6 bits, or pattern length (minimum: 50 bits).

Digital data analysis:	BPVs, BPV rate, average BPV rate, frame errors, average frame errors, CRC errors, and average CRC errors.
Time-based analysis:	Test seconds, percent error-free seconds, errored seconds, elapsed seconds, time, and date.

Signal frequency analysis

Frequency range:	50 Hz to 16 MHz.
Resolution:	Less than 1,000 Hz: 0.001 Hz. 1,000 Hz to 9,999.99 Hz: 0.01 Hz. 10,000.0 Hz to 99,999.0 Hz: 0.1 Hz. Greater than 100,000 Hz: 1 Hz.
Accuracy:	±5 ppm (±1 ppm optional).

Delay analysis

Start of measurement:	Rising edge of RTS (internal RS-232 and MIL-188C in positive signaling mode). Falling edge of RTS (internal MIL-188C in negative signaling mode).
End of measurement:	Rising edge of CTS (internal RS-232 and MIL-188C in positive signaling mode). Falling edge of CTS (internal MIL-188C in negative signaling mode).
Measurement range:	0 to 9,999.9 milliseconds.
Resolution and accuracy:	±0.1 millisecond.
Performance analysis:	Available seconds, % available seconds, unavailable seconds, degraded minutes, % degraded minutes, G.821 error-free seconds, G.821 errored seconds, G.821 % error-free seconds, severely errored seconds, and % severely errored seconds (Option 4004 required).

PROGRAMMABILITY

2.4.8 Programmable Messages

Three user-defined asynchronous messages of 1 to 2048 characters in length (Option 4006 required for synchronous operation).

2.4.9 Front-panel Programs

Number of front-panel programs:	10.
Functions under user control:	Front-panel switch settings, auxiliary functions, etc.
Access:	Program entry and recall using the RECALL/STORE function of the SETUP switch.

2.4.10   Non-Volatile Memory

Information stored: Current front-panel switch settings, keypad entries, and auxiliary
                                    functions.
                                    Three user-defined messages.
                                    Ten front-panel programs.

2.4.11   Remote Control Capability

Remote control access: RS-232 Printer/Remote Control Interface (IEEE-488 optional); complies
                                    with IEEE-488.2.

Controllable functions: Front-panel switch settings.
                                    Keypad entries.
                                    Auxiliary functions.
                                    User-defined messages.

DATA INTERFACES

2.4.12   Internal RS-232-C Data Interface

Connectors: Two 25-pin D-type female connectors. Labeled TO DCE and TO DTE.

Data rates: Asynchronous - 50 b/s to 20 kb/s.
                                    Synchronous - 50 b/s to 64 kb/s.

Data polarity: Mark (Binary 1): -3V to -25V.
                                    Space (Binary 0): +3V to +25V.

Signal Polarity: On: -3V to -25V.
                                    Off: +3V to +25V.

Drivers

Output rise time: Greater than 20 microseconds.

Generator impedance: Less than 100 ohms.

Signal swing: +10V into 7k ohms, typical.

Short circuit current: Less than 100 mA.

Receivers

Load impedance: 3k to 7k ohms.

Maximum input voltage: ±25V.

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2.4.13   Internal MIL-STD-188C Data Interface

Connectors:	Two 25-pin D-type female connectors. Labeled TO DCE and TO DTE.
Data rates:	Asynchronous - 50 b/s to 20 kb/s. Synchronous - 50 b/s to 64 kb/s.
Data polarity:	Mark (Binary 1): +4V to +6V. Space (Binary 0): -4V to -6V.
	Signal Polarity (menu controlled): ON = POS: ON is +4V to +6V, OFF is -4V to -6V. ON = NEG: ON is -4V to -6V, OFF is +4V to +6V.

Drivers

Output Impedance:	Less than 50 ohms.
Open Circuit Output Voltage:	5V to 6V.

Receivers

Input Impedance:	Greater than 6k ohms.
Input Threshold:	±0.2V.
Hysteresis:	200mV.

2.4.14   External Data Interface Slot

Accepts any FIREBERD interface (second interface slot optional).

2.4.15   Real Time Clock

Displayed and printed functions:	Hours (24-hour format), Minutes, Seconds, Month, Day, and Year.
Accuracy:	Typically better than one second per day.

