ZETRON

Model 452 and Model 459
TCBase
Operation Manual

Part No. 025-9451A

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1. INTRODUCTION

OPERATIONAL OVERVIEW

TCBase is Zetron's advanced multi-site, multi-channel LTR user database and communications system. The software program runs on an office PC, and can be remotely downloaded to multiple LTR sites. TCBase manages the Model 452/459 subscriber database information and retrieves interconnect billing data, repeater loading, and airtime accumulation information from the site equipment.

TCBase provides a user-interface for trunking repeater system management. It allows the system to be uniquely configured for maximum efficiency and convenience. Different database fields can be set on an individual subscriber level, per repeater, or uniformly for every user in the system. As a result, TCBase is extremely flexible and can grow with a changing trunking system.

TCBase monitors the site in real-time. Once the software is installed on the computer's hard disk, it can be run at any time.

System Requirements

The TCBase database management system for the Model 452/459 sites operates on an IBM-compatible computer. The office computer requires at least:

- ◆ PC-XT, AT, 286, 386, Pentium compatible processor
- ◆ 512 KB of RAM
- ◆ 10 MB of available hard disk space
- ◆ 3 1/2" or 5 1/4" floppy drive
- ◆ Monochrome or color monitor
- ◆ Hayes-compatible modem (internal or external) capable of 1200 bps operation to access the Model 459 internal modem
- ◆ Parallel port printer
- ◆ MS-DOS version 3.0 or later

SPECIAL FEATURES

Several features of TCBase allow for easy operation and management of the LTR system. Some of the most useful features are described below.

Billing Data Retrieval

TCBase retrieves airtime and interconnect billing records from the repeaters and stores the information in a versatile ASCII file format. This allows the data to be imported into virtually any billing package for convenient processing.

Repeater Loading Information

TCBase retrieves detailed repeater loading information from each repeater in the system. The information is displayed in the form of a histogram graph that shows repeater activity for the last two days.

Office Computer Programming

TCBase does not require any extra dedicated hardware. The program runs on any IBM-compatible personal computer. The TCBase user interface is easy to understand and use. Descriptive help text is available for every menu selection and status screens let the operator know exactly what the program is doing.

In addition, TCBase allows flexibility in connecting to the Model 452/459 site. The computer can be located at the site with the controllers or can call up the Model 459 through an internal or external modem. Likewise, the Model 452 can be called using an external modem.

USING THE MANUAL

Understanding what the manual is saying helps you install, program, and troubleshoot your system faster and easier. This section introduces you to the way things are presented, so that we can "speak the same language." The following subsections describe how things are identified throughout the manual, and where to find what you are looking for quickly and easily.

Organization of Sections

The manual is split into several sections so that you can find the exact information you need and any related topics. The sections are organized as follows:

Section 2. Installation

This section describes how to install TCBase on your computer and connect to the repeaters at the site.

Section 3. Programming Overview

This section introduces the TCBase database program. It discusses the basics of how the program is organized and used.

Section 4. Database Setup

This section describes how to program a new LTR site, step-by-step. This section covers each selection from the Edit menu; Site Configuration, Repeater Configuration, User IDs, Autodial Table, and Local Prefix Table. In addition, Section 4 describes how to transfer updated database information to the controllers.

Section 5. Billing and Statistics

This section describes how to retrieve, interpret, and print call detail (SMDR) and airtime accumulation files.

Section 6. Advanced Features

This section describes in detail some of the standard and optional features available in TCBase and the Model 452/459.

Section 7. Example Sites

This section provides some examples of how to set up sites, repeaters and users in TCBase for practical applications.

Text Notational Conventions

Notational conventions are the manual text styles that identify specific types of words. For instance, it is important to know which words refer to filenames, operator commands, screen quotes, manual titles, etc. The conventions help you understand what is being said.. Table 1-1 summarizes the text styles used in this manual.

Table 1-1. Summary of Manual Text Notational Styles

Sample Notation	What it Means
<xxxx>	the text inside the < > identifies a keyboard entry do not include the < > in your entry Ex. <Tab> means press the "Tab" key
Xxxx	the text that is initial capitalized within a sentence refers to a menu field or name Ex. Choose Config data from the Restore menu.
xxxx	the text in `courier font` is a screen view in TCBase
'xxxx'	the text in the 'single quotes' is exactly what appears on your computer screen

Special Notes to the User

Throughout the manual, special text boxes are used to capture the reader's attention. These boxes ensure that critical information is not overlooked. Each box includes a key word and an icon to identify the type and gravity of the information it provides. The special notes are summarized in the following text.

Note Boxes

A note box is labeled with a pointing hand symbol (☞) and the word "Note" at the top. These boxes let the user know that something important, but of relatively low priority is being said. A note box does not identify any danger to the user or the system, but rather something that simply should not be overlooked. For example:

☞   **Note:**   **If you prefer fixed call limits, put the same value in each entry of the Dynamic Call tables.**

Reference Boxes

A reference box is labeled with an alternate publication symbol (📖) and the word "Note" at the top. These boxes let the user know that further detailed information is available somewhere else. Sometimes the reference is to another section of this manual or to another document entirely. For example:

```
┌─────────────────────────────────────────────────────────────────┐
│  📖        Note:                                                  │
│                                                                   │
│  Refer to Section 5 for further details on the operation of the   │
│  front panel LEDs.                                                │
└─────────────────────────────────────────────────────────────────┘
```

Caution Boxes

A caution box is labeled with an open stop hand symbol and the word "Caution" at the top. These boxes are more serious and are intended to prevent the user from causing possible damage to the equipment. For example:

```
┌─────────────────────────────────────────────────────────────────┐
│  ✋        Caution:                                               │
│                                                                   │
│  ICs are delicate and sensitive to static. When handling them,    │
│  be sure to remain grounded by maintaining contact with the       │
│  chassis sheet metal. Only remove the ICs from the static         │
│  protective shipping material when read for installation.         │
└─────────────────────────────────────────────────────────────────┘
```

Warning Boxes

A warning box is labeled with a skull and cross-bones symbol (☠) and the word "Warning" at the top. These boxes are of the highest importance and are intended to prevent possible injury to the user. Warning boxes should never be ignored. If any questions arise, call Zetron before proceeding. For example:

```
┌─────────────────────────────────────────────────────────────────┐
│  ☠        Warning:                                               │
│                                                                   │
│  Always power-down and unplug electrical equipment before         │
│  performing any repair procedures.                                │
└─────────────────────────────────────────────────────────────────┘
```

Related Manuals

Two different manuals describe the Zetron Model 452/459 system. Both manuals can stand alone, but cannot cover all of the information necessary to install, configure, and maintain an efficient system. In addition, since a FASTNet Switch can be interfaced with the controllers, the manuals for that equipment are good references.

Each of the manuals listed in Table 1-2 is designed to be used in conjunction with one or more of the other documents. The shaded row identifies this manual. Depending on the system application, you may have up to five different documents.

Table 1-2. Model 452 & 459 and Model 2540 Manuals

Manual Title	Part No.	Description
Model 452 & 459 Trunking Controllers Installation & Operation	025-9450	Presents an overview of the Model 452 and 459 Trunking Controller hardware and theory of operation. Describes procedures for installing, adjusting, and maintaining the unit.
Model 452 & 459 TCBase Operation	025-9451	Presents installation, setup, and management of the user database program, TCBase. Also describes billing file storage and management of some standard and optional features.
Model 2540 FASTNet Switch Operation & Programming	025-9270	Presents an overview of the features of the Model 2540 and explains how to program using Fastbase, database management software. Information regarding the Trunk Card Editor is also provided in order to properly configure the input and output trunk ports of the Model 2540.
Model 2540 FASTNet Switch Installation & Maintenance	026-9260	Presents step-by-step installation instructions with adjustment and troubleshooting procedures. Also includes product specifications and theory of operation.
Model 2540 FASTNet Switch Schematics	025-9266	Presents the parts list, schematic drawings, and silkscreens for the Model 2540.

Zetron recommends storing the manuals in a convenient location. For instance, the operation and installation manuals should be located with the equipment (at the site) and the database manuals should be near the office computer, depending on where they get the most use. In addition, when contacting Zetron for technical support, it is helpful if the appropriate manual(s) are handy for quick reference.

2. INSTALLATION

INSTALLATION OVERVIEW

Setting up TCBase to program the Model 452/459 site involves five main steps:

☐   1.   Installing the TCBase software.

☐   2.   Linking the controller to the office PC.

☐   3.   Programming the Model 452/459 site configuration in TCBase .

☐   4.   Making a billing directory.

☐   5.   Setting the current time and date in the controllers.

STEP 1. TCBASE SOFTWARE INSTALLATION

A user-friendly installation program is included with the TCBase software. To install TCBase, follow the steps below:

1)   Insert the installation diskette in the appropriate disk drive.

2)   Type the drive letter where the disk is located followed by a colon, and press <Enter>. For example, if you are using drive A, type:

     A: <Enter>

3)   At the DOS prompt, type:

     INSTALL   <Enter>

4)   Now the main installation screen appears:

```
TCBase Installation Program V1.0                 Copyright 1999 Zetron Inc.
┌─Install Progress══════════════════════════════════════════════════════┐
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
└────────────────────────────────────────────────────────────────────────┘
┌─Help═══════════════════════════════┐  ┌─User Entry──────────────────────┐
│This program will install TCbase    │  │Enter 'N' or 'U':                │
│onto your computer.                 │  │                                 │
│Enter the type of installation:     │  │                                 │
│     (N)ew Installation             │  │                                 │
│     (U)pgrade of TCbase OR         │  │                                 │
│         conversion from Multibase  │  │                                 │
└────────────────────────────────────┘  └─────────────────────────────────┘
```

5) Follow the on-screen instructions to complete installation of TCBase.

   a. If this is a new installation of TCBase, enter the directory where you want to install the program.

- Press <Enter> to accept the default directory - C:\TCBASE.

- Otherwise, enter an alternate directory path.

   b. If you are upgrading from a previous version of TCBase, enter the directory where the current database files reside. All conversions are done automatically.

- Press <Enter> to accept the default directory - C:\TCBASE.

- Otherwise, enter an alternate directory path.

   c. If you are upgrading from a previous version of Multibase, enter the directory where the current database files reside. All conversions are done automatically.

- Enter the directory path where the existing Multibase files reside for conversion.

- When asked where to install TCBase, press <Enter> to accept the default directory - C:\TCBASE.

- Otherwise, enter an alternate directory path.

6) The installation program sets up the directories and copies all the files for you.

