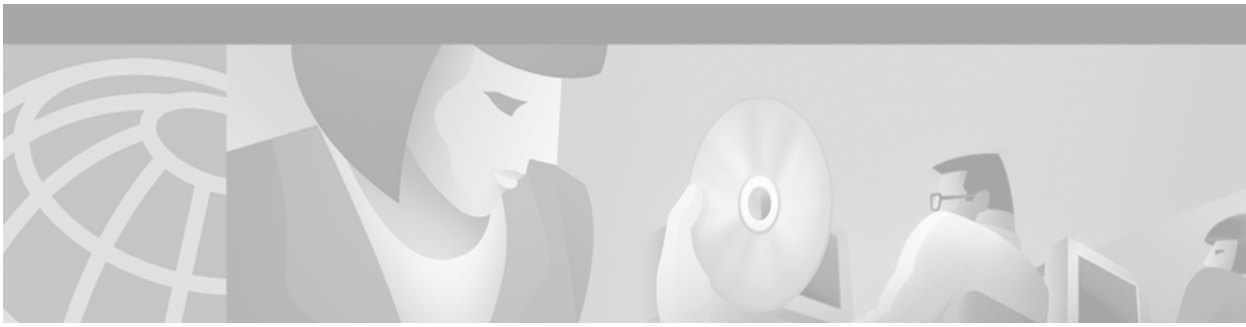

Preface

Objectives

This document provides detailed information for the VCO/4K TeleRouter component, a software overlay to the VCO/4K system software that allows the system to interpret dialed digit information and execute call routing decisions based on the information with or without assistance from a host computer.

Audience

This document is designed for system administrators and other personnel assigned to the task of installing and operating the VCO/4K switch.

Document Organization

This document is organized as follows:

- Chapter 1, “Overview,” provides a general description of the TeleRouter software, including installation instructions and basic call routing scenarios.
- Chapter 2, “Hosted and Stand Alone TeleRouter Operation,” shows TeleRouter configuration options for both hosted and stand-alone operation, including command and report descriptions for host control.
- Chapter 3, “Database Administration,” shows the master console screens to access for configuration and maintenance of the TeleRouter software functions.
- Chapter 4, “System Configuration,” elaborates on the material presented in chapter 3, including additional configuration options for switch interoperability with the TeleRouter software.
- Chapter 5, “Maintenance,”provides maintenance and alarm information for the TeleRouter software.
- Chapter 6, “Diagnostics,”describes basic diagnostic features available for TeleRouter operations.

Conventions

This document uses the following conventions:

Note Means *reader take note.* Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful.* In this situation, you might do something that could result in equipment damage or loss of data.

Warning **Warning Means *danger.* You are in a situation that could cause bodily injury. Before you work on any equipment, you must be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translated versions of the warning, refer to the *Regulatory Compliance and Safety* document that accompanied the device.**

Related Documentation

Related documentation includes:

- *Cisco VCO/4K System Maintenance Manual*
- *Cisco VCO/4K Troubleshooting Guide*
- *Cisco VCO/4K Software Installation Guide*
- *Cisco VCO/4K System Administrator's Guide*
- *Cisco VCO/4K Standard Programming Reference*
- *Cisco VCO/4K Extended Programming Reference*
- *Cisco VCO/4K System Messages*
- *Cisco VCO/4K ASIST Programming Reference*

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Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1(P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

CHAPTER 1

Overview

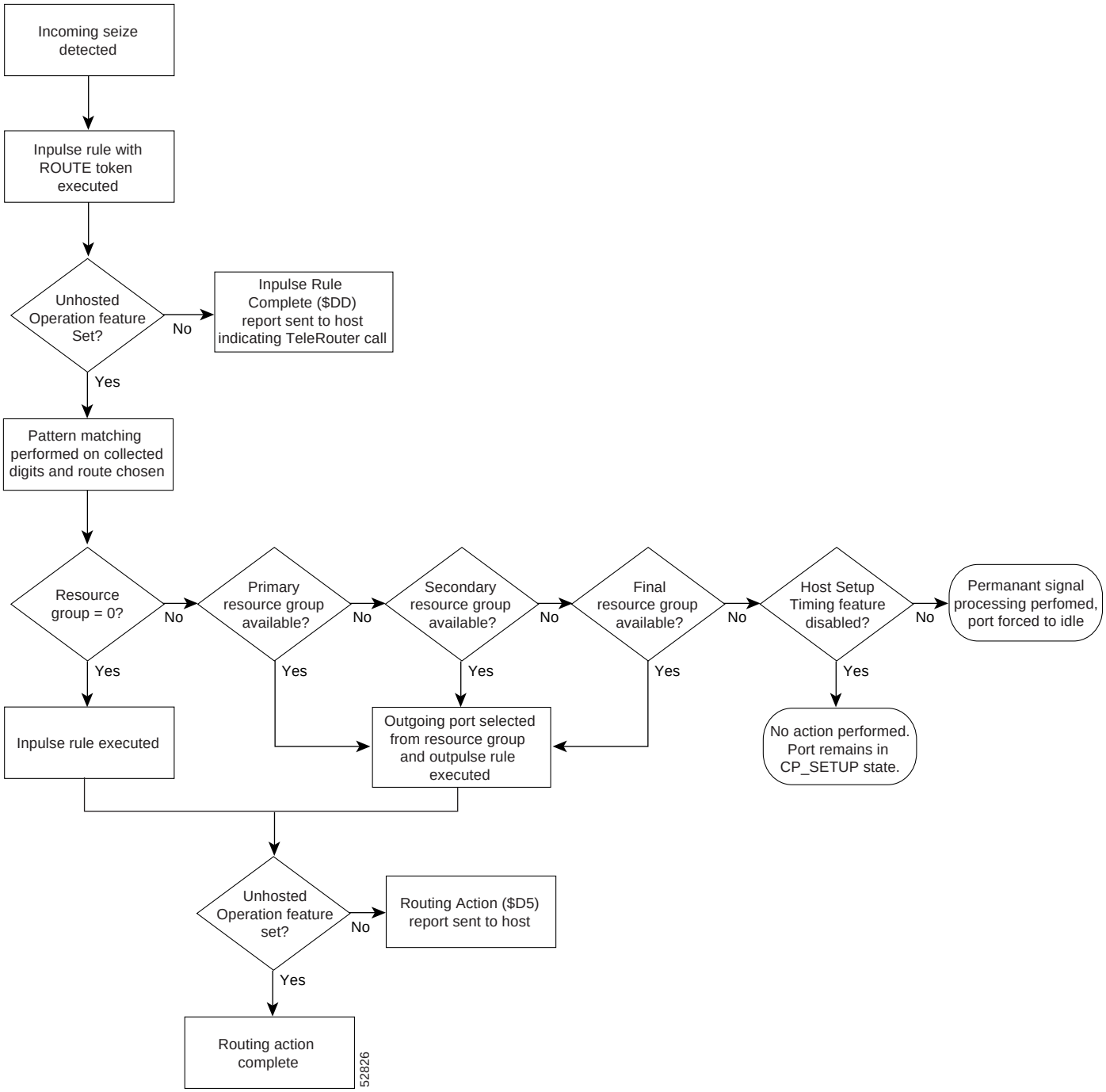
TeleRouter is a software overlay to the VCO/4K system software that allows the system to interpret dialed digit information and execute call routing decisions based on the information. All standard system functions are maintained. Additional TeleRouter capabilities allow you to design switching scenarios completely within the system. TeleRouter can be used in conjunction with a host computer in a normal system hosted environment, or it can independently perform routing actions on the switch in an unhosted configuration.

Screens within standard system administration menus provide access to TeleRouter functions. These screens create routing instruction tables. An additional inpulse rule token initiates the instructions included in the routing tables.

Call Routing Flow

The TeleRouter call routing process uses pattern matching of dialed digits to establish switched connections between incoming and outgoing ports on the system. An overview of this process is shown in Figure 1-1.

Figure 1-1 Typical TeleRouter Call Flow



During a typical call routing scenario, dialed digits are collected through inpulse rule processing. An IP ANI [xx] or IP FIELD [xx] token collects digits from an incoming port and stores them in the specified field. These digits can be either MF or DTMF digits. In the case of MF digits, the KP and ST start/end designators are stripped when the digit string is stored. The last token in the inpulse rule must be a ROUTE [Tx] token.

The ROUTE [Tx] token initiates pattern matching on the digits stored in the “x” digit field. The template information configured for the “T” route table specifies the parameters for pattern matching. Template parameters include the size (the number of consecutive digits used for matching), the starting position (the first digit within the digit string to begin matching), and the minimum number of digits necessary for matching.

The digits stored in field “x” are compared against the patterns established for the individual routes within a route table. Each route table can contain many routes, totaling up to 1000 routes distributed over the ten route tables. In addition to the user-configured route patterns, three exception routes are predefined for incomplete digit collections, empty collections and unmatched patterns. A fourth predefined route exists for direct routing.

Incomplete digit collections, referred to as short collections, are digits strings without the minimum number digits specified in the route table template. Empty collection routes manage situations when no digits are stored in the specified digit field. When collected digits do not match any of the user-configured patterns, the route designated for unmatched patterns may be used. Nailed-up connections, referred to as direct routing, can be accomplished without pattern matching the collected digits. Setting “x” to zero in the ROUTE [Tx] token performs direct routing.

User-configured patterns can use the wildcard characters Z, N, X and ✻ in addition to standard digits. The wildcard character “Z” matches digits 0 and 1, “N” matches digits 2 through 9, “X” matches digits 0 through 9, and “*” matches any digit, including 0 through 9, ✻ and #. When the digits match a pattern assigned to a specific route, a routing action is performed.

Instructions for the routing action can include executing an inpulse rule, or hunting an outgoing port from a resource group and executing an outpulse rule. Resource groups are indicated by number, with a value of 0 indicating that an inpulse rule should be performed. A letter “I” and a number identifies the inpulse rule. When a resource group is specified, TeleRouter executes the outpulse rule indicated by an “O” and a number. Each resource group and inpulse/outpulse rule pair comprises one instruction.

Up to three instructions can be designated for each route: Primary, Secondary and Final. The system will hunt for an available resource from the Primary group. If a resource is available, the Primary outpulse rule is executed. If no resources can be allocated from the Primary group, the system begins hunting from the Secondary resource group. The Secondary outpulse rule is performed if an available resource is found. If not, the system hunts from the Final resource group and executes the Final Rule if the hunt is successful.

Routing actions cannot be performed if no outgoing ports are available from the resource groups designated by the route's instructions. When this occurs, the incoming port is placed into one of two call states. If the Disable Host Setup Timing system feature flag is set to **Y**, the port remains in setup state awaiting host intervention. If the feature is not disabled (the flag is set to **N**), Permanent Signal processing is performed in an attempt to return the port to idle state. A Permanent Signal Condition ($D2) report will be sent if TeleRouter is running in a hosted environment. Refer to the *Cisco VCO/4K System Administrator's Guide* for more information on system feature settings.

Resource Group Allocation

Resource group allocation plays a vital role in TeleRouter call processing. Ports are assigned to resource groups using the Resource Group Configuration screen standard to system software. (Refer to the *Cisco VCO/4K System Administrator's Guide.*) Resource groups are specified for the Primary, Secondary and Final instructions for hunting using the Routing Table Configuration screen. (Refer to the "Routing Table Configuration Screen" section on page 3-7.)

Instructions are organized in a three-level hierarchy. TeleRouter will first hunt for available resources from the Primary resource group, and then from the Secondary group only if no outgoing ports are available from the Primary group. Similarly, TeleRouter will only hunt from the Final group if no ports are available from the Primary and Secondary resource groups.

When TeleRouter is operating in an unhosted environment, users are informed of resource limitations by two additional TeleRouter minor alarms. The first alarm, Group OOS Limit Exceeded, warns the user that more than 75 percent of the ports in any resource group have been busied out and a resource limitation condition is pending. The second alarm, Resource Limitation Exists, notifies the user that no ports are available in a particular resource group. In the hosted configuration, resource limitations are indicated by Resource Limitation ($D6) reports, and Logfile status and error messages.

Example of Call Routing

This example traces the process of collecting digits, executing a ROUTE [Tx] token, performing pattern matching, and carrying out routing instructions.

Digits are collected by the system using inpulse rule processing. The inpulse rule described in Table 1-1 collects seven MF digits from an incoming port and stores them in a digit field 2. For example, assume the digit string 5556003 was collected and stored in digit field 2. The ROUTE [Tx] takes these digits and attempts to route the call using Route Table A.

Table 1-1 Inpulse Rule Example

Rule #1	
CONT NREP	
MF	
WINK ENAB	
IP FIELD	2
ROUTE	A2

Route Table A, named Example, contains three routes (see Table 1-2) and specifies the template parameters for pattern matching. According to the template parameters, four digits from the collected digit string (beginning with the fourth digit collected) are matched against the configured patterns. In this example, the digits 6003 are matched against the route patterns (see Table 1-3).

Table 1-2 Route Table Example

Route Table	**Number of Routes**	**Route Table Name**	**Template**		**Minimum Digits**
			Size	**Start**	
A	3	Example	4	4	7

The collected digits shown in Table 1-3 match the pattern configured for Route 1. The Primary instruction for Route 1 begins hunting resources from outpulse rule 1. If an available outgoing port is found in this group, outpulse rule 2 is executed. If no ports are available, the Secondary instruction is used. Hunting is performed from outpulse rule 3, and outpulse rule 4 is executed if the hunt is successful. If no ports are available from outpulse rule 3, the Final instruction (hunting from outpulse rule 4 and executing outpulse rule 6) is used. Once an available outgoing port is found, the routing action is complete.

The route configurations shown in Table 1-3 demonstrate additional routing possibilities.

Table 1-3 Route Configuration Example

		Primary		Secondary		Final	
Route	**Pattern**	**Group**	**Rule**	**Group**	**Rule**	**Group**	**Rule**
1	*** 6003 **********	1	O 2	3	O 4	4	O 6
2	*** 6005 **********	2	O 1	2	O 5	0	I 7
0	*** 6006 **********	0	I 7	----------	----------	----------	----------
-------	----------	----------	----------	----------	----------	----------	----------
-------	----------	----------	----------	----------	----------	----------	----------
-------	----------	----------	----------	----------	----------	----------	----------
-------	----------	----------	----------	----------	----------	----------	----------
S	SHORT COLLECTION	0	I 0	0	I 0	0	I 0
E	EMPTY COLLECTION	0	I 0	0	I 0	0	I 0
U	UNMATCHED PATTERN	0	I 2	0	I 0	0	I 0
D	DIRECT ROUTE	0	I 0	0	I 0	0	I 0

If, for example, the collected digits were 5556006, inpulse rule 7 would be executed. No resource hunting would take place. In the case of an unmatchable pattern, such as the digits 5556007, the instructions for Route U (Unmatched Pattern) would be used. The Primary instruction for this case executes inpulse rule 2.