2.4.16   Display

Display type:	Vacuum fluorescent display.
Display size:	80 characters — 40 characters x 2 lines.
Character format:	5 x 7 dot matrix and cursor.

2.4.17   Audio Output

Audio indicator:	Multitone output.
Volume control:	Volume control — off, minimum to maximum.

2.4.18   Electrostatic Discharge

IEC 801-2   Withstands a direct discharge of 8kv at 50% relative humidity.

2.4.19   Power Requirements

Voltage: Two user-selectable ranges: 90-135 VAC and 195-240 VAC.

Frequency: 50 to 60 Hz.

Power: 90 W maximum.

2.4.20   Environmental Specifications

Operating temperature range: 0°C to +50°C (+32°F to +122°F).

Storage temperature range: -30°C to +75°C (-22°F to +167°F).

2.4.21   Dimensions and Weight

FIREBERD 4000 (with Plastic Case)

Dimensions: 5.8" H x 14.2" W x 11.4" D (14.7 cm x 36.0 cm x 29.0 cm).

Weight: Without printer: 16.7 lbs. (7.6 kg).
                                                  With printer: 18.2 lbs. (8.3 kg).

FIREBERD MC4000 (with Metal Case)

Dimensions: 5.8" H x 14.4" W x 11.9" D (14.7 cm x 36.6 cm x 30.2 cm).

Weight: 17.1 lbs. (7.8 kg).

2.4.22   Safety Approvals

The FIREBERD 4000 has been tested and successfully passed the following specifications. In addition, it has received licenses and approvals for UL/NRTL certification from MET Laboratory (listing number T-31143-Q) and GS license (issued by the German Government) and IEC certificate from TUV ESSEN Laboratory (license numbers 815/90 and 816/90). These approvals are so indicated by MET/NRTL and TUV/GS stickers, located on the rear panel of the unit.

UL 478   Information Processing and Business Equipment (5th edition).

UL 746   Polymeric Materials Use in Electrical Equipment Evaluations (2nd edition).

UL 1459   Telephone Equipment (2nd edition).

IEC 348   Safety Requirements for Electronic Measuring Apparatus (Rev. 1978).

IEC 950   Safety of Information Technology Equipment (including EN 60950 Electrical Business Equipment [Rev. 1990]).

DIN VDE 0805/5.90   Safety of Information Technology Equipment (including EN 60950 Electrical Business Equipment [Rev. May 1990]).

DIN VDE 0411/10.73 teil 1a/2.80   Protective Measures for Electronic Measuring Instruments (Rev. October 1973).

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Section 2

2.5 FRONT PANEL CONTROLS AND INDICATORS

Figure 2-1 identifies the key sections and switches of the FIREBERD 4000 front panel. The following information describes the functions of the front panel displays, controls, indicators, and the printer connector. The FIREBERD 4000 front panel design allows easy set-up and operation in many circuit configurations.

2.5.1 SETUP Panel and Display Sections

The SETUP panel and display sections are used to:

- Select and configure built-in and installed interfaces for circuit testing.

- Select the mainframe generator clock source and frequency.

- Select the test pattern.

- Store and recall front panel test configurations.

- Configure the remote control/printer interfaces.

The following information explains the function of the SETUP panel display and switches.

SETUP Display - The SETUP display is a 40-character by 2-line vacuum fluorescent display capable of displaying upper- and lower-case alphanumeric characters and a cursor. Mainframe and interface configuration menus are displayed here. The top line indicates the menu name and selected function and/or option. The bottom line indicates menu choices for the three softkeys below the display.

Softkeys - These three push-button switches below the display are used to select a function, option, or operation depending on the requirements of the menu displayed. A softkey is only functional when a label is displayed above it. When a softkey is pressed, the selected function is displayed on the upper right of the display. The softkeys are not functional when the SETUP SUMMARY menu is displayed.

MORE Key - This push-button switch illuminates when a displayed menu has more than three selections. When pressed, the MORE key displays the next set of softkey labels. Continually pressing this key cycles through the menu selections.

SETUP CATEGORY Switch - This rocker switch allows scrolling up or down through the SETUP menu categories listed above the switch. Repeatedly pressing the CATEGORY switch sequentially illuminates the labeled SETUP category LEDs and displays the previously displayed category menu. The FIREBERD SETUP menus are described later in this section.