7) Once the installation is complete, verify that all data converted properly (if applicable) by checking some of the current database records.

8) If all the conversions were successfully verified, a few old files can be removed from the office computer's hard disk. Any files in the TCBase directory with the extensions '.bak' (old data files), '.bef' (old definition files), and '.aud' (database conversion files) can be deleted.

Changing Screen Colors

The standard TCBase color scheme is white lettering on a blue background. If you wish to alter the screen settings, many different color combinations are available. The file 'color.zbs' stores color data for TCBase. The file can be modified using any DOS editor. For example, using the standard editor in MS-DOS:

1) From the DOS prompt, type:

    EDIT COLOR.ZBS

   The file editing screen appears. The file describes how to change screen colors. There are four different color settings; high, normal, reverse, and underline. You

may need to experiment with different combinations to determine which is most effective.

2) Use the color chart (Table 2-1) to choose the appropriate code number for each background/foreground color combination.

> ☞ **Note:**
>
> **The shaded boxes indicate color combinations that will result in unreadable text—the background and foreground colors are identical.**

3) Save the file and exit the editing program.

4) Restart TCBase and check to see that the color changes took affect.

Table 2-1. TCBase Screen Colors Chart

Foreground Color	Background Color							
	Black	**Blue**	**Green**	**Cyan**	**Red**	**Magenta**	**Brown**	**Grey**
Black	000	016	032	048	064	080	096	112
Blue	001	017	033	049	065	081	097	113
Green	002	018	034	050	066	082	098	114
Cyan	003	019	035	051	067	083	099	115
Red	004	020	036	052	068	084	100	*116* **(R)**
Magenta	005	021	037	053	069	085	101	117
Brown	006	022	038	054	070	086	102	118
Light Grey	007	*023* **(U)**	039	055	071	087	103	119
Dark Grey	008	024	040	056	072	088	104	120
Light Blue	009	025	041	057	073	089	105	121
Light Green	010	026	042	058	074	090	106	122
Light Cyan	011	027	043	059	075	091	107	123
Light Red	012	028	044	060	076	092	108	124
Light Magenta	013	029	045	061	077	093	109	125
Yellow	014	*030* **(N)**	046	062	078	094	110	126
White	015	*031* **(H)**	047	063	079	095	111	127

Foreground colors apply to the text and graphics lines. Background colors apply to the area on which text is printed. The default settings for color monitors are highlighted in bold,

italicized text. The letter in parenthesis identifies the text type. For example, (R) indicates reversed text.

STEP 2. OFFICE COMPUTER CONNECTIONS

TCBase communicates with the Model 452/459 through the office computer modem or an RS-232 local connection. Database programming is accomplished with one of the system configurations listed below. Find the subsection that describes the appropriate site application and follow the installation procedures.

- ♦ Local connection using RS-232 cabling between the PC and the front panel of the Model 452/459. A modem is not required for this type of connection. See the next subsection, "Local RS-232 Connection."

- ♦ Remote connection with one phone call from the personal computer to a Hayes-compatible external modem connected to the Model 452/459 front panel port. An external modem is used when the Model 459's internal 1200 baud modem is not fast enough or for Model 452s. See "Remote Connection via External Modem" on page 2-7.

- ♦ Remote connection with one phone call from the personal computer to the internal 1200 baud modem installed in a Model 459. See "Remote Connection to a Model 459 " on page 2-9.

Local RS-232 Connection

The office computer connects directly to a Model 452/459 with RS-232 cabling. For initial setup, or for site visits with a portable computer, use a "COM" port on your computer and the front-panel RS-232 connector.

Figure 2-1 shows the setup for local connection to a Model 452/459.
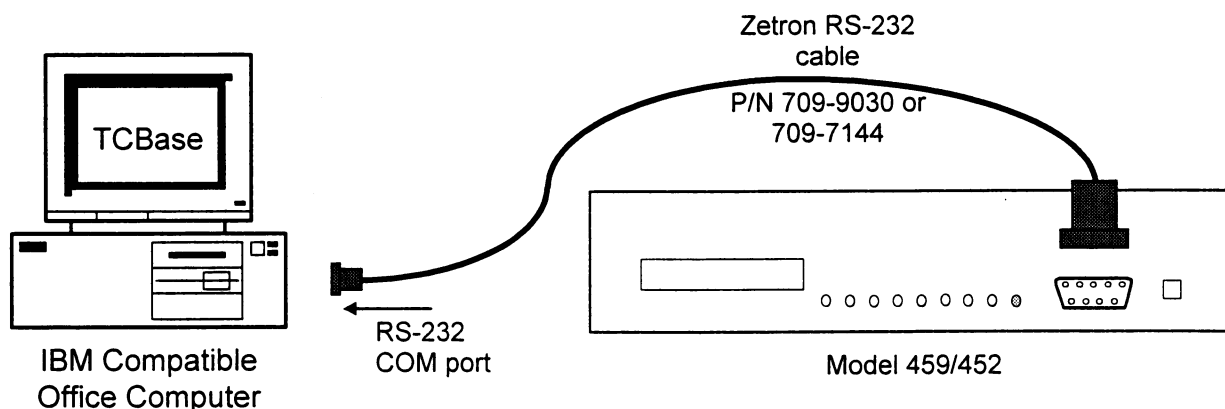
Figure 2-1. Local Serial Connection to the Model 452/459

Installation Procedure

To set up the system for local RS-232 connection, follow the steps below:

1) Determine the computer's serial Communication port (COM1 or COM2 usually) and connector type (DB9, DB25, etc.)

2) Obtain or make an appropriate RS-232 connector cable. It should have a Zetron male 9-pin connector at one end and a female 9-pin or 25-pin connector for the computer's serial port at the other end. Figure 2-2 and Figure 2-3 show the pin configurations for each cable.

   If you need to order a cable from Zetron, the part numbers are 709-9030 (25-pin) and 709-7144 (9-pin).

Model 452/459 (DB9)		Computer (DB25)
DTR (1)	brown	(4) RTS
Carrier (2)	blue	(5) CTS
Tx Data (3)	orange	(3) Rx Data
Rx Data (4)	yellow	(2) Tx Data
Ground (5)	green	(7) Ground
+12 V$_{DC}$ (6)		
Spare (7)	violet	brown (6) DSR
Audio (8)	grey ✕	
Ground (9)	black	(20) DTR
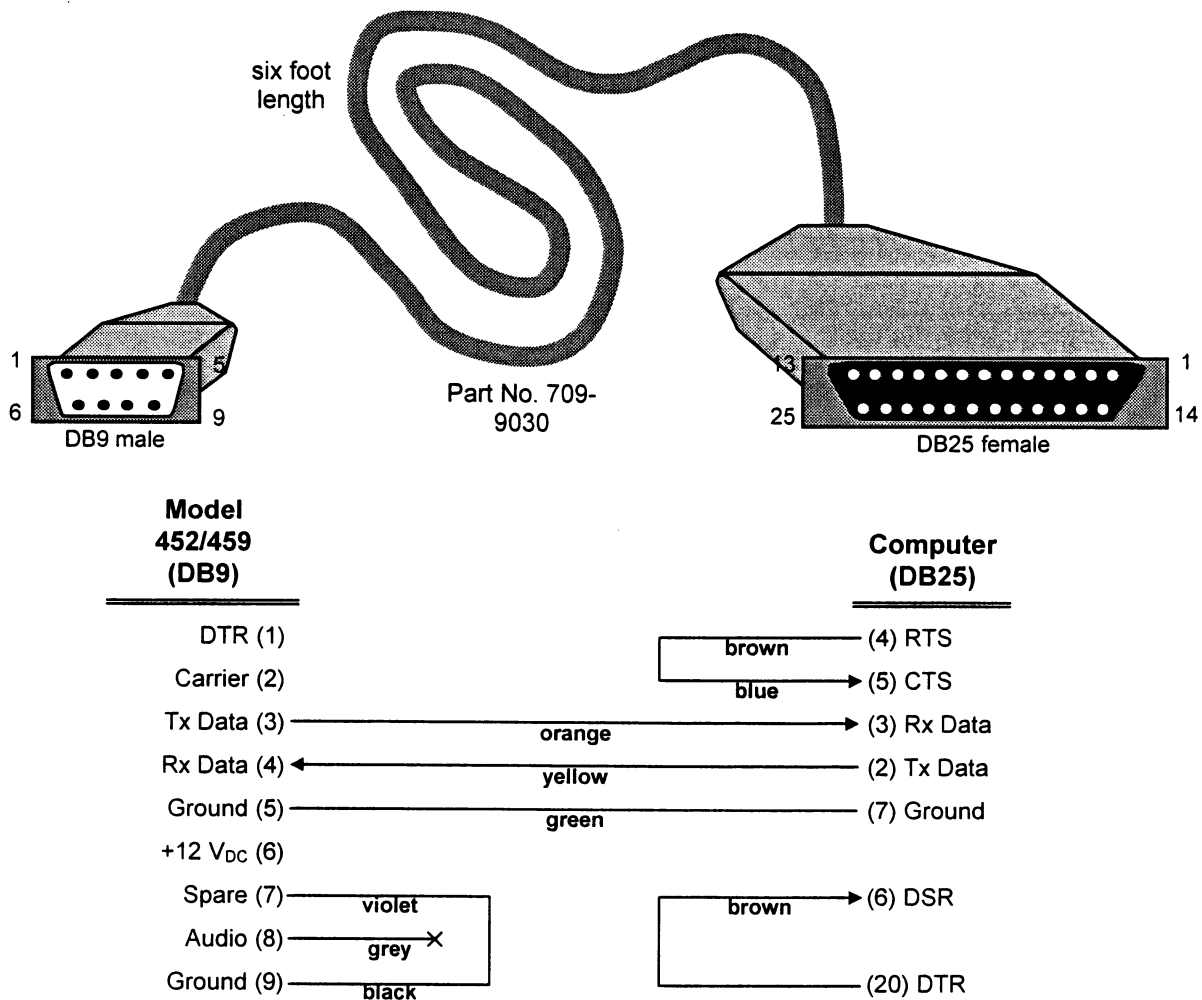
Figure 2-2. Local RS-232 DB25 Programming Cable