TeleRouter PRI B-Channel Support

When used with the optional ISDN PRI software package, TeleRouter supports call routing to and from ISDN PRI B-channels. This includes calls between B-channels and non-ISDN network interface ports (e.g. SLIC-2, DID-2, E+M, UTC-2 and T1). Routing operates in the same manner as with non-ISDN resources.

Observe the following guidelines when using TeleRouter for ISDN calls:

- An ISDN Message Template must be used to process the Channel ID Information Element (IE). A PROCESS CHAN ID is included in the message template in response to a received SETUP message. The message template is then “called” in the default inpulse rule defined for the B-channels on the PRI card. Refer to the *Cisco VCO/4K ISDN Supplement* for information on ISDN Message Templates and Channel ID IE processing.
- TeleRouter routes calls based on a string of up to 20 digits. Although an ISDN digit field is capable of collecting up to 85 digits, routing is based on the first 20 digits in a field; the twenty-first and subsequent digits are discarded.

- Resource types should not be mixed within a single resource group. Although this is true of all system resource types, it is especially important that ISDN and non-ISDN ports not be assigned to the same resource group due to call processing and other differences.
- Because routing can only be performed if the Channel ID IE is processed by the system, hyperchannel capability (switching of up to 23 contiguous B-channels) is not supported.

TeleRouter Installation Instructions

This section details the procedure for installing the TeleRouter Package. It is assumed the reader has a working knowledge of system operation and the system onto which the option is to be installed is running system software version 4.0 or later. For information on system requirements, refer to the *Cisco VCO/4K System Software Release Notes.*

The TeleRouter diskette contains an installation utility specific to the software being installed. This utility consists of the installation program and a set of disk utilities to allow operations such as database backup during the software installation process. The disk utilities are documented in the *Cisco VCO/4K System Administrator's Guide.*

The system must be off line in order to perform the installation procedure. Estimated time for completion of software installations is 5 minutes (10 minutes for a redundant system) plus additional time to define the routing tables.

Note Prior to any software installation procedure, make a backup copy of the system database. This safeguards against any errors that may occur during the installation process.

Before proceeding with the installation, make sure you read and understand all the material contained in this section. You should also have the following publications on hand for easy reference:

- *Cisco VCO/4K Hardware Installation Guide*
- *Cisco VCO/4K Software Installation Guide*
- *Cisco VCO/4K System Maintenance Manual*
- *Cisco VCO/4K System Administrator's Guide*

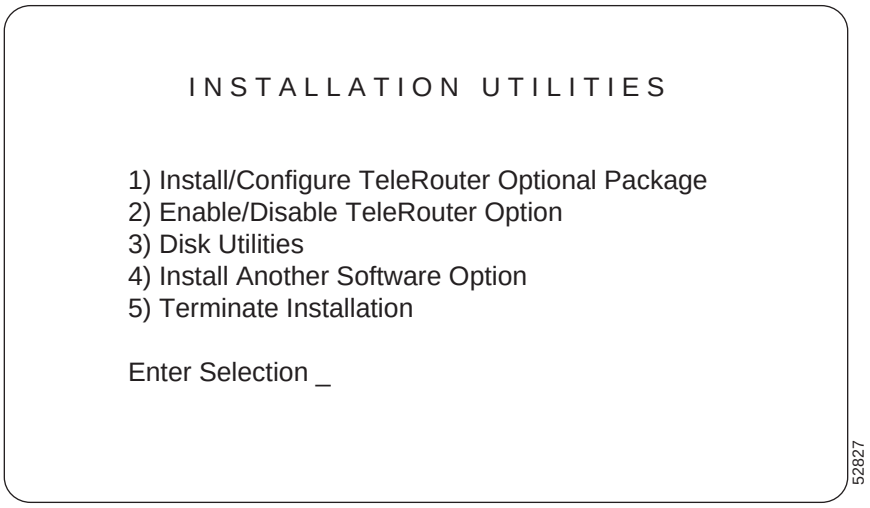
TeleRouter Installation

To install the TeleRouter Package, follow these steps:

Step 1 Insert the TeleRouter diskette into the A-side drive.

Step 2 Power up the system or press the Alarm Arbiter Card (AAC) **RESET** button for the A-side system controller. After the system performs diagnostic tests (indicated by self-test messages), the Installation Utilities Menu is displayed as shown in Figure 1-2. The cursor is located in the Enter Selection data entry field.

Figure 1-2 TeleRouter Installation Utilities Screen



Step 3 Type **1** and press **Return.** The following message appears:

```
Do You Wish To Back-Up The System Data Base? (Y/N) _
```

Backing up the database is optional. Because the hard disk drive is not reformatted as part of this option, no data will be lost.

Step 4 Determine whether to back up the system:

- If you want to perform a database backup, type **Y** and press **Return**. The following message appears and the display returns to the Installation Utilities screen:

  ```
  Software Installation Aborted by Operator
  ```

  Perform a database backup using the Disk Utilities (refer to the "Performing a Database Backup" section on page 1-8) and then restart the installation process.

- If you do not want to perform a database backup, type **N** and press **Return**. The following messages appear and the display returns to the Installation Utilities menu.

  ```
  Copying A:/TELERTE.EXE...
  1 file[s] copied
  TeleRouter Option Enabled
  ```

Step 5 Determine whether to install other optional software:

- If no other optional software needs to be installed, go to Step 7.
- To install another optional software package, type **4** and press **Return**. The following messages appear:

  ```
  Insert Another Install Disk
  Press Return To Continue
  ```

Step 6 Remove the current diskette from the drive and insert the diskette containing the software option. When this has been done, press **Return**. Repeat Step 3 and Step 4.

Step 7 Determine the redundancy configuration of your system.

- If the system is nonredundant, go to Step 8.
- If the system is redundant, connect the system console to the B-side system controller and repeat Step 1 through Step 7 for the B side.

Step 8 When all software has been installed, reconnect the system console to the A-side system controller (if necessary), then set the AAC **SELECT** to **Auto**. At the Installation Utilities menu, type **5** and press **Return** to terminate the installation. The following message appears:

```
Terminate Installation Utility? (Y/N) =N?_
```

Step 9 Type **Y** and press **Return.** The following messages appear:

```
Remove Installation Diskette NOW!
Suspending Installation Process...
Rebooting...................
Reset System NOW!
```

Step 10 Reboot the system:

- Remove the diskette from the drive and press the A-side **RESET** button on the AAC to allow the system to boot from the hard disk.
- If the system is redundant, also press the B-side **RESET** button on the AAC to allow that side to boot from hard disk.

Step 11 Log on to the system. Refer to the *Cisco VCO/4K System Administrator's Guide* for instructions.

The installation procedure is now complete. You can now peform additional database entry for routing tables and inpulse rules specific to TeleRouter operation. Refer to the "Database Administration" section on page 1-10 for more information. You can use the Enable/Disable Option selection to deactivate and reactivate the optional software. Refer to the "System Configuration" section on page 1-10 for more information.

Note TeleRouter must be configured in the system data base using the Host Configuration utility for the overlay to perform call routing. Refer to Chapter 4, "System Configuration," for more information.

If you encounter any difficulties during the installation process or need more information, contact your Cisco Systems TAC.

Performing a Database Backup

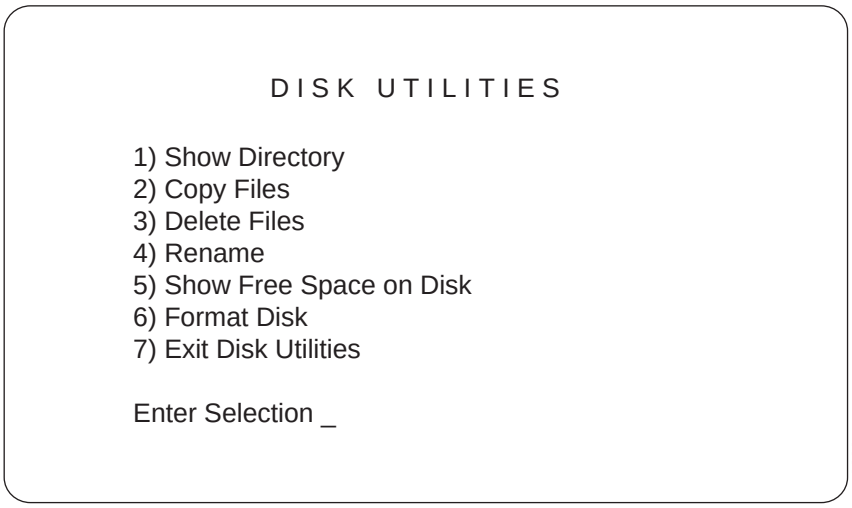
To perform a database backup using the Installation Disk Utilities, complete the following steps:

Step 1 Access the Installation Utilities screen.

Step 2 Insert a formatted high-density diskette into the floppy drive.

Step 3 Type **2** and press **Return.** The Disk Utilities screen is displayed (see Figure 1-3).

Figure 1-3 Disk Utilities Screen



Step 4 Type **2** and press **Return**. The following message appears:

```
Enter file to be copied:
```

Step 5 Type **C:/DBASE/*.tbl** and press **Return**. The following message appears:

```
Enter target file:
```

Step 6 Type **A:** and press **Return**. The following message appears:

```
Copying files…
```

When all files have been copied, the Install Disk Utilities screen is displayed.

Step 7 Type **7** and press **Return** to return to the Installation Utilities screen.

Step 8 Remove the backup diskette and continue with the installation process.

TeleRouter System Administration

TeleRouter preserves the system administration functions and basic organization of system software. The following TeleRouter-specific screens can only be accessed when the overlay is loaded on the system:

- Routing Table Summary
- Routing Table Configuration (accessed from Routing Table Summary)
- Display Routing Statistics

Several standard administration screens provide additional control over TeleRouter processing. All TeleRouter-related screens are summarized in the following sections.

Database Administration

The Routing Table Summary and Routing Table Configuration screens are used to create routing instructions based on digit matching. An additional inpulse rule token, ROUTE [Tx], is provided for call processing. This token initiates call routing based on the information configured in the Routing Table displays. The ROUTE [Tx] token is accessed from the Inpulse Rules Table display. Refer to Chapter 3, "Database Administration," for more information on TeleRouter Database Administration screens.

System Configuration

The Host Configuration screen is used to enable/disable the TeleRouter software overlay and permits the overlay to function in an unhosted (stand alone) environment. A trace option on this screen interacts with the System Trace Configuration utility to trace TeleRouter control messages. A system feature on the System Features display an unhosted (stand alone) environment. Refer to Chapter 4, "System Configuration," for more information on the System Feature Configuration screen. Stand alone TeleRouter operation is discussed in Chapter 2, "Hosted and Stand Alone TeleRouter Operation."

Maintenance

The Alarm Condition screen contains two TeleRouter-specific alarms relating to resource limitation conditions. Refer to Chapter 5, "Maintenance,"for more information.

Diagnostics

From the Diagnostics screen, the Routing Statistics Display screen provides detailed status information on call routing activity. This display can be used to trace routing activity and offers useful debugging information. Refer to Chapter 6, "Diagnostics," for more information.

Disabling TeleRouter Operation

The Enable/Disable TeleRouter Option selection on the Installation Utilities screen can be used to activate and deactivate the TeleRouter overlay. You must boot the system from the TeleRouter floppy diskette and choose option **2** on the Installation Utilities screen. If TeleRouter is currently operating on the system, this action disables the overlay; otherwise, choosing this option activates TeleRouter.

Note The Enable/Disable TeleRouter option allows users to deactivate TeleRouter without modifying their database. For example, ROUTE [Tx] tokens can remain in inpulse rules (these tokens are not executed). The TeleRouter overlay can also remain defined on the Host Configuration screen.

Disabling TeleRouter operation has the following effects on system processing:

- All ROUTE tokens are ignored during inpulse rule processing (the system skips over the ROUTE token and executes the next token).
- No Routing Action ($D5) reports are generated and sent to the host.

- The Routing Table Summary, Routing Table Configuration, and Routing Statistics Display system administration screens cannot be accessed.

CHAPTER 2

Hosted and Stand Alone TeleRouter Operation

Once TeleRouter is enabled, you can configure it to operate in both hosted and unhosted environments. In a hosted environment, TeleRouter operates in conjunction with a host computer to perform switching actions. The system responds to all messages received over the host communication links. The overlay interprets dialed digit information and routes calls based on instructions established by the user. This configuration offloads a portion of the call processing overhead from the host, allowing the system to be used for multiple applications.

In a unhosted environment, the system responds only to instructions from the TeleRouter overlay. Host communication links are not established in this configuration and all routing actions are initiated by TeleRouter.

Hosted Configuration

TeleRouter can be used to assume responsibility for some or all call routing based on pattern matching, reducing the demands of host processing. The host can still perform routing for specific call scenarios as it normally would using the Incoming Port Control ($6A) and Outgoing Port Control ($69) commands (or other actions using additional resource control commands). The host receives all status reports, and is informed of routing actions performed by TeleRouter through two reports. The first report, an Inpulse Rule Complete ($DD) report, indicates that an inpulse rule containing a ROUTE [Tx] token was executed. The $DD report informs the host that TeleRouter has assumed control of the call associated with the report. This report differs slightly from the standard $DD report format; a bit setting in the Segment Control byte (offset 9) indicates if routing was performed. A Routing Action ($D5) report notifies the host of the resulting routing action performed by TeleRouter.

Routing Action ($D5) Report

Report Type

Resource Control

Destination VCA

$40

Description

The Routing Action ($D5) report notifies the host of routing actions performed by TeleRouter. This report is generated only when TeleRouter is functioning in the hosted configuration. It indicates the success or failure of the routing action, specifies the type of action performed, and identifies the two ports linked by the routing path.

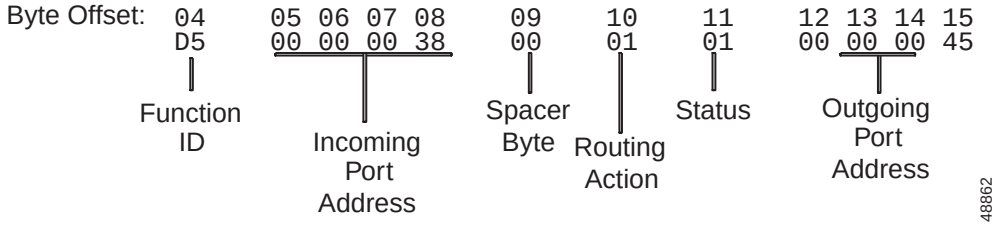
Action Causing Report Generation

The $D5 report is generated in response to a digit-matching attempt by TeleRouter. Because digit-matching is initiated by a ROUTE [Tx] inpulse rule token, the $D5 report always follows an Inpulse Rule Complete ($DD) report. The $DD report indicates whether an inpulse rule or outpulse rule was executed as part of the routing action. This report allows the host the track resource allocation by specifying the incoming and outgoing resources linked by the routing action.