SETUP CATEGORY LEDs - These six LEDs indicate which SETUP category is currently displayed. The LEDs illuminate sequentially as the SETUP CATEGORY switch is pressed.

INTERFACE - Indicates the Interface category is displayed. This category contains menus to control interface selection and operation of menu controlled interfaces.

GENERATOR CLOCK - Indicates the Generator Clock category is displayed. This category contains menus to control the mainframe clock source and frequency.

PATTERN - Indicates the Data Pattern category is displayed. This category contains menus that provide mainframe test pattern selections.

SETUP SUMMARY - Indicates the SETUP Summary is displayed. This display summarizes the mainframe configuration.

RECALL/STORE - Indicates the Recall and Store category is displayed. This category contains menus that allow front panel configurations to be saved, named, and recalled at any time.

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Figure 2-1
The FIREBERD 4000 Front Panel

Legend:

1 SETUP Display
2 SETUP Panel
3 Analysis RESULTS Display
4 Analysis RESULTS Panel
5 ALARMS Status Panel

6 RECEIVER Status Panel
7 Interface Status and Control Panel
8 PRINTER Control Panel
9 VOLUME Switch
10 PRINT EVENT Switch

11 Keypad
12 PR-45 Printer Connector
13 SELF LOOP Switch
14 ERROR INSERT Switch
15 Soft key (x3)

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AUXILIARY - Indicates the Auxiliary Function category is displayed. This category contains menus that control the remote control/printer interfaces, printout formats, and signal processing thresholds.

SETUP SELECT Switch - This rocker switch allows scrolling through available menus for the selected SETUP category.

SETUP Panel Keypad - These four push-button switches are used to save selected data, return to the home menu of the selected category, and control the display cursor.

HOME Key - Pressing the HOME key returns the selected SETUP category to its home (top level) menu.

ENTER Key - Pressing the ENTER key saves parameter changes keyed in through the front panel.

Cursor Keys - Pressing the arrow keys move the cursor left or right across the displayed field. These keys are only active when the cursor is displayed.

2.5.2 ANALYSIS RESULTS Panel and Display Section

The ANALYSIS RESULTS panel and display section presents the results of an established test. Two results are displayed at one time from the categories listed in the ANALYSIS RESULTS panel.

ANALYSIS RESULTS DISPLAY - The display is a 17-character by 2-line, vacuum fluorescent display capable of displaying upper-case and lower-case alphanumeric characters. Two test results are displayed at the same time. The top line identifies the selected result and the bottom line indicates the results value gathered during the test.

ANALYSIS RESULTS CATEGORY Switches - The two ANALYSIS RESULTS rocker switches select the category of results being displayed. These switches allow two categories to be displayed at the same time. Pressing either CATEGORY switch, up or down, sequentially illuminates the labeled category LEDs and displays the selected category above the appropriate switch. The results displayed in each category are selected with either corresponding RESULT SELECT switch.

ANALYSIS RESULTS CATEGORY LEDs - The five LEDs indicate which results category is selected. These LEDs illuminate sequentially as the RESULTS CATEGORY switch is pressed.

SUMMARY - Indicates the Results Summary category is displayed. This category provides a summary of results that indicate "non-zero" or "out-of-spec" measurements errors have been detected.

ERROR - Indicates the Error Results category is displayed. This category presents commonly used error results.

INTERFACE - Indicates the Interface Results category is displayed. This category presents interface-specific error results.

TIME & SIGNAL - Indicates the Time and Signal Results category is displayed. This category presents time related results and signal frequencies.

PERFORMANCE - Indicates the Performance Results category is displayed. This category presents CCITT G.821 performance results (Option 4004 is required).

RESULT SELECT Switches - These two rocker switches allow two results selections to be displayed at the same time, one from each selected category. Pressing the left or right switches steps the available results across the corresponding display. The categories displayed are selected using the CATEGORY switches.

RESTART Switch - Pressing this push-button switch clears all accumulated measurements and indicated alarms, restarts the test, and resynchronizes the receiver. The mainframe generator is not affected.

DISPLAY HOLD Switch - This push-button switch allows the displayed ANALYSIS RESULTS information to be halted and examined at any given instance. Normally, the displayed results are continuously updated (whether displayed or not). Pressing DISPLAY HOLD halts the display and illuminates the LED within the switch. Pressing DISPLAY HOLD again allows the display to resume normal operation. It should be noted that, while the display is on hold, the mainframe continues to accumulate analysis results. Releasing the display hold updates the display with the current results values.