six foot
length

Part No.
709-7144

DB9 male

DB9 female

Model 452/459 (DB9)		Computer (DB9)
DTR (1)	brown	(7) RTS
Carrier (2)	blue	(8) CTS
Tx Data (3)	orange	(2) Rx Data
Rx Data (4)	yellow	(3) Tx Data
Ground (5)	green	(5) Ground
+12 V$_{DC}$ (6)		
Spare (7)	violet	brown — (6) DSR
Audio (8)	grey ✕	
Ground (9)	black	(4) DTR
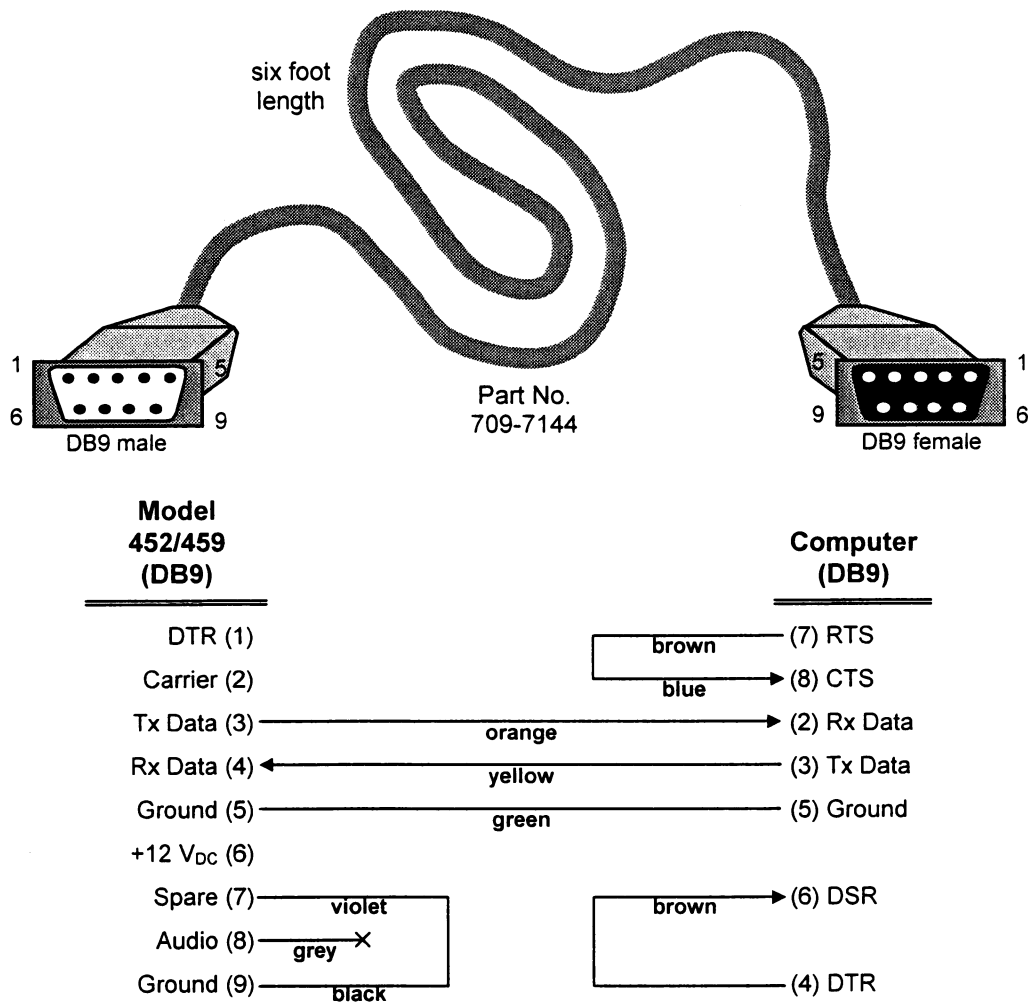
Figure 2-3. Local RS-232 DB9 Programming Cable

3) Select a Communications speed on the Model 452/459 using the front panel DIP switches. Table 2-2 shows the DIP switch settings for SW1. To access the Model 459 DIP switches, remove the black metal cover on the left side of the controller faceplate. There are two sets of DIP switches; SW1 is on the left with four switches. Switches three (3) and four (4) control the Communications rate.

Table 2-2. Communication Speeds for Local RS-232 Connection

Communication Rate (bps - bits/second)	DIP Switch #3	DIP Switch #4
300	down	down
1200	down	up
2400	up	down
9600	up	up

☞   **Note:**

To make the new switch settings take effect, cycle the power on the controller. That is, turn the unit off and then on again.

Modem Requirements

The office computer requires a modem if the Model 452/459 is not locally connected. The modem can be internal or external, but it must operate at 1200 baud or faster. In addition, the modem must respond to standard Hayes AT Commands.

Remote Connection via External Modem

If the controller in the system is remotely located, an external Hayes-compatible modem can be connected to the front panel RS-232 port. This application is useful for remotely located Model 452s, or when high-speed modem access is desired. The controller issues Hayes AT Commands periodically to the modem to set its configuration.

Figure 2-4 shows the physical connections for a remotely located Model 452/459 using an external modem.
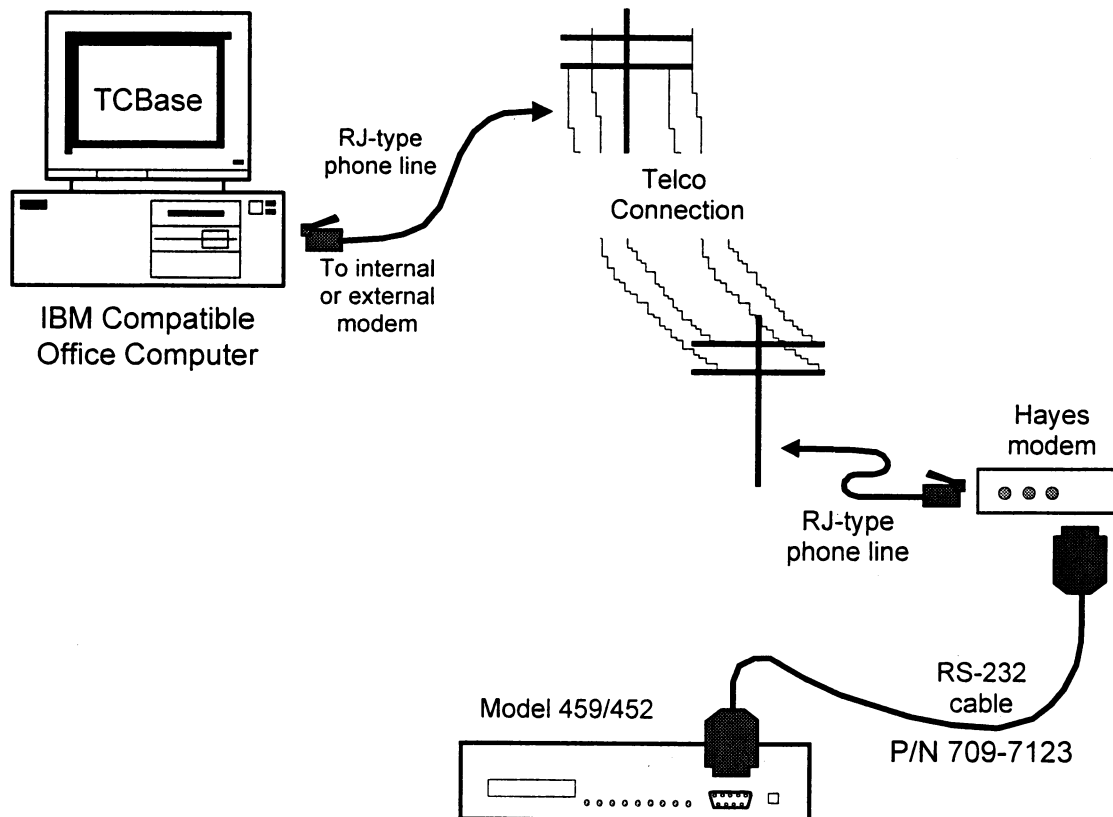
Figure 2-4. Remotely Located Model 452/459 with External Modem Connection

Installation Procedure

To set up the system for remote connection using an external modem, follow the steps below:

1) Select a modem Communications speed on the Model 452/459 using the front panel DIP switches. Table 2-3 shows the DIP switch settings for SW1. To access the Model 459 DIP switches, remove the black metal cover on the left side of the controller face plate. There are two sets of DIP switches; SW1 is the left bank with four switches. Switches 3 and 4 control the Communications rate.

Table 2-3. Model 452/459 External Modem Speed Settings

Communication Baud Rate	DIP Switch #3	DIP Switch #4
300	down	down
1200	down	up
2400	up	down
9600	up	up

☞ **Note:**

To make the new switch settings take effect, cycle the power on the controller. That is, turn the unit off and then on again. After each reset, the Model 452/459 issues Hayes AT Commands to program the modem.

2) Obtain or make an appropriate RS-232 cable to connect the Model 452/459 to the modem. It should have a Zetron male 9-pin connector at one end and a male 25-pin connector for the modem's serial port at the other end. Figure 2-5 shows the proper pin configuration for the cable. If you need to order a cable from Zetron, the part number is 709-7123.

   The DTR wire (pin 20 on the modem connection) forces the modem to reset when software control fails. Set the modem to "smart" operation to ensure that it responds to reset Commands from the Model 452/459.

3) Connect the external modem at the Model 452/459 site to an appropriate telco line using RJ-type cable.

4) Connect the office PC modem to a standard telco line using RJ11 cable. (See "Note" below.) If the PC modem is external, connect the modem to the computer's serial COM port using RS-232 cable (usually standard 25-pin male connectors on both ends).

☞ **Note:**

Make sure to use the modem jack labeled "LINE" or "TELCO". Do not connect to the "PHONE" or "LOCAL" jacks, as they are for telephone sets only.