Format

Figure 2-1 shows the byte formatting for this report.

Figure 2-1 $D5 Report Format



Function ID (byte offset 4)—Byte immediately following the Network Header; uniquely identifies this report from the system.

Incoming Port Address (byte offsets 5 to 8)—Hexadecimal representation of the incoming port address over which digits were received for call routing.

Spacer Byte (byte offset 9)—Reserved for future enhancements; always = $00.

Routing Action (byte offset 10)—Indicates whether an inpulse or outpulse rule was processed during routing. Interpret the byte as follows:

00—Outpulse rule executed ($69 command processed).

01—Inpulse rule executed ($6A command processed).

Status (byte offset 11)—Specifies successful completion of the routing action or the cause for failure. Corresponds to network status byte (NSB) values. Refer to *Cisco VCO/4K System Messages* to interpret NSB values. Refer to the *Cisco VCO/4K Extended Programming Reference* for additional NSB values and more detailed descriptions.

Outgoing Port Address (byte offsets 12 to 15)—Hexadecimal representation of the outgoing port address that was linked to the controlling port as a result of the routing action. These bytes will be $0000 when the Routing Action byte is set to $01, indicating that an inpulse rule was executed.

Examples

Example 2-1 $D5 Report

The following report indicates a successful routing action. The incoming port at address $0038 has been routed to the outgoing port at address $0045.

```
04 05060708 09 10 11 12131415
D5 00000038 00 00 01 00000045
```

Function ID = D5 (Routing Action)

Incoming Port Address = $0038

Spacer Byte = $00

Routing Action = $00 (outpulse rule executed)

Status = $01 (routing action successful)

Outgoing Port Address = $0045

Example 2-2 $D5 Report

The following report indicates that TeleRouter executed an inpulse rule on the incoming port at port address $0038. The status byte indicates that the inpulse rule execution was successful although no actual routing was performed.

```
04 05060708 09 10 11 12131415
D5 00000038 00 01 01 00000000
```

Function ID = D5 (Routing Action)

Incoming Port Address = $0038

Spacer Byte = $00

Routing Action = $01 (inpulse rule executed)

Status = $01 (action successful)

Outgoing Port Address = $0000 (no outgoing port involved in action)

Inpulse Rule Complete (Macro) ($DD) Report

Report Type

Resource Control

Destination VCA

$40

Description

The Inpulse Rule Complete (Macro) ($DD) report informs the host that an inpulse rule has been processed. The content of the report is controlled by the type of reporting specified in the inpulse rule. If REP EACH is specified, the report will indicate only that inpulse rule processing has ended. If REP END is specified, the report is a macro containing Resource Control reports (segments) to represent all actions taken during inpulse rule execution. Resource report segments included in the macro can include:

- Incoming Port Change of State ($DB)
- DTMF Digit ($D1)
- MF Digit ($D0)

Segments are reported in the following order:

- Incoming Port Change of State ($DB)
- Digit report for field 1
- Digit report for field 2
- Digit report for field 3
- Digit report for field 4
- Digit report for field ANI (originating number field)

Digit segments follow the general format for their report, but the Controlling Port Address and Spacer bytes are omitted in MF collections, and the Controlling Port Address, Report Status and Supervision bytes are omitted in DTMF collections. Incoming Port Change of State segments contain only the Function ID and Change Code.

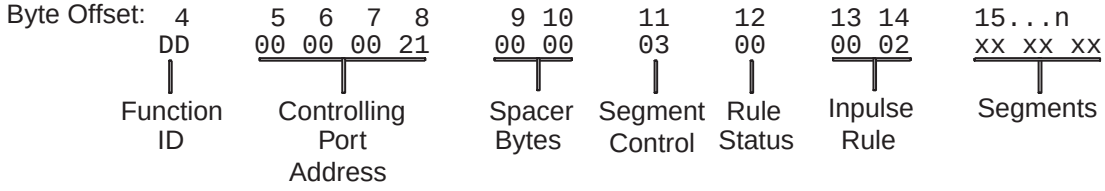
Action Causing Report Generation

This report is generated when inpulse rule processing is terminated. Termination can be caused by: the successful completion of the rule; an error in rule processing; a looping rule which only contains setup to reporting tokens; a host command overriding the rule; or by the controlling port going on hook.

Format

Figure 2-2 shows the byte formatting for this report.

Figure 2-2 $DD Report Format



Function ID (byte offset 4)—Byte immediately following the Network Header; uniquely identifies the report from the system.

Controlling Port Address (byte offsets 5 to 8)—Hexadecimal representation of the port for which the inpulse rule is being executed.

Spacer Bytes (byte offsets 9 and 10)—Reserved for future enhancements; always returned as 00 00.

Segment Control (byte offset 11)—Specifies the number of segments included in this report, if the rule was processed for an incoming or outgoing port and if the TeleRouter overlay performed a routing action. Convert the byte from hexadecimal to binary and interpret the bits as described below. If the inpulse rule executed specified REP EACH or REP NEXT, this byte will be $00, indicating there are no segments. Use REP END to include segments attached to the report.

```
ABC00NNN
```

A—Specifies if inpulse rule was processed for an incoming or outgoing port.

A = 0—Inpulse rule was processed for an incoming port.

A = 1—Inpulse rule was processed for an outgoing port.

B—Specifies if a looping rule was aborted.

B = 0—Rule was not aborted because of looping.

B = 1—Looping rule was aborted automatically by the VCO/4K (S = 1 in byte offset 10).

C—Specifies if the TeleRouter overlay performed a routing action (ROUTE [Tx] token in inpulse rule).

C = 0—No routing was performed.

C = 1—Routing action was performed by TeleRouter; a Routing Action ($D5) report follows the $DD report once the action is complete.

NNN—Specifies the number of segments included in this report; if the inpulse rule specifies a REP EACH token, these bits are zero, indicating there are no segments attached.

Rule Status (byte offset 12)—Indicates whether the rule was completed normally or was aborted, whether rule was aborted due to outpulse channel exhaust (DO ORULE token in inpulse rule), and whether a voice port was available on the first attempt as required by that rule. Convert the byte from hexadecimal to binary and interpret as follows:

```
AST00000
```

A—Specifies if a voice port was available when initially requested.

A = 0—Voice port was available on initial request.

A = 1—Voice port was not available on initial request.

S—Specifies if inpulse rule processing completed normally or was aborted; error conditions that can cause inpulse rule processing to abort are:

- MF receiver is unavailable.
- DTMF receiver is unavailable.
- Digit collection error or timeout (MF, DTMF, or DP).
- Voice port is unavailable.
- Host command was received.
- Port goes on hook (call abandon).
- Rule specifies digit collection but no DTMF or MF token is in rule.
- No outpulse channel available (when the rule includes a DO ORULE token).
- Looping rule was detected.

S = 0—Inpulse rule processing completed normally.

S = 1—Inpulse rule processing aborted.

T—When S = 1, specifies if the rule was aborted because no outpulse channel was available; DO ORULE token in rule.

T = 0—Rule was not aborted due to outpulse channel exhaust condition.

T = 1—Rule was aborted due to outpulse channel exhaust condition.

Inpulse Rule (byte offsets 13 and 14)—Specifies the inpulse rule number executed. Convert hexadecimal to decimal to get the rule number.

Segments (byte offsets 15 to n)—Resource report segments included in this macro; segment format follows that of the report the segment represents, with the following exceptions: the Controlling Port Address and Spacer Bytes are omitted in MF ($D0) collections, and the Controlling Port Address, Report Status and Supervision bytes are omitted in DTMF ($D1) collections, and Incoming Port Change of State ($DB) segments contain only the Function ID and Change Code.

Examples

Example 2-3 $DD (Macro) Report

The following report indicates that inpulse rule 3 was executed on the incoming port at address $28. Three MF digits (1, 2, 3) and seven DTMF digits were collected (1, 2, 3, 4, 5, 6, 7).

```
04 05060708 0910 11 12 1314 151617 18 1920 21 22232425 26 27282930
DD 00000028 0000 02 00 0003 000034 01 123F D1 00000052 01 1234567F
```

Function ID = DD (Inpulse Rule Complete)

Controlling Port Address = 00000028

Spacer Bytes = 0000

Segment Control = 02

```
00000010
```

A = 0 (inpulse rule processed for incoming port)

NNN = 2 (2 segments attached)

Rule Status = 00

```
00000000
```

A = 0 (voice port available on initial request)

S = 0 (inpulse rule processing completed normally)

T = 0 (rule not aborted due to Outpulse Channel exhaust condition)

Inpulse Rule = 0003

Segment 1 is as follows:

Function ID = D0 (MF Digit)

Controlling Port Address = omitted

Spacer Bytes = omitted

MF Receiver Address = 00000034

MF Status = 01

```
00000001
```

V = 0 (report not garbled)

S = 0 (no meaning since V and Y = 0)

X = 0 (MF receiver available on initial request)

Y = 0 (MF digit collection timer did not fire)

Z = 1 (valid MF digit string collected)

Digit String = 123F (F marks end of string)

End of segment 1.

Segment 2 is as follows:

Function ID = D1 (DTMF Digit)

Controlling Port Address = omitted

Report Status = omitted

Supervision = omitted

DTMF Receiver Address = 00000052

DTMF Status = 01

```
00000001
```

E = 0 (report follows the old style report format)

T = 0 (interdigit timer did not fire)

V = 0 (not a first digit report)

W = 0 (DTMF receiver available on initial request)

X = 0 (DTMF digit collection timer did not fire)

Y = 0 (DTMF first-digit collection timer did not fire)

Z = 1 (DTMF digit string reported)

Digit String = 1234567F (F marks end of string)

End of segment 2.

Example 2-4 $DD (Macro) Report

The following report indicates that the incoming port at address $35 went off hook and executed inpulse rule 16. During the execution of that rule, the system made two attempts before allocating a voice port (processing a SPEAK token). Three DTMF digits (4, 4, 2) were collected.

```
04 05060708 0910 11 12 1314 15 16 17 1819 20 2122
DD 00000035 0000 02 80 0010 DB 80 D1 0035 05 442F
```

Function ID = DD (Inpulse Rule Complete)

Controlling Port Address = 00000035

Spacer Bytes = 0000

Segment Control = 02

```
00000010
```

A = 0 (inpulse rule processed for incoming port)

NNN = 2 (2 segments attached)

Rule Status = 80

```
10000000
```

A = 1 (voice port is not available on initial request)

S = 0 (inpulse rule processing has completed normally)

T = 0 (rule not aborted due to Outpulse Channel exhaust condition)

Inpulse Rule = 0010 (decimal 16)

Segment 1 is as follows:

Function ID = DB (Incoming Port Change of State)

Resource Group = omitted

Change = 80 (off hook)

Incoming Port Address = omitted

Supervision Code = omitted

End of segment 1.

Segment 2 is as follows:

Function ID = D1 (DTMF Digit)

Controlling Port Address = omitted

Report Status = omitted

Supervision = omitted

DTMF Receiver Address = 00000035 (SLIC, DID, or UTC port with onboard receiver)

DTMF Status = 05

```
00000101
```

E = 0 (report follows the old style report format)

T = 0 (interdigit timer did not fire)

V = 0 (not a first digit report)

W = 0 (DTMF receiver available on initial request)

X = 1 (DTMF digit collection timer fired

Y = 0 (DTMF first-digit collection timer did not fire)

Z = 1 (DTMF digit string reported)

Digit String = 442F (F marks end of string)

End of segment 2

Stand Alone Configuration

Stand alone system operation is enabled when TeleRouter is the only interface defined using the Host Configuration utility. Instructions for enabling unhosted TeleRouter operation are located in Chapter 4, “System Configuration.”

In the stand alone configuration, TeleRouter generates all routing instructions for the system based on the dialed digits and routing table information. TeleRouter interprets all internal reports and sets alarm conditions when necessary. In addition to the standard system software alarm conditions, two alarms specific to TeleRouter operation may be generated. These alarms are discussed in Chapter 5, “Maintenance.”

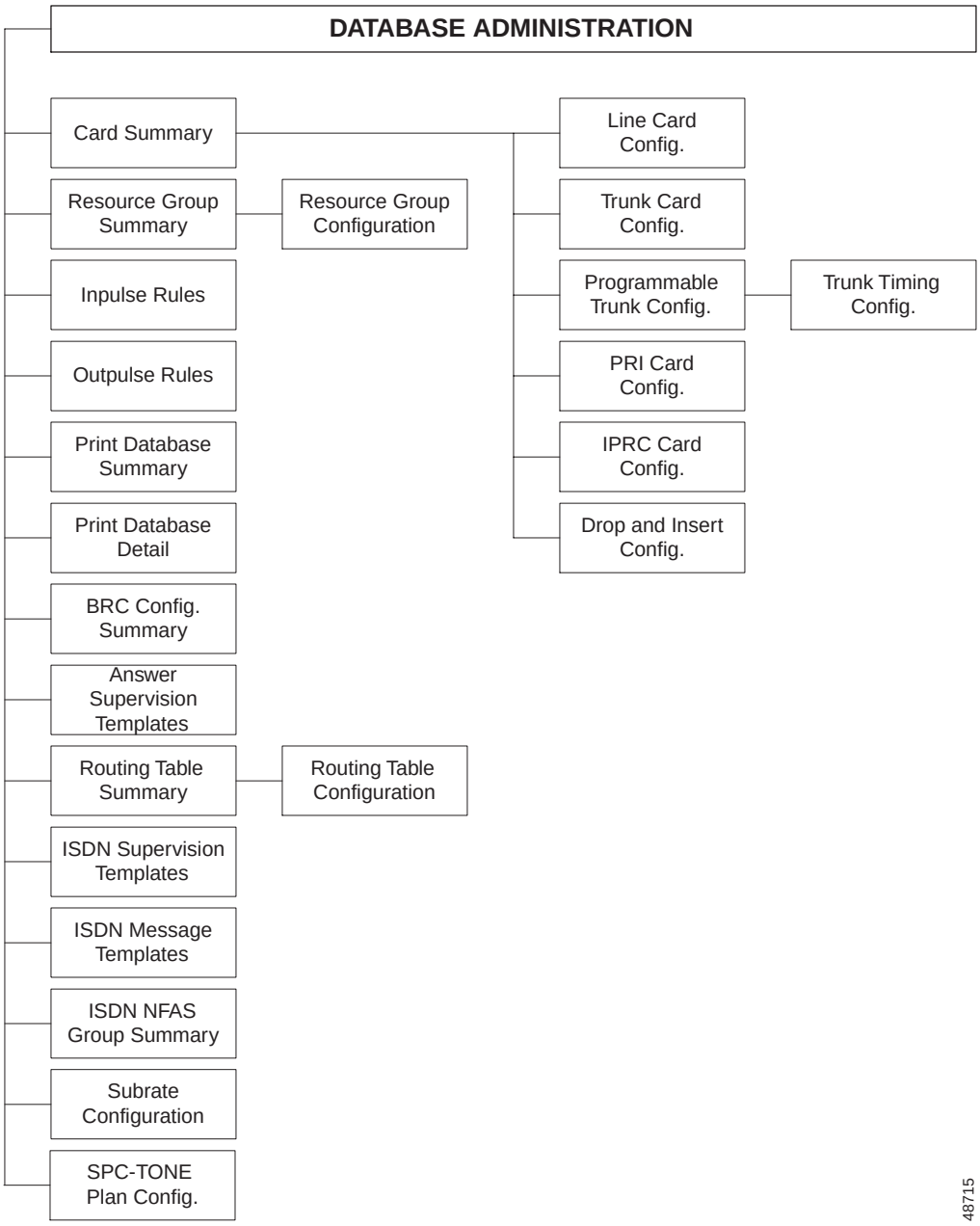
Host communication links are not established when the system is configured for unhosted operation. No host messages will be received or acknowledged.

