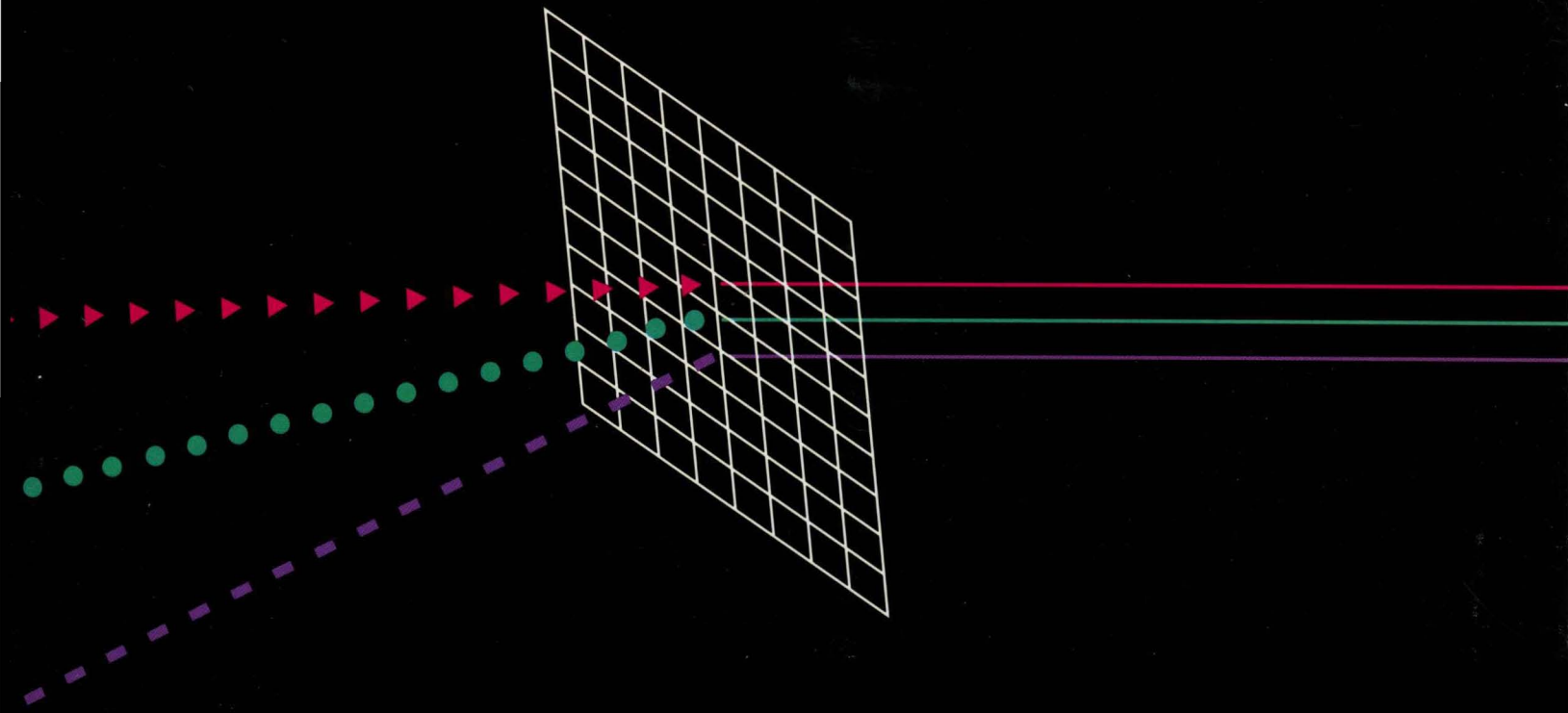
TEKELEC



TEKELEC

902-9032

Chameleon 32

User's Guide Volume I

CHAMELEON 32
USER'S MANUAL

Version 5.2

This manual, Version 5.2, corresponds to Standard Software Release 4.3.2.

TEKELEC
26580 Agoura Road
Calabasas, California
91302

Assembly Part Number 910–3383
Text Part Number 909–3383

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READ THIS FIRST

STATIC ELECTRICITY DISCHARGE

Sensitive electronic equipment can be damaged or caused to malfunction by the discharge of static electricity. Carpets, synthetic fibers, and a dry atmosphere usually increase the risks of static electricity buildup and equipment damage.

Follow the guidelines given below to minimize damage due to the discharge of static electricity.

1. Always make sure the equipment chassis is grounded to the AC ground.

2. When approaching a unit, discharge any static buildup to a discharge panel (often used with office computers) or to the equipment chassis by touching any exposed metal area of the chassis.

3. Use the following precautions to reduce the static levels in your work area:

    - Treat carpets with anti–static coatings
    - Use anti–static carpet covers and mats
    - Humidify the air.

WARNING! The Chameleon 32 and 20 have real–time clocks that are backed up by a lithium battery. If this battery is replaced incorrectly, there is a danger of its exploding. Replace this battery only in strictest accordance with manufacturer's instructions, and with the same or equivalent type of battery as recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.

DISK–DRIVE INSERT

Save the yellow, plastic disk–drive insert included with your Chameleon disk drive. **This insert MUST be used every time you ship your equipment.** Failure to use this insert will result in a damaged drive and a possible additional cost to repair the damaged drive.

PLEASE CALL TEKELEC CUSTOMER SUPPORT IF YOU HAVE ANY QUESTIONS:

1–800–441_9990

In Alaska and California, call collect:

1–800–880–5656

Tekelec Warranty Agreement

I. Term and Price

A. The term of this Agreement shall be for one year from the date of shipment to Customer of the equipment ("Equipment") and software ("Software") identified on the reverse side of this Agreement. The Equipment and Software are collectively referred to as the "Products". Upon an advance payment by Customer, not less than 30 days prior to expiration of this warranty agreement or any renewal term hereof, of Tekelec's then current annual maintenance fees with respect to any Product, Customer may renew this Agreement for a period of one year with respect to such Product. Notwithstanding the foregoing, Tekelec shall not be obligated to maintain any Product after the initial term of this Agreement.

B. In the event Customer requests Tekelec to perform on-site maintenance service, and Tekelec so agrees, Customer shall reimburse Tekelec for any out-of-pocket expenses incurred by Tekelec in performing such service and for the time of Tekelec personnel who performed such service at Tekelec's then standard rates. All such amounts shall be paid by Customer within thirty (30) days of the date of invoice.

C. In addition to any other amounts due hereunder, Customer shall pay to or reimburse Tekelec the amount of any sales, use, value added or other tax, duty, tariff or other assessment (other than any tax based solely on Tekelec's net income) and related interest and penalties which Tekelec is at any time obligated to pay or collect in connection with or arising out of the transactions contemplated by this Agreement.

II. Procedure

A. If the Equipment is defective in materials or workmanship, Customer will call Tekelec Customer Support at (818) 880-5656 for a Return Material Authorization (RMA) number. The following information is required:

Customer Name, Address and Telephone Number
Model Number
Serial Number of Equipment
Detailed Description of Problem

All repairs will require return of the entire Equipment to Tekelec. No individual modules or subassemblies will be accepted for repair under this Agreement unless prior authorization is granted by Tekelec. All Customer returned units or subassemblies must be shipped to Tekelec freight prepaid in the original carton or equivalent with an RMA number. The diskette inserts originally shipped in the disk drives must be place back in the drives before shipping. Failure to do so will result in damaged drives and a corresponding charge. Tekelec is not responsible for damage in transit. Tekelec will use commercially reasonable efforts to repair or replace and return the Customer's units within five business days of receipt and subassemblies within three business days of receipt. Tekelec will return them freight prepaid. In the event that Tekelec is unable to repair or replace such Equipment within a reasonable period of time, Tekelec will, as Customer's sole remedy, refund the price paid by the Customer for such Equipment.

B. By requesting the privilege of performing subassembly maintenance, Customer hereby represents and warrants that:

1. Customer is knowledgeable in the safety procedures required for subassembly maintenance of computers and test equipment in general and the Equipment in particular.
2. Customer is specifically knowledgeable regarding the dangers of high voltage CRT tubes, RF and X-Ray radiation, power supplies, and all other dangers which may be encountered in the maintenance of computers and test equipment.
3. Customer knowingly assumes for itself and its employees and agents any risk associated with the subassembly maintenance.
4. Customer will follow all safety precautions stated in all applicable Tekelec documentation, as well as all other reasonable safety precautions as may be required in the repair and maintenance of the Equipment, and agrees to indemnify and hold Tekelec, its directors, employees, agents, assignees and successors harmless from and against any and all claims, expenses, losses and damages which arise from Customer's maintenance of the Equipment, including Customer's failure to follow all such safety precautions.

III. Warranty

A. All Equipment repaired or replaced by Tekelec shall be covered by this Agreement for the remaining term hereof or for 30 days from the date of shipment to Customer, whichever is longer.

B. EXCEPT AS PROVIDED IN THIS SECTION III, TEKELEC DOES NOT MAKE BY VIRTUE OF THIS AGREEMENT, AND HEREBY EXPRESSLY DISCLAIMS, ANY REPRESENTATION OR WARRANTY OF ANY KIND WITH RESPECT TO THE SERVICES, EQUIPMENT OR SOFTWARE PROVIDED HEREUNDER, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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IV. Limitations

A. Tekelec shall have no obligation under this Agreement if the Products are misused, neglected, modified, improperly installed or tested or if they are damaged by accident, inadequate packaging or repairs performed by Customer or any third party or by causes external to the Products such as, but not limited to, failure of or faulty electric power or air conditioning, operator error, failure or malfunction of the data communications system or any equipment which was not provided to Customer by Tekelec of from any cause other than ordinary use.

The services provided hereunder do not include installation, relocation or removal of the Products or any accessories, apparatus, attachments or other devices or the furnishing of accessories or supplies.

B. In the event any Equipment returned by Customer to Tekelec is determined by Tekelec not to be defective in materials or workmanship, Customer shall reimburse Tekelec for all related shipping costs incurred by Tekelec under Section II.A. hereof, and shall pay Tekelec an amount equal to Tekelec's standard service charge applicable to erroneous warranty claims.

V. Software

Tekelec agrees to provide, without charge, all upgrades or modifications to the Software published by Tekelec during the term hereof. All such upgrades and modifications become part of the Software licensed to Customer pursuant to the terms of Tekelec's standard Software License Agreement. Customer's license for such upgrades and modifications shall automatically terminate upon termination of Customer's license to use such Software.

VI. Customer Support

Tekelec, through its customer support staff, will provide telephone consultation to Customer in the use and operation of the Equipment and the most recent and immediately preceding versions of the Software.

VII. Miscellaneous

A. Customer may assign or transfer this Agreement to any entity which acquires all or substantially all of Customer's operating assets or into which Customer is merged or reorganized pursuant to any plan of merger or reorganization. Except as set forth in the immediately preceding sentence, Customer may not assign or transfer this Agreement or any interest herein (including rights and duties of performance) without the prior written consent of Tekelec, which consent shall not be unreasonably withheld. This Agreement shall inure to the benefit of and shall be binding upon the parties hereto and their permitted successors and assigns.

This Agreement will be governed by the laws of the State of California which are applicable to the construction and enforcement of contract between parties resident in California which are entered into and fully performed in California. In the event that any provision is found invalid or unenforceable pursuant to judicial decree or decision, the remainder of this Agreement shall remain valid and enforceable according to its terms. No waiver of any provision of this Agreement shall be effective unless made in writing. No waiver of any breach of any provision hereof shall constitute a waiver of any subsequent breach or of any other provision of this Agreement.

This Agreement and any Software License Agreements between Tekelec and Customer are the complete and exclusive statement of the agreement between Tekelec and Customer which supersedes any proposal, prior or contemporaneous agreement, oral or written, and any other communications between Tekelec and Customer relating to the subject matter of this Agreement.

PREFACE

Introduction

The *Chameleon 32 User's Guide* is intended as a comprehensive overview of the Chameleon 32 for engineers and network managers who use the unit to design, test, install, maintain, and repair telecommunications and computer equipment. It also provides a comprehensive overview for both the new and experienced user who may need to review the basic concepts and operations of the Chameleon 32.

The Chameleon 32 is a powerful multi–protocol and ISDN test system. With the standard configuration, each physical port provides independent monitoring or simulation with a BOP acquisition rate of up to 64 kbps with dense traffic (one flag between frames). A 256k–acquisition option is available, which enables the Chameleon to monitor traffic up to 256 kbps on one port.

The *Chameleon Protocol Interpretation Manual, Volume II*, contains all protocol–specific information, including details on the ISDN ANSI Primary Rate, ISDN CEPT Primary Rate, ISDN Basic Rate and 2B1Q Interfaces.

Monitoring

The Chameleon 32 Monitoring applications interpret and display data communication traffic. The Chameleon 32 provides up to one megabyte of acquisition with a display in easy–to–read mnemonic text. Using the Chameleon 32's Monitoring applications, you can:

- Analyze 2B1Q, X.25, SNA, X.75, Q.921, Q.931, BSC, Async, QLLC, PSH, DPNSS, V.120, DMI MODE 2, DASS 2, DDCMP, and SS#7 protocols
- Simultaneously view a Real–Time and History display of interpreted traffic
- Display and print statistics for 2B1Q, X.25, SNA, BSC, ISDN, SS#7 and the Primary Rate Interface (Layer 1 error counters)
- Capture up to 30 Mbytes of data to disk for later analysis
- Filter HDLC, X.25, Q.921, Q.931, DASS 2 and SS#7 traffic using the Triggering application
- Display Dual Line traffic.

Simulation

The Chameleon 32 Simulation packages save you valuable development time. Simulation allows you to emulate either side of the line in a 2B1Q, X.25, SNA, Async, BSC, ISDN Q.921/ Q.931, or SS#7 environment. Simulation traffic (except SS#7 and Async) can be simultaneously analyzed using any of the monitoring applications described above.

Using the Chameleon protocol–specific programming languages, you can:

- Create a controlled, live environment to test both hardware and software
- Test both common and less common error conditions
- Simulate network or individual devices such as:
  - Mainframes or Front End Processors
  - Modems
  - Terminals or Terminal Controllers
  - ISDN Network Terminator (NT) or Terminal Equipment (TE) Devices
  - Other intelligent communications devices

You can also use Simulation languages for the following applications:

- To write certification packages to test equipment or software functionality, by writing protocol–specific scenarios.
- After identifying a specific problem using Chameleon 32 Analysis (for example, SABM collision), to develop simulation programs to duplicate the problem.
- If having problems running certification packages (for example, DDN tests), to copy just the portion of the test package you need, modify it, and run it.

Chameleon 32 BASIC Simulation Language

The Chameleon BASIC language is an interpreted test language based on standard BASIC. Since BASIC is a widely–used language, many Chameleon users are already familiar with its general format and usage, and can adapt quickly to Chameleon BASIC language.

Chameleon BASIC is structured so that you can develop programs quickly. It also has the added benefit of providing an interactive interface to the user. You can enter many commands directly at the BASIC prompt.

The ability to write your programs and run them without compiling means that you can reduce the amount of time required to debug programs.

BASIC provides a user–friendly interface for configuring various parameters through the use of set–up menus. It is possible to use Chameleon BASIC to determine your fundamental test design, and then develop the complete test system using C.

C Development System

The optional C Development System allows you to write C applications programs tailored to your individual testing needs. With the Chameleon 32 C Development System, you have:

- Automatic support of layers 1 and 2, with Simulation and Analysis libraries for upper layer programming
- UNIX–like libraries for input and output
- Full–feature C compiler, per standard Kernighan & Ritchie, producing 68010 object code
- vi Editor, linker, and loader via the C Menu Shell
- Libraries for screen displays for user–created windows

The Chameleon 32 C Development System includes the following special libraries with protocol–specific functions:

- Bit Oriented Protocols (BOP)
- HDLC
- SDLC
- LAPD
- Asynchronous
- BSC
- ISDN Basic Rate Interface
- ISDN Primary Rate Interface

- Analysis
- 2B1Q U–Interface

The C Development system, combined with the Chameleon 32 multi–tasking operating system, MS–DOS file compatibility, and Kermit file transfer, provides you with a truly flexible application development capability.

ISDN Primary Rate Interface
ISDN Basic Rate Interface
2B1Q U–Interface

The Chameleon 32 can be configured for ISDN ANSI Primary Rate, CEPT Primary Rate, ISDN Basic Rate Interface, or ISDN Basic Rate U–Interface testing, including powerful Simulation capabilities and comprehensive Analysis interpretation.

The ISDN Primary Rate Interface lets you connect directly to either a 1.544–Mbps (23B+D) or 2048–kbps CEPT (30B+D) ISDN interface. There is also a Primary Rate Interface Statistics application which displays error statistics.

The ISDN Basic Rate Interface lets you connect directly to an ISDN 192–kbps (2B+D) interface.

The 2B1Q U–Interface lets you connect directly to a Layer 1 64–kbps (2B+D) network.

Dual Port System

The Chameleon 32 Dual Port system allows you to:

- Simulate different communications channels on two physical ports simultaneously
- Test any two, different protocols simultaneously

The Dual Port system gives you access to a variety of testing applications. Each port can perform independently, providing multiple interface configurations, including the following combinations:

- Two V–series interfaces (V.24, V.35, V.36)
- One V–series and one ISDN Basic Rate Interface
- One V–series and one Primary Rate Interface
- One Basic Rate and one ISDN Primary Rate Interface

- Two ISDN Basic Rate Interfaces
- Two ISDN Primary Rate Interfaces

Each physical port provides independent monitoring or simulation with a BOP acquisition rate of up to 64 kbps with dense traffic (one flag beween frames). Like the Single Port system, Dual Port offers:

- ISDN Basic Rate access at 192 kbps,
- ISDN ANSI Primary Rate access at 1.544 Mbps
- ISDN CEPT Primary Rate access at 2.048 Mbps
- 2B1Q U–Interface access at 64 kbps (B channels) and 16 kbps (D channel)
- Hardware containing 8 microprocessors
- Optional C Development system

With the unique page format of the Chameleon 32, you can view the activity of both ports on separate display pages and relate events. The LED display can be switched between the ports for physical interface monitoring.

All existing Chameleon 32 hardware and software options are compatible with the Dual Port system.

Related Documents

In addition to this manual, the following documentation is available for the Chameleon 32, depending on the software options you purchased with your machine.

- Chameleon Protocol Interpretation Manual, Volume II (Part No. 910–4002)
- Chameleon 32 Simulation Manual, Volume III (Part No. 910–3372)
- Chameleon 32 C Manual, Volume IV (Part No. 910–3384)
- Chameleon 32 Quick Reference Guide (Part No. 910–3353)
- Chameleon 32 Tutorials (Part No. 910–3374)

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CHAPTER ONE:
EXPRESS INSTRUCTIONS

Introduction

This section gives you brief step-by-step instructions for powering up the Chameleon 32, and configuring one or both ports (where applicable) for monitoring or simulation. It assumes that this is the first time the Chameleon 32 has been used. If your screens differ from those described in this section, it indicates that your Chameleon 32 has been previously configured.

If you want more information on any of the topics covered in this section, refer to *Chapter Three: Using the Chameleon 32.*

If you are using a Dual Port Chameleon 32, perform the steps in this section, and then refer to the section in Chapter Three entitled *Dual Port on the Chameleon 32* for additional information on configuring and using a Dual Port machine.

If you want to configure the Chameleon 32 to use the C Development System, refer to the *Chameleon 32 C Manual, Volume IV.*

Power Up

To power up the Chameleon 32, do the following:

1. Place the Chameleon 32 on a secure surface with the Tekelec logo facing you, and easy access to the ports in the rear.

   To angle the front of the Chameleon upward for easy viewing, rotate the two feet on the bottom front of the unit forward until they lock into place.

   Be sure that the feet are securely locked into place before you rest the Chameleon on the feet.

2. Verify that the Chameleon 32 is set to the correct AC voltage setting for your country. This has been preset at the factory, but should be checked before the Chameleon 32 is powered on. The AC Voltage Selection is on the rear of the Chameleon 32, as indicated in Figure 1.1 on the following page.

3. Remove the power cord from the storage compartment in the back of your Chameleon 32.

4. Plug the power cord into the power inlet of the Chameleon 32, as shown in Figure 1.1.

5. Plug the other end of the power cord into a grounded outlet.

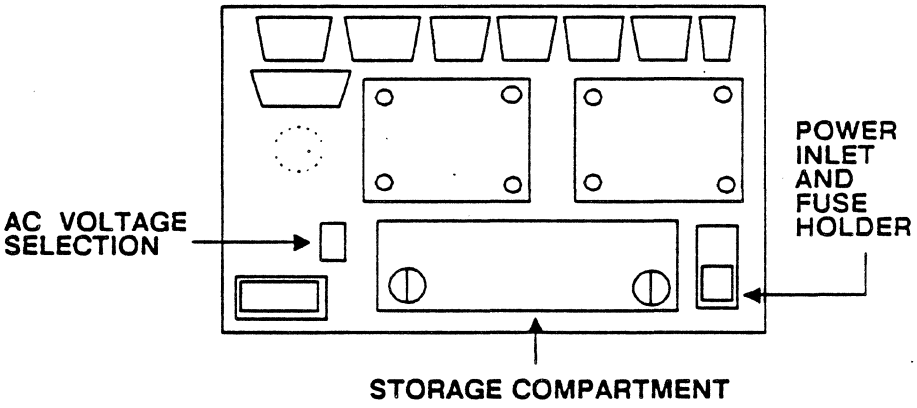


Figure 1.1: Chameleon 32 (Rear View)

6. Open the front of the Chameleon 32 by pressing down on the two latches (Figure 1.2), and then carefully lowering the keyboard.

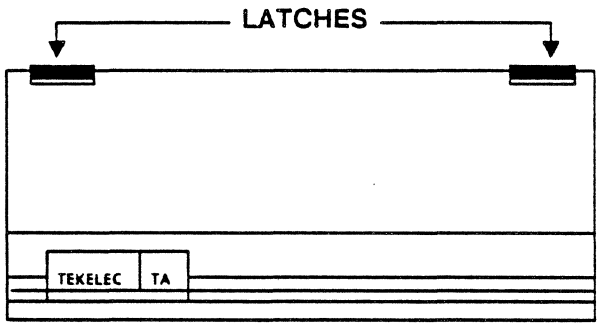


Figure 1.2: Chameleon 32 (Front View--Closed)

7. Press the eject button below the floppy disk drive to remove the yellow drive protector from the floppy disk drive (Figure 1.3). Place it in the disk storage compartment for future use.

8. Power up the Chameleon 32. The power switch is on the bottom right of the front panel (Figure 1.3). When the power is on, the switch is illuminated.

Warning Never switch the Chameleon 32 ON or OFF when there is a disk in the floppy drive. Never turn the Chameleon 32 OFF when the Hard Disk Active light is lit.

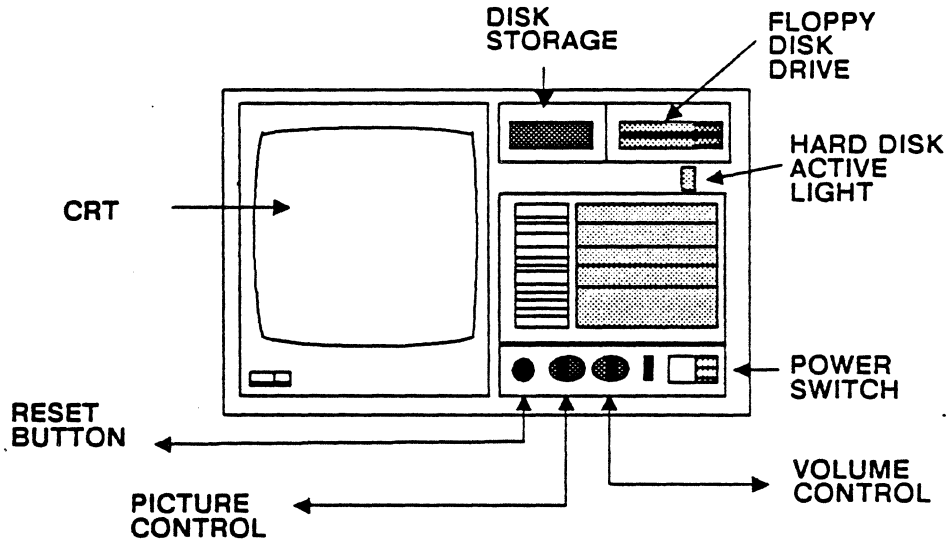


Figure 1.3: Chameleon 32 (Front View--Open)

Booting the System

9. The initial power up screen indicates the firmware (PROM) version and the processor boards installed in your machine.

   It is necessary to know this information if you call Tekelec Customer Support for assistance.

10. To boot the system software, you do not need to do anything. The system automatically boots when the Percentage Loaded bar graph reaches 100% (Figure 1.4).

    If you press a key (other than the space bar), it displays the Self-Test Menu, as described in *Chapter 2: Hardware and Installation*. (If you display the Self-Test Menu by mistake, press ***F10 Exit*** to exit the menu and continue booting.)

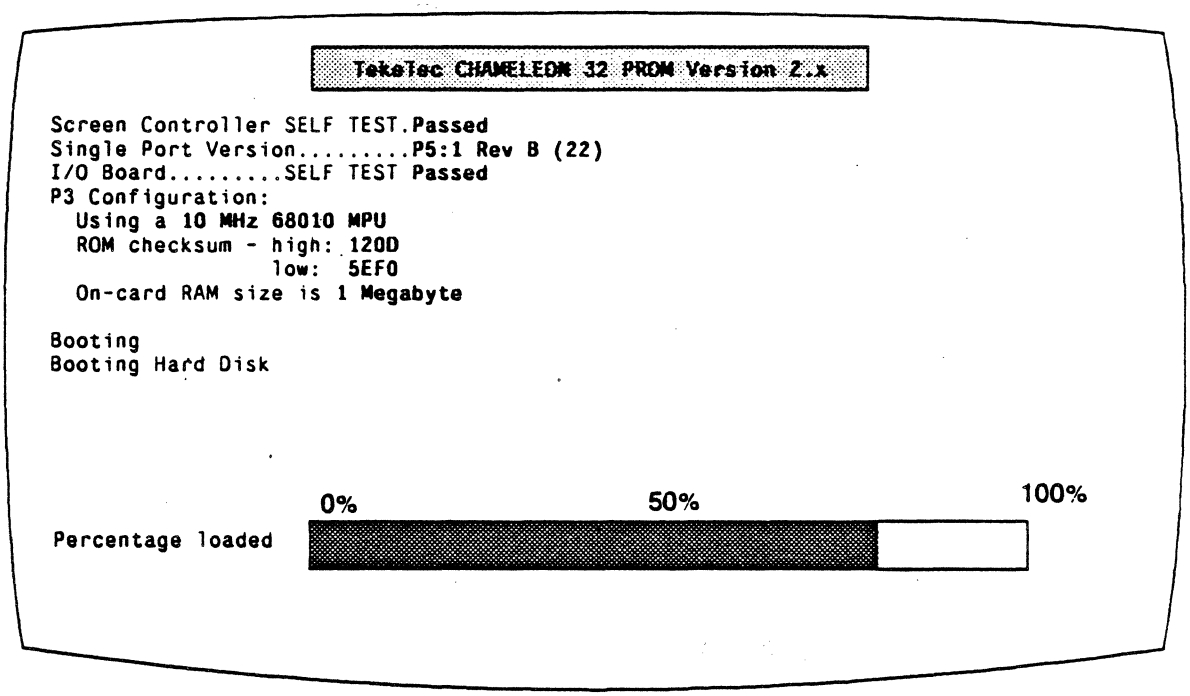


Figure 1.4: Power Up Screen

Port Configuration

11. After the system software is booted, a Configuration page appears (Figure 1.5). If this menu is not displayed, it indicates that your Chameleon 32 has been previously configured.

    If this menu is *not* displayed, the red arrow cursor will be positioned at the Setup Mode parameter. To display the menu, press ***F1 Menu***.

    If your Chameleon 32 has been previously configured, there may be additional function key options for Setup Mode (for example, ***F2 Files*** or ***F3 Autexec***). For a description of these options, refer to *Chapter 3: Using the Chameleon 32*.

    If you are using a Dual Port machine, the menu displays a list of parameters for Port B, which by default is *Off*. Refer to *Chapter 3: Using the Chameleon 32* for additional information about configuring a Dual Port machine.

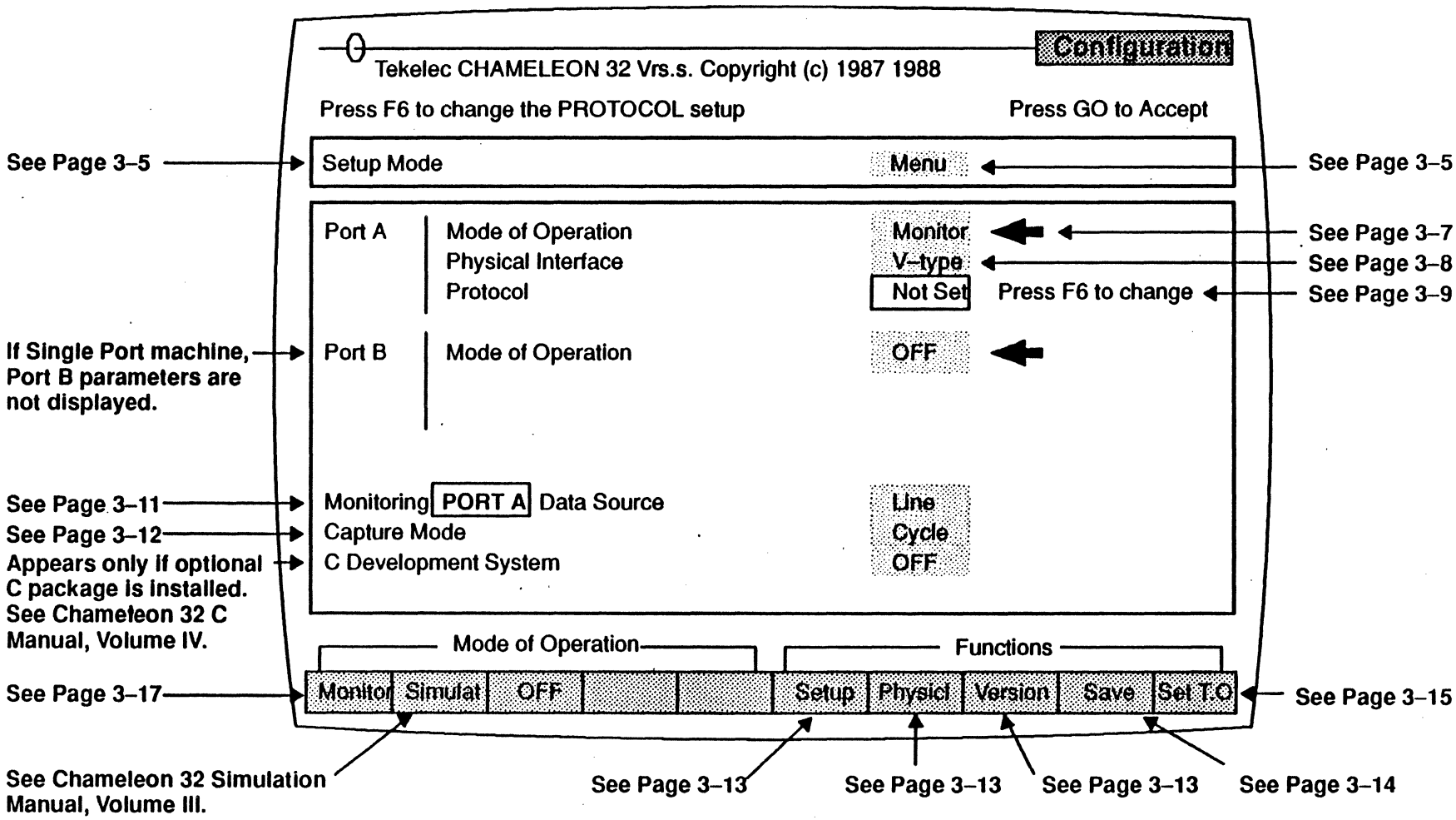


Figure1.5: Menu Setup Mode (Dual Port)

12. Use the arrows keys to move the red arrow cursor to the Mode of Operation parameter and select a mode. Depending on the software installed in your machine, you will have two or more of the following options:

    F1 Monitor mode enables the Chameleon 32 to passively monitor and analyze a data communications line.

    F2 Simulate enables the Chameleon 32 to simulate a device to test a second device. In Simulate mode, you can run Simulation and Monitoring applications simultaneously on a single port. This enables the Chameleon 32 to simulate a device, and simultaneously monitor the data between the Chameleon 32 and the device under test.

    F3 Off indicates that the port will not be used.

    F4 Fast Mo (Fast Monitoring) is displayed as an option for Port A on machines with the 256k Data Capture option installed. When Fast Monitoring is selected, traffic up to 256k bps can be acquired for Monitoring.

    When you select Fast Monitoring on a Dual Port machine, you cannot use Port B; therefore, the message *Busy* appears next to the Port B parameters.

    Refer to Appendix K for additional information about using the 256k Data Capture option.

13. Move the red arrow cursor to the Physical Interface parameter and select *V–type*.

    If your machine includes a Basic Rate or a Primary Rate Interface, it is recommended that you first complete this chapter to familiarize yourself with the Chameleon 32 menus, and then refer to the following manuals for additional information relating to the configuration and use of these interfaces:

    - For *Primary Rate Interface*, refer to the *Chameleon Protocol Interpretation Manual, Chapter 11.*
    - For *Basic Rate Interface*, refer to the *Chameleon Protocol Interpretation Manual, Chapter 12.*
    - For *U–Interface*, refer to the *Chameleon Protocol Interpretation Manual, Chapter 20.*

14. Press ***F6 Setup*** to display the menu of available protocols (Figure 1.6).

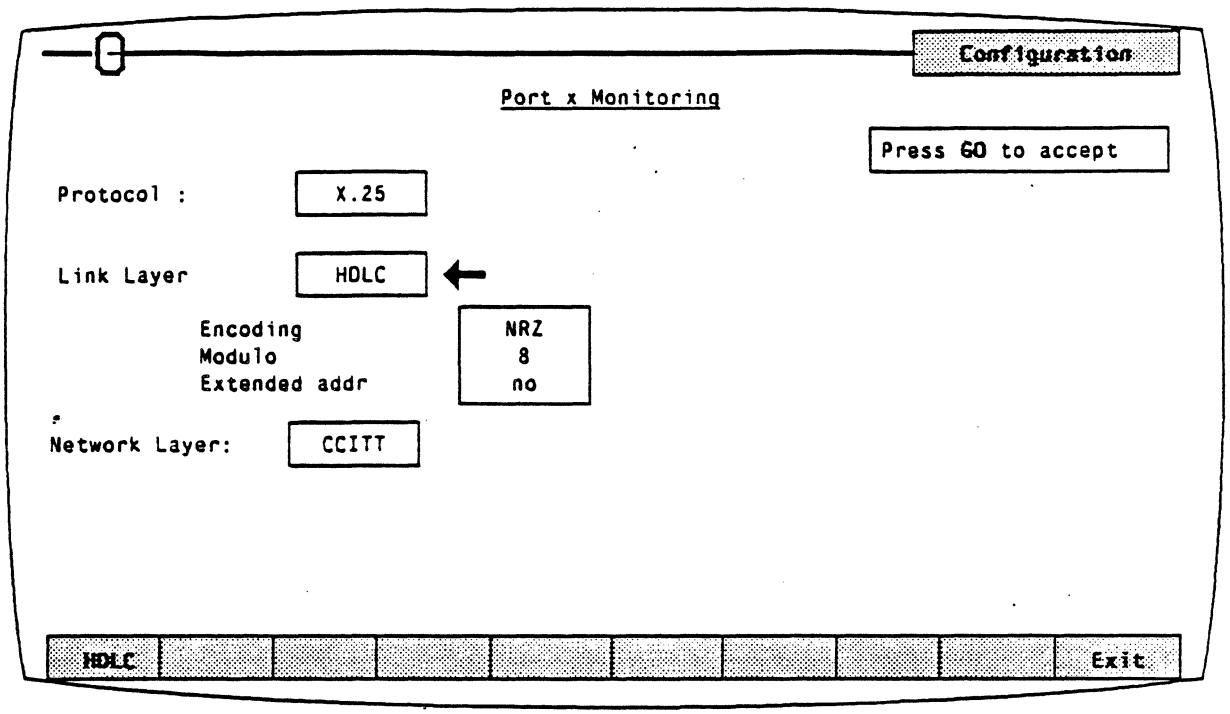


Figure 1.6: Chameleon 32 Protocol Setup Menu

15. Press the function key that corresponds to the protocol you are monitoring or simulating. Use ***F9 More*** to display additional protocol options, if needed.

16. Each protocol has additional parameters. Modify the parameters and then press ***Go*** *OR* press ***Go*** to accept the default values. This returns you to the first menu.

    To modify a parameter, move the red arrow cursor to the parameter and press the desired function key. These parameters are described in the *Chameleon Protocol Interpretation Manual* for each protocol.

Note

If you are configuring the Chameleon for BSC Simulation, both the above menu and the BSC Simulation Set-Up menu have the SYNC parameter. The value in the Simulation Set-Up menu will override the value in the Monitoring Setup menu. For more information about Simulation Set-Up menus, refer to the *Chameleon 32 Simulation Manual, Volume III*.

17. Move the red arrow cursor to the Monitoring Data Source parameter.

    This parameter is displayed only when Monitoring is selected for Mode of Operation.

    It should be set to *Line*. If not, press ***F1 Line*** to select monitoring from the line. (For information about Monitoring from Disk, refer to *Chapter 6: Direct-to-Disk*.)

18. Move the red arrow cursor to the Capture Mode parameter.

    This parameter is displayed only when Monitoring is selected for Mode of Operation.

    Press the function key that indicates how you want to use the acquisition buffer. The options are:

    F1 Cycle cycles buffer so that the oldest traffic is overwritten by new traffic when the buffer becomes full.

    F2 1 Buffer stops acquisition when the buffer is full.

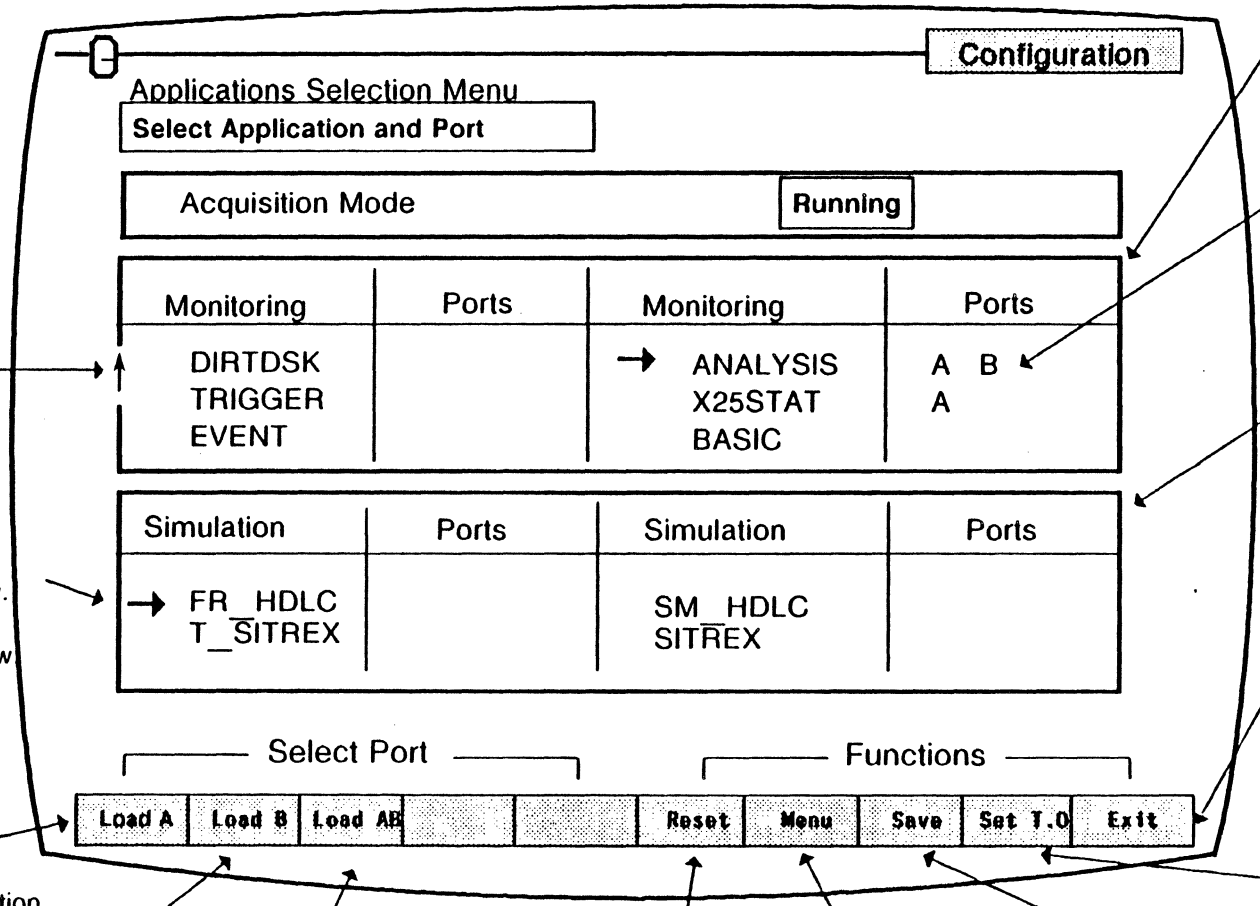
19. Press **Go** and the Applications Selection Menu is displayed. This menu enables you to select the applications that you want to run. The applications displayed on your screen depend on the selected Mode of Operation, protocol, and physical interface.

    If you selected **Monitoring** mode, only the Monitoring applications are displayed.

    If you selected **Simulation** mode, both the Monitoring and Simulation applications are displayed.

    Figure 1.7 shows a sample Applications Selection Menu for Simulation.

    Note: Data acquisition begins when you press **Go** to access this page. Use ***Run/Stop*** to start and stop acquisition. The Acquisition Mode displays either *Running* or *Acquisition Stopped* to indicate the status of acquisition.



Up/Down Arrow:
Indicates which arrow key to press to display additional applications in that window.

Arrow cursor:
Red arrow cursor indicates active window. White arrow cursor indicates inactive window Press Shift ↑ or Shift ↓ to change the active window.

Monitoring Window:
Displayed in Monitoring and Simulation modes.

A, B, A + B:
Indicates on which port(s) the application is currently loaded or running.

Simulation Window:
Displayed in Simulation mode only.
Selects a Simulator, for example:
SM_HDLC = Simpl HDLC

Exit:
Stops all applications and returns to the main configuration menu.

Load/Stop A:
Loads stops the selected application on Port A.

Load/Stop B:
Loads stops the selected application on Port B.
(Dual Port only)

Load/Stop AB:
Loads stops the selected application on Ports A and B (both ports displayed in a single page).
(Dual Port only)

Reset:
Resets all applications, for example:
Clears History buffer.
Resets all statistics values to 0.

Menu:
Displays the main configuration menu without stopping applications.

Save:
Saves the displayed configuration to a named file.

Set T.O:
Sets the value of the autoboot timer.

20. Monitoring and simulation applications are displayed in their own windows. To run an application, you must first load it into memory. To load an application, do the following:

    a. Select the window which displays the application you want to load. The selected window contains the red arrow cursor (the inactive window has a white arrow cursor).

       Press Shift↑ or Shift↓ to move between the Simulation and Monitoring windows.

    b. Move the red arrow cursor to the application name.

       If more applications exist than can be displayed, a small red arrow appears in the left border of the window.

       An up arrow indicates that you should press the up arrow key to display additional applications. A down arrow indicates that you should press the down arrow key to display additional applications.

    c. Press ***F1 Load A***. While the application is being loaded, the letter ***A*** appears blinking next to the application name. When loaded, the letter no longer blinks.

       Note: Dual Port machines have additional active function keys to load applications for Port B or for both Ports A and B. Refer to Chapter 3 for more information about these options.

21. Repeat the procedure in step 20 to load additional applications.

22. When you have loaded all desired applications, press ***Go***. This *starts* the applications, as indicated by the appearance of page banners at the bottom of the screen.

    Note: The Direct-to-Disk application does not have a page.

23. You are now ready to use the applications that are running. The Chameleon 32 page display system allows you to display several applications on the screen simultaneously. Each application has its own display page, which is 80 columns wide and 24 lines long. When running multiple applications, the application pages are much like a stack of papers on your desk. They can be looked at individually, or overlapped for comparative viewing.

24. At any given time, one of the page banners on the screen is highlighted. The page with the highlighted banner is the *active* page. To work with a specific application page, you must make it active. The ***Select*** key enables you to select the application page you want to work with.

    Each time you press ***Select***, it highlights the next banner on the screen. When a page is *active*, you can use the keys listed in Figure 1.8 to control how much of the page is displayed. These keys are described fully in *Chapter 3: Using the Chameleon 32.*

KEY	FUNCTION
Move ↑	Moves the page banner upward one line at a time (increases the size of the page).
Move ↓	Moves the page banner downward one line at a time (decreases the size of the page).
Scroll ↑	Scrolls the data displayed in the page upward one line at a time.
Scroll ↓	Scrolls the data displayed in the page downward one line at a time.
Shift Scroll ↑	Scrolls the data displayed in the page upward the number of lines displayed in the page.
Shift Scroll ↓	Scrolls the data displayed in the page downward the number of lines displayed in the page.
Shift Hide Page	Hides the active page so that the banner is no longer visible on the screen (the application continues to run).
Show Page	Displays a page that has been hidden with Shift Hide Page.
Shift Replace	Replace the active page with one that has been hidden using Shift Hide Page.
Shift Move ↑	Displays the page in a special full–screen mode referred to as Blow Mode (indicated by the letter B on the top left side of the banner). Other pages cannot be accessed when the active page is in Blow Mode. Shift Move ↑ again disables Blow Mode, and returns the screen to its previous state.

Figure1.8: Page Manipulation Keys

Note

Refer to the following chapters for information about page format and Function Key usage for a specific application:

Analysis . . . . . *Chapter 4*
Dual Line . . . . . *Chapter 5*
Direct–To–Disk . . . . . *Chapter 6*
Statistics . . . . . *Chapter 7*
Triggering . . . . . *Chapter 8*
BERT . . . . . *Chapter 11*
256k Data Capture Option . . . . . *Appendix K*

Protocol–specific information is in the *Chameleon Protocol Interpretation Manual, Volume II.*

Information about the Chameleon 32 Basic simulation languages is in the *Chameleon 32 Simulation Manual, Volume III.*6/10

CHAPTER TWO:
HARDWARE AND INSTALLATION

Setting up the Chameleon 32

The Chameleon 32, purchased accessories, and documentation are shipped in a Chameleon 32 shipping case. To set up the Chameleon 32, follow the steps described below.

1. Carefully remove the Chameleon 32 from its shipping carton. Be sure to keep all the packing materials, in case you need to ship your Chameleon 32 back to Tekelec for upgrades or repairs.

Note

If the unit is returned to the factory for service in other than the original shipping carton, it may void your warranty.

2. Write down the Serial Number of your Chameleon 32. The Serial Number is located on the back panel of the unit (Figure 2.1.). You will need to know your serial number if you contact Tekelec Customer Support.

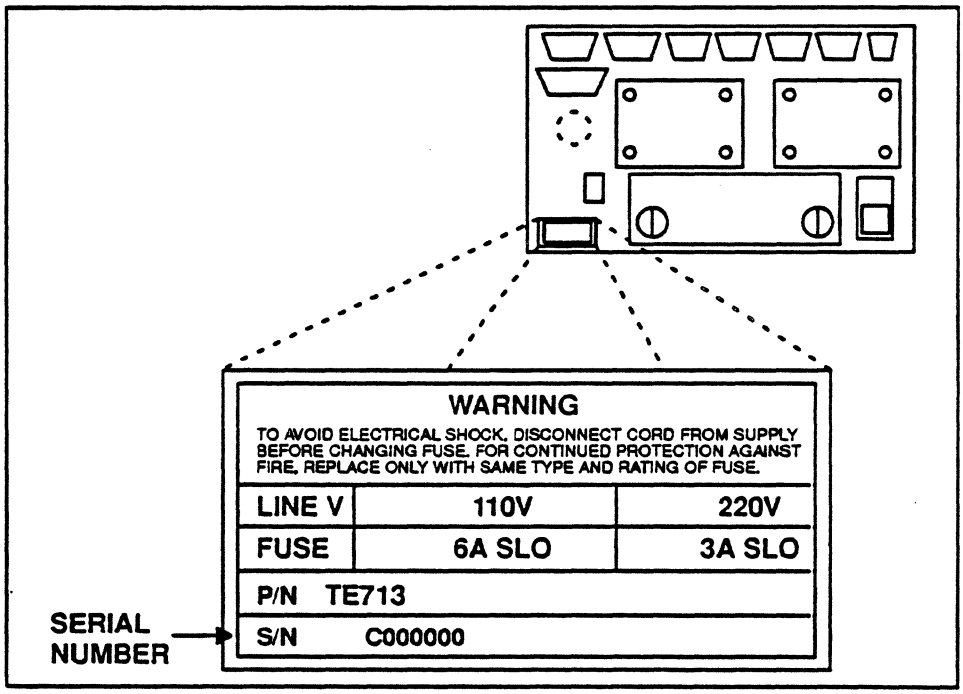


Figure 2.1: Chameleon 32 Serial Number Location

3. Make sure you have the following documentation:

   - *Chameleon 32 User's Guide, Volume I*
   - *Chameleon Protocol Interpretation Manual, Volume II*
   - *Chameleon 32 Simulation Manual, Volume III*
   - *Chameleon 32 C Manual, Volume IV* (If *C* package purchased)
   - *Chameleon 32 Quick Reference Guide*

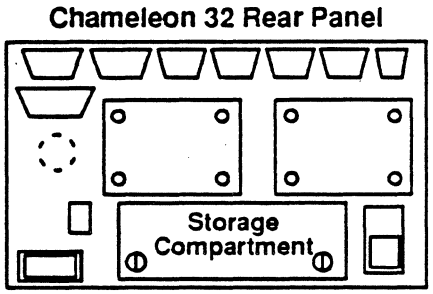
4. Make sure you have all the software packages you ordered. The software you purchased with your Chameleon 32 is installed for you at the factory. You will have a set of floppy diskettes corresponding to the software that has been installed. This software will include:

   - The Installer Disk. This disk enables you to install software updates and additional packages, as needed.
   - System Disk
   - Applications Disks
   - Simulation Packages (optional), such as U–Interface (2B1Q) Simulation, X.25 Simulation, LAPD Simulation, and SNA Simulation.
   - Optional Analysis Packages, such as DPNSS Analysis and SS7 Analysis
   - C Development System (optional)
   - Exercisers and Certification Packages, such as SNA Exerciser, BSC Exerciser, and DDN Certification Tests. These optional packages are not installed at the factory. Refer to the instructions accompanying the package for installation and operation procedures.

Note See page 2–15 for general information about software installation.

5. Make sure you have the following accessories:

- Power Cable (located in the Storage Compartment)
- RS232 cable with T–connector (located in the Storage Compartment)
- Softcase



Front Panel

The Chameleon 32 front panel is shown in Figure 2.2.

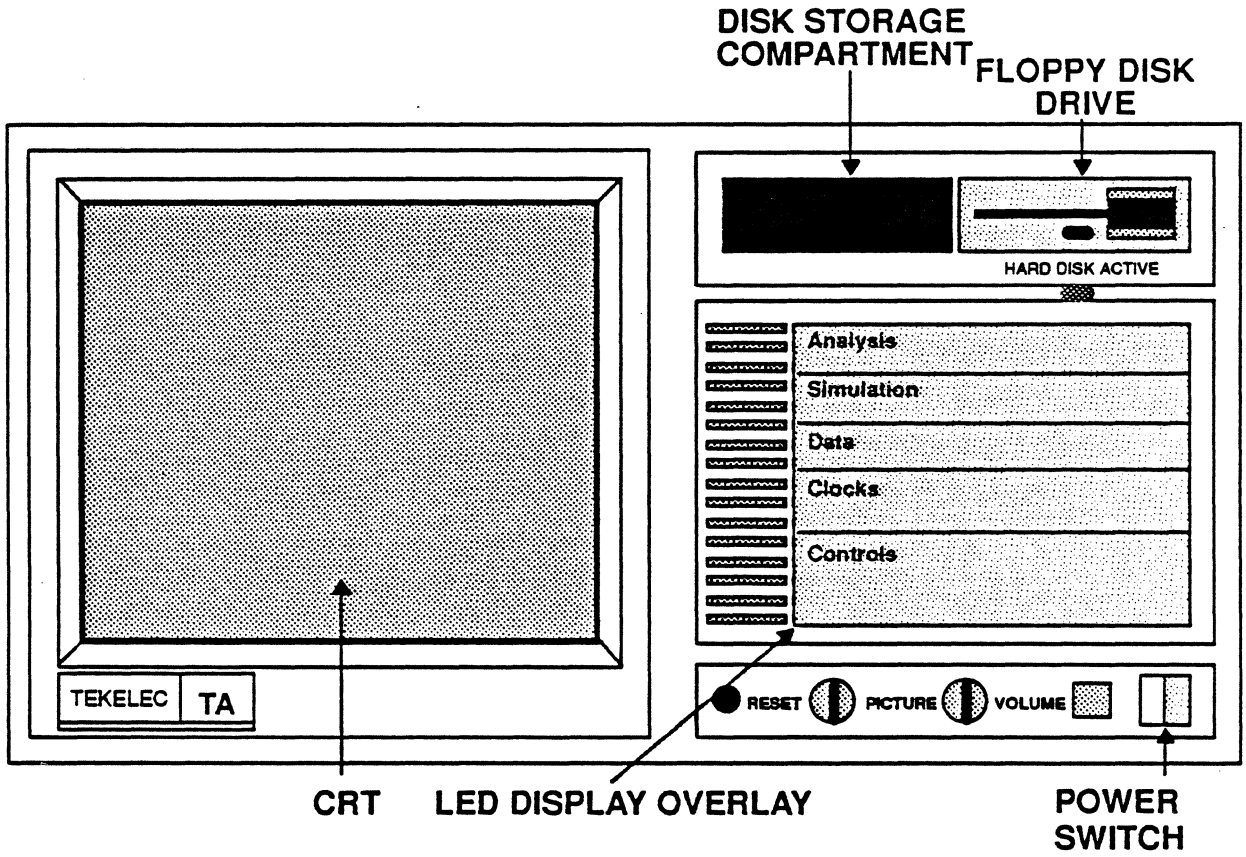


Figure 2.3: Chameleon 32 Front Panel

LED Overlays

There are four interchangeable LED display overlays, depending on the interface options installed on your unit. These LED display overlays are:

- Standard (supplied with all units)
- ISDN ANSI Primary Rate Interface
- ISDN CEPT Primary Rate Interface
- ISDN Basic Rate Interface
- 2B1Q U–Interface

See ***Appendix E*** for information about the LED Display Overlays.

Chameleon 32 Keyboard

The Chameleon 32 comes with a custom designed keyboard, including dedicated display control keys and soft function keys. The light in the upper right–hand corner of each function key indicates which keys are enabled for the selected application. For more information on how the control and function keys operate, see *Chapter Three: Using the Chameleon 32.*

Chameleon 32 Rear Panel

The Chameleon 32's rear panel is shown in Figure 2.3 below.

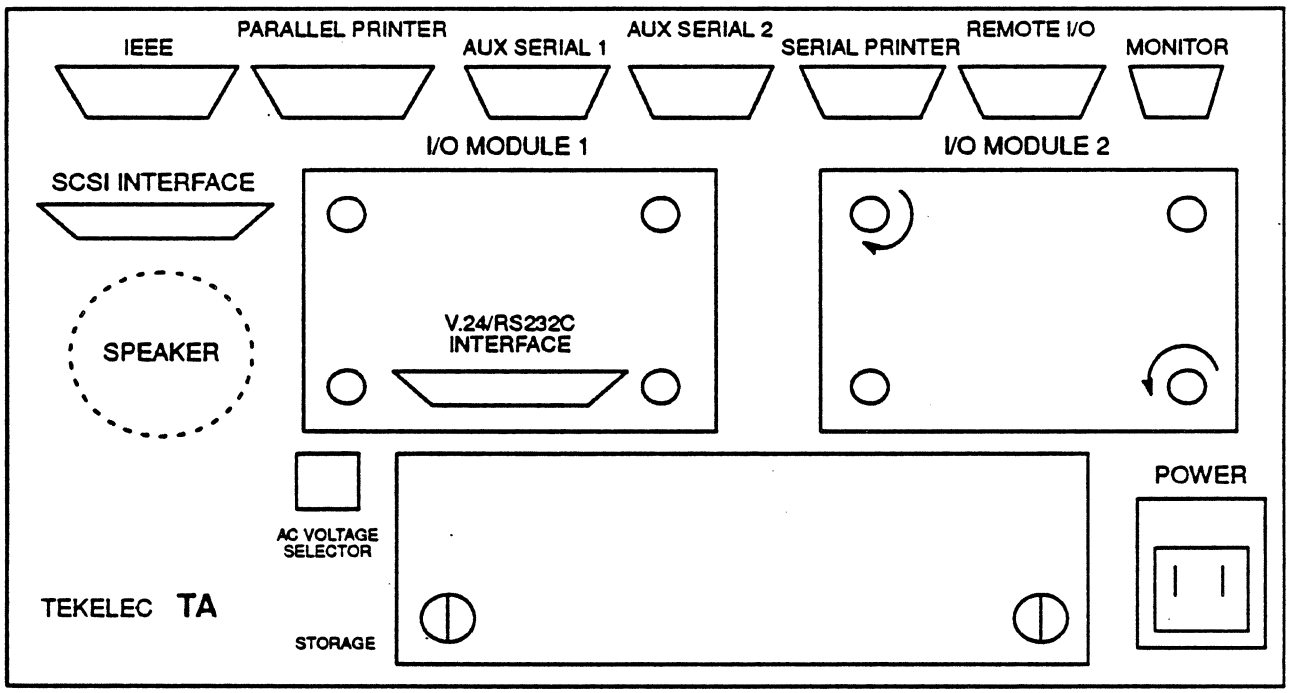


Figure 2.3: The Chameleon 32 Rear Panel

The Chameleon 32 is equipped with expansion slots, allowing for a high degree of modularity and versatility. Interchangeable modular interfaces include:

- ISDN ANSI Primary Rate Interface
- ISDN CERT Primary Rate Interface
- ISDN Basic Rate Interface
- 2B1Q U–Interface
- V.24 (RS232)
- V.35
- V.36 (RS449, RS422 & RS423)
- DSCS Interface
- G.703 Co–Directional Interface

Chameleon 32 Input/output ports include:

- Parallel printer (IBM PC and Centronics compatible)
- RS232 serial printer (IBM PC compatible, up to 9600 bps)
- RS232 remote terminal (up to 9600 bps), which supports VT100 and VT52 remote terminal
- Two RS232 auxiliary ports for Kermit File Transfer and user–written C programs.
- 9–pin external video port (IBM PC compatible), providing TTL RGBI video
- SCSI (*S*mall *C*omputer *S*ystems Interface) that allows connection to external storage, including floppy, hard, and optical disk drives

Chameleon 32 Internal Components

There are four major components to the Chameleon 32:

- Color monitor (Display)
- Card cage (containing the Processor Boards)
- Disk Drives (Hard and Floppy)
- Power Supply

Figure 2.4 shows the basic layout of the Chameleon 32. The disk drives and disk controller are mounted on top of the card cage.

Note

Flat cables are routed out of the card cage area and across the top of the machine so that they are not pushed between circuit boards. This protects the cables from the sharp pins which protrude from the underside of the circuit boards and prevents damage which can result in short circuits.

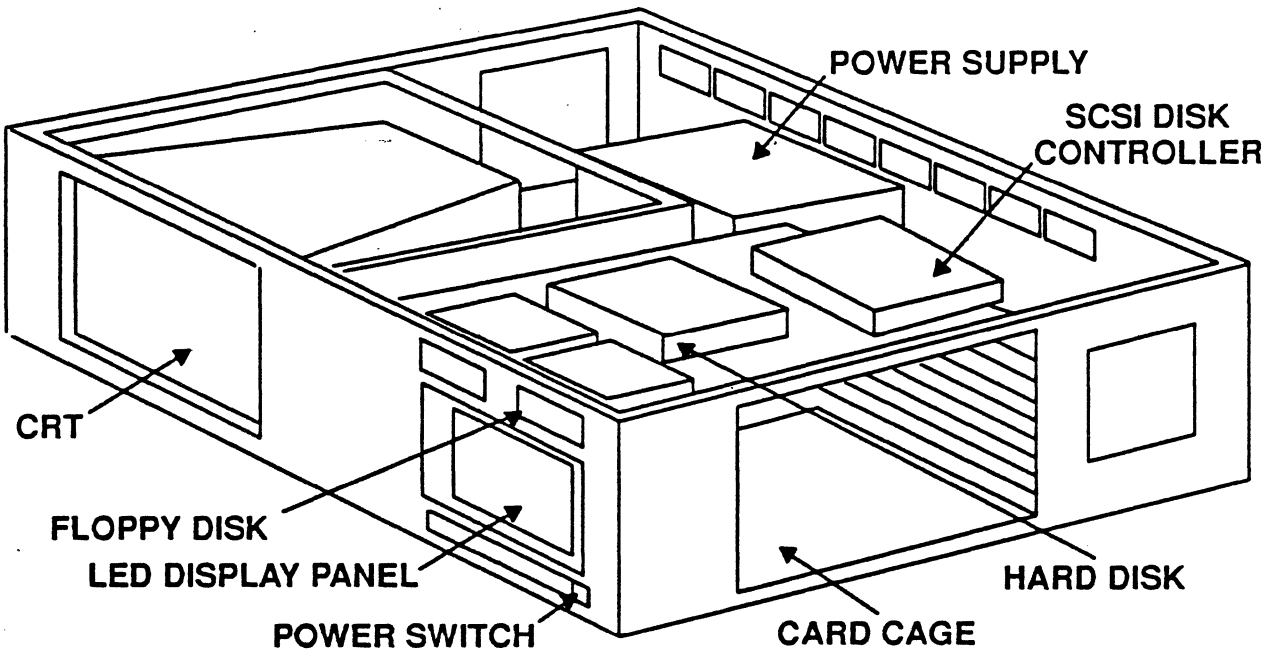


Figure 2.4: Chameleon 32 Mechanical Layout

Color Monitor

The color monitor features:

- A 9 inch Sony Trinitron
- Eight foreground colors, eight background colors, with variable intensity for both
- 80186 CPU, 6–MHz clock, and 512K RAM dedicated to both the Screen Controller and the Keyboard Controller

The Card Cage

The Chameleon 32 provides an 8–slot or 9–slot card cage that is externally expandable, and five Multibus I boards, including:

- The Data Acquisition Processor, that receives and transmits data to the line under test.
- The Chameleon II Simulator Processor, that runs all Chameleon II compatible simulation software.
- The Main Application Processor, that runs all non–simulator programs and the Setup Menus, and controls the SCSI board.
- The Video and I/O Processor, that controls the display, keyboard, printers, and the remote terminal.

The Chameleon 32 also includes a Real–Time Clock that keeps track of the time for time stamps, and is backed up with a lithium battery.

WARNING! If a lithium battery is replaced incorrectly, there is a danger of its exploding. Replace this battery only in strictest accordance with manufacturer's instructions, and with the same or equivalent type of battery as recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.

See ***Appendix A*** for more information about board configurations.

Disk Drives

The Chameleon 32 includes a 40–Mbyte hard disk drive with 10 Mbytes for system and user program storage and 30 Mbytes for data capture.

CAUTION! The green LED on the front panel labeled **HARD DISK ACTIVE** is lit when the hard disk is in use. ***Never turn the Chameleon 32 OFF when the Hard Disk Active LED is lit.***

The Chameleon 32 also includes a double–sided, double–density 3 1/2" Sony floppy disk drive, allowing 800 kbytes of data storage. The disk drives are controlled by an intelligent SCSI (Small Computer System Interface) controller board.

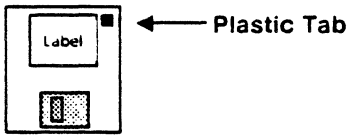
Note The small, yellow light to the left of the eject button indicates when the floppy disk drive is in use. *Never push the eject button when this yellow light is lit.*

- Inserting Floppy Diskettes

  To insert diskettes, hold the diskette so that the metal center hub faces downward, and insert the shutter end into the drive. The diskette should slide easily and lock into place. *Do not force it into the drive.*

- Floppy Diskette Write-Protection

  A disk is write-protected if there is a little hole in the upper-right corner of the disk. If the plastic tab covers the hole, the disk is not write-protected.



A complete set of instructions about the use of write protect tabs is provided by the manufacturer in each box of diskettes.

Power Supply

The power requirement for the Chameleon 32 is 4.5 Amp. @ 110V 60Hz, 220 V 50Hz, 500W maximum.

250 Volt Operation

For 250 Volt operation, use only LU Listed power cord set, (NEMA type 6-15P) Tandem Blades configuration. Rated 6A at 250 V.

Temperature Requirements

The operating temperature of the Chameleon 32 is from 10° C to 40° C. (50° F to 104° F.) with humidity of 10% to 80%, non-condensing.

Case Design

The Integral case design makes the Chameleon 32 transportable and rack mountable. The dimensions are:

- Height: 8.88" (22.56cm)
- Width: 17.96" (45.61cm)
- Depth: 20.38" (51.77cm)

Hardware Self-Tests

The hardware tests available to you depend on the PROM firmware version installed in your unit. (The PROM version of your unit is displayed in the first line of the initial power up screen.) There are two possibilities:

- For units with PROM version 1.9 or earlier, the test is run automatically when the machine is powered on. To abort the hardware test and boot the system software, press the ***spacebar***.

- For units with PROM Versions 2.0 or later, more extensive tests are available. When you power on the machine, you are prompted as follows:

For Self Test Menu, press any key (except space) Now

If you press a key (other than the spacebar), the following menu of tests is displayed:

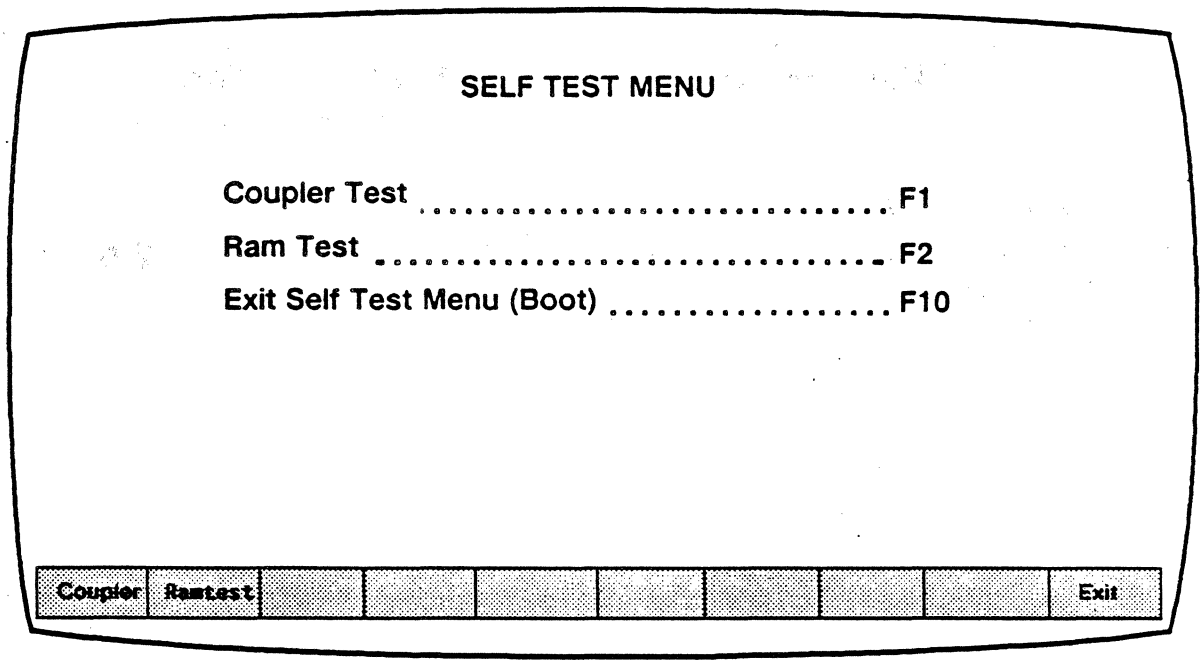


Figure 2.5: Self Test Menu

Coupler Test

If you press ***F1 Coupler***, the Coupler Test Menu is displayed (Figure 2.6).

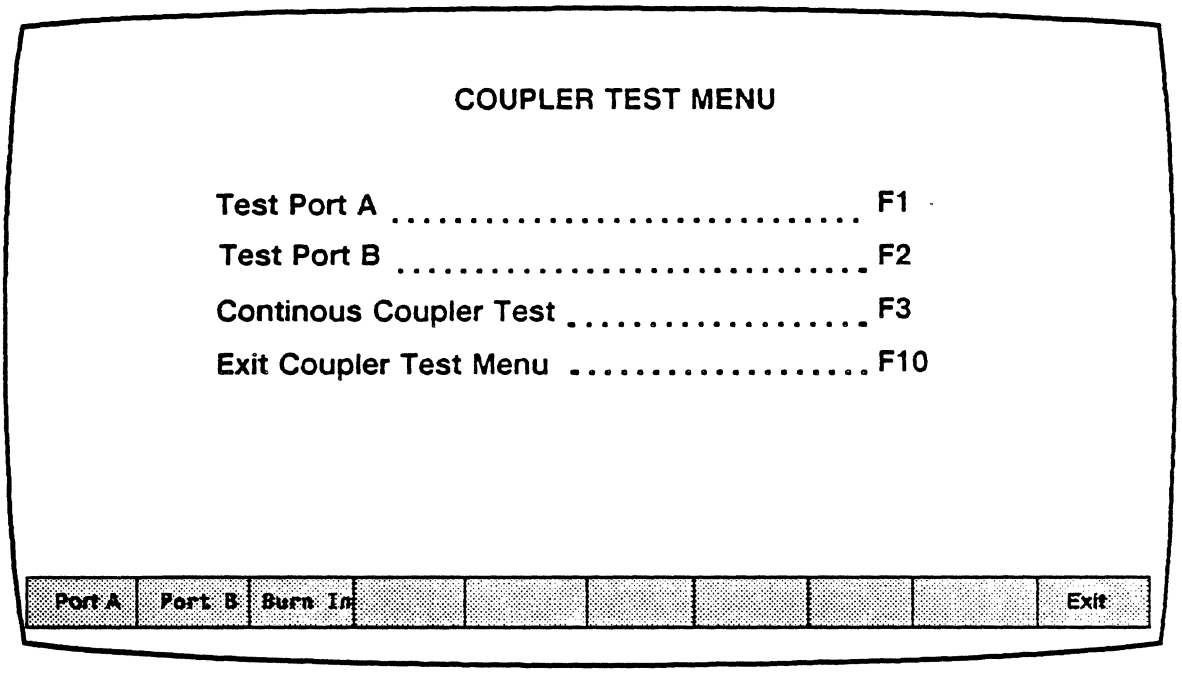


Figure 2.6: Coupler Test Menu

If you select ***F1 Port A*** or ***F2 Port B***, these tests are performed:

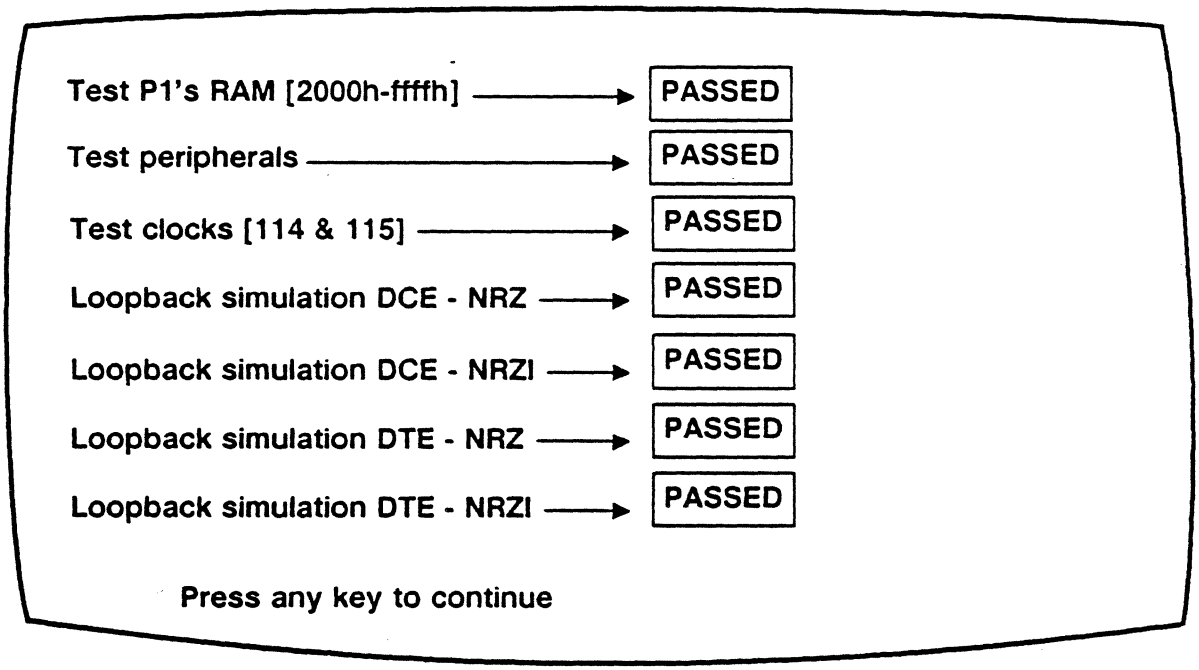


Figure 2.7: Coupler Test (Port A or Port B)

Note

While a test is running, the following message is displayed:

Test in Progress. Please Wait.

If you press any key to continue, you are returned to the Coupler Test Menu.

Error Messages

Figure 2.8 below summarizes the possible error messages for each test shown in Figure 2.7 on the previous page. P1 refers to the Chameleon Front End Processor.

TEST	ERROR MESSAGES
Test P1's RAM	No response from P1 FAILED at address *xxxxx*
Test Peripherals	No response from P1
Test Clocks [114 & 115]	No response from P1 FAILED bad 114 FAILED bad 115
Loopback simulation DCE-NRZ	No response from P1 FAILED bad reception FAILED crc error FAILED bad length FAILED bad character FAILED time-out (no reception)
Loopback simulation DCE-NRZI	No response from P1 FAILED bad reception FAILED crc error FAILED bad length FAILED bad character FAILED time-out (no reception)
Loopback simulation DTE-NRZ	No response from P1 FAILED bad reception FAILED crc error FAILED bad length FAILED bad character FAILED time-out (no reception)
Loopback simulation DTE-NRZI	No response from P1 FAILED bad reception FAILED crc error FAILED bad length FAILED bad character FAILED time-out (no reception)

Figure 2.8: Error Messages

If you press *F3 Burn In* (Continuous Coupler Test), the screen in Figure 2.9 is displayed after one full round of tests.

BURN IN TEST

	PORT A ..... PASS	PORT A ..... FAIL	PORT B ..... PASS	PORT B ..... FAIL
RAM Test	1 .	0	1	0
Peripheral Test	1 .	0	1	0
Clock Test	1 .	0	1	0
DCE NRZ Test	1 .	0	1	0
DTE NRZI Test	1 .	0	1	0
DTE NRZ Test	1 .	0	1	0
DTE NRZI Test	1 .	0	1	0

Press CANCEL to stop tests.

Figure 2.9: Burn In Test

Each test name is highlighted as the test is being performed.

When you press CANCEL to stop the Burn In Test, the following message is displayed:

Finishing current tests

followed by:

Press any key to continue

If you press any key, you are returned to the Coupler Test Menu. Press *F10 Exit* to return to the Self Test Menu.