---

six foot
length

Part No.
709-7123

DB9 male

DB25 male

Model 452/459 (DB9)		Modem (DB25)
DTR (1)	brown ⟶	(20) DTR
Carrier (2) ⟵	red	(8) Carrier
Tx Data (3)	orange ⟶	(2) Tx Data
Rx Data (4) ⟵	yellow	(3) Rx Data
Ground (5)	green	(7) Ground
+12 V$_{DC}$ (6)	blue	no connection
Spare (7)	violet	no connection
Audio (8)	grey	no connection
Ground (9)	black	no connection
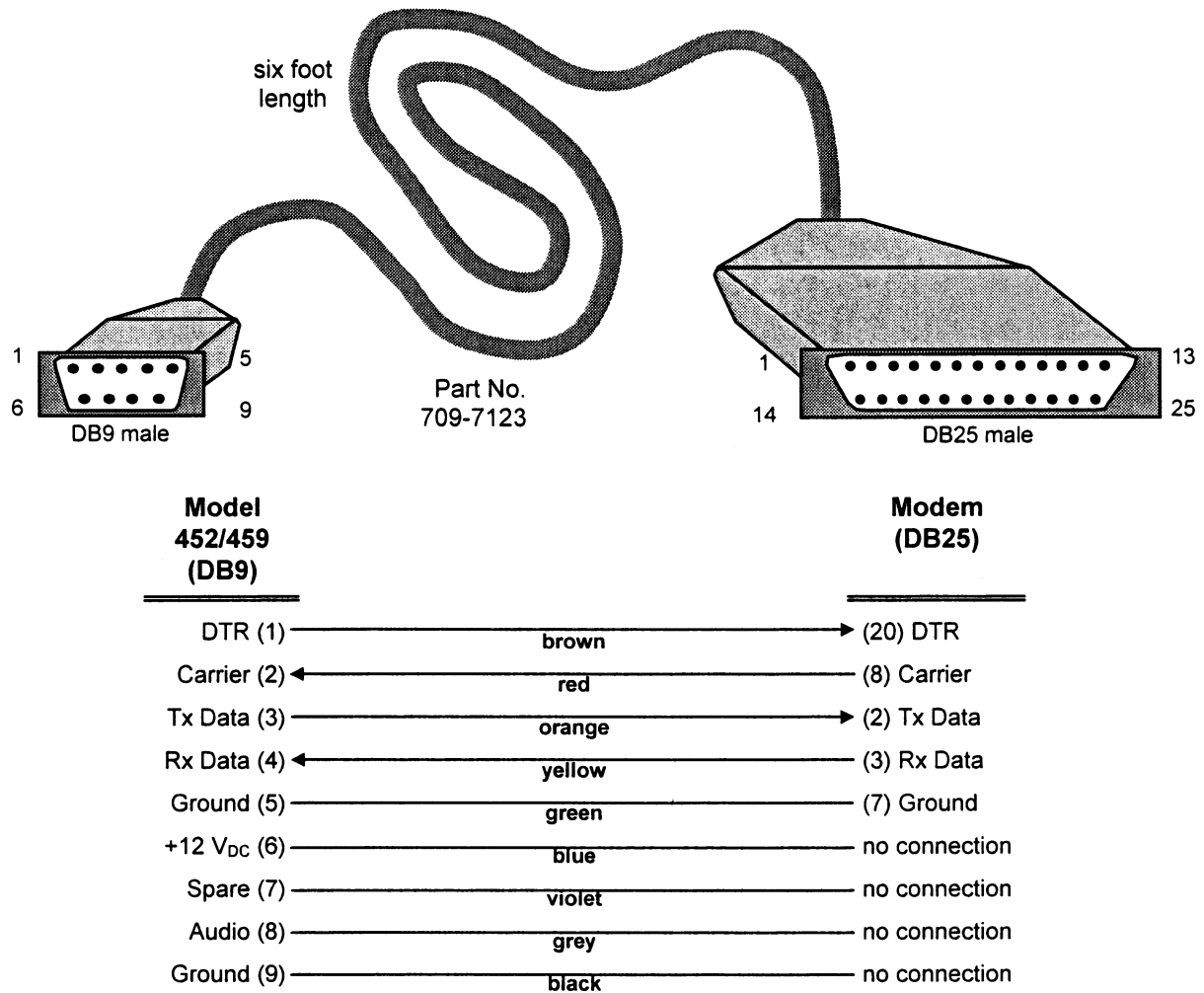
Figure 2-5. Model 452/459 External Modem Cable RS-232 cable

Remote Connection to a Model 459

The Model 459 comes equipped with an internal 1200 baud modem. This enables TCBase to call the Model 459 through its telco card, update database settings, and retrieve billing information.

Figure 2-6 shows the physical connections for a remotely located interconnect Model 459 (with an internal modem).
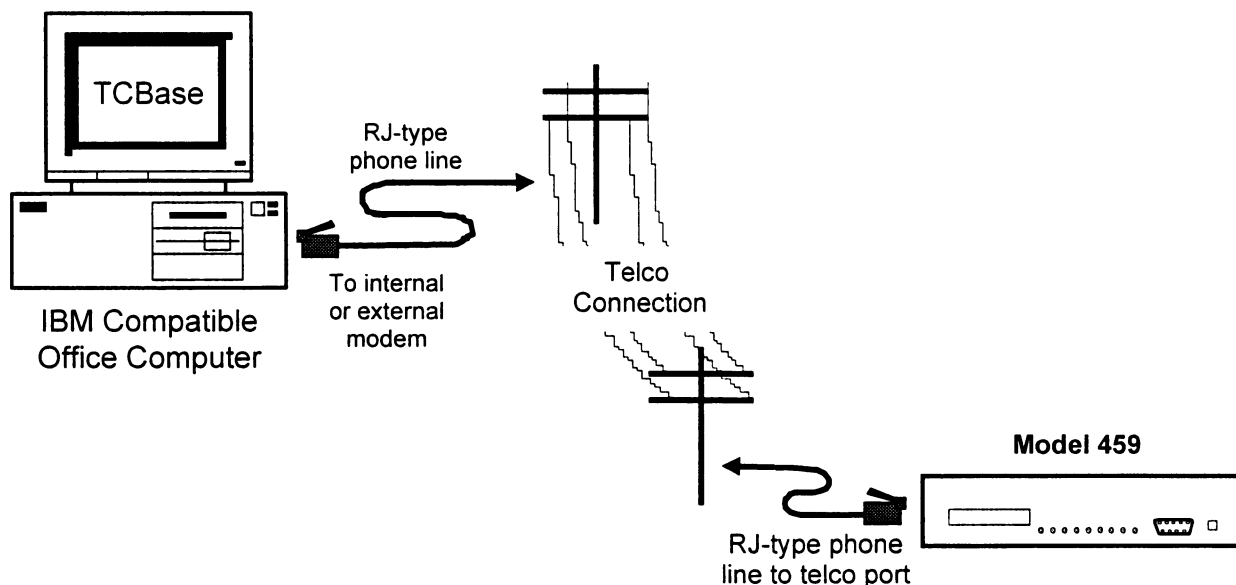
Figure 2-6. Remotely Located Interconnect Model 459

Installation Procedure

To set up the system for remote connection using the interconnect internal modem, follow the steps below:

1) Set the Communications speed on the Model 459 to 1200 baud or greater using the front panel DIP switches. Table 2-4 shows the DIP switch settings for SW1. To access the DIP switches, remove the black cover on the left side of the Model 459 face plate. There are two sets of DIP switches; SW1 is on the left with four switches. Switches three (3) and four (4) control the Communications rate.

Table 2-4. Model 459 Internal Modem Speed Settings

Communication Baud Rate	DIP Switch #3	DIP Switch #4
300	down	down
1200	down	up
2400	up	down
9600	up	up

If the Communications rate is set to 300 baud, the internal modem will connect at that rate. Otherwise, 1200 baud is used.

2) Connect the office PC modem to a standard telco line using RJ11 cable. If the PC modem is external, connect the modem to the computer's serial COM port using RS-232 cable (usually standard 25-pin male connectors on both ends).

☞ **Note:**

Make sure to use the modem jack labeled "LINE" or "TELCO". Do not connect to the "PHONE" or "LOCAL" jacks, as they are for telephone sets only.

---

3) Connect the Model 459 telco port to an appropriate telephone line using RJ-type cable.

4) Adjust the audio levels on the Model 459 as described in Model 452/459 installation and operation manual (Part No. 025-9450) before attempting to connect to the interconnected Model 459.

STEP 3. TCBASE COMMUNICATIONS PROGRAMMING

Once all of the necessary hardware connections are complete, TCBase needs to know what equipment is connected to the controller and the office computer.

Running TCBase on the Office Computer

To get TCBase up and running, follow these steps:

1) Boot up the office computer.

2) Switch to the drive and directory where TCBase is installed. (The default directory is c:\TCBase.) For example, if TCBase uses the default directory name, at the DOS prompt type:

   C: <Enter>   (only necessary if the computer isn't already on drive c:)

   Then type:

   CD TCBASE <Enter>

3) Start the program by typing:

   TCBASE <Enter>

TCBase Main Screen

The TCBase main screen should appear as shown in Figure 2-7.

☞ **Note:**

The highlights and shading will be different on your office computer, depending on the monitor type and color configuration.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron        (SUPERVISOR mode)

∞ Edit    View   Comm    Print   Backup   Restore   Other  ∞

 ┌─────────────────┐
 │ Site config     │
 │ Repeater config │
 │ User ids        │
 │ Autodial table  │
 │ Local prefix table
 └─────────────────┘




 ┌HELP───────────────────────┐
 │Select item with arrow keys and
 │ENTER or capital letter. ESC to quit
 │
 │Edit Site Config allows the Site
 │Configuration data to be changed.
 │Additions, deletions and modifications
 │can be done. Then use Comm Update.
 │
 └───────────────────────────┘
```

Figure 2-7. TCBase Main Menu Screen

Site Configuration Programming

To set up the Model 452/459 communications parameters, select Site config from the Edit menu. The site configuration box shown in Figure 2-8 appears.

```
┌Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)┐
│ ┌INDEX ══════════════════════┐  ┌SITE_CONFIG──────────────────────────┐ │
│ │Site _____Site Name_____ I│  │Site Number: [0002]                  │ │
│ │0001 FASTNET SITE #1       Y│  │Site Name:[DISPATCH W/GHOSTS       ] │ │
│ │0002 DISPATCH W/GHOSTS      N│  │                                     │ │
│ │0003 MISCELLANEOUS SITE    Y│  │Site Access:L ... PC Comm Port:1     │ │
│ │0004 DIRECT E&M LINK TO 5  Y│  │         ┌LOCAL─────────            │ │
│ │0005 DIRECT E&M LINK TO 4  Y│  │Edit Promp│Baud Rate:9600│ L ...     │ │
│ │                            │  │Prime Time└──────────────            │ │
│ │                            │  │ 1:Start: 06:00  Stop: 17:00         │ │
│ │                            │  │ 2:Start: 00:00  Stop: 00:00         │ │
│ │                            │  │                                     │ │
│ │                            │  │Unassigned Users:1                   │ │
│ └────────────────────────────┘  │Idle Msg. Time:10                    │ │
│ ┌HELP════════════════════════┐  │COR Hold Time:0.3                    │ │
│ │Enter the baud rate for local RS232│Repeater Hold Time:00.3        │ │
│ │access:  300, 1200, 2400 or 9600  │Repeater Timeout:180            │ │
│ │                            │  │                                     │ │
│ │                            │  │Interconnect:[N] ...                 │ │
│ │                            │  │                                     │ │
│ │                            │  │Create Date: 05/27/97                │ │
│ │                            │  │Alter Date:  06/04/97                │ │
│ └────────────────────────────┘  └─────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 2-8. The Site Config Box

Program the site appropriately following the steps below:

1) Use the arrow keys to select the Site Access field (highlighted in Figure 2-8).