2.5.3 RECEIVER Status Panel

The RECEIVER status panel monitors five conditions related to proper received signal processing: pattern synchronization, clock presence, frame synchronization, and Mark and Space signals. Each LED illuminates when the corresponding condition is established or detected. The LEDs remain illuminated until the test is restarted (press RESTART or power up) or the condition is no longer detected.

PATTERN SYNC - Illuminates (green LED) when pattern synchronization is established between the received data and the FIREBERD receiver.

CLOCK PRES - Illuminates (green LED) when the clock signal is detected and the receiver has synchronized to it.

FRAME SYNC - Illuminates (green LED) when frame synchronization is achieved.

MARK - Illuminates (yellow LED) when the mainframe identifies a received pulse as a Mark.

SPACE - Illuminates (yellow LED) when the mainframe identifies a received pulse as a Space.

2.5.4 ALARMS Status Panel

The ALARMS status panel monitors five conditions related to signal processing and interface operation: pattern loss, clock loss, frame loss, pattern slip, and power loss. Each red LED illuminates when the corresponding condition occurs. The LEDs remain illuminated until either the ALARM RESET switch is pressed or the test is restarted (press RESTART or power up). The action of the ALARMS panel is dependent on the interface being used. Not all alarm conditions are applicable to all interfaces. Refer to the appropriate interface manual for details.

PATTERN LOSS LED - Illuminates when pattern synchronization is lost.

CLOCK LOSS LED - Illuminates when clock or signal presence is lost.

FRAME LOSS LED - Illuminates when frame synchronization is lost.

PATTERN SLIP LED - Illuminates when a pattern slip is detected.

POWER LOSS LED - Illuminates to indicate that a power loss occurred during a test, whether the power loss was intentional or not. This alarm is helpful during unattended testing.

ALARM RESET Switch - Pressing this push-button switch clears and resets the illuminated alarms.

2.5.5 Interface Status and Control Panel

The interface status and control panel contains four yellow LEDs, two push-button switches, and three columns of panel labels. Figure 2-2 shows all of the indicators and switches illuminated during the power-up, self-test sequence. The panel operation and significance of the LEDs are dependent on the data interface being used in the mainframe. Therefore, refer to the appropriate interface operating manual for specific details regarding the function of the LEDs, panel labels, and switches.

Interface Status LEDs

The LEDs indicate the status of specific signaling leads that control DTE and DCE operation on interfaces, such as EIA RS-232-C/ V.24, EIA RS-449/CCITT V.10/V.11, or CCITT V.35-compatible Data Interfaces. The LEDs can also indicate the status of the test and control status codes generated over digital transmission links like 2048 kb/s G.704, 64 kb/s G.703, DDS DS0A/B, and DS1/T1 networks.

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Interface Control Switches

The two switches control two signaling leads that control DTE and DCE operation on interfaces, such as the EIA RS-232-C/V.24, EIA RS-449/CCITT V.10/V.11, or CCITT V.35 Data Interfaces. Each switch toggles between ON and OFF each time it is pressed; a yellow LED within the switch illuminates when in the ON position. The function of these switches is determined by the selected interface. For many interfaces, these switches control the RTS and DTR signaling leads when emulating DTE; and control the RLSD (RR) and DSR (DM) signaling leads when emulating DCE. With certain T1 interfaces installed, these switches control the transmission of LOOP UP and LOOP DOWN codes. When the LED in the switch is on, the loop code is being transmitted.

Depending on the data interface selected and its configuration, the LEDs and switches are identified by one of three columns of illuminated panel labels. Because the FIREBERD can emulate either DTE or DCE, or function in digital transmission networks, the panel labels define the function of the LEDs and switches for the selected application. It should also be noted that not all of the LEDs and switches are used at one time. Only those LEDs needed for the selected application are identified by illuminating the appropriate panel label. Again, refer to the appropriate interface operating manual for specific information on the panel labels.
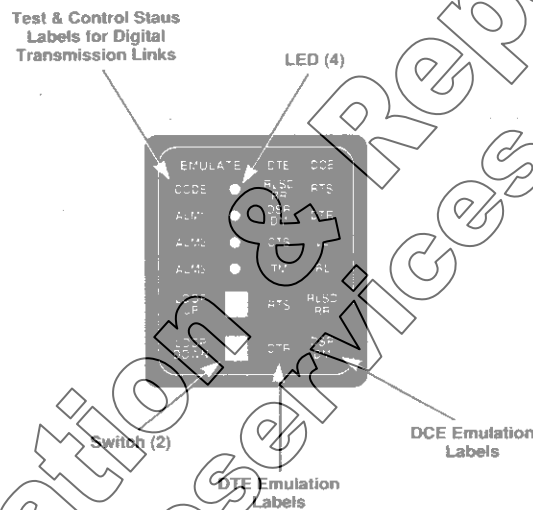