Ram Test

If you press *F2 Ram Test*, on the Self Test Menu, the following screen is displayed:

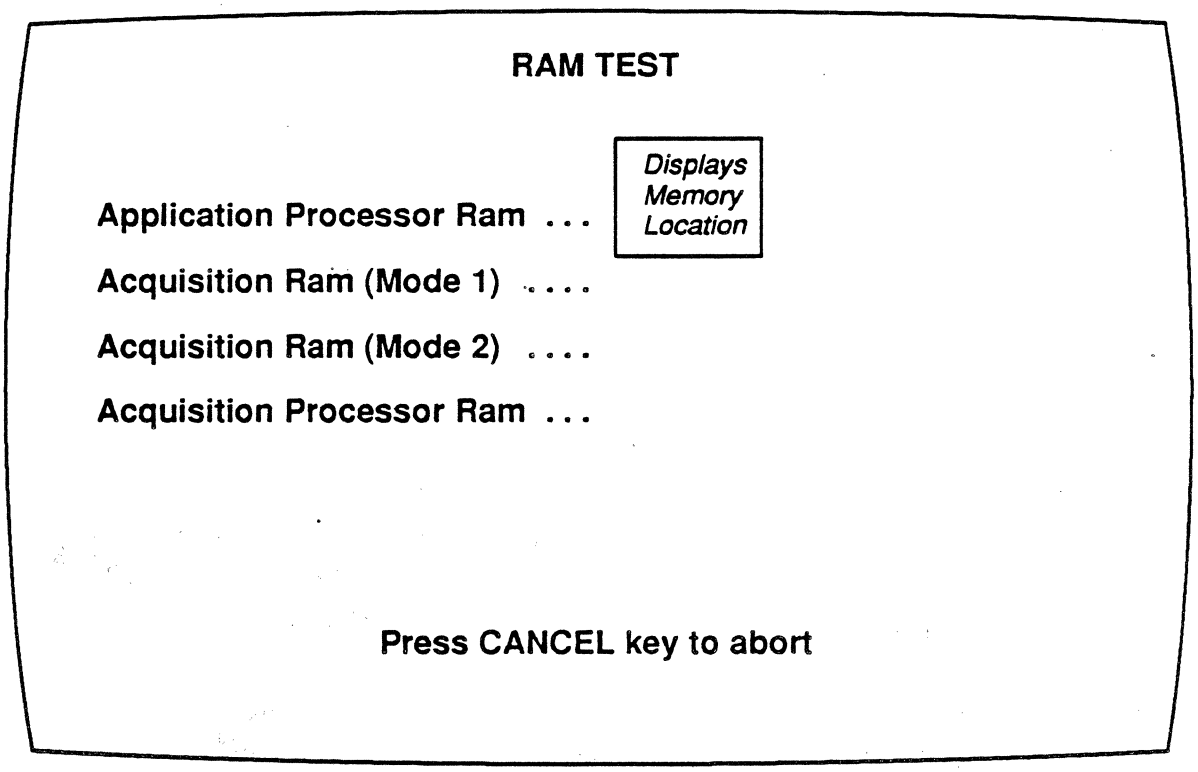


Figure 2.10: Ram Test

Pressing ***Cancel*** aborts the current test, and begins the next test. **Aborted** is displayed next to the canceled test.

If the Chameleon passes all RAM tests, the message **PASSED** is displayed.

When the last test has been completed or aborted, the following message is displayed:

PRESS ANY KEY TO CONTINUE

Pressing any key returns you to the Self Test Menu.

If errors are found, the screen displays the address and the data that was written and read.

Software Installation

Most of the software you purchase with your Chameleon 32 will be installed for you at the factory. This includes the System disks, Application disks, Analysis disks, and Simulation disks.

Optional exerciser packages and certification packages are not installed at the factory. The procedure for installing and using these packages is provided with the documentation that accompanies the package.

You should only have to install software if one of the following occurs:

- You purchase additional optional packages after you receive your Chameleon 32. If this occurs, a set of installation instructions will accompany the package.
- Tekelec releases a software update to your current software. Release notes which specify the installation procedure are always provided with software updates.
- You need to install an exerciser or certification package. As mentioned above, follow the installation instructions which accompanied the package.
- You are experiencing problems and Tekelec Customer Support recommends that you re-install one or more of your software packages. The Customer Support representative will assist you with the installation. The general procedure to follow is:

  a. Insert the Installer Disk in the floppy disk drive.

  b. Reset the Chameleon 32.

  c. The software will prompt you to format the hard disk. Generally, you will *not* format the hard disk unless instructed to do so by Release Notes or a Customer Support Representative.

     Warning! If you format the hard disk, all data on the hard disk will be erased and you will have to reinstall all your Chameleon 32 software.

  d. After responding to the format hard disk prompt, you will see the installation menu.

e. Remove the Installer Disk and press ***F1 Install***. The screen will display the following message:

Insert Disk #1 of package to be installed and press RETURN

System and application disks should be installed before any optional packages are installed.

If a package includes more than one diskette, they must be installed in order; that is Disk #1, Disk #2, Disk #3 and so on.

f. After installing the necessary packages, reset the Chameleon 32.

Note **If you have any questions, please call Tekelec Customer Support at 1-800-441-9990 (in California, call 1-818-880-5656).**

CHAPTER THREE:
USING THE CHAMELEON

Overview

This chapter describes the basic features of the Chameleon 32. It includes the following information:

- Configuration
- Keyboard description
- Screen display and manipulation

Simulation and Monitoring

The two basic task types that you can perform with the Chameleon 32 are *simulation* and *monitoring*. Figure 3.1 shows the Chameleon 32 monitoring transmissions between two remote computer systems. You might use this configuration, for instance, to check out the operation of nodes in a local area network, or to verify communication between a host and a peripheral device.

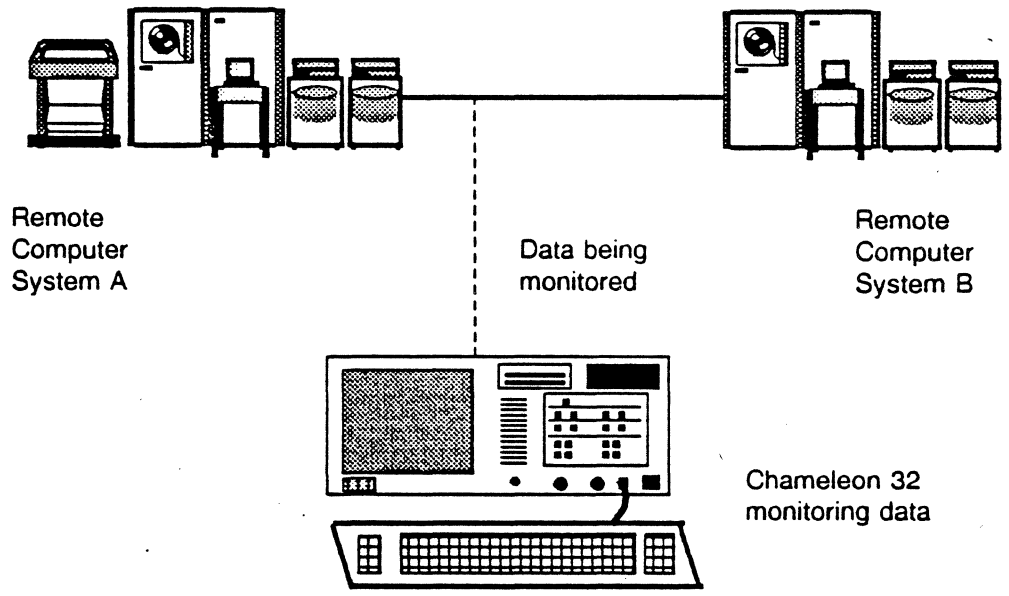


Figure 3.1: Monitoring transmissions between two remote computer systems

Figure 3.2 shows the Chameleon 32 simulating the operation of a device (cluster controller, for example) in order to test the operation of a peripheral device. Using the Chameleon 32 in this way enables you to develop, troubleshoot, or measure the performance of the device under test.

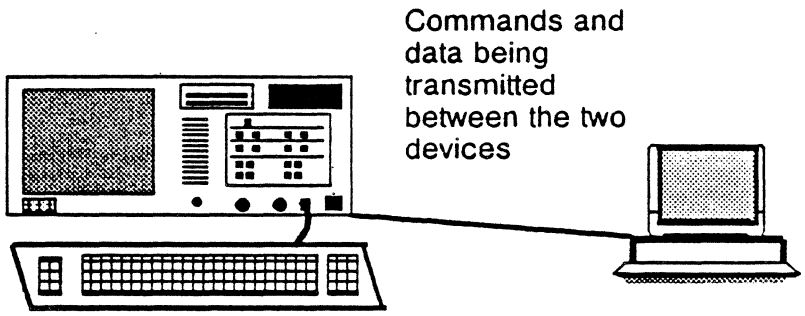


Figure 3.2: Simulating host operation to test a remote peripheral

The Chameleon 32 supports simultaneous Simulation and Monitoring on a single port, enabling you to analyze data transmitted between the Chameleon 32 and the device under test.

A Dual Port option is also available for the Chameleon 32. A Dual Port Chameleon 32 enables you to run Monitoring and/or Simulation applications on two ports simultaneously. For example, you can monitor an SNA data communications line on Port A, while running an ISDN simulation application on Port B.

Configuration Menus

When you power up the Chameleon 32, you must select a Setup Mode to configure the unit for your testing application. The first menu displayed upon power up, referred to as the Main Configuration Menu, depends on how your Chameleon 32 has been previously configured.

Figure 3.3 on the following page shows a sample Main Configuration Menu. Your screen will have one or more of the displayed parameters. A few general notes about the use of the Main Configuration Menu are given below.

Red Arrow Cursor

The red arrow is your cursor, and indicates the current parameter. The up and down arrow keys move the red arrow cursor to a specific parameter. When a parameter is selected, you can use the function keys to select a new value for that parameter.

You cannot move the red arrow cursor to the Protocol parameter. To change the protocol, you must press the ***F6 Setup*** function key.

If you have only a V-type interface installed in your machine, you cannot move the red arrow cursor to the Physical Interface parameter. *V-type* will automatically be shown as the selected Physical Interface.

Function Keys

Function keys ***F1*** - ***F5*** display the available options for the selected parameter. For example, when the red arrow cursor is pointing to *Mode of Operation*, the function key strip displays the three valid options:

- ***F1 Monitor***
- ***F2 Simulate***
- ***F3 Off***

As you move the red arrow cursor from parameter to parameter, the functions for the ***F1*** - ***F5*** softkeys change.

Function keys ***F6*** - ***F10*** perform system functions and remain constant, regardless of the selected parameter. These are described on pages 3-14 through 3-16.

The following section describes each parameter and function key of the Configuration Menu.

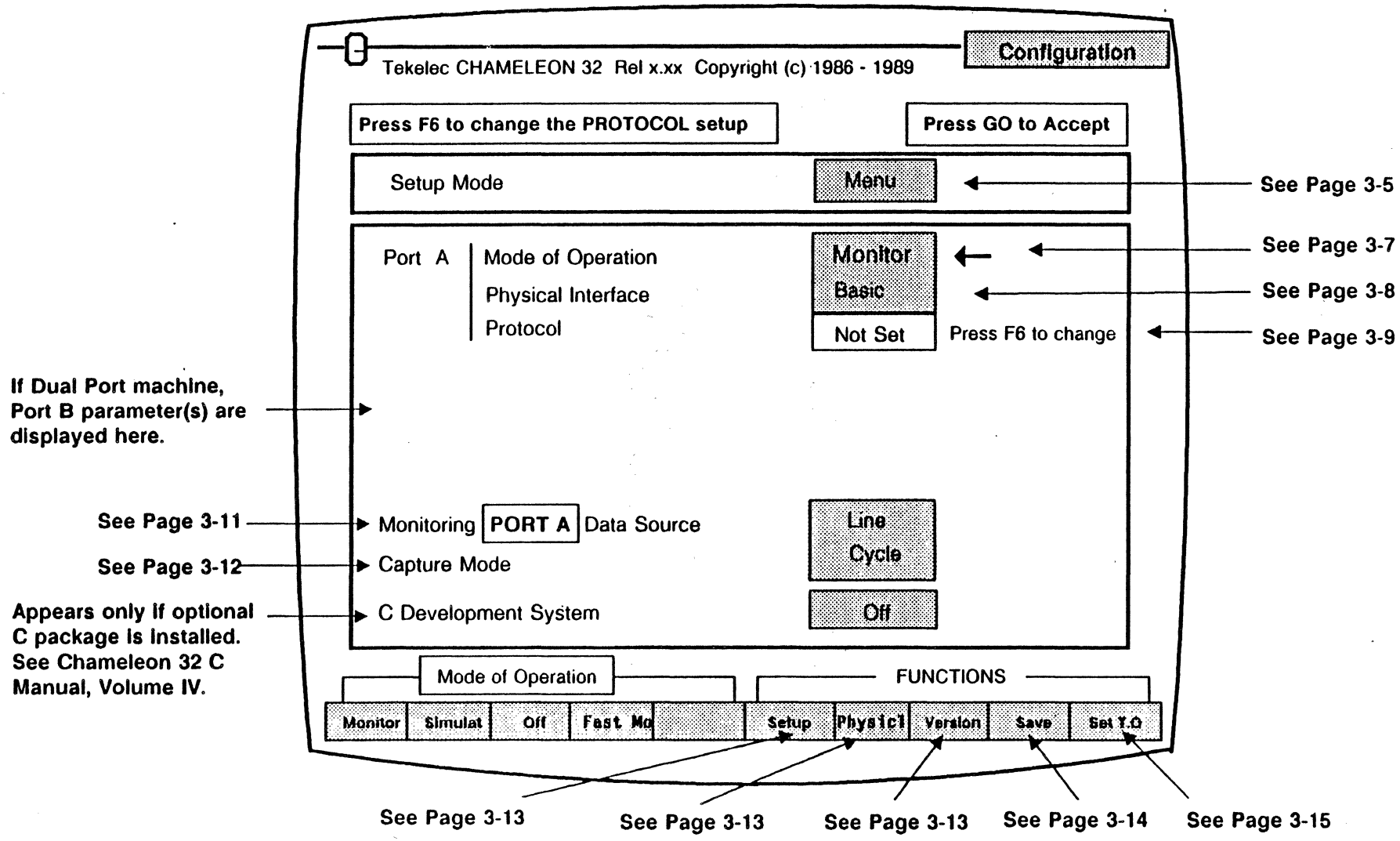


Figure 3.3: Menu Setup Mode (Single Port)

Setup Mode

The Setup Mode parameter gives you the option of manually configuring the Chameleon 32, or of using an existing configuration file, to set up the parameters necessary for your testing application. The Setup Mode options available to you depend on whether your Chameleon 32 has been previously configured.

F1 Menu

This Setup Mode option is always displayed. It enables you to manually configure the Chameleon 32. If your Chameleon 32 has never been used, it is the only Setup Mode option available to you on power up. When you press ***F1 Menu***, the configuration menu is displayed (Figure 3.3).

F2 Files

This Setup Mode option is displayed if one or more configuration files has been saved to the hard disk.

When you press ***Files***, a list of previously saved Configuration files is displayed. Figure 3.4 below shows a sample *Files* display.

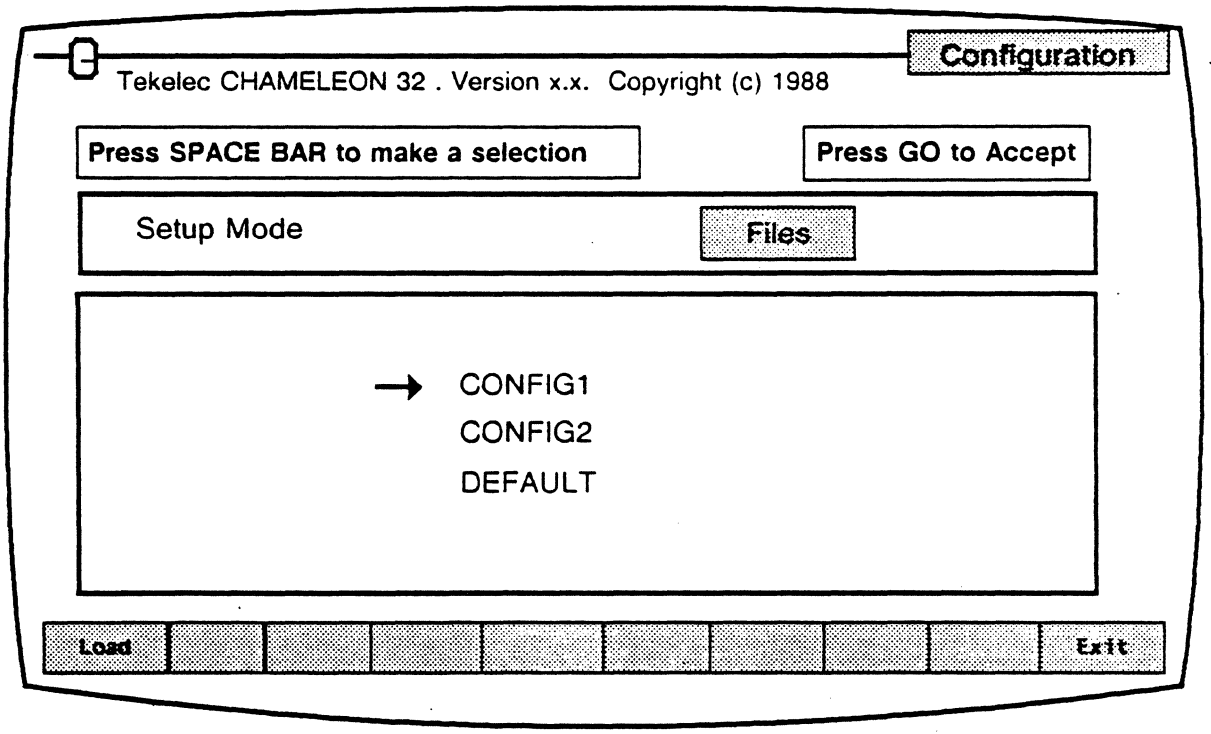


Figure 3.4: Chameleon 32 Files Display

To select a file, move the red arrow cursor to the file you want and then press one of the following keys:

F1 Load	Displays the configuration contained in that file, allowing you to modify the parameters.
F10 Exit	Returns you to the Main Configuration Menu without loading the file.
Go	Loads and executes the selected configuration file.

F3 Autexec

This Setup Mode option is displayed only if a configuration file named DEFAULT has been saved to the hard disk. DEFAULT is a special configuration file that can be automatically executed upon power up. ***F3 Autexec*** gives you direct access to the DEFAULT file after the Chameleon 32 has been powered on.

When you press ***F3 Autexec***, you have the following options:

F1 Menu	Displays the DEFAULT configuration values, enabling you to modify the parameters before executing.
Go	Loads and executes the DEFAULT configuration file.

You can also access the DEFAULT file using the ***F2 Files*** Setup Mode.

Refer to page 3-17 for a description of creating a DEFAULT file that executes on power up.

Mode of Operation

The Mode of Operation parameter specifies how you want to use the port. Depending on the software installed in your machine, you will have two or more of the following options:

F1 Monitor If selected, the Chameleon 32 passively monitors a data communications line, analyzing data being transmitted between the devices on the line. This enables you to monitor or troubleshoot, but not interfere, with the line. You can also monitor data that has been saved to disk.

F2 Simulat If selected, it enables the Chameleon 32 to simulate a specific type of device so that you can test a second device.

In Simulate mode, you can also run Monitoring applications simultaneously on a single port. This enables the Chameleon 32 to simulate a device, and simultaneously monitor the data transmitted between the Chameleon 32 and the device under test.

(See the *Chameleon 32 Simulation Manual, Volume III*, for more information about simulation.)

F3 Off If selected, this port will not be used.

F4 Fas Mo Fast Monitoring is displayed as an option for Port A on machines with the 256k acquisition option installed. When selected, traffic up to 256k bps can be acquired for Monitoring applications.

When you select Fast Monitoring on a Dual Port machine, you cannot use Port B; therefore, the message ***Busy*** appears next to the Port B parameters.

Refer to Appendix K for additional information about using the 256k acquisition option.

Physical Interface

The Physical Interface parameter allows you to select the type of physical interface you are using on the Chameleon 32. The Physical Interface function key options available to you depend on your hardware configuration.

Note If you have only a V–type interface installed in your Chameleon 32, you cannot move the red arrow cursor to this parameter.

When the red arrow cursor is pointing to the *Physical Interface* option, one or more of the following keys is displayed:

V–type If selected, you are using one of the following V–type physical interfaces:

- V.24 (RS232)
- V.35
- V.36 (RS449, RS442, RS423)

Basic Available only if the ISDN Basic Rate Interface hardware is installed on your Chameleon 32. It enables you to use the Basic Rate Interface for ISDN testing. Basic Rate Board 0 is used on Port A. (Basic Rate Board 1 is used on Port B.)

See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 12* for information on the ISDN Basic Rate Interface.

Primary Available only if the ISDN ANSI/CEPT Primary Rate Interface hardware is installed on your Chameleon 32. It enables you to use either the Primary Rate Interface or the CEPT Primary Rate Interface for ISDN testing. Primary Rate Board 0 is used on Port A. (Primary Rate Board 1 is used on Port B.)

See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 11* for information on the ISDN Primary Rate Interface.

2B1Q Available only if an ISDN Basic Rate Interface 2B1Q board (U board) and Physical Interface module are installed in your Chameleon 32. These enable you to use the 2B1Q for ISDN testing. U– Board 1 is used for Port A, or Single Port machines. U–Board 2 is used for Port B on Dual Port machines.

See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 20* for further information on this interface.

Protocol

To select a protocol, press ***F6 Setup*** to display the protocol menu.

Note

The red arrow cursor does not move to this parameter. However, you can press ***F6 Setup*** at any time while the Configuration Menu is displayed.

When you press ***F6 Setup***, a menu is displayed as shown in Figure 3.5 below. The softkey strip at the bottom of the screen gives you the current protocol options. When you press ***F9 More***, additional protocols are displayed.

When you select a protocol, additional protocol-specific parameters are displayed in the menu. The Simulation setup menus are the same as the Monitoring setup menus, except that you are not prompted for encoding (NRZ/NRZI).

In Simulation mode, this menu allows you to set up the parameters for frame decoding for the analysis applications. The Monitoring set up and Simulation set up can be different for the same port.

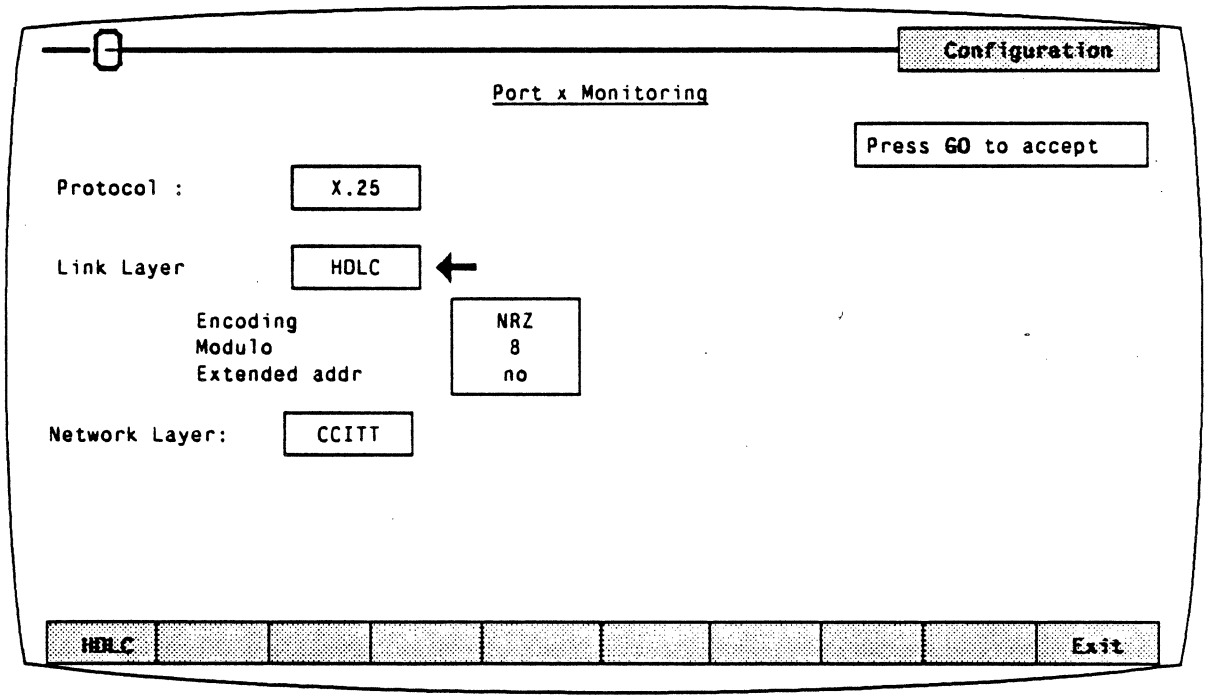


Figure 3.5: Monitor Setup Menu

The usage of this menu is consistent with other Chameleon configuration menus. Use the ***up*** and ***down*** arrow keys to move the red arrow cursor to a parameter, and then press the function key that corresponds to the desired value.

Note

If you are configuring the Chameleon for BSC Simulation, both the above menu and the BSC Simulation Set-Up menu have the SYNC parameter. The value in the Simulation Set-Up menu will override the value in the Monitoring Setup menu. For more information about Simulation Set-Up menus, refer to the *Chameleon 32 Simulation Manual, Volume III*.

When the Setup menu displays the appropriate parameters for your application, press ***Go*** to accept the displayed values and return to the Configuration menu.

To exit the menu without changing the parameters that were first displayed, press ***F10 Exit***.

Note

For a description of the protocol parameters, refer to the appropriate protocol chapter in the *Chameleon Protocol Interpretation Manual, Volume II*.

Monitoring Data Source

When a port is configured for Monitoring mode, you can specify the source of the data using the Data Source parameter. The Data Source parameter determines if you are going to monitor traffic from the line, or traffic that was previously stored to disk.

The Monitoring Data Source parameter is not displayed when Simulation is selected as the Mode of Operation.

When the red arrow cursor is pointing to the *Monitoring Data Source* parameter description, the following *Data Source* function keys are displayed:

F1 *Line* If selected, the Chameleon 32 monitors and analyzes traffic from a data communications line. This traffic can be analyzed as it is captured, or stored to disk for later analysis using the Direct-to-Disk application.

F2 Disk This option causes the Chameleon 32 to analyze traffic that has been captured using the Direct-to-Disk application, which saves data to a special area of the hard disk.

When Monitoring data from disk, the data from disk must be loaded before you start your Monitoring applications. Refer to *Chapter 6: Direct-to-Disk* for more information about the Direct-to-Disk application.

Capture Mode

As traffic is acquired, it is placed in an acquisition buffer, so that it can be processed by the Monitoring applications that are running. The acquisition buffer can contain a maximum of one megabyte of traffic at any given time. The Capture Mode parameter determines how the acquisition buffer will be used during Monitoring.

When the red arrow cursor is pointing to the *Capture Mode* parameter, the following options are displayed:

F1 Cycle When you select ***Cycle***, the acquisition buffer is cyclic. As soon as the acquisition buffer is full, the Chameleon 32 continues to acquire traffic and overwrites the oldest traffic in the buffer with newer traffic. (See Figure 3.6 below.)

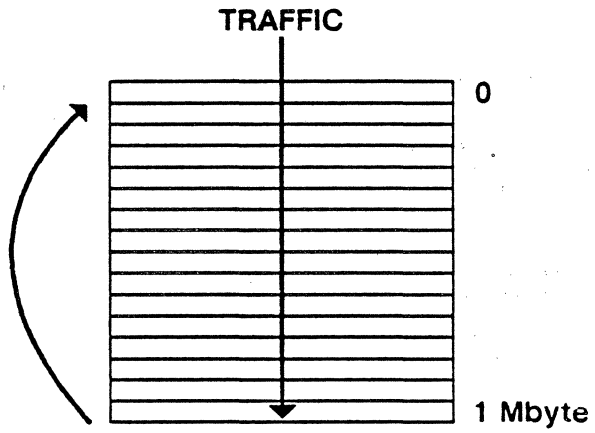


Figure 3.6: Cyclic Traffic Storage in the Acquisition Buffer

F2 1 Buffr When you select ***1 Buffr*** as the Capture Mode, acquisition halts when the buffer becomes full so that the data in the buffer is not overwritten. When this occurs, you can restart acquisition by pressing ***Run/Stop***.

Note Traffic is temporarily stored in the acquisition buffer for display only. To save data for later analysis, you must run the Direct-to-Disk application (Chapter 6). or save the acquisition buffer using the Utilities menu (Chapter 10).

You can also use the Triggering application to analyze or save selected segments of traffic. For example, you can analyze data for a specified period of time. (Refer to *Chapter Eight: Triggering* for more information on the Chameleon 32 Triggering application.)

Function Keys

This section describes the function keys in the first configuration menu.

F1 – F5

Function keys *F1 – F5* display the available options for the selected parameter. For example, when the red arrow cursor is pointing to *Mode of Operation*, the function key strip displays the three valid options:

- F1 Monitor
- F2 Simulate
- F3 Off

As you move the red arrow cursor from parameter to parameter, the functions for the *F1 – F5* softkeys change. Function keys *F6 – F10* perform system functions and remain constant, regardless of the selected parameter, as described below.

F6 Setup

The ***F6 Setup*** function key displays the menu of protocol options available. It enables you to change the protocol parameters. See page 3–9 for more information.

F7 Physicl

The ***F7 Physicl*** function key is displayed only if ***Basic*** (Basic Rate Interface), ***Primary*** (Primary Rate Interface), or ***2B1Q*** (U interface) is selected for the Physical Interface parameter. The ***F7 Physicl*** key displays a setup menu that enables you to configure the Basic Rate, Primary Rate, or 2B1Q Interface for your test application.

Refer to Chapter 11 (Basic Rate), Chapter 12 (Primary Rate) or Chapter 20 (2B1Q U–Interface) in the *Chameleon Protocol Interpretation Manual, Volume II* for more information about configuring these physical interfaces.

F8 Version

The ***F8 Version*** function key displays the version numbers of the System and Application files installed on your machine. This information may be needed if you call Tekelec Customer Service for assistance.

Press ***F1 More*** or the space bar to display the next page of files. Press ***F10 Exit*** to return to the Main Configuration Menu.

F9 Save

The *F9 Save* function key saves the currently displayed configuration values in a file. When you press *F9 Save*, you are prompted for a file name at the top of the screen. You have the following options:

F1 DEFAULT If you press *F1 DEFAULT*, the file is automatically named DEFAULT, and you are returned to the Main Configuration Menu. You can have one configuration file named DEFAULT at a time.

The DEFAULT configuration file can be accessed as follows:

- It can be automaticallly executed on power up using the Set T.O. (Timeout) option described on the next page.
- It can be loaded using the ***Files*** or ***Autexec*** Setup Mode (see pages 3–5 and 3–6 for more information).

F2 – F8 Names of previously loaded/saved configuration files are displayed in the function key strip so that you can quickly replace an existing file. To select one of these names, press the function key that corresponds to the name you want to assign to the configuration file.

Enter a name If you want to assign a new filename, you can type up to eight alphanumeric characters. After you enter the file name, press ***Return***.

Note

There is also a Save option in the Applications Selection Menu. Refer to page 3–23 for a description of this function.

The Save key appears as *F9* on the Configuration menu and as *F8* on the Applications Selection menu. The difference between these two Save keys, is as follows:

- ***F9 Save*** (available in the Configuration menu) saves only the values displayed on the current screen.
- ***F8 Save*** (available in the Applications Selection menu) saves the selected applications *and* the parameters in the Main Configuration menu.

F10 Set T.O

The ***F10 Set T.O*** (Set Timeout) function key determines if the DEFAULT configuration file will be executed automatically when the Chameleon 32 is powered on.

Note

To use this timeout value, you must save a configuration named DEFAULT with the Autoboot timer value saved as part of the DEFAULT file.

When you press ***F10 Set T.O***, the following message appears at the top of the screen:

Value of the AUTOBOOT timeout (MM:SS) >

One of the following will be displayed:

- **OFF** If OFF, the timer is not set. When the Chameleon 32 is powered on, the DEFAULT file will be loaded, but not executed.

- **(time)** If a value is displayed in the form MM:SS, it indicates that the timer is set. The displayed time indicates when the DEFAULT file will be executed after the Chameleon 32 system software is booted.

  For example, if the timer value is set to 00:30, the DEFAULT file will be loaded and executed 30 seconds after the system software is booted.

  The valid range of the Autoboot timer is 00:05 to 59:59.

When you press ***F10 Set T.O***, the ***F1*** key becomes a toggle to turn the Autoboot timer ON or OFF. If you turn the timer ON, you are prompted for a timer value. To change the value, use the ***Delete*** key to erase the current time, enter the new time, and then press ***Return***.

If the Autoboot timer is set, the following message is displayed when the system software is booted:

In xx min xx seconds the default configuration will start

When the timer expires, the DEFAULT file is automatically loaded and executed. Press any key to abort the timer and stop the execution of DEFAULT.

The following page outlines the steps necessary to create an Autobooting DEFAULT configuration file.

Creating an Autobooting DEFAULT File

To create a configuration file which automatically executes on power up, perform the following steps:

1. On the first Configuration Menu, enter the desired configuration parameters.

2. Press ***F10 Set T.O*** from either the Configuration Menu or the Applications Selection Menu.

3. If the Timer is OFF, press ***F1 ON***.

4. Press ***Delete*** to erase the current value.

5. Enter any value and press ***Return***. The valid timer range is 5 seconds to 59 minutes, 59 seconds using the format MM:SS. You must enter two digits for both the minutes and the seconds.

   For example, to set the Autoboot timer to 1 minute, 30 seconds, enter:

   01:30 ***< Return >***

6. Press ***F9 Save***.

7. Press ***F1 Default*** to save the configuration and timer value as the DEFAULT file.

   The Autoboot timer value must be saved as part of the DEFAULT configuration file.

8. To test the Autobooting feature, reset the Chameleon. When the system software is booted, the following message is displayed in the center of the Main Configuration menu:

   In xx min xx seconds the default configuration will start

   When the timer expires, the DEFAULT file is automatically loaded and executed.

   To abort the timer and stop the execution of DEFAULT, press any key.

Applications Selection Menu

When you complete the first configuration menu, press *Go*. This displays the Applications Selection Menu, as shown in Figure 3.7. The applications available will depend on which protocol(s) and mode of operation (Monitoring or Simulation) you selected in the previous menu.

The Applications Selection Menu allows you to select one or more applications, and the ports you want to run the applications on. It only displays the applications that are currently available for the selected protocol(s). Figure 3.8 lists the Monitoring and Simulation applications that are available for each protocol.

Note

User C applications (simulation or analysis) may also appear in this menu. See the next page for more information.

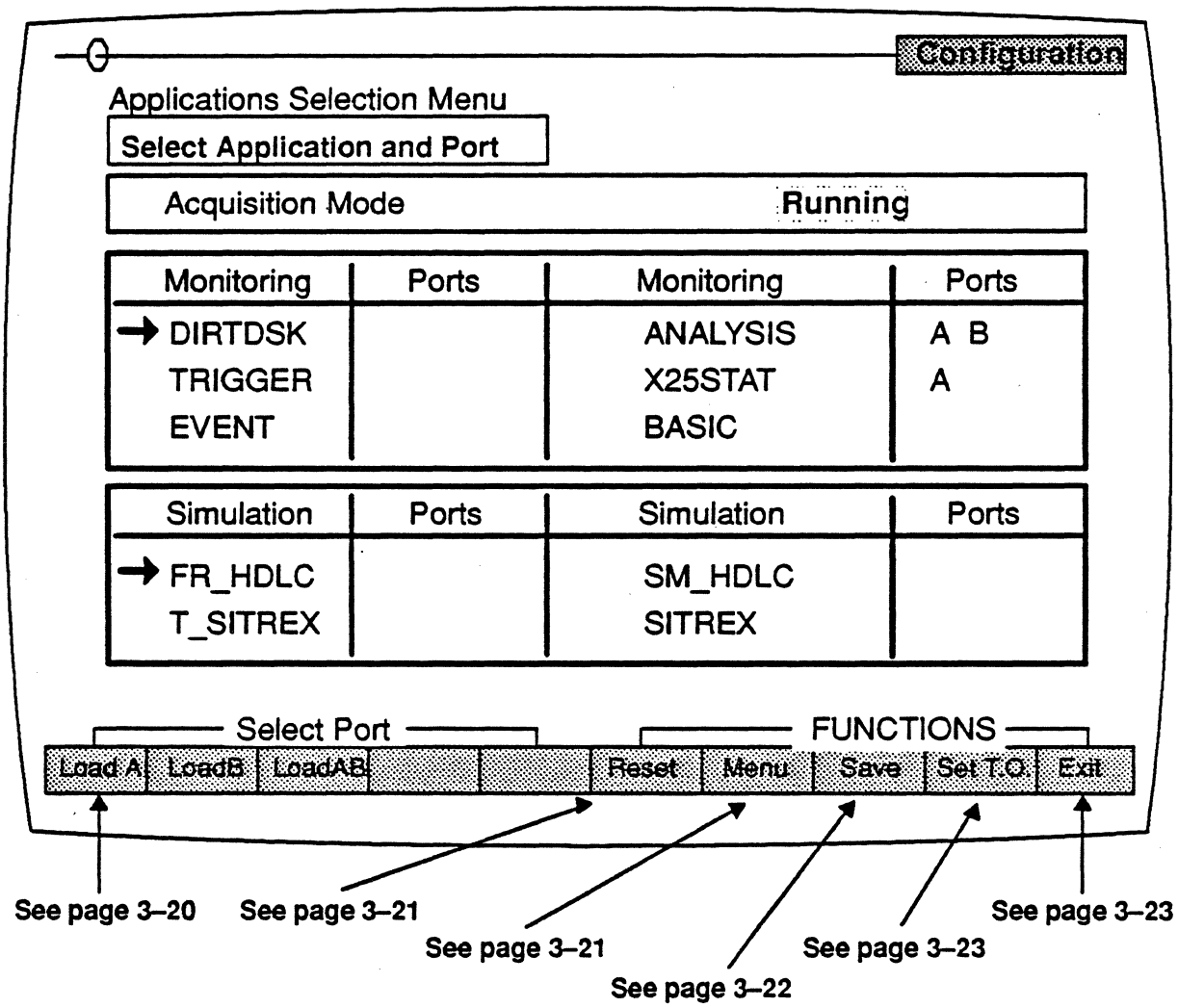


Figure 3.7: Chameleon 32 Applications Selection Menu (Simulation Mode)

In Simulate mode, you can run Monitoring and Simulation at the same time on a single port. Figure 3.7, on the previous page, shows an Applications Selection menu configured for X.25 Simulation. The general features of the Applications Selection Menu are described below.

Arrow Cursor

The red arrow cursor indicates the active window. You can select and load applications in the active window. The white arrow cursor indicates the inactive page. **Press Shift↑ or Shift↓ to change the active window.**

Up/Down Arrow

If more applications exist than can be displayed in a window, a small red arrow appears in the left border of the window. This indicates which arrow key to press to display additional applications in that window. For example, if an up arrow appears, press the up arrow key to display additional applications.

Monitoring Window

The upper window displays the Monitoring applications that are available for the selected protocol and configuration. Refer to the next page for a list of applications by protocol.

Simulation Window

The lower window (in Simulation mode) displays the Simulators available for the selected protocol. Simulators are displayed in the format **Language_protocol**. For example, SM_HDLC is SIMP/L HDLC. Refer to the Chameleon 32 Simulation Manual for a description of the Simulators.

C Applications

C applications compiled on the Chameleon 32 can be started from the Applications Selection menu, if the executable C file conforms to the following:

- The file has the extension **.exe**.
- The file is copied to one of the directories below (*xxxx* is a protocol sub–directory of *analysis* or *simul*):

  a:\tekelec\analysis*xxxx*
  a:tekelec\simul*xxxx*

The directory determines when the application will be displayed in the Applications Selection menu. For example, if the application resides in *a:\tekelec\analysis\appl*, it is displayed in the Monitoring window for all protocols. Only applications copied to *a:\tekelec\analysis\appl* can be started on Ports A+B on Dual Port machines. C applications in all other directories must be stored on each port independently. If the application resides in *a:\tekelec\analysis\x25*, it is displayed in the Monitoring window only when X.25 is the selected protocol. If the application resides in *a:tekelec\simul*, the application appears in the Simulation window for all protocols.

Note:

Direct–to–Disk and Direct–from–Disk are available for all protocols. Triggering is available for all protocols except Async, which provides interface lead triggering only. If Triggering is listed in the

table below, it indicates that there are protocol–specific triggering capabilities for that protocol. Several packages listed below are optional.

PROTOCOL	APPLICATIONS AVAILABLE		
	MONITORING	BASIC SIMULATOR	C PACKAGE
Async	Analysis, Dual Line	Chameleon Async	Async & Analysis Library
Basic Rate Interface	BASIC Runtime display		BRI Library
BSC	Analysis, Statistics, Dual Line	Chameleon BSC	BSC & Analysis Library
DASS 2	Analysis, Dual Line, Triggering		BOP & Analysis Library
DDCMP	Analysis, Dual Line		BOP & Analysis Library
DMI	Analysis, Dual Line	FRAMEM DMI	BOP & Analysis Library
DPNSS	Analysis, Dual Line		BOP & Analysis Library
ISDN	Analysis, Dual Line,	FRAMEM LAPD, SIMP/L	LAPD & Analysis Library
(Q.921/Q.931)	Statistics, Triggering	LAPD, Multi–Link LAPD	
Primary Rate Interface	PRIMARY Runtime display, Error Statistics		PRI Library
PSH	Analysis, Dual Line		BOP & Analysis Library
QLLC	Analysis, Dual Line		BOP & Analysis Library
SNA/SDLC	Analysis, Statistics, Dual Line, Triggering	FRAMEM SDLC, SIMP/L SDLC	SDLC & Analysis Library
SS7	Analysis, Dual Line, Statistics, Triggering		SS#7 Simulator
V.120	Analysis, Dual Line	V.120 SIMP/L	BOP & Analysis Library
X.25/HDLC	Analysis, Statistics, Dual Line, Triggering	FRAMEM HDLC, SIMP/L HDLC, SITREX, T. SITREX	HDLC & Analysis Library
X.75	Analysis, Dual Line		BOP & Analysis Library
2B1Q	Analysis, Statistics, 2B1Q Runtime		U–Interface Library

Figure 3.8: Chameleon 32 Applications

Applications Selection Menu Function Keys

The function key options for the Applications Selection Menu are described in this section.

F1 Load/Stop A

This option enables you to load an application that you want to run on Port A. To load an application, do the following:

1. Move the red cursor arrow next to the application name.
2. Press ***F1 Load A*** to load the application.
3. A blinking ***A*** appears in the *Ports* column as the application loads. When the letter stops blinking, the application is loaded. (Note that the ***F1*** key reads ***Stop A*** when an application is loaded. See step 7 for more information about Stop A.)
4. Load additional applications by repeating steps 1–3.
5. When you have loaded all the applications, press ***Go.***
6. This starts the applications, as indicated by the appearance of page banners at the bottom of the screen.

   Note: Direct–To–Disk does not have a page or banner.

7. When an application is loaded, the ***F1*** key becomes the ***Stop A*** key. This key has two functions:

   - If an application is loaded (but not running), and you press ***F1 Stop A***, that application will not run when you press ***Go.*** When you press ***F1 Stop A***, the letter ***A*** disappears from the *Ports* column, as though the application were never loaded.
   - If an application is running, and you press ***F1 Stop A***, it stops the application. To restart the application, you must first load it, and then press ***Go. F1 Stop A*** stops an individual application. Refer to ***F10 Exit*** and ***F6 Reset*** for additional options.

If you have a Dual Port machine, you may also have function keys for loading applications on Port B and Ports AB (Ports A and B shown on a single page display). Refer to page 3–28 for a description of those keys.

F6 Reset

This option affects all applications that are currently running. If you are using a Dual Port machine, it affects both ports. If you press ***F6 Reset*** it restarts the applications that are running, by doing the following:

- In **Analysis**, it clears the History buffer and clears the History and Real Time page displays.
- In **Statistics**, it resets all Statistics page values to zero.
- In **Triggering**, it resets all triggers.
- In **Direct-From-Disk** it replays the data in the direct-to-disk area of the hard disk from the beginning.

F7 Menu

When you press ***F7 Menu***, you return to the first configuration menu shown on page 3-5. This enables you to view your current setup, but does not allow you to change the setup of a port that has applications running.

If a setup cannot be changed, the port will display the message ***busy*** next to the Mode of Operation.

For example, on a Dual Port machine, if you have applications running on Port A, but Port B is off, you cannot change the Port A parameters, but you can set up Port B and start applications. To change parameters on a port with applications running, you must stop all applications before changing the configuration (see ***F10 Exit*** on the page 3-24).

F8 Save

This option saves the current configuration to a file. When you press ***F8 Save*** it saves the loaded applications and the parameter values on the first configuration page.

When you press ***F8 Save***, you are prompted for the name of the configuration file. You have the following options:

F1 DEFAULT If you press ***F1 DEFAULT***, the file is automatically named DEFAULT, and you are returned to the Applications Selection menu. You can have one configuration file named DEFAULT at a time.

The DEFAULT configuration file can be accessed as follows:

- It can be automatically executed on power up using the Set T.O. (Timeout) option described on the next page.
- It can be loaded using the ***Files*** or ***Autexec*** Setup Mode (see page 3-6 for more information).

F2 - F8 Names of previously loaded/saved configuration files are displayed in the function key strip so that you can quickly replace an existing file.

Enter a name If you want to assign a new filename, you can type up to eight alphanumeric characters. After you enter the file name, press ***Return***.

Note

There is also a Save option in the first configuration menu Menu. Refer to page 3-15 for a description of this function.

The Save key appears as ***F9*** on the Configuration menu and as ***F8*** on the Applications Selection menu. The difference between these two Save keys, is as follows:

- ***F9 Save*** saves only the values displayed on the current screen.
- ***F8 Save*** saves the selected applications *and* the parameters on the first configuration page.

F9 Set T.O

The Set Time Out function is the same as the ***F10 Set T.O*** function described on page 3-16. It determines whether the DEFAULT configuration file is automatically executed when the machine is powered on.

F10 Exit

This option stops all applications that are currently running. To stop an individual application, use ***F1 Stop A***. For Dual Port machines, you can also use ***F2 Stop B***, or ***F3 Stop AB*** function keys to stop an application on the selected port(s).

To restart an application once it is stopped, first load the application, and then press ***Go***.

You can also use ***F6 Reset*** to restart all applications without first stopping them.

Acquisition

Acquisition from the line (in cyclic Capture Mode), or from disk, starts when the Applications Selection Menu is displayed. This is indicated by the message:

```
Running
```

To stop acquisition, press ***Run/Stop***. This is indicated by the message:

```
Acquisition Stopped
```

Acquisition from the line (using one buffer Capture Mode) displays the message sequence:

```
Buffer Full
Acquisition Stopped
```

Acquisition is automatically stopped so that you can load applications before capturing data. To start acquisition, press ***Run/Stop***.

Stopping Applications

To stop a single application, perform the following steps:

1. Select the Configuration banner.
2. Move the red arrow cursor to the desired application.
3. Press the function key that *stops* the application on the desired port. For example, on a Single Port machine, press ***F1 Stop A*** to stop the selected application.
4. Stop additional applications, if desired.
5. The banners of the stopped applications disappear from the screen.

To stop all applications, perform the following steps:

1. Select the Configuration banner.
2. Press ***F10 Exit***. This stops all applications. You can then change configuration parameters for the port, or select other applications.

Time Stamping

The Chameleon real-time clock provides time stamping of data events for Monitoring applications. The time stamp clock's resolution is ±20 microseconds and represents the time at the end of the event.

Dual Port on the Chameleon 32

The Chameleon 32 Dual Port system allows you to use two ports to run multiple Monitoring and/or Simulation applications simultaneously. Each physical port provides independent Monitoring or Simulation, with a line rate of up to 64Kbps. In addition, on Dual Port machines you have the option of selecting Fast Monitoring mode which enables you to monitor traffic up to 256k bps on one port.

The Dual Port system gives you access to a variety of testing applications. Each port can perform independently, providing multiple interface configurations, using a combination of any two interface options that are currently available for the Chameleon. For example, Port A could be fitted with a V.35 interface and Port B with a Basic Rate Interface.

With the Chameleon 32's unique page format, you can view the activity of both ports on separate display pages and interrelate events. If both ports are running the same application, you can display the results of both ports on the same page. The LED display can be switched between the ports for physical interface monitoring.

Configuring and using a Dual Port machine is similar to using a Single Port machine. However, the Dual Port system does provide multiple interface configurations, making it somewhat more complex than the Single Port machine. The additional information you need to know is contained in this section.

Configuration Menu

The Dual Port Configuration Menu (Figure 3.9) has additional parameters and display features which enable you to:

- Configure the second port (Port B)
- Select 256k data capture mode (Fast Monitoring)
- Control the front panel LED display

Port B Configuration

The Chameleon 32 recognizes the number of ports available on your system. On Dual Port machines, this causes the Configuration Menu to display parameters that enable you to configure Port B. With a Dual Port machine, you can configure the Chameleon 32 ports for the following applications:

- Simultaneous monitoring on both ports
- Simultaneous simulation on both ports
- Monitoring on one port, simulation on the other port

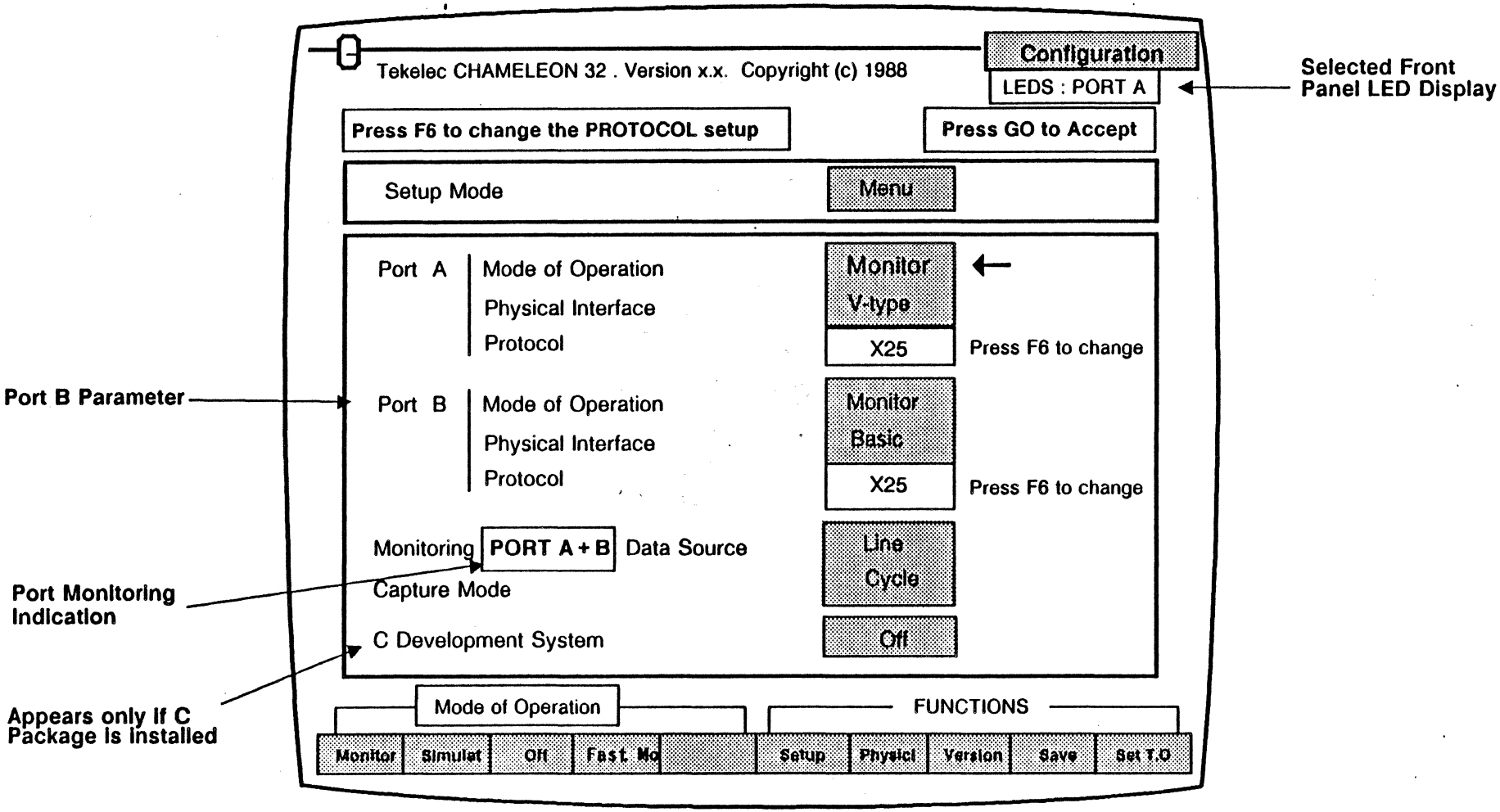


Figure 3.9: Sample Dual Port Configuration Menu

On a Dual Port machine, when a port is configured for Simulation, you can simultaneously run Monitoring applications on the same port to analyze the data being transmitted between the Chameleon 32 and the device under test.

256k Data Capture Mode (Fast Monitoring)

When Monitoring is the selected Mode of Operation, the Chameleon can monitor up to 64k bps with dense traffic (one flag between frames). On Dual Port machines, you have the option of selecting ***F4 Fast Mo*** (Fast Monitoring) as the Mode of Operation for Port A. When selected, traffic up to 256k bps can be acquired for Monitoring applications.

When you select Fast Monitoring, you cannot use Port B; therefore, the message ***Busy*** appears next to the Port B parameters.

Refer to Appendix K for additional information about using the 256k data capture option.

LED Display

Although there are two physical ports, the Chameleon 32s LED panel can display the state of only one port at a time. The LED display message at the top, right-hand corner of the Configuration Menu indicates which port's leads are currently being displayed on the LED panel. For example, if the message is **LEDS: PORTS A**, the front LED panel is displaying the state of the leads on Port A.

To change the LED display, press the letter **A** or **B** to display the leads of the desired port. For example, to display the leads for Port B, press the letter **B**. The LED display message on the Configuration page changes to: **LEDS: PORT B**, and the LED front panel displays the Port B leads.

Dual Port Protocol Selection

When both ports are configured for use, a configuration page is available for each port. This enables you to select the Monitoring protocol or Simulator for each port independently. For example, if both ports are configured for Monitoring, when you press ***F6 Setup***, two protocol pages are displayed so that you can select a protocol for each port.

Applications Selection Menu

The Applications Selection menu provides the same functions as the Single Port machine, except that you have the following options for loading applications:

F1 Load A Loads the selected application for Port A. When the application is started, information for Port A is shown in its own page.

F2 Load B If Port B is configured for Monitoring or Simulation, ***F2*** loads applications for that port. It functions the same as the ***F1 Load A*** key described on page 3-20. Once an application is loaded ***F2*** changes to ***Stop B*** so that you can stop the application.

F3 Load AB ***F3 Load AB*** loads an application for both ports, using a single page to display the information for both Ports. The ***Load AB*** option is available only for non-protocol-specific Monitoring applications. See additional limitations below.

To run the same application on both ports with a separate page display for each port, load the application for each port separately, using ***F1 Load A*** and ***F2 Load B***. Once an application is loaded ***F3*** changes to ***Stop AB*** so that you can stop the application.

When you move the arrow cursor from application to application, the ***F1 Load A***, ***F2 Load B***, and ***F3 Load AB*** functions keys are enabled only for the applications available for that protocol.

For example, if Port A is configured for X.25 Monitoring and Port B is configured for BSC Monitoring, when the arrow cursor is positioned on an X.25 application (such as X.25 Statistics), only ***F1 Load A*** is enabled. In other words, you do not have the option of loading an X.25 application for a port configured for BSC Monitoring.

Limitations

Only two copies of an application can be running simultaneously. For example, you can run Analysis on Ports A and B independently, but not on Ports A, B, and AB.

Only one copy of Triggering and Direct-to-Disk can be run at a time.

When you have loaded your applications, press **Go** to start them. This starts the applications, as indicated by the appearance of page banners at the bottom of the page.

Figure 3.10 shows an example display with both ports configured for ISDN monitoring. The page banners indicate the ports for which an application is running,using the letters ***A***, ***B*** or ***AB*** in the banner name.

In the example below, the following applications are running:

- Dual Line on Port B
- Q.921 Statistics on Port A and Port B on separate pages
- Analysis (Real Time and History) on Port A and B, together on a single page

Note that the LEDs for Port A are currently displayed in the LED panel, as indicated by the message in the upper right corner of the page.

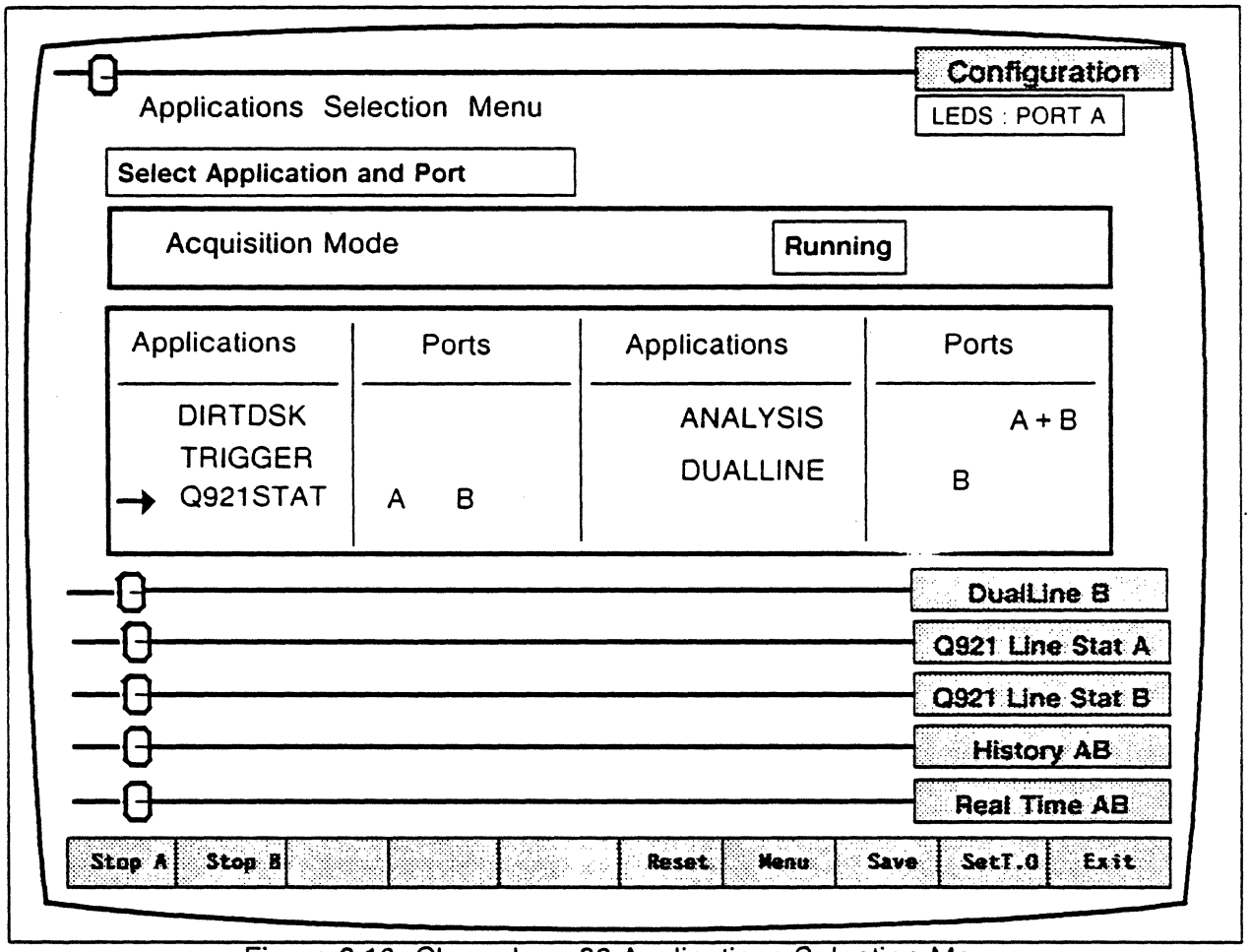


Figure 3.10: Chameleon 32 Applications Selection Menu

Time Stamping

With a Dual Port Chameleon 32, the port's time stamp clocks will only be synchronized if Monitoring is initiated on both ports at the same time. If Monitoring is started on one port after the other port has been started, the Analysis time stamp may differ by up to 10 milliseconds.

To synchronize the time stamps of both ports, press the ***Run/Stop*** key. This will allow comparative measurements between the ports to within the time stamp clock's minimum resolution (plus or minus 20 micro-seconds).

Acquisition starts 1.5 seconds after you press ***Run***.

Chameleon 32 Pages

Each Chameleon 32 application has unique pages, or windows, that display information and menus. When you run more than one application simultaneously, you have access to the pages of each of the running applications.

The paging concept is analogous to having a stack of papers on your desk. The stack of papers may contain memos, reports, and messages, but you can have access to all the information in the stack by moving the item you want to the top of the stack. By shuffling papers, you can easily put them in a different order, or scan for information.

Each of the following Chameleon 32 tasks has a dedicated page:

- Monitoring applications
  - History
  - Real Time
  - Dual Line
  - Triggering
  - Statistics
- Simulation applications
- Utilities Menu
- File Management Menu
- Configuration Menus

Each page is composed of a standard screen, keyboard, and set of softkeys.

Multiple Pages

Each application that is running has its own page. The top line of each page displays that page's name. You can position individual pages on the Chameleon 32 screen so that you can see several pages at once. The pages are displayed in various colors to help you differentiate them on the screen. There is no limit to the number of overlapping pages that you can display simultaneously.

Figure 3.11 on the following page illustrates how the Chameleon 32 screen appears with four pages displayed. The name of the page is displayed in the upper right corner (*banner*) of the page.

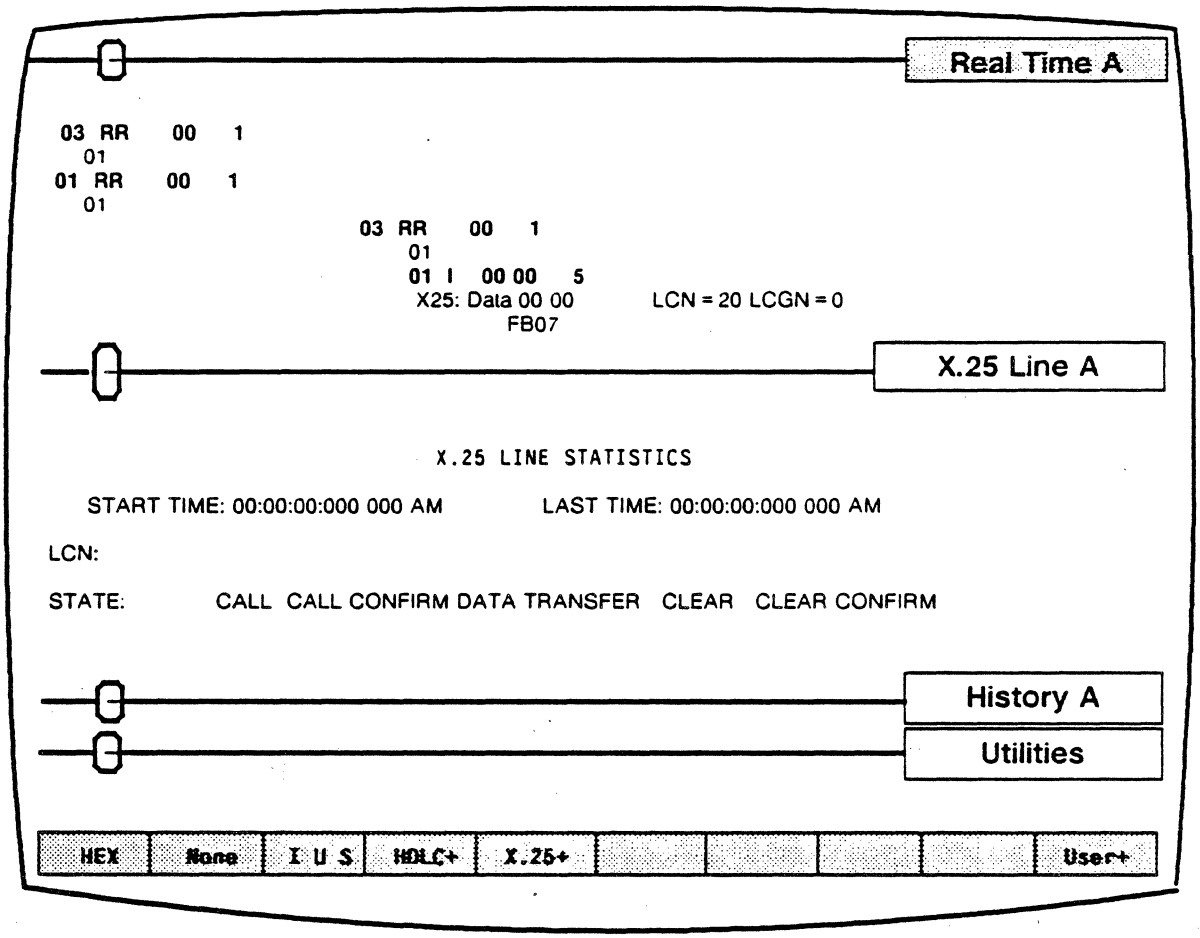


Figure 3.11: Sample Screen Display

The Active Page

Although you can view multiple pages simultaneously, you can access the menu and function keys of only one page at a time. The active page is displayed with a highlighted banner, and its available function keys at the bottom of the screen. In Figure 3.11, the *Real Time* page is active.

To select a page, press the ***Select*** key. Each time you press the key, the page banner for the next page in the sequence is highlighted, indicating that the page has become active. When a page is active, you can use the function keys displayed at the bottom of the screen.

Refer to page 3-37 for a complete description of the Chameleon 32 page manipulation keys.

Chameleon 32 Keyboard

The Chameleon 32 comes with a custom designed keyboard, which includes dedicated key functions and programmable or soft function keys (Figure 3.12).

Note

To remove the keyboard from the Chameleon, disconnect the keyboard cable at the Chameleon front panel. The cable connection on the keyboard itself is considered factory installed, and should not be disconnected.

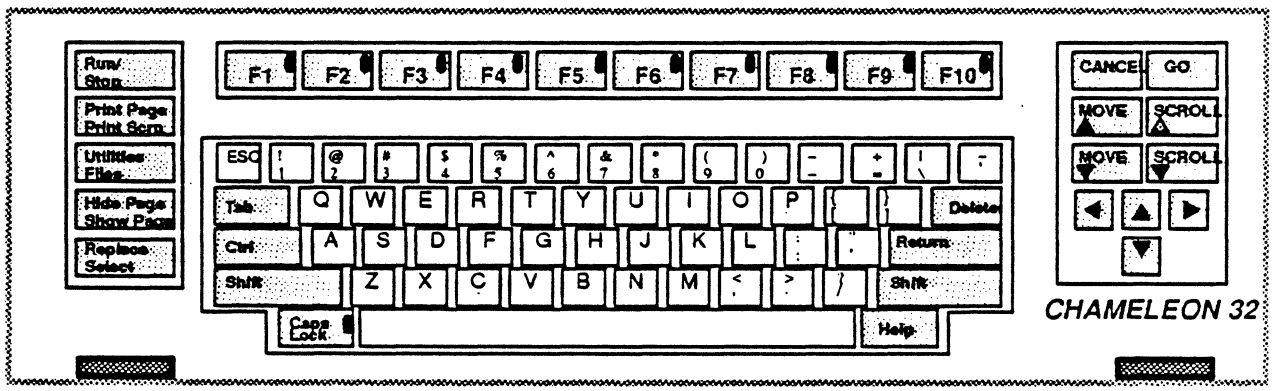


Figure 3.12: The Chameleon 32 Keyboard

Dedicated Key Functions

The Chameleon 32 keyboard provides dedicated keys. These keys function the same regardless of the application you are running.

There are five dedicated keys on the left side of the keyboard. Each of these keys is labeled with two functions. The lower function is executed when you press the key by itself. The upper function is executed when you hold down ***Shift*** and press the dedicated key. These keys are described on the following page.

Left–Hand Keys

Run/Stop Starts/stops acquisition of traffic in Monitoring Mode. (The Shift key has no effect.) When you stop acquisition, the Chameleon 32 beeps, and the message *Acquisition Stopped* is displayed on the Application Selection menu.

Shift Print Page Prints the currently active page.
Print Scrn Prints the current screen if there is a page banner on–screen. If there is no page banner on–screen, there will be no printout.

Shift Utilities Invokes the Utilities page.
Files Invokes the File Management page.

Shift Hide Page Causes the active page to be hidden from view. The application is still running, but you cannot see its page.

Show Page Causes a hidden page to be shown on top of the active page. If the active page is only one line, you need to enlarge the page size before the Show Page function will work.

Shift Replace Replaces the active page with a hidden one. (See ***Shift Hide Page*** above.) You can toggle between all currently displayed pages.

Select Selects which page on the screen is the active page.

Right-Hand Keys

There are ten dedicated keys on the right side of the keyboard.

Cancel Clears error messages, and is used by certain applications to cancel user input.

Go Accepts user input.

Move ↑ Slides the active page up over the other displayed pages.

Shift Move ↑ fills the entire screen with the active page. Pressing ***Shift Move*** ↑ again restores the pages you were displaying.

Move ↓ Slides the active page down over the other displayed pages.

Scroll ↑ Scrolls the text within the active page up.

Shift Scroll ↑ scrolls the text within the active page up the same number of lines as the current page size.

Scroll ↓ Scrolls the text within the active page down.

Shift Scroll ↓ scrolls the text within the active page down the same number of lines as the current page size.

Arrow Keys

There are four arrow keys located on the right side of the Chameleon 32 keyboard.

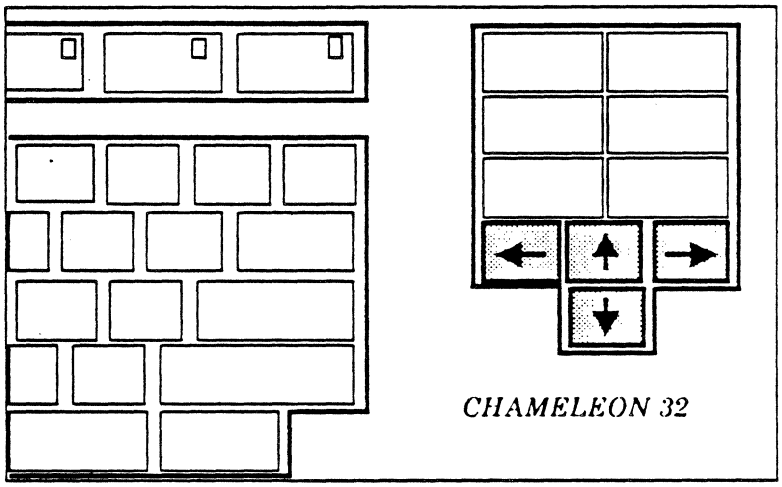


Figure 3.13: Arrows Keys

The arrows keys are application specific. For example, when at the Protocol Setup Menu:

- Pressing the ← key moves the red cursor arrow directly to the top option field.
- Pressing the → key, moves the red cursor arrow to the currently displayed bottom option field.
- Pressing the ↓ key moves the red arrow cursor to the next available option field.
- Pressing the ↑ key, moves the red arrow cursor to the previously available option field.

ASCII Keys

On the front edge of each letter key is a blue function. This label is the mnemonic of the ASCII Control function accessed by that key.

The ASCII functions are used only when the Chameleon 32 is being used for terminal emulation. The functions are accessed by pressing ***Ctrl*** plus the desired key.

For more information about using the Chameleon 32 for terminal emulation, refer to Chapter 9: Utilities.

Page Manipulation

Although you can display multiple pages simultaneously, you can access the menu and function keys of only one page at a time. The following dedicated keys enable you to manipulate the pages for the currently running applications.

- ***Select***
- ***Replace***
- ***Move*** ↑
- ***Move*** ↓
- ***Hide Page***
- ***Show Page***

Select enables you to select the active page. Each time you press ***Select***, the next page banner is highlighted. When a page is active, you can then use the associated function keys, which are displayed at the bottom of the screen.

Shift Hide Page hides the active page without stopping the application. The banner disappears from the screen, but the application continues to run.

Show Page displays hidden pages. If more than one page is hidden, you must press ***Show Page*** once for each hidden page. If the active page is only one line, you need to enlarge the page size before the Show Page function will work.

Shift Replace replaces the active page with a hidden one. When you press ***Shift Replace***, the active page is hidden, and the next hidden page is displayed and becomes the active page.

When you are running multiple applications, it is usually more convenient to view one complete page at a time without other pages or banners on the screen. One way to do this is to use ***Shift Hide Page*** to hide all pages but one. You can then toggle through each hidden page, displaying one at a time, using ***Shift Replace***.

When you have several pages/banners displayed, you can change the size of the active page using the ***Move*** keys. ***Move*** ↑ displays more of the active page each time you press the key. ***Move*** ↓ displays less of the active page each time you press the key. Each time you press one of these keys, the active page moves up or down one line.

Shift Move ↑ displays the active page in a special full-screen mode (BLOW MODE). When in BLOW MODE, the letter B is displayed in the upper left-hand corner of the page banner. You cannot access any other pages while a page is displayed in BLOW MODE. Pressing ***Shift Move*** ↑ again returns the screen to its former condition, disabling BLOW MODE.

On-Line Help

To receive On-Line Help for any menu, press the ***Help*** key. The screen below shows Help information for File Management.

Pressing the *space bar* returns you to the current application.

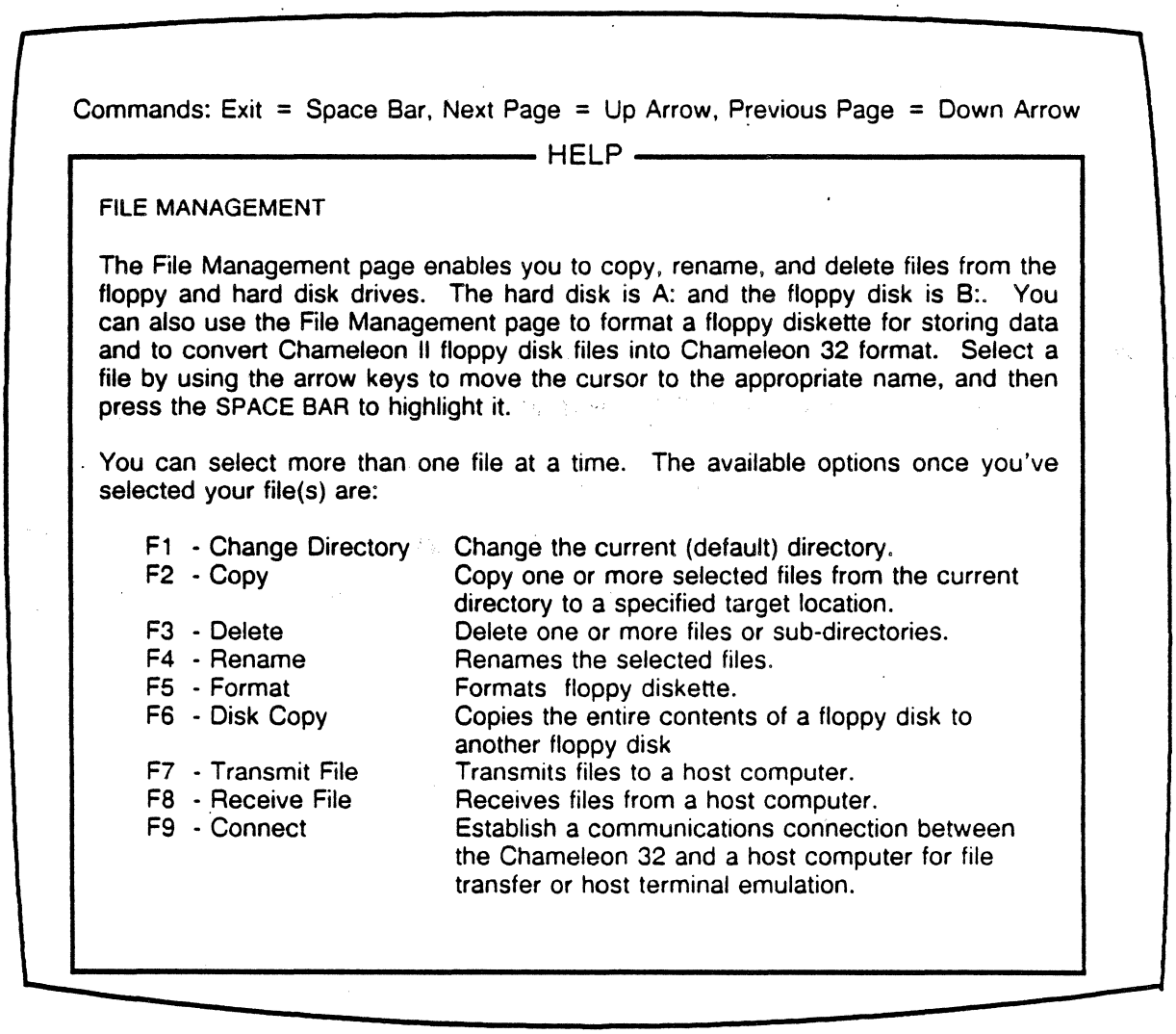


Figure 3.14: Chameleon 32 Help Facility

Soft Function Keys

Each application has a specific set of softkeys corresponding to the ten function keys along the top of the keyboard. The light in the upper right-hand corner of each function key indicates which keys are enabled for the active page.