2) Enter the correct PC connection type:

   ♦ L = local RS-232 connection

   ♦ I = internal Model 459 modem connection with the PC in answer mode (See Figure 2-9)

   ♦ X = external Model 452/459 modem connection (See Figure 2-10) or internal Model 459 modem connection with the PC in originate mode

   A small box pops up requesting further information depending on the type of connection.

```
┌INT_MODEM─────────────────┐
│ Phone #:020-6363          │
│ Baud Rate:1200            │
└──────────────────────────┘
```

Figure 2-9. Internal Modem Parameters

```
┌─EXT_MODEM────────────────────────────────┐
│ Phone #:▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓    │
│ Baud Rate:▓▓▓▓                            │
└──────────────────────────────────────────┘
```

Figure 2-10. External Modem Parameters

3) Enter the baud rate as follows:

local connection:	Enter the communication speed of the Model 452/459. This is not the same as a modem baud rate. No modem is used in this connection, so the rate can be faster. Most computers can communicate at 9600 baud.
	The default baud rate is 9600.
	Skip to step #5.
interconnect Model 459 connection:	Enter 1200 baud. The internal modem provided with the Interconnect option only communicates at that speed.
external modem connection:	Enter the baud rate of the external modem. Most modems can communicate at the maximum speed, 9600 baud.
	The default baud rate is 9600.

✋ Caution:

For the computer and the Model 452/459 to communicate properly, the baud rate programmed in TCBase must match the baud rate set on the controller front panel DIP switches (See "STEP 2. OFFICE COMPUTER CONNECTIONS" on page 2-4).

However, when connecting to the Model 459 internal modem, the front panel DIP switches can be set to 1200, 2400, or 9600 baud. In this case, the connection is made at 1200 baud, as long as the TCBase baud rate is 1200.

---

4) Enter the phone number that the computer should call to access a *remotely* located Model 452/459.

5) Select the PC Comm Port field. Enter the communications port number used to connect to the Model 452/459. This is the modem card port or RS-232 serial port on the rear of your computer. Most computers use COM 1.

6) Power up the external modem first (if applicable). Then power up the Model 452/459.

Section 2. Installation

PC in Originate Mode

Some PC modems are unable to communicate with the Model 459's internal modem in answer mode. To remedy the situation, the internal Model 459 modem can be set to recognize a request for modem connection with the PC in originate mode.

Enable PC-originate mode as described in the following paragraphs.

For End-End Lines with Overdial Access = N

1. Choose X for "External Modem" even though it is an internal modem on the Model 459.

2. Enter phone number and special overdial digits "00255" separated by a semicolon.

   For example: 8206363;00255

3. Select 1200 baud.

4. Call into the Model 459 from the Comm menu selection. Wait for the go-ahead prompt from the Model 459 (you hear this prompt through your modem's speaker). When you hear the prompt, hit any key to cause your PC to overdial the 00255 to the Model 459. When the Model 459 receives the 00255, it proceeds to initiate the modem connection tone.

For End-End Lines with Overdial Access = Y

Two methods can be used to connect to the Model 459.

Method 1
1. Choose X for "External Modem" even though it is an internal modem on the Model 459.

2. Enter the phone number, a semicolon, an invalid ID code, two commas, the same invalid ID code again, and the special overdial digits 00255. The commas cause a delay to be inserted before continuing.

   For example: 8206363;0025,,0025,00255

3. Select 1200 baud.

4. Call into the Model 459 from the Comm menu selection. Wait for the go-ahead prompt from the Model 459 (you hear this prompt through your modem's speaker). When you hear the prompt, hit any key to cause your PC to overdial the remaining digits to the Model 459. When the Model 459 receives the 00255, it proceeds to initiate the modem connection.

Method 2

1. Create a user ID 19-250 and set its ID status to Invalid. Assign an access number to that ID code. For this example, assume an assigned access number of 9250.

2. Choose X for "External Modem" even though it is an internal modem on the Model 459.

3. Enter the phone number and the access number assigned to the ID code 19-250 separated by a semicolon.

   For example: 8206363;9250

4. Select 1200 baud.

5. Call into the Model 459 from the Comm menu selection. Wait for the go-ahead prompt from the Model 459 (you hear this prompt through your modem's speaker). When you hear the prompt, hit any key to cause your PC to overdial the access number to the Model 459. When the Model 459 receives the access number, it translates it to 19-250. Because 19-250 has an invalid status, the Model 459 proceeds to initiate the modem connection.

For 4-wire E&M Type 1 Lines

Two methods can be used to connect to the Model 459.

Method 1

1. Choose X for "External Modem" even though it is an internal modem on the Model 459.

2. Enter a DID phone number that has not been assigned to a valid user, a semi-colon followed by the special overdial digits "00255".

   For example: 8206000;00255 where 8206000 has not been assigned to a valid user

3. Select 1200 baud.

4. Call into the Model 459 from the Comm menu selection. Wait until you hear the error tones begin playing (you hear the tones through your modem's speaker). When you hear the error tones, hit any key to cause your PC to overdial the remaining digits to the Model 459. Be sure to hit the key while the tones are playing or within 2 seconds after they stop playing. When the Model 459 receives the 00255, it proceeds to initiate the modem connection.

Method 2

1. Create a user ID 19-250 and set that ID status to Invalid. Assign an access number to this ID code. For this example, assume an assigned access number of 9250.

2. Choose X for "External Modem" even though it is an internal modem on the Model 459.

3. Enter the DID phone number assigned to the ID code 19-250.

   For example: 8209250

4. Select 1200 baud.

5. Initiate a communication call to the Model 459. When the Model 459 receives the DID feed digits, it translates them to 19-250. Because 19-250 has an invalid status, the Model 459 proceeds to initiate the modem connection.

Real-Time Communications Monitoring

To confirm that all hardware connections and software settings are correct, select Monitor from the Comm menu. The PC should dial the site phone number (if the controller is remotely located), connect to the repeater, and display the Communications monitor screen shown in Figure 2-11.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)

               MODEL 452/459 SITE 0002 - REAL-TIME MONITORING

     Date: 10/06/99  Time: 15:39:53  System Loading: 0%

     RPTR #  HH-UUU  TYPE  MM:SS          RPTR #  HH-UUU  TYPE  MM:SS

       01    Idle                           11     -
       02    Idle                           12     -
       03     -                             13     -
       04     -                             14     -
       05     -                             15     -
       06     -                             16     -
       07     -                             17     -
       08     -                             18     -
       09     -                             19     -
       10     -                             20     -


enter ESC to exit....
```

Figure 2-11. Real-Time Monitoring Screen

2-18

Troubleshooting PC Communications

If you have difficulty connecting to the site, follow the instructions below until a connection is made. After any changes, try to connect to the site again.

Check the Hardware Connections

Verify that all of the hardware connections, including cabling, phone lines, and DIP switches, are correct. See "STEP 2. OFFICE COMPUTER CONNECTIONS" on page 2-4.

☞ **Note:**

Perform a soft reset of the Model 452/459 if any hardware connections or settings are changed. The controller only recognizes changes when it is reset or powered up. To perform a soft reset, push the Setup button twice. See the Model 452/459 installation and operation manual (Part No. 025-9450) for details.

Check the TCBase Communications Parameters

Use View or Edit, Site config to verify that the Communications settings, including phone number, baud rate, and Comm port, are correct.

Change the Modem Initialization String

If the site connection is made through the office PC's modem, you may have to alter the modem initialization string to ensure proper handshaking. TCBase is designed to talk to Hayes-compatible modems that respond to standard ATZ and ATDT Commands.

To change the modem initialization string, choose Other, Change pc modem parms from the TCBase main menu. The Status box shown in Figure 2-12 should appear.

```
┌─STATUS─────────────────────────┐
│CHANGE MODEM INIT STRING         │
│                                 │
│Current settings:                │
│ Tone or Pulse = T               │
│ Init Str = AT E1 Q0 X2          │
│String must begin with AT        │
│Enter T for tone, P for pulse: t │
│Enter New Str: █                 │
└─────────────────────────────────┘
```

Figure 2-12. Modem Initialization String Box

Enter a T for tone dialing or a P for pulse dialing. Then enter the new modem initialization string, beginning with "AT". Refer to the modem's manual for more information on modem Commands.

☞　**Note:**

If you are unsure about modem initialization Commands, contact Zetron technical support for assistance. Be sure to have your modem's manual handy for reference before calling.

Check the PC Interrupt Jumpers

Verify that the interrupt jumpers for the PC Communications port are set correctly. COM1 requires an IRQ4 setting and COM2 requires an IRQ3 setting.

Call Zetron

If TCBase still cannot communicate with the Model 452/459, contact Zetron technical support for assistance.

STEP 4. MAKING A BILLING DIRECTORY

Billing files for the system are stored in the \TCBASE directory (or whatever alternate name was assigned during installation) or the \MOBILL49 directory. When TCBase retrieves billing files from the repeaters (Comm, Retrieve, Billing Records), the files are saved in the MOBILL49 directory. This ensures that if you already have Model 49s, the existing billing package can work with Model 49s, 452s, and 459s.

If the MOBILL49 directory does not exist, TCBase stores the files in the TCBASE directory instead.

☞ **Note:**

If you have both Model 49 and Model 452/459 sites, verify that all sites are assigned unique site numbers. If site numbers are duplicated, the billing files will not have unique names and data could be inadvertently lost.

To create a new directory for storing only billing files, follow these steps:

1) Switch to the root directory on the hard disk. At the DOS prompt, type:

    CD\

2) Create a new directory. Type:

    MKDIR MOBILL49

STEP 5. SETTING THE CURRENT TIME AND DATE

Before programming the rest of the database, it is important to set the correct time and date in the repeaters. If the time and date are not set, all billing data is meaningless. To set the Model 452/459 clock, follow these steps:

1) Choose Comm from the TCBase main menu.

2) Choose Other from the Communications menu.

3) Choose set date & Time from the Other menu.

4) TCBase lists the currently programmed sites in the Index window. Select the correct site and press <Enter>.

5) The status screen shown in Figure 2-13 appears (without the date and time already entered). Type in the current date. Do not press <Enter> after typing the date. The cursor automatically moves to the time prompt when six numbers are received for the date setting.