Figure 2-2
Interface Status and Control Panel

The EMULATE DTE label and the panel labels below it illuminate when the FIREBERD is emulating DTE (Data Terminal Equipment). The EMULATE DCE label and the panel labels below it illuminate when the FIREBERD is emulating DCE (Data Communication Equipment). The DTE and DCE emulation labels not in parentheses indicate EIA RS-232-C/V.24 lead notation. The labels in parentheses indicate EIA RS-449 lead notation. When neither emulation label is illuminated, the test and control labels are illuminated. Because of the different codes and alarms generated over digital transmission links, generic labels are used to identify the LEDs. The label definitions are provided in the data interface manuals.

2.5.6 PRINTER Control Panel

The PRINTER control panel contains three push-button switches that are used to turn a printer on and off and initiate specific printouts at set periods, or as desired. The LEDs illuminate to indicate the automatic printout status. Refer to Section 3, Printer Interfaces, for setting up and operating a printer with the FIREBERD.

Print Event Switch - This push-button switch controls the operation and set-up of the printer attached to the FIREBERD. Repeatedly pressing the switch sequentially illuminates the labeled LEDs listed above the switch from bottom to top.

AUX SETUP - Indicates that the Auxiliary Print Event menu, in the SETUP AUXILIARY category, determines the printout generation.

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Instrument Description

ERROR - Indicates that printouts are generated each time an error is detected. The reported errors include: bit errors, frame errors, CRC errors, BPV errors, clock slips, and block errors.

1 HR - Indicates that results printouts occur every 60 minutes after a test is started.

15 MIN - Indicates that results printouts occur every 15 minutes after a test is started.

OFF - Indicates that no results or status printout is automatically generated.

PRINTER RESULTS Switch - This push-button switch causes the current results values to be printed. Every time RESULTS is pressed, the current results are printed, regardless of the printer event selection or the DISPLAY HOLD function.

PRINTER CONTROLS Switch - This push-button switch causes a printout of the current front panel switch and set-up menu settings to be printed.

2.5.7 VOLUME Control

The volume control slide switch controls the volume of the audible tones generated by the FIREBERD. The audible tones identify specific conditions that may occur during testing.

A short single tone beep indicates:

- an invalid keypad entry.
- the cursor has reached the limits of a field.
- a bit error has occurred when the bit error count or errored seconds result is displayed.

A two tone beep indicates a loss of pattern synchronization.

2.5.8 PR-45 Printer Connector

The 8-pin DIN connector provides power, data, and control leads for the optional PR-45 thermal printer (see Section 5).

2.5.9 SELF LOOP Switch

The SELF LOOP push-button switch changes the FIREBERD operation from a normal full-duplex test mode to a self-loop test mode and vice versa. When in self-loop mode, the LED in the SELF LOOP switch illuminates, indicating the data interface transmit data and clock leads are connected to the receive data and clock leads, establishing an internal loop to test the mainframe and the selected data interface. The internal interface loop disconnects the FIREBERD from the circuit under test without the need for disconnecting the cables from the interface. Pressing the SELF LOOP switch again releases the self-loop mode and extinguishes the LED in the switch.