The keys' functions are displayed in a strip along the bottom of the screen. This strip changes as the active page changes. (See Figure 3.15 below.)

The function keys are fully programmable in Chameleon BASIC and C. The *Chameleon 32 Simulation Manual, Volume III* contains a complete description of Chameleon BASIC and of programming of the function keys. Information about the C Development System can be found in the *Chameleon 32 C Manual, Volume IV*.

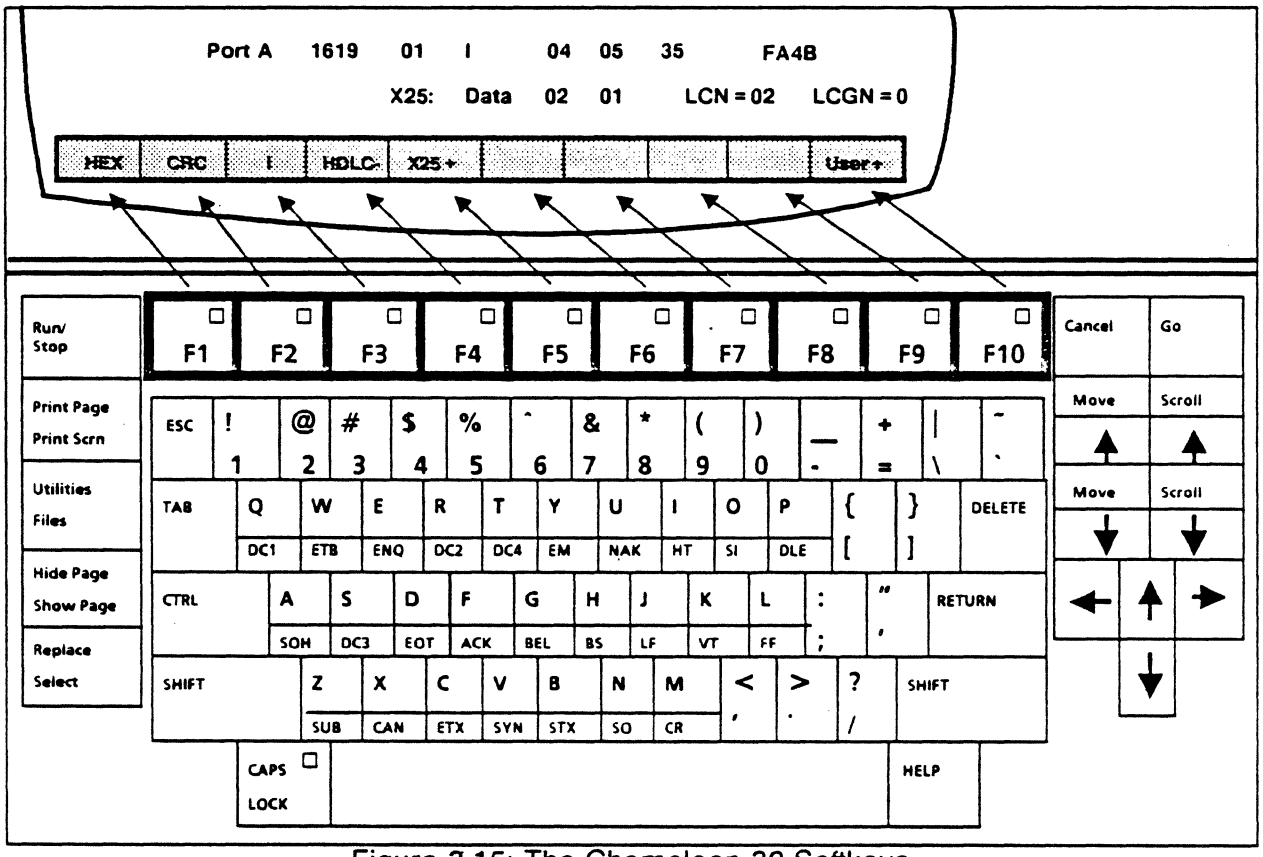


Figure 3.15: The Chameleon 32 Softkeys

CHAPTER FOUR:
ANALYSIS

Starting Analysis

To start the Analysis application, select **ANALYSIS** from the Applications Selection menu. The only exception to this is SS#7 Analysis. To start SS#7 Analysis, select **SS7ANAL** from the Applications Selection menu.

Analysis Applications

The Analysis application has two page displays: Real Time and History. The display format is the same for both pages; however, the pages are used for different purposes.

The **Real Time page** displays traffic from both sides of the line *as it is acquired*. There is a continuous display of traffic on the screen as the data is acquired.

The **History page** displays traffic that has been acquired and put in a history buffer. You can move back and forth through the data in the buffer to display specific parts of it, independent of line activity.

This chapter describes the general features of the two Analysis pages. To interpret protocol-specific information, refer to the appropriate protocol in the *Chameleon Protocol Interpretation Manual, Volume II*.

Saving Data

There are three methods for saving Analysis data to disk:

- You can save data as it is acquired using the Direct-to-Disk application, described in Chapter 6. This type of file ***can*** be replayed and analyzed by the Monitoring applications.
- You can save the contents of the acquisition buffer using the Traffic Load/Save option in the Utilities menu. This type of file ***can*** be replayed and analyzed by the Monitoring applications. Refer to page 9-13 for more information.
- You can output a specified range of events to a printer or an ASCII file using the History Print feature (Ctrl P), described on page 4-11. This type of file ***cannot*** be replayed and analyzed by the Monitoring applications.

However, this option saves the data in a format that can be accessed using the Chameleon 32 C Development System (optional package) or using a PC.

General Features of the Analysis Page

Figure 4.1 shows a sample Analysis (Real Time or History) page with sample X.25 traffic. The general features of the Analysis pages are described on the following pages.

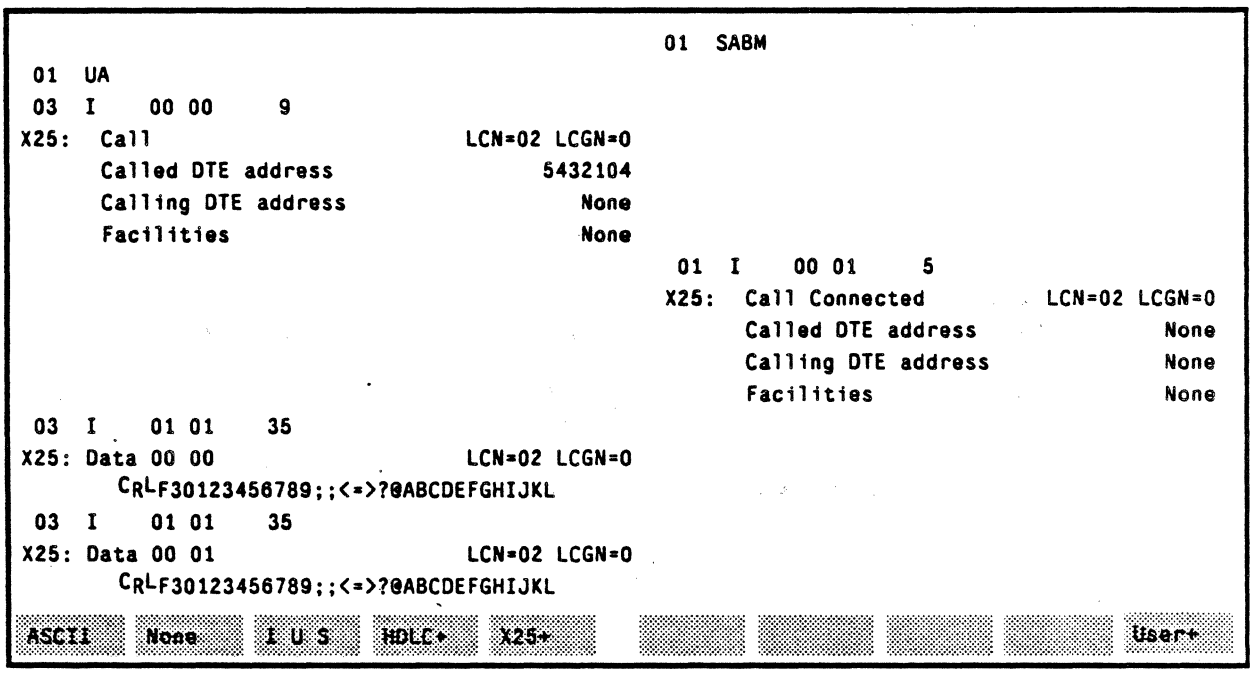


Figure 4.1: Sample X.25 History Page

DCE/DTE Display

Frames transmitted by the DCE are displayed on the left half of the screen. Frames transmitted by the DTE are displayed on the right half of the screen.

Notes

In the Real Time page, only the last 22 lines of each event are displayed.

When simulating an ISDN line and monitoring the simulation traffic, the Chameleon always displays data on the DTE (right) side of the Real Time and History pages.

Colors

Colors distinguish the protocol elements of the display. The colors are protocol–specific and are described in the *Chameleon Protocol Interpretation Manual, Volume II.* For example, in the X.25 page shown in Figure 4.1, the following colors would be used:

Green = HDLC	Yellow = X.25
White = User Data	Red = Errors

Interface Lead Transitions

An interface lead transition is displayed as the lead name along with an up arrow (↑) [MARK at the physical level] or a down arrow (↓) [SPACE at the physical level] to indicate the direction of the transition. Low–to–high transitions elicit a ↓; high–to–low transitions elicit an ↑. All transitions for a given event are shown on one line. The leads are:

DCE	DTE
CTS	RTS
DSR	DTR
DCD	
SDCD	
RI	

There may be more than one transition. ***F3*** controls whether lead transitions are displayed on the page.

Note: Lead change indicators in Analysis and Triggering differ in meaning. In Analysis, the arrows indicate physical level, as described above. In Triggering, ↑ and ↓ indicate logical levels, and are the opposite of the Analysis indicators for the same event. However, when using an ISDN interface:

(1) lead changes are NOT displayed; and,

(2) abort frames are not detected, but are concatenated with the following frame.

Baud Rate Changes

Baud rate changes are shown as **New Baud Rate 9600.** In Analysis, baud rate is calculated at two times:

- When the Analysis application is started
- After ***Run/Stop*** is pressed. If the line is idle when Analysis is started, you must press ***Run/Stop*** when acquisition begins. Otherwise, the baud rate will be zero. When the baud rate is zero, line utilization is not calculated in the Statistics application.

Incomplete Event Display

The **Incomplete event Length** ***x*** message indicates that the received frame ended unexpectedly.

x indicates the length of the portion of the frame received. For example, if an X.25 I–frame of only two bytes is received, the message **Incomplete event Length** ***2*** appears.

An **Incomplete event Length 0** indicates that only a portion of one byte was received before the frame was aborted.

The **Incomplete event Length** message can be enabled/disabled using ***Ctrl E***, as described on page 4–6. When this message is disabled, **Unknown** is displayed when an incomplete event is detected.

Time Stamping

The Chameleon includes a real–time clock that provides time stamping in Analysis. The time stamp clock's resolution is 20 microseconds and represents the time at the end of the event. The display of the time stamp is controlled by the ***F2*** key, as described on page 4–5.

History Trigger Feature

The Triggering application enables you to filter captured data according to user-defined criteria. One of the triggering options is DISPLAY which causes the History display to differentiate between data which meets the criteria and data which does not.

Beginning with system software 4.2, you have two DISPLAY modes to choose from:

- In normal mode, data which meets the triggering criteria is shown in low intensity color. All other data is shown in high intensity color.
- In trigger mode, only data which meets the triggering criteria is displayed in the History page. All other data is suppressed from the display.

The triggering DISPLAY mode is controlled from the History page using two commands:

- :normal Selects normal triggering display mode. This is the default mode.
- :trigger Selects trigger mode.

Note that when using these command, you must include the colon (:) as part of the command to invoke the command line.

Refer to Chapter 8 for a complete description of the Triggering application.

Function Keys

The traffic is displayed in an interpreted format so that you can quickly distinguish the protocol-specific components. The function keys control how the traffic is interpreted and displayed. For example, you can suppress the display of user data, display frame level only, or show all traffic in an uninterpreted (raw) format.

Function keys have multiple values which affect the display format of interpreted data. Each time you press a function key, you select the next value in the cycle. If you press **Shift function key**, the previous value is selected. The current selection is shown in the softkey strip on the screen.

Several of the function keys are available for all protocols. These are described in this chapter. Other function keys are used only with specific protocols. These are mentioned in this chapter, but are described fully in the *Chameleon Protocol Interpretation Manual, Volume II.*

F1

F1 determines the format of the user data display, which is the data which does not belong to a protocol specific format. When you press ***F1***, the user data (displayed in white) changes to the code indicated in the softkey strip at the bottom of the screen. In the History page, all displayed user data is changed to the indicated code.

In the Real Time page, only the user data acquired after ***F1*** is pressed, is displayed in the new code. ***F10*** controls whether or not user data is displayed at all. The options are:

ASCII Each byte is displayed as an ASCII character. For example, 41 hex is displayed as the ASCII character **A**. Characters in the range 0 - 1F hex are shown as single character mnemonics. Characters above 80 hex are shown as ' ▪ ' .

EBCDIC Each byte is displayed as an EBCDIC character. For example, F1 hex is displayed as the EBCDIC character 1. Special characters are handled the same way as ASCII.

HEX Each byte is displayed as a pair of hex digits.

HEXS Each byte is displayed as a pair of hexadecimal digits, with a space between each pair.

F2

F2 determines the acquisition information display format, which is displayed on the first line of interpretation on the opposite side of the screen. Not all options are available for all protocols, as noted below.

Number Event number in decimal

Flags Number of flags preceding the frame in decimal (BOP only)

Time Event timestamp as hh:mm:ss ddd ddd
Time shows the time at the end of the event in hours, minutes, seconds and microseconds. **ddd ddd** is equivalent to .dddddd in decimal. For example: 999 999 = .999999 seconds.

dTime (delta time) Elapsed time between the previous event and the current event.

When monitoring two ports on a Dual Port machine, the delta time refers to the time between events regardless of which port the event occurred on. That is, the delta time may be calculated as the time between the previous event on Port A and the current event on Port B.

If the Real Time clocks on Port A and Port B are not synchronized, negative delta time might be reported. If this occurs, resynchronize the clocks by pressing ***Run/Stop*** to stop and then restart acquisition on both ports.

CRC CRC value in hex, **OK** if good CRC or **BAD** if bad CRC (Not available in Async)

None No acquisition information is displayed

F3

F3 determines what types of events will be displayed. This function is not available in Async or BSC. The options are:

I	Information frames only
IU	Information and Unnumbered frames only
IUS	Information, Unnumbered, and Supervisory frames
IUSL	All frames, plus lead transitions. However, when using an ISDN interface, lead transitions are NOT displayed. Furthermore, abort frames are not detected, but are concatenated with following frames.

F4 - F9

These keys are protocol specific. Refer to the *Chameleon Protocol Interpretation Manual Volume II,* for more information.

F10

F10 determines if user data is displayed. It also displays the traffic in an uninterpreted mode (raw). The options are:

User +	User data is displayed
User-	User data is not displayed
Raw	All data is shown as user data, uninterpreted in the code selected with ***F1***

Function Key Setup Files

You can create files which store function key setups for History and Real Time pages. A function key file can be executed automatically when a monitoring application is started, or can be invoked on–demand at run–time. Function key files for History and Real Time are independent of each other.

To create a function key setup file, do the following:

1. Start the monitoring application and select either the History or Real Time page.

2. Select the desired function key settings for that page.

3. Use the **:save** command to save the setup to a file. Use the following syntax:

   :save "filename"

   where *filename* is enclosed in quotation marks (" ") and is one of the following:

   hist Saves a setup which executes when the application is started and automatically sets the History function keys

   rt Saves a setup which executes when the application is started and automatically sets the Real Time function keys

   Other filenames must be 1 – 8 alphanumeric characters.

4. To load a function key file at run–time, use the **:load** command. The syntax for **:load** is:

   :load "filename"

Control Keys

The keys and key combinations shown in Figure 4.2 perform a number of useful functions for the Analysis pages. These functions are described in more detail following the table.

KEY	FUNCTION
A or a	For Dual Port machines, displays the Port A function key strip in History
B or b	For Dual Port machines, displays the Port B function key strip in History
Ctrl B	Switches on/off a line which separates events in the display
Ctrl C	For Dual Port machines, toggles between the Port A and Port B function key strips for the active page. (Also see Shift A and Shift B below.)
Ctrl E	Switches the display of the message *Incomplete event* on/off. When off, incomplete events are indicated by the message *Unknown*
Ctrl N	Protocol–specific to ISDN Monitoring. Toggles the display between the extended address in hex and LTI or TGI byte interpretation.
Ctrl P	Available for the History page only. Invokes the History print feature.
Ctrl Z	Protocol specific to SS7. Invokes the User Parts Editor.

Figure 4.2: Analysis Control Keys

A or a

Pressing ***A*** (or ***a***) is similar to ***Ctrl C*** described above. It displays the Port A function key strip when a monitoring AB page is active.

B or b

Pressing ***B*** (or ***b***) is similar to ***Ctrl C*** described above. It displays the Port B function key strip when a monitoring AB page is active.

Ctrl B

When you press ***Ctrl B***, a white line appears between each event. To suppress the white line, press ***Ctrl B*** again. This enables you to quickly differentiate each event on the screen.

Ctrl C

On Dual Port machines, you can run some Monitoring applications on both ports simultaneously, using a single page to display the traffic from both ports. This is indicated in the page banner by ***AB***.

You can control the Analysis display for each port independently, using the function keys. For example, the Port A data can be displayed in hex, while the port B data is displayed in ASCII. ***Ctrl C*** toggles between the Port A and Port B function key strip, so that you can access the function keys for each port. See also ***A*** and ***B*** below.

Ctrl E

Usually, when an incomplete event is encountered, the message *Incomplete event* is displayed. ***Ctrl E*** enables you to suppress the display of this message. To resume the display of the message, press ***Ctrl E*** again.

Ctrl N

When monitoring ISDN data with extended addressing, the display will show the extended address in hex. Using ***Ctrl N*** you have the following options:

- If you selected Northern Telecom as your ISDN protocol, ***Ctrl N*** displays the LTID interpretation in place of the Extended Address. The LTID byte is interpreted and displayed in both hex and decimal in the following format:

  LTID:Hex = xx Decimal=xxx

- For all other ISDN protocols, ***Ctrl N*** displays the TGI (Terminal Group Identifier) interpretation in place of the Extended Address. The TGI byte is interpreted and displayed in both hex and decimal in the following format:

  TGI:Hex = xx Decimal=xxx

Ctrl P

In the History page only, ***Ctrl P*** invokes a print feature which enables you to output a range of events to a printer or ASCII file. If you have a printer connected to the Chameleon, and the Chameleon is correctly configured, you can print selected events from the history buffer. Alternately, you can output the events to a print file.

Note

If you use ***Ctrl P*** to save data to a file, the data in the file cannot be replayed and analyzed by the Analysis application. In order to save data to a file and analyze it from disk, you must use the Direct–to–Disk application described in Chapter 6.

You can use the ASCII file generated by Ctrl P for the following purposes:

- To access the file using the Chameleon C Development System vi Editor (optional package)
- To access the file on a PC after using the Chameleon Kermit facility to transfer the file (see Chapter 10) or after copying the ASCII file to an MS–DOS 2.x or 3.x formatted floppy disk

There are two methods to use the History Print feature.

METHOD 1 – ENTER A SPECIFIED RANGE OF EVENTS:

1. Select the History page.
2. Press ***Ctrl P*** to invoke the History Print feature. The following prompts appear:

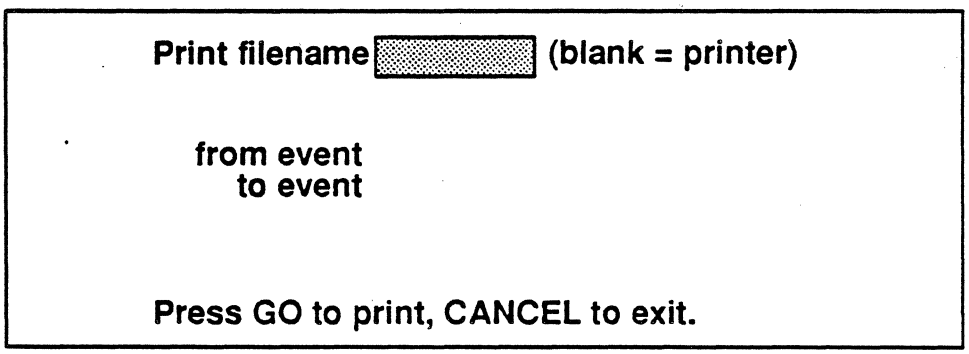


Figure 4.3: Print–Range–of–Events Prompt Screen

3. You may download events to either a printer or an ASCII file.

   To download events to a printer:

   Press ***Return*** when prompted for a file name.

   To download events to an ASCII file:

   Enter a file name and press ***Return***. The file will be saved to the hard disk in the following directory: **A:\TEKELEC\DATA\HIST** unless a different path is specified.

To save the file to a floppy disk, you must use the path (including the back slash [\ ]) as follows:

b:\filename

4. Specify a range of event numbers to print by entering the number of the first event and pressing ***Return***.

5. Enter the number of the last event you want to print and press ***Return***.

6. Press ***Go*** to start the printer/file output. A message is displayed that indicates which events are being sent to the printer or file.

7. To abort this function at any time, press ***Cancel***.

METHOD 2 – HIGHLIGHT A RANGE OF EVENTS:

1. Select the History page.

2. Use ***Scroll*** ↑ or ***Scroll*** ↓ key to position the first event you want to output at the top of the page. Press the left bracket key ([ ). This marks (highlights) the first event.

   Use the ***Scroll*** ↑ or ***Scroll*** ↓ key to display the last event you want to output as the last event on the screen. Press the right bracket key ( ]). This marks (highlights) the last event to be output.

3. Press ***Ctrl P*** to invoke the History Print menu (see previous page).

4. You may download events to either a printer or an ASCII file.

   To download events to a printer:

   Press ***Return*** when prompted for a file name.

   To download events to an ASCII file:

   Enter a file name and press ***Return***. The file will be saved to the hard disk in the following directory: **A:\TEKELEC\DATA\HIST** unless a different path is specified. The selected event numbers appear in the menu.

5. Change event numbers by deleting the displayed number and entering the new number.

6. Press ***Go*** to start the printer/file output. A message is displayed that indicates which events are being sent to the printer or file.

7. To abort this function at any time, press ***Cancel***.

Ctrl Z

Ctrl Z has a special function for Signaling System #7 Analysis only. It invokes an editor that enables you to configure the Heading Code Mnemonic and the Routing Label Structure for User Parts. Refer to the *Chameleon Protocol Interpretation Manual, Volume II,* for more information.

Acquisition Buffer

The size of the acquisition buffers depends on whether you have a Single Port or Dual Port Chameleon. Figures 4.4 and 4.5 list the capacities for these buffers.

DTE	DCE	Other
196–Kbyte	196–Kbyte	48–Kbyte lead changes, aborts, CRC, time stamp

Figure 4.4: Single Port Buffer Capacities.

DTE	DCE	Other
Port A		
196–Kbyte	196–Kbyte	48–Kbyte lead changes, aborts, CRC, time stamp
Port B		
196–Kbyte	196–Kbyte	48–Kbyte lead changes, aborts, CRC, time stamp

Figure 4.5: Dual–Port Buffer Capacities.

Event Overwritten Message

In the History or Real Time pages there are two conditions which elicit the message:

Event Overwritten

These two conditions are: (1) when the Event buffer wraps around and overwrites the Event pointer to the data currently being read; or, (2) when the DCE or DTE data buffer wraps and overwrites the data currently being read. When the History or Real Time application attempts to access either events or data which have been overwritten, *Event Overwritten* is displayed on the appropriate side (DCE/DTE) of the page. Figure 4.6 illustrates these *Event Overwritten* processes.

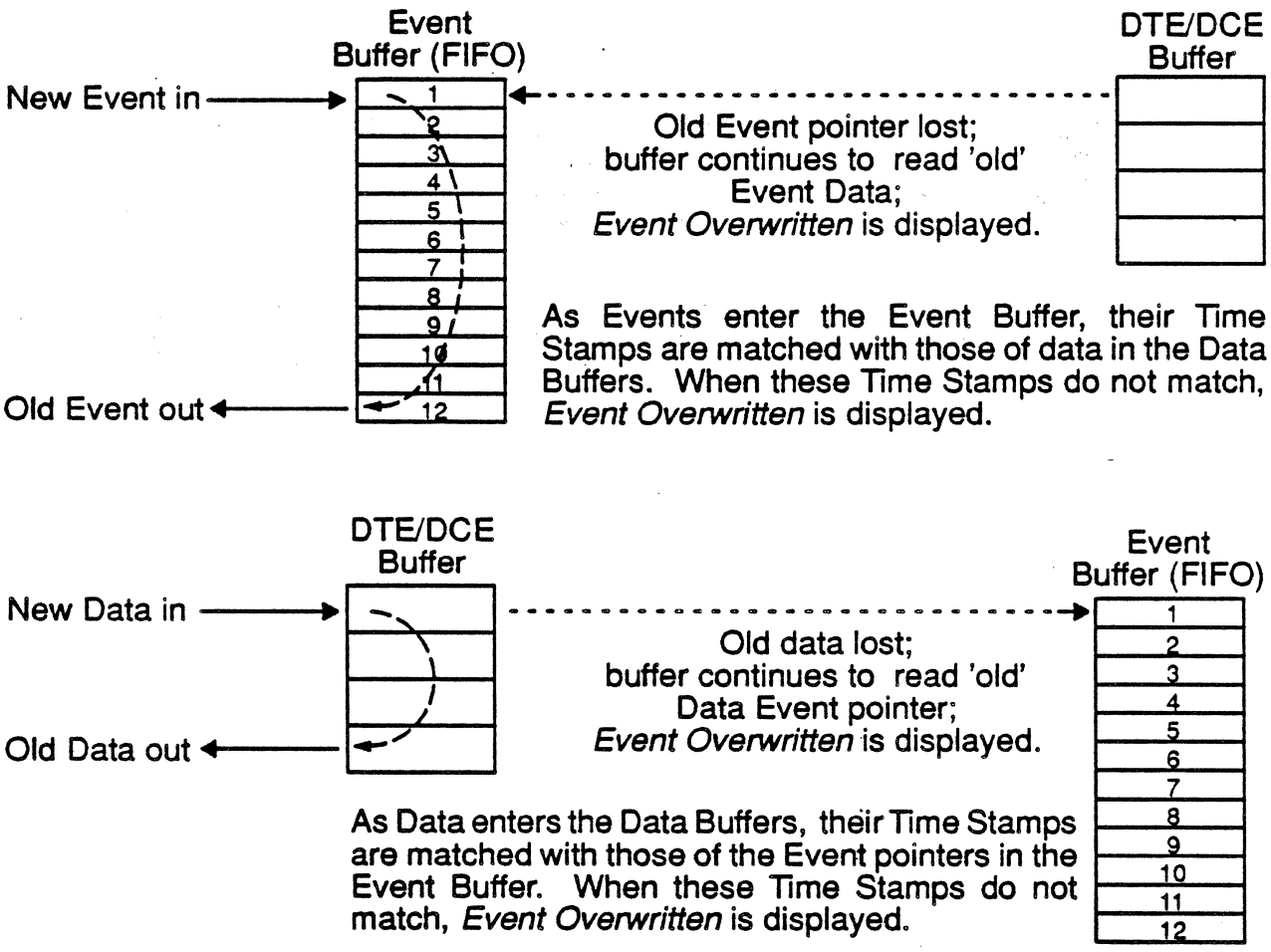


Figure 4.6: *Event Overwritten* processes.

History Page Features

Unlike the Real Time page, the History page displays traffic from a buffer and not from the line. This enables you to scroll back and forth through the traffic stored in the buffer so that you can analyze it independently of line activity.

History Lock

The Chameleon stores traffic in a FIFO (first–in, first–out) buffer. When the buffer is full, the oldest (first–in) data in the buffer is overwritten by newly–acquired data. This ensures that the buffer always contains the most recent traffic. However, this also means that traffic currently being displayed on the History page will be overwritten in the buffer if the Chameleon is capturing traffic in that buffer. To indicate that the History page is displaying overwritten traffic, the word *Locked* appears in the softkey strip at the bottom of the screen. When the History page is locked, the displayed data can be scrolled up and down to the limit of the stored data (several pages), but it is not possible to change the interpretation of the data as the original traffic is no longer in the buffer.

To clear the locked condition and display the current acquisition buffer contents, press *Cancel*.

To ensure that the data in the buffer will not get overwritten by new data, press *Run/Stop*.

History Freeze Mode

When Freeze Mode is enabled, the most recent 32 K of data from the acquisition buffer is copied into a History Freeze buffer. This buffer is displayed on the History Page until Freeze Mode is terminated.

To enable the Freeze Mode, press ***f***. Acquisition continues while you are in Freeze Mode. All new data is written into the Acquisition buffer but will not be displayed on the History page until you unfreeze the buffer.

To disable the Freeze Mode, press ***u***.

History Display Commands

Note

When you first display the History page it may be blank. To display traffic from the History buffer, use one of the keys or commands listed in Figure 4.7 on the following page. These keys determine which events in the buffer appear in the History page.

If the selected event is not valid (it is overwritten in the buffer, for example) the next valid event following the selected event is

displayed. For example, if you press the left arrow key, the oldest valid events in the History buffer are displayed.

KEY	FUNCTION
→	Displays the oldest events in the buffer.
←	Displays the most recent events in the buffer.
↑	Scrolls the data upward continuously. Each time you press the UP arrow, the scrolling speed increases. If data is scrolling downward, it decreases the speed of the downward scroll.
↓	Scrolls the data downward continuously. Each time you press the DOWN arrow, the scrolling speed increases. If data is scrolling upward, it decreases the speed of the upward scroll.
Space bar	Stops scrolling.
F or f (Freeze)	Selects most recent 32 K of data for display on the History page. Refer to 4–12 for details
U or u (Un–freeze)	Terminates Freeze Mode. Refer to page 4–12 for details
Scroll ↑	Scrolls data up one line each time you press the key.
Shift Scroll ↑	Displays the next page of data.
Scroll ↓	Scrolls data down one line each time you press the key.
Shift Scroll ↓	Displays the previous page of data.
0 – 9	Move you to a certain point in the buffer. Each number represents a percentage of the buffer, from 0% (0) to 90% (9). For example, if you press 5, the middle (50%) of the buffer is displayed.
:jump *a*	Jumps to event number a. For example, *:jump 150* displays event 150 as the first event on the page. *:jump 99999* displays the end of the buffer (most recent events).

Figure 4.7: History Display Command Keys

KEY	FUNCTION
←	The left arrow displays the oldest events in the buffer.
→	The right arrow displays the most recent events in the buffer.
↑	The up arrow scrolls the data upward continuously. Each time you press up arrow, the scrolling speed increases. If data is scrolling downward, it decreases the speed of the downward scroll.
↓	The down arrow scrolls the data downward continuously. Each time you press down arrow, the scrolling speed increases. If data is scrolling upward, it decreases the speed of the upward scroll.
Space bar	Stops scrolling.
F or f	Freeze Mode - Selects most recent 32 K of data for display on the History page. Refer to 4-12 for details
U or u	Un-freeze - terminates Freeze Mode, refer to 4-12 for details
Scroll ↑	The Scroll ↑ key moves data up one line each time you press the key.
Shift Scroll ↑	Shift Scroll ↑ displays the next page of data.
Scroll ↓	The Scroll ↓ key moves data down one line each time you press the key.
Shift Scroll ↓	Shift Scroll ↓ displays the previous page of data.
0 - 9	The number keys move you to a certain point in the buffer. Each number represents a percentage of the buffer, from 0% (0) to 90% (9). For example, if you press 5, the middle (50%) of the buffer is displayed.
:jump *a*	Jumps to event number **a**. For example, :jump 150 displays event 150 as the first event on the page. **:jump 99999** displays the end of the buffer (most recent events).

Figure 4.5: History Display Keys

CHAPTER FIVE:
DUAL LINE

Introduction

The Dual Line application displays data in a 2-line format (DCE over DTE) which represents the actual sequence of data as it was acquired by the Chameleon. This type of display enables you to determine the overlap of data being received simultaneously from both sides of the line.

The Dual Line application is available for all Monitoring protocols. To start the application, select **DUALLINE** from the Monitoring window of the Applications Selection menu.

Note

DUALLINE cannot be run on both ports A and B in one page display. That is, you cannot run the application on A + B, using ***F3 Load AB***. You can, however, start the application independently on both ports, using ***F1 Load A*** and then ***F2 Load B***.

Dual Line vs. Analysis

In Analysis (History and Real Time), an event is displayed once the entire event has been acquired. This is necessary so that the Chameleon can interpret the data according to the protocol. However, it then becomes impossible to represent the timing relationships for data which was received simultaneously from both sides.

For example, Figure 5.1 shows sample data received by the Chameleon. In this data, DTE frame 1 is the second frame which is received by the Chameleon. However, the entire frame is not received until DCE frames 1, 2, and 3 are received in their entirety.

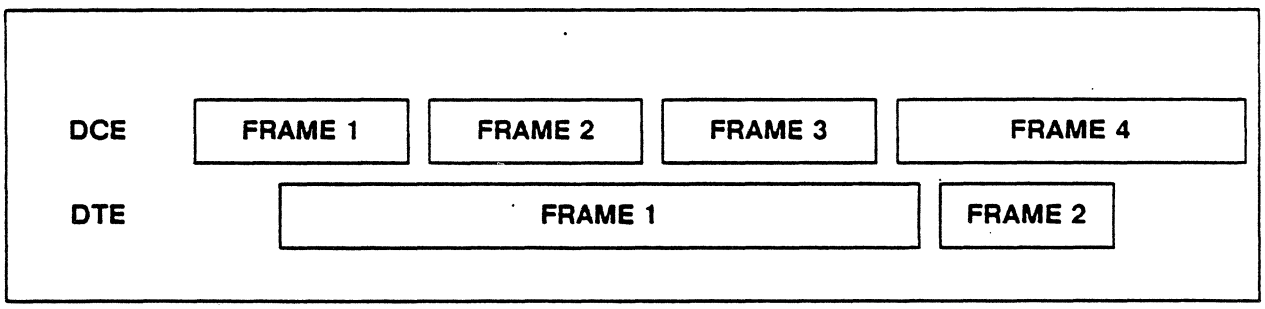


Figure 5.1: Sample Data Acquisition

The Real Time History page displays DCE events on the left and DTE events on the right side of the screen. This results in the data being displayed as shown in Figure 5.2, which suggests that DCE frames 1, 2, and 3 were received before *any* data was received from the DTE.

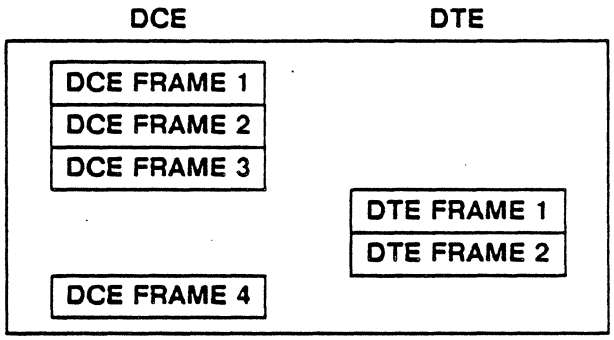


Figure 5.2: Sample Data Sequence in History Page

In the Dual Line display, the sequence of events in shown in a format which retains the actual acquisition sequence of the data, as shown in Figure 5.3. In the Dual Line display, data is not interpreted, but is shown in a user-specified format (ASCII, EBCDIC, or hex). More information about the Dual Line display is provided on the following page.

```
DCE    ABCDEFGHIJ    ABCDEFGHIJ    ABCDEFGHIJ    ABCDEFGHIJKLMNOP
DTE          1234567890ABCDEFGHIJKLMNOPQRSTUVWXYZ    12345678
```

Figure 5.3: Sample Data Sequence in Dual Line Page

Dual Line Modes

There are two Dual Line modes:

- **run** mode causes the page to be updated as data is acquired from the line or from disk. It is much like a Real Time page in that you can view data as it is acquired, but you cannot scroll back and forth through the data.
- **freeze** mode freezes the Dual Line page so that it is no longer updated as data is acquired. In Freeze mode there are additional function keys which enable you to scroll through the data. There are also additional fields of information at the top of the display.

The ***F10*** key toggles between Run mode and Freeze mode.

Run Mode

Figure 5.4 shows the Dual Line display in **run** mode.

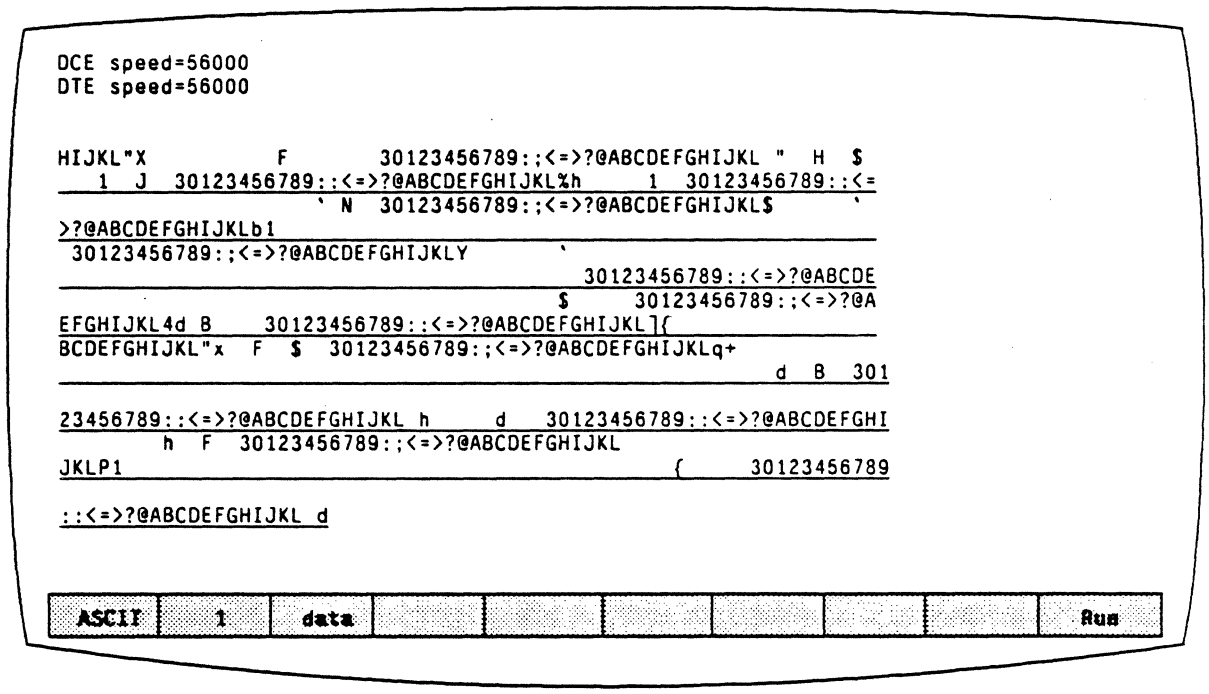


Figure 5.4: Dual Line Display (Run Mode)

Display

The features of the Run mode display are as follows:

- The DCE and DTE baud rates are displayed at the top of the screen. This is the speed indicated by the last acquired baud rate event. If no baud rate events are detected, the message **assumed** is displayed.

  The **:set baud** command enables you to inform the Chameleon of the speed when no baud rate events are detected. See below for more information.

- DCE data is displayed in brown above the DTE data
- DTE data is displayed in underlined cyan below the DCE data
- Each line displays up to 64 characters
- Interface lead states are displayed when ***F3 State*** is selected.
- Data is displayed in the format set selected with ***F1***.
- Blank spaces between frames indicate idle time. You can compress the number of idle data bytes displayed between frames using ***F2***.

Baud Rate

The Dual Line application determines the baud rate of the data upon detection of a baud rate change. If a baud rate change is not detected, the Chameleon assumes the default data rate of 56000 bits per second. The current baud rate is displayed in the **DCE speed** and **DTE speed** fields at the top of the run time page. The Chameleon must know the correct baud rate in order to determine the time and byte offset when marking an event. See page 5-9 for a description of marking events.

To change the baud rate use the **:set baud** command by selecting the DUALLINE page and entering:

:set baud *n*

where *n* is in the range 0 - 64000 and specifies the data rate in bits per second. The default value is 56000 bits per second.

If a baud rate change is detected, the baud rate is changed accordingly.

Function Keys The Run mode function keys are described below.

F1 ***F1*** determines in what format the data is displayed. The options are:

ASCII All data is displayed in ASCII.

EBCDIC All data is displayed in EBCDIC.

HEX All data is displayed in hex pairs.

HEXS All data is displayed in hex pairs, with pairs alternating in high and low intensity color so that each pair can be more easily identified.

Specifically, the hex pairs on each DCE line alternate between high intensity brown and low intensity brown. The hex pairs on each DTE line alternate between high intensity cyan and low intensity cyan.

Note The Frame Check Sequence (FCS) is treated as data and is shown in the code selected with ***F1***.

F2 ***F2*** determines how idle data bytes are displayed. Idle data is shown as blank spaces between frames. ***F2*** enables you to compress the display of idle data bytes so that more data events can be displayed in a single screen. The options are:

1 Only one byte of idle data (blank space) is shown between each frame, regardless of the number of idle data bytes which occurred.

10 Up to 10 bytes of idle data (blank spaces) are displayed between each frame. If more than 10 occur, only the first five bytes and the last five bytes of idle data are represented in the display.

100 Up to 100 bytes of idle data are displayed between each frame. If more than 100 bytes occur, only the first 50 bytes and the last 50 bytes of idle data are represented.

1000 Up to 1000 bytes of idle data are displayed between each frame. If more than 1000 bytes occur, only the first 500 bytes and the last 500 bytes of idle data are represented.

F3 *F3* determines what data is displayed. The options are:

data The DCE/DTE acquired data is displayed in the format selected with the *F1* key. Interface lead states are not displayed.

state Interface lead states and data are displayed. When selected, one line of DCE data is displayed with the five DCE interface leads shown below the data. Below the DCE leads is one line of DTE data with the two DTE interface leads. Changes in voltage are shown as raised or lowered portions of the line. This is shown in the DTE leads in Figure 5.5.

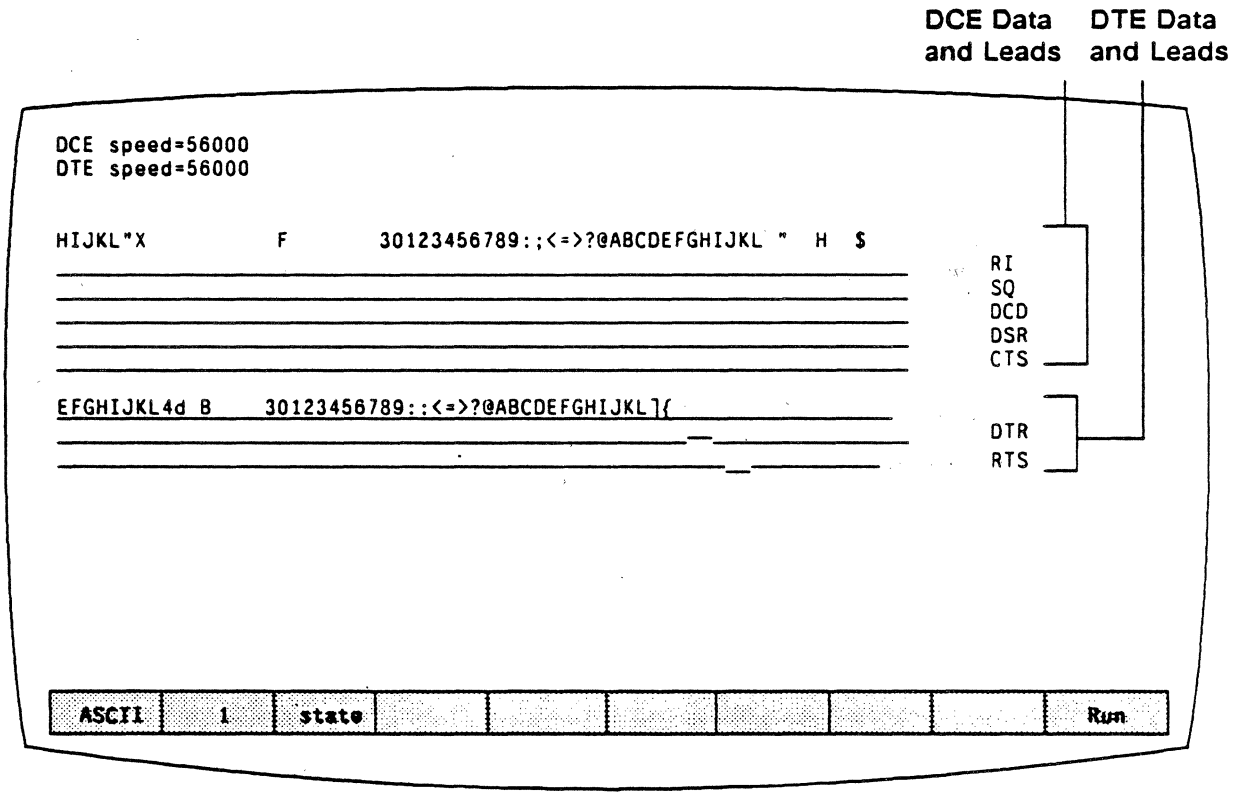


Figure 5.5: Dual Line Display (F3 = State)

F10 *F10* toggles between Run mode and Freeze mode.

run Dual Line is currently in Run mode. The F-key label displays 'freeze'.

freeze Dual Line is currently in 'freeze' mode. The F-key label displays 'run'. See the description of the 'freeze' mode on the following page.

Freeze Mode

When you select ***F10 freeze***, the Dual Line page stops being updated so that you can scroll through the data and examine it more closely. A sample 'freeze' mode display is shown in Figure 5.6.

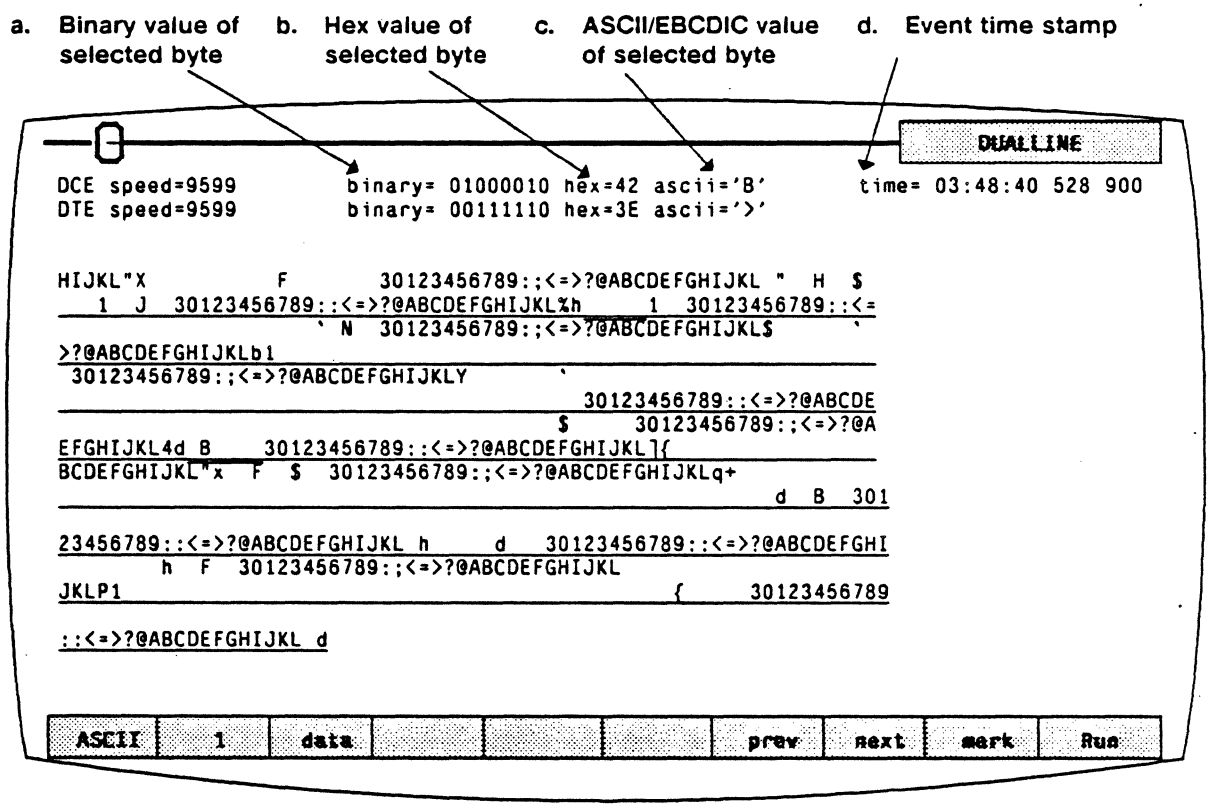


Figure 5.6: Dual Line Display (Freeze Mode)

Display

The 'freeze' mode display is the same as the run mode display, with the addition of these fields:

a. Binary value of the DCE and DTE byte at the location of the cursor

b. Hex value of the DCE and DTE byte at the location of the cursor

c. ASCII or EBCDIC value of selected byte (depending on current ***F1*** selection)

d. Time stamp indicating the time that the end of the event was acquired. The time stamp is in the format:

hh:mm:ss ddd ddd

ddd ddd is the number of microseconds in decimal. For example, 999 999 is .999999 seconds.

Cursor Keys

In freeze mode, a cursor appears in the data. You can use the following keys to move through the data:

KEY	DESCRIPTION
→	Moves the cursor one byte to the right.
↓	Moves the cursor one line down.
←	Moves the cursor one byte to the left.
↑	Moves the cursor one byte to the right.
F7 prev	Scrolls the data downward one page to the previous page.
F8 next	Scrolls the data upward to the next page.

Figure 5.7: Freeze Mode Cursor Keys

Function Keys

The freeze mode function keys are the same as Run mode, with the addition of these function keys:

F7 prev ***F7*** displays the previous page of data.

F8 next ***F8*** displays the next page of data.

F9 mark ***F9*** marks the byte at the cursor as the base line byte. When a byte is marked, the following changes occur to the Dual Line page (Figure 5.8):

- The marked byte is shown in red
- The following fields appear below the time stamp field:

dtime Displays the elapsed time between the marked byte and the currently selected byte

bytes Displays the offset of the currently selected byte to the marked byte

Note

The Chameleon must know the correct baud rate in order to determine the **dtime** and **bytes** values when marking an event. See page 5-5 for a description of how to set the baud rate.

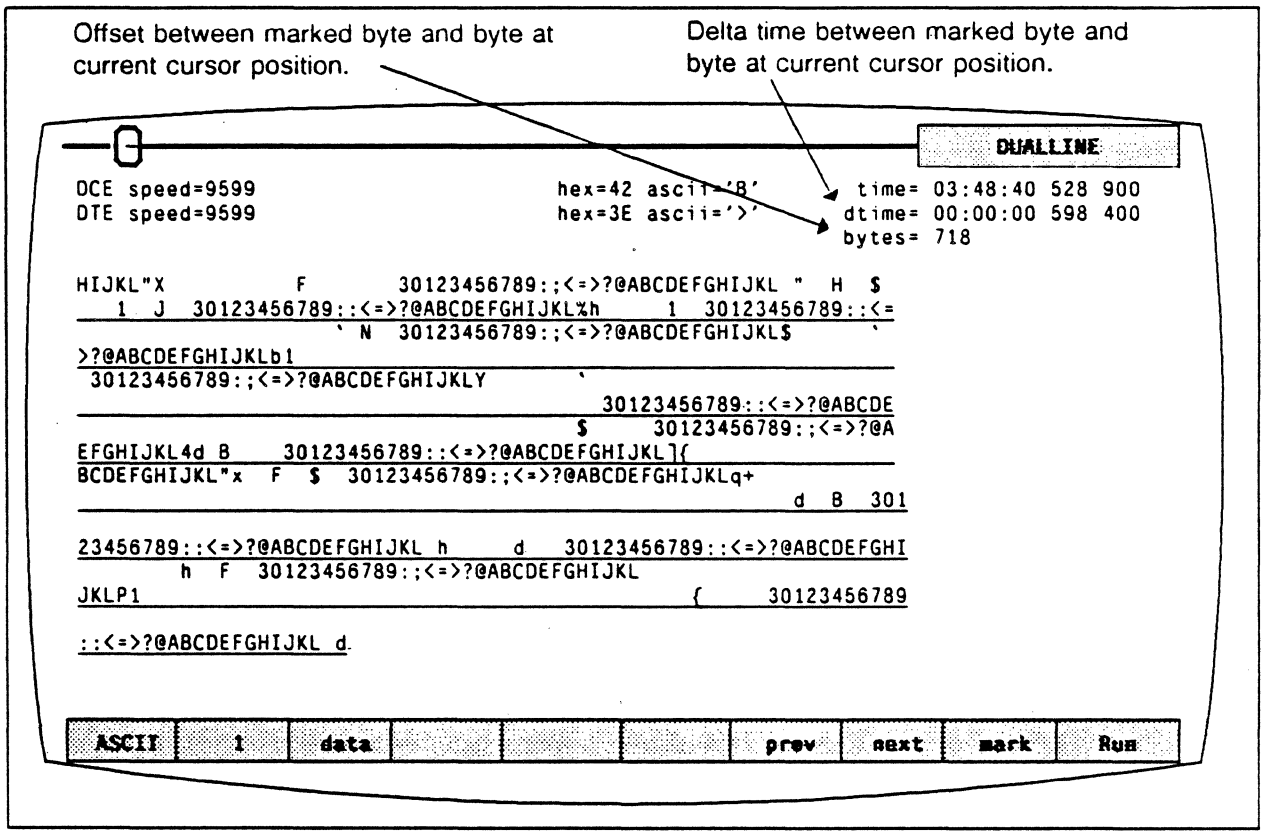


Figure 5.8: Dual Line Display (Marked Byte)

Marking Bytes

To mark a byte, do the following:

1. Move the cursor to the desired byte.

2. Press ***F9 Mark***. This marks the byte in red. The **time** , **dtime** and **bytes** fields apear in the upper right corner of the screen; **dtime** and **bytes** fields are set to zero for every byte mark performed.

   When a byte is marked, the **bytes** field shows the actual number of idle data bytes between frames, regardless of the ***F2*** selection. For example, if you select ***F2*** = 10, a maximum of 10 idle data bytes are shown in the display. (Each byte of idle data is shown as a blank space between frames.) However, when a byte is marked, as you move the cursor through the idle data (blank spaces) between frames, you will notice that the **bytes** field represents the actual number of bytes of idle data that

occurred, and not the number of idle data bytes displayed.

3. Move the cursor to a new location. As you move the cursor, the **dtime** and **bytes** fields show the elapsed time and offset relative to the marked byte.

Note

If you press ***F1*** to change the code (hex, ASCII, etc.) in which data is displayed, the marked event is cancelled and the **dtime** and **bytes** fields no longer appear. To re-mark the event, use ***F9 Mark*** to mark a new byte.

Clearing Marks

To clear a marked byte:

Press ***F9 Mark*** to mark a new byte; or,

Press the ***F2*** key.

CHAPTER SIX:
DIRECT-TO-DISK

Introduction

The Direct-to-Disk application stores traffic acquired from the line to the hard disk. Once stored to disk, traffic can be played back and analyzed off-line. A maximum of 30 Mbytes of data can be stored to disk.

You can also run the other Monitoring applications while you are running Direct-to-Disk. This enables you to look at the traffic and save it at the same time.

For example, you could take the Chameleon 32 to several remote locations in your network and save traffic from each location to disk. The traffic from all locations could then be analyzed at a central location to provide network managers with a comprehensive view of the network in operation.

This chapter describes the four activities related to the Direct-to-Disk application. These are:

- Recording traffic with Direct-to-Disk
- Replaying Direct-to-Disk traffic
- Saving Direct-to-Disk traffic to a file
- Loading a Direct-to-Disk file

General Notes

Direct-to-Disk is one of the Monitoring applications that can be loaded and run using the Applications Selection page. If you do not know how to run a Monitoring application, refer to *Chapter 3, Using the Chameleon 32*.

Unlike other Monitoring applications, Direct-to-Disk does not display a page when it is running. When running it saves the traffic being acquired to an area of the hard disk dedicated to Direct-to-Disk traffic. This is referred to as the Direct-to-Disk area of the hard disk or Direct-to-Disk buffer.

You record traffic to the the hard disk as long as the Chameleon 32 is running the Direct-to-Disk application and acquisition is occurring. The Direct-to-Disk area is cyclical, so that when the buffer is filled, the oldest traffic is overwritten by the most recent traffic. In other words, you can run Direct-to-Disk forever, but only the most recent 30 Mbytes of traffic will be saved on the hard disk.

Since the Direct-to-Disk application *saves* the traffic to the hard disk, traffic remains on the hard disk if you reset or power off the machine. However, Direct-to-Disk data is erased if one of the following occurs:

- If more than 30 Mbytes of traffic is recorded while Direct-to-Disk is running, the oldest data is overwritten by the most recent data
- If the Direct-to-Disk application is *restarted*, it records traffic at the beginning of the Direct-to-Disk area, erasing data that may already be there
- If you load a traffic file from disk (previously saved Direct-to-Disk data) it is written to the Direct-to-Disk area of the hard disk

A dedicated area of the hard disk is used to maximize the performance of the Chameleon 32 when monitoring high speed lines. It enables the traffic to be saved as a contiguous block of data, which minimizes the time needed to access the disk when replaying traffic for analysis.

You can use Triggering to define conditions which reduce the amount of traffic written to disk. For example, you could specify that only Information Frames are recorded. Refer to *Chapter 8: Triggering*, for more information.

Recording Traffic with Direct-to-Disk

To run the Direct-to-Disk application, perform these steps:

1. Configure the desired port for Monitoring from the line or for Simulation.

2. Press ***Go*** to display the Application Selection page.

3. Move the red arrow cursor to the DIRTDSK application and press the function key that loads the application for the appropriate port.

4. If desired, load additional applications by moving the red arrow cursor to the application name and pressing the function key that loads the application for the appropriate port.

5. Press ***Go***. This starts the tasks that are loaded, including Direct-to-Disk. There is no page for the Direct-to-Disk application, so a page banner will not be displayed for it. The **HARD DISK ACTIVE** light indicates when traffic is being written to the hard disk.

6. If you selected the Triggering application, you can write a trigger that reduces the amount of traffic saved on the hard disk, by specifying one or more conditions that the data must meet before it is processed by the Direct-to-Disk application. Refer to Chapter 8 for information about creating Triggering files.

7. To complete the *Direct-to-Disk task, stop the Direct-to-Disk application or press **F10 Exit** in the Application Selection page to stop all applications (do not re-boot).* To stop only Direct-to-Disk, do the following:

   a. For high speed SS#7 traffic, press ***Run/Stop*** to stop acquisition.
   b. Make the Configuration page active.
   c. Move the red arrow cursor to DIRTDSK.
   d. Press the function key that stops the application for the desired port (for example, ***F1 Stop A***).
   e. The Direct-to-Disk application stops immediately.

   If you restart the Direct-to-Disk application, it will overwrite the data in the Direct-to-Disk area of the hard disk, beginning with the oldest data.

   The next section describes how to replay Direct-to-Disk data without saving it to a file.

Replaying Direct-to-Disk Traffic

Replaying and analyzing Direct-to-Disk data is referred to as monitoring Direct-from-Disk.

When monitoring Direct-from-Disk data, the traffic is analyzed as if you were monitoring from the line, because the data was initially recorded at line speed. For example, the baud rate is shown at the correct line speed, although the traffic is replayed at disk speed.

When replaying traffic, the traffic in the Direct-to-Disk area of the hard disk is not erased or modified by the Direct-from-Disk application. Therefore, you can replay the same traffic as many times as you like.

Note

If you restart Direct-*to*-Disk, the current data in the Direct-to-Disk area of the hard disk will be erased.

To analyze data Direct-from-Disk, perform these steps:

1. Configure the Chameleon 32 for Monitoring selecting the protocol and port for the recorded data.

2. Move the red arrow cursor to the Monitoring Data Source parameter.

3. Press ***F2 Disk*** to select monitoring from disk.

4. Move the red arrow cursor to Capture Mode. This parameter is valid for replaying Direct-from-Disk data. Select the desired Capture Mode: Cycle or 1 Buffer.

5. Press ***Go*** to display the Applications Selection page.

6. Load the Monitoring applications that you want to use to analyze the traffic on disk. To load a Monitoring application, move the red arrow cursor to the application and press the function key that loads the application for the appropriate port.

Note

The Direct-to-Disk (DIRTDSK) application is not available while you are running Direct-from-Disk, since it would cause the Chameleon 32 to record traffic over the traffic you are trying to analyze.

7. Press ***Go*** to start the monitoring applications.

8. You can now use the application pages as though you were monitoring from the line. The ***Run/Stop*** key starts and stops acquisition from the disk.

9. When the entire contents of the Direct-to-Disk area has been replayed, acquisition stops. To stop the Direct-from-Disk application, make the Configuration page active and press ***F10 Exit.*** This stops all applications that are currently running and displays the main configuration menu.

Saving Direct-to-Disk Data to a File

You can replay traffic directly from the Direct-to-Disk area of the hard disk. However, if you want to record new traffic, you lose the data that is currently stored in that area of the hard disk. Before you record new traffic, you must save the current traffic to a file on either the hard disk or a floppy disk. Later this file can be loaded into the Direct-to-Disk area of the hard disk and analyzed.

To save Direct-to-Disk data to a file, perform these steps:

1. Stop the Direct-to-Disk or the Direct-from-Disk application, if it is currently running. You cannot save Direct-to-Disk data if either of these tasks is running.

2. Make the Utilities page active. If the Utilities banner is not on the screen, press ***Shift Utilities*** to display it, and then make it active. (For more information about the Utilities menu, refer to Chapter 9.)

3. Press ***F4 Traffic Load/Save***. This displays the Traffic Operations menu.

4. Press ***F1 Save*** to select the operation.

5. Enter a file name and press ***Return***. The file is automatically saved to the hard disk unless you specify **b:** as part of the file name, as shown in this example:

   b:filename

Note

If you save Direct-to-Disk data to a floppy disk, the maximum traffic file size is 700 Kbytes. If you want to save more than 700 Kbytes to floppy disks, you can back up the Direct-to-Disk area of the hard disk using the Utilities ***F8 Backup/Restore*** option.

6. Press ***F1 Direct-to-Disk*** to select the Data Source.

7. If you want to save less than 100% of the Direct-to-Disk data, press ***Delete*** to erase the current percentage, enter the new percentage, and press ***Return***.

   This percentage represents the most recently recorded traffic. For example, if you enter 50%, the most recent 50% of the traffic is saved.

8.. Press ***Go*** and the traffic is saved. The size of the file in Kbytes is displayed when the procedure is completed.

Loading a Direct-to-Disk File

To analyze Direct-to-Disk traffic that has been saved in a file, you must *load the file into the Direct-to-Disk area of the hard disk, before you start your monitoring applications.*

Note

This procedure erases the traffic that is currently stored in the Direct-to-Disk area. Before you begin this procedure, save or back up any Direct-to-Disk data that you want to keep.

To load a Direct-to-Disk file, perform the following steps:

1. Make the Utilities page active. If the Utilities banner is not on the screen, press ***Shift Utilities*** to display it, and then make it active.

2. Press ***F4 Traffic Load/Save***. This displays the Traffic Operations menu.

3. Press ***F2 Load*** to select the operation.

4. Enter a name for the traffic file. If you provided a file name extension when you saved the file, you must include the file extension as part of the file name.

   The file is automatically loaded from the hard disk directory **a:\tekelec\data\d2d** unless you specify **b:** as part of the file name, as shown in this example:

   b:filename.ext

Note

   If you used the Utilities ***F8 Backup/Restore*** option to back up the Direct-to-Disk area to multiple floppy disks, you must use the ***F8 Backup/Restore*** to restore the data to the hard disk.

5. Press ***Go*** and the traffic is retrieved from the disk and is loaded into the Direct-to-Disk area of the hard disk.

6. The data can now be analyzed by replaying the Direct-to-Disk data as described on page 6-4.

CHAPTER SEVEN: STATISTICS

Introduction

The Statistics application gathers and displays summary information about the traffic being monitored, including line usage. The Statistics application can be run with traffic from the line, or using the Direct–From–Disk option. If you do not know how to load and run a Statistics application, refer to Chapter 3: *Using the Chameleon.*

Most Statistics applications provide multiple pages for displaying information for all protocol layers and addresses, or for a selected layer or address. Figure 7.1 lists the available statistics applications by protocol, the display pages provided for each, and the pertinent chapter in the Protocol Interpretation Manual.

PROTOCOL	APPLICATION	STATISTICS PAGES	Refer to Chameleon Protocol Interpretation Manual :
BSC	BSCSTAT	BSC Line Statistics BSC CU Statistics	Chapter 6
ISDN (Q.921)	Q921STAT	Q.921 Line Statistics Q.921 SAPI 0 Statistics Q.921 SAPI 0 Statistics Q.921 SAPI 16 Statistics Q.921 SAPI 63 Statistics Q.921 Other SAPI Statistics	Chapter 10
PRI	PRISTAT	PRI Error Statistics	Chapter 8
SNA	SNASTAT	SNA Session Statistics SDLC Line Statistics Session PU Statistics SNA LU Statistics SDLC PU Statistics SNA LU Line	Chapter 6
SS#7	SS7STAT	SS#7 Line Statistics	Chapter 13
X.25	X25STAT	X.25 Line Statistics HDLC Line Statistics X.25 LCN Statistics	Chapter 2
2B1Q	2B1QSTAT	2B1Q Line Error Statistics	Chapter 20

Figure 7.1: Available Statistics Pages

Statistics Display

The statistical information is displayed in numeric, and for some information, graph form. This section describes the general format and usage of a Statistics page and the associated Performance page. The exact format and function keys for each Statistics page are protocol specific, and are described in the *Chameleon Protocol Interpretation Manual.*

The X.25 Line statistics page (Figure 7.2) will be used as the example in this section.

In Monitoring, the Chameleon determines the baud rate at two times:

- when the Monitoring applications are started
- when the ***Run/Stop*** key is pressed

If the line is idle when Monitoring applications are started, and then traffic occurs, the baud rate will be calculated as zero. When this occurs, the Line Utilization will be shown as zero in a Statistics page. To prevent this, press the ***Run/Stop*** key after traffic starts.

If the baud rate is less than 50 bps, all utilization fields will be blank (in both the screen and the printed report).

Statistics Function Keys

Statistics page function keys are protocol specific. There are several functions which are common to all Statistics pages; however, they may not be assigned to the same function key for each application. For example, the PRINT function key for X.25 is ***F3***, while the PRINT function key for ISDN is ***F5.***

This section describes the common function keys. It also describes the general procedure for activating and deactivating the various Statistics pages for a protocol. Since the function key numbers vary by protocol, the options are described by function, and not by function key number.

For a complete description of the function keys for a specific protocol, refer to the *Chameleon Protocol Interpretation Manual.*

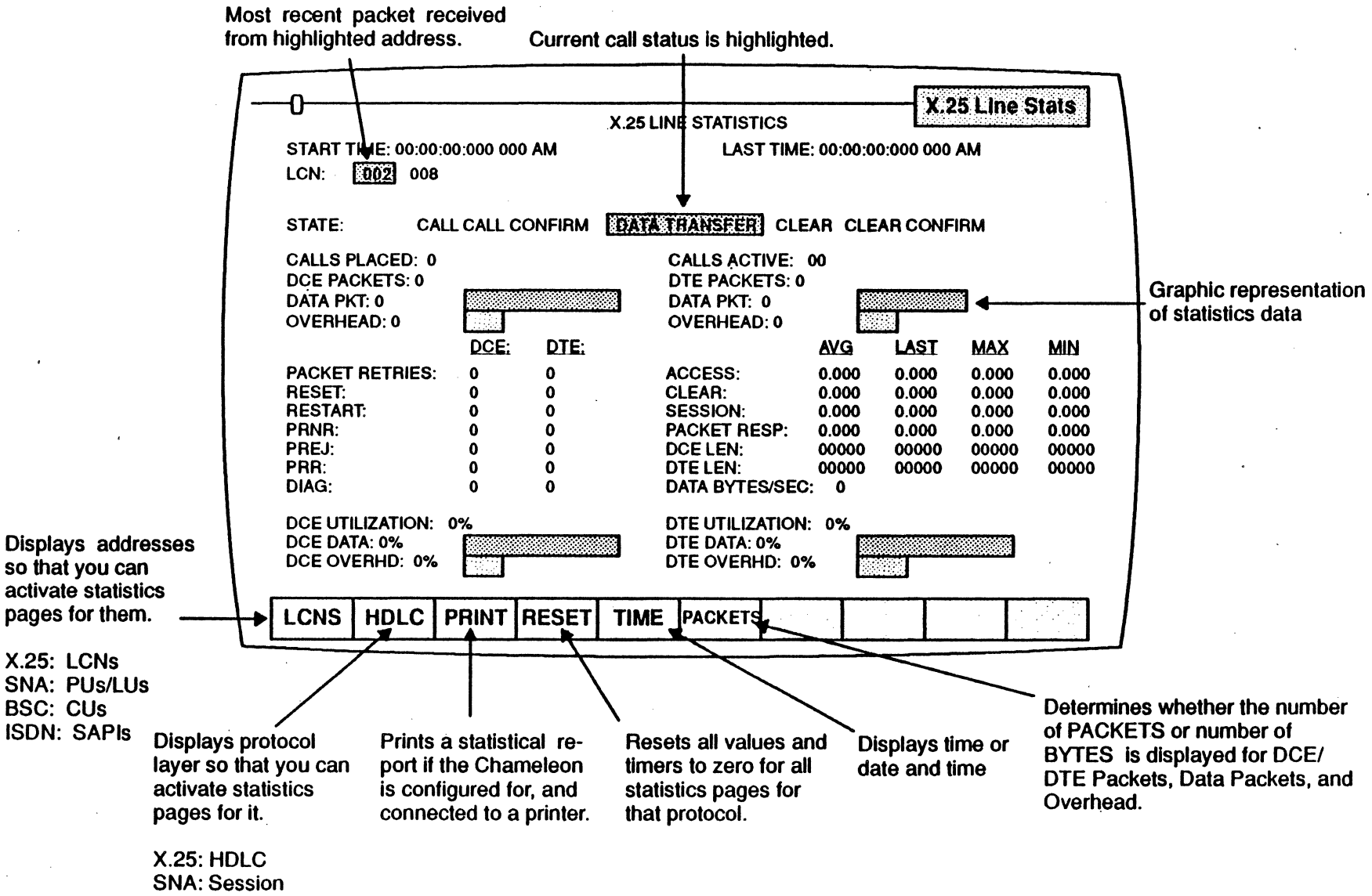


Figure 7.2: Sample Statistics Page (X.25 Line Statistics)

Address Function Keys (LCNs, PUs, CUs, SAPIs)

You can activate a page which displays statistical information for a selected address on the line. The active addresses are displayed in the softkey strip at the bottom of the screen. Depending on the protocol you are using, you will have a choice of selecting one of the following:

- X.25 A page for each Logical Channel Number (LCN)
- SNA A page for each Physical Unit (PU) or Logical Unit (LU)
- BSC A page for each Control Unit (CU)
- ISDN A page for each of these Service Access Point Identifiers (SAPIs): 0, 16, 63, All Others

When the addresses are displayed in the softkey strip, if the address has a + next to it, a page has been activated. If the address has a – next to it, a page for the address is not currently activated.

Note

If you press ***F1 FUNCT*** when the addresses are displayed in the softkey strip at the bottom of the screen, the Statistics softkey strip with the functions is displayed. This is true except for ISDN Statistics, which has a single softkey function strip with the SAPIs included.

To activate a Statistics page for a specific address, perform these steps:

1. Press ***Select*** to make a Statistics page active for the desired protocol.

2. Press ***F1 to*** display the addresses in the softkey strip. If you do not have traffic in the buffer, there will not be any addresses displayed.

3. Press the function key that corresponds to the address you want to activate a Statistics page for. A banner for the address page appears at the bottom of the screen. It also causes a + to appear next to the address in the softkey strip.

4. Press ***Select*** to make the Statistic page active.

To deactivate a Statistics page for an address, perform these steps:

1. Press ***Select*** to make one of the Statistic pages active for the desired protocol.

2. Press ***F1 to*** display the addresses in the softkey strip.

3. Press the function key that corresponds to the address you want to deactivate the Statistics page for. The banner for the address page disappears from the screen. It also causes a – to appear next to the address in the softkey strip.

Protocol Layer Function Key (HDLC, SESS)

For X.25 and SNA Statistics, ***F2*** activates or deactivates a page for a specific protocol layer, as follows:

- X.25 A page for HDLC (layer 2) Statistics only
- SNA A page for Session (layer 3) Statistics only

In SNA, you can also select a specific PU or LU for a protocol layer. For example, you can have one page for SDLC statistics for a selected PU, and you can have another page for SNA statistics for the same PU.

To activate a Statistics page for a protocol layer:

1. Press ***Select*** to make a Statistics page for the desired protocol active. The layer name should appear for ***F2*** in the softkey strip (***HDLC*** for X.25 or ***SESS*** for SNA). If the layer name is not displayed, press ***F1***.

2. Press ***F2***. A banner for the protocol layer page appears at the bottom of the screen. It also causes a + to appear next to the address in the softkey strip.

3. Press ***Select*** to make the Statistics page active.

To deactivate a statistics page:

1. Press ***Select*** to make one of the Statistics pages for the desired protocol active. The layer name should appear for ***F2*** in the softkey strip (HDLC for X.25 or SESS for SNA). If the layer name is not displayed, press ***F1***.

2. Press ***F2***. The banner for the protocol layer page disappears from the screen. It also causes a – to appear next to the layer name in the softkey strip.

Print Function Key

The Print function key prints a statistical report that is similar to the screen display format. If you have a printer connected to the Chameleon 32, you can print a report. A sample X.25 Line statistics report is shown in Figure 7.3.

*If you do not have a printer, pressing **F3** has no effect.* The report is not shown on the Chameleon screen. Refer to *Chapter 9, Utilities*, for information about configuring the Chameleon to use your printer.

Reset Function Key

The Reset function key resets the statistics values to zero and resets the time displayed at the top of the statistics page. When you press the Reset key, it resets the values to zero in all Statistics pages currently active for that protocol. This function is available for all Statistics pages.

Time/Date Function Key

The ***Time/Date*** key affects the format of the time fields displayed at the top of each Statistics page.

If ***Time*** is selected, the times are displayed in the format:

hh:mm:ss:ddd ddd AM/PM

For example, 08:46:25:934 160 AM.

If ***Date*** is selected, the time display is in the following format:

dd MMM yyyy hh:mm:ss

For example, 01 JAN 1989 08:06:45.

If you are analyzing data from disk the date will be the current system date, but the time at which the event was originally captured to disk.

Bytes Function Key

Each statistics page has a function key which displays optional information about the number of bytes received. For example in X.25, if the Byte option is selected, the display includes the total number of bytes, the number of data bytes, and the number of bytes received in control frames.

For most pages, the byte fields appear in lieu of other fields on the page. For example, in X.25 the F6 key offers the option of Bytes or Packets. If Bytes is selected, several fields with packet data are replaced by the byte fields.