```
┌─STATUS─────────────────────────────┐
│SET DATE AND TIME                   │
│                                    │
│Enter Date as MMDDYY: 061496        │
│Enter Time as HHMMSS: 140400        │
│Time of Day: Fri Jun 14 14:04:00 1996│
│                                    │
│Press any key to set time...        │
│                                    │
└────────────────────────────────────┘
 press ENTER key to preceed...
```
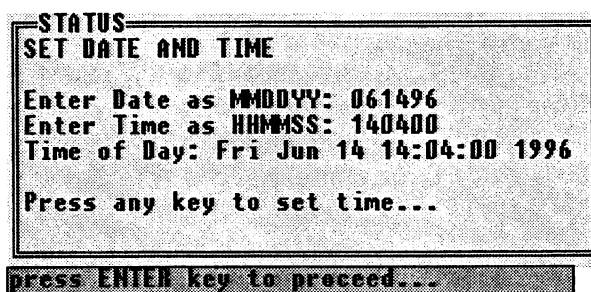
Figure 2-13. Date & Time Status Window

6) Type in the current time. Do not press <Enter> immediately.

7) TCBase displays the current date and time as they have been entered. To accept the values, press <Enter>.

The controllers are now set to the current date and time.

3. PROGRAMMING OVERVIEW

INTRODUCTION TO DATABASE OPERATIONS

TCBase is a typical database program in its format and function. The program stores different types of data in a complex hierarchy of information.

A tree structure best describes the organization of TCBase. Like a tree, each branch (menu) in the program has twigs (Other menus) attached to it. Moreover, each twig (submenu) has several leaves (data fields) attached to it.

The result is that entering or changing a single field in TCBase may require only two keystrokes, or several different call outs. In addition, changes to the database fields often affect several Other pieces of data.

Database Terminology

Throughout this manual, many keywords are used to refer to the TCBase database and its contents. The vocabulary is fairly standard for all software database applications. A brief definition and example of each term follows.

active; *highlighted;* *selected*	Describes the current window or field. An active window is always shaded or colored differently on the TCBase screen.
	Ex. Site config is the selected item in the Edit menu.
box; *window*	Describes a framed text box on the TCBase screen.
	Ex. The Site Config box has 18 separate fields.
data window	Describes a window that shows one data record in full detail.
	Ex. The Site Config data window contains the Site Name field.
field	Describes a specific type of entry, in a specific location in the database. A field does not point to Other information like a menu does. It requires an actual keyboard entry.
	Ex. Access the PC Comm Port field by selecting Site config from the Edit menu.

index window Describes a window that shows a nine record portion of the data file. The index window gives an overview of which records are available. Those data fields used for sorting are shown in the index window. The item selected in the index window is shown in the related data window.

Ex. The Site config index window lists all the programmed sites.

key field Describes a field that can be used for sorting the database.

Ex. The Access # field in the User IDs window is keyed for sorting.

menu Describes a word or phrase that points to Other menus or fields. A menu does not request an actual database entry, it requires a selection to direct the program.

Ex. The Other menu has four possible choices: Change pc modem parms, change 452/459 <-> PC password, create User file, and Exit.

record Describes a set of database fields. One subscriber's database information is a record.

Ex. The record for User ID # 01-143 is invalid.

sort Describes a reorganization of the database information by a specified data field.

Ex. Sort the data alphabetically by Site Number.

Figure 3-1 shows a sample TCBase screen and points out the database terms defined above.

☞ **Note:**

Some parts of the TCBase screen are identified by two different terms. The phrases represent common uses of the database vocabulary.
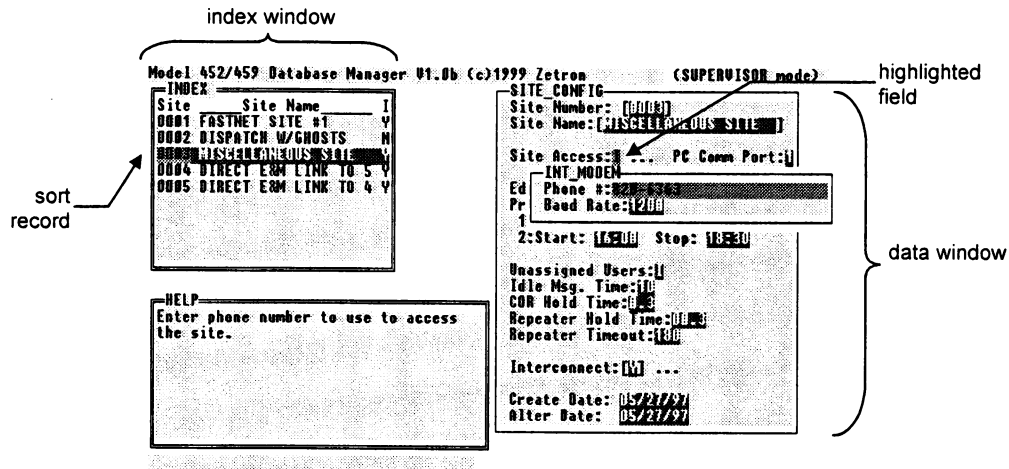
Figure 3-1. TCBase Terminology Examples

Moving through the Database

In addition to the terminology above, TCBase uses some unique conventions of its own. Each menu and submenu item has one and only one capital letter in it. The capital letter provides a keyboard shortcut to the item. For example, from the main menu the Communications menu is listed as "Comm". In this case, entering a "C" from the keyboard automatically selects that menu.

The Guide Window

The <F1> key performs a special function in TCBase. When <F1> is pressed, the guide window is displayed, showing what each key does. When <F1> is pressed a second time, the guide window is hidden. The guide window is useful for quick reference of the available keyboard operations.

Secondary Menus

Many fields in the different Data windows call out Other fields, depending on the selected entry. When a field points to Other fields, the connection is identified by three dots (...) on the TCBase screen.

Section 3. Programming Overview

Keyboard Entries

Moving through the database is very easy once a few important keystrokes are learned. Always use the <Esc> key to finish an operation and return to the main menu. Table 3-1 shows each keyboard entry and what action it performs in TCBase. The keys are listed in order of appearance on the keyboard from top left to bottom right. Figure 3-2 highlights the important keys on an extended PC keyboard.

Table 3-1. TCBase Keyboard Operations

Key Name	Keyboard View in Figure 3-2	Function in Index Window	Function in Data Window
Escape	Esc	Back to main menu	Back to index window
F1– F10	F1, F2, F3,... F10	Guide information on Fn keys	Guide information on Fn keys
Backspace	← Back	Previous index field	Move back one character
Insert	Ins	Insert new data record	Insert one character
Home	Hm	Move to top of index window	Move to top of data window
Page Up	PgUp	Previous index window	Previous data record
Tab Shift + Tab	Tab	Next index field Previous index field	Accept default data and move to next data field
Delete	Del	Delete data record	Delete one character
End	End	Move to bottom of index window	Move to bottom of data window
Page Down	PgDn	Next index window	Next data record
Enter	←⏎ Enter	Move to data window	Enter typed data into field and move to next data field
Shift (appears twice)	⇧ Shift	No function by itself	No function by itself
Up Arrow	↑	Previous record	Previous data field
Left Arrow	←	Previous index field	Move back one character
Down Arrow	↓	Next record	Next data field
Right Arrow	→	Next index field	Move forward one character
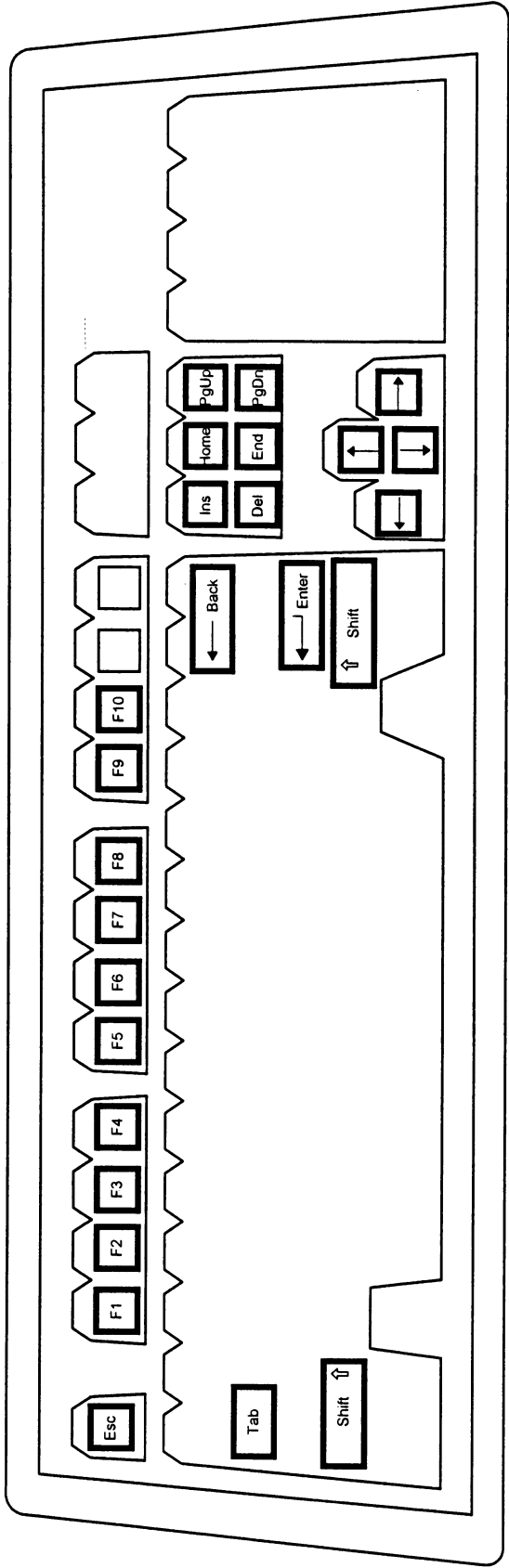
Figure 3-2. PC Keyboard for TCBase Operations

Using Record Templates

After programming a few new clients, some patterns may develop. For instance, several fields, such as those found in the User Status window, are set identically for many different records. Some of the information, however, does change.

Ten different "data templates" can be defined in each data window to save typing time. Each template is retrieved with the assigned function key to fill-in a new data record.

Defining New Data Templates

To define a new template, follow these steps:

1) From the Index window (in any of the Edit menu choices), press <F9> to start a new record.

2) Fill-in the template in the Data window with the information that is identical for many users. Be sure to leave the ID field blank.

3) Press and hold <Alt>. Then press one of the ten function keys (<F1> through <F10> on the keyboard).

The function key selected is now assigned to the template.

Using Data Templates

To use a template, follow these steps:

1) From the Index window, press <F9> to start a new record.

2) Press and hold <Shift>. Then press the function key corresponding to the desired template.

Fill-in the blank fields appropriately to finish defining the record.

☞ **Note:**

The templates are saved automatically when TCBase is properly exited.

Searching the Database

When the User ID database gets large (more than a few hundred users), scrolling up and down through the database to locate an individual record is time consuming. TCBase can search and find specific records easily using any field in the Index window. To find a particular record, follow these steps:

1) Access the Index window (in any of the Edit menu choices).

2) Select the desired search field (within the Index window) using the left and right arrow keys.

3) Press <F8>. TCBase moves the cursor into the Data window, to the selected field.

4) Type in the data for the desired record.

5) Press <Enter>.

TCBase finds the record and displays it in the data window. If the record isn't found, TCBase returns the message "CAUTION! not exact match". The next record is displayed in the User ID window.

PASSWORD PROTECTION

TCBase provides an advanced security feature to prevent unauthorized access to the database information. Greater password protection may be desirable if the office computer resides in a high-traffic area available to unauthorized persons. TCBase has five distinct levels of security. Each level is assigned a unique password (if desired). System operators access the appropriate level of security with the assigned password for that level.

The password feature is accessed by pressing <Shift> + <F9> from the main menu. Figure 3-3 shows the password screen.