2.5.10   ERROR INSERT Switch

The ERROR INSERT push-button switch allows bit errors to be inserted in the test pattern data stream either one at a time or continuously at a bit error rate of 10^{-3}. Each time the switch is momentarily pressed and released, a single error is inserted. When the switch is held down for longer than 1 second, the continuous 10^{-3} error rate is applied to the test pattern and the LED in the switch illuminates. Momentarily pressing the switch, while the LED is illuminated, returns the test pattern to the error-free state and the switch LED is extinguished.
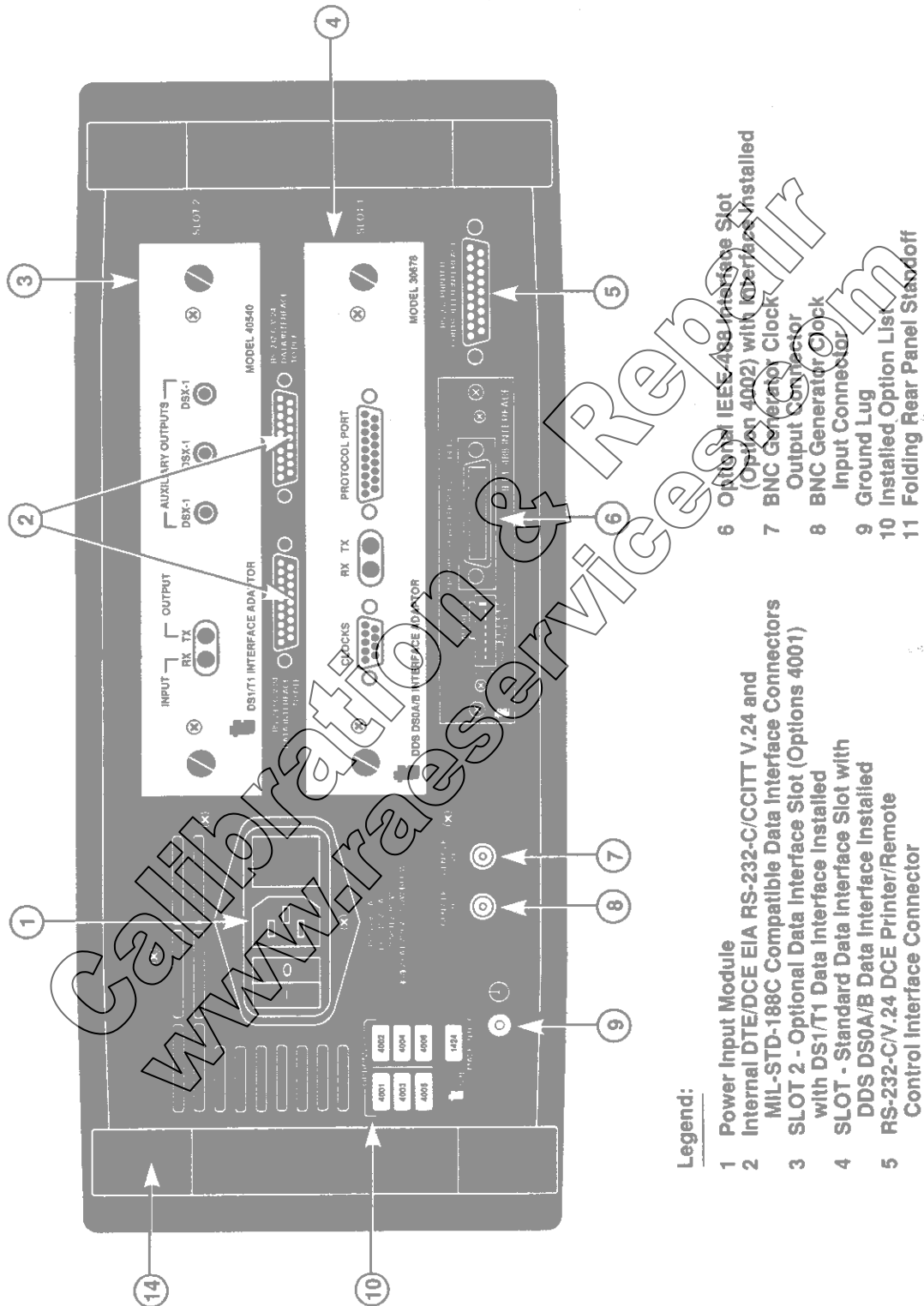
To receive a calibration and/or repair quote-RMA from R.A.E. Services Inc.
Click here>> www.raeservices.com/services/quote.htm

Section 2

Figure 2-3
The FIREBERD 4000 Rear Panel

Legend:

1 Power Input Module
2 Internal DTE/DCE EIA RS-232-C/CCITT V.24 and
   MIL-STD-188C Compatible Data Interface Connectors
3 SLOT 2 - Optional Data Interface Slot (Options 4001)
   with DS1/T1 Data Interface Installed
4 SLOT - Standard Data Interface Slot with
   DDS DS0A/B Data Interface Installed
5 RS-232-C/V.24 DCE Printer/Remote
   Control Interface Connector