TEKELEC X25 LINE STATISTICS REPORT

START TIME: 00:00:00:000 000
LAST TIME: 00:00:00:000 000

LCNs ACTIVE : 000 000 000

CALLS ACTIVE : 0

	DCE	DTE
CALLS PLACED :	00000000	00000000
PACKET COUNT :	00000000	00000000
DATA PACKETS	00000000	00000000
OVERHEAD PACKETS :	00000000	00000000
FRAME ABORTS :	00000000	00000000
CRC ERRORS :	00000000	00000000
FRAME RETRIES :	00000000	00000000
PACKET RETRIES :	00000000	00000000
FRAME RRs :	00000000	00000000
FRAME RNRs :	00000000	00000000
FRAME REJs :	00000000	00000000
FRAME DMs	00000000	00000000
FRAME SABMs	00000000	00000000
FRAME DISCs	00000000	00000000
FRAME UAs	00000000	00000000
FRAME FRMRs	00000000	00000000
FRAME SABMEs	00000000	00000000
PACKET RRs :	00000000	00000000
PACKET RNRs :	00000000	00000000
PACKET REJs :	00000000	00000000
PACKET CLEARs :	00000000	00000000
PACKEt INTERRUPTs :	00000000	00000000
PACKET RESETs :	00000000	00000000
PACKET RESET CONFs	00000000	00000000
PACKET RESTARTs :	00000000	00000000
PACKET RESTART CONFs	00000000	00000000
PACKET DIAGs :	00000000	00000000

	AVG	LAST	MAX	MIN
ACCESS TIME :	0.000	0.000	0.000	0.000
CLEAR TIME :	0.000	0.000	0.000	0.000
SESSION TIME :	0.000	0.000	0.000	0.000
DCE PACKET LENGTH :	00000	00000	00000	00000
DTE PACKET LENGTH :	00000	00000	00000	00000
DCE PACKET RESPONSE :	0.000	0.000	0.000	0.000
DTE PACKET RESPONSE :	0.000	0.000	0.000	0.000

DCE TOTAL BYTES: 0
DCE DATA BYTES: 0
DTE TOTAL BYTES: 0
DTE DATA BYTES: 0

DCE LINE UTILIZATION : 00 %
DCE DATA UTILIZATION : 00 %
DTE LINE UTILIZATION : 00 %
DTE DATA UTILIZATION : 00 %

Figure 7.3: Sample Statistics Report (X.25 Line)

Utilization Statistics

Frames with errors (such as ABORTs or bad CRCs) are not included in the utilization statistics. Utilization fields will be blank if the baud rate is less than 50 bps.

The Performance Page

The Performance page, a protocol–specific read–only display, is used when Statistics Performance falls below 100%. This occurs when the data stream rates cycling through the data and event buffers of the Chameleon are so high that the Chameleon cannot keep up with one or the other. At such times, the Chameleon is forced to skip events or data in order to keep incoming events in sychronization with incoming data. The Performance Page is available for SS7, SNA, X.25 and Q.921 protocols. It is not available for BSCSTAT (Bisynch), or U–Interface 2B1Q.

Function Keys

The Performance Page for any active Statistics page is opened or closed by pressing ***Ctrl + P.***

To open or close the Performance Page:

1. Select the Statistics Page banner and, if necessary, scroll it onto the screen. (Do NOT use the blow–page mode.)
2. Press ***Ctrl+P.*** The Performance page banner appears at, or disappears from the bottom of the screen.

There are no function keys for this page.

Interpretation

The interpretation of the Performance Page is given in Figure 7.4.

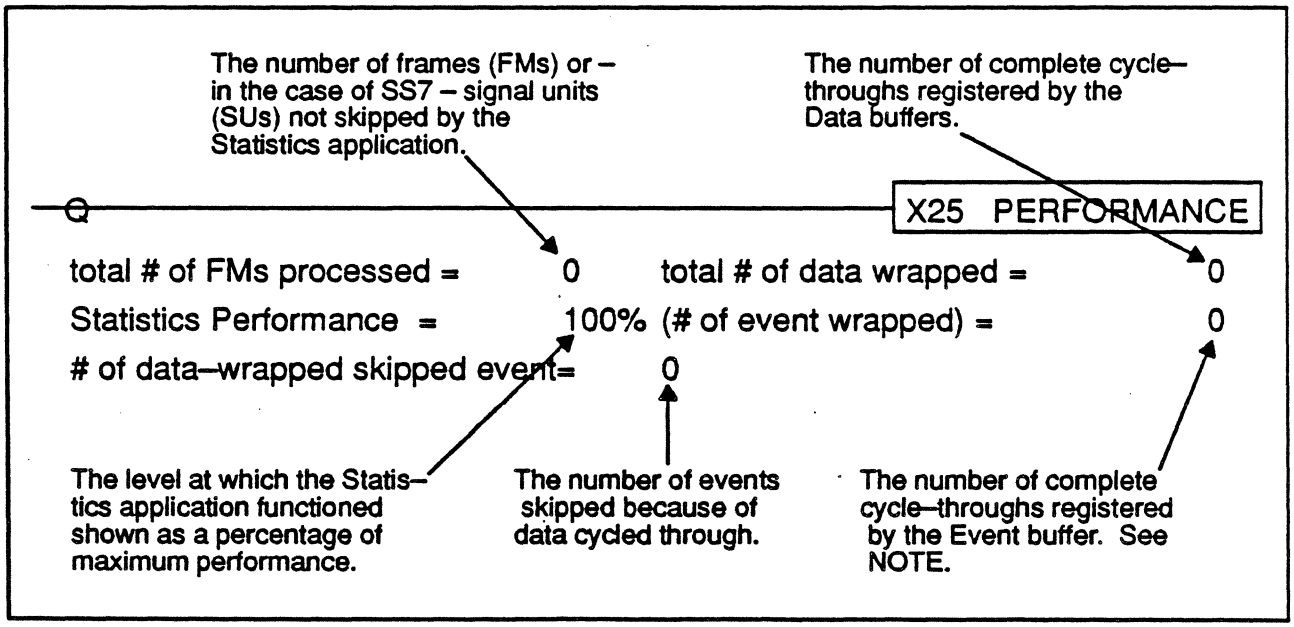


Figure 7.4: The X.25 Performance Page

Note: Whenever one wrapped event is counted, the whole Event buffer is cycled through. Therefore, 6143 (the size of the Event buffer) events are skipped.

Calculation of Statistics Performance

Statistics Performance is calculated using the following formula, where:

N1 = total # of FMs (SUs) processed
N2 = total # of data wrapped
N3 = Statistics Performance
N4 = (# of event wrapped)
N5 = # of data–wrapped skipped event

$$N3 = (N1 \times 100) / [N1 + (N4 \times 6143) + N5]$$

CHAPTER EIGHT: TRIGGERING

Introduction

Chameleon Triggering is a powerful software tool which allows you to define a set of conditions under which data acquisition is started and stopped. This allows you to program the Chameleon to take specific action only for certain user–specified frames.

Condition/ Action

Each trigger consists of a **CONDITION ⇒ ACTION** pair. You must specify what CONDITION, or combination of CONDITIONS, you want the trigger to search received events for, and the ACTION, or ACTIONS, you want the trigger to take. For ACTIONS to take effect, all CONDITIONS for that trigger must be **true.**

Default

The default CONDITION (in which the user does not enter any of his own CONDITIONS) will match all received events. This means that every event captured will cause the ACTIONS you specified to be carried out.

Figure 8.1 illustrates the components of a trigger.

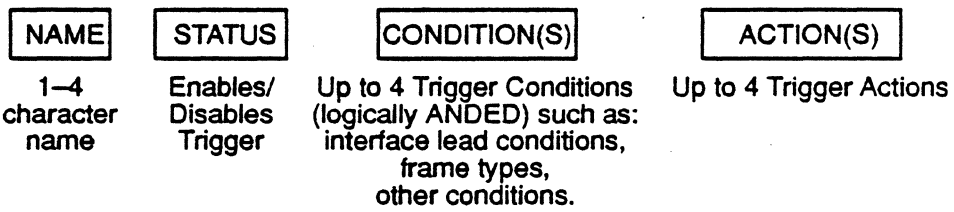


Figure 8.1: Trigger Components

All the CONDITIONS within one trigger are logically **AND**ed. Subsequent triggers are combined in logical **OR** statements. You can perform any logical operation with a combination of **AND** and **OR** operations (see Figure 8.2). For example, if the following CONDITIONS are satisfied:

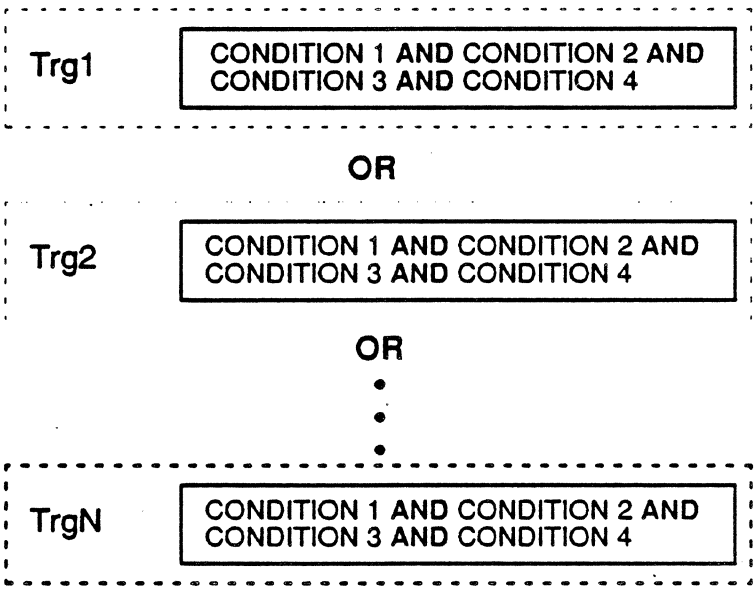


Figure 8.2: Logical Operations of Triggering

then the specified actions are performed.

Any trigger you build will be invoked if it satisfies the following CONDITION:

> If the trigger is enabled, and if all CONDITIONS 1 through 4 are satisfied, then the Chameleon will perform the specified ACTIONS (up to 4 per trigger).

Each trigger has a status that can be modified at run time to enable or disable the trigger. This gives you the ability to use nested triggers, iterative triggers, and provides a general control structure.

The Chameleon will always check to see if the trigger CONDITIONS have been satisfied in the order you specify them. Because the CONDITIONS within a trigger are in a logical **AND** statement, the Chameleon will not carry out the specified ACTIONS until all the conditions have been satisfied.

The Chameleon allows you to define as many triggers as you need. A Triggering Editor is provided so that you can create and modify your triggers using a simple menu–driven interface. The Triggering Editor is described on page 8–7.

Note: The form (A1 **AND** A2 **AND** A3) **OR** (B1 **AND** B2), and so on, allows you to represent any logical expression.

Starting Triggering

To start the Triggering application:

1. Configure the port(s) for the appropriate protocol. This procedure is described in *Chapter 1: Express Instructions.*

2. Press ***Go*** to display the Applications Selection menu (Figure 8.3).

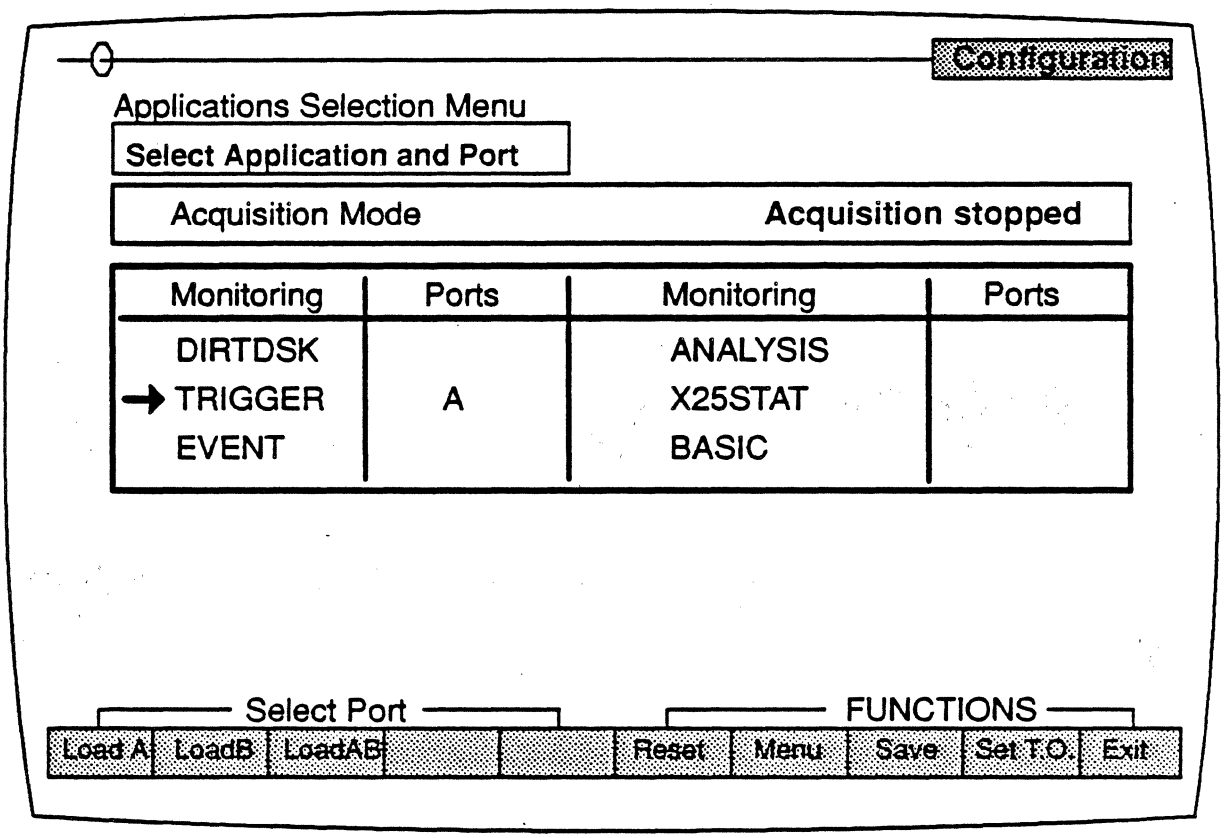


Figure 8.3: The Chameleon Application Selection Menu (X.25 Monitoring)

Note: In step 3, the function keys available to you will depend on your configuration.

3. Move the cursor to **Trigger** and press the *F1*, *F2* or *F3* to load the application on the corresponding port(s).

4. Load additional applications, as desired.

5. Press ***Go*** to start the loaded applications. Page banners appear at the bottom of the screen for each application loaded. When Triggering is started, acquisition automatically stops until you create or load a trigger to run. This procedure is described on the following page.

The Triggering Page

To load or create a trigger, select and display the Triggering page. The first menu, shown in Figure 8.4, is displayed.

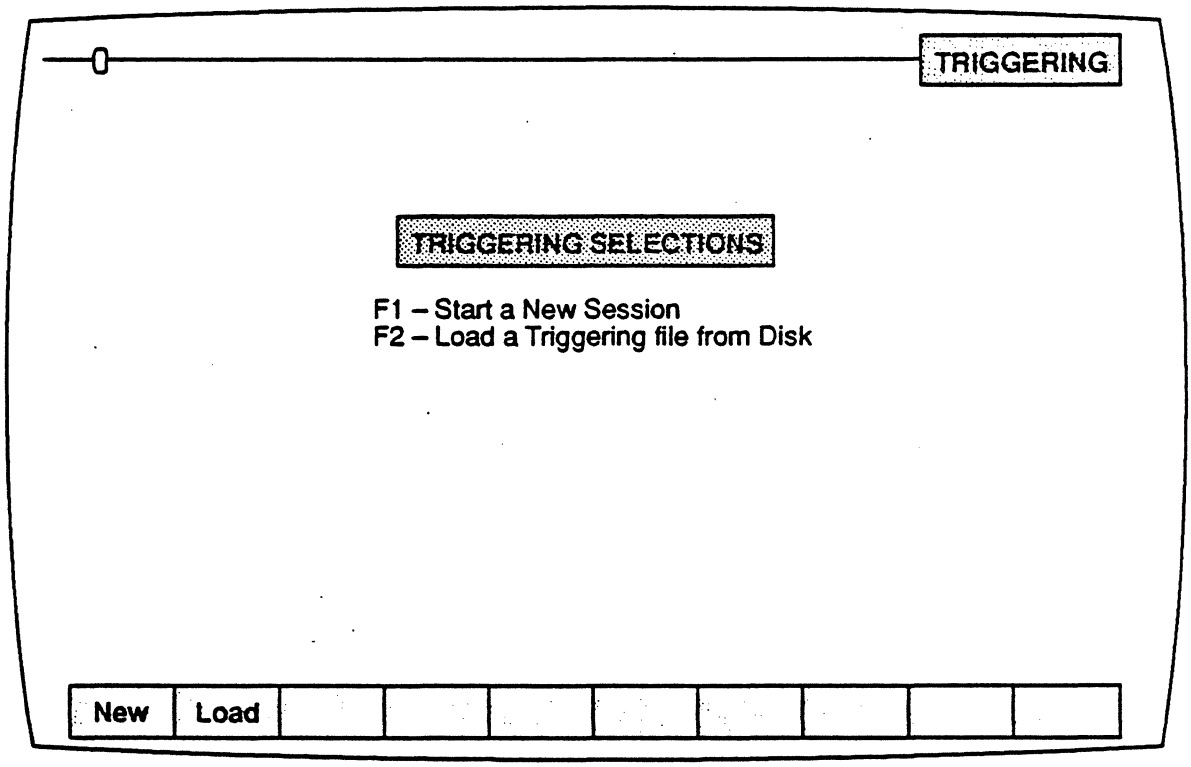


Figure 8.4: The Triggering Page

F1 New Session

This option enables you to create a new trigger from scratch. It displays the Triggering Editor screen with blank fields, as shown in Figure 8.5.

F2 Load a Triggering File from Disk

This option loads an existing triggering file into the Triggering Editor. This enables you to then run the trigger as is, or to modify the trigger before you run it.

Use of the Triggering Editor for creating and modifying triggers is described on the following page.

After creating or modifying your trigger with the Triggering Editor, you run it by pressing the *Go* key. You then have access to a Triggering Run Time page, as described on page 8–47.

Figure 8.5 shows the Triggering page after selecting the *New Session* option.

There are four fields in each trigger: NAME, STATUS, CONDITIONS, and ACTIONS. Select each field with the arrow cursor. The F–key options for each field are displayed in the softkey strip at the bottom of the screen as the field is selected. Use the → and ← keys to move the cursor to any field in a particular trigger. Use the ↑ and ↓ keys to move between triggers.

Each of the four fields is described on the following pages.

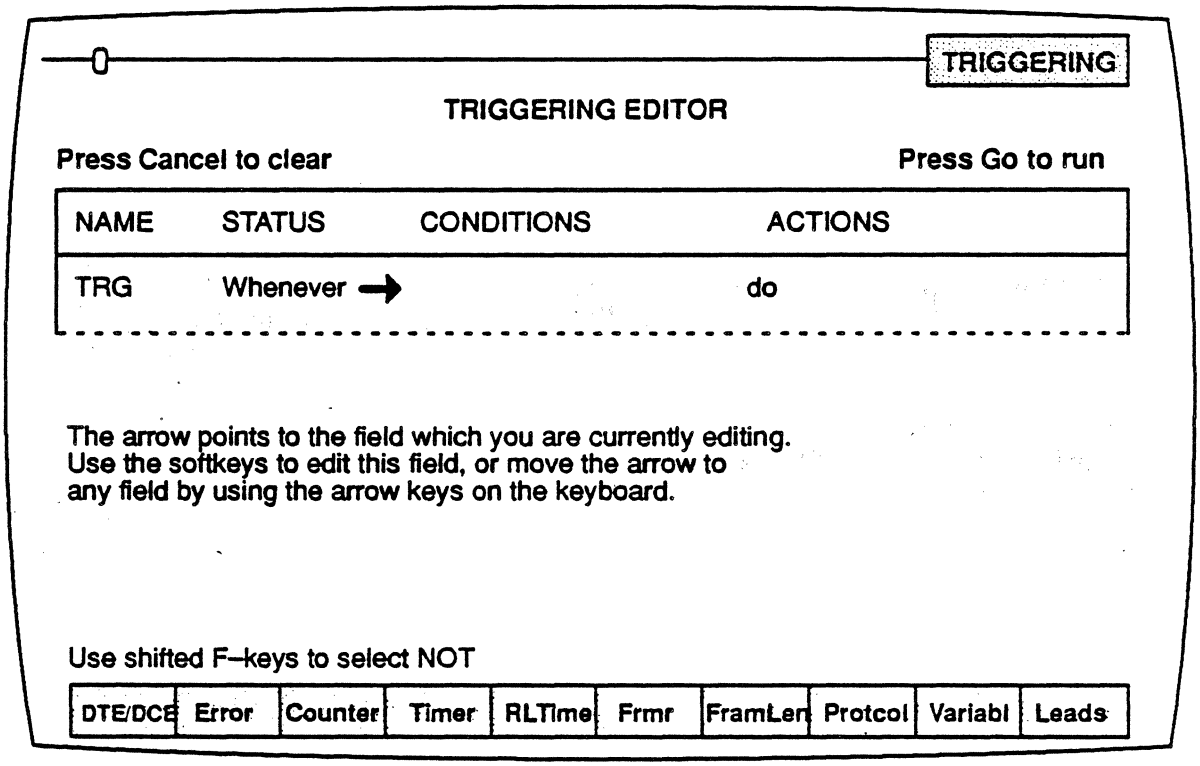


Figure 8.5: The Triggering Editor (New Session)

Triggering Editor

This section explains the Triggering Editor fields. These fields allow you to build or modify a trigger.

NAME

This field enables you to add triggers, delete triggers and assign names to triggers. When the red arrow cursor is positioned in the NAME field, you have the following options:

F1 Addtrig This option adds a new trigger below the currently selected trigger. The trigger is blank except for the default name and status (Whenever) assigned to the trigger. The default name can be changed using the ***F2 NewName*** option.

F2 NewName This option enables you to assign a user–specified name to a trigger. Triggers are automatically assigned default names for your convenience. However, you do not have to use the default name; you can assign whatever name you wish to the trigger. The default names used are:

TRG1 – TRG9

TR10 – TR99

T100 – T999

These names are assigned in order. If a trigger is deleted, the default name assigned to that trigger is available to be reassigned. For example, suppose you you have triggers named TRG1, TRG2, TRG3 and TRG4. If you delete TRG2, and add a trigger to follow TRG4, the default name of TRG2 is assigned to the new trigger. In other words, all previously used default names are reused before a new name is used.

When you press ***F2 NewName*** the current name is erased and you are prompted for a new name.

Enter a four–character name, and then press ***Return***. You can use the ← and → keys to correct entry errors.

F3 Deltrig This option deletes the current trigger.

When the red arrow cursor is positioned in the NAME field, you also have the following function keys available:

F8 Restart This option erases the field entries of the displayed triggers. This enables you to enter a new trigger without having to return to the first triggering menu.

If you want to save the displayed trigger to a file, you must first use the ***F10 Save*** option before your press ***F8 Restart***. When you press ***F8 Restart***, you will be prompted for confirmation before the screen is cleared.

F9 Load This option loads a specified triggering file from disk. It enables you to load a file without having to return to the first triggering menu.

When you press ***F9 Load***, you are prompted for the file name. Enter the file name in the following format, and then press ***Return***:

a:filename	(hard disk drive)
b:filename	(floppy disk drive)

A filename is 1 – 8 characters. If you do not specify a drive, the default is the hard disk, (drive A). If you enter more than an 8–character file name, without a drive specifier, anything beyond the eighth character is ignored.

F10 Save This option saves the trigger(s) currently displayed to a named file.

When you press ***F10 Save***, you are prompted for the file name. Enter the file name in the following format, and then press ***Return***:

a:filename	(hard disk drive)
b:filename	(floppy disk drive)

A filename is 1 – 8 characters. If you do not specify a drive, the default is the hard disk, (drive A). If you enter more than an 8–character file name, without a drive specifier, anything beyond the eighth character is ignored.

STATUS

The STATUS field indicates how the Chameleon will invoke a trigger. (Note that a trigger STATUS can be specified as a trigger ACTION.)

F1 1st Time The trigger will search received frames for the specified conditions. If the conditions match, the trigger actions will be performed, and the trigger will then be disabled.

F2 Disabled The trigger will not be invoked when the triggering is run. Even though a trigger is disabled, it can be armed at run time through another trigger's action.

F3 Whenever (Default) The trigger will search received frames for the specified conditions . If the CONDITIONS match, the trigger actions will be performed, and the trigger remains enabled.

When the red arrow cursor is positioned in the STATUS field, you also have the following function keys available:

F8 Restart
F9 Load
F10 Save

These are identical to the ***F8***, ***F9***, and ***F10*** keys described on the previous page.

CONDITIONS

Triggering conditions are built using the softkeys. The CONDITIONS field allows you to specify up to four trigger conditions for each trigger. The available options are shown in Figure 8.5 in the softkey strip. Figure 8.6 shows the menu structure for the triggering conditions.

To erase existing conditions for a trigger, move the arrow cursor to the CONDITIONS field and press ***Cancel***. ***Cancel*** erases one condition at a time, starting with the bottom condition. The message *Press Cancel to Clear* appears in the top left–hand corner of the screen whenever the cancel option is applicable.

Logical NOT

You can logically negate any of the triggering conditions. This enables you to filter specified items from the data being monitored. For example, in X.25 you can define a condition which triggers on anything that is *not* a data packet.

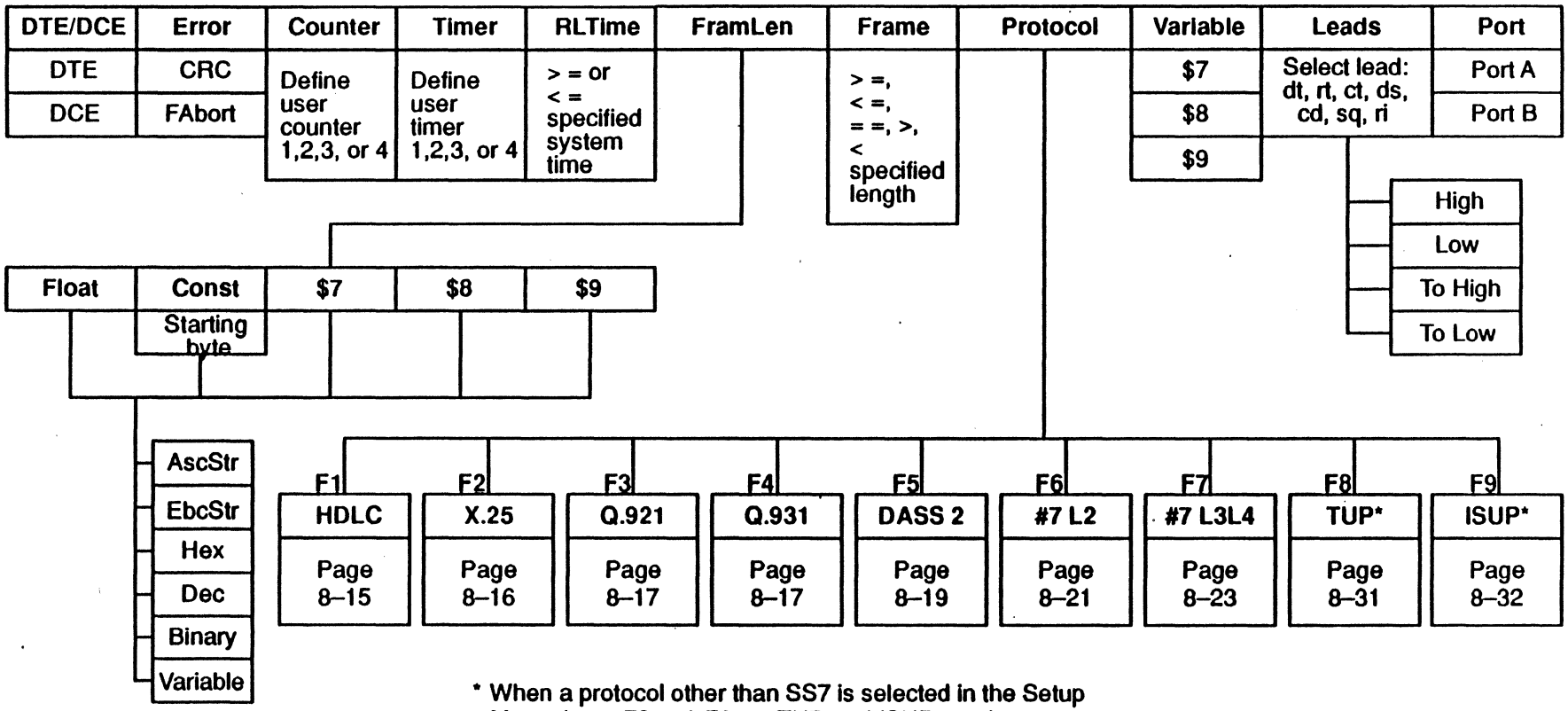
The availability of NOT logic is indicated by the message **Use shifted F–keys to select NOT**, which appears above the function key strip. To select the NOT logic, press ***Shift*** and the desired function key. The NOT logic can be selected only from the first (highest level) CONDITION function key strip. When NOT is selected, the message **You have selected NOT** appears in the CONDITIONS column in highlighted text.

You then continue to define the condition by pressing subsequent function keys, as needed. (Do not use Shift with these subsequent function keys.)

When the condition is complete, it is displayed in the CONDITIONS column in highlighted text and is preceded by an exclamation point (!) which represents the logical NOT.

For example, for SS#7 Triggering, if you want to filter all ISUP traffic from the data, you would press the following function key sequence to define your condition:

Shift F8 Protocol	Displays the message ***You have selected NOT***
F7 #7L3L4	Selects SS#7 Level 3/Level 4 menu
F1 SI	Selects SS#7 Signalling Indicator option
F6 ISUP	Selects SS#7 ISUP Signalling Indicator
F1 Any	Selects ANY ISUP. Displays the condition **!Any ISUP messages**, indicating that any ISUP message will be filtered from the data.



* When a protocol other than SS7 is selected in the Setup Menu, keys *F8* and *F9* are TUP and ISUP, as shown. However, when SS7 is selected as the Setup protocol, these two keys reflect the SS7 standards listed below.

Standard	F8	F9
CCITT (84 or 88)	CT TUP	CT ISUP
NCC	NCC TUP	NCCISUP
NTT	NTT TUP	NTTISUP
ANSI	ASN TUP	ANSISUP
1TR7	TR7 TUP	TR7ISUP

Figure 8.6: Triggering Conditions Menu Structure

DTE/DCE

When you press this key, you get a choice of DTE or DCE. The Chameleon searches either the DTE or DCE side of the communications line for the trigger conditions. The default is both sides.

Error

If you select Error, the following function key options are available.

CRC Triggers on CRC errors (displays **CRC Error** in the CONDITIONS field).

FAbort Triggers on Frame Aborts (displays **Frame Abort** in the CONDITIONS field).

Counter

This option triggers on a counter value. You can use up to four user–defined counters. When you select the Counter option, you are prompted to select a counter number:

Cnt1 (Counter 1)

Cnt2 (Counter 2)

Cnt3 (Counter 3)

Cnt4 (Counter 4)

After selecting the counter, you define the counter value to trigger on, by first selecting a comparison operator:

> = Greater than or equal to

< = Less than or equal to

= = Equal to

> Greater than

< Less than

You are then prompted to enter a decimal value (0 – 999). (You can use the and keys to correct an entered value.) If you press ***Return*** without entering a value, the value is set to 0. When a counter condition is defined, the Conditions column displays a message similar to:

Cnt3 > 10 (perform the defined action(s) when counter 3 is greater than 10)

This feature is used in conjunction with the trigger actions which increment and reset counters. For example, you could increment a counter each time a CRC error occurs, and then trigger on the counter value when it exceeds 10.

Timer

This option triggers on a timer value. You can use up to four user–defined timers. When you select the Timer option, you are prompted to select a timer number (Timer1 – Timer 4) using the function keys.

After selecting the timer, you define the timer value to trigger on, by first selecting a comparison operator:

> = Greater than or equal to

< = Less than or equal to

You are then prompted to enter a decimal value (0 – 99999 milliseconds). (You can use the and keys to correct an entered value.) If you press ***Return*** without entering a value, the value is set to 0. When a timer condition is defined, the Conditions column displays a message similar to:

Timer2 >= 45678 ms

In the above example, the trigger will fire when Timer2 is greater than or equal to 45678 ms.

This feature is used in conjunction with the Timer trigger actions which start, stop, or reset timers. A timer must be started before the value can be checked. For example, you could start a timer when acquisition begins and then reset the timer each time a CRC error occurs, or when the specified timer value is exceeded.

RLTime

Trigger on Real Time Clock value. Real Time is checked only when there is continuous traffic. Therefore, you cannot set triggering to start acquisition at a specified time. When you press this softkey, select a comparison operator (**>=** or **<=**) and enter a clock value (with colons between hours, minutes, and seconds). Then, press ***Return***. If you enter **<=** and the clock value **12:30:00**, the CONDITIONS field will display **Real–Time <= 12:30:00**.

Frame

This option triggers on a specified data string within a frame. When you press this softkey, you are prompted for the index, as follows:

Frame[Index ?]

The index specifies the scope of the search for the data string within the frame. There are three types of indices:

Note: As the floating index uses significantly more processing time than the other index options, it is suggested it be used sparingly.

Float The Chameleon will search the entire frame for the data string.

Const The Chameleon will look for the data string only at a specified offset from the beginning of the frame. When you select this option, you are prompted for a starting byte (offset), as follows:

[ ] ==

Enter a decimal value in the range 1 – 99. (The first byte of a frame is 1.) The Chameleon will then search for the data string to begin at that byte only. If no value is entered, it is treated as a float index.

Variable $7, $8, $9 The Chameleon will search for the data string using the range specified by variable $7, $8, or $9. The variables $7, $8, and $9 can be defined using the *Variable* function key, described on pages 8–15, –42, and –46. For example, if you use $7 as your index and $7 is defined as >=10, the Chameleon will search for the data string from byte 10 to the end of the frame. After selecting an index, you are prompted to enter the data string. The first step is to specify the type of data string you are entering, using the following options:

AscStr (ASCII String) Enter 1 – 13 ASCII characters. For example, if you enter **12345**, the CONDITIONS field will display **FrAsc[ ] = 12345**.

EbcStr (EBCDIC String) Enter 1 – 13 EBCDIC characters. For example, if you enter **12345**, the CONDITIONS field will display **FrEbc[ ] = 12345**.

Hex (Hexadecimal string) Enter up to 12 HEX digits (six hex pairs). For example, if you enter the **000102030405**, the CONDITIONS field will display FrHex[ ] = **000102030405**.

Dec (Decimal string) Enter a decimal number in the range 1 – 255, which represents a single byte value. The CONDITIONS field will display **FrDec[ ] = xxx**, where xxx is the decimal value.

Bin (Binary string) Enter an 8–digit binary mask. You can enter an **x** (for don't care) for digits you want the Chameleon to disregard. For example, if you enter **x010x10x**, the CONDITIONS field will display **FrBin[ ] = x010x10x**.

Variable Select a string variable by pressing a softkey. $1 – $3 are byte strings and $4 – $6 are bit strings, and are described on pages 8–37.

FramLen This option enables you to trigger on the number of bytes in a frame. You will be prompted for a logical operator, as follows: >=, <=, ==, >, and <. You must then enter a decimal number. The Chameleon will trigger on frames which meet the specified size.

Protocol This softkey provides subsequent softkeys that allow you to build trigger conditions using protocol–specific mnemonics.

Protocol: HDLC

The HDLC options are:

I–Frame The Information Frame command transfers sequentially numbered frames containing user–information across the data link.

RR The Receive Ready supervisory frame is used to indicate that a station is ready to receive I–Frames, and to acknowledge previously received I–Frames.

RNR The Receive Not Ready supervisory frame is used to indicate that a station is not ready to receive additional incoming I–Frames.

REJ The REJect supervisory frame is used to request re–transmission of an I–Frame.

SABM The Set Asynchronous Balanced Mode command requests the link be set in Information Transfer mode.

DISC The DISConnect command is used to perform a logical disconnect.

FRMR The Frame Reject (FRMR) response signals a condition that is not recoverable by re–transmission of the errored frame.

UA Unnumbered Acknowledgements (UA) are unnumbered responses to SABM, SABME, and DISC commands.

DM The Disconnect Mode (DM) response is used to report a non–operational status where the station is logically disconnected from the data link.

SABME The Set Asynchronous Balanced Mode Extended (SABME) command places the addressed station in asynchronous balanced mode – extended.

P/F The Poll/Final Bit is used for various signaling tasks. By using the function keys, you can select P/F to be 1 (set) or 0 (unset).

Protocol: Q.921

The protocol–specific Q.921 options are the same as the HDLC options described on page 8–16 with the additions described below.

SAPI Triggers on a Service Access Point Identifier value in the range 0 – 63.

TEI Triggers on a Terminal Endpoint Identifier value in the range 0 – 127.

C/R Triggers on a Command/Response bit value of 1 or 0.

Protocol: X.25

The protocol–specific X.25 options include the ability to trigger on the following types of packets:

CallReq	Call Request
CallCon	Call Confirmation
Clr Req	Clear Request
Clr Con	Clear Confirmation
Data	Data
Intrupt	Interrupt
Inrpt C	Interrupt Confirmation
RRP	Receiver Ready Packet
RNRP	Receiver Not Ready Packet
REJP	Reject Packet
Reset	Reset
Reset C	Reset Confirmation
Restrt	Restart
RestrtC	Restart Confirmation

In addition to triggering on the X.25 packets above, you can also trigger on these elements:

Subscrb Select this option to trigger on a user–specified calling or called address in Call Request packets. When selected, you are prompted for *Called* or *Calling*.

You are then prompted for the address. To specify *don't care* digits, enter as many Xs as there are digits in the corresponding address displayed in the History page. For example, if the History page shows the Called Address 1234, enter *XXXX* for the Called Address trigger.

Once the Chameleon finds a frame with the specified address, it will store the LCGN/LCN. Each trigger can store up to five LCGN/LCNs for a given address. If more than five are seen, the fifth LCGN/LCN is replaced by the one just seen.

The stored LCGN/LCN is not active until a Call Confirmation packet is seen with the same LCGN/LCN. The specified actions then occur when incoming frames containing this LCGN/LCN are found. This LCGN/LCN is dropped when a clear confirmation or Restart confirmation packet is seen. A Restart confirmation packet will clear all LCGN/LCNs.

Q Bit Triggers on a Qualifier (Q) bit value of 0 or 1.

D Bit Triggers on a Delivery Confirmation (D) bit value of 0 or 1.

M Bit Triggers on a More (M) bit value of 0 or 1.

Protocol: Q.931

The protocol–specific Q.931 options are described below.

ProDisc Triggers on a Protocol Discriminator value. Enter an 8–bit binary string composed of 1, 0, or x (ignore).

CR Flag Triggers on a Call Reference flag value of 1 or 0.

CR Valu Triggers on a Call Reference value. The value you enter must be the exact hex number string that would appear in the traffic. For example, if you want to trigger on a frame with a Call Reference value of '5' and a Call Reference length of '2', the trigger input condition for *Cl–Rf Val:* must be set to hex 0005.

Msg Type Triggers on a specific Q.931 message type:

ALERTing
CALL PROceeding
CONNECT
CONNect ACKnowledgement
SETUP
SETUP ACKnowledgement
RESUME
RESUme ACKnowledgement
RESUme REJection
RESTART
RESTart ACKnowledgement
SUSPEND
SUSPEND ACKnowledgement
SUSPend REJection
USeR INFOrmation
DETACH
DETach ACKnowledgement
DISConnect
RELEASE
RELease COMplete
CANCEL
CANCel ACKnowledgement
CANCel REJection,
CONgestion CONtrol
FACILITY
FACility ACKnowledgement
FACILITY REJection
INFOrmation
REGISTER
REGister ACKnowledgement
REGister REJection
STATUS
STATus ENQuiry
PROGress

Protocol: DASS 2

The DASS 2 function keys enable you to trigger on one of the following elements:

F1 LAP triggers on a user–specified LAP (time slot)

F2 Msg triggers on a specific type of message (see list below)

F3 SupServ triggers on a type of Supplementary Service (see list below)

F1 LAP

If you press ***F1 LAP***, the message **DASS: LAP==** appears in the ACTION column and you are prompted to enter a decimal number which indicates the Link Access Protocol (LAP or time slot) on which to trigger. The valid range for this entry is 0 – 31 decimal.

F2 Msg

If you press ***F2 Msg***, the message **DASS:** appears in the ACTION column and you are prompted to select a DASS 2 message type by pressing the appropriate softkey. There are 28 message types to choose from, as listed below. For more information about DASS 2 message types, refer to the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 14.*

Softkey	*Meaning*
CS	Channel Seized
ICI c	Incoming Call Indication (Complete)
ICI i	Incoming Call Indication (Incomplete)
SCI i	Subsequent Call Indication (Incomplete)
SCI c	Subsequent Call Indication (Complete)
CA	Call Arrival
NAM	Number Acknowledge
NIM	Network Indication
CIM	Clear Indication
RRM	Recall Rejection
WSR	Withhold Service Request
SeSR	Send Service Request
UDC	User Data Control
ISRM c	Initial Service Request (Complete)
ISRM i	Initial Service Request (Incomplete)
SSRM i	Subsequent Service Request (Incomplete)
SSRM c	Subsequent Service Request (Complete)

Softkey	*Meaning*
CAM	Call Accepted
CRM	Clear Request
CCF	Clear Confirmation
RM c	Recall (Complete)
RM i	Recall (Incomplete)
SRW	Service Request Withheld
CCM	Call Connected
SM	Swap
UUD c	User to User Data (Complete)
UUD i	User to User Data (Incomplete)
MIM c	Maintenance Information (Complete)
MCM c	Maintenance Command (Complete)
MREJM	Maintenance Reject
MIDM c	Maintenance Ind. (Complete)
MRM c	Maintenance Result (Complete)
MRM i	Maintenance Result (Incomplete)
MACKM	Maintenance Acknowledge
MEOTM	Maintenance End of Task

F3 SupServ

If you press ***F3 SupServ***, you are prompted to select a DASS 2 Supplementary Service type by pressing the appropriate softkey. There are eight services to choose from, as listed below.

Softkey	*Meaning*
Usr>Usr	User to User Signalling
CUG	Closed User Group
CCL Id	Calling or Called Line Identification
CCI	Call Charge Indication
NAE	Network Address Extension
I Disp	Information for Display
MSTRqst	Maintenance Status Test Request
MSTResp	Mainentance Status Test Response

SS#7 Triggering

There are several protocol specific functions keys dedicated to SS#7 Triggering:

- ***F6 #7 L2*** displays SS#7 Level 2 triggering options
- ***F7 #7 L3L4*** displays Level 3 and 4 triggering options
- ***F8 CT TUP*** provides direct access to simpler SS#7 Telephone User Part (TUP) triggering
- ***F9 CT ISUP*** provides direct access to simpler SS#7 ISDN User Part (ISUP) triggering

SS#7 triggering options are specific to the SS#7 standard selected when the Chameleon was configured (NCC, CCITT, ANSI, NTT, etc.). This includes standard heading codes, CIC, and OPC (Originating Point Code) and DPC (Destination Point Code) formats.

Heading Codes

Heading codes are handled by way of heading code tables which are specific to the SS#7 standard in use. These standard tables can be modified as needed to suit your application.

OPC, DPC and CIC Format

When triggering on OPC, DPC, and CIC the SS#7 standard in use determines how the field should be entered. The functions keys indicate the options for the selected standard:

FIELDS This option is displayed for all SS#7 standards. It prompts you to enter the field in decimal in the format shown at the bottom of the screen. For example, for NTT OPC, the following prompts appears:

Enter decimal numbers in the format: ddd ddd ddd

HEX This option is displayed for the CCITT 1984, CCITT 1988, 1TR7, NCC and NTT standards. It prompts you for the field in hex in the format shown at the bottom of the screen. For example, for NTT OPC, the following prompts appears:

Maximum hex value is: ffff

DEC This option is displayed for the 1TR7, NCC and NTT standards. It prompts you for the field in decimal, with the maximum value displayed at the bottom of the screen. For example, for NTT OPC, the following prompts appears:

Maximum decimal value is: 65535

Protocol: #7 L2

F6 #7 L2 displays SS#7 Level 2 triggering options as shown in Figure 8.7.

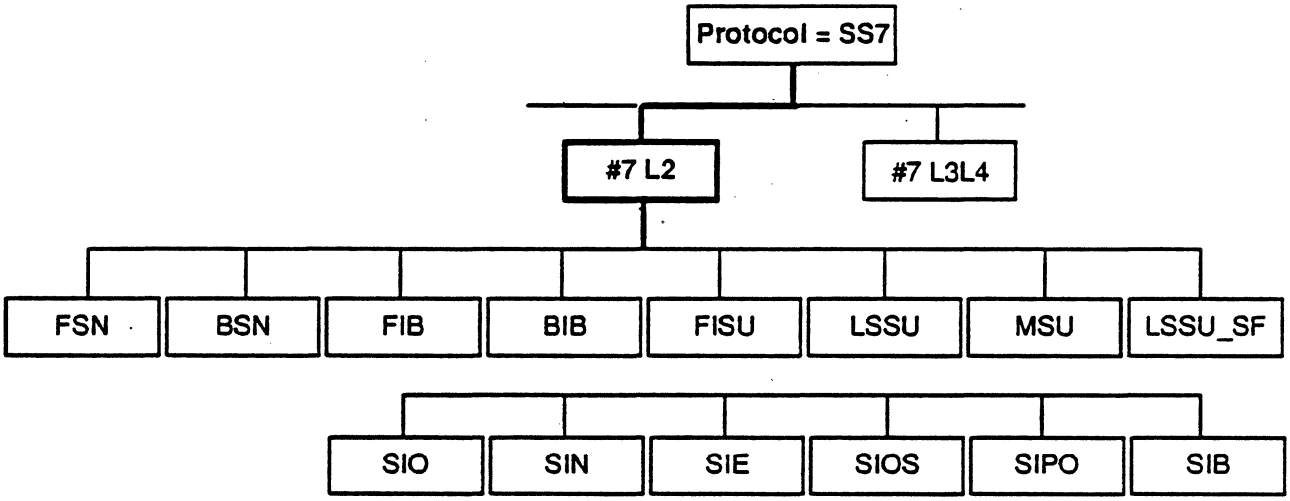


Figure 8.7: SS#7 Level 2 Triggering Options

You can trigger on the following SS#7 Level 2 elements:

FSN Forward Sequence Number

BSN Backward Sequence Number

FIB Forward Indicator Bit

BIB Backward Indicator Bit

When you select one of the above options, you are prompted for a 1 – 3 digit decimal number. When you enter a number and press *Return*, the Conditions column displays one of the following:

FSN == nnn

BSN == nnn

FIB == nnn

BIB == nnn

nnn is the decimal number you entered.

FISU (Fill In Signal Unit). When you select FISU, the message **Any FISU** appears in the Conditions column, and the Chameleon will trigger on any FISU encountered.

LSSU (Link Status Signal Unit). When you select LSSU, the message **Any LSSU** appears in the Conditions column,

and the Chameleon will trigger on any LSSU encountered. To trigger on the status indicator of an LSSU (SIO, SIE, SIOS, etc), use the LSSU_SF option described below.

MSU (Message Signal Unit). When you select MSU, the message **Any MSU** appears in the Conditions column, and the Chameleon will trigger on any MSU encountered.

LSSU_SF [Link Status Signal Unit (Status Field)]. This option enables you to trigger on the status field of an LSSU. When you select LSSU_SF, one of the following can be selected using the function keys:

SIO	Link Out of Alignment
SIN	Normal Alignment
SIE	Emergency Alignment
SIOS	Link out of Service
SIPO	Processor Outage
SIB	Busy

When you select one of these LSSU status field types, the message **LSSU_SF on nnn** appears in the Conditions column, where **nnn** is one of the status types listed above.

Protocol: #7 L3L4

F7 #7 L3L4 displays the menu of SS#7 Level 3 and Level 4 triggering options, as shown in Figure 8.8. This option enables you to trigger on specific Signalling Indicators, their components, and the following Level 3 and Level 4 elements:

SI (Signalling Indicator). This option enables you to trigger on a specific component of a Signalling Indicator. When you select **SI**, the function key strip displays the message types that can be triggered on:

MGT	Signalling network management messages
TMR	Signalling network testing and maintenance messages
TMS	Signalling network testing and maintenance messages (spare)
DUPC	Data User Part (call and circuit related messages)
DUPF	Data User Part (facility registration and cancellation messages
SCCP	Signalling Connection and Control Part
TUP	Telephone User Part (see also page 8–33)
ISUP	ISDN User Part (see also page 8–35)

When you select a specific Signalling Indicator type, the function key strip displays the elements on which you can trigger. Depending on the Signalling Indicator selected, and the SS#7 specification in use (CCITT, ANSI, or NTT) the available elements will be among the following options:

Any This option is available for all Signalling Indicator types. When selected, it causes the Chameleon to trigger on the selected Signalling Indicator type. It displays the message *Any nnn* in the Conditions column, where *nnn* is the SI type.

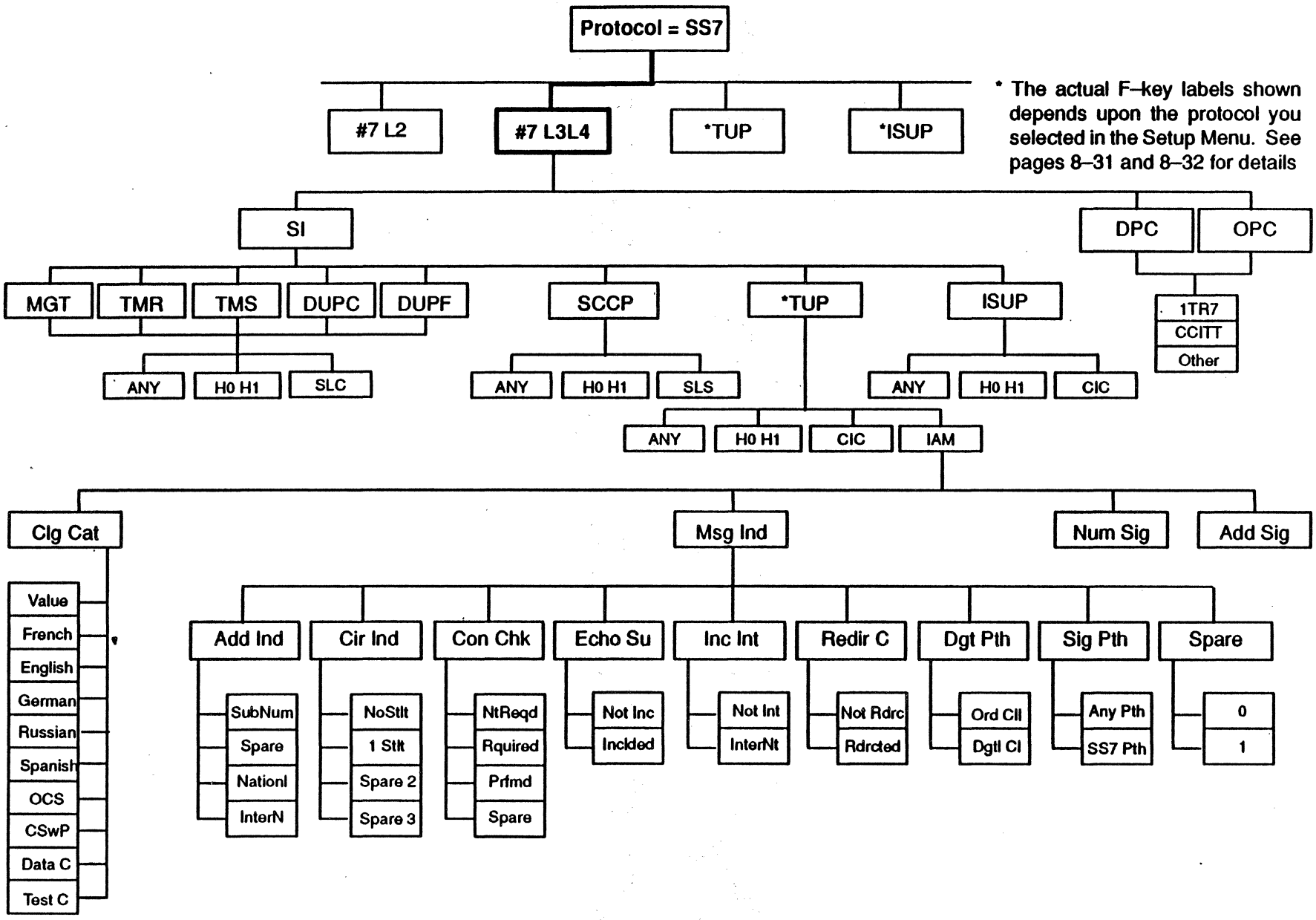


Figure 8.8: SS#7 Level 3 and Level 4 Triggering Options.

SL(C/S) (Signalling Link Code). This option is displayed for all Signalling Indicator types except TUP and ISUP. When selected, you are prompted for a hex value. The Conditions column displays the message **SLC==nnn**, where **nnn** is the hex value of the desired SLC.

(Signalling Link Selection). This option – available for the SCCP SI only – allows you to trigger on the signalling link selection field. When selected, you are prompted for a hex value. The Conditions column displays the message **SLS==nnn**, where **nnn** is the hex value for the desired SLS.

CIC (Circuit Identification Code.) This option is displayed when triggering on ISUP, TUP, or 1TR7 messages. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

H0H1 (Heading Code). This option is available for all Signalling Indicator types. The heading code is a 4–bit field (H0 H1) which identifies the message group. When you select H0 H1, it displays a mnemonic table for the selected message type. For example, if you select TUP H0 H1, the table shown in Figure 8.9 is displayed.

IAM (Initial Address Message). This option, available only when the TUP SI is selected, allows you to trigger on IAM elements. See page 8–29 for further details. Figure 8.8 lists the elements available for triggering.

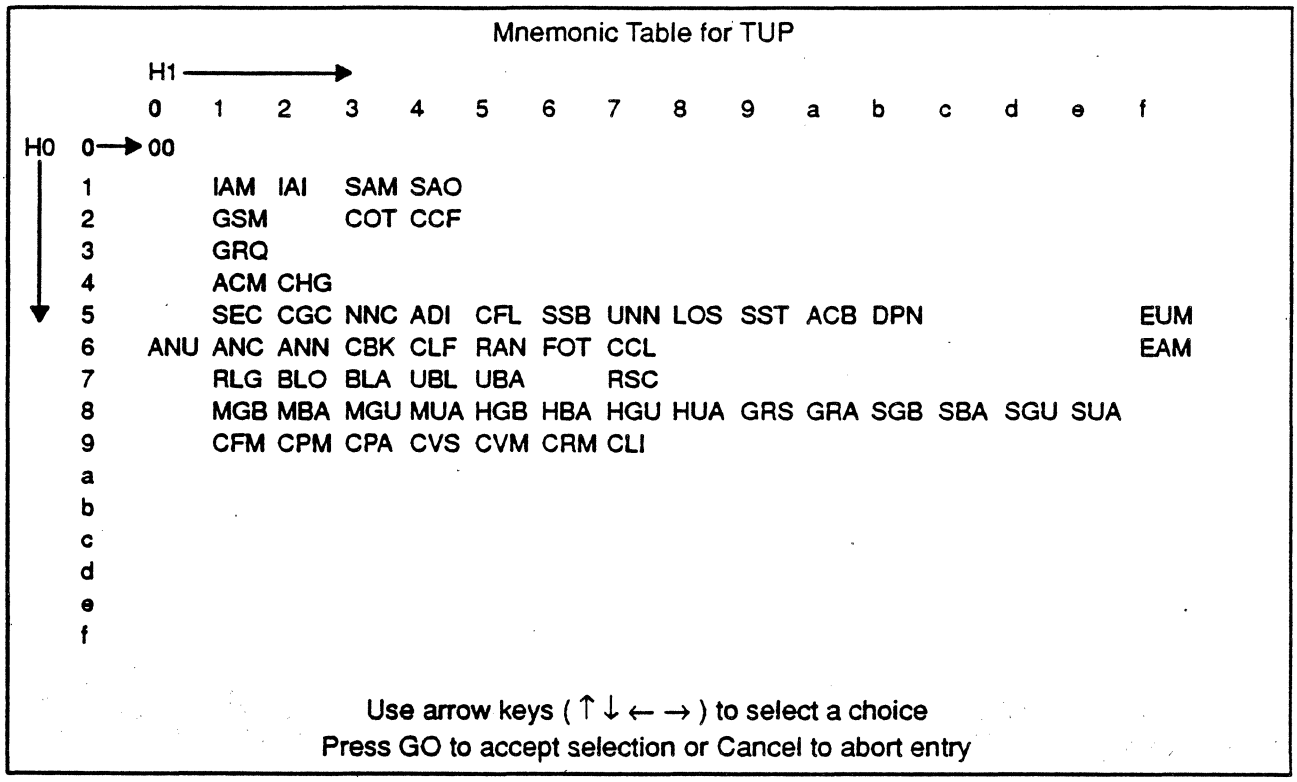


Figure 8.9: Heading Code Mnemonic Selection for Telephone User Part (TUP)

To select a heading code by standard mnemonic:

1. Move the arrow cursor to the mnemonic
2. Press ***Go***. This returns you to the Triggering editor and displays the message **TUP Heading Code is nnn**, where **nnn** is the selected mnemonic. In the table, the selected mnemonic or value is displayed in green.

To exit the heading code table without making a selection:

Press ***Cancel***.

To trigger on a heading code value other than the standard mnemonics displayed in the table:

1. Move the arrow to the appropriate position in the table.
2. Press ***Go***.

For example, to trigger on heading code H0 value 0 and H1 value 4, move the cursor to the fifth column of the first row, and press ***Go***.

In addition, when you trigger on Telephone User Part (TUP), you have the option of triggering on specific elements of Initial Address Messages (IAM). This feature is provided because of the relative importance of IAMs. Figure 8.10 illustrates the format of an IAM so that you can relate the SS#7 triggering options to the IAM components.

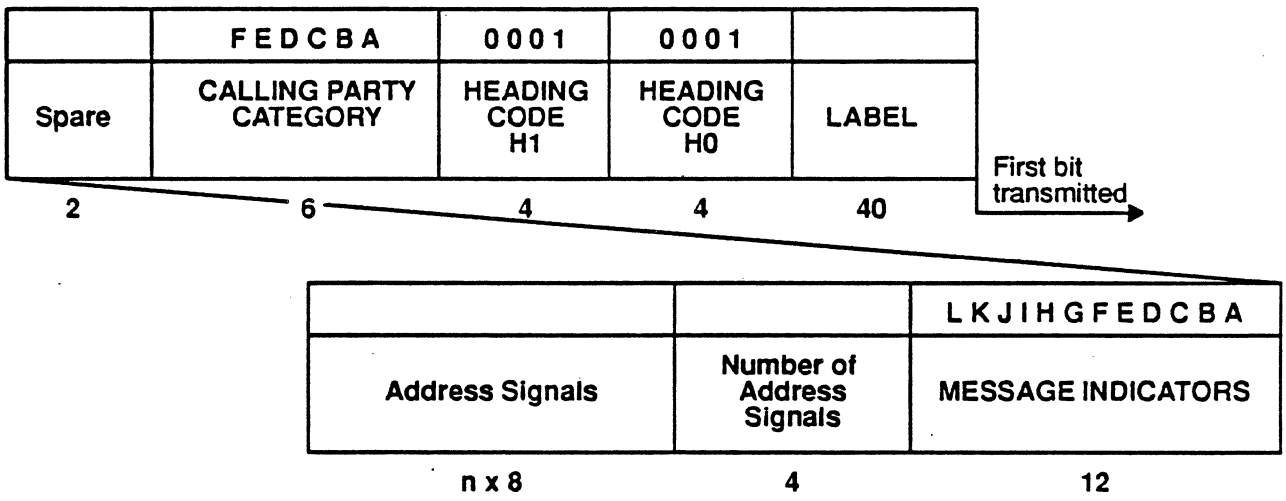


Figure 8.10: TUP Initial Address Message (IAM) Format

When you select TUP IAM, the function key strip displays the following triggering options:

Num Sig (Number of address signals). This option enables you to trigger on the number of address signals contained in the initial address message. Enter one hex digit or **X** to specify 'don't care.' This displays the message **Num of add sigs == x** in the Conditions column, where **x** is the hex value that you entered.

Add Sig (Address Signal). This option enables you to trigger on a specific telephone number, or specific elements of a telephone number. When you select this option, you are prompted for the telephone digits (in decimal) that you want to trigger on. To ignore a digit, enter the letter **x** in that position. For example, to trigger on area code 818, enter the following:

818xxxxxxx <Return>

The Conditions column then displays the message **IAM digits == 818xxxxxxx.**

The Chameleon will trigger only on phone numbers with the same number of digits shown in the condition. For example, if you enter the condition

IAM digits == 123xx

the Chameleon will trigger only on phone numbers beginning with 123 with a length of 5 digits. If the phone number has more or less than 5 digits, the trigger will not fire.

If the number of **'don't care'** digits will vary, for example, in a country code, you can express a logical OR condition by writing two triggers. For example, the first trigger could specify two initial **'don't care'** digits and the second trigger could specify three initial **'don't care'** digits.

Clg Cat (Calling Party Category). This option triggers on a specific Calling Party Category, with the following options:.

French	Operator, language French
English	Operator, language English
German	Operator, language German
Russian	Operator, language Russian
Spanish	Operator, language Spanish
O C S	Ordinary Calling Subscriber
C S w P	Calling Subscriber with Priority
Data C	Data Call
Test C	Test Call

Value Enter a decimal value which represents one of the categories not defined above. An appropriate message will be displayed in the Conditions column, as described below. If a value is entered that corresponds to one of the above values, the appropriate message will appear.

Admin. Language (Available to Administrations for selecting a particular language provided by mutual agreement) This appears when value 6, 7, or 8 is entered.

Reserved

This appears when value 9 is entered.

Spare

This appears when values 14–127 are entered.

Msg Ind (Message Indicator). This option enables you to trigger on message–indicator bit settings A – L (refer to Figure 8.10). The following options are available:

Add Ind Nature of address indicator (Bits B A):

Sub Num	Subscriber Number
Spare	Spare (reserved for national use)
Nationl	National (significant) number
InterN	International number

Cir Ind Nature of circuit indicator (Bits D C):

No Stlt	No satellite circuit in the connection
1 Stlt	One satellite circuit in the connection
Spare 2	Spare (binary 1 0)
Spare 3	Spare (binary 1 1)

Con Chk Continuity check Indicator (Bits F E):

Nt Reqd	Continuity check not required
Rquired	Continuity check required on this circuit
Prfmd	Continuity check performed on a previous circuit
Spare	Spare

Echo Su Echo suppressor indicator (Bit G):

Not Inc	Outgoing half echo suppressor not included
Incided	Outgoing half echo suppressor included

Inc Intl Incoming International Call indicator (Bit H):

Not Int	Call other than international incoming
InterNt	Incoming international call

Redir C Redirected call indicator (Bit I):

Not Rdrc	Not a redirected call
Rdrcted	Redirected call

Dig Pth All digital path required indicator (Bit J):

Ord Cll	Ordinary call
Dgtl Cl	Digital path required

Sig Pth Signalling path indicator(Bit K):

Any Pth	Any path
SS7 Pth	All signalling system No. 7 path

Spare Spare (Bit L):

0	Spare bit not set
1	Spare bit set

OPC Origination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

DPC Destination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

Protocol: CT TUP

F8 CT TUP displays function key options for CCITT SS#7 Telephone User Part (TUP) triggering, as shown in Figure 8.11. This option provides direct access for writing simpler TUP triggers. Refer to ***F7 #7 L3L4*** for more complex Level 3 and Level 4 TUP triggering and for triggering on Signalling Indicators other than TUP. See page 8–52 for an example of an SS#7 TUP trigger.

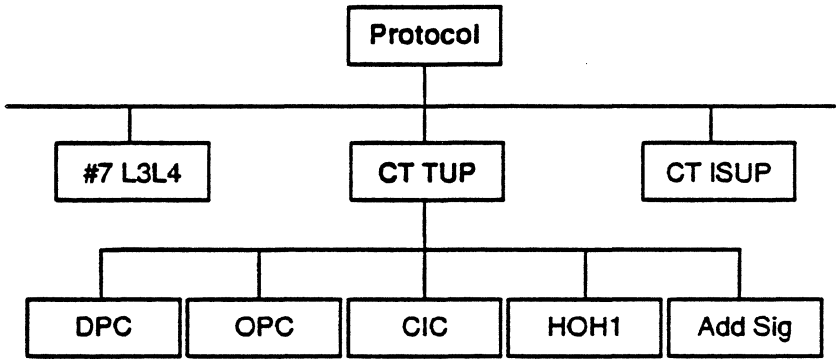


Figure 8.11: SS#7 CCITT TUP Level 3 and Level 4 Options

With the ***F8 CT TUP*** option, you can trigger on the following TUP components:

OPC Origination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

DPC Destination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

CIC (Circuit Identification Code.) This option is displayed when triggering on ISUP, TUP, or 1TR7 messages. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

H0H1 (Heading Code) The heading code is a 4–bit field (H0 H1) which identifies the message group. When you select H0 H1, it displays the mnemonic table for TUP. The format and use of the TUP mnemonic table is described on page 8–28.

Add Sig (Address Signal.) This option enables you to trigger on a specific telephone number, or specific elements of a telephone number. When you select this option, you are prompted for the telephone digits (in decimal) that you want to trigger on. To ignore a digit, enter the letter **x** in that position. For example, to trigger on area code 818, enter the following:

818xxxxxxx <Return>

The Conditions column then displays the message **IAM digits == 818xxxxxxx**

Protocol: CT ISUP

F9 CT ISUP displays function key options for CCITT SS#7 ISDN User Part (ISUP) triggering, as shown in Figure 8.12. This option provides direct access for writing ISUP triggers. Refer to *F7 #7 L3L4* (page 8–25) for triggering on Signalling Indicators other than ISUP.

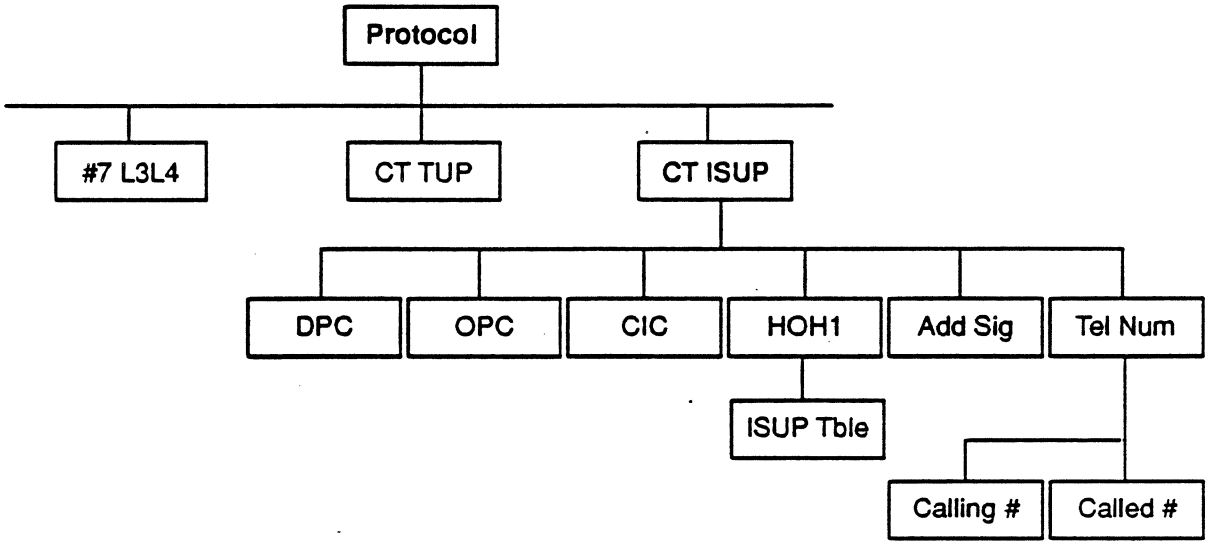


Figure 8.12: SS#7 CCITT ISUP Level 3 and Level 4 Options

With the *F9 CT ISUP* option, you can trigger on the following TUP components:

OPC Origination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

DPC Destination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

CIC (Circuit Identification Code.) This option is displayed when triggering on ISUP, TUP, or 1TR7 messages. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

H0H1 (Heading Code) The heading code is a 4–bit field (H0H1) which identifies the message group. When you select H0 H1, it displays the mnemonic table for ISUP (see Figure 8.13 below). The use of an H0/H1 mnemonic table is described on page 8–28.

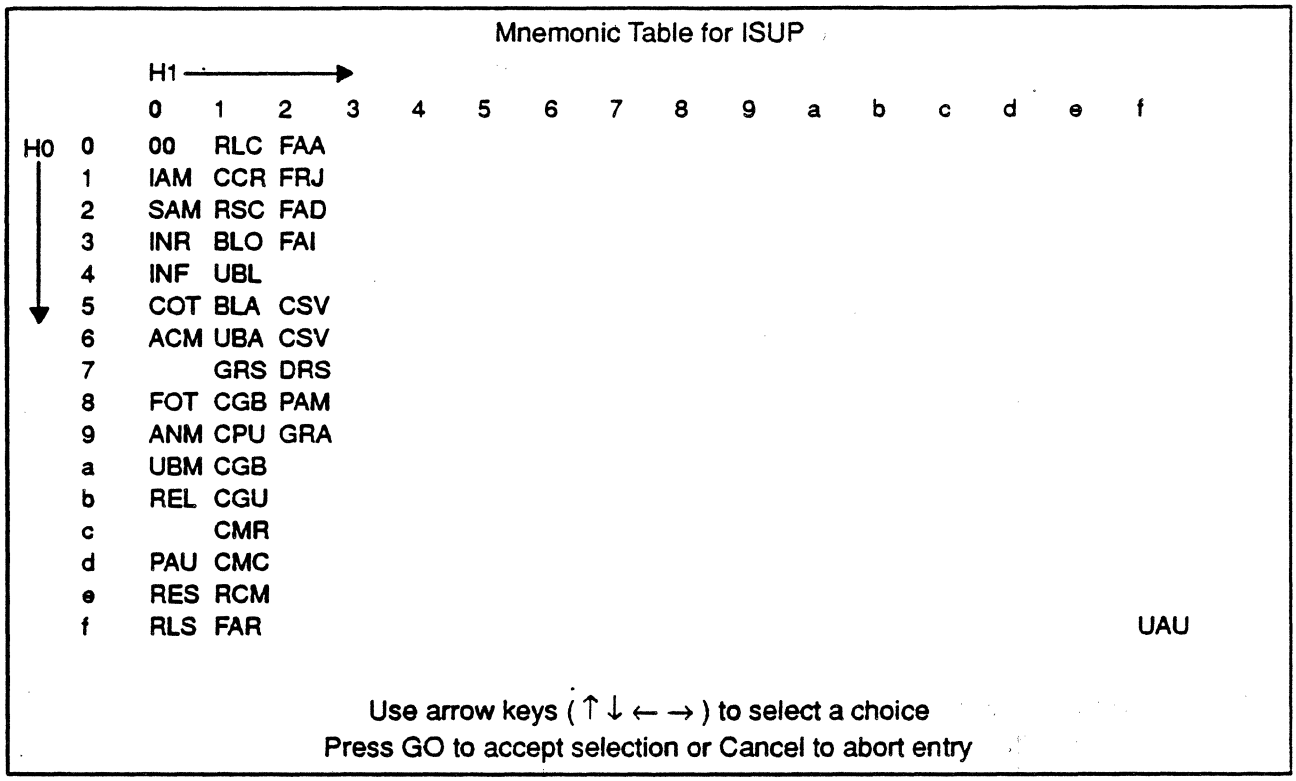


Figure 8.13: The ISUP Mnemonic Table.

Add Sig (Address Signal). This option triggers on a specific address signal (telephone number) in a Called Party Number information element of an IAM.

When you select this option, you are prompted for the telephone digits (in decimal) that you want to trigger on. To ignore a digit, enter the letter **x** in that position. For example, to trigger on area code 818, enter the following:

818xxxxxxx <Return>

The Conditions column then displays the message: **IAM digits == 818xxxxxxx**

The following option is available only if your Chameleon is configured to monitor SS#7 standard 1TR7.

Tel. Num This option triggers on the called or calling **Telephone Number**. Selecting this option calls up two other options:

F1 Calling # Prompts you for the telephone number of the calling party.

The Chameleon triggers on the IAM frame containing the complete Calling Number, and on all messages related to the call.

F2 Called # Prompts you for the telephone number of the called party.

The Chameleon triggers on the IAM frame containing the complete or partial called number, the SAM containing the address signal which completed the called number, and on all the messages related to the call.

The following factors determine if a message is related to the call when triggering on Called #:

- For ISUP messages, for those messages with a CIC value which matches the CIC in the IAM
- For SCCP messages sent from the same direction as the IAM, related messages are those in which the Source Local Reference matches the IAM Local Reference of Connection Request IE.
- For other SCCP messages, related messages are those in which the Destination Local Reference matches the IAM Local Reference of Connection Request IE.

Note: When the Called Address in an IAM frame matches a trigger condition, but the SAM fails to complete the number, only the IAM frame will be triggered.

The telephone number you enter must conform to the following rules:

- Enter a maximum of 20 digits.
- Do not include spaces and hyphens (–) when you enter the number.
- You can use the following wildcards within the telephone number:

  ? Wildcard substitution for a single telephone number digit, for example:

  41486??98

  * Wildcard substitution for the remaining digits of the telephone number. For example, the following triggers on any telephone number with the first three digits 414:

  414*

- A maximum of 16 telephone numbers can be entered in a triggering file.

Protocol: TR7ISUP

F9 TR7ISUP displays function key options for 1TR7 #SS7 ISDN User Part (ISUP) triggering, as shown in Figure 8.14. This option provides direct access for writing 1TR7 SS7 ISUP triggers.

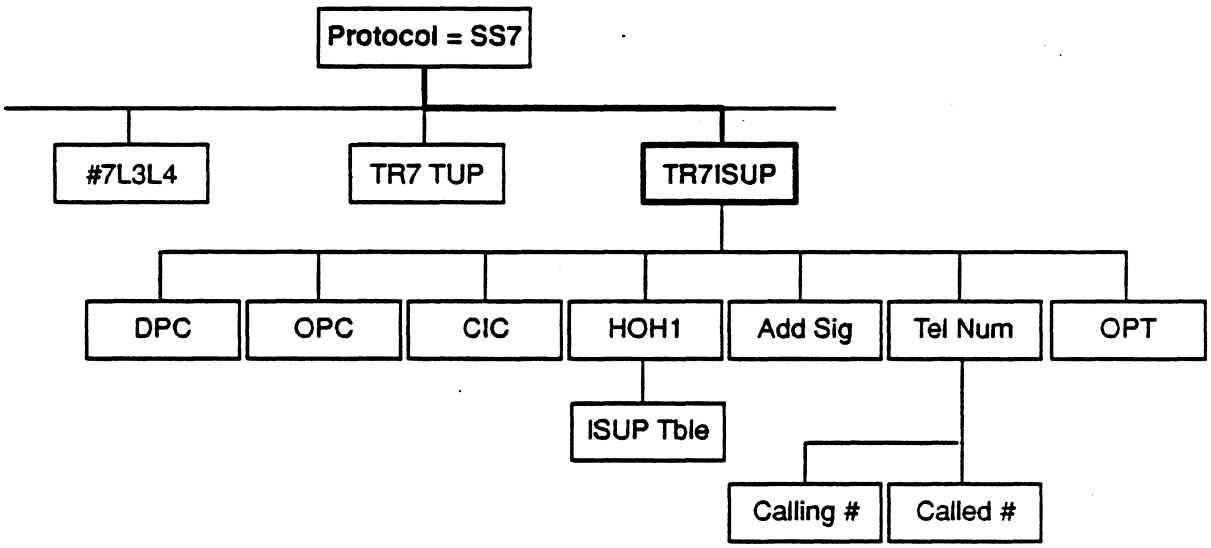


Figure 8.14: SS#7 1TR7 ISUP Level 3 and Level 4 Options

With the ***F9 TR7ISUP*** option, you can trigger on the following components:

OPC Origination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

DPC Destination Point Code. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

CIC (Circuit Identification Code.) This option is displayed when triggering on ISUP, TUP, or 1TR7 messages. The way in which this field is entered is specific to the SS#7 standard being used. Refer to page 8–22 for more information.

H0H1 (Heading Code) The heading code is a 4–bit field (H0H1) which identifies the message group. When you select H0 H1, it displays the mnemonic table for ISUP (see Figure 8.15 below). The use of an H0/H1 mnemonic table is described on page 8–28.