```
┌─Passwords──────────────────┐
│                            │
│     Level Password         │
│     ----- --------         │
│       1_   *               │
│       2_   *               │
│       3_   *               │
│       4_   *               │
│                            │
│   Enter the number of the level │
│   you wish to change: ■    │
│                            │
└────────────────────────────┘
```
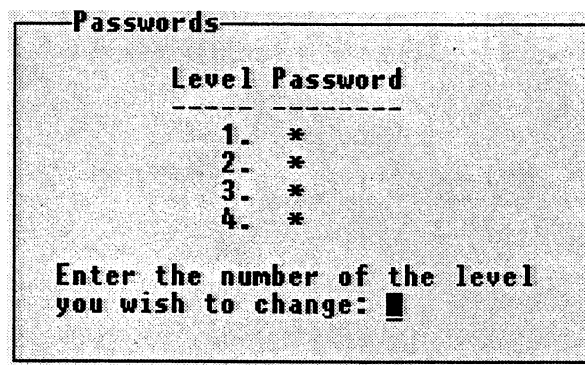
Figure 3-3. Password Protection Screen

Section 3. Programming Overview

When TCBase is first installed, the system defaults to full user-access. This is noted in the upper right corner of the TCBase screen as "SUPERVISOR mode". The message is displayed to warn the system operator that anyone has full access to the database. Anyone who knows the <Shift> + <F9> sequence can change the password and lock authorized personnel out of the system. If this happens, follow the procedure in "Restoring Passwords" on page 3-12.

TCBase remains in the supervisor mode until the <Shift> + <F9> sequence is pressed, passwords are altered, and TCBase is restarted.

Levels of Security

TCBase has four security levels and one low-level (0), restricted access mode that requires no password. The capabilities of each level are shown in Table 3-2.

Table 3-2. TCBase Security Access Levels

Level	Main Menu	Submenu #1	Submenu #2
0	Comm	Monitor rptr. Loading Status info.	
	Other	Exit	
1	Edit, View, and Print	Site config Repeater config	
	Comm	Update get/Verify reseT model 452/459s Other	Change Modem string
	Other	Change pc modem parms	
2	Edit, View, and Print	User ids Autodial table Local prefix table	
	Comm	Update get/Verify	
	Backup and Restore	Config data call Detail	
3	Comm	Retrieve	Billing Records
	Backup and Restore	Config data call Detail	
	Other	create User file	
4	ALL	ALL	ALL

The levels are numbered, but the numbers do not reflect increasing levels of access. Each level 1-4 user can change their own password.

Levels of Security Menu Tree

Figure 3-4 shows the TCBase menu tree. The numbers in parenthesis next to each menu selection indicate the minimum level of security required to access the function.

Level 2, 3, or 4 security is needed to backup and restore files. Level 1, 2, or 4 security is needed to update and verify. Level 1, 2, or 3 security is needed to change the user's own password. Level 4 security is needed to change all the passwords.

☞ **Note:**

The security level access designations may change as new features are added to TCBase.

Edit	View	Comm	Print	Backup	Restore	Other

Site config (1)
Repeater config (1)
User ids (2)
Autodial table (2)
Local prefix table (2)

Update (1 or 2)
get/Verify (1 or 2)
Retrieve (3)
Monitor (0)
rptr. Loading (0)
Status info. (0)
reseT model 452/459s (1)
Other (1)

Config data (1,2, or 3)
call Detail (1,2, or 3)

Change pc modem parms (1)
change 452/459<-> PC password (4)
create User file (3)
Exit (0)

Site config (1 or 2)
Repeater config (1 or 2)
User ids (1 or 2)
Autodial table (1 or 2)
Local prefix table (1 or 2)
Changes (1 or 2)
Entire database (1 or 2)

Billing Records (3)

change Password (4)
set date & Time (1)
clear Billing buffers (4)
clear Alarms (1)
change Modem string (1)
Status Logs (1)

Figure 3-4. Security Level Menu Tree

Setting the Passwords

To get the password entry screen, press <Shift> + <F9> from the main menu. The password screen is *only* available from the main menu.

Passwords must be one to eight ASCII characters long. They are case sensitive, and no spaces are allowed within a password. Bad characters are automatically filtered out during entry. The character string "HELP" is not an acceptable password.

Enter a password for each security level that is password protected.

After typing in a password, press <Enter> to make it valid. To cancel an entry, press <Esc>. You must exit and restart TCBase to make the password changes take effect.

Unlimited Access Password

To allow unlimited access to a security level, enter a single star "*" for the password. That level becomes accessible to all users.

Caution:

Never set passwords for security levels 0-3 and then enter a * for level 4. If passwords are programmed this way, the passwords are ignored and all users are granted level 4 access.

Certain menu items are accessible from more than one security level. If a password exists for one level of a shared menu item and * is the password for another level of the same menu item, access is denied for users at the star's level.

If two levels of security are assigned the same password (not *), any user with that password can access both levels.

Note:

The character string "" is a valid password and is not interpreted the same as a single star "*".**

Using Passwords

When TCBase is restarted, the same main menu screen appears. If the user attempts to access a protected menu item, TCBase prompts for the password as shown in Figure 3-5. If an incorrect password is entered, the user can reenter a password by selecting the menu item again. When the password is entered correctly, the menu selection is accessed and the user gains new security privileges.

```
┌─STATUS─────────────────────┐
│You lack sufficient privilege for│
│the command you just attempted.  │
│You can now enter a password to  │
│change your access level.        │
│   Password: █                   │
│                                 │
└─────────────────────────────────┘
```
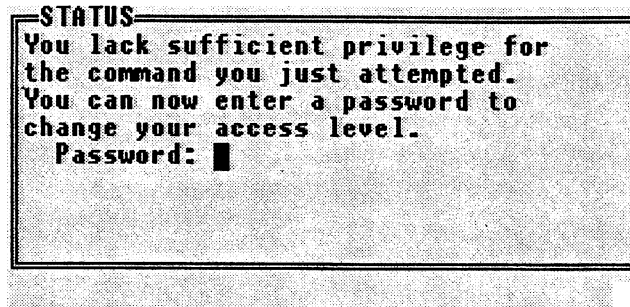
Figure 3-5. Password Entry Prompt

Users can migrate between access levels, but a level 4 user cannot change levels without exiting and restarting TCBase. In addition, once level 0 access is upgraded, it cannot be re-entered without exiting TCBase. Figure 3-6 illustrates the movement between the five security access levels.
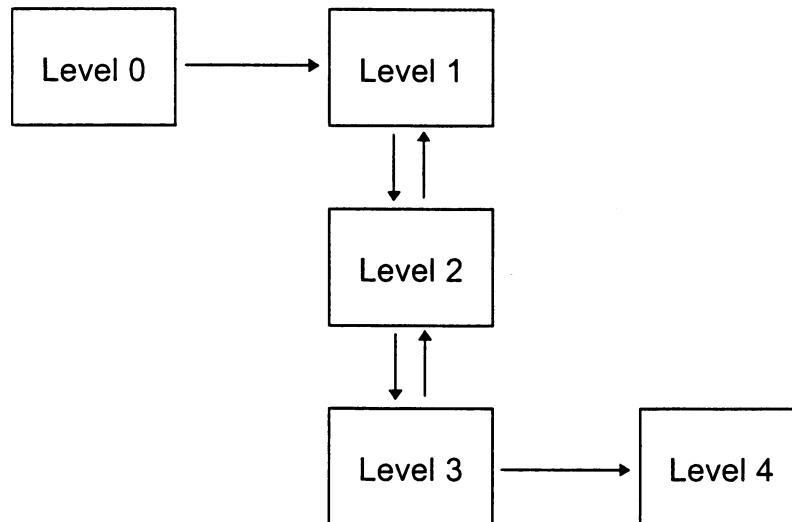
Figure 3-6. Migration Between Security Access Levels

Caution:

Users should always quit TCBase after they are done changing any passwords to prevent unauthorized access.

Changing Passwords for Security Levels 1, 2, and 3

The user can change the password for their level of security if the current level is 1, 2, or 3. Pressing <Shift> + <F9> from the main menu allows the user to change their password. Once again, "HELP" is an invalid password. In addition, if a "*" is entered, the current password is cleared and anyone can access that level of security.

Restoring Passwords

🖐 Caution:

The password restoring procedure grants full security access. Only authorized personnel should have access to this procedure.

TCBase provides an emergency method of restoring passwords in the event that they are forgotten or the system locks up. If TCBase denies any access, enter "HELP" as a password. A five-digit number appears on the screen similar to the one shown in Figure 3-7. (This number changes each time "HELP" is entered.)