CHAPTER 3

Database Administration

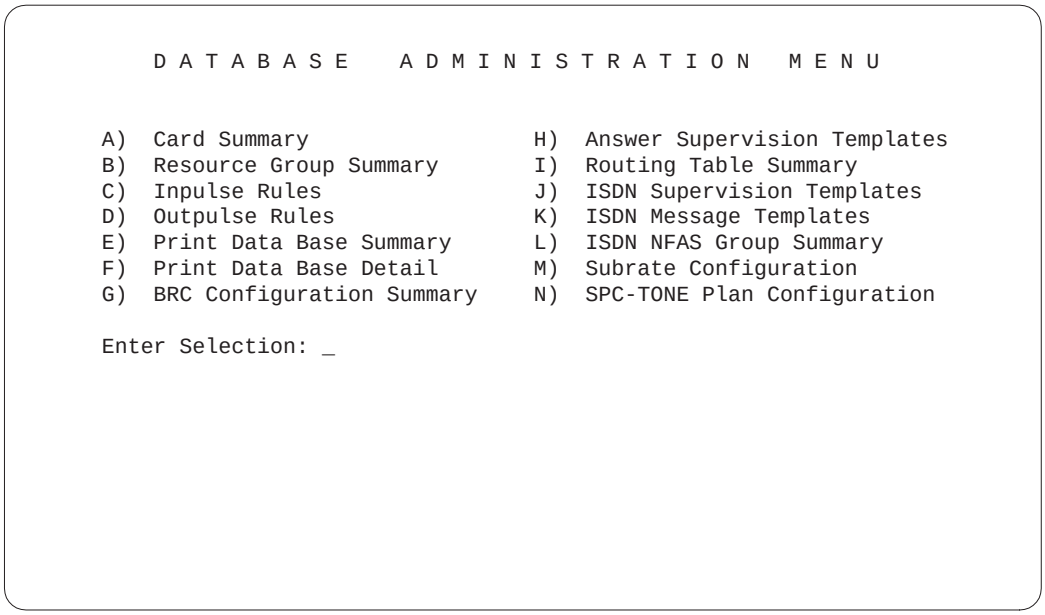
The TeleRouter overlay allows access to two routing-related functions to the standard system software functions. These functions are accessed from the Database Administration Menu screen, and are organized as shown in Figure 3-1.

Figure 3-1 Database Administration Menu Structure



To access the Database Administration Menu screen (see Figure 3-2), type **A** and press **Enter**. The cursor is located in the Enter Selection data entry field.

Figure 3-2 Database Administration Menu Screen



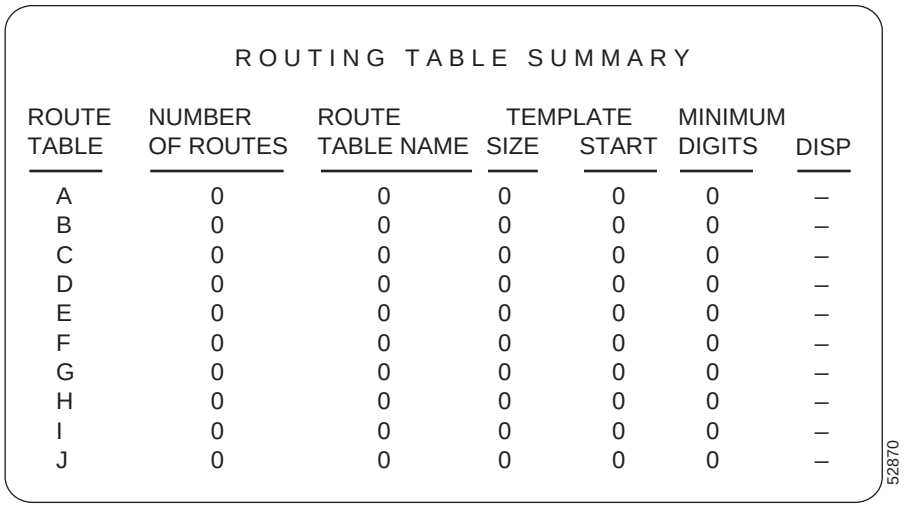
To access a function, type the letter that precedes it and press **Enter**. The specific TeleRouter functions you can access from this menu are discussed in the remainder of this chapter. Refer to the *Cisco VCO/4K System Administrator's Guide* for information on other database administration capabilities.

Routing Table Summary Screen

The Routing Table Summary screen is used to name a routing table, set up basic template parameters for pattern matching, and provide access to the Routing Table Configuration screens. Up to 10 Routing Tables can be established for the system.

To access the Routing Table Summary screen (see Figure 3-3) from the Database Administration Menu screen, type **I** and press **Enter**. The cursor is located in the first Route Table Name data entry field.

Figure 3-3 Routing Table Summary Screen



ROUTING TABLE SUMMARY

ROUTE TABLE	NUMBER OF ROUTES	ROUTE TABLE NAME	TEMPLATE SIZE	TEMPLATE START	MINIMUM DIGITS	DISP
A	0	0	0	0	0	–
B	0	0	0	0	0	–
C	0	0	0	0	0	–
D	0	0	0	0	0	–
E	0	0	0	0	0	–
F	0	0	0	0	0	–
G	0	0	0	0	0	–
H	0	0	0	0	0	–
I	0	0	0	0	0	–
J	0	0	0	0	0	–

52870

Use the **Print Screen** key to obtain a hard copy of the Routing Table Summary screen. Use the **TAB** and < keys to move between Route Table Name fields.

Routing Table Summary Screen Field Definitions

The Routing Table Summary screen contains the following fields:

ROUTE TABLE—*Display only.* Indicates the letter of the routing table. Possible values for this field range between A and J.

NUMBER OF ROUTES—*Display only.* Indicates the number of routes that have been defined for this routing table. Possible values for this field range between 0 and 1000.

ROUTE TABLE NAME—*Data entry via main keypad.* Determines the name of the routing table. Route Table name should be descriptive of the usage of the routing table. This field accepts up to 12 alphanumeric characters, either upper- or lowercase.

TEMPLATE SIZE—*Data entry via main keypad.* Determines the number of consecutive digits used in pattern matching for this routing table. The size should include any special matching characters (refer to the description of the Routing Table Configuration screen Pattern field for a description of these characters). Possible values for this field range between 0 and 20.

TEMPLATE START—*Data entry via main keypad.* Determines the starting position of the digits used in pattern matching for this routing table. The value entered for this field must be less than or equal to the difference between the template size and 20, plus 1 (e.g. if size = 10, start must be 11 or less); the value is zero if the only pattern used is a direct route, otherwise the value is always greater than zero. If size = 20, start must be 1.

MINIMUM DIGITS—*Data entry via main keypad.* Determines minimum number of digits that must be detected for use in pattern matching for this routing table. The value entered for this field must be greater than or equal to the template size, up to a maximum value of 20.

Note A zero value is allowed if the only pattern used is direct route.

DISP—*Data entry via main keypad; access to another screen(s)*. Display Routing Table; provides access to the Routing Table Configuration screens. Any character is valid for entry. Refer to the following subsection for instructions on using this field.

Defining/Changing Routing Table Parameters

The routing table name, template (both size and start) and minimum number of digits for each routing table can be defined or changed using the Routing Table Summary menu.

Note Before changing template information for an existing Route Table, all routes must first be deleted from that table. Altering either the size or start values invalidates any patterns defined in a Route Table. Refer to the "Deleting a Route" section on page 3-11 for instructions on deleting a route.

To define or change any of the Routing Table Summary screen fields, complete the following steps:

Step 1 Access the Routing Table Summary screen.

The cursor is located in the Route Table Name field for the first routing table.

Step 2 Type the Route Table Name information. If this field already contains an entry, typing over it changes it. If the new name is shorter than the old name, use the spacebar to eliminate the excess characters. When the Route Table Name information has been typed, press the **Next Field** key.

The cursor moves to the Template Size field.

Step 3 Type the Template Size information. If this field already contains an entry, typing over it changes it. If the new size is shorter than the old size, use the spacebar to eliminate the excess characters. When the Template Size information has been typed, press the **Next Field** key.

The cursor moves to the Template Start field.

Step 4 Type the Template Start information. If this field already contains an entry, typing over it changes it. If the new start is shorter than the old start, use the spacebar to eliminate the excess characters. When the Template Start information has been typed, press the **Next Field** key.

The cursor moves to the Minimum Digits field.

Step 5 Type the Minimum Digits information. If this field already contains an entry, typing over it changes it. If the new number of digits is shorter than the old number of digits, use the spacebar to eliminate the excess characters. When the Minimum Digits information has been typed, press the **Next Field** key.

The cursor moves to the DISP field.

Step 6 If you want to define or change the next routing table summary, press the **Next Field** key and repeat Step 2 through Step 5. The **Tab** key can be used to move between Route Table Name fields.

Step 7 When all changes have been made, press **Enter**.

The database is automatically updated.

Step 8 If you want to display or edit a routing table listing, use the **Next Field** and **Prev Field** keys to position the cursor in the DISP field corresponding to that table. Then type any character and press **Enter**.

The Routing Table Configuration screen will only be displayed if the template parameters have been specified.

Step 9 If no further Routing Table Summary screen changes are to be made, press **Exit** or **Prev Menu** to return to the Database Administration Menu screen.

To leave the Routing Table Summary screen without making any changes, press **Exit**. No changes are made to the database unless you press **Enter**.

Prompts, Warning, and Error Messages

In addition to the general messages listed in *Cisco VCO/4K System Messages*, the following messages may be displayed:

`Template Size, 1-20`

Explanation You entered a template size greater than 20.

`Size+Start Greater Than 21`

Explanation You entered a template offset (start) that when added to the current template size exceeds 21.

`Template Start, 1-20`

Explanation You attempted to assign a template start of 0. This value must be at least 1.

`Minimum Digits, Length 1-20`

Explanation You attempted to assign a minimum collection length greater than 20.

`Template Not Specified`

Explanation You attempted to access the Routing Table Configuration screen before specifying values for both the Template, Size and Template, Start fields.

`Routes Already Configured`

Explanation You attempted to change values in the Template, Size and Template, Start fields after routes have been added to the Routing Table Configuration screen.

Accessing Other Screens

You can access the following screens from the Routing Table Summary screen:

- Main Menu Access—Press the **Main Menu** key.
- Database Administration Menu—Press the **Prev Menu** or **Exit** key.

- Routing Table Configuration Screen—Use the **Prev Field** or **Next Field** key to position the cursor in the DISP field corresponding to the routing table you want to edit or display. Type any character and press **Enter**.

Routing Table Configuration Screen

The Routing Table Configuration screen is used to define call routes (resource group hunted and inpulse/outpulse rule executed) based on pattern matching of the dialed digits. You can define and distribute up to 1000 routes among the ten route tables. The routes do not have to be divided equally among the route tables (for example, one table can possess 217 routes, another 105 routes, and so forth); you can assign all 1000 possible routes to a single routing table.

Three exception routes are dedicated to handling the following conditions:

- Fewer than the minimum number of digits received
- No digits received
- No match found—invalid digits or table problem

A fourth route is dedicated to direct routing without pattern matching.

Specific digits used in pattern matching for a route are defined using this screen. When a route is added, changed, or deleted, all matching/routing information is sorted and ordered numerically according to the pattern. The number of digits used for matching and the start position are defined for the entire route table using the Routing Table Summary screen described earlier in the "Routing Table Summary Screen" section on page 3-3.

Four wildcard characters can be used for matching unspecified digits in a pattern. The wildcard character "Z" matches digits 0 and 1, "N" matches digits 2 through 9, "X" matches digits 0 through 9, and "*" matches any digit, including 0 through 9, * and #.

A route test facility is also included in the Routing Table Configuration screen.

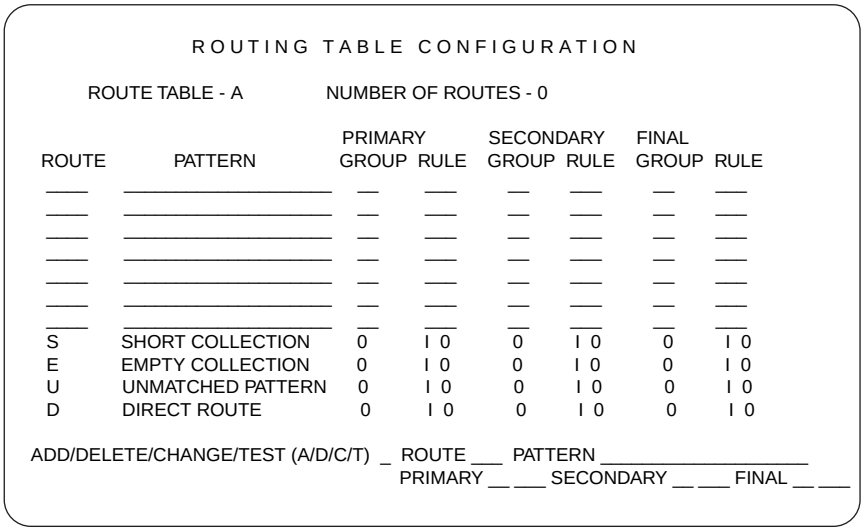
To access the Routing Table Configuration screen from the Routing Table Summary screen , complete the following steps:

Step 1 Use the **Prev Field** or **Next Field** key to position the cursor in the DISP field corresponding to the routing table you want to edit or display.

Step 2 Type any character and press **Enter**.