Mnemonic Table for 1TR7 ISUP

H0	H1 → 0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
↓	0	00	RLC	FAA												
	1	IAM	CCR	FRJ												
	2	SAM	RSC	FAD												
	3	INR	BLO	FAI												
	4	INF	UBL													
	5	COT	BLA	CSV												
	6	ACM	UBA	CSV												
	7		GRS	DRS												
	8	FOT	CGB	PAM												
	9	ANM	CPU	GRA												
	a	UBM	CGB													
	b	REL	CGU													
	c		CMR													
	d	PAU	CMC													
	e	RES	RCM													
	f	RLS	FAR													UAU

Use arrow keys (↑ ↓ ← →) to select a choice
Press GO to accept selection or Cancel to abort entry

Figure 8.15: The 1TR7 ISUP Mnemonic Table.

Add Sig (Address Signal). This option triggers on a specific address signal (telephone number) in a Called Party Number information element of an IAM.

When you select this option, you are prompted for the telephone digits (in decimal) that you want to trigger on. To ignore a digit, enter the letter **x** in that position. For example, to trigger on area code 818, enter the following:

818xxxxxxx <Return>

The Conditions column then displays the message: **IAM digits == 818xxxxxxx**

The following option is available only if your Chameleon is configured to monitor SS#7 standard 1TR7.

Tel. Num This option triggers on the called or calling Telephone Number. Selecting this option calls up two other options:

F1 Calling # Prompts you for the telephone number of the calling party.

The Chameleon triggers on the IAM frame containing the complete Calling Number, and on all messages related to the call.

F2 Called # Prompts you for the telephone number of the called party.

The Chameleon triggers on the IAM frame containing the complete or partial called number, the SAM containing the address signal which completed the called number, and on all the messages related to the call.

The following factors determine if a message is related to the call when triggering on Called #:

- For ISUP messages, for those messages with a CIC value which matches the CIC in the IAM
- For SCCP messages sent from the same direction as the IAM, related messages are those in which the Source Local Reference matches the IAM Local Reference of Connection Request IE.
- For other SCCP messages, related messages are those in which the Destination Local Reference matches the IAM Local Reference of Connection Request IE.

Note: When the Called Address in an IAM frame matches a trigger condition, but the SAM fails to complete the number, only the IAM frame will be triggered.

The telephone number you enter must conform to the following four rules:

- Enter a maximum of 20 digits.
- Do not include spaces and hyphens (–) when you enter the number.
- You can use the following wildcards within the telephone number:

  ? Wildcard substitution for a single telephone number digit, for example:

  41486??98

* Wildcard substitution for the remaining digits of the telephone number. For example, the following triggers on any telephone number with the first three digits 414:

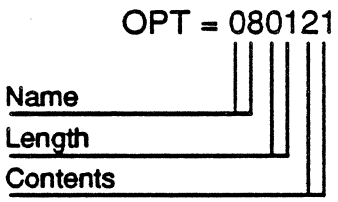
414*

- A maximum of 16 telephone numbers can be entered in a triggering file.

OPT This option allows you to trigger on 1TR7 SS#7 ISUP optional message parameters. Selecting this option elicits a prompt for hex strings representing the optional parameters to trigger on. This string of hex digits should contain:

1. The name of the optional part (1 octet): 2 hex digits
2. The length of the optional part (1 octet): 2 hex digits
3. The contents of the optional part (up to 9 octets): up to 18 hex digits.

For example:



Note: OPT TRIGGER cannot be executed unless the following file is in the Chameleon directory:

A:\Tekelec\setup\trigger\OPT.DEF.

This file contains the values of all message–types of frames having an optional part. It also contains the corresponding offsets of the pointer to the first optional part. If you try to execute OPT TRIGGER without first having loaded the OPT.DEF file, the following error message is given:

Can't open <path> OPT.DEF

Variable This option allows you to compare an integer variable with another integer variable or a constant. If you press this softkey, you will be asked to select an integer variable ($7, $8, $9). You will then be prompted for a logical operator (> =, < =, ==, >, <). You should then select either another integer variable or a constant for comparison with the first integer variable previously chosen.

Leads

This option allows you to trigger on the state or change of a specific interface lead. When you press ***Leads***, you are prompted for DCE or DTE lead mnemonics shown in Figures 8.16 and 8.17 below.

Mnemonic	Name	CCITT	EIA Ref.	RS232 Pin
CTS	Clear to Send	106	CB/CS	5
DSR	Data Set Ready	107	CC/DM	6
DCD	Data Carrier Detect	109	CF/RR	8
RI	Ring Indicator	125	CE/IC	22

Figure 8.16: DCE Interface Leads

Mnemonic	Name	CCITT	EIA Ref.	RS232 Pin
RTS	Request to Send	105	CA/RS	4
DTR	Data Terminal Ready	108.2	CD/FR	20

Figure 8.17: DTE Interface Leads

After selecting a lead, you are prompted for the condition:

High Triggers whenever the lead is high. High =Space (driven).

Low Triggers whenever the lead is low. Low =Mark (undriven).

ToHigh Triggers if the lead changes from low to high.

ToLow Triggers if the lead changes from high to low.

Port

On a Dual Port machine, you can trigger on frames from either Port A or Port B. If you do not indicate a preference, the Chameleon will trigger from both ports. On a Single Port machine, the **Port** option does not appear.

ACTIONS

Any combination of up to four trigger ACTIONS can be set to take effect when all CONDITIONS selected for a trigger are **true**. More than one trigger can access the same ACTION(s).

Note: Triggers are checked in the order they were entered, and operate on every event. For a trigger ACTION to take effect, all CONDITIONS selected for that trigger must be **true**.

The ACTIONS will be displayed in the field that follows the word **do** on the Trigger page. The **Cancel** key will remove previously specified ACTIONS when the trigger editor cursor is on the ACTIONS field. *Cancel* erases one condition at a time, starting with the bottom condition.

All triggers are first evaluated to see if their CONDITIONS are **true**. If *all* the conditions of a trigger are true, the trigger ACTIONS take effect in order.

The Triggering language allows you to specify up to four ACTIONS for each trigger: The softkey options are:

Arm Alters the status of a trigger during run–time. Enter the four–character trigger name (for example, trigger **ABCD**), and press **<RETURN>**. (**Trigger ABCD** is displayed in the ACTION field). Then, select how it should be ARMed (1stTime, Disable, or Whenever). For example, if you select **Whenever**, **Whenever ABCD** will replace **Trigger ABCD** in the ACTION field.

Stats (Statistics) You are given a choice between Process, Print, and Reset. The Process option marks frames that satisfy the trigger CONDITIONS. The **Statistics** application will only keep track of the frames which cause the trigger to fire. The Print option forces the **Statistics** program to print the **Statistics** screen, and the Reset option resets the **Statistics** page to zero.

Stat Process, Stat Print, OR Stat Reset will be displayed in the ACTION field for these options.

Display When this Action is selected, **Display** will appear in the ACTION field. This Action determines which data is displayed in the Real Time and History pages.

In the Real Time page, only data meeting the triggering conditions will be displayed.

In the History page, there are two DISPLAY options:

- In normal mode, data which meets the triggering conditions is shown in low intensity color. All other data is shown in high intensity color.
- In trigger mode, only data which meets the triggering conditions is displayed in the History page. All other data is suppressed from the display.

The triggering DISPLAY mode is controlled from the History page using two commands:

- :normal Selects normal display mode. This is the default mode.
- :trigger Selects trigger display mode.

When using these commands, you must include the colon (:) as part of the command to invoke the command line. See Chapter 4 for more information about the History page.

=>Disk Marks frames that satisfy the trigger CONDITIONS so that they will be recorded to the Direct–To–Disk area of the hard disk. **"Direct=>Disk"** will be displayed in the ACTION field.

Note: When analyzing data from disk, this key is 'Not Active' (N/A). Pressing it elicits the error message:

"=>DISK option is not valid when data source is DISK."

Mesg Displays the message **"Trigger Fired"** and beeps, indicating that the trigger CONDITIONS have been met. This message will be displayed on the Run time page. The words **"Display Message"** will be displayed in the ACTION field.

StopAcq (Stop Acquisition) Stops the acquisition of traffic from the line. A variable number of frames may be captured after the trigger frame by specifying, in decimal, the number to be captured (up to five digits).

IncCnt (Increment Counter) Increments the specified counter by one. For example, if you specify **Counter1 Inc, "Inc (Counter1)"** will be displayed in the ACTION field.

ResCnt

Resets specified counter. For example, if you specify **Counter2 Res**, "**Reset (Counter2)**" will be displayed in the ACTION field.

Timer

Starts, Stops, or resumes a specified timer. For example, if you specify that **Timer3** should **stop**, "**Stop (Timer3)**" will be displayed in the ACTION field. **Start** resets it to 0, and **resume** *continues* from where it was stopped.

SetVars

When you select **SetVars** option, there are three different kinds of actions which can be performed. Triggering variables are used to store sections of incoming frames for comparison with later frames. There are nine variables in all, divided into three distinct types: byte, bit, and int. Depending on which type you choose, you can store a string of complete bytes, store a string of bits, or convert a number of bits in to an integer.

Keys ***F1–F3*** store a string of entire bytes. After pressing one of these keys, you are asked at which byte of the frame you would like to begin storage. Select a number and press return. Then enter a number 1–32 to designate how many bytes should be stored.

Keys ***F4–F6*** store a string of bits. After pressing one of these keys you are asked at which byte of the frame you would like to begin storage. After entering a number and pressing return, you are asked at which bit within the designated byte you would like to begin storage. Enter a number between 1 and 8 and then press return again. Finally, enter a number between 1 and 256 to designate how many bits should be stored. You are allowed to store up to 256 bits.

Keys ***F7–F9*** are used when you would like to convert a certain number of bits (1–9) into an integer for use as an index. After pressing one of these softkeys you are asked at which byte of the frame to begin storage, then at which bit within the byte to begin storage, and, finally, for how many bits (1–9) storage should be continued. Once you enter the final number, the bits are converted to an integer for use as an index.

V Arith

This option allows you to change the value of one of the integer variables ($7–$9). To do this, select one of the variables and then select a variable or a constant to use to modify the first variable. You have the option of adding, multiplying, subtracting, or dividing (+, x, –, DIV, MOD) another variable or constant. Select the option 'Done' if you do not wish to use any operation.

TrigOut

This option, when chosen, sets the Chameleon to trigger to trigger an external device upon detecting an event. The external device can be an oscilloscope, logic analyzer, or other Chameleon. For further details, see *Example 4: Triggering an External Device.*

Run Time Triggering Page

When you have completed building or modifying your trigger, press *Go* to run it. You can press *Go* to start a trigger whenever the ***Press Go to Run*** message is displayed in the upper right corner of the Triggering Editor screen. This starts the trigger and displays the Run Time Triggering page shown below.

Acquisition is stopped while you are in the Triggering Editor. This allows you to go back and forth from the Triggering Editor to Triggering Run Time. You can use ***Run/Stop*** to continue acquisition.

Note: The Run Time Triggering page (see Figure 8.18) displays the status of a maximum of 20 triggers.

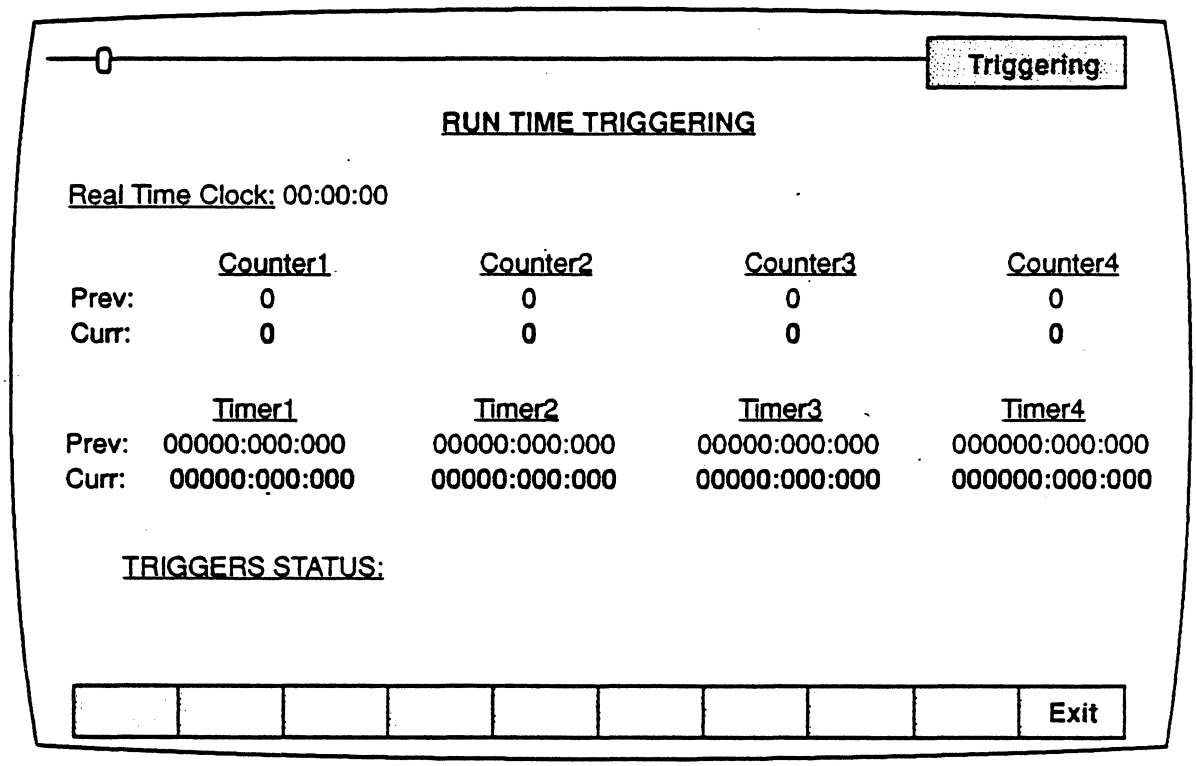


Figure 8.18: Run–Time Triggering Page.

The fields of the Run Time Triggering page are:

Real Time Clock: Displays the time of day.

Prev: and Curr: Curr keeps track of the current counter and timer. When either are reset, Prev displays the old value of the counter or timer for later review.

Timer Timer keeps track of time in the following format: **sssss:mmm:uuu**, *where* **s**=seconds, **m**=milliseconds, and **u**=microseconds. This field is based on the time stamps from the events.

- **TRIGGERS STATUS** Displays the status of the trigger it is currently checking. The display will be blue if the conditions are being checked and green if it is disabled. The fields are:
  - Trigger status:
    + = Enabled (first time)
    − = Disabled
    * = Whenever
  - Trigger name
  - Number of times the trigger conditions have been met.

Messages

The following messages can be displayed during Run Time:

- **No more active triggers**

  In Run Time, all the triggers were disabled.

- **Waiting on acquisition**

  The Chameleon is waiting for new frames to arrive.

- **Data overwritten**

  The data currently displayed has been overwritten by new data in the data buffer. To avouid this message, do one of three things: run at a lower speed, run off–line, or reduce the number of triggers in your triggering program.

- **Trigger fired** The trigger conditions have been met.

Note: A message is displayed until it is no longer valid.

Programming Examples

The following examples show how to program a trigger for a specific application. Remember, because the Chameleon looks at trigger CONDITIONS as constraints, and checks them in the order you specified them, the first CONDITION you specify within each trigger should be the CONDITION you think is the *least* likely to be satisfied. This will minimize the time the Chameleon spends checking subsequent CONDITIONS.

Example 1: Displaying Frames with same Call Reference.

Assuming that you are monitoring an ISDN line, you want to tell the Chameleon to capture the Call Reference value when the first SETUP message type is seen and to display all subsequent frames with that Call Reference value (see Figure 8.19).

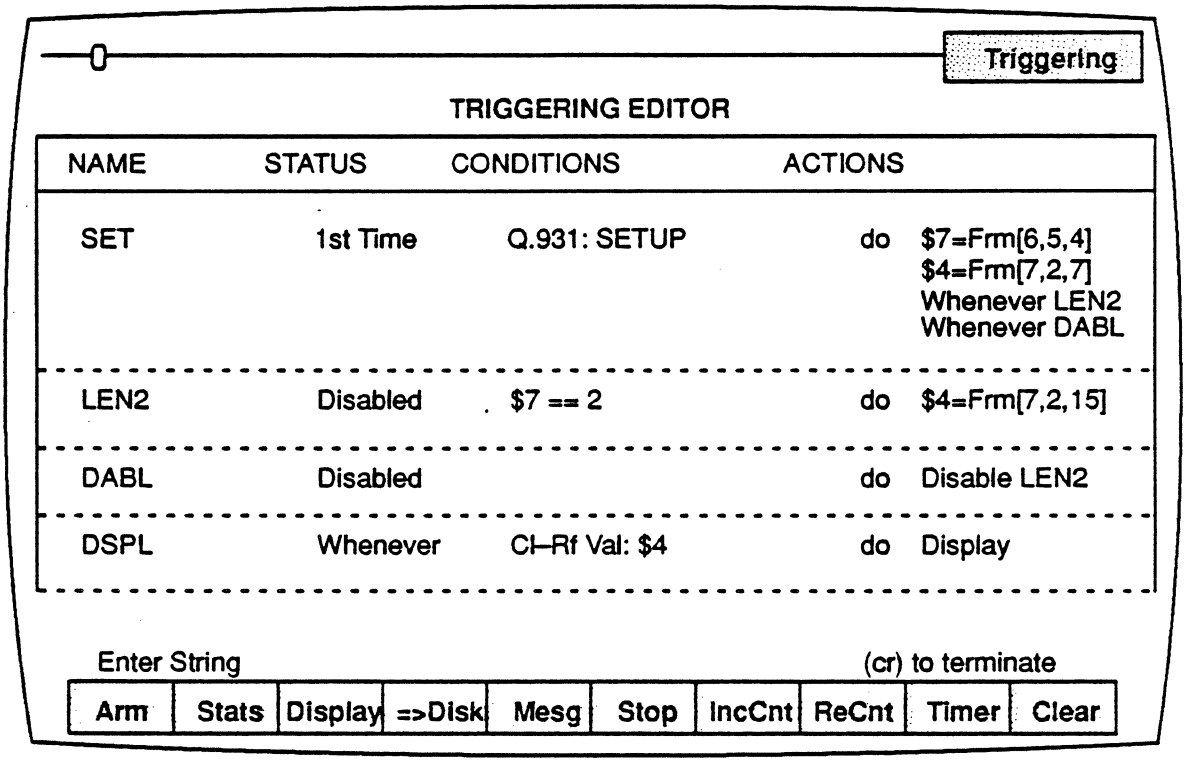


Figure 8.19: Programming Example 1 – Display Frames with Same Call Reference.

Note: Only three triggers can actually be seen at a time on the screen. Use the UP and DOWN arrows to scroll up or down to display additional triggers.

The **SET** trigger will search for a frame with the message type SETUP. Once it finds this frame, the Call Reference length will be stored in the integer variable $7. (The call reference length is coded in the frame as 4 bits, starting at bit 5 in the 6th byte.) The Call Reference value is stored in the variable $4. (Assume that the Call Reference is of length 1, in which case it is 7 bits, starting at bit 2 in the 7th byte.) Triggers **LEN2** and **DABL** are then enabled. The **SET** trigger will only fire once, since its status is 1st Time.

*Condition in the **SET** trigger*: Protocol: Q.931: MsgType: Setup
*Actions used in the **SET** trigger:* SetVars, Arm

The **LEN2** trigger will look at the Call Reference length stored in the integer variable $7. If the length equals 2, the Call Reference value is stored in the variable $4. (The Call Reference value is 15 bits, starting at bit 2, in the 7th byte.)

*Condition used in the **LEN2** trigger:* Variabl: const
*Action used in the **LEN2** trigger:* SetVars

The **DABL** trigger disables the **LEN2** trigger.

*Action used in the **DABL** trigger:* Arm

The **DSPL** trigger will search for frames with a Call Reference value equal to the value stored in the variable $4. Such frames will then be displayed by Real Time.

*Condition used in the **DSPL** trigger:* Protocol: Q.931: CallRef
*Action used in the **DSPL** trigger:* Display

Example 2: Displaying ALERT Frames

Assuming that you are monitoring an ISDN line , you want to tell the Chameleon to display all frames with message type ALERT, and with the first information element after the call reference not equal to hex 18 (see Figure 8.20).

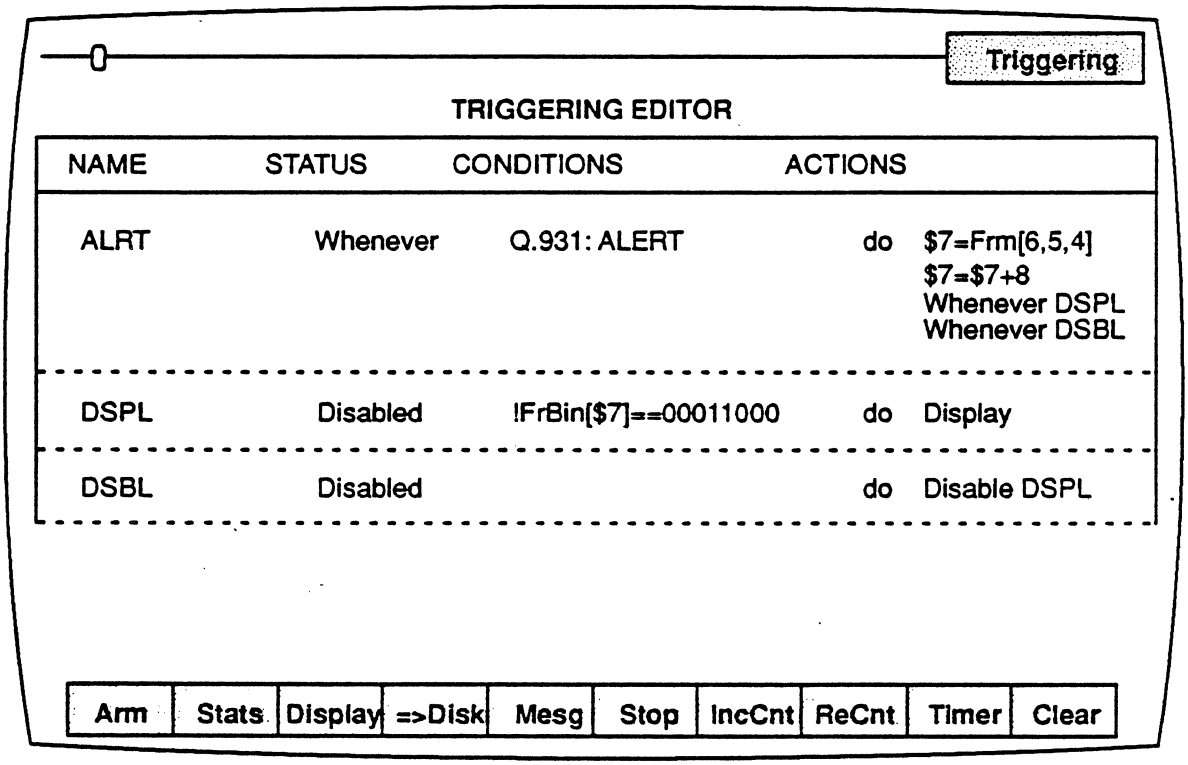


Figure 8.20: Programming Example 2 – Alert Display

The **ALERT** trigger will search for a frame with the message type ALERT. Once it finds this frame, the call reference length will be stored into the integer variable $7. (The call reference length is coded in the frame as 4 bits, starting at bit 5 in the 6th byte.) The number 8 will be added to the length in the integer variable $7 so that $7 will contain the offset in the frame of the first byte after the message type. The triggers **DSPL** and **DSBL** will then be enabled.

*Condition used in the **ALRT** trigger:* Protocol: Q.931 MsgType
*Action used in the **ALRT** trigger:* SetVars, V Arith, Arm

The **DSPL** trigger will check to see if the octet at the offset of $7 equals 00011000 (hex 18). If the offset does NOT equal hex 18, the frame is displayed.

*Condition used in the **DSPL** trigger:* Not Frame
*Action used in the **DSPL** trigger:* Display

The **DSBL** trigger disables the **DSPL** trigger

*Action used in the **DSBL** trigger:* Arm

Example 3: Storing Defined Address Messages

Figure 8.21 illustrates a trigger for SS#7 CCITT TUP, which stores to disk any address message containing the called number (address signal) 818–880–5656 with the DPC (Destination Point Code) 02–012–01. Because trigger conditions are logically ANDed, the address message must have the specified DPC and address signal in order to be stored to disk.

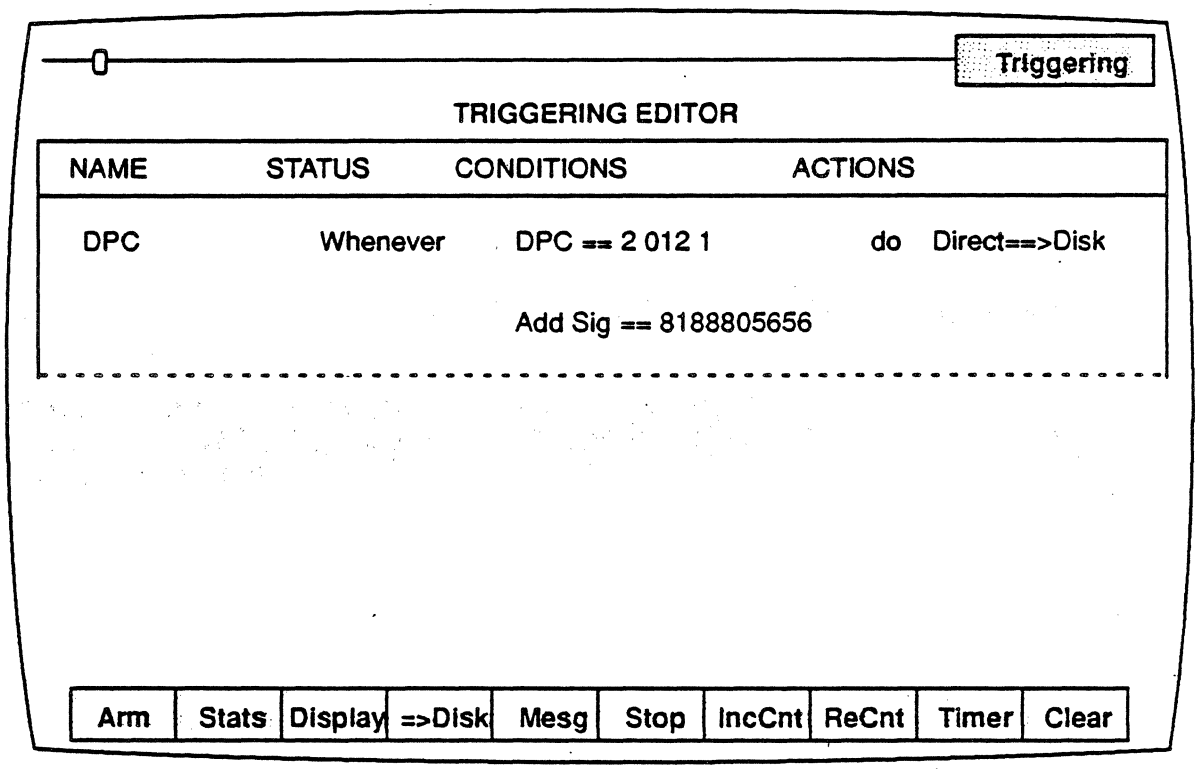


Figure 8.21: CCITT TUP Sample Trigger

The sequence of keystrokes necessary to build this trigger is listed below.

CONDITIONS

F8 Protocol For the first condition, this displays the menu of protocol options.

F8 CT TUP Selects the SS#7 CCITT Telephone User Part menu.

F1 DPC Selects the TUP DPC option.
Enter: 2 012 1 Specifies the DPC value on which to trigger.

F8 Protocol For the second condition, this displays the menu of protocol options.

F8 CT TUP Selects the SS#7 CCITT Telephone User Part menu.

F5 Add Sig Selects the TUP Address Signal option.
Enter: 8188805656 Specifies the address signal value on which to trigger.

ACTIONS

F4 =>Disk Selects the Direct–to–Disk action if the specified conditions are met.

Example 4: Triggering an External Device.

Figure 8.22 illustrates the setup for triggering an external device. When you implement such a setup, any defined event detected by the Chameleon will be reported to an external device connected to the Chameleon at the RS232 (AUX 2) port. Figures 8.23 and 8.24 illustrate certain physical characteristics of the **TrigOut** action.

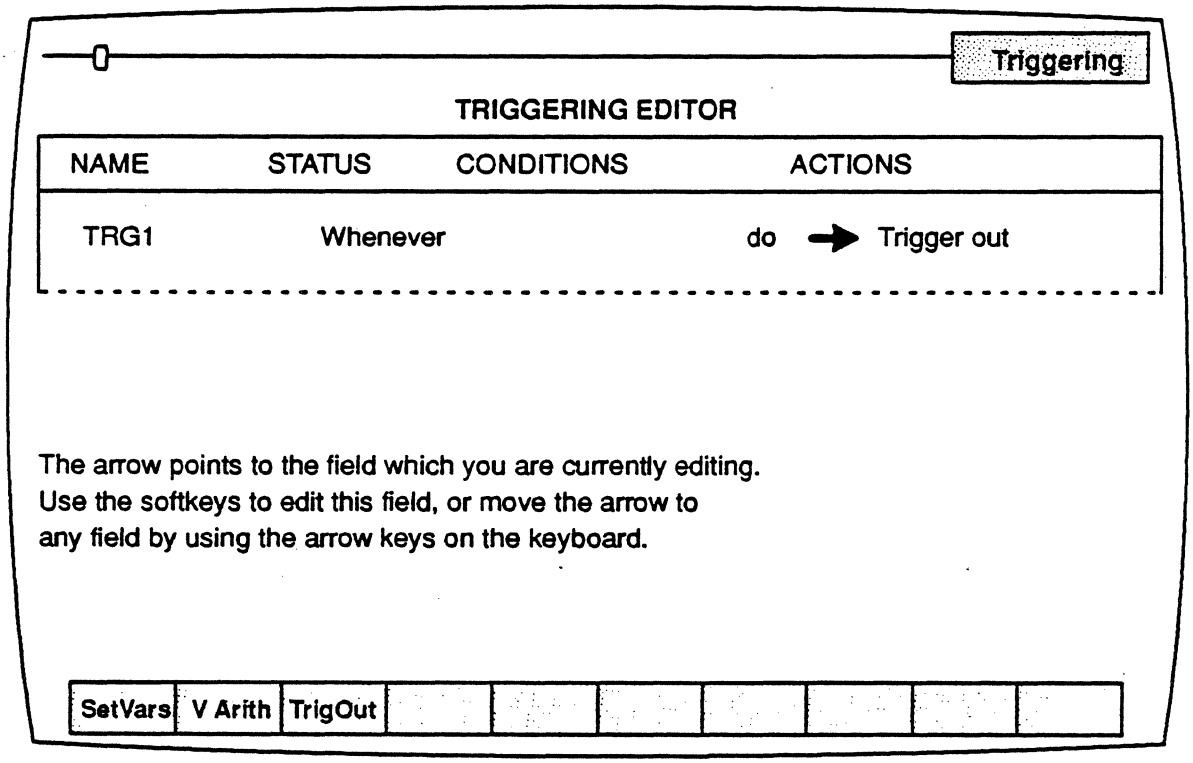


Figure 8.22: A Basic *TrigOut* (Trigger External Device) Setup.

The external device may be an oscilloscope, logic analyzer, or some other instrument for registering the occurrence of an event. When the Chameleon detects a triggering event, a pulse is transmitted to the external device over signal line 5 of the AUX 2 port, as shown in Figure 8.23.

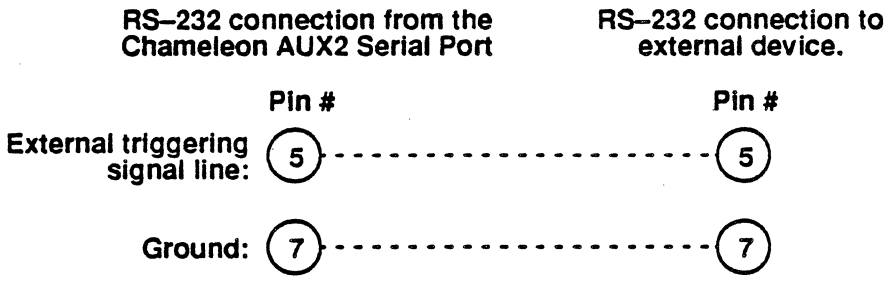


Figure 8.23: RS–232 Pinouts for Triggering to External Device.

Regardless of the nature of the event detected and being reported, the testing Chameleon generates a pulse of 6 microseconds in width. Figure 8.24 illustrates this pulse pattern and width.

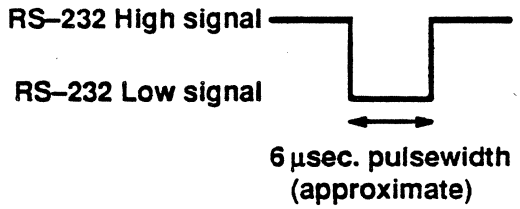


Figure 8.24: TrigOut Pulse Pattern.

CHAPTER NINE:
UTILITIES

Introduction

This section describes the Chameleon 32 Utilities Menu options. The Utilities Menu options are:

F1 Remote I/O Port Setup (Page 9–3)

Configures the Remote I/O port so that the Chameleon 32 can be remotely controlled from an asynchronous terminal, Chameleon 20, or other Chameleon 32.

F2 Printer Setup (Page 9–9)

Configures a Chameleon 32 printer port to output to a serial or parallel printer.

F3 Set Date and Time (Page 9–12)

Sets the Chameleon 32 system time and date.

F4 Traffic Load/Save (Page 9–13)

Saves Direct–To–Disk or Acquisition buffer traffic to a file. Loads a traffic file for Monitoring.

F5 645/705 Analysis Conversion (Page 9–16)

Converts traffic saved on–disk over a V–type interface by Hard Engineering models 645 and 705 testers to a format compatible with the Chameleon 32 and Chameleon 20.

F6 Check Free Disk Space (Page 9–20)

Displays the number of bytes available on the hard disk or a floppy disk.

F7 Kermit/Connect Mode Setup (Page 9–21)

Configures the Chameleon 32 Aux Serial Port 2 for Kermit File Transfer.

F8 Backup/Restore Menu (Page 9–26)

Backs up and restore user files or Direct–to–disk data larger than 700 kbytes on the Chameleon hard disk.

F9 FMS File Conversion (Page 9–29)

Converts files created with the Chameleon 32, Release 2.6.1 and earlier, to the Chameleon 32 MS–DOS file format used with Software Releases 3.x and 4.x.

Menu Access

The Utilities menu is available at any time during operation of the Chameleon 32. To access the Utilities Menu, do the following:

1. Press ***Shift Utilities***. The Utilities banner appears in several seconds (in yellow) at the bottom of the Chameleon 32 screen.

2. Use the ***Select*** key to make the Utilities page active. You can then display the page (Figure 9.1 below), and use its function keys, as described on the following pages.

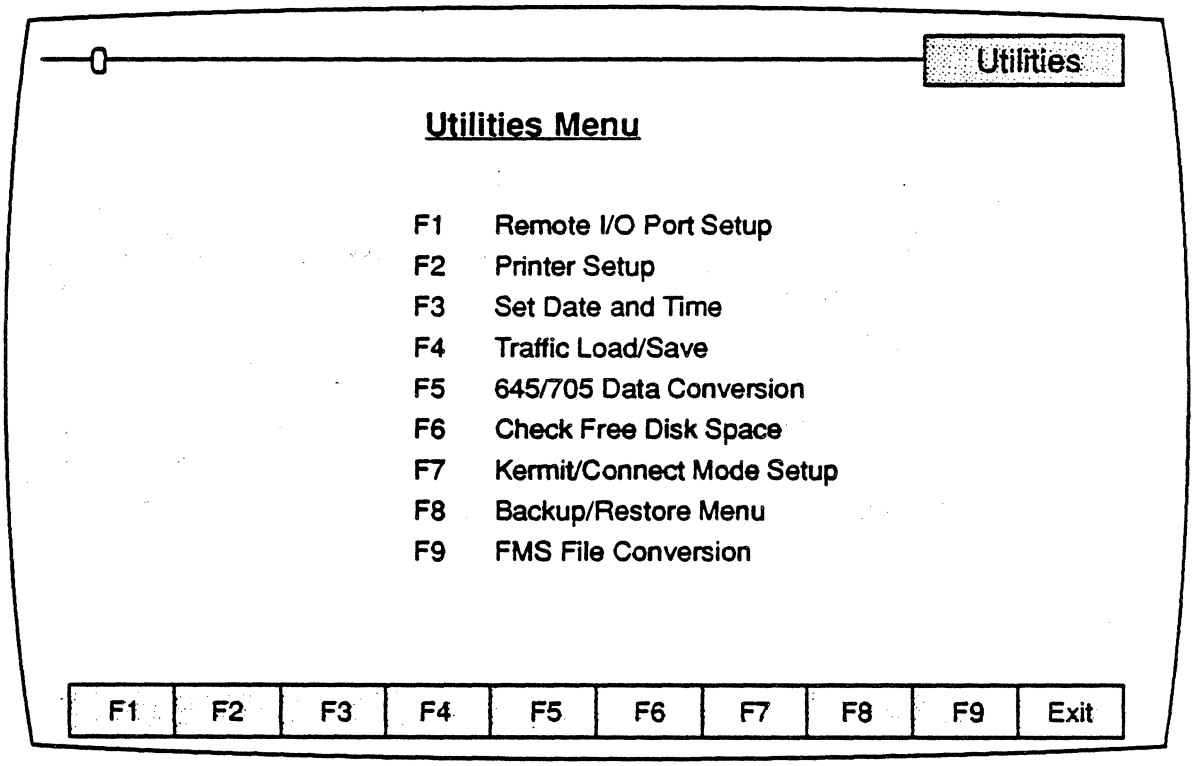


Figure 9.1: Utilities Menu

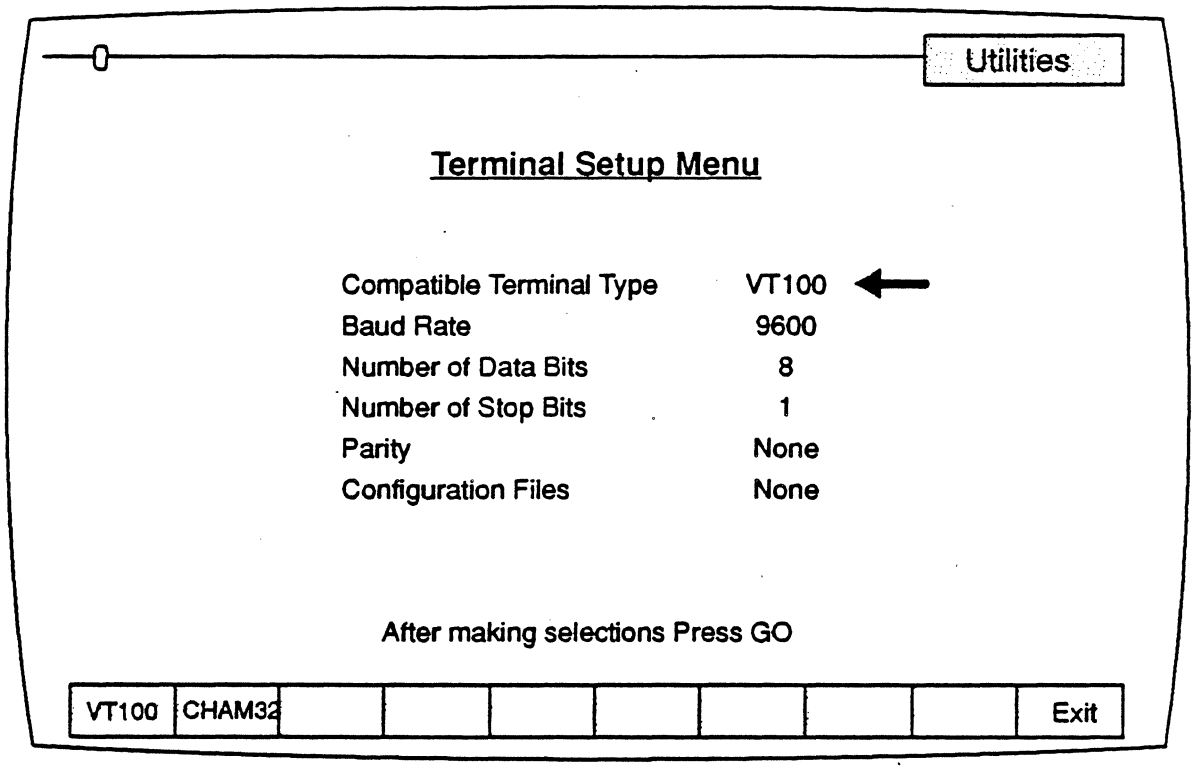


Figure 9.2: Terminal Setup Menu

Compatible Terminal Type

This selects the type of device that is connected to the Remote I/O Port to control the Chameleon. The options are:

F1 VT100
F2 CHAM32 (for Chameleon 32 or Chameleon 20)

Baud Rate

This specifies the baud rate required by the device connected to the Remote I/O Port. The options are in bits per second:

F1 300	**F4 2400**
F2 600	**F5 4800**
F3 1200	**F6 9600**

Number of Data Bits

This specifies the number of data bits required by the device connected to the Remote I/O Port. The options are:

F1 5
F2 6
F3 7
F4 8

Number of Stop Bits

This specifies the number of stop bits required by the device connected to the Remote I/O Port. The options are:

F1 1
F2 1.5
F3 2

Parity

This parameter allows you to specify the parity that will be used for error checking on the Remote I/O Port. The options are:

F1 None
F2 Odd
F3 Even

Configuration Files

This option allows you to load or save a setup file. The default path for terminal setup files is:

A:\TEKELEC\SETUP\UTILITY

The function key options are:

F1 None This indicates that you want to use the parameters as shown, and do not want to load a setup file, or save the displayed parameters. Press ***Go*** to set up the Chameleon 32 using the displayed parameters.

F2 Load This loads an existing setup file. When you press ***F2 Load***, the default file TERMINAL.DF is displayed. If you want to load a file other than TERMINAL.DF, use the delete key to erase it, and enter the file name you want. When the name is correct, press ***Go*** to load the file and perform the setup.

F3 Save This saves the displayed parameters to a file. When you press ***F3 Save***, the default file name TERMINAL.DF is displayed. If you want to use a name other than TERMINAL.DF, use the delete key to erase it, and enter the file name you want. When the name is correct, press ***Go*** to save the file and perform the setup.

Remote Terminal Keyboard

Figure 9.3 shows the Chameleon 32 keyboard. The keys in parentheses indicate which keys you have to press on a remote terminal to emulate the Chameleon 32 keyboard.

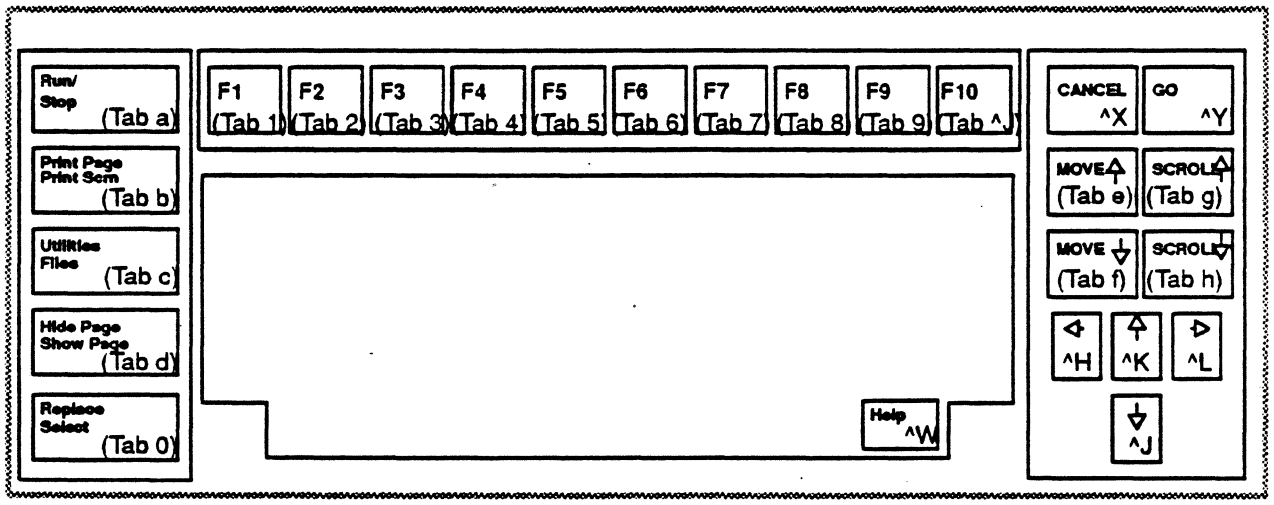


Figure 9.3: Chameleon 32 Keyboard Emulation

To cause a remote terminal to perform the same functions as the Chameleon 32, you use three keys:

Ctrl The caret symbol (^) indicates the Control key. For example, to execute the Cancel key function, type, ^X.(Ctrl+X)

Tab The use of the Tab key is indicated by the word Tab. To use the Tab key, press the Tab key, release it, and then press the other key. For example, to perform the Files key function, press ***Tab***, release it, and then press ***b***.

Shift The Shift key works the same way on a remote terminal as it does on the Chameleon 32. Pressing the Shift key with the other Tab or Ctrl key combinations, executes the upper function on the key. For example, ***Tab, Shift–d*** is the same as pressing ***Shift Replace*** on the Chameleon 32.

You can refresh the screen on a remote terminal by pressing the Tab key twice.

Figure 9.4 shows the HEX codes for a remote terminal keyboard.

To emulate the Chameleon key:	On the host, use:	Hex Code	To emulate the Chameleon key:	On the host, use:	Hex Code
F1	Tab 1	09 81	Scroll^	Tab g	09 67
F2	Tab 2	09 82	Move	Tab f	09 66
F3	Tab 3	09 83	Scroll	Tab h	09 68
F4	Tab 4	09 84	Left Arrow	Ctrl H	08
F5	Tab 5	09 85	Up Arrow	Ctrl J	0b
F6	Tab 6	09 86	Right Arrow	Ctrl L	0c
F7	Tab 7	09 87	Down Arrow	Ctrl K	0a
F8	Tab 8	09 88	Replace	Tab D	09 44
F9	Tab 9	09 89	Select	Tab d	09 64
F10	Tab Ctrl J	09 8a	Files	Tab b	09 42
Cancel	Ctrl X	18	Utilities	Tab B	09 62
Go	Ctrl Y	19	Run/Stop	Tab 0	09 80
Move ^	Tab e	09 65	Space bar	Space bar	20
Print Page	Tab A	09 41	ESCape	ESCape	1b
Print Scrn	Tab a	09 61	Return	Return	0d
Hide Page	Tab C	09 43	Help	Ctrl W	17
Show Page	Tab c	09 63	Delete	Delete	7f
Shift ↑	Tab Ctrl L	09 0C	Shift ↓	Tab Ctrl N	09 0E

Figure 9.4: Keyboard Hex Values

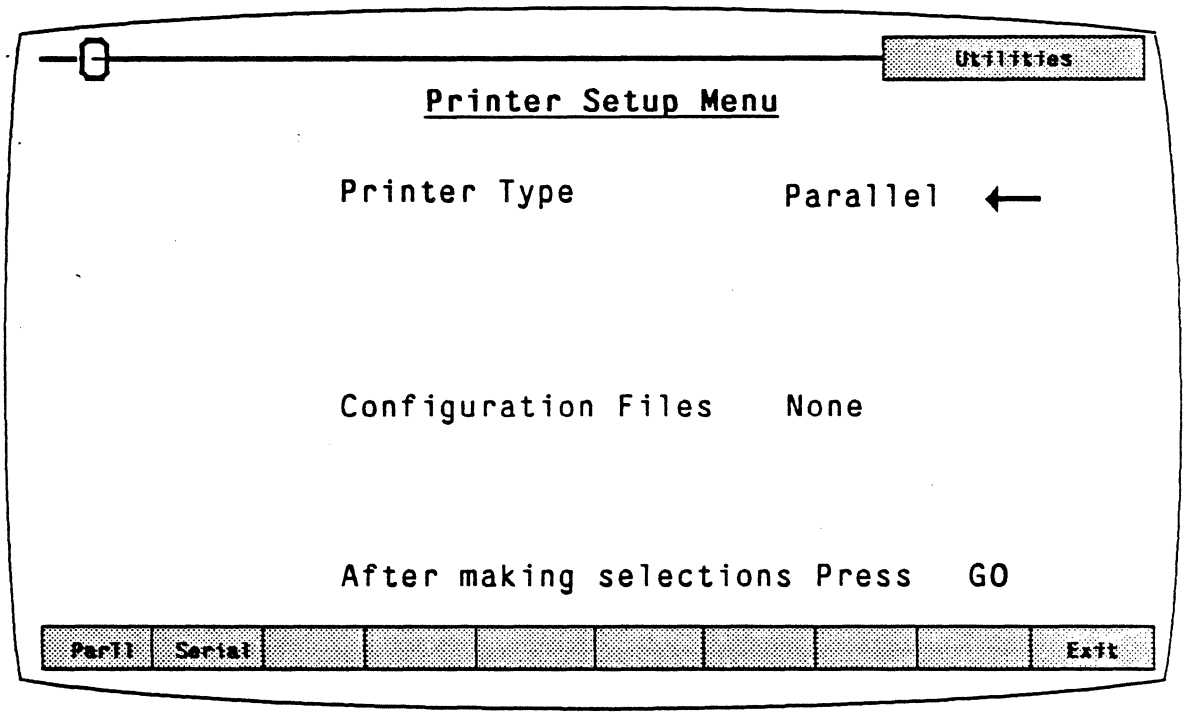
F2 Printer Setup

To configure the Chameleon 32 for your printer, press **F2 Printer Setup** in the Utilities menu. This displays the Printer Setup Menu as shown in the figure below. You can connect a serial or parallel printer to the Chameleon 32 for printing screens, program code, program results, and statistics reports.

If you are using a parallel printer, connect the printer cable to the Chameleon 32 Parallel Printer port. The Parallel Printer port is compatible with standard IBM PC compatible printers.

If you are using a serial printer, connect the printer cable to the Chameleon 32 Serial Printer port. The Serial Printer port is a standard DCE interface.

Refer to *Chapter 2: Hardware and Installation*, for a description of the Chameleon 32 ports. Refer to Appendix C for a description of the pinouts.



Printer Setup Menu

The Printer Setup Menu parameters are always loaded from the system default file PRINTER.DF. The default path is **A:\TEKELEC\SETUP\UTILITY**. On power up, this file is automatically loaded, and the printer port set up according to its parameter values.

You also have the ability to save additional printer setups in named files using the .Configuration Files option described below.

Printer Type

This parameter identifies the type of printer you are using. The options are:

F1 Parallel
F2 Serial

If you select ***F2 Serial***, these additional printer parameters are displayed:

Baud Rate
Number of Data Bits
Number of Stop Bits
Parity
Configuration Files

These parameters are identical to the options on the Terminal Setup Menu, which are described on pages 9-5 and 9-6.

Configuration Files

This option allows you to load or save a setup file. The default path for terminal setup files is **A:\TEKELEC\SETUP\UTILITY** . The options are:

F1 None This indicates that you want to use the parameters as shown, and do not want to load a setup file, or save the displayed parameters. Press ***Go*** to set up the Chameleon 32 using the displayed parameters.

F2 Load This loads an existing setup file. When you press ***F2 Load***, the default file PRINTER.DF is displayed. If you want to load a file other than PRINTER.DF, use the delete key to erase it and enter the file name you want. When the name is correct, press ***Go*** to load the file and perform the setup.

F3 Save This saves the displayed parameters to a file. When you press ***F3 Save***, the default file name PRINTER.DF is displayed. If you want to use a name other than PRINTER.DF, use the delete key to erase it, and enter the file name you want. When the name is correct, press ***Go*** to save the file and perform the setup.

Figure 9.5 below lists the commands and keys available for printing with the Chameleon 32.

APPLICATION	KEY/COMMAND	RESULT
All applications	Print Scrn key	Prints the current screen
	Print Page key	Prints the active page
History	Ctrl P	Displays print menu to print a user-defined range of events.
X.25 Statistics	F3 Print key	Prints an X.25 statistical report
SNA Statistics	F3 Print key	Prints an SNA statistical report
BSC Statistics	F2 Print key	Prints a BSC statistical report
ISDN Statistics	F5 Print key	Prints an ISDN statistical report
SS#7 Statistics	F1 Print key	Prints an SS#7 statistical report
BASIC Simulators	LFILES command	Prints file directory
	LFLIST command	Prints current function key assignments
	LLIST command	Prints the program in memory
	LMLIST command	Prints the mnemonic table in memory
	LPRINT command	Prints text
	LTPRINT command	Prints the contents of the trace buffer
SITREX	LDISPT command	Prints timer values in decimal
	LDISPC command	Prints counters in hex
	LDISPV command	Prints variable values
	LDISPX command	Prints numeric variables in hex
	LDISPM command	Prints length and contents of message buffer
	LLIST command	Prints the scenario in memory
	LPRINT command	Prints text
C Development System	>.PRT	Redirects output to the printer from the shell (.PRT must be in upper case letters)
	Aux Serial Port 2 Library	Redirects output to the Aux 2 serial port. (See the *Chameleon 32 C Manual*, Chapter 5.7 for more information.)
Triggering	ACTION = STATS PRINT	Prints a statistics report when user-defined conditions are met.

Figure 9.5: Print Commands and Keys

F3 Set Date and Time

The Chameleon 32 Real-time clock is backed up by battery. You should not have to reset the time after your initial setup. When you press the F3 softkey, the Set Date and Time Menu is displayed. (See Figure 9.6 below.)

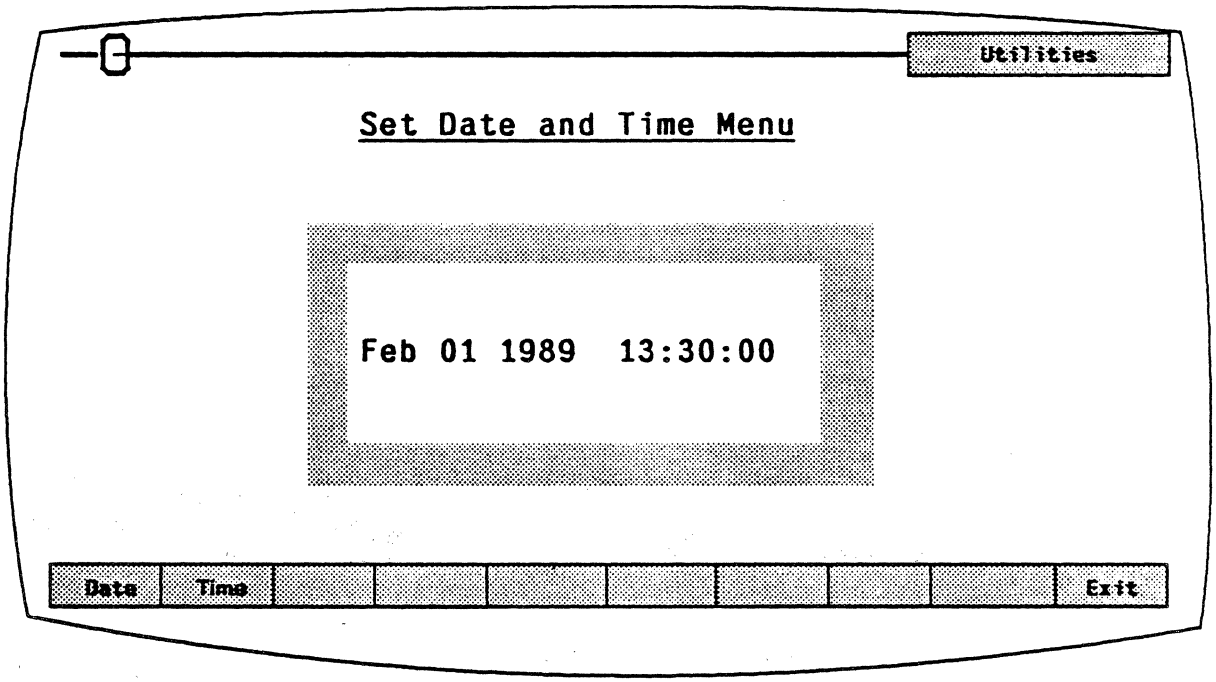


Figure 9.6: Set Date and Time Menu

Date

To set the date, press ***F1 Date***, enter the date in the format MM-DD-YYYY, and press ***Return***. For example to set the date to February 1, 1989, enter:

02-01-1989 <RETURN> or **2-1-1989** <RETURN>

Note

The year does not automatically increment on January 1st. You must manually update the year each January using this option.

Time

To set the time, press ***F2 Time***, enter the time in the format HH:MM:SS, and press ***Return***. Entering the seconds is optional. The time uses the 24-hour clock. For example to set the time to 1:30 p.m., enter:

13:30:00 <RETURN> or **13:30** <RETURN>

F4 Traffic Load/Save

This option enables you to save Direct-to-Disk and acquisition buffer data to files. It also enables you to load a file which contains Direct-to-Disk or acquistion buffer data. Refer to Chapter 6: Direct-to-Disk for a complete description of the Direct-to-Disk application.

When you press ***F4***, the Traffic Operations Menu is displayed. (See Figure 9.7 below.)

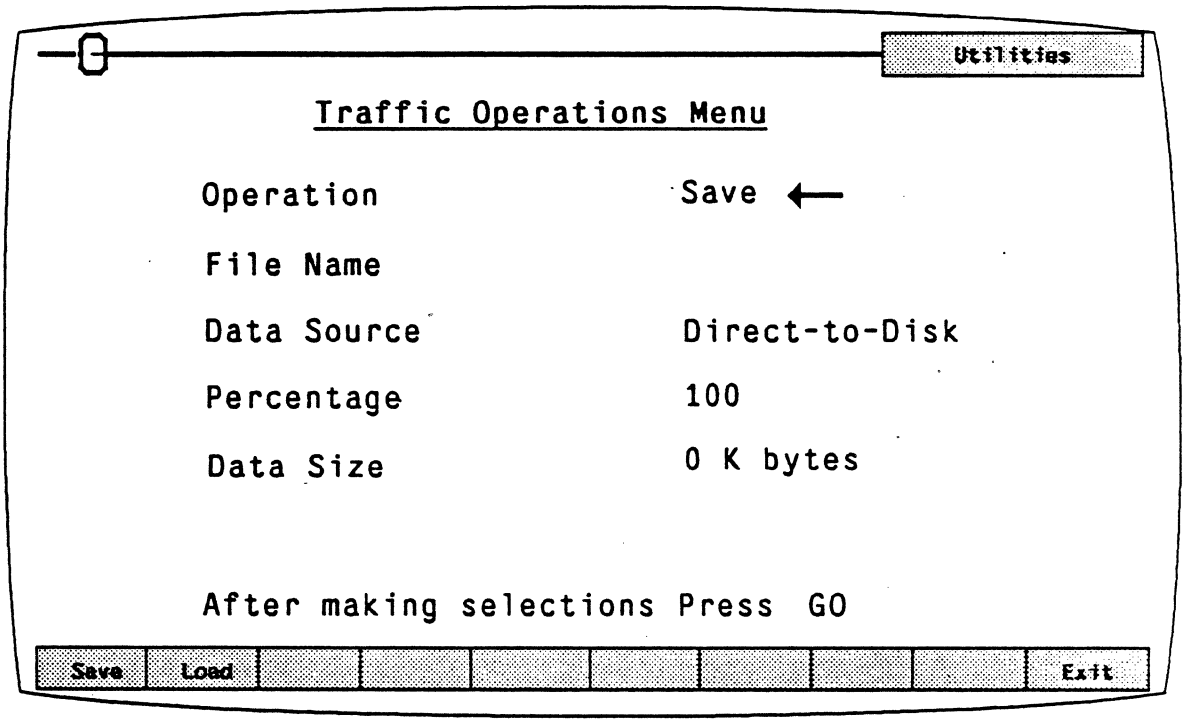


Figure 9.7: Traffic Operations Menu

Operation

This parameter allows you to select the traffic operation. The options are:

F1 Save This option enables you to save either Direct-to-Disk or acquisition buffer traffic. Once saved, these files can be loaded and used as the data source for Monitoring applications.

You cannot save Direct-to-Disk data while the Direct-to-Disk or Direct-from-Disk applications are running.

You can save the acquisition buffer to a file while Direct-from-Disk is running, but the applications stops temporarily, while the buffer is being saved. The applications starts again automatically when the save operation is complete.

To save the acquisition buffer to a file while Direct-to-Disk is running, you must stop acquisition by pressing ***Run/Stop***. When the save operation is complete, press ***Run/Stop*** to resume acquisition.

F2 Load The ***F2 Load*** option enables you to load an existing direct-to-disk or acquisition buffer file from disk. Once loaded the traffic in the file can be used as the data source for Analysis. You must have previously used the save option to save traffic to disk before it can be loaded with this option.

File Name

This parameter specifies the name of the direct-to-disk or acquisition buffer file that you want to save or load. Refer to the *Chapter 10: File Management* for a description of valid file names.

Data Source

If you select Save as the Operation, this parameter specifies the type of traffic you want to save. The options are:

F1 DTD You want to save the Direct-to-Disk data. This is traffic that is stored to the Direct-to-Disk portion of the hard disk. Refer to *Chapter 6: Direct-to-Disk* for more information.

F2 Buffer You want to save the acquisition buffer. If not saved to a file, this is traffic that is volatile, and will be lost when the Chameleon 32 is reset or applications are restarted.

Percentage

If you are saving Direct–to–Disk data, this parameter enables you to specify the percentage of the Direct–to–Disk area that you want to save. The Direct–to–Disk area of the hard disk is 10 Mbytes in size.

For example, to save the most recent 50% of the Direct–to–Disk data, you would enter 50 and press ***Return.*** To save the most recently acquired traffic, you must save 100% of the Direct–to–Disk data.

If you are saving data to a floppy disk, the maximum you can save is 700 kbytes of data (approximately 7% of the Direct–to–Disk area). If you want to save more than this amount to floppy disks, you must use the ***F8 Backup*** option in the Utility menu.

Data Size

If you are saving Direct–to–Disk data, this parameter displays the number of kbytes of data being saved from the Direct–to–Disk area to the file.

F5 645/705 Data Conversion

This utility converts data saved to disk on Hard Engineering tester models 645 and 705 to a format compatible with the Chameleon 32 and Chameleon 20 testers. The procedures given here do not deal with installation of the software, which procedure is given in the documentation accompanying your software package.

The data on your 645/705 disk can be analyzed either as it is being converted, after it has been converted or, after it has been converted and saved.

Limitations

This conversion utility has the following limitations:

- It operates only on traffic data acquired over a V–type interface.
- Data conversion begins on the first complete event on the starting track and ends with the last complete event on the ending track. Therefore, if an event overlaps tracks, it could be lost in the conversion process. To prevent this from happening when converting large blocks, it is best to break such blocks down into smaller segments and start the conversion of each segment with the same track as the last one ended on. For example, if you are converting the data on tracks 3 through 48 (a total of 45 tracks), convert the block in three segments of 15 tracks each, each successive segment beginning on the last track of the preceding segment: 3 through 18; 18 through 33; 33 through 48.
- To avoid overwriting events in cases where you are analyzing the data as it is being converted, conversion is limited to 48 tracks at a time.
- If you are going to save converted data, do so before beginning any other conversion or Direct–to–Disk operations. Converted data remains on disk until another conversion or direct–to–disk operation is performed, at which time it is overwritten. Resetting your Chameleon, or turning it off and on, will not erase or otherwise corrupt converted, on–disk data.
- If the file being converted is larger than the Direct–to–Disk operation can accommodate, your Chameleon will hang up.
- If the file name you enter for your converted data already exists, data conversion will proceed, but you will be given an error message when the Chameleon tries to save the data. Begin data conversion again, using a different file name.

Data Conversion Procedure

To convert the data to a Chameleon format:

1. Press ***F5 645/705 Data Conversion.***

2. Insert the 645/705 data disk into the Chameleon floppy drive and press ***Return.***

   The 645/705 Data Conversion menu appears (Figure 9.9).

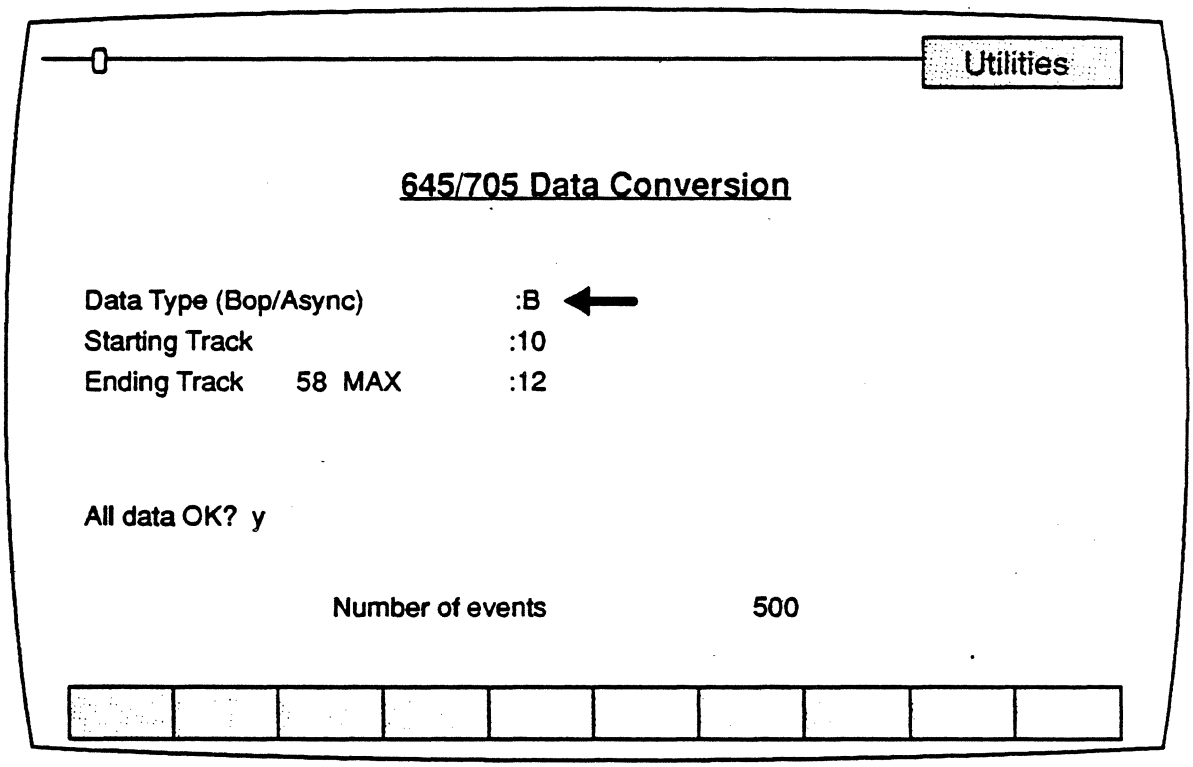


Figure 9.9: 645/705 Data Conversion Menu

3. In the Data Conversion menu, enter the parameters appropriate for the data you want to convert:

   a. Data Type:

      B = bit–oriented protocol
      A = Asynchronous

   c. Starting Track:

      Designates the starting point of the data you are converting. Enter a number in the range of 0 to 79, but not greater than the number entered for the Ending Track.

d. Ending Track:

Designates the end point of the data you are converting. Enter a number equal to or greater than that entered for the Starting Track up to the maximum number indicated to the right of ENDING TRACK. The maximum number of tracks that can be converted at any one time is 49. All 79 tracks can be converted in two passes.

e. All data OK?

A *No* cancels the parameters entered and allows you to re–enter them correctly, or to cancel the conversion operation at this point.

A *Yes* to this prompt confirms that all parameters entered are correct.

Data conversion begins immediately upon entering this response and the number of events read and converted is displayed on the *Number of Events* line.

Data Analysis

Converted data is handled as if it were received from an outside source with the Direct–to–Disk application running. As noted earlier, this provides three means of analyzing the 645/705 data:

- While conversion is in process
- After the data has been converted and saved to the Chameleon Tekelec/Data/D2D directory
- By playing the data back through analysis *after* saving the Direct–to–Disk captured data in a file.

Each of these means is explained below.

Analysis During Conversion

Analysis of data during conversion is begun prior to starting the conversion operation. As this entails using the Direct–to–Disk application, it is suggested that you first read Chapter 6: Direct–to–Disk and page 9–13f.

Note: Since the Data Conversion uitility is emulating Direct–to–Disk, *DO NOT* select the Direct–to–Disk application for storing the converted data.

1. In the Traffic Operations Menu (see **F4 Traffic Load/Save**, page 9–13), select ***Line*** as the Data Source.

2. Proceed with the conversion operation as explained on the preceding page. The converted data will be displayed in the analysis windows as if it were being received 'live' over an external line.

Analysis After Conversion

1. In the Traffic Operations Menu (see **F4 Traffic Load/Save**, page 9–13), select ***Disk*** as the Data Source.

2. Proceed with the conversion operation as explained on the preceding page. The converted data will be displayed in the analysis windows as if it had been captured by the Direct–to–Disk function.

Analysis After Saving to Direct–To–Disk

1. Do the conversion operation as explained on the preceding page.

2. Press ***F4 Traffic Load/Save.***

3. In the Traffic Operations Menu,

   a. For Operation, select ***Save.***

   b. For File Name, enter the name of the file in which the data is to be saved.

4. Press ***GO.***

5. Return to the Operation parameter and select ***Load.***

6. At Data Source, select ***Disk.***

7. Press ***GO.*** The saved and loaded data is now analyzed.

F6 Check Free Disk Space

This option displays the number of bytes available on the hard disk or a floppy disk. When you press ***F6 Check Free Disk Space***, the Check Free Disk Menu is displayed as shown in Figure 9.10 below.

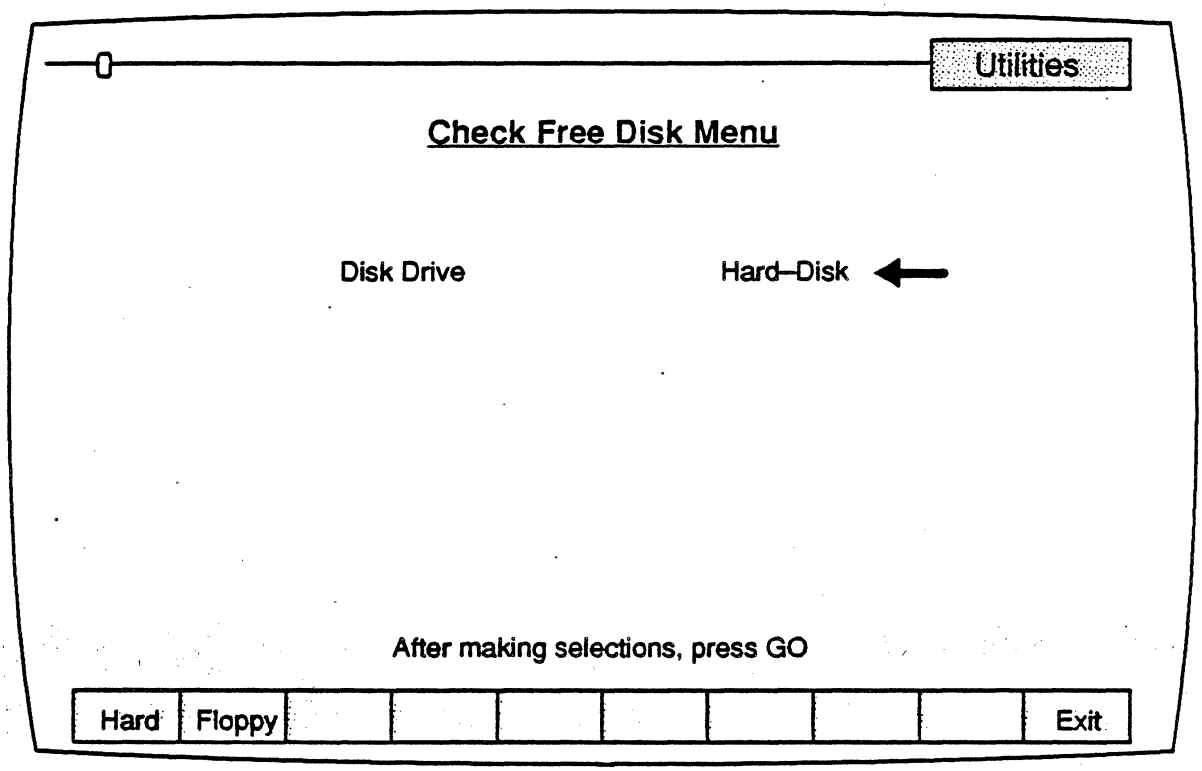


Figure 9.10: Check Free Disk Menu

Disk Drive

This parameter enables you to select the disk you want to check. The options are:

F1 Hard To check the free disk space on the hard disk, press ***F1 Hard***, and then press ***Go***. The following message is displayed:

Free Disk Memory Space =xxxx K Bytes

F2 Floppy To check the free disk space on a floppy disk, press ***F2 Floppy***, insert the floppy disk into the floppy drive, and press ***Go***. The following message is displayed:

Free Disk Memory Space =xxx K Bytes

F7 Kermit/Connect Mode Setup

Two Modes

The Chameleon operates in two modes with a host computer. For both modes, Aux Serial Port 2 is used for the physical connection to the Chameleon 32. This requires the use of a special cable which can be purchased as an option from Tekelec (Part Number 932–5001–01) or can be made as shown in Appendix M.

The two operating modes are:

- Data Transfer — Use Kermit to transmit and receive files from a host computer that is using a compatible file transfer protocol.
- Connect Mode — Use your Chameleon as a host terminal and employing the Connect page.

Data Transfer

In Data Transfer mode, Kermit automatically uses 8 data bits with no parity. Even if you use the Kermit menu to change these parameters, when Kermit is invoked, the data bits and parity setting are changed to 8 and none, respectively. The host computer Kermit program must also be configured for 8 data bits and no parity.

There are additional Data Transfer parameters that you can configure using this menu. For example, *you must select the type of file you are transferring.* Once you have set up the Chameleon 32 using this menu, you use the File Management menu to establish a connection with the host computer and perform the file transfer. Refer to *Chapter 10: File Management*, for information about file transfer procedures.

Connect Mode

In Connect mode, the Chameleon 32 Aux Serial Port 2 is configured to the settings in the Kermit menu. The parameters must be compatible with your host for terminal emulation. Refer to Chapter 10: *File Management*, ***F9 Connect/Disconnect*** for information about the Connect window.

Default Setup File

When you access the Kermit Setup menu, it loads and displays the default setup file KERMIT.DF. The default path is:

A:\TEKELEC\SETUP\UTILITY

You can also save and load additional Kermit setups in named files using this option. When you press ***F7 Kermit Connect Mode Setup***, a configuration menu is displayed (Figure 9.11 below).