6 Optional IEEE-488 Interface Slot
   (Option 4002) with Interface Installed
7 BNC Generator Clock
   Output Connector
8 BNC Generator Clock
   Input Connector
9 Ground Lug
10 Installed Option List
11 Folding Rear Panel Standoff

2.6 FIREBERD 4000 REAR PANEL

The FIREBERD 4000 rear panel, shown in Figure 2-3, provides the connections for an external RS-232-C or IEEE-488 Interface printer or for remote control device. External clock sources can be connected to or from the mainframe. A standard interface slot allows different interface modules to be installed, allowing the FIREBERD the capability to access a wide variety of communications circuits. An optional second interface slot can be added so two interfaces can be installed and operated, one at a time. The rear panel has folding standoffs which safeguard the rear panel and allow the FIREBERD to be placed on end during testing. Power is also supplied through the rear panel.

Power Input Module - This module contains the power switch and fuse, provides the physical connection, and input voltage range selection for the mainframe. The rocker switch controls power to the mainframe and is labeled 1 (ON) and 0 (OFF). The power receptacle is the IEC (International Electrotechnical Commission) 320 "cold" connector receptacle, accepting the mating connector for the line power cord with hot, neutral, and ground leads. The voltage selector and fuse holder module allows the user to change the input voltage from 120 VAC to 240 VAC. The fuses, one live and one spare, are also built into the module. Refer to Section 1, Getting Started, for the FIREBERD 4000 voltage and fuse requirements.

Data Interface Module Slot(s) - Slot 1 (on the bottom) is the standard interface slot where the interface module is plugged into the mainframe. Slot 2 (on the top) is the optional interface slot allowing a second interface to be installed in the mainframe. Option 4001 is required to use Slot 2. A blank plate covers the slot when the option is not installed. The slot(s) are also used to connect the FIREBERD to up to four ISU-6000 Interface Switching Units.

Internal RS-232-C/V.24 DATA INTERFACE TO DTE/DCE Connectors - The internal EIA RS-232-C/V.24 Interface has two female, 25-pin, D-type connectors for separate DTE and DCE operation. The left connector is configured as a DCE connection to test DTE. The right connector is configured as a DTE connection to test DCE. The connections are used to test EIA RS-232-C/V.24 and MIL-STD-188C compatible devices. Refer to information later in this section for additional information on configuring and operating the internal interface.

RS-232 PRINTER/CONTROLLER INTERFACE Connector - This connector is a female, 25-pin, D-type connector (located at the bottom right on the rear panel) configured for asynchronous DCE operation. The connector can be configured to send information to a compatible printer to generate printouts of status messages, test results, and mainframe configurations. The connector is also used to connect a device to the FIREBERD 4000 for remote control operation. The FIREBERD can be controlled using a dumb terminal or computer with a communications package. Refer to Section 3, Printer Interfaces, and Section 4, Remote Control, for printer and remote control operation. The device attached to this connector determines which auxiliary functions must also be set.

Optional IEEE-488 Interface Slot - This slot allows the optional IEEE-488 Interface (Option 4002) to be installed in the FIREBERD 4000. When this option is not installed, the slot is covered with a blank plate.

GEN CLK IN Connector - An external clock source can be connected to the FIREBERD through this BNC connector. The input signal is selected through the GENERATOR CLOCK menu, BNC selection. The FIREBERD accepts a 50% duty cycle, sine- or square-wave signal with a level from 1.5 volts peak-to-peak to a maximum of 25 volts peak-to-peak. The acceptable frequency range is from 50 Hz to 15 MHz. The BNC input has a built-in, 50-ohm termination.

GEN CLK OUT Connector - This BNC connector provides a buffered generator clock source output. The output level is TTL (0 to +5V) and drives a 50-ohm load.

Installed OPTIONS List - This panel lists the installed options in the unit. Refer to Section 5, Options and Accessories, for information on options and accessories.

Option	Description
4001	Second Interface Slot
4002	IEEE-488
4003	Precision Time Base (± 1 ppm)
4004	G.821 Performance Analysis
4005	Frequency Synthesizer
4006	Synchronous User Pattern