The Routing Table Configuration screen is displayed (see Figure 3-4). The cursor is located in the ADD/DELETE/CHANGE/TEST (A/D/C/T) command field.

Figure 3-4 Routing Table Configuration Screen



Routing Table Configuration consists of multiple screens. Each screen contains information for 11 routes. Routes are displayed in order from 1 to the total number of routes defined for the route table specified. The bottom four positions on the first screen are reserved for the three exception conditions and direct routing; they are not included in the total Number of Entries for the table. Use the **Prev Screen** and **Next Screen** keys to page through the listings. Use the **Print Screen** key to obtain hard copy of any of these screens.

Routing Table Configuration Screen Field Definitions

The Routing Table Configuration screen contains the following fields:

ROUTE TABLE—*Display only.* Indicates the letter of the routing table. Possible values for this field range between A and J.

NUMBER OF ROUTES—*Display only.* Indicates the number of routes that have been defined for this routing table. Possible values for this field range between 0 and 1000. The three exception conditions and direct routing option are not included in this count.

ROUTE—*Display only.* Indicates the number of the route for which the displayed information applies. Possible values for this field range between 1 and 1000. The characters S (short collection), E (empty collection), U (unmatched pattern), and D (direct route) can also be displayed. For definitions of these characters, refer to Table 3-1.

PATTERN—*Display only.* Indicates the specific digits that must be detected (matched) in order for this route to be used. The "*" character is used as a wild card, indicating these digits are not checked for matching. The number of digits and their positions are defined for the entire table using the Routing Table Summary screen. Other special matching characters and routes for error conditions are defined in Table 3-1.

Table 3-1 Special Character Definitions

Value	Meaning
S	Short Collection. Number of digits collected is less than the minimum number of digits required for the table (value specified in the Routing Table Summary screen).
E	Empty Collection. No digits collected (collection failure).
U	Unmatched Pattern. Digits collected do not match any pattern in the table or routing attempt failed.
D	Direct Route. Performs direct routing without matching digits against a pattern.

PRIMARY GROUP—*Display only.* Indicates the resource group from which an outgoing port is to be hunted if the dialed digits match the corresponding pattern (primary hunting). Possible values range from 0 to 32. A value of 0 indicates that an inpulse rule is to be executed; a value of 1 to 32 executes an outpulse rule. The inpulse/outpulse rule number is displayed in the PRIMARY RULE field. If no resource in the indicated group is available, hunting continues with the group specified in the SECONDARY GROUP field.

PRIMARY RULE—*Display only.* Indicates the inpulse/outpulse rule to be executed if the dialed digits match the corresponding pattern. A letter "I" before the number indicates that an inpulse rule; possible values are inpulse rule numbers between 1 and 30. A letter "O" before the number indicates an outpulse rule; possible values are outpulse rule numbers between 0 and 30 (rule 0 indicates the null outpulse rule). If both Group and Rule are 0, no routing actions are attempted.

SECONDARY GROUP—*Display only.* Indicates the resource group from which an outgoing port is to be hunted if no resources are available in the group specified in the PRIMARY GROUP field. Possible values range from 0 to 32. A value of 0 indicates that an inpulse rule is to be executed; a value of 1 to 32 executes an outpulse rule. The inpulse/outpulse rule number is displayed in the SECONDARY RULE field. If no resource in the indicated group is available, hunting continues with the group specified in the FINAL GROUP field.

SECONDARY RULE—*Display only.* Indicates the inpulse/outpulse rule to be executed if the dialed digits match the corresponding pattern. A letter "I" before the number indicates that an inpulse rule; possible values are inpulse rule numbers between 1 and 30. A letter "O" before the number indicates an outpulse rule; possible values are outpulse rule numbers between 0 and 30 (rule 0 indicates the null outpulse rule). If both Group and Rule are 0, no routing actions are attempted.

FINAL GROUP—*Display only.* Indicates the resource group from which an outgoing port is to be hunted if no resources are available in the groups specified in the PRIMARY GROUP and SECONDARY GROUP fields. Possible values range from 0 to 32. A value of 0 indicates that an inpulse rule is to be executed, while a value of 1 to 32 executes an outpulse rule. The inpulse/outpulse rule number is displayed in the FINAL RULE field. If no resource in the indicated group is available, a log message is generated indicating the call failed.

FINAL RULE—*Display only.* Indicates the inpulse/outpulse rule to be executed if the dialed digits match the corresponding pattern. A letter "I" before the number indicates an inpulse rule; possible values are inpulse rule numbers between 1 and 30. A letter "O" before the number indicates an outpulse rule; possible values are outpulse rule numbers between 0 and 30 (rule 0 indicates the Null outpulse rule). If both Group and Rule are 0, no routing actions are attempted.

ADD/DELETE/CHANGE/TEST (A/D/C/T)—*Data entry via main keypad; command field*. Allows the user to specify the function to perform. Possible values are as follows:

A—Add. Specifies to add a route to the table.

D—Delete. Specifies to delete a route from the table.

C—Change. Specifies to change one of the routes already defined in the table.

T—Test. Specifies to perform a routing test using this table.

ROUTE—*Data entry via main keypad*. Specifies the route number upon which to perform the function indicated in the command field. Possible values include digits between 1 and 1000 and the letters S (short collection), E (empty collection), U (unmatched pattern) and D (direct route) depending upon the function selected (refer to Table 3-1). No route entry is allowed for the Add command, because routes are sorted numerically according to pattern. A route number is also not allowed for the Test command.

PATTERN—*Data entry via main keypad*. Specifies the digit pattern that must be detected (matched) in order for this route to be used. This field is used to precisely define the digit strings. The total number of digits and the starting digit position have already been defined for the entire table using template portion of the Routing Table Summary screen. Special conditions apply for this field when using the S, E, U or D routes; refer to Table 3-1. Values range from 0 through 9 and the special matching (wildcard) characters are as follows:

Z—Match digits 0 and 1.

N—Match digits 2 through 9.

X—Match digits 0 through 9.

S—Match any digit, including 0 through 9, * and #.

PRIMARY—*Data entry via main keypad*. Two fields used to specify the inpulse/outpulse rule to execute and the resource group from which an outgoing port is to be hunted if the dialed digits match the pattern. Refer to the descriptions of PRIMARY GROUP and PRIMARY RULE earlier in this section.

SECONDARY—*Data entry via main keypad*. Two fields used to specify the inpulse/outpulse rule to execute and the resource group from which an outgoing port is to be hunted if no resources are available from the group specified in the PRIMARY GROUP field. Refer to the descriptions of Secondary Group and Secondary Rule earlier in this subsection.

FINAL—*Data entry via main keypad*. Two fields used to specify the inpulse/outpulse rule to execute and the resource group from which an outgoing port is to be hunted if no resources are available from the groups specified in the PRIMARY GROUP and SECONDARY GROUP fields. Refer to the descriptions of FINAL GROUP and FINAL RULE earlier in this section.

Adding a Route

When you add a new route to a table, the system resorts all entries numerically according to the pattern specified. Therefore, the route number is automatically assigned when a route is added. Wildcards are treated as digits and sorted after 0 to 9 in the following order: Z, N, X, *.

Patterns for three exception conditions and direct routing are predefined in the system. To add one of these conditions, type S, E, U or D as the pattern and add the Group/Rule information.

To add a route to a table, complete the following steps:

Step 1 Access the Routing Table Configuration screen. The cursor is located in the ADD/DELETE/CHANGE/TEST command field.

Step 2 Type **A** and press the **Next Field** key.

The cursor skips the ROUTE field and moves to the PATTERN field.

Step 3 Type the pattern information and press the **Next Field** key.

The cursor moves to the PRIMARY fields. If more characters are typed than the pattern template allows, all excess characters are ignored.

Step 4 Type the primary group and primary rule information:

a. Type the group value and press the **Next Field** key.

The cursor moves to the RULE field.

b. Based on the value entered in the GROUP field, an “I” or “O” will be printed in the first space of the RULE field (refer to the previous field definitions). Type the rule number and press the **Next Field** key.

The cursor moves to the SECONDARY fields.

Step 5 Type the secondary group and secondary rule information:

a. Type the group value and press the **Next Field** key.

The cursor moves to the RULE field.

b. Based on the value entered in the GROUP field, an “I” or “O” will be printed in the first space of the RULE field (refer to the previous field definitions). Type the rule number and press the **Next Field** key.

The cursor moves to the FINAL fields.

Step 6 Type the final group and final rule information:

a. Type the group value and press the **Next Field** key.

The cursor moves to the RULE field.

b. Based on the value entered in the GROUP field, an “I” or “O” will be printed in the first space of the RULE field (refer to the previous field definitions). Type the rule number and press **Enter**.

The database is updated when **Enter** is pressed.

The screen display is updated to show the route number in the data entry field and the number of entries is incremented by one. If the route listing consists of more than one screen, the screen containing the newly-entered route number is shown. The cursor returns to the ADD/DELETE/CHANGE/TEST command field.

Step 7 Repeat Step 2 through Step 6 for each route you want to add.

Step 8 Press **Exit** to return to the Routing Table Summary screen.

To leave the Routing Table Configuration screen without making any changes, press **Exit** or **Prev Menu** before pressing **Enter**. No changes are made to the database unless you press **Enter**.

Deleting a Route

When you delete a route from a table, the system resorts all entries in numerical order according to the pattern specified. Because of this, route numbers in a table can change after a delete has been performed. Wildcards are treated as digits and sorted after 0 through 9 in the following order: Z, N, X, *.

To delete a route from a table, complete the followings steps:

Step 1 Access the Routing Table Configuration screen. The cursor is located in the ADD/DELETE/CHANGE/TEST command field.

Step 2 Type **D** and press the **Next Field** key.

The cursor moves to the ROUTE field.

Step 3 To delete a specific route, type the route number you want to delete and press **Enter**.

The system displays the pattern, group, and rule information for that route and the following message:

```
Are you sure?
```

Step 4 Press **Enter** to delete this route (pressing any other key aborts the operation).

The display is updated to show the deletion and the number of entries is decremented by one. The cursor returns to the ADD/DELETE/CHANGE/TEST command field.

Step 5 Repeat Step 2 through Step 4 for each route you want to delete.

Step 6 Press **Exit** to return to the Routing Table Summary screen.

To leave the Routing Table Configuration screen without making any changes, press **Exit** or **Prev Menu** before pressing **Enter**. No changes are made to the database unless you press **Enter**.

Changing a Route

When you change a route, the system sorts all entries in numerical order according to the pattern specified. Because of this, route numbers in a table can change after a change in pattern has been performed. Wildcards are treated as digits and sorted after 0 through 9 in the following order: Z, N, X, *.

Patterns for the three exception conditions and direct routing are predefined in the system. To change the route to perform one of these conditions, type **S**, **E**, **U**, or **D** as the Route; no change is required to the Pattern field.

To change a route from a table, complete the following steps:

Step 1 Access the Routing Table Configuration screen.

The cursor is located in the ADD/DELETE/CHANGE/TEST command field.

Step 2 Type **C** and press the **Next Field** key.

The cursor moves to the ROUTE field.

Step 3 Type the route number you want to change and press the **Next Field** key.

The system displays the pattern, group, and rule information for that route. The cursor moves to the PATTERN field.

Step 4 Make any changes necessary to the PATTERN field by typing over the characters and press the **Next Field** key. If more characters are typed than the pattern template allows, all excess characters are ignored.

The cursor moves to the PRIMARY fields.

Step 5 Change the primary group and primary rule information:

a. Make any changes necessary to the group value by typing over the characters and press the **Next Field** key.

The cursor moves to the RULE field.

b. Make any changes necessary to the rule value by typing over the characters and press the **Next Field** key.

The cursor moves to the SECONDARY fields.

Step 6 Change the secondary group and secondary rule information:

a. Make any changes necessary to the group value by typing over the characters and press the **Next Field** key.

The cursor moves to the RULE field.

b. Make any changes necessary to the rule value by typing over the characters and press the **Next Field** key.

The cursor moves to the FINAL fields.

Step 7 Change the final group and final rule information:

a. Make any changes necessary to the group value by typing over the characters and press the **Next Field** key.

The cursor moves to the RULE field.

b. Make any changes necessary to the rule value by typing over the characters and press **Enter**.

The database is updated when you press **Enter**.

The screen display is updated to show the new route number in the data entry field (if a change was made in the pattern). If the route listing consists of more than one screen, the screen containing the changed route number in its new position is shown. The cursor returns to the ADD/DELETE/CHANGE/TEST command field.

Step 8 Repeat Step 2 through Step 7 for each route you want to change.

Step 9 Press **Exit** to return to the Routing Table Summary screen.

To leave the Routing Table Configuration screen without making any changes, press **Exit** or the **Prev Menu** screen before pressing **Enter**. No changes are made to the database unless you press **Enter**.

Testing a Route

The Test command allows you to enter a digit string and compare it against the route table to determine if a match occurs. Use this command to determine if all digit strings anticipated are covered by a table.

To test a route table for a specific digit string, complete the following steps:

Step 1 Access the Routing Table Configuration screen.

The cursor is located in the ADD/DELETE/CHANGE/TEST command field.

Step 2 Type **T** and press the **Next Field** key.

The cursor moves to the PATTERN field.

Step 3 Type the digit string you want to compare against the table. Enter the string as if it were a collected digit string. The string should contain at least the minimum number of digits required for this table. When all digits have been typed, press **Enter** or **Next Field**.

The system attempts to match the digit string against a pattern in the table. If a match is found, the following message appears, where x is the route number containing the pattern that matches the digit string:

```
Matched Route = x
```

The cursor returns to the first position in the PATTERN field so that another digit string can be entered. If no match is found, the following message appears:

```
No Match
```

The cursor returns to the ADD/DELETE/CHANGE/TEST command field.

Step 4 Press **Exit** to return to the Routing Table Summary screen.

Prompts, Warning, and Error Messages

In addition to the general messages listed in *Cisco VCO/4K System Messages*, the following messages may be displayed.

`Not A Valid Pattern`

Explanation You entered a route pattern with invalid characters. Valid characters are 0 to 9 and the wildcards Z, N, X and S (ADD, CHANGE and TEST options only).

`Invalid Route`

Explanation You entered an invalid route number (CHANGE and DELETE options only).

`NO MATCH`

Explanation Displayed as part of the Test function when the digits string you input does not match with any of the routes defined in the table.

`MATCHED ROUTE = N`

Explanation Displayed as part of the Test function to indicate that the digit string you input has been matched to the ‘Nth route in the table.

`Pattern Already Exists`

Explanation You entered a pattern that is identical to another route already defined in the route table. (ADD and CHANGE options only)

`No Pattern Entered`

Explanation No test pattern has been input by the user (TEST option only).