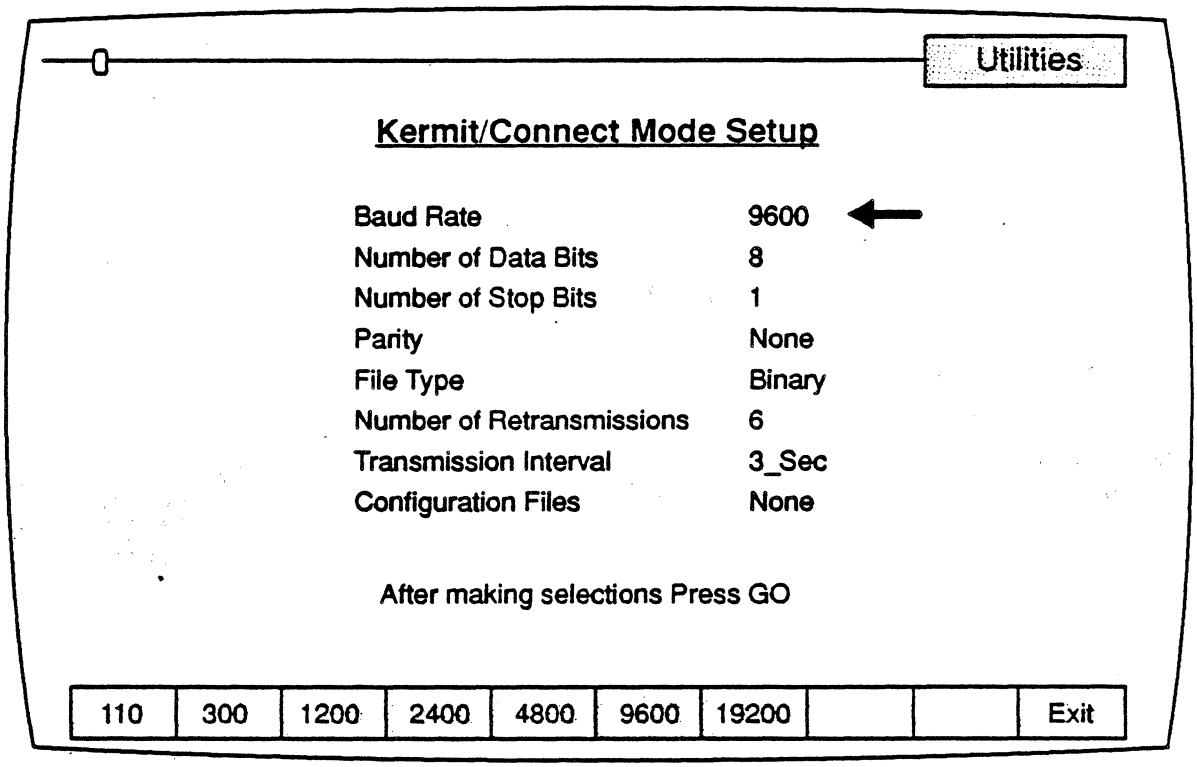


Figure 9.11: Kermit Connect Mode Setup Menu

Baud Rate

This parameter allows you to specify the baud rate (in bits per second) that the Chameleon 32 will use to transmit or receive a file. The baud rate on the other computer must be set to the same as the Chameleon 32. The options are:

F1 110
F2 300
F3 1200
F4 2400
F5 4800
F6 9600
F7 19200

Number of Data Bits

This parameter specifies the number of data bits for each character being transmitted or received. For Connect mode, the data bits setting on the host computer must be the same as the Chameleon 32. For Data Transfer mode, the Data Bits are automatically set to 8, regardless of the value you set in this menu. The options are:

F1 5 ***F3 7***
F2 6 ***F4 8***

Number of Stop Bits

This parameter specifies the number of stop bits between characters being transmitted or received. The stop bits setting on the host computer must be the same as the Chameleon 32. The options are:

F1 1
F2 1.5
F3 2

Parity

This parameter specifies the parity setting. Parity is used to detect errors during file transfer. For Connect mode, the parity setting on the host computer must be the same as the Chameleon 32. For Data Transfer mode, the Parity is automatically set to None, regardless of the value you set in this menu. The options are:

F1 None
F2 Odd
F3 Even

File Type

This parameter allows you to specify the type of file being transmitted or received. For Data Transfer mode, this must be set correctly. *You cannot transfer Binary and Text files together.* The options are:

F1 Binary
F2 Text

Number of Retransmissions

In Data Transfer mode, if an error is detected, a packet will be retransmitted. This parameter specifies the total number of times a data packet will be transmitted. If the packet has not been received correctly following the number of configured retransmissions, the file transfer is aborted.

The options are:

F1 1
F2 2
F3 3
F4 4
F5 5
F6 6
F7 7
F8 8
F9 More
F1 9
F2 10

Transmission Interval

This parameter specifies the time interval between each retransmission of a data packet. The options are:

F1 1 Sec
F2 2 Sec
F3 3 Sec
F4 4 Sec
F5 5 Sec
F6 6 Sec
F7 7 Sec
F8 8 Sec
F9 More
F1 9 Sec
F2 10 Sec

The data transfer timeout is the Number of Retransmissions multiplied by the Transmission Interval. Therefore the maximum timeout is:

10 (retransmissions) x 10 seconds (interval) = 100 seconds

Configuration Files

This option allows you to load or save a Kermit setup file. The default path for terminal setup files is:

A:\TEKELEC\SETUP\UTILITY

The options are:

F1 None This indicates that you want to use the parameters as shown; you do not want to load a setup file, nor save the displayed parameters. Press ***Go*** to set up the Chameleon using the displayed parameters.

F2 Load This loads an existing setup file. When you press ***F2 Load***, the default file name KERMIT.DF is displayed. If you want to load a file other than KERMIT.DF, use the delete key to erase it and enter the file name you want. When the name is correct, press ***Go*** to load the file and perform the setup.

F3 Save This saves the displayed parameters to a file. When you press ***F3 Save***, the default file name KERMIT.DF is displayed. If you want to use a name other than KERMIT.DF, use the delete key to erase it and enter the file name you want. When the name is correct, press ***Go*** to save the file and perform the setup.

F8 Backup/Restore Menu

This utility allows you to back up the hard disk to floppy disks and restore the hard disk from floppy disks. You can do the following:

- Back up/restore the entire hard disk to/from floppy disks (excluding the Direct–to–Disk and bootable system areas)
- Backup/restore the Direct–to–Disk area of the hard disk.
- Back up/restore a large file to/from a floppy disk. If the file fits on a single floppy disk (700 kbytes or less), use the Copy File option in the File Management menu. If the file is larger than 700 kbytes, you must use this Backup option to make a floppy backup copy.

Notes

While a backup or restore operation is in progress, do not change the current directory using the File Management menu.

When the Backup option is used, the files on the backup floppy cannot be accessed unless they are first restored to the hard disk.

When you press ***F8 Backup/Restore Menu***, the Backup Menu is displayed (Figure 9.12).

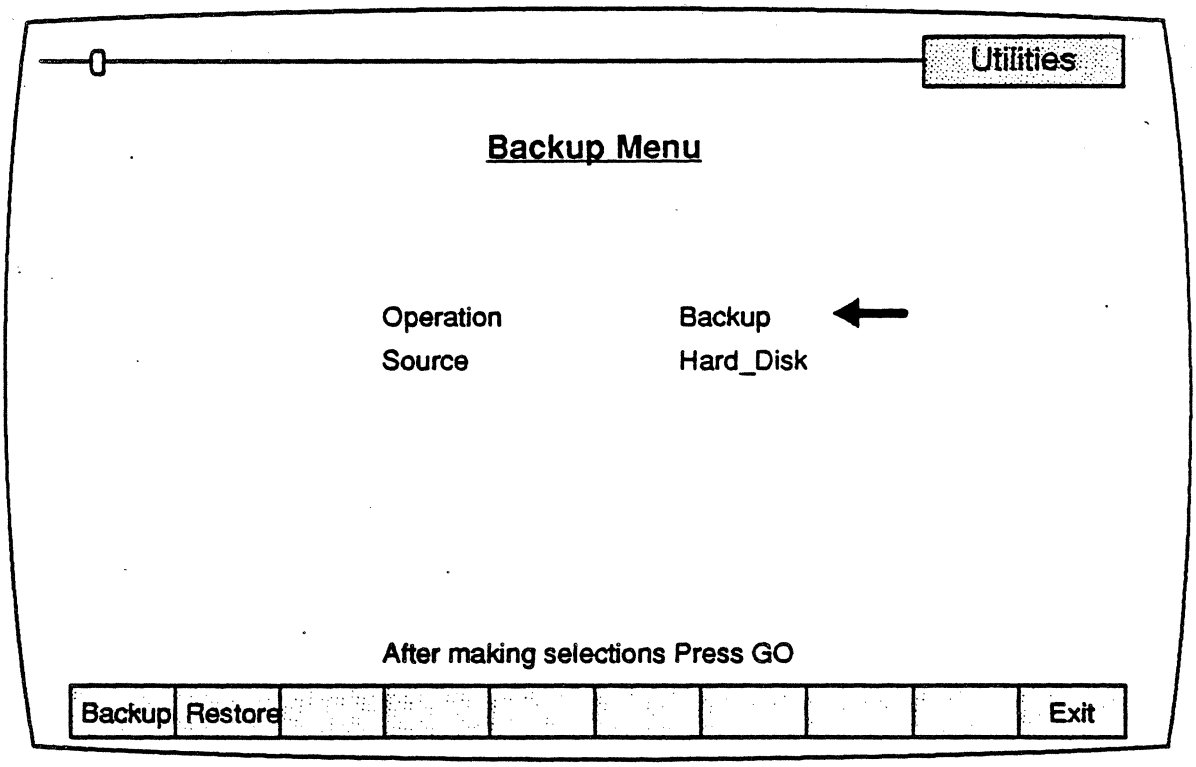


Figure 9.12: Backup Menu

Operation

This parameter enables you to select the operation. The options are:

F1 Backup This option makes a backup copy of the item selected in the **Source** parameter. The backup procedure formats the floppy as it copies; therefore, any data that is on the floppy disk will be erased during the backup.

F2 Restore This option restores files to the hard disk that have been backed up to a floppy disk. Refer to the additional notes below about restoring Direct–to–Disk data.

Source

This parameter specifies what portion of the hard disk you want to back up or restore. The options are:

F1 Harddsk Backs up/restores the entire hard disk, except the Direct–to–Disk and bootable system areas. When you restore the hard disk, all files on the hard disk are erased (excluding the Direct–to–Disk and bootable system areas).

F2 DTD Backs up/restores the Direct–To–Disk area of the hard disk. When you restore the Direct–to–Disk area of the hard disk, the current data in the Direct–to–Disk area is erased. See the additional notes provided below.

F3 File Backs up/restores a single file. When you select this option, you are prompted for a file name.

If you are backing up a file, enter the path and name of the file you want to copy from the hard disk.

If you are restoring a file, enter the path and name of the file you are restoring. **If you do not enter the destination path when restoring a file, the file is restored to the root directory of the hard disk.**

When the path and file name are entered, press ***Go*** to begin the procedure. You are then prompted for the first disk to back up or restore. Insert the disk and press ***Return*** to continue the selected procedure.

Restoring Direct–to–Disk Data

Beginning with System Software Release 4.10, the Chameleon 32 may have the standard 20–Mbyte hard disk drive or an optional 40–Mbyte hard disk drive. The 20–Mbyte hard disk stores up to 10 Mbytes of Direct–to–Disk data, while the 40–Mbyte option stores up to 30–Mbytes of Direct–to–Disk data. The following guidelines apply to backing up and restoring files between 40–Mbyte and 20–Mbyte hard disk drives.

If data was backed up from a 20–Mbyte hard disk drive, it can be restored to either a 20–Mbyte or 40–Mbyte hard disk drive.

If data was backed up from a 40–Mbyte hard disk, it can be restored to either a 20–Mbyte or 40–Mbyte hard disk drive on a Chameleon with *System Software Release 4.10 or later.* It cannot be restored to a Chameleon with System Software prior to Release 4.10.

A Direct–to–Disk file larger than 10 Mbytes cannot be fully restored to a 20–Mbyte hard disk having only 10 Mbytes available for direct–to–disk storage. When restoring a file larger than 10 Mbytes to a 20–Mbyte drive, use the following procedure:

1. Start the Restore procedure, inserting each backup disk in sequence as prompted on the screen.

2. When the Direct–to–Disk area of the hard disk is full, the restore procedure pauses and a message is displayed which provides you with several options.

3. Once the Restore procedure pauses, you can press one of keys described below, or you can replay and analyze the data that has been restored up to that point, and then press one of the keys.

   C If you press **C**, the restore procedure will continue and the data that has just been restored to disk will be overwritten as additional data is restored.

   T If you press **T**, you will temporarily exit the Restore menu and return to the Utilities menu. When you select ***F8 Backup/Restore***, you are returned to the Restore menu to continue the back up that you temporarily interrupted.

   F10 If you press ***F10***, you will exit the Restore menu and return to the Utilities menu. If you select ***F8 Backup/Restore***, you start a new restore; you cannot continue the previous restore.

Note

The direct–from–disk data from two or more 10–megabyte restores is not treated contiguously. This means, for example, that you cannot run Statistics and accumulate statistical data for more than 10–megabytes of direct–from–disk data at a time.

F9 FMS File Conversion

FMS File Conversion converts Chameleon 32 files from Release 2.6.1 and earlier software (FMS operating system) to a format compatible with Release 3.0 and later. This enables you to convert your old user files to the new format, so that you can use them with the new Chameleon 32 operating system.

FMS File conversion copies files from a floppy in the old format to the appropriate directory of the hard disk of a Chameleon 32 running the new operating system. After converting your files, you can copy them to an MS–DOS formatted diskette using the File Management menu.

Note You cannot convert files while Monitoring applications are running on the Chameleon 32.

To convert files to the new format:

1. Insert the diskette containing the files you want to convert (Release 2.6.1 or earlier) into the floppy drive.

2. Access the Utilities page and press ***F9 FMS File Conversion.*** This displays a file directory of the floppy disk and displays the following softkey options:

   F1 Dir This option lists the files on the floppy disk. It enables you to select the files you want to convert.

   F2 Convert This option converts selected files to the new format.

   F3 Full Cv This option automatically converts all files on the floppy disk (up to 80 files maximum) to the new format.

3. If you want to convert all files to the new format, press ***F3 Full Cv***. As each file is converted, the file name and file type are displayed at the top of the screen. Once ***F3 Full Cv*** process is started, you cannot abort the operation unless you reset the Chameleon 32.

Note This operation converts a maximum of 80 files from the floppy disk. If you attempt to convert more than 80 files, you will get the error message **Too Many Files.**

4. To convert selected files, use the List Selector to select one or more files. (To use the List Selector, use the arrow keys to move the red arrow cursor to the desired file and press the space bar to highlight the name in red. Select as many files as desired. If a file is selected in error, press the space bar again to remove the red highlight.)

   Once all desired files are selected, press ***F2 Convert.*** As each file is converted, the file name and file type are displayed at the top of the screen.

5. If you want to copy files from another diskette, insert the diskette in the floppy drive and press ***F1 Dir*** to display the file directory of the floppy. Then use ***F2 Convert*** or ***F3 Full Cv*** as described above.

CHAPTER TEN:
FILE MANAGEMENT

Introduction

This section describes the features and usage of the Chameleon File Management menu. The File Management menu options are:

F1 **Chdir** (Page 10-8)
Changes the current disk directory.

F2 **Copy** (Page 10-10)
Copies selected files to the hard disk or a floppy disk.

F3 **Delete** (Page 10-12)
Deletes files from the the hard disk or a floppy disk.

F4 **Rename** (Page 10-13)
Renames the selected files.

F5 **Format** (Page 10-14)
Formats floppy diskette.

F6 **Disk Copy** (Page 10-15)
Copies the entire contents of a floppy disk to another floppy disk.

F7 **Transmit File** (Page 10-16)
Transmits files to a host computer.

F8 **Receive File** (Page 10-19)
Receives files from a host computer.

F9 **Connect** (Page 10-21)
Establish a communications connection between the Chameleon and a host computer for file transfer or host terminal emulation.

File and Directory Structure

Files

Chameleon files are compatible with MS-DOS 2.x and 3.x format. File names must adhere to these conventions:

- File names are 1 - 8 characters in length
- Optional 1 - 3 character file extension
- Optional drive specification of **A:** (hard disk drive) or **B:** (floppy disk drive)
- File name and file extension separated by a period (.)
- Acceptable file name and path characters are:

A - Z a - z 0 - 9 \ - _

Hard Disk Directories

The Chameleon hard disk has a number of directories that contain the system files it needs for each application. When you create user files (programs, history files, traffic files, etc.) these are also stored in specific directories so that they can be located as needed by an application. Chameleon file extensions are listed in Figure 10.2 on page 10-4 and 10-5.

The Chameleon hard disk has the directory structure shown in Figure 10.1. The root directory can contain a maximum of 140 files. The other directories can contain a maximum of 600 files.

These are the only directories necessary for operating the Chameleon in Monitoring and Simulation mode; therefore, you do not have the ability to create or delete directories from the hard disk.

If the optional C Development System package is installed on your Chameleon 32, you will also have these directories: \BIN, \INCLUDE, \LIB, and \USR. You also have the ability to create additional directories using the C shell. Refer to the *Chameleon 32 C Manual*, for a description of these directories.

Floppy Disk Directories

If you save traffic or copy files to a floppy disk, the file is always copied into the root directory of the floppy disk (unless you copy an entire *directory* to a floppy disk). When accessing a floppy disk for an application, the Chameleon searches only the root directory. Therefore all user files should be in the root directory of a floppy disk.

A maximum of 112 files are permitted in the root directory of a floppy disk.

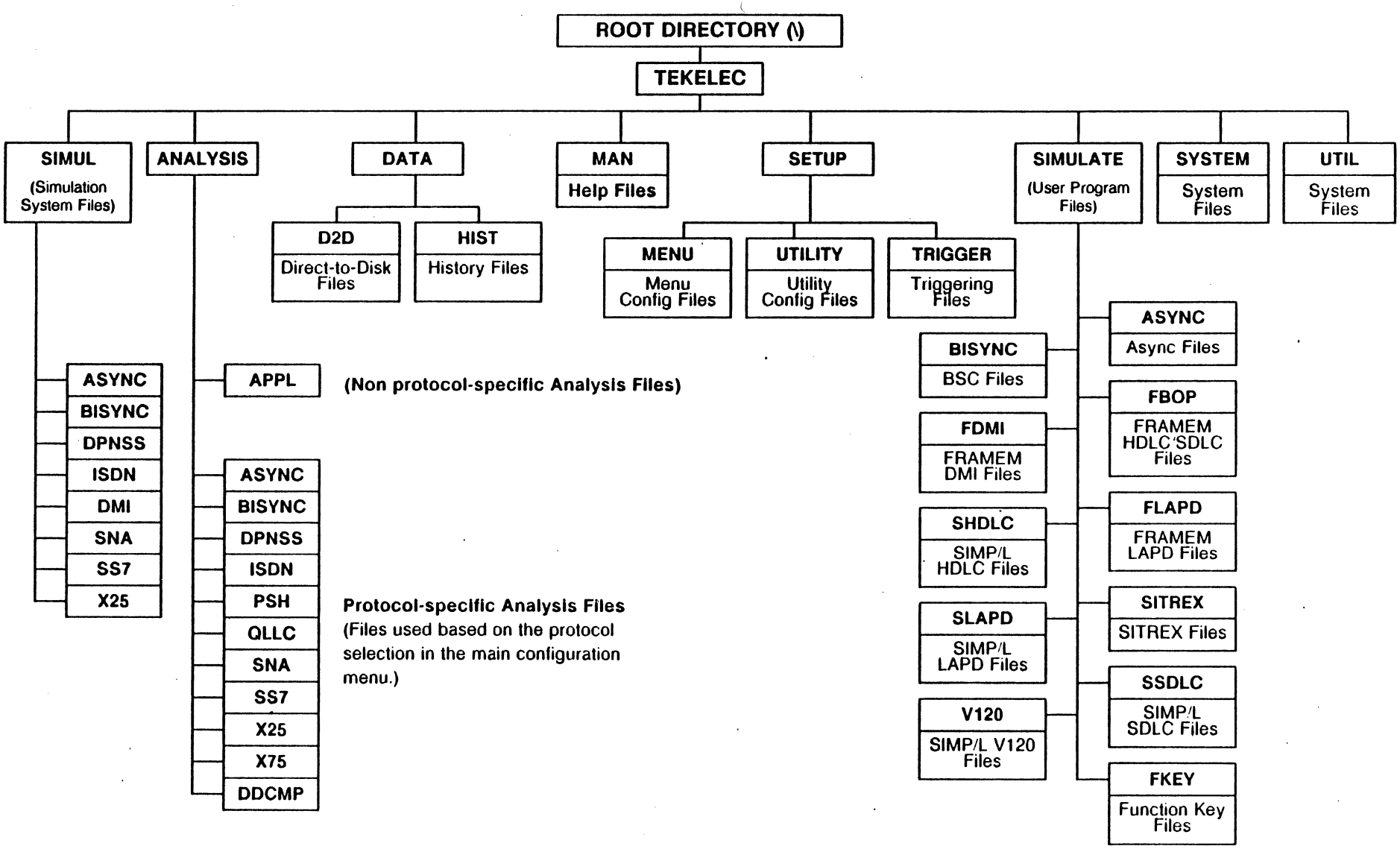


Figure 10.1: Chameleon 32 Hard Disk Directory Structure

File Extensions

Figure 10.2 (below and continued on page 10-5) lists the file name extensions used by the Chameleon. These file extensions are automatically assigned to files and should not be changed. These files must reside in the directories shown in order for the application to be able to locate the file.

Some files are not assigned extensions automatically. In these cases, you can specify an extension when you enter the file name, if desired. These files include History print files, traffic files, and C files. If you specify a file name extension for these files, you must include the extension as part of the file name when you access the file.

File Extension	File Type	Hard Disk Directory
.A	C LIBRARY	\LIB
.AE	FRAMEM SDLC/HDLC SETUP MENU	\TEKELEC\SIMULATE\FBOP
.AOU	SYSTEM FILE	\TEKELEC\ANALYSIS
.BA	SITREX PROGRAM	\TEKELEC\SIMULATE\SITREX
.CB	FRAMEM SDLC/HDLC PROGRAM	\TEKELEC\SIMULATE\FBOP
.CF	FRAMEM SDLC/HDLC DATA	\TEKELEC\SIMULATE\FBOP
.CG	FRAMEM SDLC/HDLC MNEMONIC TABLE	\TEKELEC\SIMULATE\FBOP
.CO	SYSTEM FILE	\TEKELEC\SYSTEM
.DB	SIMP/L SDLC PROGRAM	\TEKELEC\SIMULATE\SSDLC
.DE	SIMP/L SDLC SETUP MENU	\TEKELEC\SIMULATE\SSDLC
.DF	SIMP/L SDLC DATA	\TEKELEC\SIMULATE\SSDLC
.DG	SIMP/L SDLC MNEMONIC TABLE	\TEKELEC\SIMULATE\SSDLC
.EB	SIMP/L HDLC PROGRAM	\TEKELEC\SIMULATE\SHDLC
.EE	SIMP/L HDLC SETUP MENU	\TEKELEC\SIMULATE\SHDLC
.EF	SIMP/L HDLC DATA	\TEKELEC\SIMULATE\SHDLC
.EG	SIMP/L HDLC MNEMONIC TABLE	\TEKELEC\SIMULATE\SHDLC
.FE	SITREX SETUP MENU	\TEKELEC\SIMULATE\SITREX
.GB	SIMP/L V.120 PROGRAM	\TEKELEC\SIMULATE\V120

Figure 10.2: Chameleon File Name Extensions

File Extension	File Type	Hard Disk Directory
.H	C HEADER FILE	\INCLUDE
.HB	BISYNC SIMULATION PROGRAM BSC EXERCISER FILE	\TEKELEC\SIMULATE\BISYNC
.HF	BISYNC BASIC DATA FILE	\TEKELEC\SIMULATE\BISYNC
.HE	BISYNC BASIC SETUP MENU	\TEKELEC\SIMULATE\BISYNC
.HG	BISYNC BASIC MNEMONIC TABLE	\TEKELEC\SIMULATE\BISYNC
.IB	ASYNC BASIC PROGRAM	\TEKELEC\SIMULATE\ASYNC
.IE	ASYNC BASIC SETUP MENU	\TEKELEC\SIMULATE\ASYNC
.IF	ASYNC BASIC DATA	\TEKELEC\SIMULATE\ASYNC
.IG	ASYNC BASIC MNEMONIC TABLE	\TEKELEC\SIMULATE\ASYNC
.JB	FRAMEM DMI PROGRAM	\TEKELEC\SIMULATE\FDMI
.JF	FRAMEM DMI DATA	\TEKELEC\SIMULATE\FDMI
.JG	FRAMEM DMI MNEMONIC TABLE	\TEKELEC\SIMULATE\FDMI
.KE	SIMULATION FUNCTION KEY FILE	\TEKELEC\SIMULATE\FKEYS
.LB	FRAMEM LAPD PROGRAM	\TEKELEC\SIMULATE\FLAPD
.LE	FRAMEM LAPD SETUP MENU	\TEKELEC\SIMULATE\FLAPD
.LF	FRAMEM LAPD DATA	\TEKELEC\SIMULATE\FLAPD
.LG	FRAMEM LAPD MNEMONIC TABLE	\TEKELEC\SIMULATE\FLAPD
.MAN	ON-LINE HELP	\TEKELEC\MAN
.MB	SIMP/L LAPD PROGRAM SIMP/L MULTI-LINK LAPD PROGRAM	\TEKELEC\SIMULATE\SLAPD
.ME	SIMP/L LAPD SETUP MENU	\TEKELEC\SIMULATE\SLAPD
.MF	SIMP/L LAPD DATA	\TEKELEC\SIMULATE\SLAPD
.MG	SIMP/L LAPD MNEMONIC TABLE	\TEKELEC\SIMULATE\SLAPD
.SU	SYSTEM FILES	\TEKELEC\SETUP\MENU
.SYS	SYSTEM FILES	\TEKELEC\UTIL
.TR	TRIGGER FILE	\TEKELEC\SETUP\TRIGGER

Figure 10.2 (continued): Chameleon File Name Extensions

C Applications

C application programs compiled on the Chameleon 32 can be started from the Applications Selection menu, if the executable C file conforms to the following:

- The file has the extension **.exe**.
- The file is copied to one of the directories below (*xxxx* is one of the subdirectories shown in Figure10.1):

  a:\tekelec\analysis*xxxx*
  a:tekelec\simul

The directory determines when the application will be displayed in the Applications Selection menu. For example, if the application resides in a:\tekelec\analysis\appl, the application is displayed in the Monitoring window for all protocols. If the application resides in a:\tekelec\analysis\X25, the application is displayed in the Monitoring window only when X.25 is the selected protocol. If the application resides in a:tekelec\simul, the application appears in the Simulation window for all protocols.

Menu Access

File Management is available at any time during operation of the Chameleon by pressing the ***Files*** key, which is located on the left side of the keyboard. This causes the File Management banner to appear at the bottom of the screen. You can then select the page (Figure 10.3) and use its function keys, as described on the following pages.

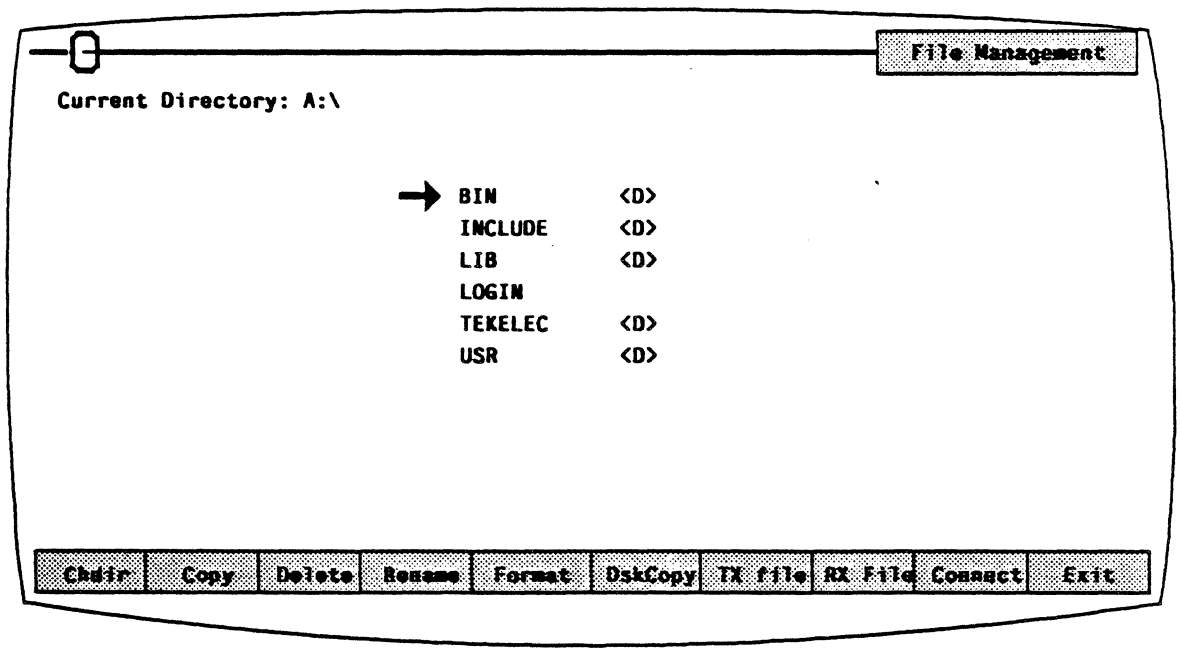


Figure 10.3: File Management Menu (with optional C package installed)

List Selector

For many of the File Management options, you can select several files or sub–directories for a single operation. (However, for ***F1Chdir***, ***Dir.***, and ***F4Rename*** you can select only one directory or file at a time.) For example, you can select three files, and then copy all three by pressing ***F2 Copy*** one time. This feature is referred to as the List Selector.

The List Selector is available for the following operations:

- Chdir
- Copy
- Delete
- Rename
- TX File

To use the List Selector:

1. Use the arrow keys to move the red arrow cursor to the first file or directory you want to select.
2. Press the space bar to highlight your selection.
3. Repeat steps 1 and 2 to select other directories/files.

NOTE: To de–select a directory or file, move the red arrow cursor to the file or directory you want to de–select. Press the space bar. The red highlight disappears.

4. Press the F–key corresponding to the operation you wish to execute. For example, press ***F2 Copy*** to copy the selected file(s).

This feature can also be used to change directories.

1. Select the desired directory and press the space bar to highlight it. You can only select one directory at a time. (Directories are identified by a <D> following the directory label.)
2. Press ***F1 Chdir.***

NOTE: If you highlight .. and press ***F1 Chdir***, it changes to the parent of the current directory.

View File(s)

Once you have opened a directory via ***F1 Chdir***, you can view any ASCII file using ***CTRL V.*** This applies to ASCII files only, not to directories or binary files. For details, see page 10–9.

F1 Chdir
Change Directory

F1 changes the current directory listed at the top of the screen. File names and sub–directories are displayed in the current directory. A <D> following the file name identifies a sub–directory. For example, if TEKELEC is the current directory, the screen displays:

Current directory : A:\TEKELEC

	<D>	..	<D>	ANALYSIS	<D>	DATA	<D>
MAN	<D>	SETUP	<D>	SIMULATE	<D>	SYSTEM	<D>
TMP	<D>	UTIL	<D>				

Only the files and sub–directories in the current (TEKELEC) directory are listed. Before using the List Selector (copy, delete, transmit, etc.), use the ↑ and ↓ keys and the space bar to select the directory containing the files you want to work with, then press ***F1 Chdir*** to open that directory.

If the current directory contains more than 60 files, *Page x* is displayed in the upper right corner of the screen. To display the next directory page, press ***Shift*** ↑. To display the previous directory page, press ***Shift*** ↓.

When using ***F1 Chdir*** you can specify the directory you want by entering the name manually, or by using the List Selector.

To enter the name manually:

1. Press ***F1 Chdir***. The following message is displayed:

   Please enter path name:

2. Enter the path to the directory that you want to open, and press ***Return***. For example, to select the ANALYSIS sub–directory on drive A, enter:

   A:\TEKELEC\ANALYSIS *<RETURN>*

   You only have to specify the drive name (A: or B:) if you want to change disk drives.

To change to the root directory, use the back slash (\). For example:

Please enter path name: A: *<RETURN>*

To change to the parent directory of the current directory, use two dots (..). For example,

Please enter path name: .. *<RETURN>*

Ctrl D
Re–Display

The directory listing shown on the previous page illustrates the default display format. By pressing ***Ctrl D***, you can re–display all files in alphabetical order along with the time, date, and size of each file. For example, the file display shown on the previous page would be re–displayed as follows:

Current directory : A:\TEKELEC

.	<D>	01–19–1989	00:02:36	0
. .	.<D>	01–19–1989	00:02:36	0
ANALYSIS	<D>	07–22–1989	10:16:00	0
DATA	<D>	07–22–1989	10:16:00	0
MAN	<D>	07–22–1989	10:16:00	0
SETUP	<D>	06–15–1989	13:43:55	0
SIMULATE	<D>	04–12–1990	09:12:23	0
SYSTEM	<D>	08–22–1989	10:15:15	0
TMP	<D>	11–17–1988	15:22:07	0
UTIL	<D>	12–12–1988	09:33:44	0

Only 15 files are displayed at one time. The size of listed directories is always shown as 0 bytes. Use ***Shift*** ↑ or ***Shift*** ↓ to move to the previous or next page, respectively.

To return to the default directory format, press ***Ctrl D*** again.

View File(s)

Once you have opened a directory via ***F1 Chdir***, you can view one or more ASCII file (and only ASCII files) using ***CTRL V.***

To view an ASCII file:

1. Open the directory containing the desired file.
2. Select the file(s) to be viewed. (If more than one file is to be selected, see List Selector, page 10–7.)
3. Press ***CTRL–V.*** The text of the file(s) is displayed. Keys ***F1*** through ***F5*** take on the following functions:

   F1 **MORE** Scrolls down 1 page of current file.

   F2 **NEXT** Returns to files list or to start of next file

   F3 **PREV** Jumps to start of previous file, or current one if only one file open.

   F4 **RESTART** Jumps to start of current file.

   F5 **QUIT** Quits to directory.

F2 Copy
Copy Files

The Copy option copies one or more selected files from the current directory to a specified target location. To copy files, perform the following steps:

1. If necessary, use ***F1 Chdir*** to change to the directory that contains the files you want to copy.
2. Use the List Selector to select one or more files or directories to copy. (To use the List Selector, use the arrows keys to move the red arrow cursor to the desired file and then press the space bar to highlight the file in red. Press the space bar again to unselect the file.)
3. After all files have been selected, press ***F2 Copy***. The following message appears on the screen:

   Copy to:

4. If you are copying files, enter the directory or filename to copy the file to. For example, to copy the selected files to the TEKELEC directory on the A: drive, enter:

   Copy to: \TEKELEC or

   Copy to: \TEKELEC

   To copy a selected file to the current directory using a new filename (for example, TEST5.TXT) enter:

   Copy to: TEST5.TXT

   If you copy multiple files, you can copy them to a directory in a single operation. If you do this AND specify a new filename, the following occurs:

   - The first file is copied using the new filename.
   - The Chameleon attempts to copy the second file to the same filename, recognizes that the file already exists, and displays the message:

     overwrite file (y\n) ?

   If you press **y**, the first copy is overwritten by the second file copy. If you press **n**, the copy operation for the second file is aborted. If additional files were selected to copy, the *overwrite file* message is displayed for each existing file.

To copy one directory into another directory, use the following syntax for the **Copy to** path:

```
Copy to:  B:\dira
```

where: **dira** is the name of the directory you are copying to. The directory you are copying becomes a subdirectory of the directory it is being copied to.

To copy all the files from a given directory (but not the directory itself) to another directory, use the List Selector to select the files and the syntax:

```
Copy to:  B:\dira
```

To copy a file from one floppy disk to another floppy disk, use the syntax:

```
Copy to:  z:\filename
```

The destination z:\ copies the file to a virtual drive, which can then be copied onto a different diskette. When you enter z:\ as the destination drive, this message appears:

Direct-to-disk data will be overwritten. Do you still want to continue? (y/n)

The Chameleon copies the source files to the Direct-to-Disk area of the hard disk before it copies them to the target disk.

If you have direct-to-disk data that you need to keep, press **n** to abort the copy procedure, use the Utilities menu to save the direct-to-disk data to a file, and then perform the file copy operation.

If you do not have direct-to-disk data, press **y** to continue.

The message **Reading floppy disk...** appears. When the file has been read into the virtual drive, you are prompted to insert the target disk with the message:

Please insert floppy disk, and enter RETURN key

Insert the disk that you want the file to be copied on, and press ***Return***.

Note

You can use z: (virtual drive) to copy from the B (floppy) drive only.

10. When the last copy operation is completed or aborted, the current directory is displayed with the new file entries.

F3 Delete
Delete File

The Delete option deletes one or more files from the current directory. To delete files, perform the following steps:

1. If necessary, use ***F1 Chdir*** to change to the directory that contains the files you want to delete.

2. Use the List Selector to select one or more files or sub-directories to delete. (To use the List Selector, use the arrows keys to move the red arrow cursor to the desired file and then press the space bar to highlight the file in red. Press the space bar a second time to unselect the file.)

3. After all files have been selected, press ***F3 Delete***.

4. For each file, the following question is asked:

   Erase *filea* **? (y/n)**

   To delete the file, press **y**. To abort the deletion of that file, press **n**.

5. When all selected files have been deleted, the current directory is displayed.

F4 Rename
Rename File

The Rename option renames files in the current directory. You cannot rename sub-directories (entries followed by <D>).

Note

Do not include a path as part of the new file name. If you wish to rename a file and move it to another directory, first rename the file, and then use the ***F2 Copy*** option.

To rename a file, perform the following steps:

1. If necessary, use ***F1 Chdir*** to change to the directory that contains the file you want to rename.

2. Use the List Selector to select *one* file name from the current directory. (To use the List Selector, use the arrows keys to move the red arrow cursor to the desired file and then press the space bar to highlight the file in red. Press the space bar a second time to unselect the file.)

3. Press ***F4 Rename***. The following message appears:

```
Rename to:
```

4. Enter the new filename for the selected file. For example, to rename the selected file to CODE1.TXT, enter:

```
Rename to: CODE1.TXT
```

You can rename only one file at a time. If you select more than one filename and press ***F4 Rename***, the following error message appears:

```
Too many selections
```

You cannot move a file from one directory to another by specifying a path as part of the new file name.

F5 Format
Format Floppy Disk

F5 Format formats the diskette in the floppy drive in MS-DOS format. **It is *not* possible to format the hard disk drive using this option.**

Warning! **Formatting erases all data on the floppy diskette. Do not format a diskette that contains files you want to keep.**

To format a disk, perform the following steps:

1. Insert the diskette you want to format into the Chameleon floppy disk drive.

3. Press ***F5 Format***. The following message appears on the screen:

   Do you really want to format this disk (y/n)?

4. To abort the format procedure, press **n**.

   To begin the format procedure, press **y**. The following message appears:

   Formatting floppy disk to MS-DOS format...

   Formatting will take several minutes. The floppy disk drive light is lit during the format procedure. The formatting procedure is complete when the current directory is displayed on the Chameleon screen.

F6 Dsk Copy
Disk Copy

This option copies the entire contents of a floppy disk onto a second floppy disk, enabling you to make one or more backup copies of the entire floppy disk. (To copy a single file from floppy to floppy, use the z: option for ***F2 Copy***.)

F6 DskCopy does not format the diskette as it makes the copy. Therefore, you first need to format enough diskettes for the number of copies you want to make. To use the ***F6 DskCopy*** option, follow these steps:

1. Press ***F6 Dsk Copy***. This message appears:

   Please insert the source disk and type <cr>

2. Insert the disk that you want to copy (source disk) into the floppy drive and press ***Return***.

3. The following message appears:

   WARNING This copy will erase the direct to disk data. Continue ? (y/n)

   The Chameleon copies the source disk files to the Direct-to-Disk area of the hard disk before it copies it to the target disk.

   If you have direct-to-disk data that you need to keep, press **n** to abort the copy procedure, use Utilities menu ***F8 Backup*** to save the Direct-to-Disk data to a file, and then perform the ***F6 DskCopy*** procedure.

   Otherwise, press **y** to continue with the copy operation and the message **Reading floppy disk...** appears.

4. When the floppy has been read, this message appears:

   Please insert the destination disk and type <cr>

5. Insert a blank formatted disk in the floppy drive and press ***Return***. The following message appears:

   Writing floppy disk

6. When the copy is complete, this message appears:

   Do you want to copy this disk again? (y/n)

   To make additional copies of the same diskette, press **y**. When you have made sufficient copies of the disk, press **n** and the Disk Utilities menu is displayed.

F7 TX File Transmit File

The Transmit File option transmits text or binary files from the Chameleon to a host computer. The host computer must have a file transfer protocol that is compatible with the Kermit protocol.

File transfer operations can be initiated by either the Chameleon or the host computer. When entering host commands, you can enter the commands on a host terminal *OR* you can use the Chameleon Connect window to emulate a host terminal. To use the Chameleon Connect window for host terminal emulation refer to ***F9 Connect*** on page 10-21.

To use the Chameleon file transfer option, follow this procedure:

1. Verify that the host has a file transfer utility that is compatible with the KERMIT protocol.

2. Connect the host to the Chameleon **Aux Serial Port 2** using an RS232 cable. This capability requires the use of a special cable which can be purchased as an option from Tekelec (Part Number 932-5001-01) or can be made as shown in Appendix M.

   The Chameleon will act as the DCE.

3. Use the Kermit/Connect Mode Setup menu in the Utilities page to configure the Chameleon for file transfer. *Make sure that you select the type of file you are going to transfer: Text or Binary.*

Note

Kermit automatically sets the Data Bits to 8 and Parity to None regardless of how these two parameters are configured in the Kermit/Connect Mode Setup menu.

4. Call up the host Kermit program. For example, to call up KERMIT, enter:

   KERMIT <RETURN>

   and the host will respond:

   KERMIT>_

   This prompt indicates that the file transfer program has been loaded on the host and will execute KERMIT commands.

5. On the Chameleon make the File Management page active.

6. If necessary, use ***F1 Chdir*** to select the drive and directory that contains the files you want to transmit to the host.

7. Use the List Selector to select one or more files to transmit. (To use the List Selector, use the arrows keys to move the red arrow cursor to the desired file and then press the space bar to highlight the file in red. Press the space bar a second time to unselect the file.)

Note

You cannot transmit binary and text files at the same time.

8. Enter the following command on the host computer:

   receive <RETURN>

9. In the Chameleon File Management menu, press ***F7 TX File***. This begins the transmission.

10. As the file is transferred, information is displayed so that you can monitor the progress of the transmission (Figure 10.4).

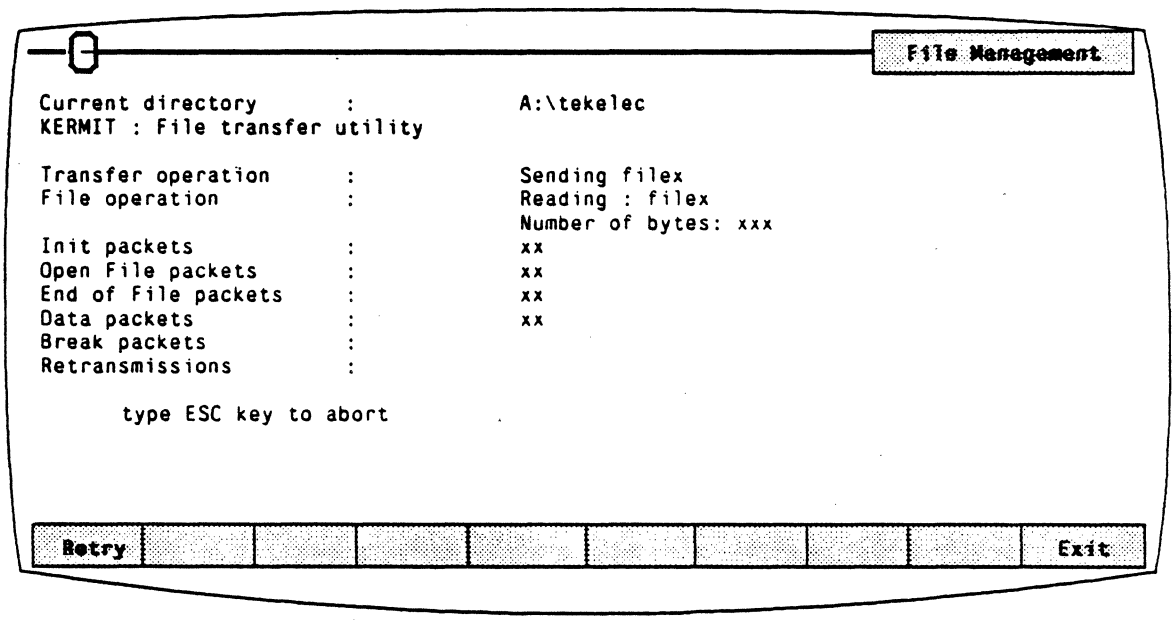


Figure 10.4: File Transfer Utility (Transmit) Screen

11. When the transfer is complete the screen displays the message **Reception OK**.

    To abort the operation in the middle of the transfer, press ***Esc***. The message **Send failed** is displayed.

    If an error was detected during the file transfer, the following message appears **Send failed**.

    If the transfer fails, you can retransmit the file(s) by pressing ***F1 Retry***.

12. When the file transfer has been completed successfully, press ***F10 Exit*** to return to the File Management menu.

F8 RX File Receive File

The Receive File option enables the Chameleon to receive text or binary files from a host computer. The host computer must have a file transfer protocol that is compatible with the Kermit protocol.

File transfer operations can be initiated by either the Chameleon or the host computer. When entering host commands, you can enter the commands on a host terminal *OR* you can use the Chameleon Connect window to emulate a host terminal. To use the Chameleon Connect window for host terminal emulation refer to ***F9 Connect*** on page 10-21.

To use the Chameleon Receive File option, follow this procedure:

1. Verify that the host has a file transfer utility that is compatible with the KERMIT protocol.

2. Connect the host to the Chameleon **Aux Serial Port 2** using an RS232 cable. This requires the use of a special cable which can be purchased as an option from Tekelec (Part Number 932-5001-01) or can be made as shown in Appendix M.

   The Chameleon will act as the DCE.

3. Use the Kermit/Connect Mode Setup menu in the Utilities page to configure the Chameleon for file transfer. *Make sure that you select the type of file you are going to transfer: Text or Binary.*

Note

Kermit automatically sets the Data Bits to 8 and Parity to None regardless of how you configure these two parameters in the Kermit/Connect Mode Setup menu.

4. Call up the host Kermit program. For example, to call up KERMIT, enter:

   KERMIT <RETURN>

   and the host will respond: **KERMIT>_**

   This prompt indicates that the file transfer program has been loaded on the host and will execute KERMIT commands.

5. Enter the host command that transmits the files. For example:

   send filename.ext <RETURN>

You can use the asterisk (*) as a wildcard to select more than one file to transmit. For example, to transmit all files from the host with the extension .doc, enter:

send *.doc <RETURN>

Note

You cannot transmit binary and text files at the same time.

6. Make the File Management page active.

7. Press ***F8 RX File***.

8. As the file is transferred, information is displayed so that you can monitor the transmission (Figure 10.5).

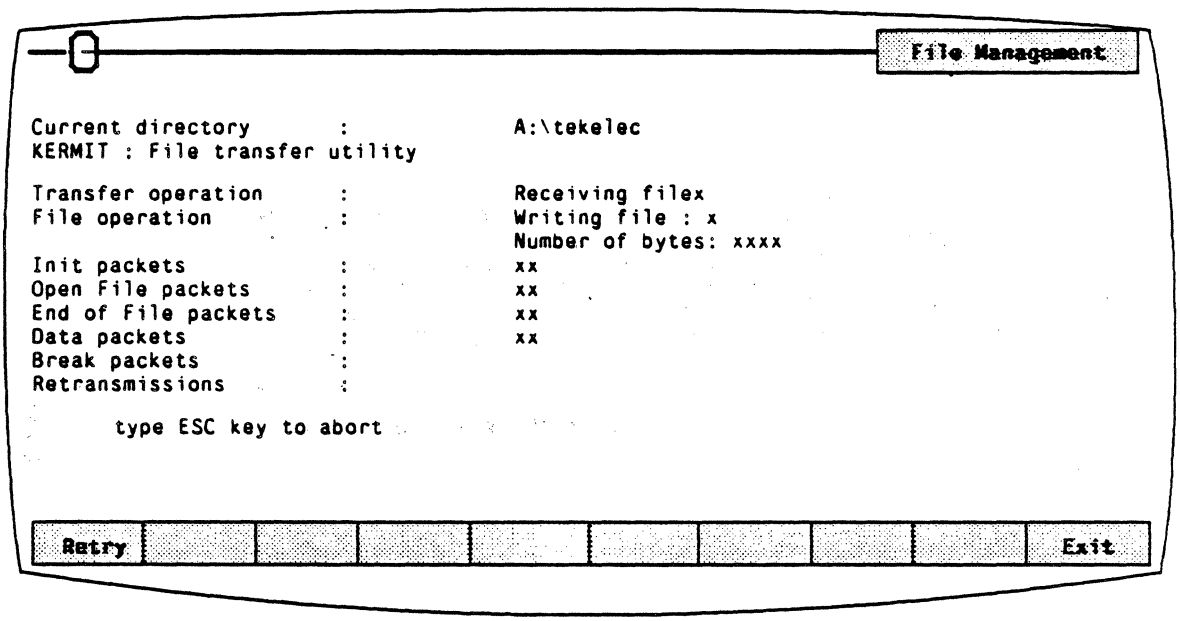


Figure 10.5: File Transfer Utility (Receive) Screen

9. When the transfer is complete the screen displays the message **Reception OK**.

   To abort the operation in the middle of the transfer, press ***Esc***. The message **Send failed** is displayed.

   If an error was detected during the file transfer, the following message appears **Send failed**.

   If the transfer fails, you can retransmit the file(s) by pressing ***F1 Retry***.

10. When the file transfer has been completed successfully, press ***F10 Exit*** to return to the File Management menu.

F9 Connect

The ***F9 Connect*** option enables you to use the Chameleon for terminal emulation. This gives you the ability to control the host from a remote location. For example, you can use the Chameleon from a remote location to transfer files between a host computer and the Chameleon 32.

Using the Connect window, you can also control a Chameleon 32 using a remote Chameleon 32 or 20. Refer to Appendix M for a description of this procedure.

To use the Chameleon for terminal emulation, perform these steps:

1. Connect the host to the Chameleon **Aux Serial Port 2** using an RS232 cable. This requires the use of a special cable which can be purchased as an option from Tekelec (Part Number 932-5001-01) or can be made as shown in Appendix M.

   The Chameleon will act as the DCE.

2. Use the Kermit Connect Mode Setup in the Utilities menu to configure the Chameleon to be compatible with the host. See *Chapter 9: Utilities* for more information.

3. On the Chameleon 32, make the File Management page active.

4. Press ***F9 Connect***. This causes the Chameleon screen to go blank and behave as a host terminal.

   You can now enter host commands. To transfer files between the Chameleon and the host, refer to pages 10-16 to 10-20.

5. To exit the Connect window, press ***Shift Cancel***. This maintains the connection with the host, but enables you to operate the Chameleon independently of the host.

CHAPTER ELEVEN:
BERT

Introduction

The Chameleon BERT application provides synchronous or asynchronous Bit Error–Rate Testing (BERT) for a variety of data communications systems. With the Chameleon configured as either a DTE or a DCE, the BERT application transmits a data stream consisting of a known pattern. One of two operations is then performed on this data stream:

- It is looped back at the device under test and analyzed by the Chameleon; or,
- It is monitored by the data tester, which then performs the same analysis.

To accomplish these test scenarios, the Chameleon can:

- Simulate synchronous data rates from 50 Hz to 64 kHz where the data is selectable from several transmission patterns with an option for error insertion
- Simulate standard asynchronous data rates from 50 Hz to 19.2 kHz where the data is selectable from several transmission patterns with optional error insertion
- Perform single interval or continuous testing

Note: BERT testing is not available for a Basic Rate Interface D–Channel. This is in keeping with the protocol specification as defined in CCITT Recommendation I.430.

Testing Configuration

Figure 11.1 shows the location of the Chameleon within the network when the Chameleon is simulating and monitoring data. The remote device on the line must be set up to loop the incoming information back to the Chameleon. This provides the known pattern required to completely analyze the incoming signal.

Note: For a V–type interface, the BERT application presumes that the DCE provides the clock and the DTE transmits on the received clock.

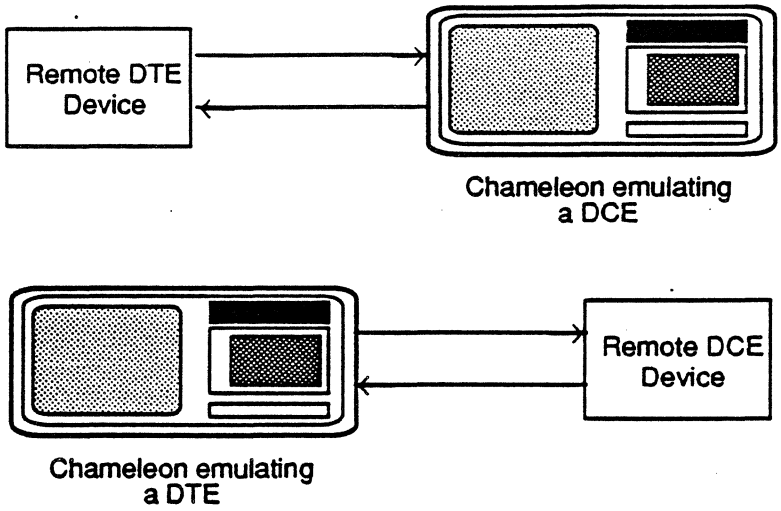


Figure 11.1: Hardware Configurations

If the Chameleon is not simulating the data stream, but simply monitoring the output of the device, you must transmit a known pattern from the remote device and configure the Chameleon to receive that pattern.

Two Chameleons can also be used to test a network. In this configuration (see Figure 11.2), the two Chameleons are set up with the same pattern. The first transmits the information through the network. It can then be analyzed by the second machine positioned at the other end of the connection.

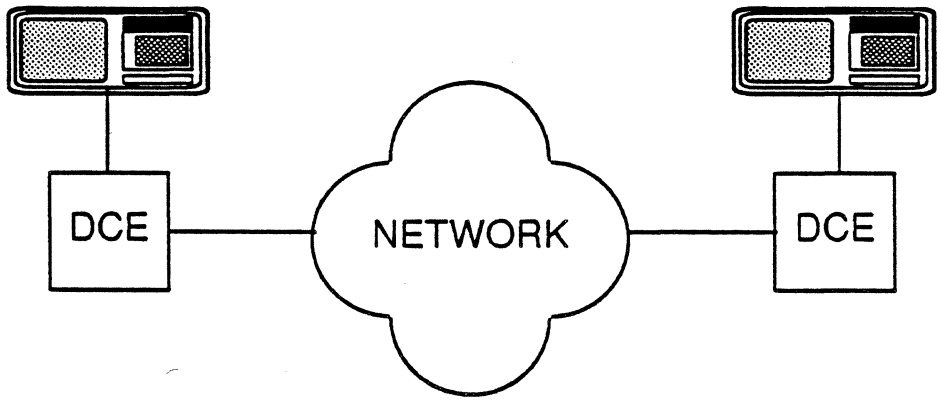


Figure 11.2: Network Test Configuration

The signal used for BERT is accessed through the I/O modules in the rear panel of the Chameleon. If your Chameleon has more than one type of I/O module, the physical interface is selectable through software.

Using the BERT Application

The following summary procedure assumes that your Chameleon is powered up and booted. To use the BERT application:

1. At the main configuration menu select. ***F2 Simulat*** as the Mode of Operation for the port you want to use.
2. Press the appropriate F–key to select the Physical Interface for the port you are using.

   Note: If your protocol is ISDN, use ***F7*** to set the physical setup now.

3. Press ***F6 Setup*** to display the Simulation menu.
4. With the arrow cursor positioned on the Protocol parameter, press ***F9 More*** to display the additional protocol options.
5. Press ***F6 BERT*** to select the BERT option.
6. Press ***Go*** to load your selection(s) and return you to the main configuration menu.
7. Press ***Go*** to load the main configuration setup and display the Applications Selection menu.
8. Press ***F1 LoadA*** or ***F2 LoadB*** to load the BERT application on the appropriate port(s).
9. Press ***Go*** to start the application and display the BERT page banner at the bottom of the screen.
10. Press ***Shift Hide Page*** to display the full BERT Setup menu applicable to your chosen protocol (Figures 11.3 through 11.6).
11. Complete the BERT Setup menu as required by your testing application. Description of the Setup menu begins on page 11–9.
12. After completing the Setup menu, press ***Go***. One of the following screens is displayed:

    - If you selected USER for the Pattern parameter in the Setup menu, the Pattern Editor screen will appear. The use of the Pattern Editor is described on page 11–13.
    - If you selected something other than USER for the Pattern parameter (you will use a standard data pattern), the first of the BERT run–time displays appear. The BERT run–time displays are described beginning on page 11–15.

(Procedure continues on next page).

13. The BERT run–time pages display bit and block error statistics and enable you to start and stop testing intervals. When your entire testing session is complete, press ***F10 Exit*** to stop the BERT application and return to the Applications Selection menu.

Setup Menus

There are four BERT setup menus. The first – displayed by pressing ***F1 SYNC*** – is used for defining BERT parameters for synchronous transmissions. The second – displayed by pressing ***F2 ASYNC*** – is used for defining the BERT parameters for asynchronous transmissions. The third and fourth are displayed when their respective ISDN–type interface is selected for Physical Interface. These menus enable you to:

- Configure the Chameleon as a DCE or DTE device
- Set the Baud rate (all except ISDN)
- Specify the data pattern which will be used for the test
- Define a user preamble.
- Define the data block length
- Select the type and duration of BERT test

The setup menus for synchronous and ISDN transmission (Figures 11.3, 11.5 and 11.6) allow you to define an error insertion rate, but do not allow you to define:

- Data bits
- Stop bits
- Parity bits

The asynchronous setup menu (Figure 11.4) allows you to define data, stop and parity bits, but does not allow you to define an error insertion rate.

Two ISDN setup menus (Figures 11.5 and 6) allow you to define Transmit and Receive Channels, and Transmit and Receive Time Slots, respectively.

Figure 11.7 is a summary chart of the parameters available for each of the protocol types. Each parameter is described beginning on page 11–9.

To change a parameter:

1. Move the cursor to the desired parameter. The options are displayed in the F–key strip at the bottom of the screen.
2. Press the F–key corresponding to the desired parameter. In the ASYNC mode, the Data, Stop and Parity bit settings for the Chameleon must be the same as those for the device–under–test.
3. Press ***Go*** to display the first BERT run–time page. For a description of the three available pages, see page 11–15.

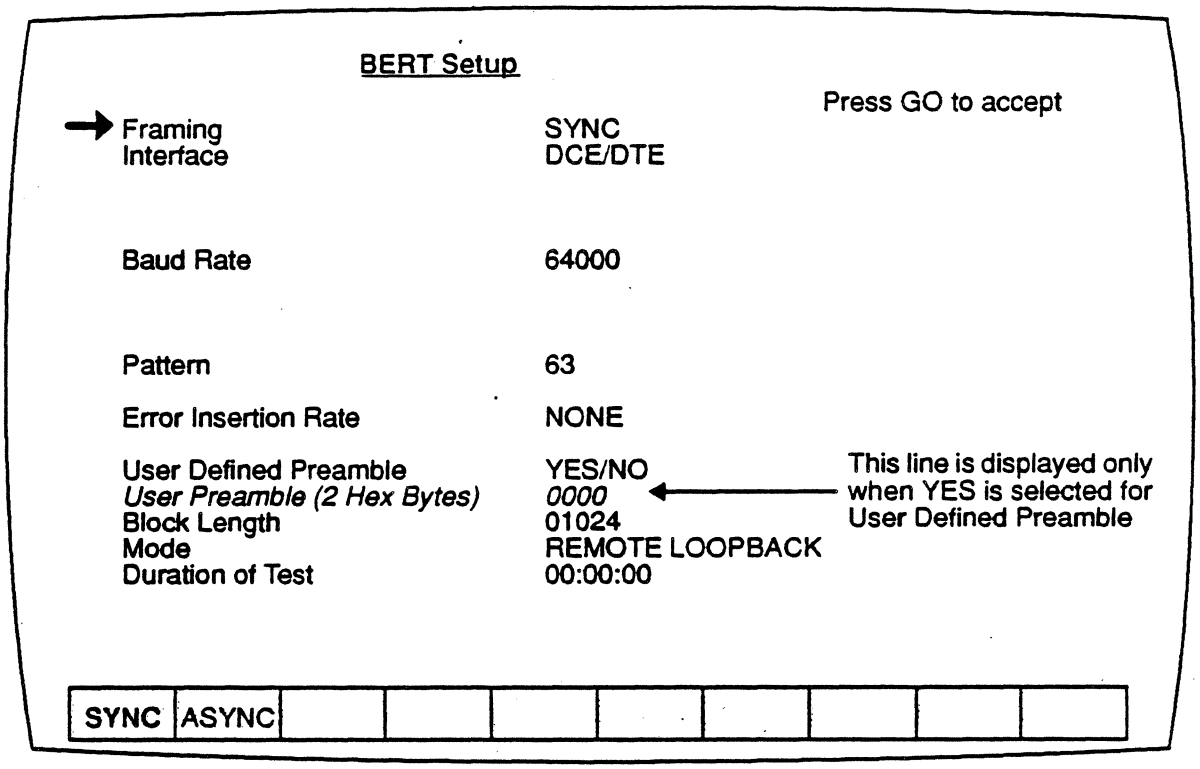


Figure 11.3: BERT SYNC Setup Menu

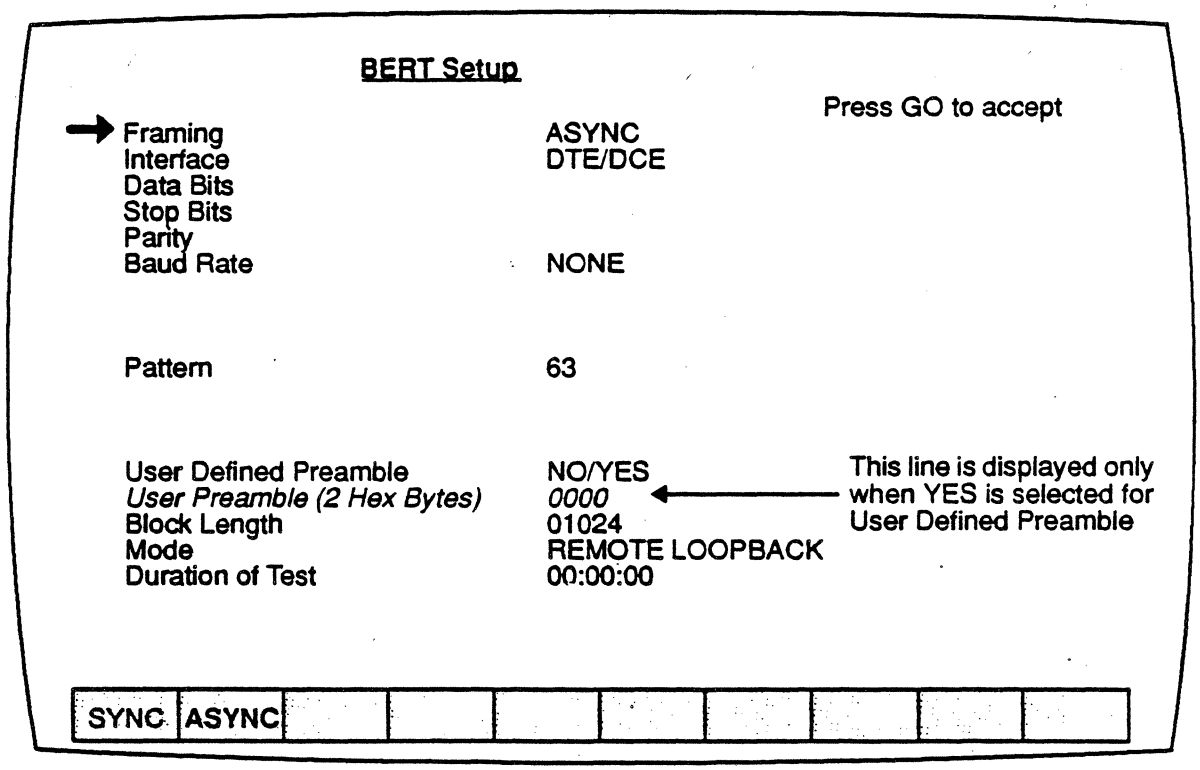


Figure 11.4: The BERT ASYNC Setup Menu

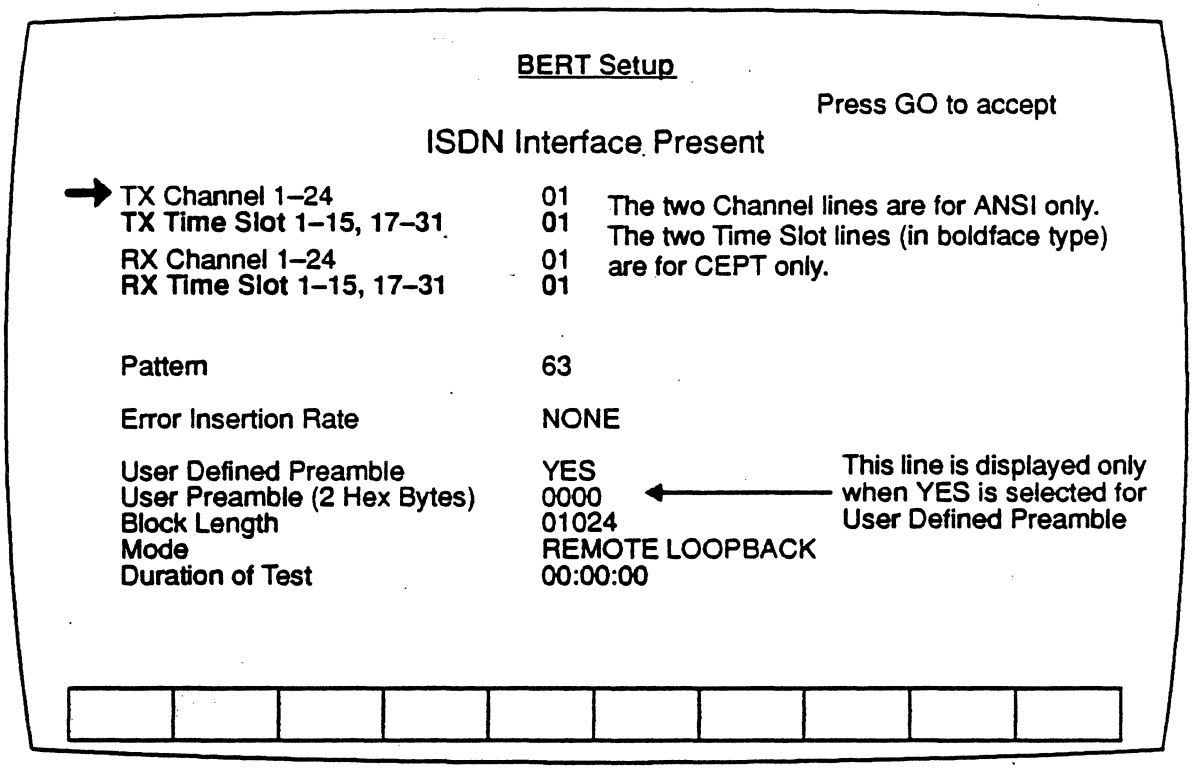


Figure 11.5: The BERT Setup Menu for ISDN PRI.

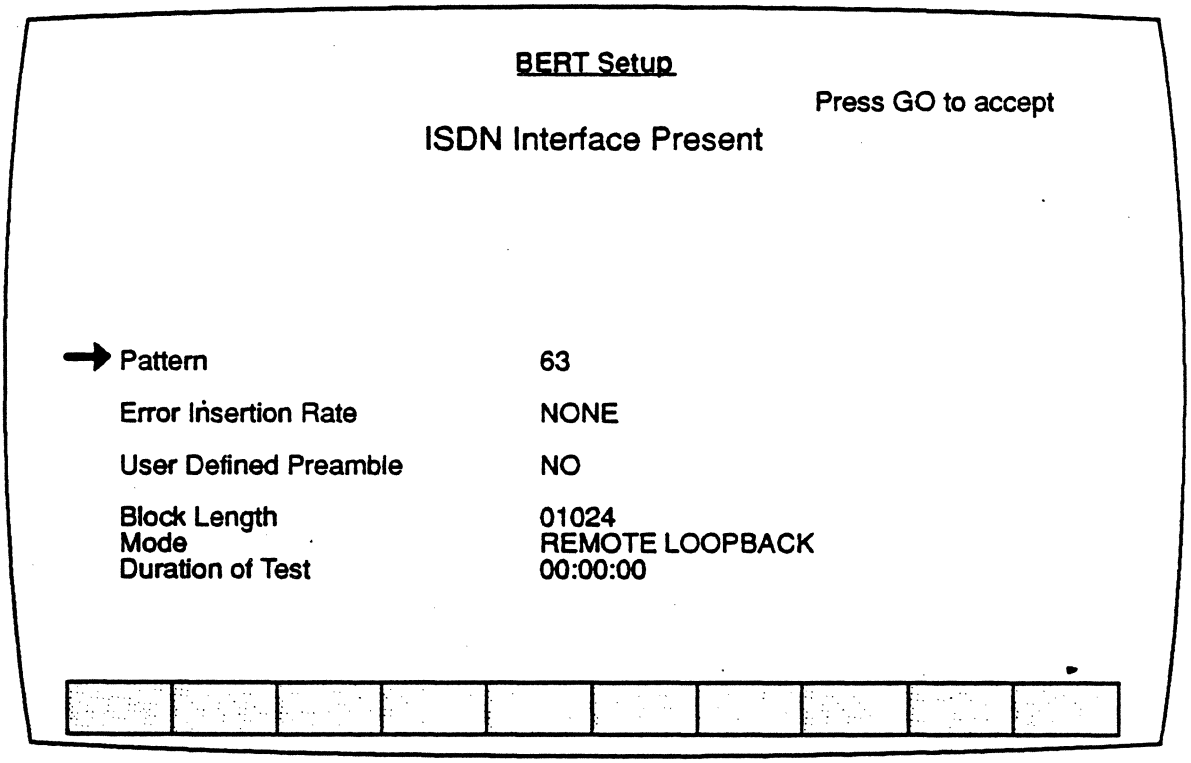


Figure 11.6: The BERT Setup Menu for ISDN 2B1Q and BRI.

BERT Setup Parameters	Sync	Async	ANSI PRI	CEPT PRI	BRI/2B1Q
Framing	X	X			
Interface	X	X			
Data Bits		X			
Stop Bits		X			
Parity		X			
Baud Rate	X	X			
TX Channel			X		
TX Time Slot				X	
RX Channel			X		
RX Time Slot				X	
Pattern	X	X	X	X	X
Error Insertion Rate	X	X	X	X	X
User–Defined Preamble	X	X	X	X	X
User Preamble	X	X	X	X	X
Block Length	X	X	X	X	X
Mode	X	X	X	X	X
Duration of Test	X	X	X	X	X

Figure 11.7: The BERT Setup Parameters for Available Interfaces.

Setup Parameter Descriptions

Framing The Framing parameter selects Synchronous or Asynchronous timing. If you select asynchronous framing, you must also specify the Data Bits, Stop Bits and Parity, and Baud Rate.

Interface The Interface parameter specifies whether the Chameleon will simulate a DCE or a DTE device. However, see the second NOTE on page 11–1 regarding V–type interfaces.

Data Bits In Asynchronous Framing only, the Data Bits parameter specifies the number of data bits in each byte as 8, 7, 6, or 5. The setting for this parameter must be the same as that for the remote device.

Stop Bits In Asynchronous Framing only, the Stop Bits parameter specifies the number of stop bits being used in each byte of data as 1, 1.5, or 2. The setting for this parameter must be the same as that for the remote device.

Parity In Asynchronous Framing only, the Parity parameter specifies the parity setting being used as None, Odd, or Even. The setting for this parameter must be the same as that for the remote device.

Baud Rate The Baud Rate parameter specifies the speed (in bits per second) that the Chameleon will use to transmit or receive data. This parameter is displayed only when the Chameleon is configured for asynchronous framing, or as a DCE using synchronous framing. If the Chameleon is configured as a DTE using synchronous framing, the Chameleon will match the received clock.

TX/RX Channels The Transmit (TX) and Receive (RX) Channels parameters (Figure 11.5) allow you to specify which ANSI Primary Rate Interface channel the bit stream is to be transmitted and received over. When working with two Chameleons, or with a port–to–port network in which one end transmits and the other receives the same bit stream, the Tx channel must be the same one as the Rx channel.

TX/RX Time Slots The Transmit (TX) and Receive (RX) Time Slots parameters (Figure 11.5) allow you to specify which CEPT Primary Rate Interface time slots the bit stream is to be transmitted and received over. When working with two Chameleons, or with a port–to–port network in which one end transmits and the other receives the same bit stream, the Tx time slot must be the same one as the Rx time slot.

Pattern The Pattern parameter specifies the type of data that the Chameleon will transmit or expect to receive on the line. The following patterns are available:

- You can select a bit pattern of 63, 511, 2047, 4095, or 32767 bits in length. The algorithm for each pattern is shown in Figure 11.8.

- Press *F6 01010101* to select the pattern 1010101.
- Press *F7 FOX* to select the standard FOX message: THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 1234567890 $^{C}_{R}$
- Press *F8 USER* to define your own pattern of 3 – 200 bytes in length. See page 11–13 for the procedure for specifying your own pattern.

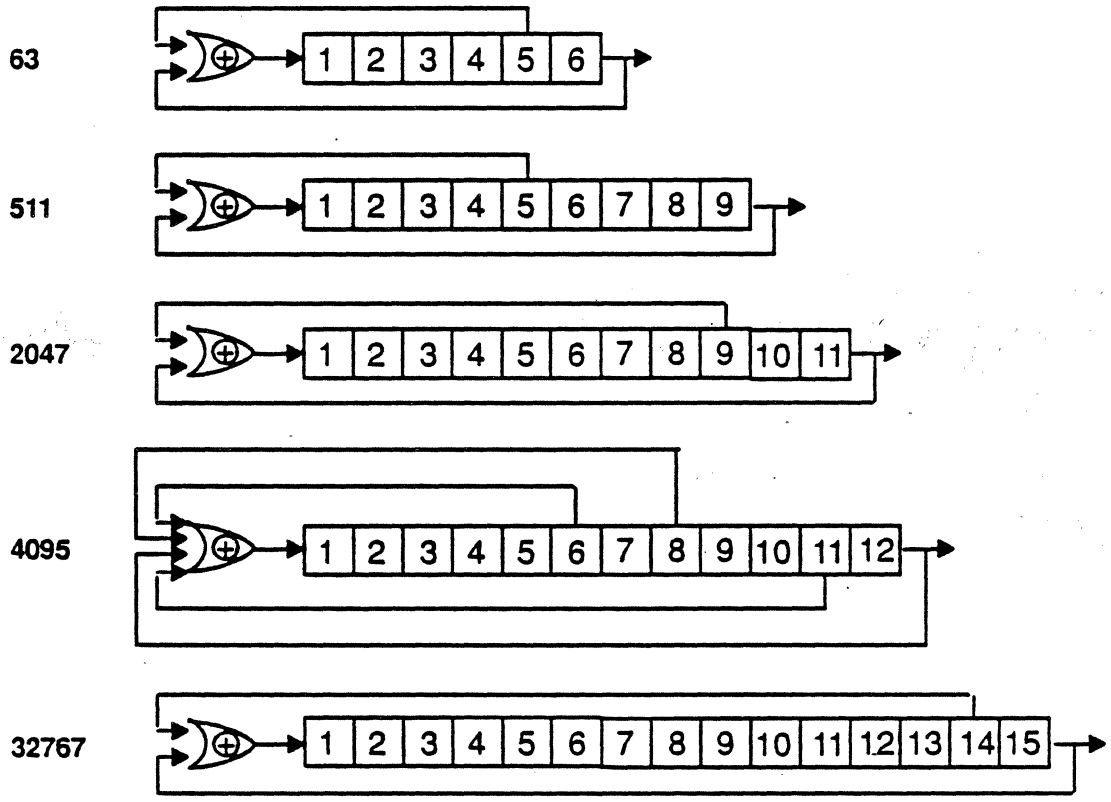


Figure 11.8: BERT Data Pattern Algorithms

Error Insertion Rate In Synchronous Framing only (see Figure 11.3), this parameter sets the rate at which errors are automatically inserted into the bit stream. When you set the *F4* key, you activate the *F8* key of the Run–Time Menu for turning error insertion on and off. See page 11–17 for details. Keys *F2* through *F7* set the following rates:

F1 None	There will be no automatic insertion of errors.
F2 1.04E–2	Errors will be automatically inserted into the bit stream at the rate of 1040 in every 100,000 bits.

F3 1.02E–3 Errors will be automatically inserted into the bit stream at the rate of 102 in every 100,000 bits. This rate is just above the threshold defining severely errored seconds from errored seconds.

F4 1.00E–3 Errors will be automatically inserted into the bit stream at the rate of 100 in every 100,000 bits. This is the threshold rate defining errored seconds from severely errored seconds.

F5 9.54E–4 Errors will be automatically inserted into the bit stream at the the rate of 95.4 in every 100,000 bits. This rate is just below the threshold defining errored seconds from severely errored seconds.

F6 1.00E–4 Errors will be automatically inserted into the bit stream at the the rate of 10 in every 100,000 bits.

F7 1.00E–5 Errors will be automatically inserted into the bit stream at the the rate of 1 in every 100,000 bits.

User–Defined Preamble

This parameter enables you to enter a 2–byte preamble which may be required by the remote device in order to synchronize the line. When you select *YES*, the User Preamble parameter appears, as described below.

User Preamble

This parameter appears only when you select *Yes* for the User–Defined Preamble. Enter the required 2 hex bytes and press ***Return***.

Block Length

The Block Length parameter enables you to select the block length required for your testing application. The block length varies by standard and may correspond to the pattern length or to a fixed number of bytes, such as 1000 or 10000. To specify a block length, enter the number of bits in decimal and press ***Return***. The range is 0 – 64k bits.

Mode

The Mode parameter determines the function of the Chameleon during a test session. There are three options:

F1REMOTE is the normal mode of operation, in which the Chameleon generates and transmits a BERT pattern and expects the remote device to either physically/logically return that pattern, or generate its own pattern. Either method of pattern loopback is acceptable and will be checked for validity.

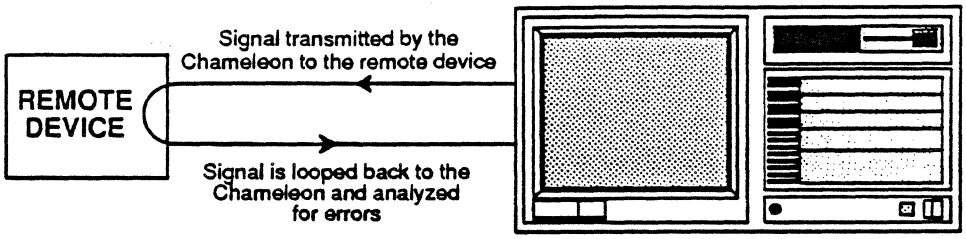


Figure 11.9: Signal Path in Remote (Transmit) Mode.

F2LOCAL is a *logical* loopback mode in which the Chameleon waits for synchronization on an incoming BERT pattern. It then transmits that pattern back to the remote device. The Chameleon does a full validity check on the received pattern. (Figure 11.10).

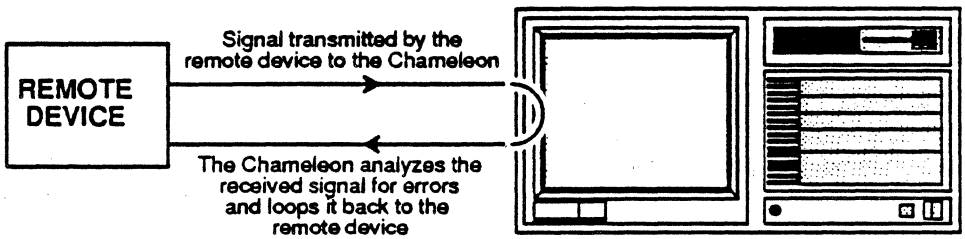


Figure 11.10: Signal Path in Local (Transmit) Mode.

F3RECEIVE is the mode in which the Chameleon waits for synchronization on an incoming BERT pattern and checks it for validity. The Chameleon does not transmit a BERT pattern in this mode. (Figure 11.11).

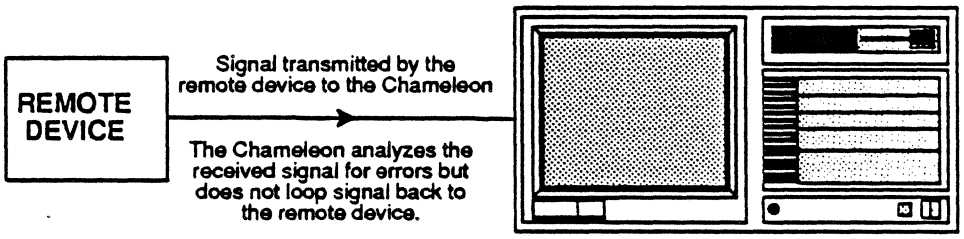


Figure 11.11: Signal Path in (Local) Receive.

Duration of Test

This parameter determines how long the test will run when in continuous mode (see ***F2 Contins*** on page 11–16). It does **not** specify the time at which to start or stop a test, but only indicates test duration. Enter the test duration in the format **hh:mm:ss**. A value of 00:00:00 causes the test to run until manually stopped (see ***F3 Stop*** on page 11–16). The maximum duration for a test is 97 hours, 59 minutes, and 59 seconds (97:59:59).

BERT Pattern Editor

The BERT Pattern Editor (Figure 11.12) enables you to define a data pattern for the Chameleon to transmit. To use the editor:

1. Access the BERT Pattern Editor.

   a. In the BERT Setup menu, select **USER** for the Pattern parameter.

   b. When the BERT Setup menu is complete, press *Go*. This displays the Pattern Editor.

Note: If the Pattern parameter is other than **USER**, the BERT run–time display appears.

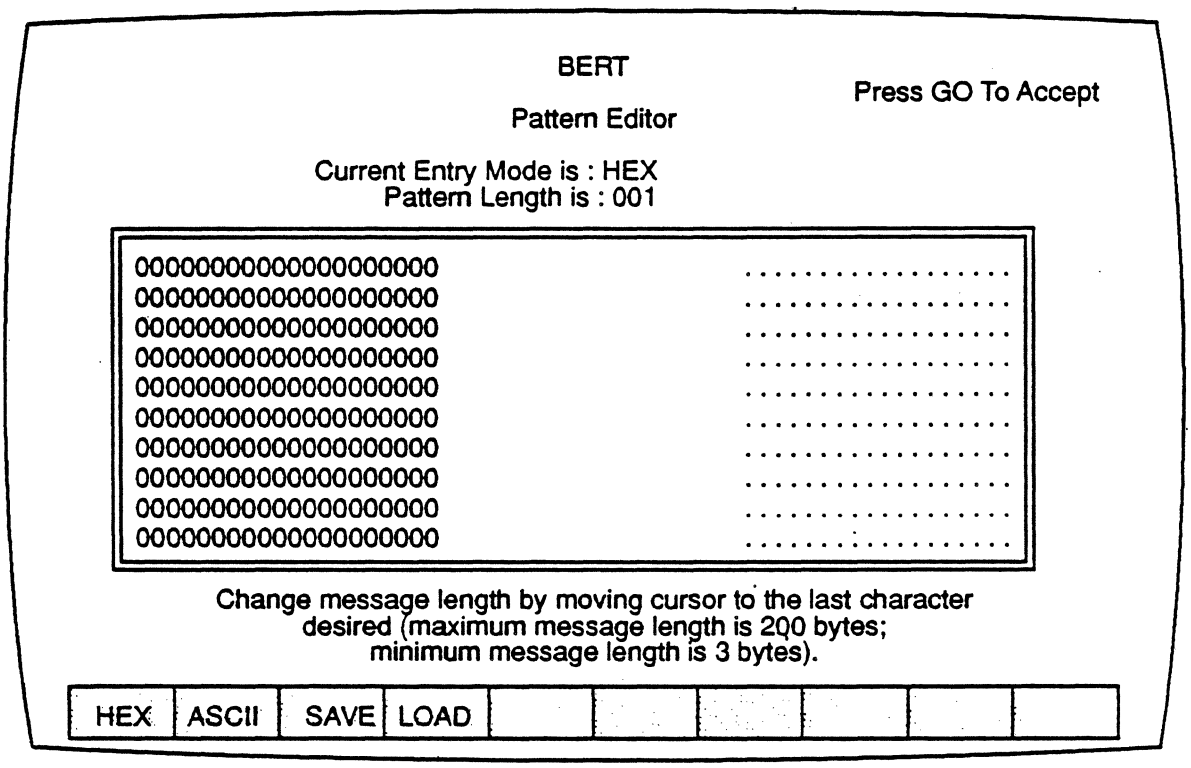


Figure 11.12: BERT Pattern Editor.

2. Select an Entry Mode.

   The data pattern will be shown in hex pattern on the left and in ASCII on the right of the editor screen. You can enter data in either hex or ASCII, by pressing either ***F1 HEX*** or ***F2 ASCII***. The current entry mode (hex or ASCII) is displayed above the

data and is also indicated by the blinking cursor in the data entry area.

Note: In step 3, if you are using asynchronous framing with 5 or fewer data bits, see the note following step 6.

3. Enter the pattern.

   The pattern must be 3 – 200 bytes in length. The data is displayed in 10 lines of 20 bytes each. If you enter more than 200 bytes, the cursor will loop back to the top of the data and begin overwriting the first part of the pattern. The current pattern length is displayed above the data entry area.

4. When your pattern is complete, position the cursor on the last byte of the data pattern. The cursor position determines the last byte of data in the pattern, regardless of the data that is displayed in the editor screen. This gives you the option of varying the pattern length while having entered only one pattern. If you do not move the cursor back one space after completing the pattern, an extra 00 byte is added to the end of the transmitted pattern.

5. If you want to save the pattern to a file for future use, press ***F3 Save***. You will be prompted for a file name. Enter a name of up to 8 characters and press ***Return***. (The file extension *.pat* will automatically be added to the file as it is saved to disk.) Files which are saved can later be retrieved from the Pattern Editor using the ***F4 Load*** key.

6. Press ***Go***. This displays the first BERT run–time display as described on page 11–18.

Patterns of 5 or Fewer Data Bits

If you are using asynchronous framing with five or fewer data bits, set the Setup menu Data Bits parameter to 5 and define the pattern using the BERT pattern Editor. Your pattern must conform to the following binary format:

Bit #	7 6 5 4 3 2 1 0
5 data bits	0 0 0 d d d d d
4 data bits	1 0 0 0 d d d d
3 data bits	1 1 0 0 0 d d d
2 data bits	1 1 1 0 0 0 d d
1 data bit	1 1 1 1 0 0 0 d

where *d* represents the data bit(s) being transmitted, followed by three 0s, with the remainder of the byte filled with 1s.

BERT Run–time Pages

There are three BERT run–time pages for displaying the results of the Chameleon's analysis of data received on the line. These pages are illustrated in Figure 11.13 through Figure 11.15.

Each of these pages share certain features. Also, the function keys for the two BERT run–time pages are identical. These shared features are described below. The features peculiar to each page are described in detail following the illustration of the page.

Common Displays

The top three lines of all BERT run–time pages display the same kinds of non–statistical information.

Elapsed Seconds Displays the number of seconds which have elapsed since the test was started. This timer is restarted when ***F1 1block***, ***F2 Contins***, or ***F6 Reset*** is pressed. This timer is stopped when the ***F3 Stop*** key is pressed.

Time Displays the system time as derived from the Chameleon clock in the format hh:mm:ss.

Mode Displays the current testing Mode as configured in the Setup menu. The field will display one of the following: Remote L/B (loop back), Local L/B, or Receive Only.

Pattern Displays the current Pattern as configured in the Setup menu. If a user–defined pattern is being used, this field displays the message USER DEFINED (but does not display the actual pattern in use).

Block Length Displays the current Block Length as configured in the Setup menu.

User Preamble Displays the User Preamble as configured in the Setup menu. If a User Preamble is not being used, the field will display *None*. If a preamble is being used, it displays the preamble as two hex pairs.

Status Displays the testing status between the Chameleon and the remote device. It will display one of the following:

Idle The Chameleon is not actively performing a test. Testing has not yet

been started or a single block or timed test has been completed.

No Sync The test is proceeding, but the line is not synchronized. In this state, the Chameleon will continuously attempt to re–synchronize the line automatically.

In Sync The line is synchronized and the test is proceeding.

Refer to page 11–23 for a more in–depth description of line synchronization.

Function Keys

The functions of the *F* keys are identical for each of the three BERT pages.

F1 1block This key is relevant only for Remote Loopback and Local Loopback testing. It causes the Chameleon to transmit one block of data to the remote device. The block size is specified in the Block Length parameter in the Setup menu. The data pattern is specified in the Pattern parameter in the Setup menu.

F2 Contins In Remote Loopback mode, this key causes the Chameleon to transmit data continuously. In Local Loopback mode, the Chameleon will begin to transmit data continuously once the line is in sync. In Receive Only mode, this key causes the Chameleon to begin receiving and analyzing data from the remote device. In continuous mode, testing continues until one of the following occurs:

- ***F3 Stop*** is pressed
- The test has run its duration as configured in the Setup menu.

F3 Stop This key stops continuous testing mode. To continue testing, press ***F2 Contins.***

F4 Ins Err This key causes the Chameleon to transmit an errored bit into the data being transmitted to the remote device. It is relevant for Remote Loopback or Local Loopback test mode.

F5 Resync This key causes the Chameleon to attempt to re–synchronize the line. See page 11–23 for a more in–depth description of line synchronization.

F6 Reset This key resets all statistical fields in both pages to zero. In continuous mode, ***F6 Reset*** resets all statistics fields.

If a counter value exceeds two billion, the message *overflow* will appear in the field. To reset the counters to zero, press ***F6 Reset.***

F7 Setup This key stops the test session and exits to the BERT Setup menu.

F8 Err off/on In Synchronous Framing only, this key is activated whenever Error Insertion Rate keys ***F2*** through ***F7*** are pressed. ***F8*** toggles the insertion of errors *ON* and *OFF*, but is active only after the ***F4*** key of the BERT Setup Menu is set. If no error rate is selected with the ***F4*** key, this key is inactive.

The function of the ***F8*** key is bound to the ***F4*** key of the BERT Setup Menu to allow you to turn error insertion on and off without having to open the Setup Menu. Furthermore, it prevents the accidental occurrence of error insertion during synchronization. Such an occurrence would prevent synchronization and hang up your Chameleon.

F9 Next This key cycles through the run–time pages.

F10 Exit This key stops the BERT application and returns you to the Applications Selection menu.

Errored Bits/ Errored Blocks Statistics

The first BERT run–time page (Figure 11.13) displays transmit and receive error statistics for bits and blocks.

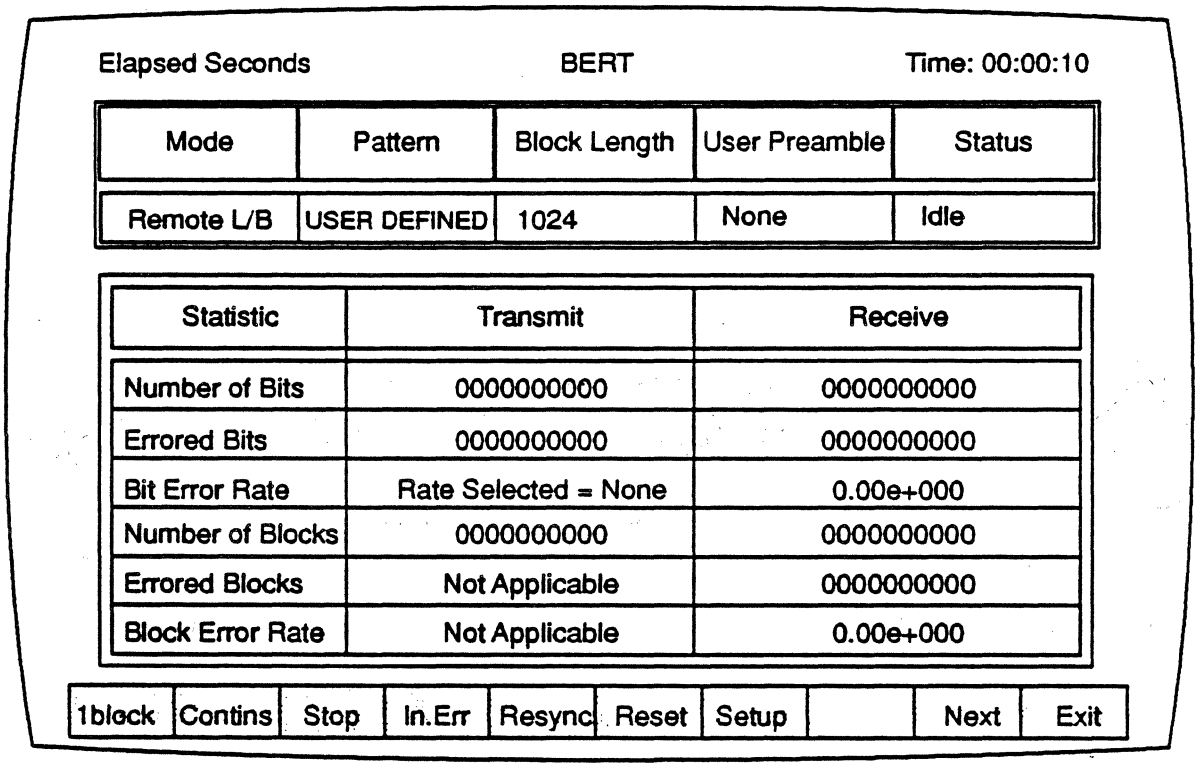


Figure 11.13: The First BERT Run–Time Page.

Number of Bits

For Transmit, this field displays the total number of bits transmitted by the Chameleon to the remote device.

For Receive, this field displays the total number of bits received by the Chameleon from the remote device.

Errored Bits

For Receive, this field displays the number of errored bits received from the remote device according to the data pattern in use.

For Transmit, this field displays the number of errored bits transmitted by the Chameleon to the remote device. To transmit an errored bit from the Chameleon:

- Press the ***F4 Ins. Err*** key; or,
- When an error insertion rate is selected, press ***F8 ErrOn***.

Bit Error Rate

For Receive, this field displays the number of errored bits received since the beginning of the test session, or since the run–time display was reset using ***F6 Reset***. It is calculated as the ratio of the number of bit errors to the total number of bits received.

For Transmit, this field displays the rate at which bit errors are being transmitted; or, if none are being transmitted, it shows *Rate Selected = None*.

Number of Blocks

For Transmit, this field displays the total number of blocks transmitted by the Chameleon to the remote device.

For Receive, this field displays the total number of blocks received by the Chameleon from the remote device.

Block size can be configured using the BERT Setup menu.

Errored Blocks

For Receive, this field displays the number of blocks received from the remote device with one or more bit errors.

For Transmit, this field is not applicable.

Block Error Rate

For Receive, this field displays the number of errored blocks received since the beginning of the test session, or since the run–time display was reset using ***F6 Reset***. It is calculated as the ratio of the number of block errors to the total number of blocks received.

For Transmit, this field is not applicable.

Errored Seconds Statistics

The second BERT run–time screen (Figure 11.14) displays error statistics for seconds and minutes.

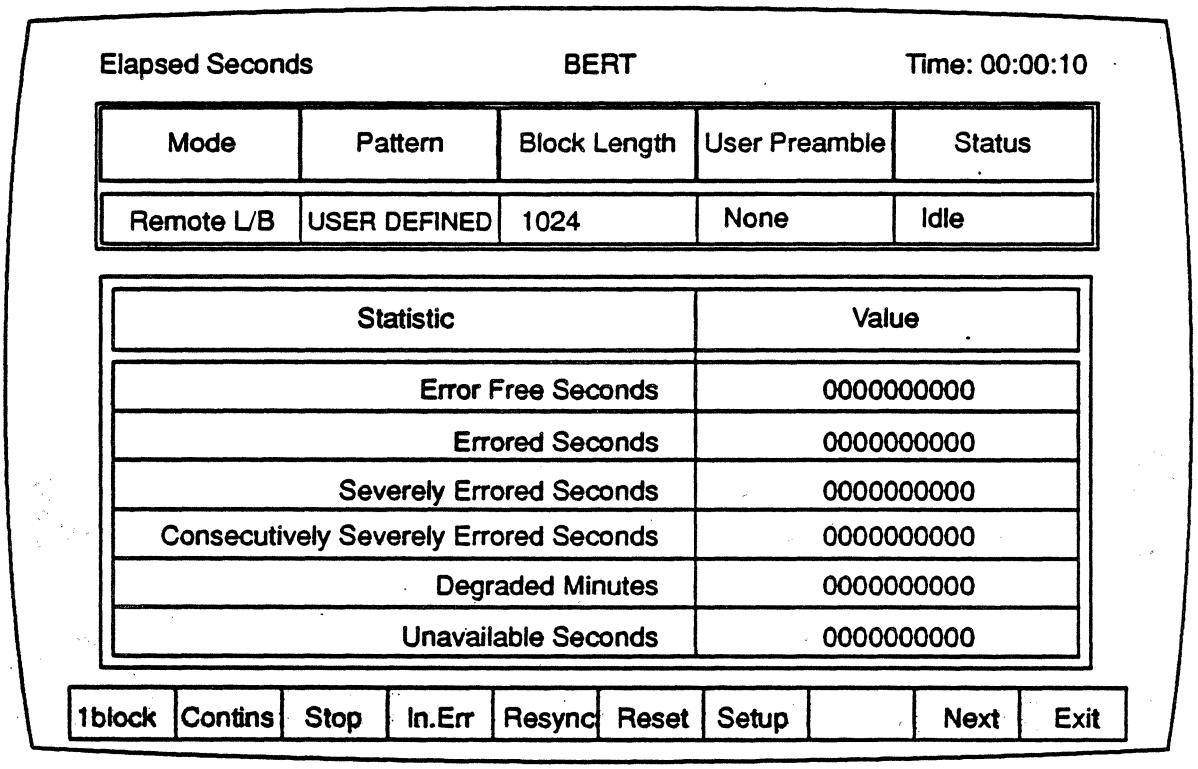


Figure 11.14: Second BERT Run–time Display

Error–Free Seconds Displays the number of available seconds in which no bit errors have occurred on the line.

Errored Seconds Displays the number of seconds in which at least one bit error has occurred.

Severely Errored Seconds Displays the number of seconds in which an available second has a bit error rate worse than 10E–3.

Consecutively Severely Errored Seconds Displays the number of consecutive seconds with bit error rates worse than 10E–3.

Degraded Minutes Displays the number of degraded minutes. A degraded minute is a 60–second block of non–severely errored available seconds in which the average bit error rate, measured over the 60 seconds, is worse than 10E–6.

Unavailable Seconds Displays the number of unavailable seconds. An unavailable second is a second in which the line quality is degraded enough that the Chameleon received data with more than 10 consecutive severely errored seconds.

Synchronization Statistics

The third BERT run–time screen (Figure 11.15) displays both the number of times synchronization was lost while testing, and the total length of time (in seconds) the bit stream was out of synchronization. To avoid misleading data, counts of synchronization loss and out–of–sync seconds are not registered until the receiver is initially in sync. While synchronization is lost, no other statistical data is collected. This prevents:

- Counting loopback delay as lost synchronization; and,
- Incorrect error reporting due to inadvertent disconnections or pattern changes.

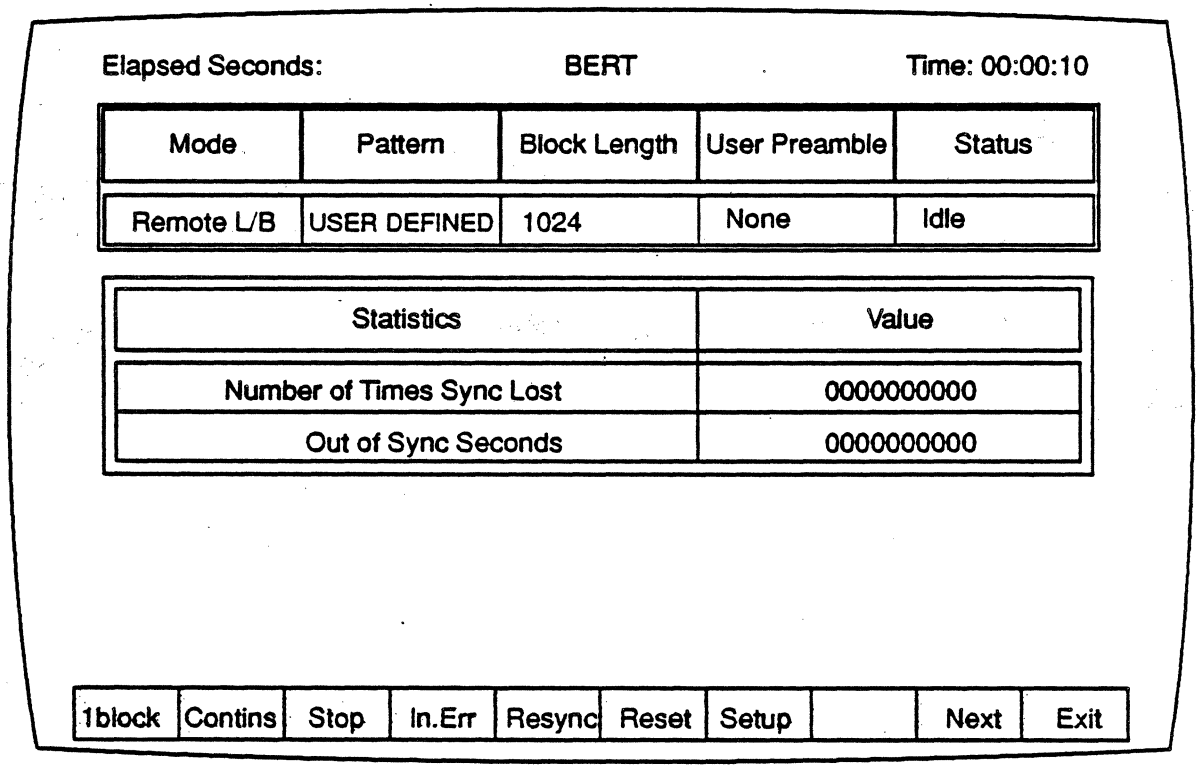


Figure 11.15: The BERT Synchronization Statistics Page.

Number of Times Sync. Lost

Displays the total number of occurrences of loss of synchronization while the Bit Error–Rate Test was in progress.

Out of Sync Seconds

Displays the number of seconds synchronization was lost while the Bit Error–Rate Test was in progress.

Line Synchronization

When testing is started in synchronous mode, the Chameleon automatically attempts to synchronize the line. The Chameleon considers the line in sync when it receives 48 consecutive bits of data which match the selected pattern, with no more than one 8–bit group containing errored bits.

When the received bit–error rate equals or exceeds 25% of received bits in any reporting, period an automatic resync command is given. However, in the case of a data slip, the change from 'In Sync' to 'No Sync' to 'In Sync' usually occurs so quickly that the change in status cannot be seen. A continuous 'No Sync' condition is generally caused by a loss of signal or a change in the received pattern.

If an unexpectedly high bit error rate occurs, there are several possible causes:

- Since synchronous mode deals with bits streams which contain no byte or word boundaries (such as asynchronous start/stop bits) an *idle* line will appear to be a continuous stream of 1s or 0s. Once sync is established, this will be seen as a very large number of bit errors.

  Since the Chameleon will not count bit errors until it is in sync with the received data, automatic resync should correct the problem.

- If sync cannot be re–established by pressing ***F5 Resync*** or the error rate is still high, it is likely that the received data is badly errored, the remote device has changed the pattern of the data it is transmitting; or, the link has been disconnected.

APPENDIX A:
PRELIMINARY TROUBLESHOOTING PROCEDURES

If the Configuration *page* is displayed after you power on and boot the System software, your Chameleon 32 has passed the built–in self tests.

If you do not see the Configuration *page*, see the Preliminary Troubleshooting Procedures below.

See page A–3 for the Chameleon 32 board configuration.

SYMPTOM	POSSIBLE REMEDY
Nothing happens when you turn the Chameleon 32 ON.	Check all power source connections. Check the AC Mains voltage setting.
There are no startup sounds when you turn the machine ON.	Check the VOLUME control.
The screen remains blank.	Check the PICTURE control.
The **Yellow Protector in Drive** message is displayed on the screen.	Remove the yellow protector from the floppy–disk drive.

If your Chameleon 32 is still not functioning properly, contact the Tekelec Customer Service Department for assistance.

CUSTOMER SUPPORT:

1–800–441–9990

In Alaska and California, please call:

1–818–880–5656

Board Configurations

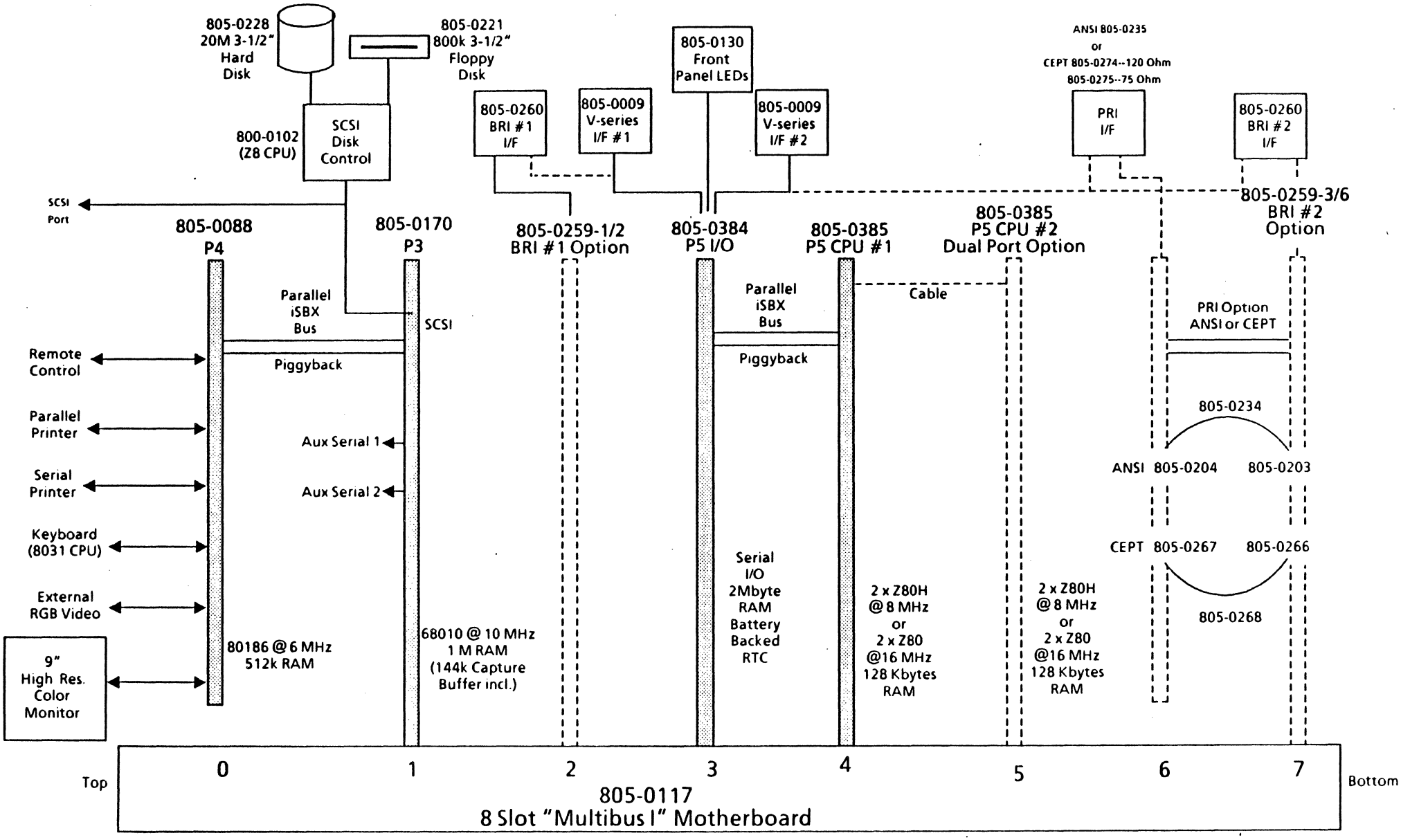
The following page illustrates the P5–based Chameleon 32 board configuration. Only P5–based machines support Software Release 4.3.

WARNING!

The Chameleon 32 has a Real–Time Clock that is backed up by a lithium battery. If this battery is replaced incorrectly, there is a danger of its exploding. Replace this battery only in strictest accordance with manufacturer's instructions, and with the same or equivalent type of battery as recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.

Single or Dual Port P5 M/C
V, BRI (X2), PRI Interface

P2 = Basic Language Simulator Engine
P1 = All Serial I/O



Notes: Different Board Configurations for BRI, PRI, and Dual Port

TEKELEC

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APPENDIX B:
ELECTRICAL CHARACTERISTICS OF THE V.24 AND V.35 INTERFACES

V.24 Interface

This section describes the V.24 interface for the Chameleon 32.

The electrical characteristics of V.24 series plugs on the Chameleon conform to the CCITT V.28 Recommendation.

The V.24 series plugs have the following electrical specifications:

Line Receiver:

- Impedance: $6 < Z < 8$ (Kohms)
- Max. Input Voltage: $\pm$ 25 V
- Decision Threshold: $\pm$ 3 V

Line Transmitter:

- Impedance: < 100 ohms
- Output Voltage: $\pm$ 12 V

The connectors of the V.24 series are 25 pin socket connectors of the standard ISO DB 25.

V.24/RS232 Specifications

RS232C is a United States standard that corresponds to the CCITT's V.24 International standard. RS232 specifications are applicable to asynchronous and synchronous binary data transmission using either private lines or swithched network systems at speeds up to 20K bps.

The physical connection of interchange circuits within a data terminal and a data set is made by a pair of pluggable connectors (the interface point). The terminal side consists of 25 pins and the data set side consists of 25 holes arranged in two columns.

Cable

The data terminal equipment must be provided with an extension cable no longer than fifty feet. Longer cables are permitted only if the load capacitance at the interface point does not exceed 2500 picofarads. Restricting cable connections to fifty feet between the computer communications adaptor and the local data set and between the remote data set and the associated terminal guards against excessive signal distortion.

The tables on the following pages show the RS232 CCITT equivalent pin numbers and their functions. The pins described are only those handled by the TEKELEC RS232 interface module. Pin 12 is included in this group, although it is not visible on the front panel LED display.

V.24 PIN ASSIGNMENTS
Monitoring Mode

DB25 Pin No.	CCITT Circuit No.	EIA	Ground	Incoming	Out-going	Processed by Chameleon	RS232 Name
1	101	AA	x	x		x	Frame Ground
2	103	BA		x		x	Transmitted Data
3	104	BB		x		x	Received Data
4	105	CA		x		x	Request to Send
5	106	CB		x		x	Clear to Send
6	107	CC		x		x	Data set Ready
7	102	AB	x	x		x	Signal Ground
8	109	CF		x		x	Data Carrier Detect
9							+ dc Test Voltage
10							-dc Test Voltage
11							Unassigned
12	122	SCF		x		x	2nd Data Carrier Detec
13	121	SCB					2nd Clear to Send
14	118	SBA					2nd Transmitted Data
15	114	DB		x		x	Transmitted Clock
16	119	SBB					2nd Received Data
17	115	DD		x		x	Receiver Clock
18							Receiver Dibit Clock
19	120	SCA					2nd Request to Send
20	108.2	CD		x		x	Data Terminal Ready
21	110	CG					Signal Quality Detect
22	125	CE		x		x	Ring Indicator
23							Data Rate Select
24	113	DA		x		x	Ext. Transmitter Clock
25							Busy

V.24 PIN ASSIGNMENTS
Simulation Mode

DB25 Pin No.	CCITT Circuit No.	EIA	Ground	To DCE	From DCE	Processed by Chameleon	RS232 Name
1	101	AA	x			x	Frame Ground
2	103	BA		x		x	Transmitted Data
3	104	BB			x	x	Received Data
4	105	CA		x		x	Request to Send
5	106	CB			x	x	Clear to Send
6	107	CC			x	x	Data set Ready
7	102	AB	x			x	Signal Ground
8	109	CF			x	x	Data Carrier Detect
9							+ dc Test Voltage
10							-dc Test Voltage
11							Unassigned
12	122	SCF			x	x	2nd Data Carrier Detect
13	121	SCB			x		2nd Clear to Send
14	118	SBA		x			2nd Transmitted Data
15	114	DB			x	x	Transmitted Clock
16	119	SBB			x		2nd Received Data
17	115	DD			x	x	Receiver Clock
18							Receiver Dibit Clock
19	120	SCA		x			2nd Request to Send
20	108.2	CD		x		x	Data Terminal Ready
21	110	CG			x		Signal Quality Detect
22	125	CE			x	x	Ring Indicator
23							Data Rate Select
24	113	DA		x		x	Ext. Transmitter Clock
25							Busy

V.35 Interface

This section describes the Chameleon 32. V.35 interchangeable interface module, which includes:

- One male connector (reference AMP 201 357-1)
- One female connector (reference AMP 200 838-2)
- Standard SAE 632 mounting hardware single lead jackscrew.

The male connector's male jackpost is near pin MM.

The female connector's female jackscrew is near pin MM.

The diameter of the pins is 0.060" for units to be used in the U.S., Japan, Australia and England. For France, Switzerland and Sweden, the diameter is 0.040".

The pins can be removed or reassigned easily using an AMP tool (reference AMP 305 183).

Electrical Characteristics

The unbalanced signals have electrical characteristics which conform to the CCITT's V.28/EIA RS232.

Driver	Output voltage:	+/- 10 volts
	Output impedance:	300 ohms
	Output slew rate:	30 volts/microseconds
Receiver	Input resistance:	approximately 5 Kohms
	Input voltage max:	+/- 25 volts
	hysteresis:	3 to 4 volts

The balanced signals have electrical characteristics which conform to the CCITT's X.27/EIA RS422.

Driver	Output resistance:	100 ohms differential
	Lead to ground:	175 ohms
	Output current:	150 mA maximum
	Output voltage:	+/- 3 volts
Receiver	Input resistance:	100 ohms differential
	Lead to ground:	175 ohms
	Input sensitivity:	+/- 200 mvolts

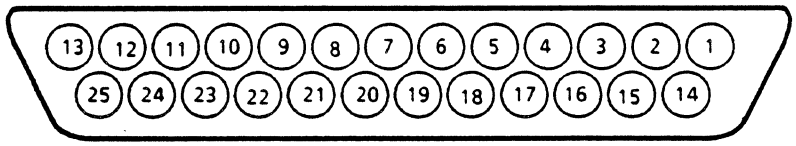
V.35 PIN ASSIGNMENTS

Pin No.	CCITT Circuit No.	Ground	From DCE	To DCE	Name	RS232 Name	Bal.	Unbal
A	-	X			FG	Frame Ground	-	-
B	102	X			SG	Signal Ground	-	-
P	103			x	TD (A)	Transmit Data	x	
S	103			x	TD (B)	Transmit Data	x	
R	104		x		RD (A)	Receive Data	x	
T	104		x		RD (B)	Receive Data	x	
C	105			x	RTS	Request to Send		x
D	106		x		CTS	Clear to Send		x
E	107		x		DSR	Data Set Ready		x
F	109		x		DCD	Data Carrier Detect		x
H	108			x	DTR	Data Terminal Ready		x
J	125		x		RI	Ring Indicator		x
Y	114		x		SCT (A)	Transmitter Signal Timing	x	
AA or a	114		x		SCT (B)	Transmitter Signal Timing	x	
V	115		x		SCR (A)	Receiver Signal Timing	x	
X	115		x		SCR (B)	Receiver Signal Timing	x	
U	113			x	SCTE (A)	Transmitter Signal Timing	x	
W	113			x	SCTE (B)	Transmitter Signal Timing	x	

APPENDIX C:
PINOUTS

Parallel Printer Connector Pinout

The Chameleon 32 parallel printer connector is a 25 pin D-sub socket (female) connector (DB25S). The pinout is shown as viewed from the rear of the machine:



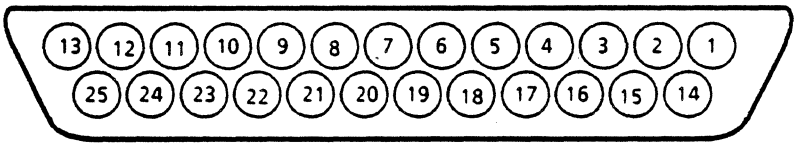
All signals are standard TTL levels.

Pin Number	Description
1	/STROBE (Active Low)
2	Data 0
3	Data 1
4	Data 2
5	Data 3
6	Data 4
7	Data 5
8	Data 6
9	Data 7
10	/ACK (Active Low)
11	Busy
12	No Connection
13	No Connection
14	No Connection
15	No Connection
16	No Connection
17	No Connection
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	No Connection
25	Ground

This connector is pinout and signal compatible with the IBM PC. It is also signal compatible with Centronics compatible parallel interface printers.

Serial Printer Connector Pinout

The Chameleon 32 serial printer connector is a 25 pin D-subminature socket (female) (DB25S). The pinout is shown as the connector is viewed from the rear of the machine:

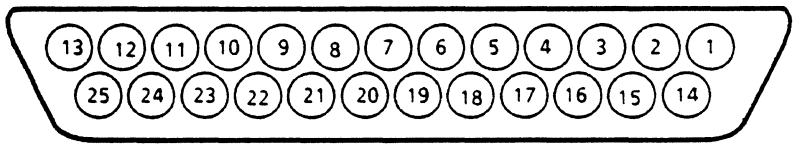


All signals are standard RS-232 voltage levels. The connector is physically and electrically a DCE type connector.

DB25 Pin Number	EIA Designation	CCITT Circuit	Signal Name	Source
1	AA	101	Chassis Ground	Chassis
2	BA	103	TXD, Transmit Data	Printer
3	BB	104	RXD, Receive Data	Chameleon
4	CA	105	RTS, Request to Send	Printer
5	CB	106	CTS, Clear to Send	Chameleon
6	CC	107	DSR, Data Set Ready	Chameleon
7	AB	102	GND, Signal Ground	Signal Gnd.
8	CF	109	DCD, Carrier Detect	Chameleon
15	DB	114	TXC, Transmit Clock	Chameleon
17	DD	115	RXC, Receive Clock	Chameleon
20	CD	108	DTR, Data Term. Rdy.	Printer
24	DA	-	CK, External Clock	Printer

Remote Terminal Connector Pinout

The Chameleon 32 remote terminal connector is a 25 pin D-subminature socket (female) (DB25S). The pinout is shown as the connector is viewed from the rear of the machine:

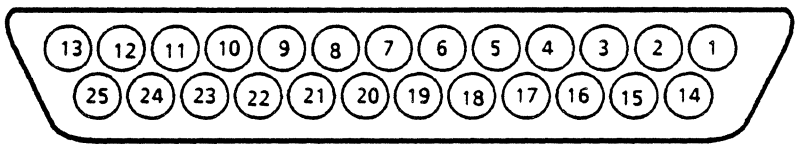


All signals are standard RS-232 voltage levels. The connector is physically and electrically a DCE type connector.

DB25 Pin Number	EIA Designation	CCITT Circuit	Signal Name	Source
1	AA	101	Chassis Ground	Chassis
2	BA	103	TXD, Transmit Data	Terminal
3	BB	104	RXD, Receive Data	Chameleon
4	CA	105	RTS, Request to Send	Terminal
5	CB	106	CTS, Clear to Send	Chameleon
6	CC	107	DSR, Data Set Ready	Chameleon
7	AB	102	GND, Signal Ground	Signal Gnd.
8	CF	109	DCD, Carrier Detect	Chameleon
15	DB	114	TXC, Transmit Clock	Chameleon
17	DD	115	RXC, Receive Clock	Chameleon
20	CD	108	DTR, Data Term. Rdy.	Terminal
24	DA	-	CK, External Clock	Terminal

Auxiliary 1 and Auxiliary 2 Connector Pinouts

The Chameleon 32 Aux. 1 and Aux. 2 connectors are 25 pin D-subminature sockets (female) (DB25S). The pinout for both is shown as the connector is viewed from the rear of the machine:

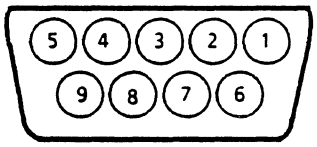


All signals are standard RS-232 voltage levels. The connector is physically and electrically a DCE type connector.

DB25 Pin Number	EIA Designation	CCITT Circuit	Signal Name	Source
1	AA	101	Chassis Ground	N/C
2	BA	103	TXD, Transmit Data	Terminal
3	BB	104	RXD, Receive Data	Chameleon
4	CA	105	RTS, Request to Send	Terminal
5	CB	106	CTS, Clear to Send	Chameleon
6	CC	107	DSR, Data Set Ready	Chameleon
7	AB	102	GND, Signal Ground	Signal Gnd.
15	DB	114	TXC, Transmit Clock	Chameleon
17	DD	115	RXC, Receive Clock	Chameleon
20	CD	108	DTR, Data Term. Rdy.	Terminal
22	CE	125	RI, Ring Indicator	Terminal
24	DA	-	CK, External Clock	Terminal

Video Connector Pinout

The Chameleon 32 video connector is a 9 pin D-sub socket (female) connector (DB9S). The pinout is as shown below:



All signals are standard TTL levels.

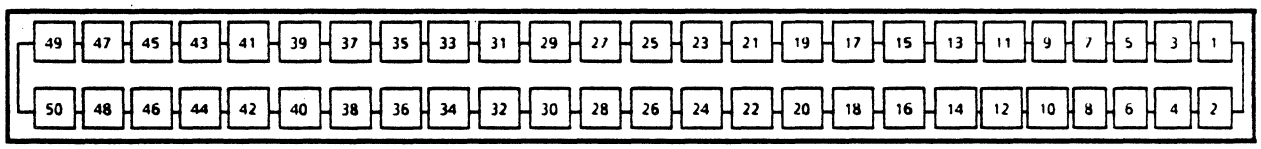
Pin Number	Description
1	Ground
2	Ground
3	Red
4	Green
5	Blue
6	Intensity
7	Monochrome
8	Horizontal Sync.
9	Vertical Sync.

This connector is pinout and signal compatible with the IBM PC. The video signal requires a monitor capable of displaying 640 pixels by 240 lines (this is higher resolution than the standard PC CGA standard). High resolution or "Multisync" type monitors are recommended for use with the Chameleon 32.

APPENDIX D:
SCSI SIGNAL INTERFACE

SCSI Interface Signals

The Chameleon 32 SCSI interface signals are as shown below. All signals are low true.



All odd pins are ground.

GND	1	2	DATA BIT 0 (DB0)
.	3	4	DATA BIT 1 (DB1)
.	5	6	DATA BIT 2 (DB2)
.	7	8	DATA BIT 3 (DB3)
.	9	10	DATA BIT 4 (DB4)
.	11	12	DATA BIT 5 (DB5)
.	13	14	DATA BIT 6 (DB6)
.	15	16	DATA BIT 7 (DB7)
.	17	18	DATA PARITY (DBP)
.	19	20	OPEN
.	21	22	OPEN
.	23	24	OPEN
.	25	26	OPEN
.	27	28	OPEN
.	29	30	OPEN
.	31	32	OPEN
.	33	34	OPEN
.	35	36	BUSY (BSY)
.	37	38	ACKNOWLEDGE (ACK)
.	39	40	RESET (RST)
.	41	42	MESSAGE (MSG)
.	43	44	SELECT (SEL)
.	45	46	CONTROL/DATA (C/D)
.	47	48	REQUEST (REQ)
GND	49	50	INPUT/OUTPUT (I/O)

The SCSI (**S**mall **C**omputer **S**ystem **I**nterface) Bus was designed to tie peripherals and one or more hosts together on small computer systems. SCSI has been standardized by ANSI, with a protocol that enables a driver to be used with slight modification on a wide variety of hosts. SCSI uses a 50 pin ribbon cable, with 8 leads used for data and one for parity.

Nine lines are used for control signals (select, busy, request, acknowledge, control/data, input/output, message, reset and attention). All control and data lines are biased at a positive voltage by terminating resistors and are considered to be asserted when pulled low to ground.

The sequence for the host to, for example, read a logical sector on a disk is divided into several phases. The selection phase requires the host to assert one of the data lines to identify which controller (target) is desired and then assert the select line. The target addressed then asserts the busy line to indicate it has recognized its selection.

In the command phase, the target unasserts the input/output line to indicate a block of six or ten bytes of command information should be outputted by the host to the target. The target asserts the request line for the first byte until the host asserts the acknowledge line to indicate the byte is on the data lines. When the target has read the byte, the request is unasserted. The host then unasserts the acknowledge line and the handshake sequence continues until all bytes of the command are transferred to the target.

In the data phase, once the controller has read the sector(s) on the disk into a buffer, it will unassert the control/data line and assert the input/output line to indicate that the host can now input the data. This is done with the request/acknowledge handshake as before.

When all data is transferred, the status phase is entered and the controller asserts the control/data line to indicate the status byte may be input by the host. The status byte will indicate if all is well.

The message phase is indicated by the message line being asserted by the target.

APPENDIX E:
CHAMELEON 32 LED OVERLAYS

Standard LED Display Overlay

On the standard CCITT V-Series Interface LED Display Overlay, there are five groups of LED displays:

- Analysis — Indicates when the Chameleon 32 is in Analysis Mode.
- Simulation — Indicates when the Chameleon 32 is in DTE or DCE Simulation Mode.
- Data — Indicates transmission or reception of Data.
- Clocks — Indicates transmission or reception of clocks.
- Controls — Indicates the state of the Interface Control Signals.

Note

The first two groups indicate whether you are running Analysis or Simulation (DCE or DTE).

The LED display is shown in Figure E.1 on the following page.

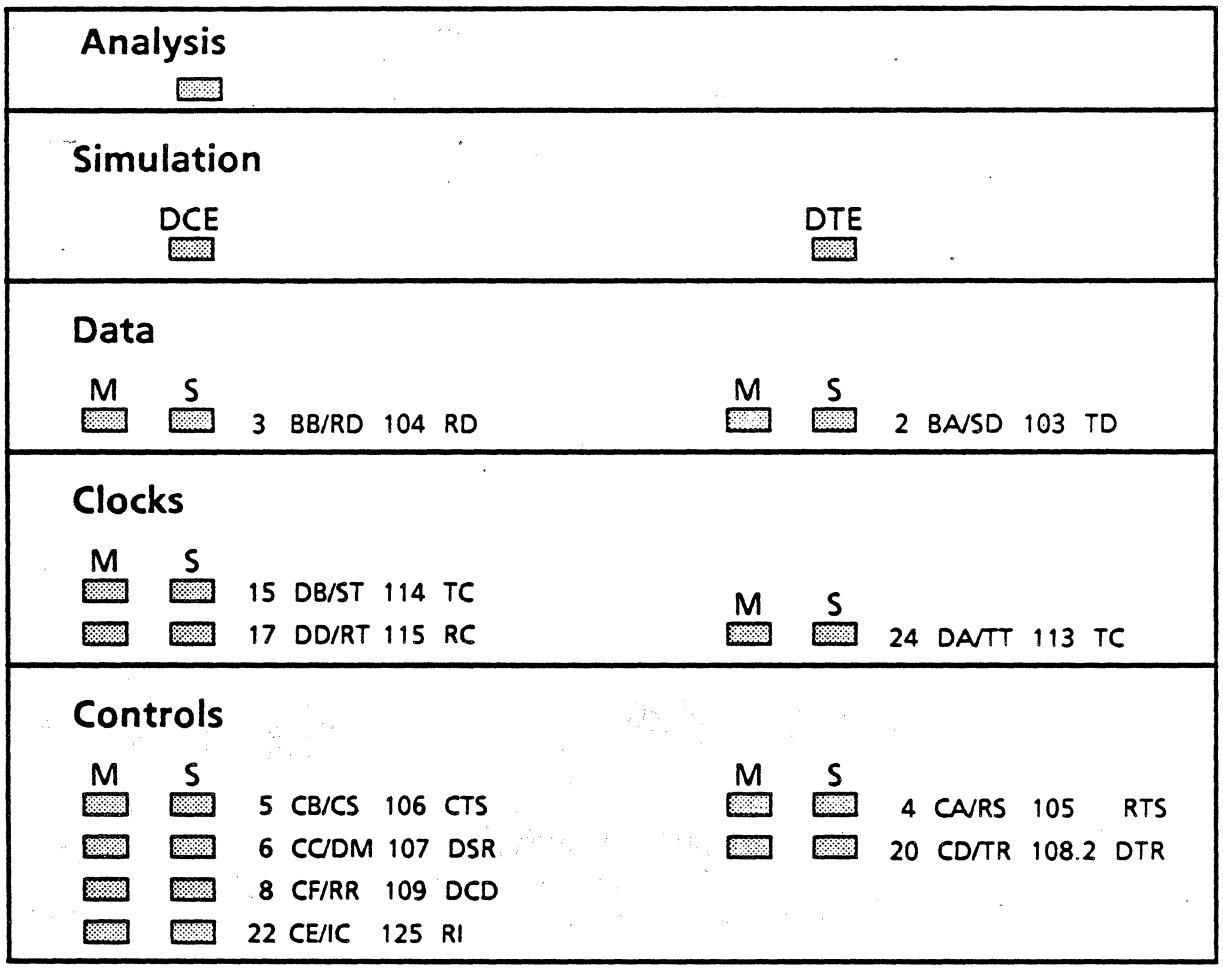


Figure E.1: The Standard LED Display Overlay

The remaining groups have two columns of LED displays, indicating Mark or Space. There are also four columns in each row. These columns are from left to right:

- DB 25 pin number
- EIA circuit description/V.35 circuit description
- CCITT circuit number
- EIA signal name

ANSI Primary Rate Interface LED Overlay

The ANSI Primary Rate LED Overlay is shown in Figure E.2 below. (See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 11: ISDN Primary Rate Interface*, for more information.)

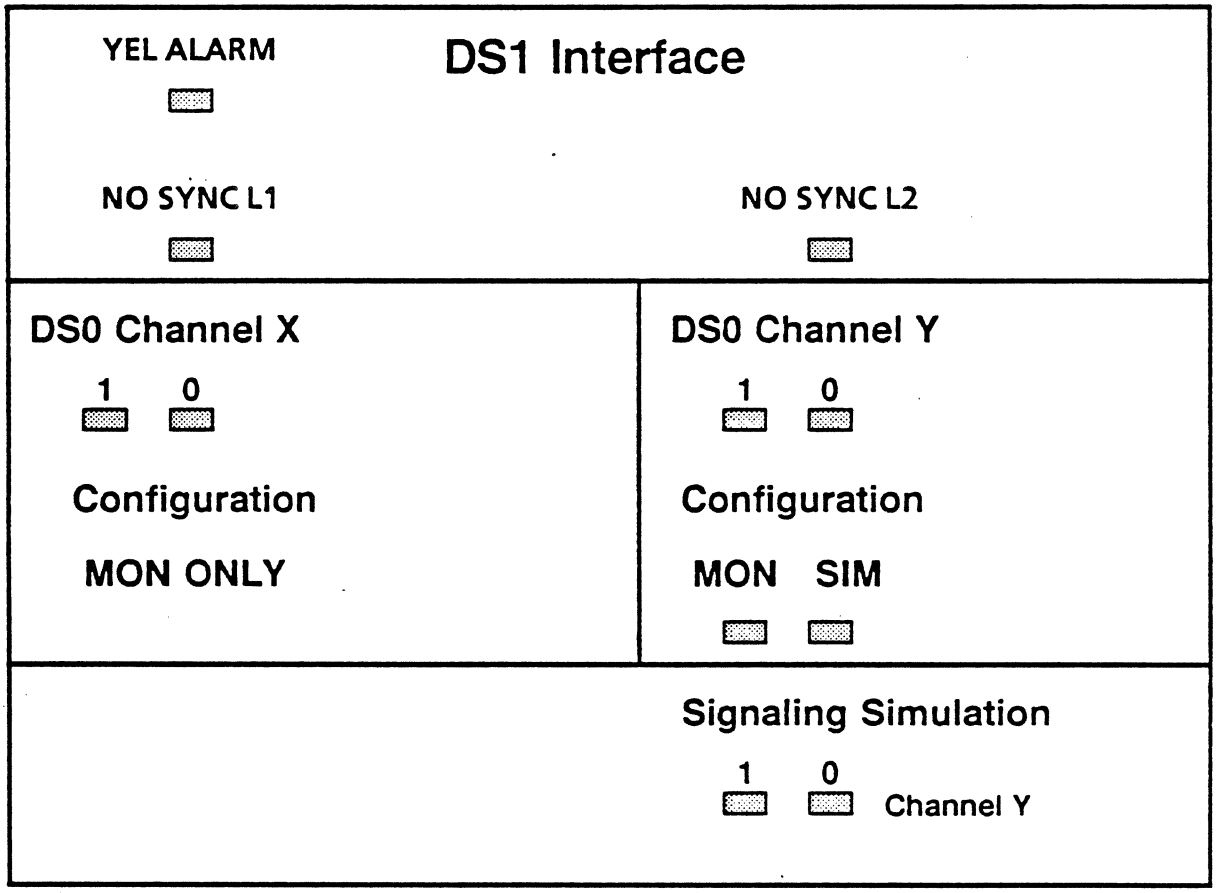


Figure E.2: The ANSI Primary Rate Interface LED Display

The Level 1 information for both signals includes:

- NO SYNC L1/2

  No Frame Synchronization

  The LED for the corresponding line is lit when an out-of-frame condition exists on that line.

- YEL ALARM

  Yellow Alarm

  This LED is lit when remote end problems exist, indicating one of the following conditions has been met:

  - In ESF framing (Extended Superframe, with or without signaling), the Receiver has detected 16 Yellow Alarm patterns of 0000000011111111 or 1111111100000000 on the 4K bps Data Link.

  - In SF framing (Superframe, with or without signaling), a Yellow Alarm is detected when BIT 2 equals 0 for 255 consecutive channels. A switch on the Multibus Board allows selection of an alternate Yellow Alarm which activates when the S-bit of Frame 12 is *high*.

- DS0 Channel X/Y

  The two LEDs for Channels X and Y show what constitutes the DS0 data of the corresponding channel. If the data is all ones, only the LED labeled 1 is lit. The same is true for all zero data. If the data is ones and zeros, then both the LED labeled 0 and 1 are flashing.

  - Configuration

    The **MON** LED, when lit, indicates that the DS0 Channel Y is in Monitoring Mode. (DS0 Channel X is always in Monitoring Mode.)

    The **SIM** LED indictates that the Channel Y is in Simulation Mode.

- Signaling Simulation

  The two LEDs show the current state of the "A" signaling bit for Channel Y when the channel is in Simulation Mode. (Channel X is always in Monitor Mode.)

CEPT Primary Rate Interface LED Overlay

The CEPT Primary Rate Interface LED Overlay for the Chameleon 32 Front Panel LED display is shown in Figure E.3 below. (See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 11: ISDN Primary Rate Interface*, for more information.)

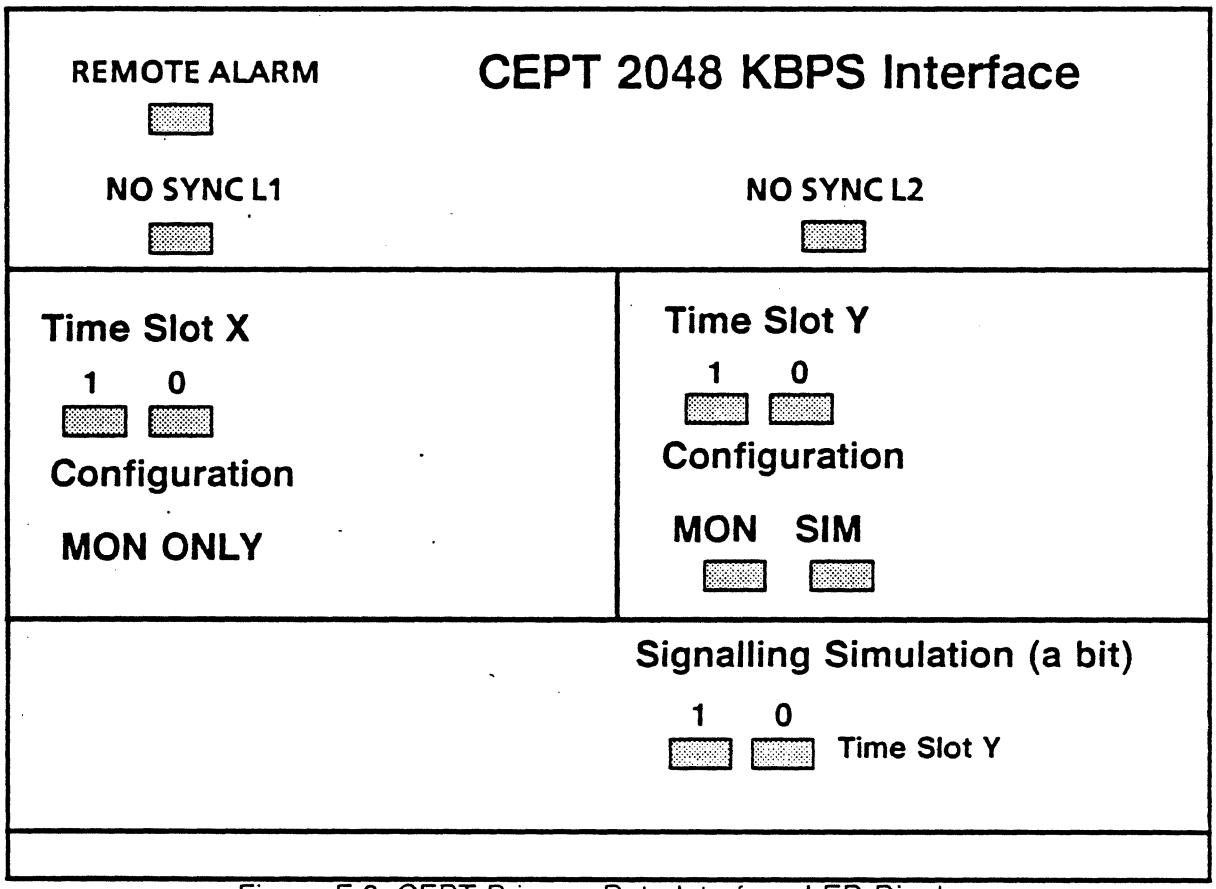


Figure E.3: CEPT Primary Rate Interface LED Display

Level 1 information on the LED display for both signals includes:

- **REMOTE ALARM**

  This LED is lit when remote end problems exist.

- **NO SYNC L1/2**

  No Frame Synchronization

  The LED for the corresponding line is lit when an out-of-frame condition exists on that line.

- **Time Slot X/Y**

  The two LEDs for Time Slots X and Y show what constitutes the data of the corresponding Time Slot. If the data is all ones, only the LED labeled **1** is lit. The same is true for all zero data. If the data is ones and zeros, then both the LED labeled **0** and **1** are flashing.

  - **Configuration**

    The **MON** LED, when lit, indicates that Time Slot Y is in Monitoring Mode. (Time Slot X is always in Monitoring Mode.)

    The **SIM** LED indictates that the Time Slot Y is in Simulation Mode.

- **Signalling Simulation (a bit)**

  The two LEDs show the current state of the "A" signaling bit for Time Slot Y, when the Time Slot is in Simulation Mode. (Time Slot X is always in Monitor Mode.)

Basic Rate Interface LED Overlay

The Basic Rate Interface LED overlay is shown in Figure E.4 below. (See the *Chameleon Protocol Interpretation Manual, Volume II, Chapter 12: ISDN Basic Rate Interface*, for more information.)

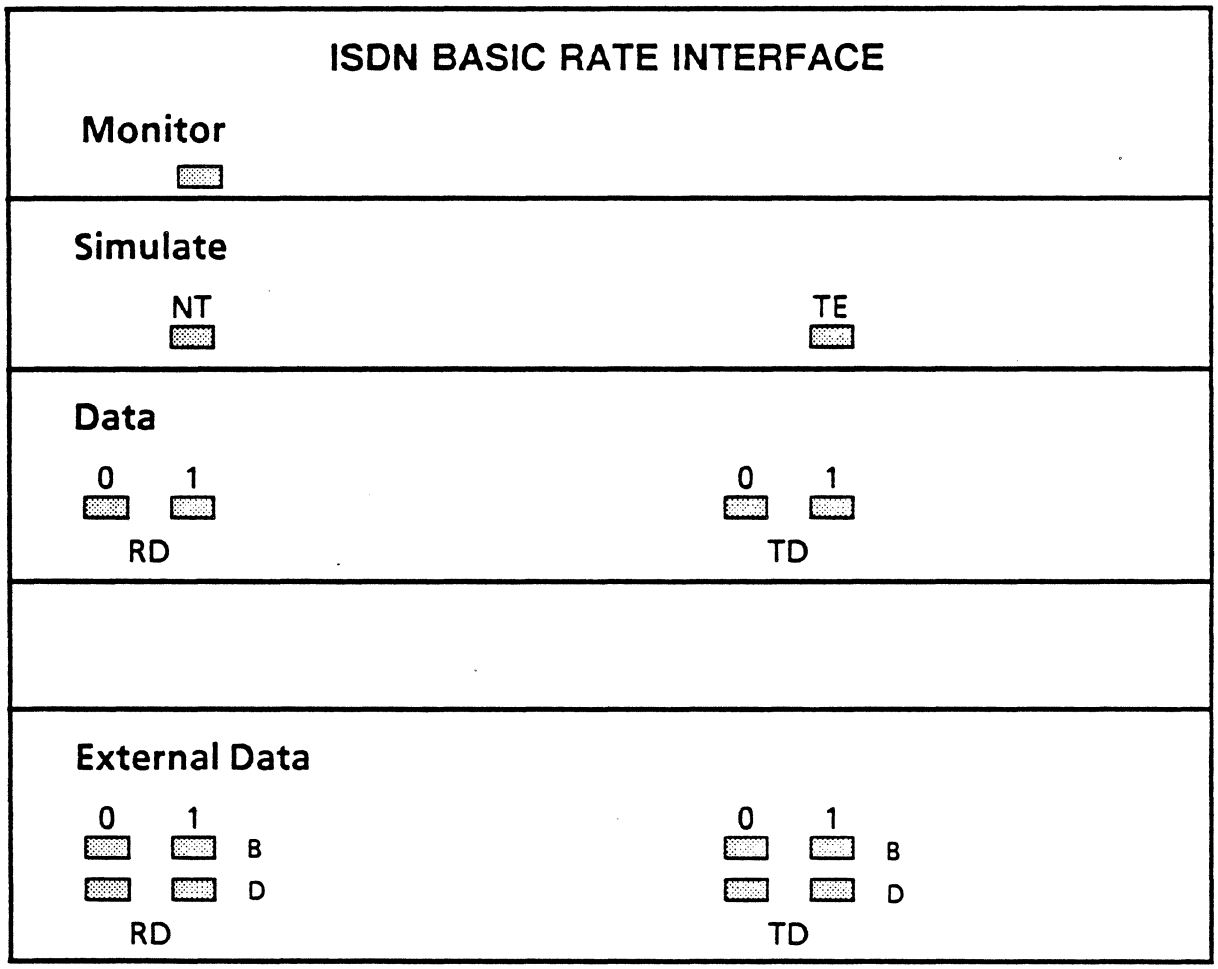


Figure E.4: Basic Rate Interface LED

The Level 1 information on the LED display includes:

- Monitor and Simulate LEDs — These LEDs indicate the operating state of the Chameleon 32. It can be NT Simulation, TE Simulation, or Monitor (Analysis).

- RD/TD Data LEDs — These LEDs show the state of the signals (Receive and Transmit) on the B or D Channel running the Chameleon 32 protocol software. If the data is all 1s, then only the LED labeled 1 is lit. (The same is true for all zero data.) If the data is 1s *and* 0s, then both the LEDs labeled 0 and 1 are flashing.

  Note: In the current release of the Basic Rate Interface, the RD/TD Data LEDs show the data on the S/T Interface.

- RD/TD External Data LEDs — These LEDs show the state of the signals on the External B and D connectors on the Chameleon 32 Interface Module.

X.21 Interface LED Overlay

The X.21 Interface LED overlay is shown in Figure E.5 below. See the *Chameleon Protocol Interpretation Manual, Chapter 18: X.21 Interface,* for information about the operation of the X.21 Interface module.

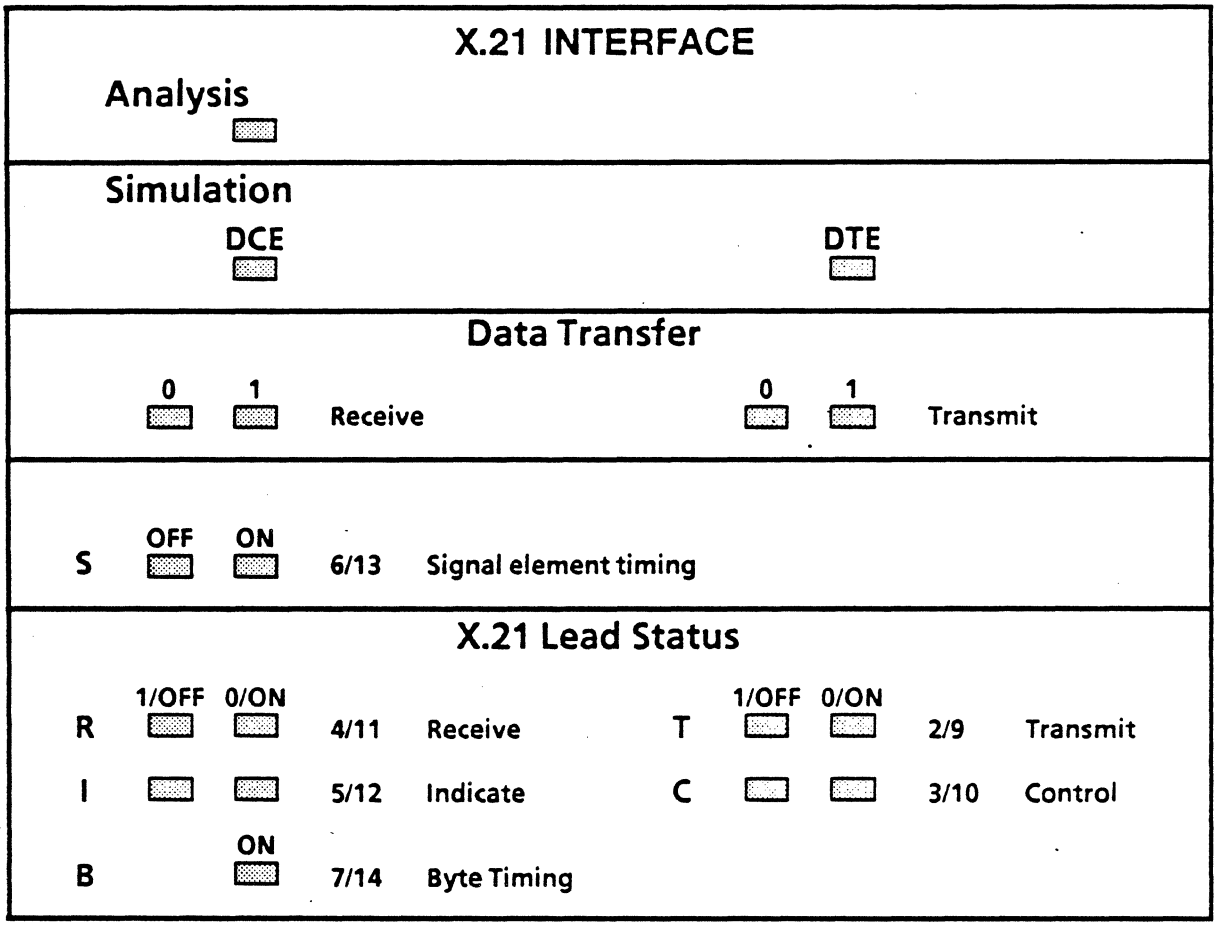


Figure E.5: X.21 Interface LED Overlay

The Level 1 Information displayed for the X.21 interface includes the following:

- Analysis/Simulation — Indicates the current use of the Interface, either Analysis, DCE Simulation or DTE Simulation.
- Data Transfer — Displays the Data being received or transmitted by the Chameleon.
- Signal element timing — Indicates the state of the Signal element timing circuit.
- X.21 Lead Status — Displays the status of the four leads, Receive, Indicate, Transmit and Control.
- Byte Timing — Indicates whether Byte timing is active.

U–Interface Overlay

Figure E.6 illustrates the U–Interface overlay. When you are using the U–interface software (2B1Q Simulation and/or Monitoring), you must apply this overlay to the Chameleon LED panel. Explanations of each of the LEDs follow the figure.

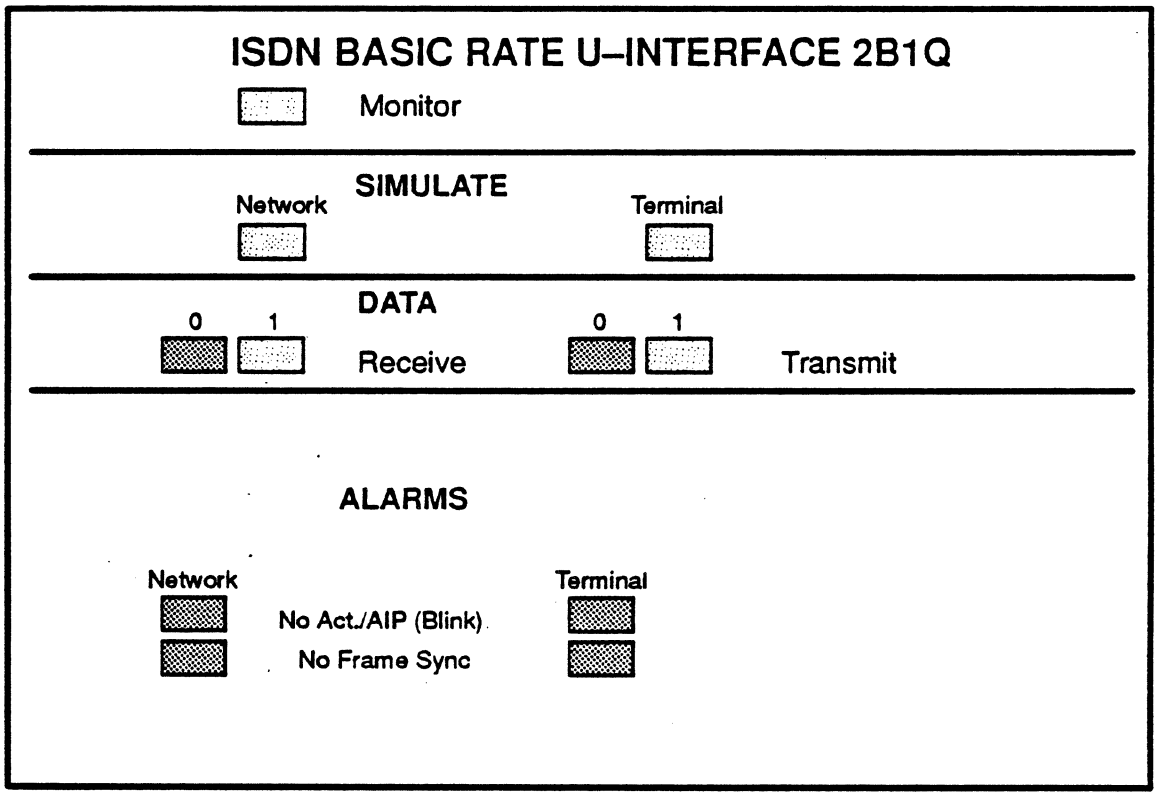


Figure E.6: The Chameleon 32 2B1Q U–Interface LED Overlay.

- Monitor

  This green LED lights to indicate that you are running the 2B1Q Monitoring application.

- Simulate

  These green LEDs lights to indicate that you are running the 2B1Q Simulation application. When simulating an LT, the *Network* LED is on; when simulating an NT, the *Terminal* LED is on.

- Data

  These LEDs show the bit–values of received and transmitted data. They light to signify one of the three following conditions:

  - Red only:

    The Receive and Transmit bit streams are binary 0s (zeros) only.

  - Green only:

    The Receive and Transmit bit streams are binary 1s (ones) only.

  - Red and Green:

    The Receive and Transmit bit streams are binary 0s and 1s.

- Alarms

  The four red ALARMS LEDs signal three conditions on either the Network side or Terminal side of your configuration:

  - No Act/AIP (blink)

    These LEDs light to indicate two dfiferent states:

    1) That there is *no activation* (No Act) of the link; or,

    2) That link *activation is in progress* (AIP) and that no other action should be taken until the link is fully up and the LED stops blinking.

  - No Frame Sync

    The *No Frame Synchronization* LEDs light to signal that frame synchronization of Receive and Transmit data is not occurring between the LT and the NT. Loss of synchronization may result from clocking irregularities, or from corrupted structures of the Synchronization Word and – at the superframe level – Inverted Synchronization Word. For further details on synchronization, see ANSI Spec. T1.601–1988.

APPENDIX F: DECIMAL-HEXADECIMAL CONVERSION CHART

Conversion Chart

Use the conversion chart below to convert from hexadecimal to decimal and vice versa.