`Are You Sure??`

Explanation You is being prompted to press **Enter** again to delete a route from a table.

`No Add Performed`

Explanation An error occurred during an attempt to add route to the table.

`No Change Performed`

Explanation An error occurred during an attempt to change a route in the table.

`No Delete Performed`

Explanation You aborted the operation by pressing a key other than **Enter** when prompted (Are You Sure??), or an error occurred during an attempt to delete a route from the table.

`No Test Performed`

Explanation An error occurred during a route test attempt.

`All Routes Allocated`

Explanation All 1000 routes have already been allocated to the route tables.

`Group Must Be 0-32`

Explanation You entered an invalid resource group entry into the route table.

`Inpulse Rule Must Be 1-30`

Explanation You entered an invalid inpulse rule entry into the route table.

`Outpulse Rule Must Be 0-30`

Explanation You entered an invalid outpulse rule entry into the route table.

Accessing Other Menus and Screens

You can access the following screens from the Routing Table Configuration screen:

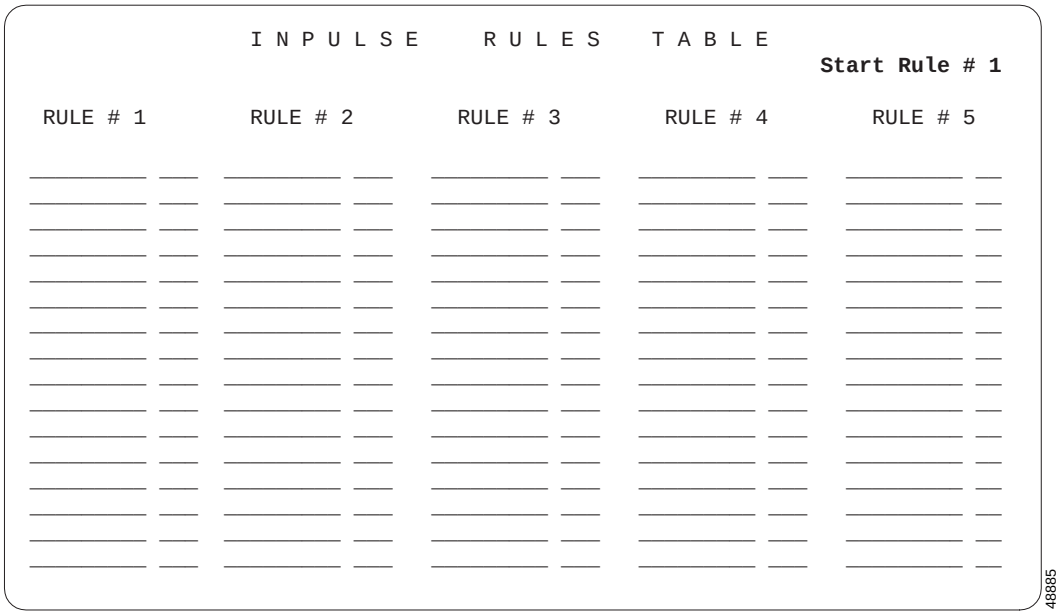
- Main Menu—Press the **Main Menu** key.
- Database Administration—Press the **Prev Menu** or **Exit** key.
- Routing Table Summary Menu—Press the **Prev Menu** or **Exit key**.

Inpulse Rules

An additional inpulse rule token has been created specifically for TeleRouter use. This token, ROUTE [Tx], can perform in conjunction with all preexisting VCO/4K system software inpulse rule tokens. This section provides instructions for adding and deleting the ROUTE [Tx] token to established rules. Refer to the *Cisco VCO/4K System Administrator's Guide* for complete information on creating and revising inpulse rules.

To access the Inpulse Rules Table screens (see Figure 3-5) from the Database Administration Menu screen, type **C** and press **Enter**. The cursor is located in the first token field of inpulse rule 1.

Figure 3-5 Inpulse Rules Table Screen



The Inpulse Rules Table consists of four screens, each containing five inpulse rule listings. Use the **Prev Screen** and **Next Screen** keys to page through the listings. Use the **TAB** and **<** keys to move between inpulse rules. Use the **Print Screen** key to obtain hard copy of any of these screens.

Inpulse Rules Table Screen Field Definitions

The Inpulse Rules Table screen contains the following fields:

RULE #—*Display only.* Identifies the inpulse rule listing displayed. inpulse rules are specified by number when entered as the default on the Line and Trunk Card Configuration screens or entered via a command. Valid inpulse rule numbers are 1 through 30.

Data Entry Fields—*Data entry via Select key and main keypad*. Sixteen lines are displayed under each RULE # heading; each of these lines contains two data entry fields. The first field is the token field, the second the additional data field.

ROUTE [Tx] Token

ROUTE [Tx] provides call routing based on the digits stored in the specified digit field. When the token is used, digits collected and stored in digit field “x” are matched against the patterns established in routing table “T” and routed accordingly. Route table values can range from A to J. Digit field values can range from 1 to 5, with 1 to 4 corresponding to the numbered the digit fields and 5 indicating the Originating Number (ANI) field. If a value of 0 is entered for “x”, direct routing is performed.

Cisco recommends that you use a CONT NREP token in rules containing a ROUTE [Tx] token. The CONT NREP token continues rule processing in the event of a first digit, interdigit, or field collection timeout. This token prevents rule processing from ending before the ROUTE [Tx] token is processed.

The ROUTE [Tx] token must be the last token defined in an inpulse rule. Inpulse rule processing ceases after a routing action is performed. Any tokens after ROUTE [Tx] in an inpulse rule will not be executed.

Adding a Token to a Rule

To add the ROUTE [Tx] token to an existing inpulse rule, complete the following steps:

Step 1 Display the Inpulse Rules Table screen (refer to Figure 3-5).

The cursor is located in the first token field of inpulse rule 1.

Step 2 Use the **Prev Screen**, **Next Screen**, **Tab**, **<**, **Prev Field**, and **Next Field** keys to advance the cursor to the first blank token field available in the rule.

Step 3 Use the **Select** and **Reverse Select** keys to step through the token listing until the ROUTE [Tx] token is displayed.

Step 4 Press the **Next Field** key.

Step 5 Type the letter of the route table and number of the digit field.

Step 6 Repeat Step 2 through Step 5 for each inpulse rule that you want to contain the token.

Step 7 Press **Enter** to automatically update the database.

Step 8 Press **Exit** to return to the Database Administration Menu screen.

To leave the Inpulse Rules Table screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

Deleting a Token

To delete the ROUTE [Tx] token, complete the following steps:

Step 1 Display the Inpulse Rules Table screen (see Figure 3-5).

The cursor is located in the first token field of inpulse rule 1.

Step 2 Use the **Prev Screen**, **Next Screen**, **Tab**, **<**, **Prev Field**, and **Next Field** keys to advance the cursor to the ROUTE [Tx] token you want to delete.

Step 3 Use the **Select** and **Reverse Select** keys to step through the token listing until a blank line is displayed. Press **Enter**. The database is automatically updated and the screen display is updated to show the deletion of the token(s).

Step 4 Repeat Step 2 and Step 3 for each rule from which you want to delete one or more tokens.

Step 5 Press **Exit** to return to the Database Administration Menu screen.

To leave the Inpulse Rules Table screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**.

Prompts, Warning, and Error Messages

In addition to the general messages listed in *Cisco VCO/4K System Messages* and standard Inpulse Rule screen messages, the following messages can be displayed:

```
Route Table Should Be A – J
```

Explanation You entered an invalid route table letter in the “T” value of the ROUTE [Tx] token.

```
Digit Field Should Be 0 – 5
```

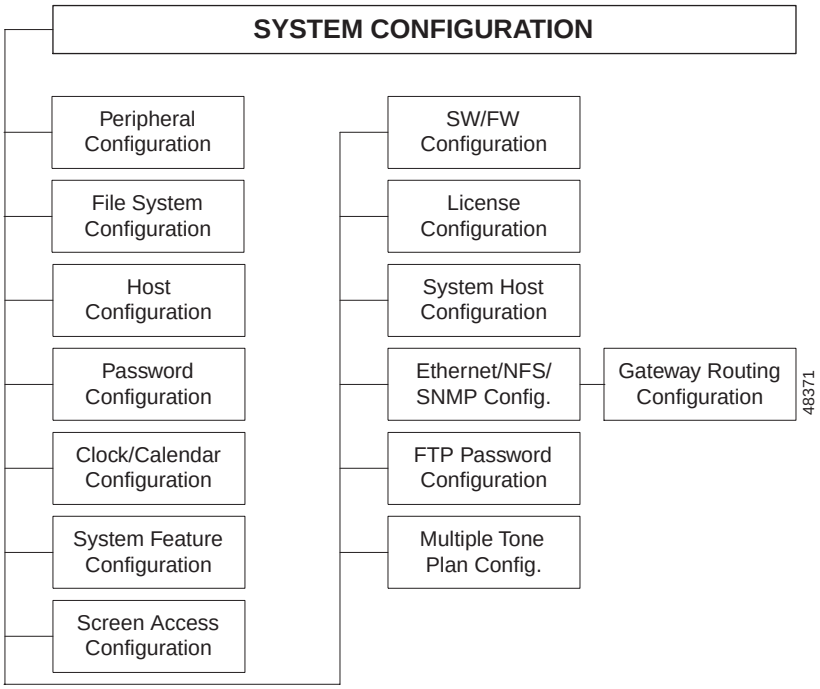
Explanation You entered an invalid digit field number in the “x” value of the ROUTE [Tx] token.

CHAPTER 4

System Configuration

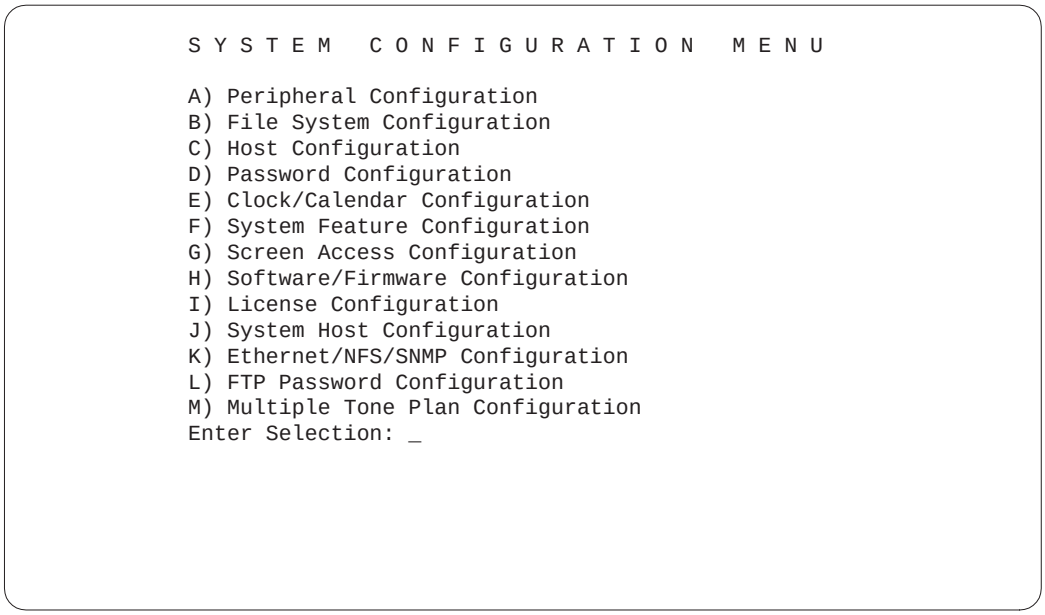
Two System Configuration utilities provide additional control of TeleRouter operation. The Host Configuration screen is used to activate/deactivate TeleRouter operation and configure TeleRouter to operate in an unhosted environment. The System Features Configuration contains a system feature setting that improves TeleRouter processing in an unhosted environment. These functions are accessed from the Database Administration Menu screen, and are organized as shown in Figure 4-1.

Figure 4-1 System Configuration Menu Structure



To access the System Configuration menu (see Figure 4-2) from the Main menu, type **B** and press **Enter**.

Figure 4-2 System Configuration Menu



The cursor is located in the Enter Selection data entry field. To access a function, type the letter that precedes it and press **Enter**.

Host Configuration

The Host Configuration utility is used to configure host interfaces and software overlays and indicate the status of alarm conditions for host interfaces. TeleRouter operation is enabled when you select TeleRouter in the Internal interface field. If the internal interface is not configured (no value selected), TeleRouter call routing is not performed.

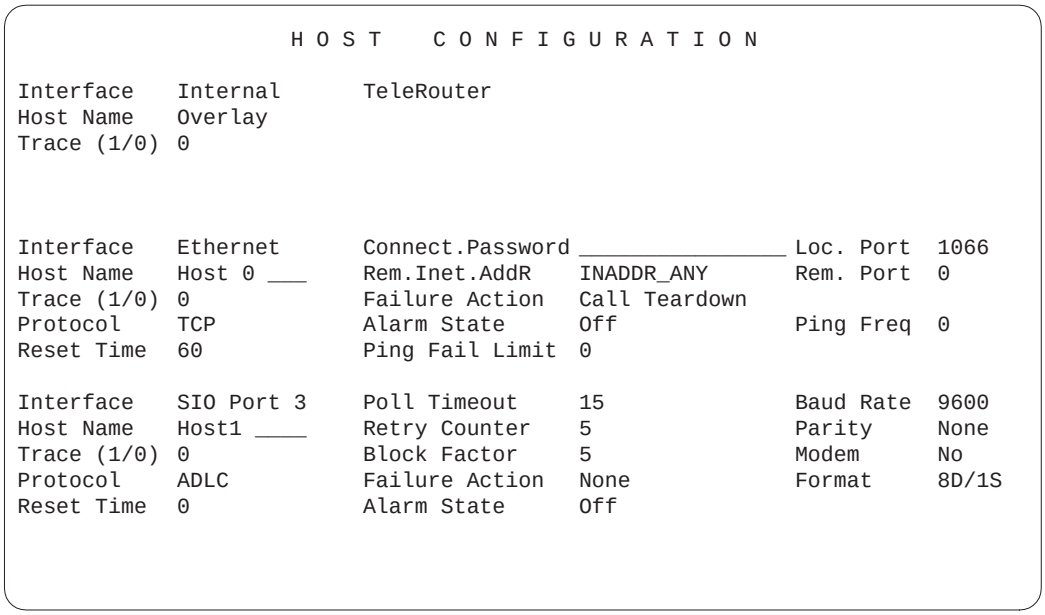
To operate TeleRouter in a stand alone configuration (unhosted environment), do not define any SIO or Ethernet host links in the additional interface fields. If TeleRouter is enabled and no host links are defined, all system call processing is performed using the TeleRouter call routing instructions.