16^3	16^2	16^1	16^0	HEX
0	0	0	0	0
4096	256	16	1	1
8192	512	32	2	2
12288	768	48	3	3
16384	1024	64	4	4
20480	1280	80	5	5
24576	1536	96	6	6
28672	1792	112	7	7
32768	2048	128	8	8
36864	2304	144	9	9
40960	2560	160	10	A
45056	2816	176	11	B
49152	3072	192	12	C
53248	3328	208	13	D
57344	3584	224	14	E
61440	3840	240	15	F

Example

To convert 3E hexadecimal to decimal:

1)	Look up E in the first column (16^0)	14
2)	Look up 3 in the second column (16^1)	48
3)	Sum equals decimal value	62

Example

To convert 1A72 hexadecimal to decimal:

1)	Look up 2 in the first column (16^0)	2
2)	Look up 7 in the second column (16^1)	112
3)	Look up A in the third column (16^2)	2560
4)	Look up 1 in the fourth column (16^3)	4096
5)	Sum equals decimal value	6770

Example

To convert 6770 decimal to hexadecimal:

```
 6770
-4096   (highest number in table > = 6770)
 2674
-2560   (highest number in table > = 2674)
  114
- 112   (highest number in table > = 114)
    2
    2   (highest number in table > = 2)
```

Hexadecimal value is equal to line numbers of each value chosen from table.

value:	4096	2560	112	2	
hexadecimal:	1	A	7	2	= 1A72

APPENDIX G:
ASCII-EBCDIC-HEX TABLE

The following table lists ASCII characters and their octal, decimal, and hexadecimal values.

HEX	DEC	OCT	ASCII	EBCDIC	HEX	DEC	OCT	ASCII	EBCDIC
00	0	00	NUL	NUL	30	48	60	0	
01	1	01	SOH	SOH	31	49	61	1	
02	2	02	STX	STX	32	50	62	2	SYN
03	3	03	ETX	ETX	33	51	63	3	
04	4	04	EOT		34	52	64	4	
05	5	05	ENQ	PT	35	53	65	5	
06	6	06			36	54	66	6	
07	7	07	BEL		37	55	67	7	EOT
08	8	10	BS		38	56	70	8	
09	9	11	HT		39	57	71	9	
0A	10	12	LF		3A	58	72	:	
0B	11	13	VT		3B	59	73	;	
0C	12	14	FF	FF	3C	60	74	<	RA
0D	13	15	CR		3D	61	75	=	NAK
0E	14	16	SO		3E	62	76	>	
0F	15	17	SI		3F	63	77	?	SUB
10	16	20	DLE	DLE	40	64	100	@	' ' (space)
11	17	21	DC1	SBA	41	65	101	A	
12	18	22	DC2	EUA	42	66	102	B	
13	19	23	DC3	IC	43	67	103	C	
14	20	24	DC4		44	68	104	D	
15	21	25	NAK	NL	45	69	105	E	
16	22	26	SYN		46	70	106	F	
17	23	27	ETB		47	71	107	G	
18	24	30	CAN		48	72	110	H	
19	25	31	EM	EM	49	73	111	I	
1A	26	32	SUB		4A	74	112	J	¢
1B	27	33	ESC		4B	75	113	K	.
1C	28	34	FS	DUP	4C	76	114	L	<
1D	29	35	GSC	SF	4D	77	115	M	(
1E	30	36	RS	FM	4E	78	116	N	+
1F	31	37	RS	ITB	4F	79	117	O	!
20	32	40	' ' (space)		50	80	120	P	&
21	33	41	!		51	81	121	Q	
22	34	42	"		52	82	122	R	
23	35	43	#		53	83	123	S	
24	36	44	$		54	84	124	T	
25	37	45	%		55	85	125	U	
26	38	46	&	ETB	56	86	126	V	
27	34	47	'	ESC	57	87	127	W	
28	40	50	(		58	88	130	X	
29	41	51	)		59	89	131	Y	
2A	42	52	*		5A	90	132	Z	!
2B	43	53	+		5B	91	133	[	$
2C	44	54	,		5C	92	134	\	*
2D	45	55	-	ENQ	5D	93	135	]	)
2E	46	56	.		5E	94	136	^	;
2F	47	57	/		5F	95	137	¬	¬

HEX	DEC	OCT	ASCII	EBCDIC	HEX	DEC	OCT	ASCII	EBCDIC
60	96	140	`		90	144	220		
61	97	141	a	/	91	145	221		j
62	98	142	b		92	146	222		k
63	99	143	c		93	147	223		l
64	100	144	d		94	148	224		m
65	101	145	e		95	149	225		n
66	102	146	f		96	150	226		o
67	103	147	g		97	151	227		p
68	104	150	h		98	152	230		q
69	105	151	i		99	153	231		r
6A	106	152	j	|	A2	162	242		s
6B	107	153	k	,	A3	163	243		t
6C	108	154	l	%	A4	164	244		u
6D	109	155	m	_	A5	165	245		v
6E	110	156	n	>	A6	166	246		w
6F	111	157	o	?	A7	167	247		x
70	112	160	p		A8	168	250		y
71	113	161	q		A9	169	251		z
72	114	162	r		C1	193	301		A
73	115	163	s		C2	194	302		B
74	116	164	t		C3	195	303		C
75	117	165	u		C4	196	304		D
76	118	166	v		C5	197	305		E
77	119	167	w		C6	198	306		F
78	120	170	x		C7	199	307		G
79	121	171	y		C8	200	310		H
7A	122	172	z	:	C9	201	311		I
7B	123	173	{	#	D1	209	321		J
7C	124	174	|	@	D2	210	322		K
7D	125	175	}	'	D3	211	323		L
7E	126	176	~	=	D4	212	324		M
7F	127	177	DEL	"	D5	213	325		N
80	128	200			D6	214	326		O
81	129	201		a	D7	215	327		P
82	130	202		b	D8	216	328		Q
83	131	203		c	D9	217	329		R
84	132	204		d	E2	226	342		S
85	133	205		e	E3	227	343		T
86	134	206		f	E4	228	344		U
87	135	207		g	E5	229	345		V
88	136	210		h	E6	230	346		W
89	137	211		i	E7	231	347		X
8A	138	212			E8	232	350		Y
8B	139	213			E9	233	351		Z
8C	140	214			F0	240	360		0
8D	141	215			F1	241	361		1
8E	142	216			F2	242	362		2
8F	143	217			F3	243	363		3

HEX	DEC	OCT	ASCII	EBCDIC
F4	244	364		4
F5	245	365		5
F6	246	366		6
F7	247	367		7
F8	248	370		8
F9	249	371		9

APPENDIX H:
RS422/V.11/V.36
RS423/V.10/V.36
INTERFACE MODULES

RS422/V.11/V.36 Interface Module

RS422 is an EIA standard that corresponds to the CCITT's V.11 and V.36 International standards. RS422 specifications are applicable to asynchronous and synchronous binary data transmission using either private lines or switched network systems at speeds up to 64 kbps. The RS422 Interface is inter-operable with equipment using RS423.

The primary new capabilities available with RS422 as compared to RS232 are:

- Ability to handle significantly higher maximum data rates
- Ability to use a longer interface cables and
- Additional interface functions, such as loopback testing

The physical connection of interchange circuits within a data terminal and a data set is made by a pair of pluggable connectors (the interface point.) The Chameleon 32 side is a 37 pin D-subminature socket (female) connector (DB37S).

The terminal side consists of the matching male connector (DB37P). The pinout below is shown as the connector is viewed from the rear of the machine:

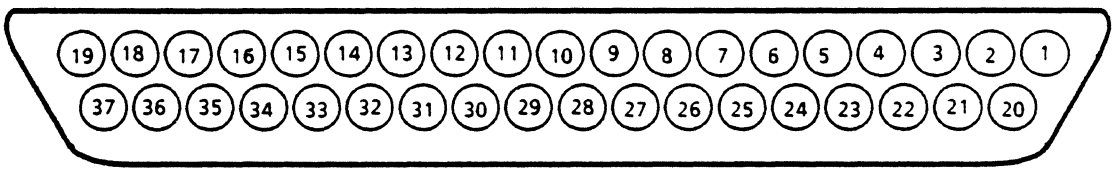


Figure H.1: RS422 Connector

Cable

Because of the improvements in the electrical characteristics, the connections between the computer communications adaptor and the local data set and between the remote data set and the associated terminal can be extended to 4,000 feet (1,200 meters). This is accurate for data signalling rates of up to 100 kbps.

Figure H.2 shows the RS422 CCITT equivalent pin numbers and their functions. The Chameleon 32 can be configured to simulate either the DCE or DTE, therefore the circuit direction specifies the direction TO and FROM the DCE rather than TO and FROM the Chameleon 32.

Electrical Characteristics

RS422 is a Balanced Voltage Digital Signal with electrical characteristics which conform to the CCITT's V.11/X.27.

Driver	Output resistance:	200 ohms differential
	Lead to ground:	175 ohms
	Output current:	150 mA maximum
	Output voltage:	+/- 3 volts
Receiver	Input resistance:	200 ohms differential
	Lead to ground:	175 ohms
	Input sensitivity:	+/- 200 mvolts

DB37 Pin Number	ISO Circuit	CCITT Circuit Mnemonic and Name	Circuit Direction	Circuit Type		Implemented by Chameleon
19	102	SG Signal Ground	–			X
37	102a	SC Send Common	To DCE	Common		X
20	102b	RC Receive Common	From DCE			X
28	135	IS Terminal in Service	To DCE			X
15	125	IC Incoming Call	From DCE	Control		X
12 / 30	108	TR Terminal Ready	To DCE			X
11 / 29	107	DM Data Mode	From DCE			X
4 / 22	103	SD Send Data	To DCE	Data	PRIMARY CHANNEL	X
6 / 24	104	RD Receive Data	From DCE			X
17 / 35	113	TT Terminal Timing	To DCE			X
5 / 23	114	ST Send Timing	From DCE	Timing		X
8 / 26	115	RT Receive Timing	From DCE			X
7 / 25	105	RS Request to Send	To DCE			X
9 / 27	106	CS Clear to Send	From DCE			X
13 / 31	109	RR Receiver Ready	From DCE			X
33	110	SQ Signal Quality	From DCE	Control		
34	135	NS New Signal	To DCE			
16	111/126	SF Select Frequency	To DCE			
16	111/126	SR Signaling Rate Selector	To DCE			
2	112	SI Signaling Rate Indicator	From DCE			
10	141	LL Local Loopback	To DCE			
14	140	RL Remote Loopback	To DCE	Control		
18	142	TM Test Mode	From DCE			
32	116	SS Select Standby	To DCE			
36	117	SB Standby Indicator	From DCE			

Figure H.2: RS422 Connector Pinout

DTE TO DCE INTERCONNECTION

Figure H.3 shows the connections between the Data Terminal Equipment (DTE) and the Data Circuit-Terminating Equipment (DCE).

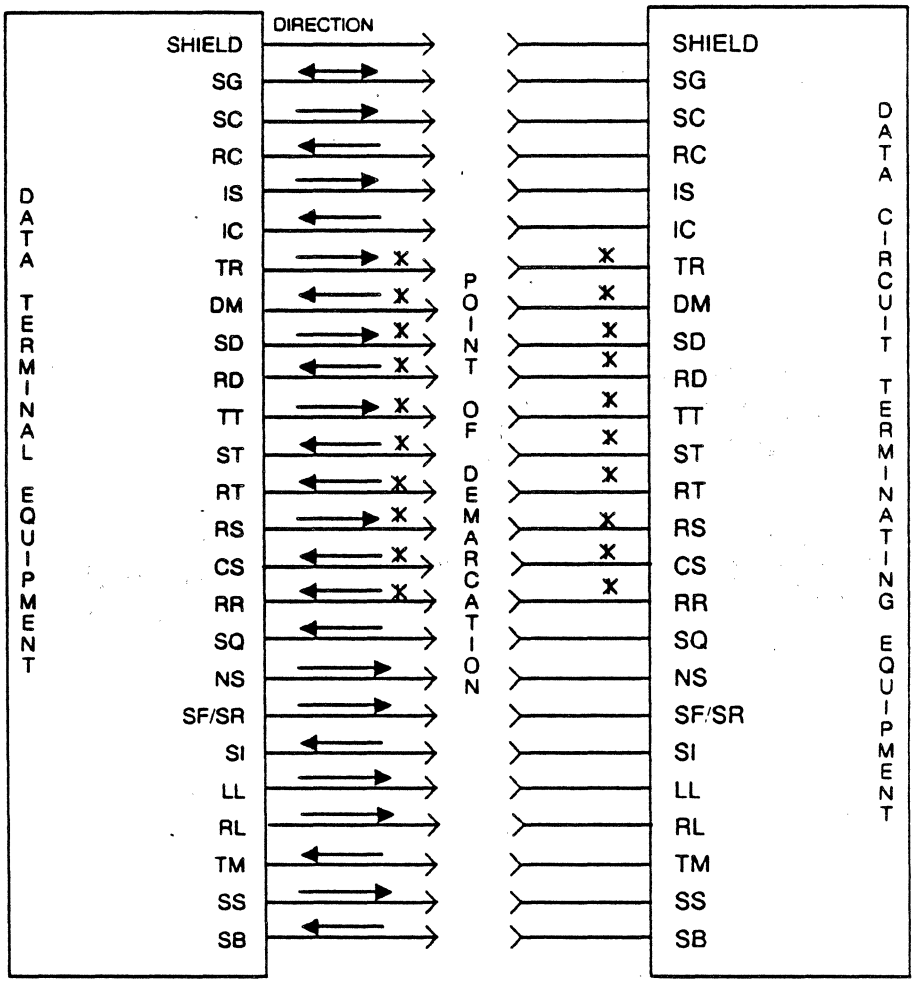


Figure H.3: DTE to DCE Interconnection

RS423 /V.10/V.36 INTERFACE MODULE

RS423 is an EIA standard that corresponds to the CCITT's V.10 and V.36 International standard. RS423 specifications are applicable to asynchronous and synchronous binary data transmission using either private lines or switched network systems at speeds up to 64 kbps. The RS423 interface module is inter-operable with equipment using RS422 and (with certain considerations) RS232. The requirements and suggested implementations for such inter-operation is provided by EIA Industrial Electronics Bulletin 12.

Although all of the new capabilities available when using RS422 are available with the RS423 Interface Module, the following cases should be avoided because of its unbalanced electrical characteristics:

- Avoid an interconnecting cable that is too long for proper unbalanced circuit operation
- Avoid extraneous noise sources which make unbalanced circuit operation impossible
- Avoid unnecessary interference from other signals

The physical connection of interchange circuits within a data terminal and a data set is made by a pair of pluggable connectors (the interface point.) The Chameleon 32 side is a 37 pin D-subminature socket (female) connector (DB37S).

The terminal side consists of the matching male connector (DB37P). The pinout below is shown as the connector is viewed from the rear of the machine:

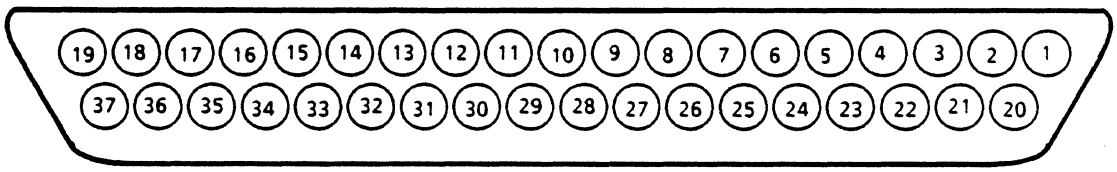


Figure H.4: RS423 Connector

Cable

RS423 is an unbalanced interchange circuit which creates complications with the cable length. It is dependent on the data signalling rate and on the rise time.

With a data signalling rate of 64 kbps, the extension cable to the DTE can be no longer than 10 to 20 meters in length. (With decreased data signalling rate, the length can also be increased.) These limitations are due to interference (near-end crosstalk) and the circuits susceptibility to differential noise.

Figure H.5 shows the RS423 CCITT equivalent pin numbers and their functions. The Chameleon 32 can be configured to simulate either the DCE or DTE, therefore the circuit direction specifies the direction TO and FROM the DCE rather than TO and FROM the Chameleon 32.

Electrical Characteristics

This is an unbalanced signal which has electrical characteristics which conform to CCITT's V.10/EIA RS423.

Driver	Output voltage:	+/-
	Output impedance:	< 50 ohms
	Output current:	150 mA maximum
Receiver	Input Voltage:	+/- 10 volts
	Input impedance:	
	Input sensitivity:	+/- 200 mvolts

APPENDIX I:
DSCS INTERFACE MODULE

Introduction

This section describes the Digital Signal Customer Service (DSCS) Interface for the Chameleon. The interface operates at 56 Kbps. A unit which operates at 9.6 Kpbs is available on special order.

The DSCS interface contains two receiver circuits and one transmitter circuit. This allows the interface to operate in either of two modes when connected to a Chameleon port:

- Simulation using one transmitter and one receiver. In this mode, the interface provides the clock to the Chameleon. The Chameleon must, therefore, be configured as a DTE.
- Analysis using two receivers

The Interface Module

Figure I.1 shows the DSCS Interface module.

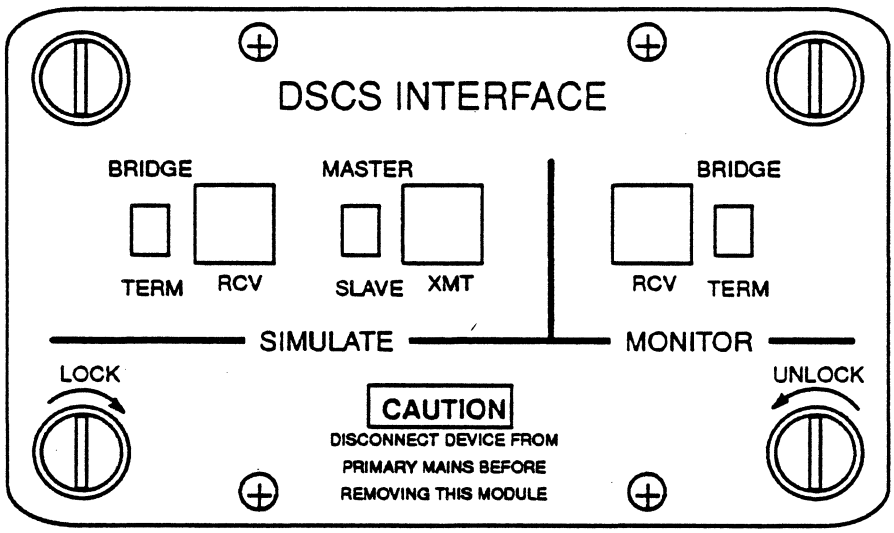


Figure I.1: DSCS Interface Module

The receiver and transmitter connections to the DSCS interface (shown as **A** for receivers and **B** for transmitters) are made with industry–standard 3–conductor bantam jacks. These connections are split into two sections:

SIMULATE

This section includes the receiver (A) and the transmitter (B) used in simulation. A TERM/BRIDGE switch is provided by the receiver for selection of the input impedance.

- TERM Provides a 135 ohm nominal input impedance
- BRIDGE Provides an input impedance greater than 3 K ohms

A second switch, located by the transmitter jack, is used to select the transmitter clock used by the DSCS Interface. Figure I.2 illustrates the transmit clock between the DSCS Interface, the Chameleon and the Network.

- Master Transmits using the internally generated clock
- Slave Transmits using the recovered received clock

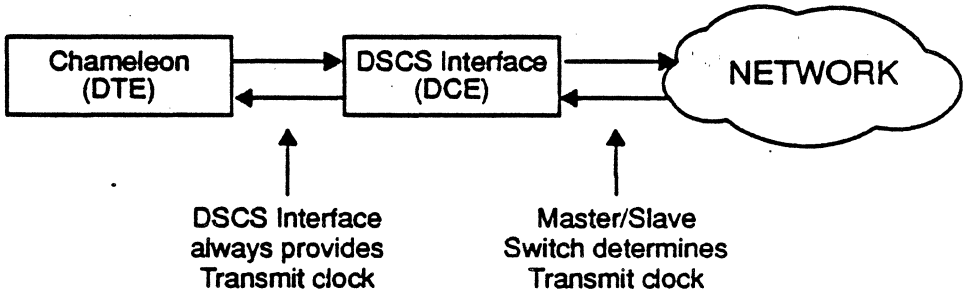


Figure I.2: Transmit Clock during Simulation

MONITOR

The Monitor section is the second receiver, also designated as A. It is used with the Simulate receiver to perform Analysis tasks. A TERM/BRIDGE switch is provided for this receiver as well.

For both of the receivers, the DSCS Interface derives a clock from the received signal for use in received timing.

A switch is also provided on the interface to select either TERM or BRIDGE as the terminating resistance for each receiver.

SPECIFICATIONS

Receivers operate with standard DSCS/DDS signals per:

- AT&T Pub 62310
- Bellcore TA–TSY–000083

- Coding method: AMI with zero suppression
- Distance from OCU and DSU up to 1000 feet
- Input Impedance:
  - Terminated (TERM) 135 5 ohms, balanced
  - Bridged (BRIDGE) > 3 K ohms, balanced

Transmitter provides a balanced output

- Pulse amplitude and shape is in accordance with:
  - AT&T Pub 62310
  - Bellcore TA–TSY–000083
- Encoding method: AMI with zero suppression
- Internal clock provides 56 kbps 0.01%

  This clock times the transmission when the Master/ Slave switch is in the Master position.
- Pulse amplitude: 1.66 volts nominal

The documents used as standards are:

- *AT&T Pub 62310* – Digital Data System Channel Interface Specification
- *Bellcore TA–TSY–000083* – Generic Requirements for the Digital Data System (DDS) Network Office Channel Unit

APPENDIX J:
G.703 CO-DIRECTIONAL INTERFACE MODULE

Introduction

This document describes the CCITT G.703 Co-Directional Interface for the Chameleon 32. The interface operates at 64 Kbps.

The Co-Directional interface contains two receiver circuits and one transmitter circuit. This allows the interface to operate in either of two modes when connected to a Chameleon port:

- Simulation — using one transmitter and one receiver. In this mode, the interface provides the clock to the Chameleon. The Chameleon must, therefore, be configured as a DTE.
- Analysis — using two receivers

The Interface Module

Figure J.1 shows the Co-Directional Interface module as viewed from the rear of the machine.

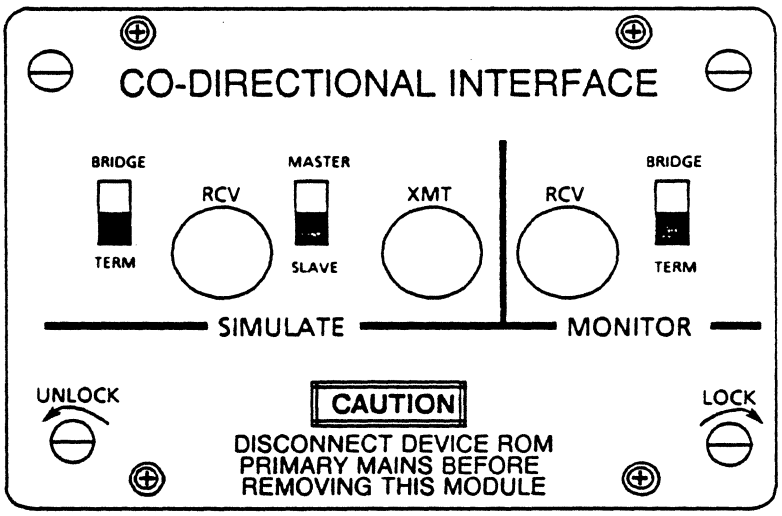


Figure J.1: Co-Directional Interface Module

The receiver and transmitter connections to the Co-Directional interface are made with 2-conductor balanced BR2 connectors. These connections are split into two sections:

SIMULATE

In simulate mode, the Co-Directional interfaces uses both the transmitter and receiver. In this mode, the Co-Directional interface module must be configured as a DTE. The Master/Slave switch selects the transmitter clock source used by the Co-Directional interface, as follows:

- When Master is selected, the transmit clock is generated by the internal clock of the Co-Directional interface.
- When slave is selected, the transmit clock is derived from the recovered receive clock, and is thus synchronous to the receive clock.

MONITOR

In Monitor mode, the Co-Directional interfaces uses two receivers: the Simulate receiver and the Monitor receiver. Both receivers use the received clock for receive timing.

Term/Bridge

Each receiver is provided with a Term/Bridge switch. When Term is selected, the line is terminated with a 120 ohm nominal input impedance. When Bridge is selected, the input impedance is greater than 3k ohms.

If multiple receivers are connected to one line, only one should be terminated, and the remaining receivers set for Bridge mode. If only one receiver is connected, it should be in Term mode.

SPECIFICATIONS

Receiver

- Receivers operate with standard Co-Directional signals per CCITT Recommendation G.703.
- Coding method: per G.703
- Input Impedance:
  - 120 ohms ± 5 ohms, balanced (Term mode)
  - > 3k ohms, balanced (Bridge mode)
- Bipolar signal input range 5.0 Volts peak-to-peak to 0.3 Volts peak-to-peak

Transmitter

- The transmitter provides a balanced output
- Output impedance: 120 ohms ± 5 ohms
- Pulse amplitude and shape is in accordance with CCITT Recommendation G.703.
- Encoding method: per CCITT Rec. G.703
- Internal clock provides 64 KBPS ± 100 ppm
  This clock times the transmission when the Master/ Slave switch is in the Master position.
- Pulse amplitude: 1.0 volts nominal, into 120 ohm balanced
- Peak voltage of no pulse: 0 ± 0.1 volts

The document used as a standard reference is:

- CCITT Red Book, Volume III - Fascicle III.3, Recommendation G.703

APPENDIX K:
256k DATA CAPTURE OPTION

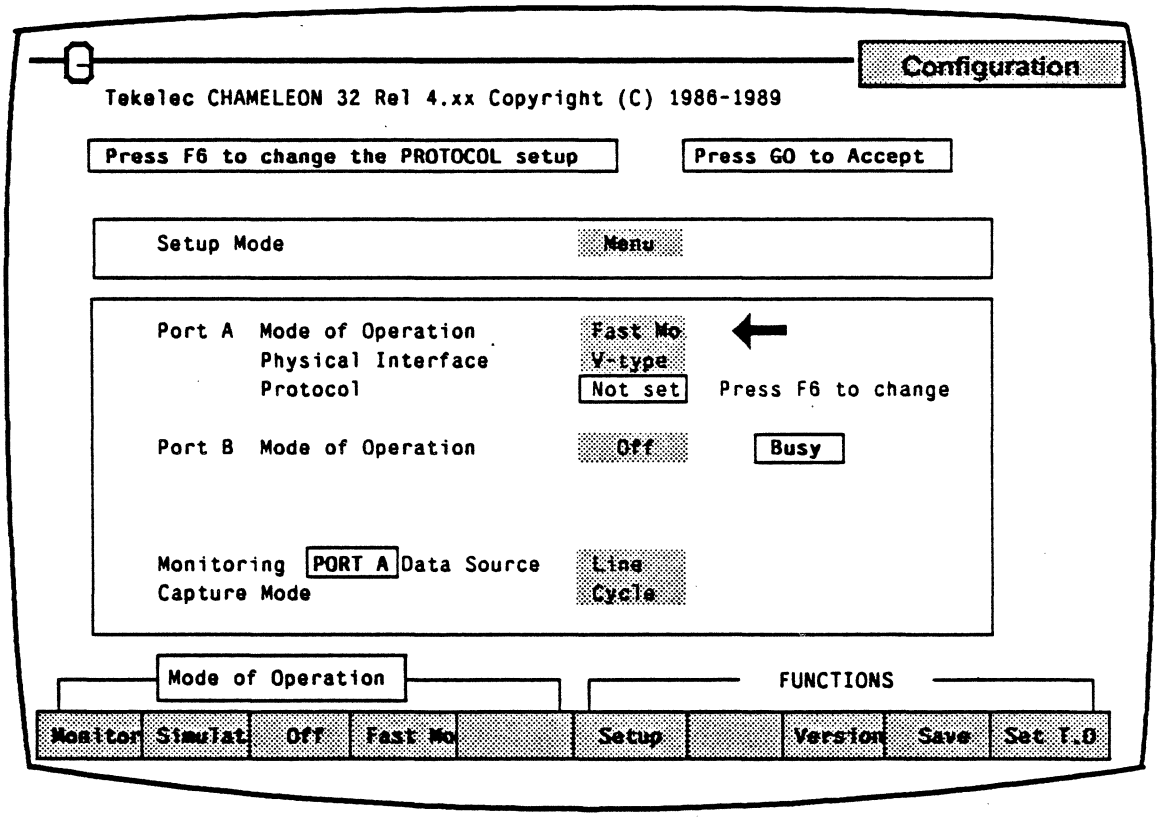
Introduction

On Dual Port machines, there are two monitoring modes available:

- **Monitor** mode enables the Chameleon to monitor up to 64k bps with dense traffic (one flag between frames).
- **Fast Monitor** mode enables the Chameleon to monitor full duplex traffic up to 256k bps. This mode is also referred to as 256k data capture mode.

The mode is selected in the main configuration menu using the Mode of Operation parameter. Fast Monitor mode is available only on Port A.

The 256k data capture option requires specific hardware and software. When available, the **Port A Mode of Operation** parameter includes a **Fast Mo** (Fast Monitoring) option as shown in the figure below.



A Chameleon can support only one 256k port. Therefore, when you select Fast Monitor mode for Port A, Port B is not available. To indicate that Port B is not available, the message ***Busy*** appears next to the Port B parameters.

Once Fast Monitoring is selected, you configure and use the Chameleon in the same manner as for standard 64k bps Monitoring.

Limitations

When using Fast Monitoring, the following guidelines and limitations apply:

- A Dual Port machine is required, and only one port can operate while 256k is being used
- For dense traffic (less than five flags between frames at greater than 64 kbps) the Chameleon may loose frames.
- Due to the large amount of data being processed on a dense line with large frames at a high baud rate, you may elect not to run several tasks simultaneously. You may experience a slight performance degradation, depending on which tasks you run.

  For example, if you are running Statistics, Direct-to-Disk and Analysis, you may notice the following:

  - The Statistics display may not be updated as frequently as usual. The Statistics display may appear to be frozen or the machine may appear to be hung up. This is not the case. The data is still being processed and the information is still being captured on disk. The updating of the screen has a lower priority. If you stop acquisition by pressing ***Run/Stop***, the display will be updated to reflect the data acquired up to that point.

    To then start a new Statistics session, press the ***Reset*** function key. If you resume acquisition by pressing ***Run/Stop*** (instead of restarting statistics by pressing ***Reset***), the maximum response time fields will include the time that acquisition was halted.

  - The number of triggers that can be used is dependent on the type of trigger and the nature of the traffic being monitored.

APPENDIX L:
TTL INTERFACE MODULE

Introduction

The TTL interface is a standard Chameleon 32 interface module. It provides access to a serial I/O port at TTL voltage levels.

This module functions in the same way as the V-series modules (V.24, V.35, V.36), but signal levels conform to TTL specifications. The module will support Monitoring and Simulation in both DCE and DTE modes.

The module can be used to:

- interface a Chameleon 32 to a Chameleon 8000
  (A sample application and the required cable are available as Part Number 999-2003).
- interface a Chameleon 32 to any other device using TTL logic.

This module is selected as the physical interface by selecting the V-Type Interface.

Interface Module

Figure L.1 shows the TTL Interface module as viewed from the rear of the machine. Note that it has two connectors and a bank of DIP switches.

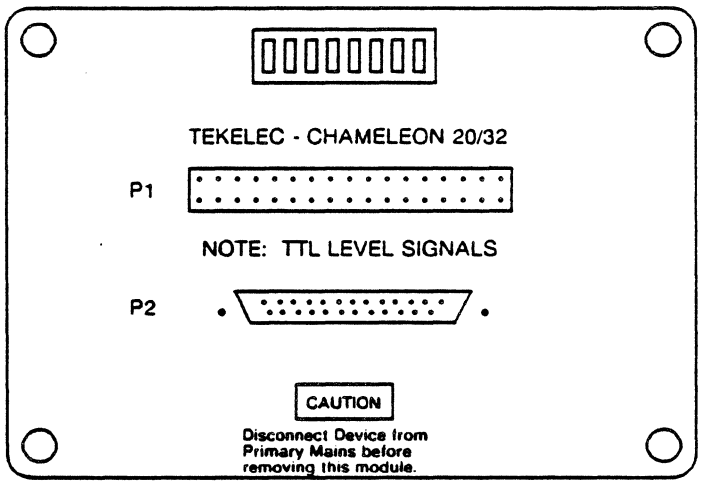


Figure L.1: The TTL Interface

P1 The first connector is a 34 pin flat ribbon cable connector. This connector is convenient for cabling to a PCB or breadboard.

P2 The second connector is a DB-25S connector. It has the same logical pin out as a V.24 / RS-232 connector. This connector is convenient for cabling using standard DB25 hardware and cables.

Switches

The DIP switches are accessible from the outside of the machine. They provide programmable signal polarity and other features. The details of these will be described later in this chapter.

Specifications

The TTL Interface module conforms to the following specifications:

• Minimum output high voltage	2.4V
• Maximum output low voltage	0.6V
• Minimum input high voltage	2.0V
• Maximum input low voltage	0.8V
• Maximum low level output current	24mA
• Maximum high level output current	-3.2mA
• Maximum input low current (pullup)	2.5mA
• Maximum short circuit Current (1 O/P)	150mA
• Maximum input voltage	6.0V
• Minimum Input voltage	-0.5V

Notes: 1. Exceeding the short circuit current or maximum/minimum input voltage specifications will damage the interface.

2. All lines are pulled up to +5V internally via a 2.2 Kohm resistor. This is to prevent pickup of noise on unconnected pins. Other termination configurations are possible (220/330 etc.). Contact Tekelec if different termination schemes are required.

The interconnect cable provided with the interface kit is described later in this chapter.

If you intend to construct additional cables for use with this interface, standard TTL design rules should be observed.

- Cables should not be over 6 feet in length. Preferably, they will be under 3 feet.
- Shielded, twisted pairs are preferable.

Note: Crosstalk and other cable effects may seriously affect the operation of this interface at high clock and data rates.

TTL Interface Connectors

The pin outs for the two connectors on the module are shown in Figures L.2 and L.3.

Figure L.2 shows the connections for the 34 pin ribbon cable connector (**P1**). This table shows the ISO CCT Number, signal description and the direction of the signal when simulating a DCE, simulating a DTE and monitoring. Any pins not shown in this table are not connected.

PIN No.	ISO CCT Number	DESCRIPTION (or mnemonic)	SIGNAL DIRECTION		
			DCE	DTE	MON
2	105	RTS	In	Out	In
3	114	Transmit clock	Out	In	In
7	104	Receive data	Out	In	In
8	103	Transmit data	In	Out	In
10	107	Data set ready	Out	In	In
11	102	Signal ground			
12	102	Signal ground			
13		+5 volts (switch select)			
14		+5 volts (switch select)			
17	109	Data carrier Detect	Out	In	In
20	108	Data terminal ready	In	Out	In
22	102	Signal ground			
23	115	Receive clock	Out	In	In
24	125	Ring indicator	Out	In	In
27	106	Clear to send	Out	In	In
31		-12 volts (jumper sel.)			
32		-12 volts (jumper sel.)			
33		+12 volts (jumper sel.)			
34		+12 volts (jumper sel.)			

Figure L.2: P1 Connector - 34 Pin Ribbon Cable

Notes:

1. See DIP switch description for signal polarity control and other configuration information.
2. +5 Volt power is available at the interface if DIP Switch 8 is ON. This is provided for use as a reference voltage only. No more than 50mA should be drawn from this circuit.
3. +12 Volt and -12 Volt power is available from the interface by shorting jumper posts JP1 and JP2 on the PCB inside the module. The default condition is not to supply power to the interface. Current draw from +12V or -12V must not exceed 50mA.

Figure L.3 shows the connections for the 25 pin connector (**P2**). This table shows the ISO CCT Number, signal description and the direction of the signal when simulating a DCE, simulating a DTE and monitoring. Any pins not shown in this table are not connected.

PIN No.	ISO CCT Number	DESCRIPTION (or mnemonic)	SIGNAL DIRECTION		
			DCE	DTE	MON
2	103	Transmit data	In	Out	In
3	104	Receive data	Out	In	In
4	105	Request to send	In	Out	In
5	106	Clear to send	Out	In	In
6	107	Data set ready	Out	In	In
7	102	Signal ground			
8	109	Data carrier Detect	Out	In	In
15	114	Transmit clock	Out	In	In
17	115	Receive clock	Out	In	In
20	108	Data terminal ready	In	Out	In
22	125	Ring indicator	Out	In	In

Figure L.3: P2 Connector - 25 Pin D-Sub

Notes: 1. See the DIP switch description for signal polarity control and other configuration information.

DIP Switch Configuration

The bank of switches accessible through the module control the polarity of certain signals on the TTL interface. The switches can also be used to disable certain handshake signals when they are unused.

The default setting of all switches as shipped is OFF.

SWITCH	SWITCH ON	SWITCH OFF (Default)
1	Invert circuit 103 TxData	Do not invert 103 TxData
2	Invert circuit 104 RxData	Do not invert 104 RxData
3	Invert circuit 114 TxClock	Do not invert 114 TxClock
4	Invert circuit 115 RxClock	Do not invert 115 RxClock
5	Invert 105-109,125	Do not invert 105-109,125
6	Enable 105-109,125	Disable 105-109,125
7	Reserved	Reserved
8	Supply +5V to P1	Do not supply +5V to P1

Figure L.4: DIP Switch Configuration

Notes:

1. Switch 6, in the OFF position, disables all non-data or clock lines. This prevents unused lines from picking up spurious noise and causing excessive interrupts to the CH32 front end acquisition hardware.

   It is recommended that Switch 6 be left in the OFF position at all times unless circuits 105-109 and 125 are required.

2. The default polarity of the signals is inverted with respect to V.24/RS-232 logic levels. As V.24 drivers and receivers are usually inverting, this allows direct connection to TTL compatible devices that would normally be used with discrete V.24 drivers/receivers.

   In the event the circuit signals are of different polarity, switches 1-5 may be used to invert the logical levels of the data, clock and handshake signals.

APPENDIX M: REMOTE CONTROL VIA MODEM

Introduction

This appendix describes how to interconnect Chameleon 20/32 test systems using dial-up modems. This enables you to remotely control a Chameleon from another Chameleon.

Required Equipment

The following equipment is required to interconnect two Chameleon systems for remote control via modem:

- Two Chameleon 20 or Chameleon 32 machines (any combination)
- Two dial-up modems of similar types

  Any asynchronous serial dial-up modems can be used; however, for maximum utility, modems with the following features are recommended:

  - Capable of originating calls (dialing)
  - Capable of auto-answer
  - Highest baud rate possible (1200 baud or higher)
  - Hayes AT or compatible

- Chameleon cable option 932-5001-01 which can be purchased from Tekelec or can be made to conform to the diagram on page M-8.

Equipment Setup

The Chameleon being operated remotely is referred to as the slave Chameleon. The Chameleon operating the remote Chameleon is referred to as the master Chameleon.

Slave Chameleon Setup

To set up the slave Chameleon, perform the following steps:

1. Attach the modem to the Remote I/O port (Remote Control port on the Chameleon 20) using a cable as described on page 6. This cable configuration is wired specifically for the Chameleon.

2. Attach the modem to the telephone line, following the modem manufacturer's instructions.

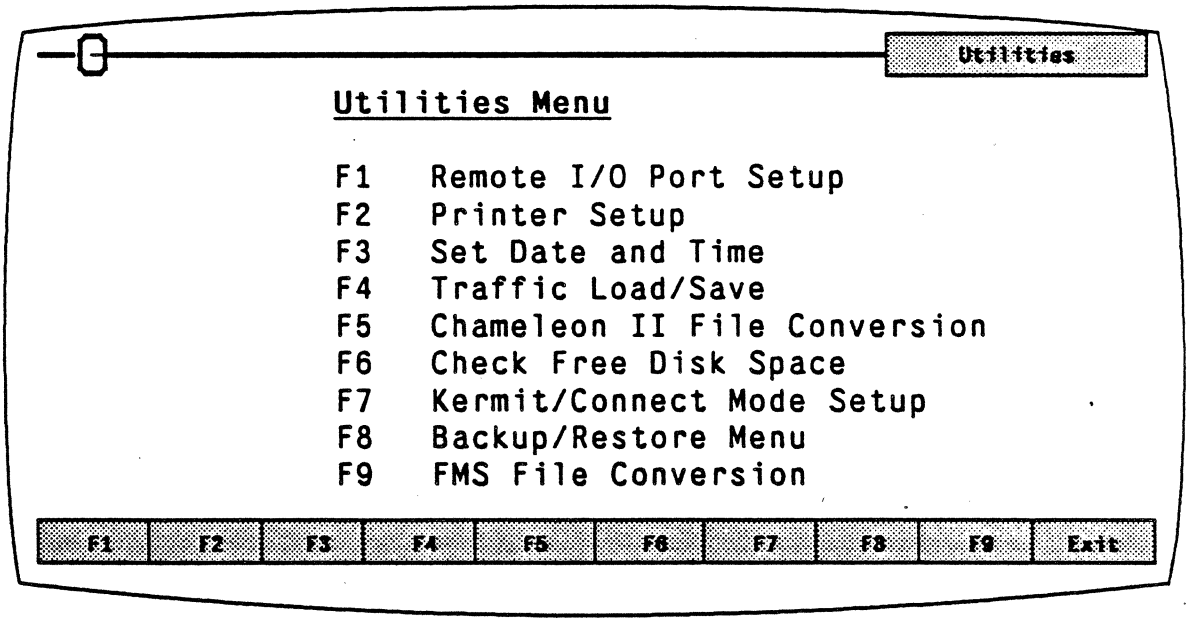
3. Configure the modem, following the modem manufacturer's instructions, as follows:

   - Enable automatic answer
   - Activate RS232 Carrier Detect (DCD) when carrier is detected. This is required by the Chameleon.
   - Configure all other settings to be suitable for the modem and the line condition. Note that these must match the modem settings that you set at the master Chameleon.

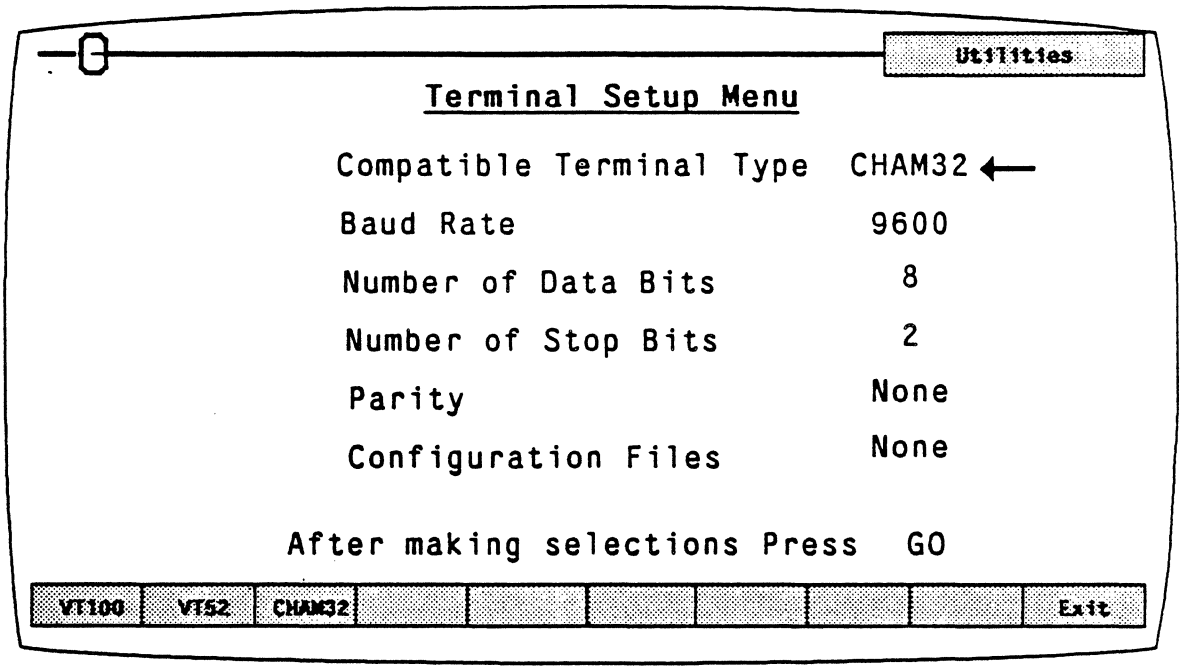
4. Power up the modem, and then the Chameleon.

5. On the Chameleon, press ***Shift Utilities*** to invoke the Utilities banner.

6. Press ***Shift Hide Page*** to display the Utilities menu, as shown in the following figure.



7. Press ***F1 Remote I/O Port Setup*** to display the setup menu for the Remote I/O port, as shown below.



8. Select the following configuration parameter values:

Terminal Type	**CHAM32**
Baud Rate	(Select according to modem requirement)
Data Bits	**8**
Stop Bits	**2**
Parity	**None**

9. Save this configuration with the file name TERMINAL.DF, which is the default setup file. This will allow the slave Chameleon to be automatically configured for remote control when it boots up unattended.

10. Press ***Go*** to initialize the Remote I/O port using the displayed parameters.

11. Press ***F10 Exit*** to exit the setup menu.

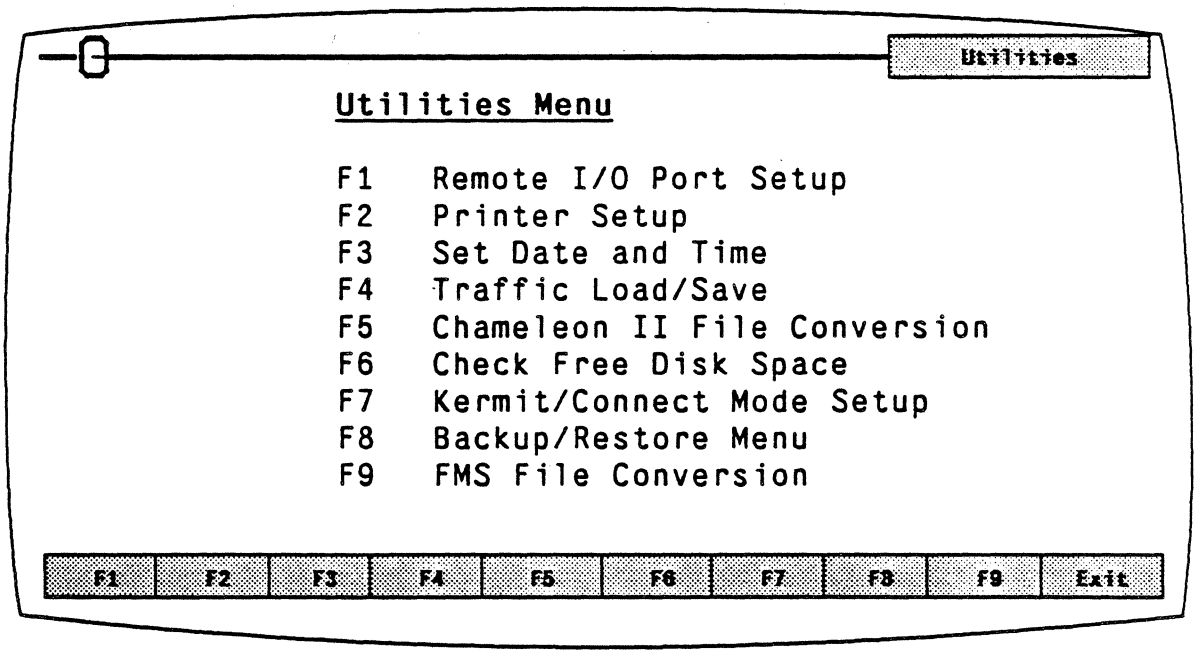
12. Press ***F10 Exit*** to exit the Utilities menu.

    The slave Chameleon is now ready to be remotely controlled. This machine can now be powered up and remotely controlled without further human intervention.

Master Chameleon Setup

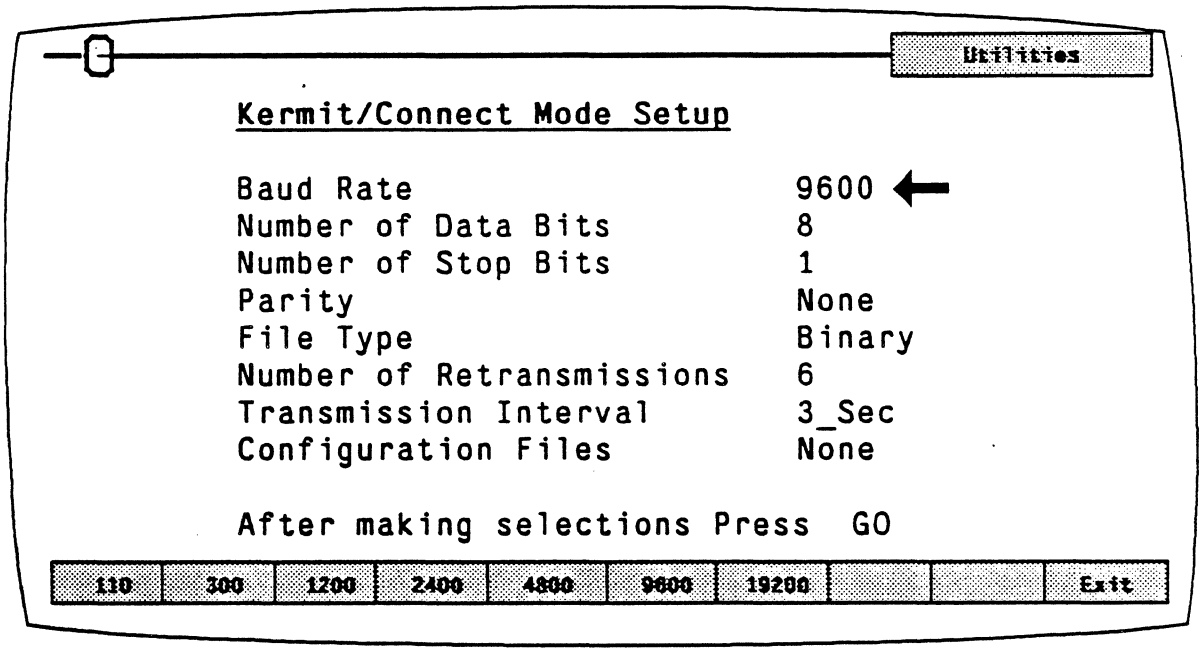
To set up the master Chameleon, perform the following steps:

1. Attach the modem to the Aux 2 serial port using a cable as described on page 7.
2. Attach the modem to the telephone line, following the modem manufacturer's instructions.
3. Configure the modem, following the modem manufacturer's instructions, as follows:
   - Originate (dial) call
   - Configure all other settings to be suitable for the modem and the line condition. Note that these must match the modem settings that you set at the master Chameleon
4. Power up the modem, and then the Chameleon.
5. On the Chameleon, press ***Shift Utilities*** to invoke the Utilities menu.
6. Press ***Shift Hide Page*** to display the Utilities menu, as shown in the figure below.



Utilities Menu

7. Press ***F7 Kermit/Connect Mode Setup*** to access the setup menu for the Aux 2 serial port, as shown below.



Kermit Connect Mode Setup Menu

8. Select the following configuration parameter values:

Baud Rate	(Select according to the modem's requirements. It must be the same baud rate as configured on the slave Chameleon.)
Data Bits	**8**
Stop Bits	**2**
Parity	**None**

This setup must match the slave Remote I/O port setup.

9. Save this configuration with the file name KERMIT.DF, which is the default Aux 2 serial port setup file. This will allow the master Chameleon to automatically use remote control when booted, without reconfiguring the Aux 2 serial port.

10. Press ***Go*** to initialize the port using the displayed parameters.

11. Press ***F10 Exit*** to exit the setup menu.

12. Press ***F10 Exit*** to exit the Utilities menu.

13. Press ***Files*** to invoke the File Management menu.

14. Press ***F9 Connect.*** This puts the master Chameleon into terminal mode.

    You should now be able to communicate directly with the modem. With a Hayes-compatible modem, to connect to the modem, type the attention string:

    + + +

Establishing the Connection

Once the Chameleons and modems are correctly configured and the master Chameleon is in terminal mode, you can dial the telephone number of the slave Chameleon from the keyboard of the master Chameleon. For Hayes Compatible modems, dial:

atdt*phonenumber* ***< Return >***

phonenumber is the telephone number of the line connected to the slave modem. The modem of the slave Chameleon will then answer and a connection will be established. At this point, the master Chameleon screen will be blank. To refresh (update) the screen, on the master Chameleon, press:

< Tab > < Tab >

You should then see the screen of the slave machine on the master machine. Please note the following:

- The screen update will be at modem speeds. This is substantially slower than the internal update rate of a Chameleon. In addition, the Chameleon uses an algorithm to attempt to update the screen over slow lines in the minimum time. If you are scrolling the display, the remote display may be unintelligible until scrolling stops.

- On the master Chameleon, the slave screen will always have a black background color. This is to help you distinguish between master and slave screens on the master Chameleon.

- If the master screen becomes corrupted, refresh the screen by pressing ***Tab*** twice.

- On the slave Chameleon, the screen will display normally, as if it were being controlled by the local keyboard. The slave keyboard will remain active during remote control.

- If you wish to exit terminal mode so that you can perform an action on the master while on-line to the slave, do the following:

  1. Press ***Shift Cancel***. This exits terminal mode and returns the master machine to normal control. Note that this does not terminate the connection between the two machines.

  2. Perform the operation on the master.

  3. To return to terminal mode, on the master Chameleon, do the following:

     a. Press ***Files*** to invoke File Management.
     b. Press ***F9 Connect.***
     c. Press ***Tab*** twice to refresh the master screen.

Terminating the Connection

To terminate the remote control session, you must hang up the line from the Chameleon master. With Hayes-compatible modems, this requires the following sequence:

a. Type: **+ + +**. The screen will attempt to update.

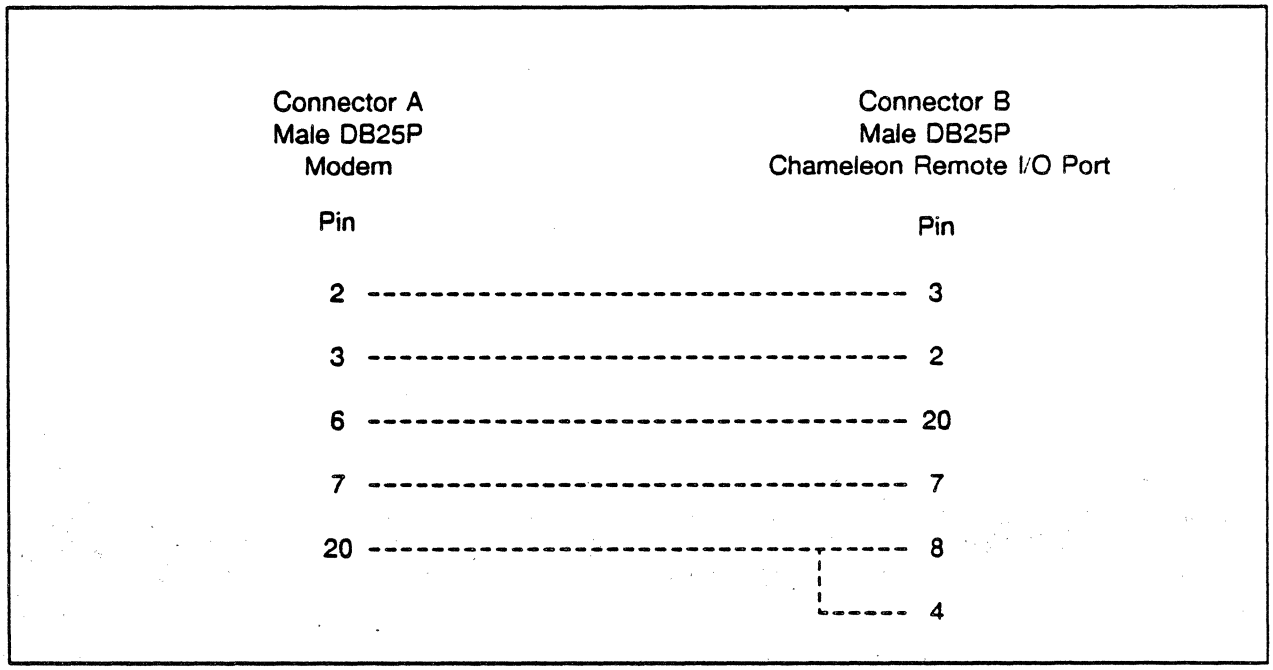
b. Type: ***ath***. The modem will hang up.

c. Press ***Shift Cancel***. The master Chameleon exits terminal mode and returns to normal mode.

The slave will be usable locally immediately; however, the modem may not hang up after loss of carrier for some time (depending on the modem type). You cannot re-establish a connection between the master and slave until the slave modem has hung up.

Cable Requirements

A special cable is required for this application. Chameleon Cable 932-5001-01 is available as an option from Tekelec or you can construct a cable following the diagram below.



GLOSSARY

GLOSSARY

ADCCP — Advance Data Communications Control Procedure. A bit-oriented protocol developed by ANSI. ADCCP defines three LAP link level access procedures: SNRM (Set Normal Response Mode), SARM (Set Asynchronous Response Mode), and SABM (Set Asynchronous Balance Mode).

Address

1) A location that can be specifically referred to in a software program.
2) The identification of a physically and/or logically distinct entity in a network.

Alphanumeric Characters — Upper and lower case alphabet letters from A to Z and the numerals 0 to 9.

AMI Coding — Alternate Mark Inversion Coding. A technique for encoding data using a three state signal to convey binary digits in which successive digits are of alternating positive and negative polarity, but equal in amplitude (and in which zeros are of zero amplitude).

Analysis — The process of passively monitoring a data communications link to display the traffic in a format designed to permit meaningful evaluation.

ANSI — American National Standards Institute. A group affiliated with ISO that establishes standards for transmission codes, protocols, high level languages, and so forth.

Application Layer — The seventh layer defined by ISO in its seven layer OSI (Open System Interconnect) model. This layer provides users with access to the OSI environment and distributed information services.

ASCII — American National Standard Code for Information Interchange. A coded character set of 7-bit coded characters, and a parity bit used for data communications, which defines 128 characters.

Async — Tekelec's Asynchronous Simulation software.

Asynchronous — Refers to events that occur without regular timed relationships to other events or clocks.

Asynchronous Communication — A method of data communications characterized by the use of *local* rather than *system* clocks. Synchronization is maintained via a leading (start) bit and at least one trailing (stop) bit per character.

AT&T — American Telephone and Telegraph Company.

B Channels — Channels that are provided for data transmission in ISDN at 64 Kbps; with PRI, 23 channels are provided for this purpose. (In BRI, 2 channels are provided.)

B8ZS Coding — Bipolar Eight Zero Substitution Coding. Consists of an AMI encoded signal using a technique for meeting ones density requirements on 1.544 Mbps facilities by using a special pattern of coding violations as a substitute for an all zero byte.

BCC — Block Check Character.

BCD — Binary Coded Decimal. A notation in which each decimal digit is represented by four binary digits.

BOP — Bit Oriented Protocol. Protocols that rely on positional significance and coded control fields, such as HDLC, LAPB, and SDLC.

BOS — Bit Oriented Signaling. One of two signaling techniques used with DMI. The separate channel provides a multiplex of the per channel signaling bits which are used in T carrier signaling.

BPS — Bits Per Second.

BSC — Binary Synchronous Communication. A character-oriented protocol in half-duplex designed by IBM in 1964.

Baud — A measure of data rate equal to the number of bits per second.

Binary Code — A numbering code that is based on only two characters or states, usually zero and one.

Bisync — Tekelec's BSC Simulation software package.

Bisynchronous — A method of transmission, based on synchronous system clocks, and a defined SYNC character used to synchronize the transmitter and receiver. The SYNC characters (for example, 32, 16, or 96 in HEX) are transmitted prior to data and usually in pairs.

Bit The smallest information unit, named as a contraction of *Bi*nary digi*T*.

Bit-oriented Protocols A protocol in which each bit may have independent significance and without octet alignment.

Boolean Operators An operator such as AND, OR and NOT used in Boolean algebra applied to logical units. The result of any operation is restricted to either zero or one (true or false).

Break Sequence Interruption in a transmission, often permits a controlled terminal to interrupt its controller.

Broadband Channel Transmission channel with a bandwidth wider than that required for transmitting voice signals.

Bug A hardware or software problem causing malfunctions.

Buffer A storage medium that holds blocks of data being transferred between devices.

CCIS Common-Channel Inter-office Signaling. A signaling system developed for use between central office switching stations (with stored program control).

CCITT International Telegraph and Telephone Consultive Committee. An international standards organization.

Chameleon

1) A small animal characterized by its ability to change its skin color to match its environment.
2) Tekelec's Simulator/Analyzer which adapts to the needs of a data communications environment.

Chameleon BASIC A generic programming language based on BASIC developed by Tekelec. The commands and functions are used in Tekelec's FRAMEM, SIMP/L, Bisync, and Async Simulators.

Character Term often used to refer to an eight bit pattern in a code.

Clock Equipment used in a transmission system that provides a time base to control certain functions, such as the the duration of signal element, and the sampling.

Command, Direct A command in Chameleon BASIC which is executed immediately, and is unnumbered (no line number).

Command, Statement — A command in Chameleon BASIC which is preceded by a line number. It is stored in memory, and executed according to line number sequence when the entire program is run.

Communications Processor — A type of computer used for processing the overhead of data communication (allowing the CPU to concentrate on the applications).

Control Field — Eight or sixteen bits of information following the address in a BOP frame, consisting of the number of transmissions received count, a poll/final bit, the number of transmissions sent count, and a concluding bit.

CPU — Central Processing Unit.

CRC — Cyclic Redundancy Check. A check word generated by a polynomial sequence that allows errors to be detected. It is sent with the transmission and checked after being recalculated by the receiver.

D-Channel — The 24th channel used with DMI for common channel call set-up and tear-down signaling.

D4 Framing — Framing format used on most existing 1.544 Mbps facilities.

Data bits — The number of data bits specifies the number of significant bits in an asynchronous transmission.

Data Endpoint — The point at which the DMI channel protocol is terminated. Data Endpoints may be at the Host or at the PBX, at terminal equipments, or terminal adapters behind the PBX.

Data Mode 0 — The data channel protocol mode which supports clear 64 Kbps data transmission.

Data Mode 1 — The data channel protocol mode which supports 56 Kbps data transmission.

Data Mode 2 — The data channel protocol mode which supports standard synchronous or asynchronous data transmission up to 19.2 Kbps using HDLC-type framing to perform rate adaptation.

Data Mode 3 — The data channel protocol that supports virtual circuit service for statistical multiplexing of data streams.

Datapac — The Canadian X.25 Packet Switching Network.

DCE Data Circuit Terminating Equipment.

Decimal Code System in which each numeric position may be any one of ten states.

Default Condition which is set or occurs automatically when no instructions are stated to the contrary.

Dial Pulses Interruptions in loop of a calling end. The interruptions consist of the breaking and making of the dial pulse contacts when a digit is dialed.

DMI Digital Multiplexed Interface. DMI refers to:

1) The requirements and specifications for multiplexed data communication over digital facilities, between a Host computer and a PBX.
2) The actual interface that allows the above communication.

DS0 Digital Signal level 0. The term used widely in North America for the basic digital channel rate (64 Kbps).

DS1 Digital Signal level 1. The term used widely in North America for the first level 1.544 Mbps PCM multiplex signal.

DTE Data Terminal Equipment.

EBCDIC Extended Binary-Coded Decimal Interchange Code. A set of 8-bit coded characters, defined by IBM.

Encode Conversion of a character into a specific bit pattern.

FE Framing Extended Framing Format. This format is replacing the D4 format in North America on 1.544 Mbps facilities. It incorporates error measuring and a data link, in addition to providing framing.

FIFO First In, First Out. Term used to describe sequential flow of data through a buffer.

Flow Control In general, a method of maintaining the orderly flow of data traffic across a data link. Also, the use of buffers and controls to avoid loosing data during transmission.

Fox Message A sentence reading: THE QUICK BROWN FOX JUMPS OVER A LAZY DOG'S BACK 1234567890, containing all the alphanumeric characters. Several variations are commonly used.

Frame A logical grouping of data and control information usually used to define a bit-oriented sequence.

Frame Alignment The state in which the frame of the receiving equipment is correctly phased with respect to that of the received signal.

Frame Level The second or link level access procedure defined by ISO in its seven layer OSI (Open System Interconnect) model.

FRAMEM Tekelec's *FRAM*e *EM*ulator software package.

Full Duplex Communications in which transmission occurs simultaneously in two directions.

Glare Occasional simultaneous seizures occurring at both ends of a two-way channel tie-trunk signaling system. Glare conditions may be minimized, but not completely eliminated.

HDLC High-level Data Link Control. A bit-oriented protocol specified by ISO.

Half-Duplex Describes communications in which transmission occurs in two directions, but not simultaneously.

Hexadecimal A numbering code which is based on 16 characters, or states. These characters are 0 - 9 and A - F.

IEEE Institute of Electrical and Electronics Engineers.

I-Field The data portion of an Information frame in bit-oriented protocols.

I-Frame A bit-oriented protocol frame containing an I-Field.

Inpulse Incoming dial pulse.

ISDN Integrated Services Digital Network.

ISO International Standards Organization.

Input-Output (I/O) Device A system component used to transfer data between the main storage and other devices.

Interface The physical connection between two devices.

Interface Signal A method of physical signaling defined by various specifications such as V.24, V.35, V.36, RS232, and RS449.

KBPS Kilobits Per Second.

Link Level The second or link level access procedure defined by ISO in its seven layer OSI (Open System Interconnect) model.

LMA Loss of Multiframe Alignment. Indicates a loss of signaling integrity. Must be declared if a Multiframe Alignment Error (MER) occurs in at least 3 out of 5 consecutive frames.

Logical Channel One of 4095 logical communications paths defined by the CCITT X.25 Recommendations.

LRC Longitudinal Redundancy Check. An 8-bit block check character calculated by a polynomial used for error detection.

Mark The signal or communications channel state corresponding to binary one. Occurs when the current flows, or when the voltage is less than -3 V.

MBPS Megabits Per Second.

MHz Megahertz.

MER Multiframe Alignment Error. Used to indicate an error in the signaling framing. In signaling frames 1 to 23, a MER is defined as an error in the multiframe alignment sequence. In signaling frame 24, it is defined as either an error in the multiframe alignment sequence, and/or an error in one or more multiframe alignment signal bits.

Mnemonic Codes Operations translated to a symbolic notation to facilitate human recognition and memory. They must be converted back to their original binary bit patterns by a compiler (or other device) before a computer can interpret them. The symbolic representations, for example SABM, are called mnemonics.

Mnemonic Table A table showing the names of mnemonics, their binary equivalents, and representation in other codes.

Modem A communications device that *modulates* digital signals at the transmitting end, and *demodulates* them at the receiving end. The name is a contraction of modulate and demodulate.

Modulo 8 A finite number system (0 - 7) used to count the number of frames sent and received on a line [N(s) and N(r)].

Modulo 128 An expanded finite number system (0 - 127) that counts the number of frames sent and received on a line [N(s) and N(r)].

Modulus In a finite number system, the modulus is the exact number of integers available.

MOS Message Oriented Signaling. One of two signaling techniques used with DMI, and designed to eventually replace Bit Oriented Signaling (BOS). Provides a high functionality control mechanism that allows features such as endpoint parameter negotiation, improved maintenance procedures, and better call set-up and tear-down. The data link layer protocol is LAPD.

Multi-Point Refers to a line with more than two stations connected.

NRZ Non-Return to Zero encoding.

NRZI Non-Return to Zero Inverted encoding.

Network A system of connected devices used for communications.

Network Layer The third level defined by ISO in its seven layer OSI (Open System Interconnect) model, responsible for establishing, maintaining, and terminating connections.

Off-Hook Connected state.

On-Hook Disconnected state.

Outpulse An outgoing dial pulse.

Packet A subdivision of a message. In packet switching operations, a message that exceeds a maximum defined length is broken into smaller units, called packets.

Packet Level The third level of the ISO model, also defined by CCITT specifications.

Packet Switching A method of transmitting messages through a communication network, in which messages are subdivided into short packets.

Pages Chameleon 32's unique windowing system that allows the screen to be shared between several applications. Each active application program has its own page that can be overlapped to display multiple pages simultaneously.

Parity Bit A zero or one check bit added to a byte to force the total number of the binary one digits to be always odd or always even.

Parity Checking An error checking method in which character bit patterns are forced into parity (odd or even) by adding a one or zero parity bit to the transmission.

PBX Private Branch Exchange. A private switching system, either manual or automatic, usually serving a businesss, and located on the customer's premises.

PCM Pulse Code Modulation. Conversion of an analog signal, such as voice, to a digital format in the form of binary-coded pusles representing the quantized amplitude samples of the analog signal.

Physical Link Layer The first level defined by ISO in its seven layer OSI (Open System Interconnect) model, concerned with transmission of unstructured bit stream over the physical medium.

Point-to-Point Refers to a line with exactly two stations.

Poll/Final Bit The fifth bit (low to high order) used for various signaling tasks in the ADCCP subset SABM, SARM, and SNRM.

PRBS Pseudo-Random Bit Sequence.

Presentation Layer The sixth layer defined by ISO in its seven layer OSI (Open System Interconnect) model, provides independence to the application processes from differences in data representation.

Primary Rate The term used in ISDN documentation to describe the first level for PCM transmission systems. There are two versions of Primary Rate Access: 1.544 Mbps and 2.048 Mbps (CEPT).

Primary Station The main station in a network. In an SDLC environment, the primary station is usually a front-end processor.

Protocol A set of rules and procedures for establishing and controlling communication on a line.

Protocol Specific Used in this manual to refer to commands that are only used with a particular software package.

Pseudo-user A portion of the Chameleon's SITREX code which is a logical entity capable of supporting a logical communications channel.

QRSS Quasi-Random Bit Sequence.

RAM Random Access Memory.

RMA Remote Multiframe Alarm. Indicates loss of signaling integrity at the far end. Implies a terminal equipment failure rather than a facility failure.

Robbed Bit Signaling — Signaling in which digit time slots primarily used for the transmission of encoded speed are periodically used for signaling.

RS232C — Specifications published by the Electronic Industries Association (EIA) for mechanical and electrical interface standards.

RS449 — Specifications published by the Electronic Industries Association (EIA) that provides mechanical and electrical interface standards.

RZ — Return to Zero. A line code that returns to zero level half way through the bit interval. This provides a pulse for each "one" bit.

SNA — Systems Network Architecture, developed by IBM.

SDLC — Synchronous Data Link Control. A bit-oriented protocol used as the link access procedure for IBM's SNA.

SIMP/L — Tekelec's Simulated Interactive Multi-Protocol Language software packages used to simulate SDLC, HDLC, and LAPD protocols with the Chameleon 32.

Scenario — A series of commands structured into a program used in Tekelec's SITREX software.

Secondary Station — Any station controlled by a primary station. Usually a terminal controller.

Session Layer — The fifth level defined by ISO in its seven layer OSI (Open System Interconnect) model, establishes, manages, and terminates sessions between applications.

Signal — An intentional introduction of energy onto a line to transmit information.

Simulation — When one device imitates the functional behavior of another. The simulator will transmit and receive the same data and produce results identically to the simulated device.

SITREX — The Chameleon 32's automatic X.25 Simulator that allows generation of scenarios in an X.25 environment and creation of normal or abnormal situations to troubleshoot an X.25 Subscriber or Network.

Space The signal or communications channel state corresponding to binary zero. Occurs when no current flows or when the voltage is more than +3 V.

Split Screen A CRT divided into two independent sections vertically.

Start Bit A signal used to indicate the beginning of a character transmission in asynchronous protocols.

Stop Bit The quiescent state usually one, one and half, or two bits long following the transmission of a character in asynchronous transmissions.

State Variables The internal variables used to maintain the state of a specific data communications device.

Station Input or output devices within a system.

Subscriber A device using the services of a network, such as an X.25 network.

Supervisory Frames A type of frame used to enforce flow control in bit-oriented protocols.

TDM Time Division Multiplexing. A method of serving a number of simultaneous channels over a common transmission path by assigning the transmission path sequentially to the various channels, each assignment being for a discrete time interval.

Terminal An input or output device used to send data to or receive data from another device in the system.

Transmission Mode Control Byte An eight bit word used in Tekelec's Bisync software to provide instructions to the hardware designating the procedure for handling frames.

Trace An analysis function within Tekelec's Simulation software in which each frame transmitted or received on the line is stored.

Transport Layer The fourth level defined by ISO in its seven layer OSI (Open System Interconnect) model, provides transparent transfer of data between end points, end-to-end error recovery, and flow control.

Trigger The definition of a condition or event used to initiate a specified action.

Transparency A transmission mode which *suspends* the recognition of control characters so that any bit pattern may be transmitted as data.

Unnumbered Frame A type of frame used for a variety of control functions in bit-oriented protocols. U-frames do not carry sequence numbers, and do not alter the sequencing or flow of numbered I-frames.

Video Attribute The way a character is displayed on a CRT screen, for example color, blinking, half intensity, reverse video, bold, or italics.

Window The maximum number of frames which may be outstanding or unacknowledged during transmission at any time.

Write Protected A disk or file which cannot be erased or written over.

X.25 A set of packet switching standards developed by the CCITT.

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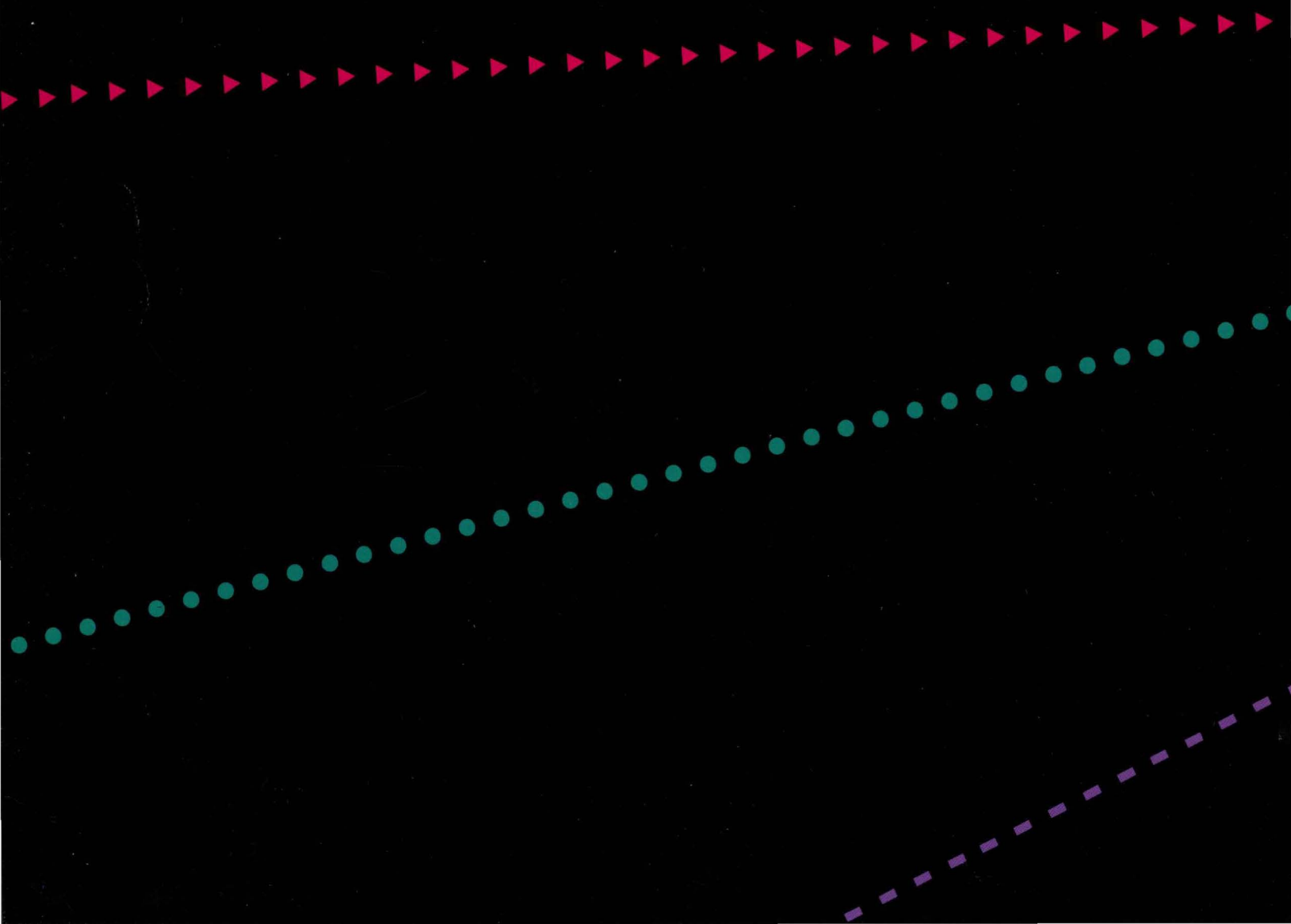
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