The trace field under the Overlay host name field works in conjunction with the System Trace Configuration. When this option is activated, the system trace files contain listings of the commands and reports generated by the overlay.

Note In addition to standard system host commands and reports, TeleRouter uses several commands in the $50 to $5E range that are proprietary and therefore not documented in the *Cisco VCO/4K Standard Programming Reference* or *Cisco VCO/4K Extended Programming Reference.*

To access the Host Configuration screen from the System Configuration menu, type **C** and press **Enter**. The first Host Configuration screen is displayed (see Figure 4-3). The cursor is located in the first Interface field.

Figure 4-3 Host Configuration Screen



The Host Configuration utility consists of three screens. Use the **Prev Screen** and **Next Screen** keys to page through the listings. Use the **Print Screen** key to obtain a hard copy of these screens.

Host Configuration Screen Field Definitions

From the Host Configuration screen, you can configure up to three types of host interfaces. The fields displayed on the screen are determined by the value specified in the Interface field. The fields that apply to TeleRouter are defined as follows.

Interface—*Data entry via Select key.* Specifies the type of interface being configured. Also determines what data entry fields are displayed on the screen. The valid value is:

Internal—Internal software overlay; optional TeleRouter software currently supported; only one Internal interface can be specified.

Trace—*Data entry via main keypad.* Specifies if the trace utility is enabled for this interface. The system trace utility is described in Chapter 5, "Maintenance." The valid values are:

0—Trace facility not enabled.

1—Trace facility enabled; trace messages output to printer and/or trace file.

Enabling TeleRouter Operation

To enable TeleRouter operation, complete the following steps:

Step 1 Access the Host Configuration utility (refer to the "Host Configuration" section on page 4-2).

The cursor is located in the Overlay data entry field.

Step 2 Press **Select** until **TeleRouter** is displayed in the field and press the **Next Field** key.

The cursor moves to the Trace data entry field.

Step 3 Type the correct value to enable or disable tracing for the Internal interface. Proceed based on the following:

- If TeleRouter is operating in a hosted environment, go to Step 4.
- If TeleRouter is operating in a stand alone configuration, go to Step 8.

Step 4 To define an external interface, use the **Select** key to display the correct interface value. The data entry fields displayed are determined by the value specified in the Interface field.

Step 5 Use the **Prev Field** and **Next Field** keys to position the cursor in the data entry field to be specified. Fill in the field using the **Select** key, **Reverse Select** key, or the main keypad.

Step 6 Repeat Step 5 for all fields required for the link configuration to be defined.

Step 7 To define additional interfaces, press **Tab** to move to the next Interface data entry field and repeat Step 4 through Step 6. If no additional interfaces are to be defined, go to Step 8.

Step 8 Press **Enter**.

The following message appears:

```
Press ENTER to update configuration
```

Step 9 Press **Enter**.

The following message appears:

```
Host configuration updated
```

The configuration data is written to the database, and the link is taken out of service and reestablished. This process takes several seconds.

Step 10 Press **Exit** to return to the System Configuration screen.

System Features

You can modify system operating characteristics to meet specific application requirements. An additional TeleRouter-specific system feature can be enabled using the System Features function under the System Configuration menu. Use the Suppress PSC/Rule Abort Messages feature when operating TeleRouter in an unhosted environment.

To access the System Features screen (see Figure 4-4) from the System Configuration menu, type **F** and press **Enter**. The cursor is located in the first Allowed (Y,N) data field.

Figure 4-4 System Features Display

```
                    S Y S T E M    F E A T U R E S

          FEATURES                              FEATURES
                        ALLOWED (Y,N)                         ALLOWED (Y,N)
Redundant System                  N    Send All ISDN Connect Reports    N
Output Periodic Alarm Reports     N    Enable $66 Cmd Host Checking     N
Card/Alarm Status at Init.        N    Cut Thru For Non-ISDN Alerting   N
Manual Intervention For SLIP/OOF  N    Enable 4th Column DTMF           N
Enable Grace Timing On Null Rule  N    Set System to A-Law              Y
Disable Card Error Report/Reset   N    Enable AllPortsDeactivated Alrm  N
Enable Digit Field Reporting      N    $EA Reports on DChannel RESTART  N
Suppress PSC/Rule Abort Messages  N    Send All ISDN Disconnect Report  N
Enable Host Password Check        N    Convert Reorder Tone To Busy     N
Force Bearer/Lap Activation       N    K1197 Layer 3 Testing            N
Enable MFC-R2 Supervised Clear    N    Enable Host Call Ref             N
Enable SLIC Guarded Disconnect    N    Extended Operation Mode Set      N
Enable CPA Monitor Disconnect     N    C-bus Mode Enabled                N
Revert to Basic Redundancy        N
Send Reports Before Guard Time    N
Enable ISDN Manual Disconnect     N
                                                                        48345
```

There is one System Features Display screen. Use the **Print Screen** key to obtain a hard copy of this screen.

System Features Screen Field Definitions

The System Features Display screen has the following fields:

FEATURES—*Display only.* Indicates the system feature. TeleRouter features are listed in the "Features Affecting TeleRouter" section on page 4-5.

Allowed (Y,N)—*Data entry via main keypad*. Indicates if the corresponding feature is enabled.

Features Affecting TeleRouter

This section describes system features affecting TeleRouter. For a complete description of all system features, refer to the *Cisco VCO/4K System Administrator's Guide.*

Suppress PSC/Rule Abort Messages

When enabled, this feature prevents Permanent Signal Condition and inpulse rule abort messages from being written to the system log. Certain types of line equipment use the tones issued during Permanent Signal processing to determine disconnects. This feature suppresses the PSC messages generated by this normal occurrence with these line types. Also, certain situations may generate inpulse rule abort messages due to incoming call abandons prior to call routing. This feature prevents system log files from becoming filled with inpulse rule abort messages.

Disable Host Setup Timing

The Disable Host Setup Timing feature should remain set to **N** when you operate TeleRouter in an unhosted environment. This setting causes Reorder and Permanent Signal processing on incoming ports when no outgoing ports are available from the Primary, Secondary and Final resource groups. When this feature is set to **Y**, the port remains in CP_SETUP state indefinitely.

Enabling or Disabling System Features

Enabling or disabling system features does not immediately change the system configuration. The system must be reset in order to put any system feature change in effect.

To enable or disable TeleRouter system features, complete the following steps:

Step 1 Display the System Features Display screen (refer to the "System Features" section on page 4-4).

The cursor is located in the first Allowed (Y,N) field.

Step 2 Use the **Prev Field** and **Next Field** keys to position the cursor in the Allowed (Y,N) field corresponding to the feature you want to enable/disable.

Step 3 Type **Y** or **N** (depending upon the setting you want for that feature).

The database is automatically updated.

Step 4 Repeat Step 2 and Step 3 for each feature setting you want to change.

Step 5 Press **Exit** to return to the Database Administration Menu or Maintenance Menu screen.

Step 6 Press the Alarm Arbiter Card (AAC) RESET button to put the changes into effect.

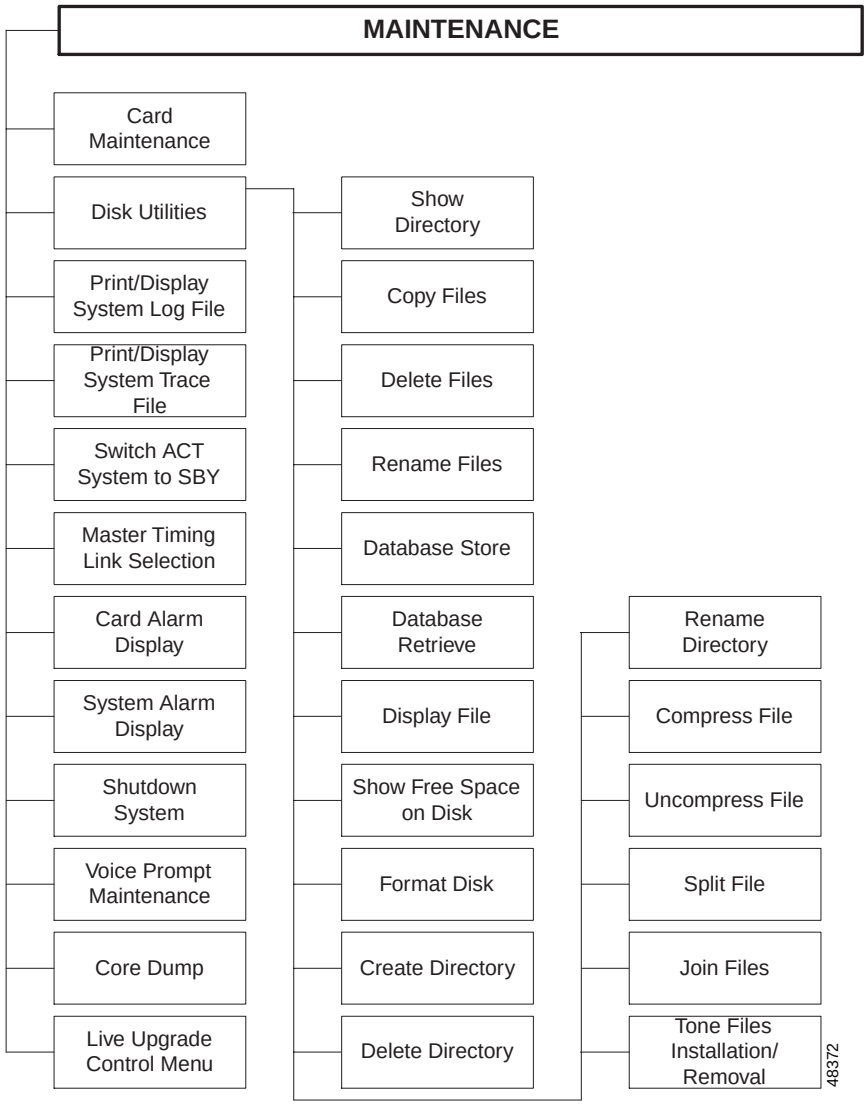
To leave the System Features Display screen without making any changes, press **Exit**, **Prev Menu**, or **Main Menu**. No changes are made to the database unless you press **Enter**. Once the changes are made, you should reset the system. Refer to the *Cisco VCO/4K System Administrator's Guide* for more information.

CHAPTER 5

Maintenance

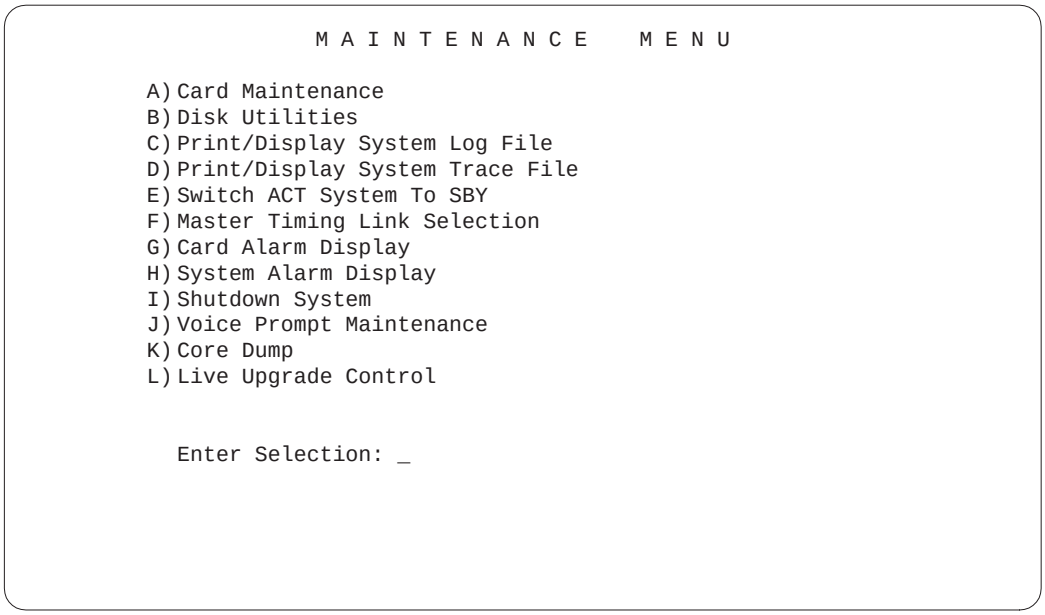
The System Alarm Display indicates two resource limitation conditions that can impact TeleRouter performance. This display is accessed from the Maintenance Menu screen as shown in Figure 5-1.

Figure 5-1 Maintenance Menu Structure



To access the Maintenance Menu screen (see Figure 5-2) from the Main Menu screen, type **C** and press **Enter**.

Figure 5-2 Maintenance Menu Screen



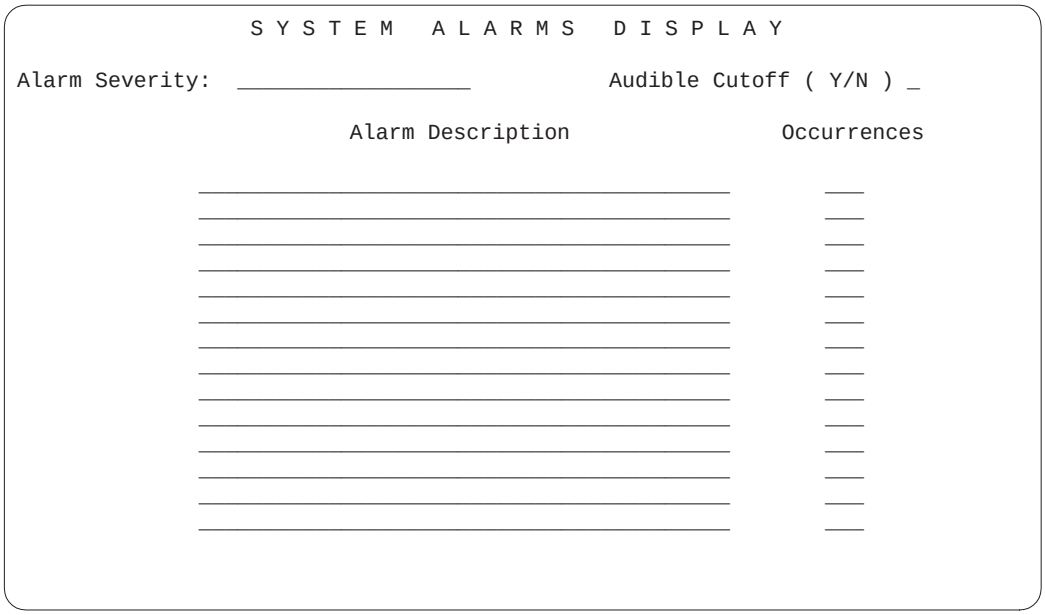
The cursor is located in the Enter Selection data entry field. To access a function, type the letter that precedes it and press **Enter**. To return to the **Main Menu**, press **Prev Menu**, **Main Menu**, or **Exit**. The functions that can be accessed from this menu are discussed in the remainder of this chapter.

TeleRouter Alarm Conditions

The System Alarms Display screen is used to view a listing of the alarm types present on the system. Refer to the *Cisco VCO/4K System Administrator's Guide* for details on the System Alarm Display function.

To access the System Alarms Display screen from the Maintenance Menu screen, type **H** and press **Enter**. The System Alarms Display screen is shown in Figure 5-3. The cursor is located in the Alarm Severity data entry field, and all current alarm conditions are listed.

Figure 5-3 System Alarms Display Screen



The System Alarm Display can include multiple screens. Each screen lists up to 14 messages. Use the **Print Screen** key to obtain a hard copy of this screen. This screen is not dynamically updated. To update the display with the most recent alarms, press the **Redraw** key.

To return to the Maintenance Menu screen, press **Exit** or the **Prev Menu** key.

System Alarms Display Screen Field Definitions

The System Alarms Display screen includes the following fields:

Alarm Severity—*Data entry via Select key.* Specifies the type of system alarms to display. Possible values and their meaning are as follows:

Fatal—Condition has caused a system reset or control switchover in a redundant system. Immediate corrective action is required.

Critical—Condition is severe and service-affecting. Escalation to a Fatal condition is likely. Immediate corrective action is required.

Major—Condition is service-affecting, although not as urgent as a Critical condition. Immediate corrective action is recommended.

Minor—Condition does not have a serious affect on system operation.

Aux 1—Host has set an AUX 1 alarm using the Set/Reset Host Alarms ($C0 03) command.

Aux 2—Host has set an AUX 1 alarm using the Set/Reset Host Alarms ($C0 03) command.

Non-Alarmed Events—Condition is non-service affecting, such as system printer off-line.

Audible Cutoff (Y,N)—*Optional data entry via main keypad; command field.* Specifies whether to disable the AAC alarm contact to stop any central offices alarms tied to the switch.

Alarm Descriptions—*Display only.* Indicates the alarm conditions present for the system. Possible values and their meanings are listed in *Cisco VCO/4K System Messages.*

Occurrences—*Display only.* Indicates the number of alarm occurrences.

Displaying Alarm Conditions

To display current system alarm conditions, complete the following steps:

Step 1 Display the System Alarms Display screen.

The cursor is located in the Alarm Severity data entry field.

Step 2 Use the **Select** and **Reverse Select** keys to step through the values until the correct alarm severity is shown.

Step 3 Press **Enter**.

The display is updated to show all alarms and occurrences for the severity level chosen.

Step 4 Press **Exit** to return to the Maintenance Menu screen.

To leave the System Alarms Display screen, press **Exit** or the **Prev Menu** or **Main Menu** key.

Alarm Definitions

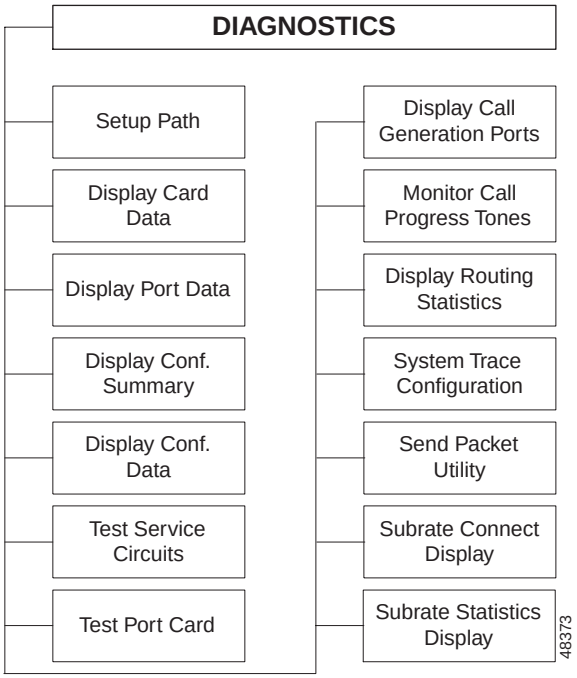
Refer to Cisco VCO/4K System Messages for descriptions of alarms ALM015 and ALM016, which are set when the system is operating TeleRouter in a stand alone configuration.

CHAPTER 6

Diagnostics

The Routing Statistics Display diagnostic function allows you to view TeleRouter's operating status. This function is accessed from the Diagnostics Menu screen, and is organized within the Diagnostic facilities as shown in Figure 6-1.

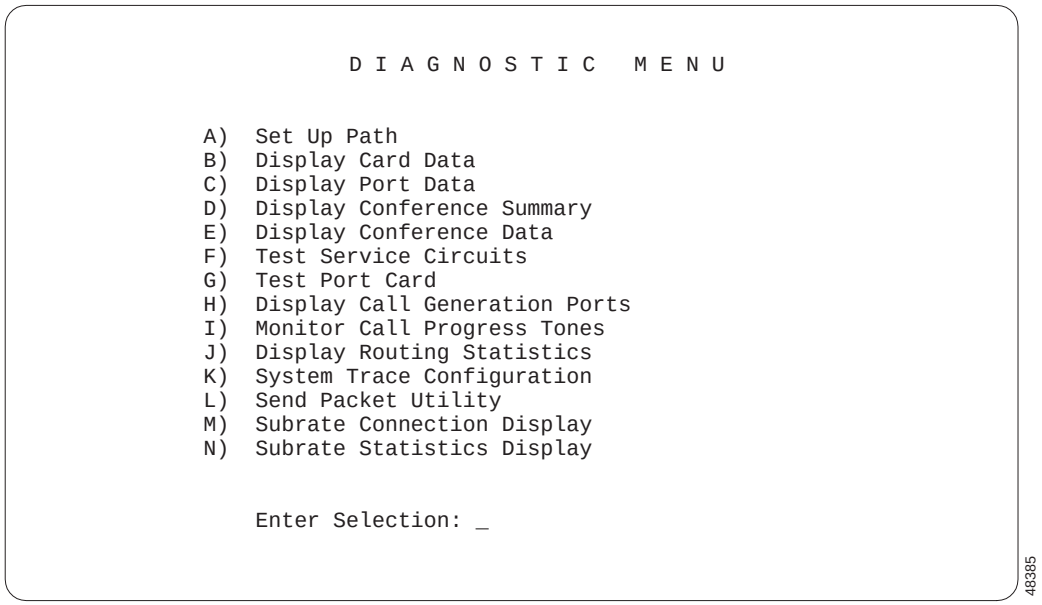
Figure 6-1 Diagnostics Menu Structure



To access the Diagnostics Menu screen (see Figure 6-2) from the Main Menu screen, type **D** and press **Enter**.

The cursor is located in the Enter Selection data entry field. To access a function, type the letter that precedes it and press **Enter**. To return to the Main Menu screen, press **Exit** or the **Prev Menu** or **Main Menu** key.

Figure 6-2 Diagnostics Menu

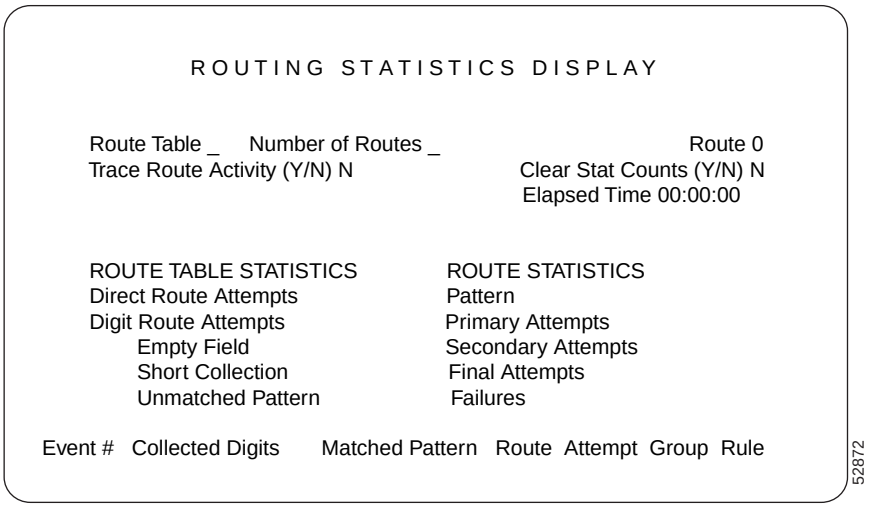


Routing Statistics Display

The Routing Statistics Display screen is used to view the routing activity performed on an individual route or on all routes in a table. The screen indicates routing attempts for a specified table and route, and a tracing facility is also provided to trace routing activity. An elapsed time counter indicates the duration of the statistic collection period.

To access the Routing Statistics Display screen (see Figure 6-3) from the Diagnostics menu, type **J** and press **Enter**. The cursor is located in the Route Table command field.

Figure 6-3 Routing Statistics Display Screen



Routing Statistics Display Screen Field Definitions

The Routing Table Configuration screen contains the following fields:

Route Table—*Data entry via main keypad.* Indicates the number of the routing table. Possible values for this field range between A and J.

Number of Routes—*Display only.* Indicates the number of routes that have been defined for this routing table. Possible values for this field range between 0 and 1000. The three exception conditions and direct routing are not included in this count.

Route—*Data entry via main keypad.* Indicates the number of the route for which the displayed information applies. Possible values for this field range between 0 and 1000. A value of 0 causes statistics for the entire route table displayed. The alphabetic characters S (short collection), E (empty collection), U (unmatched pattern), and D (direct route) can also be entered for exception cases.

Trace Route Activity (Y/N)—*Data entry via main keypad.* Specifies whether to trace activity on the tables and routes indicated in the Route Table and Route fields. Possible values are Y (perform trace) and N (do not trace). When tracing is enabled, routing events are displayed at the bottom of the screen.

Clear Stat Counts (Y/N)—*Data entry via main keypad.* Specifies whether to clear the run-time counters displayed for the route table and individual routes. Clearing the statistic counter also resets the Elapsed Time field. Possible values are Y (clear all counters) and N (do not clear counters).

Elapsed Time—*Display only.* Indicates the time elapsed since the statistic counters were last cleared, in terms of hours, minutes and seconds. Once the timer reaches 99 hours, 59 minutes and 59 seconds, it will reset itself. The timer can be reset using the Clear Stats Counts (Y/N) field above.

ROUTE TABLE STATISTICS fields—*Display only.* Indicates the number and types of events occurring on all routes defined on the specified route table. The fields are as follows:

Direct Route Attempts—The number of direct routing attempts made without performing digit matching.

Digit Route Attempts—The number of routing attempts made while performing digit matching.

Empty Field—The number of failed routing attempts due to the digit field being empty.

Short Collection—The number of failed routing attempts because of an insufficient number of digits in the digit field.

Unmatched Pattern—The number of failed routing attempts due to the inability of the system to match the digit field to an valid route.

ROUTE STATISTICS fields—*Display only.* Indicates the number and types of events occurring on the single route specified. The fields are as follows:

Pattern—The matching pattern defined for the route in the Route Table Configuration screen.

Primary Attempts—The number of attempts to route calls using the Primary resource group and inpulse/outpulse rule.

Secondary Attempts—The number of attempts to route calls using the Secondary resource group and Inpulse/Outpulse rule.

Final Attempts—The number of attempts to route calls using the Final resource group and Inpulse/Outpulse rule.

Failures—The number failed calls due to the Primary, Secondary, and Final group/rule pair resources being exhausted.

The remaining seven field columns display routing events when the routing trace function is enabled (when **Y** is entered in the Trace Route Activity (Y/N) field). Up to six routing events are displayed at a time (additional events overwrite the displayed information).

Event #—*Display only.* Provides a sequential numbering of the routing events in chronological order.

Collected Digits—*Display only.* Indicates the digits collected for the routing attempt.

Matched Pattern—*Display only.* Indicates the pattern the collected digits matched with for routing.

Route—*Display only.* Indicates the route number associated with the matched pattern.

Attempt—*Display only.* Indicates whether the routing was completed using the Primary, Secondary, or Final instruction.

Group—*Display only.* Indicates the resource group used to route the call.

Rule—*Display only.* Indicates the inpulse or outpulse rule (specified by an “I” or “O” prefix) performed during call routing.

Displaying Route Table and Route Information

To view the current routing activity for a route table, complete the following steps:

Step 1 Display the Routing Statistics Display screen.

The cursor is located in the Route Table data entry field.

Step 2 Specify the route table and/or specific route to display, as follows:

- To view routing statistics for all routes on a specified table, type the letter of the table and press **Next Field.** Type **0** (zero) in the Route field and press **Enter.** Routing attempts statistics will be constantly updated on the screen. To temporarily halt the screen updates, press any key. The cursor returns to the Route field. To resume the screen updates, press **Enter.**

- To view routing statistics for an individual route, type the letter of the route table and press **Next Field** to move the cursor to the Route field. Type the route number, or **S**, **E**, **U** or **D**, press **Enter**. The screen is updated to show the current activity on the route entered. To temporarily halt the screen updates, press any key. The cursor returns to the Route field. To resume the screen updates, press **Enter.**

Step 3 To trace routing activity on a route table or an individual route, halt the screen updates by pressing any key. The cursor returns to the Route field. Use the **Prev Field** or **Next Field** key to position the cursor at the Trace Route Activity (Y/N) entry field Type **Y** and press **Enter** to resume screen updates and start the trace. Routes used for call routing will be displayed under the last seven display field columns starting with Event #.

Step 4 To clear the route statistics on the display, halt the screen updates by pressing any key. The cursor returns to the Route field. Use the **Prev Field** or **Next Field** key to move the cursor to the Clear Stat Counts (Y/N) field. Type a **Y** and press **Enter** to clear all statistics for the route or route table specified.

Step 5 Press **Exit** or **Prev Menu** to return to the Diagnostics Menu screen.

Prompts, Warning, and Error Messages

In addition to the general messages listed in *Cisco VCO/4K System Messages*, the following messages may be displayed.

```
Error—Invalid Route Table
```

Explanation You entered a letter for the Route Table outside the range of A through J.

```
Error— Invalid Route For This Table
```

Explanation You entered a route number greater than the number of routes (XX) in the specified table.

```
Error—Y/N Only, Y To Enable Trace
```

Explanation You entered a value other than Y or N in the Trace Route Activity field.

```
Error—Y/N Only, Y To Clear Stats
```

Explanation You entered a value other than Y or N in the Clear Stat. Counts field.

Accessing Other Menus and Screens

You can access the following menus from the Routing Statistics Display screen:

- Main Menu Access—Press the **Main Menu** key.
- Diagnostics Menu—Press the **Prev Menu** or **Exit** key.