```
┌─STATUS──────────────────┐
│You lack sufficient privilege for
│the command you just attempted.
│You can now enter a password to
│change your access level.
│ Password:
│
│Locked: 11841
└─────────────────────────┘
```

Figure 3-7. Password Restoration Help Code

Contact Zetron technical support for assistance. An applications engineer will ask for the number that appeared on your screen, so have it handy when you call. Once you have entered the access number provided, press the <Shift> + <F9> key sequence to verify that the passwords were restored.

🖐 Caution:

Please write down the passwords and store them in a secure location to avoid accidental disclosure. If a system user forgets their password, they should get help from the system supervisor, NOT ZETRON!

THE MAIN MENU

When TCBase starts, the main menu appears on the computer screen. Select menu items using the arrow and <Enter> keys. Figure 3-8 shows the main menu screen.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron        (SUPERVISOR mode)

∞  Edit    View   Comm    Print    Backup    Restore    Other   ∞

   ┌────────────────────┐
   │ Site config        │
   │ Repeater config    │
   │ User ids           │
   │ Autodial table     │
   │ Local prefix table │
   └────────────────────┘




   ┌HELP───────────────────────────┐
   ║Select item with arrow keys and║
   ║ENTER or capital letter. ESC to quit║
   ║                               ║
   ║Edit Site Config allows the Site║
   ║Configuration data to be changed.║
   ║Additions, deletions and modifications║
   ║can be done. Then use Comm Update.║
   └───────────────────────────────┘
```

Figure 3-8. TCBase Main Menu

The menu line (at the top of the screen) lists seven categories of operations that TCBase can perform. Each menu has several sub-menus or fields under it.

Edit Menu

The editing menu allows the operator to look at the way everything is configured and make changes along the way. The Edit menu is used on initial installation to add subscribers, sites and system configurations. The Edit menu is also used to alter any of those items.

The selections available in the Edit menu are shown in Figure 3-8 and listed below.

- ♦ Site config
- ♦ Repeater config
- ♦ User ids
- ♦ Autodial table
- ♦ Local prefix table

Select Edit, Site config to begin editing. Create a new site by entering a number in the Site Number field. Then continue by programming Repeaters, User IDs, Autodial and Local Prefix Numbers.

View Menu

The viewing menu allows the system operator to see all the same things that the Edit menu does. The critical distinction, however, is that no changes can be made from the View menu. This menu is useful when it is desirable to see database entries without making any accidental changes to the settings.

The selections available in the View menu are:

- ◆ Site config
- ◆ Repeater config
- ◆ User ids
- ◆ Autodial table
- ◆ Local prefix table

Comm Menu

The Communication menu links to the site, either through an RS-232 cable or a modem connection. This allows the operator to send or retrieve data from the site. As soon as any selection is entered from the Comm menu, the computer attempts to make a connection with the controller.

The selections available in the Comm menu are:

- ◆ Update
- ◆ get/Verify
- ◆ Retrieve
- ◆ Monitor
- ◆ rptr. Loading
- ◆ Status info.
- ◆ reseT model 452/459s
- ◆ Other

Figure 3-9 shows the Communications menu choices.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron        (SUPERVISOR mode)

∞ Edit    View   Comm    Print    Backup    Restore    Other  ∞
              ┌──────────────────────────────┐
              │ Update                        │
              │ get/Verify                    │
              │ Retrieve                      │
              │ Monitor                       │
              │ rptr. Loading                 │
              │ Status info.                  │
              │ reseT model 452/459s          │
              │ Other                         │
              └──────────────────────────────┘

   ┌─HELP─────────────────────────────────┐
   │ Select item with arrow keys and      │
   │ ENTER or capital letter. ESC to quit │
   │                                      │
   │ Comm Update updates the selected     │
   │ Model 452/459 Site with configuration│
   │ data.                                │
   │                                      │
   └──────────────────────────────────────┘
```
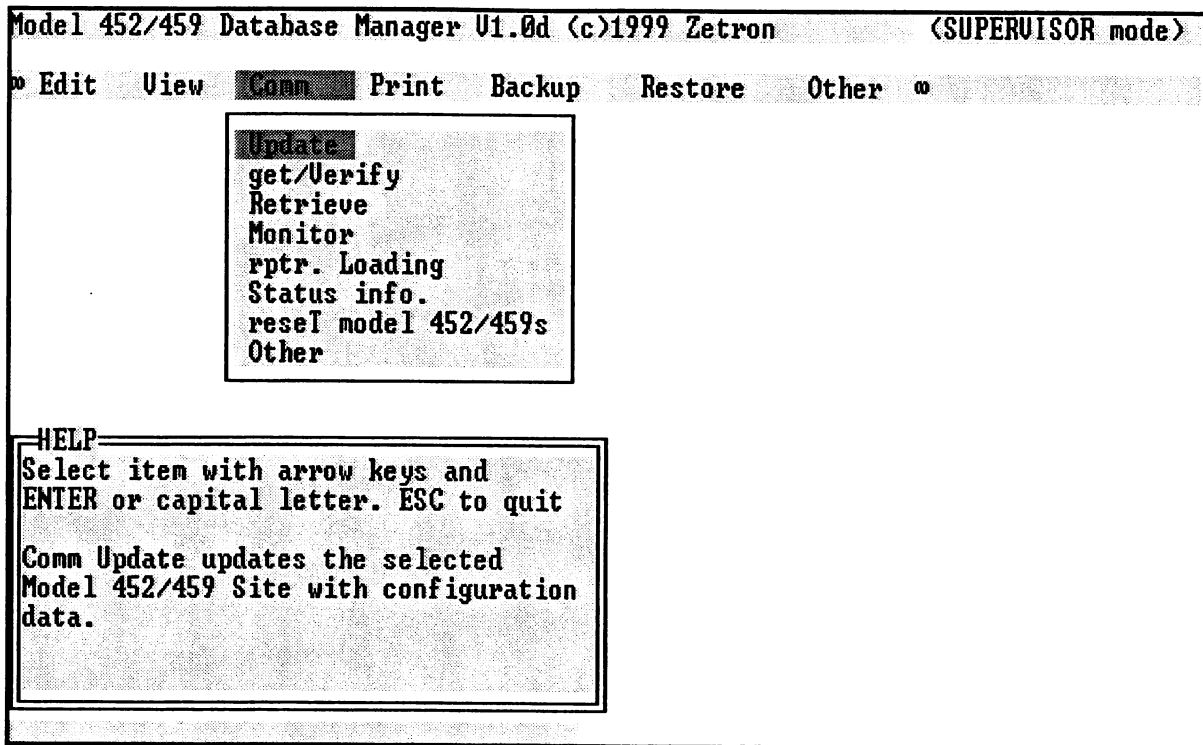
Figure 3-9. Comm Menu

When Comm is selected, TCBase prompts for the site number to call. Then an automatic connection is made using the Site Access method programmed in Site config (See Section 2). Once a connection is made, Other options can be selected from the Comm menu without disconnecting from the site.

Updating the Site

To update a Model 452/459 site with the new or changed database information, select Update from the Comm menu. Choose the appropriate site. TCBase automatically connects to the selected site and prompts for an update type as shown in Figure 3-10. The box on the right provides seven choices of the type of data to update.

```
┌──────────────────┐
│ Site Config      │
│ Repeater Config  │
│ User Ids         │
│ Autodial Table   │
│ Local Prefix Table│
│ Changes          │
│ Entire Database  │
└──────────────────┘
```
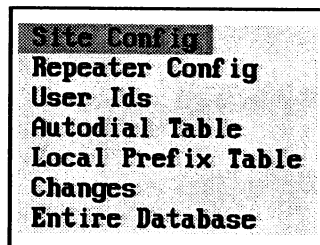
Figure 3-10. Comm Update Menu

Select Entire database if this is the first site update. This ensures that the Model 452/459s are configured exactly like the database.

If the status message "No bus master, cannot clone data" appears, the updated unit cannot perform automatic cloning to the other Model 452/459s on the subscriber bus. If only one unit is being updated, ignore the message. If the site was accessed through a remote modem connection, there is a problem on the subscriber bus. The problem is one of the following:

- ◆ the bus master unit may be inoperative

- ◆ the data bus cable is faulty or improperly connected

- ◆ one of the Model 452/459s is not set as master via the front panel DIP switches (See the Model 452/459 installation and operation manual [Part No. 025-9450]).

Verifying the Site Programming

To ensure that the programming information in the Model 452/459 is current, select get/Verify from the Comm menu. TCBase dials the selected site, checks the computer files against the controller's RAM contents. If a discrepancy is found, TCBase notes the mismatch in the Status box. If get/Verify, Entire database is selected, a new site is created in the database named VERIFIED SITE. All of the retrieved data is stored in the new database. No Other selection from the get/Verify menu creates a new database.

☞ **Note:**

When the entire database is verified, data is retrieved from all the active repeaters, even if they have not been programmed. If a nonexistent repeater has been programmed, that data is also retrieved. Unassigned users are not retrieved.

Retrieving Billing Data

A Comm, Retrieve gathers billing data from all the controllers at the selected site.

📖 **Note:**

For more details on statistics and billing retrieval, see Section 5.

Traffic Monitoring

Activity for every repeater channel at the radio site is available by selecting Monitor from the Comm menu. Real-time traffic is displayed for every unit connected on the repeater bus.

As mobiles key and release their PTT, the display is updated automatically with a momentary delay. Depending on the modem data rate, the delay is approximately 2 to 4 seconds from site activity to display changes.

The real-time monitoring screen shows each repeater number, the mobile (home/ID) using that channel, the type of mobile call (dispatch or interconnect), and how long the call has been in progress. If the mobile is invalid in the database, a home = 21 appears on the screen. If the repeater is busied up to send the station ID, either at the end of a call or because of a cross-busy condition, a 253 appears in the ID field.

Monitoring is useful for watching system activity during peak periods and traffic congestion as mobiles move from channel to channel. Select Monitor from the Comm menu and TCBase connects to the site and displays a screen like that shown Figure 3-11.

```
Model 452/459 Database Manager V1.0 (c)1999 Zetron (SUPERVISOR mode)

    ┌─────────────────────────────────────────────────────────────────────┐
    │              MODEL 452/459 SITE 0001 - REAL-TIME MONITORING          │
    │                                                                       │
    │   Date: 06/30/99  Time: 13:04:03  System Loading: 32%                │
    │                                                                       │
    │   RPTR #  HH-UUU  TYPE  MM:SS          RPTR #  HH-UUU  TYPE  MM:SS    │
    │                                                                       │
    │     01    Idle                           11      -                    │
    │     02    02-020   D   00:12             12      -                    │
    │     03    -                              13    13-098   D   00:31     │
    │     04    -                              14      -                    │
    │     05    05-145   I   01:07             15      -                    │
    │     06    -                              16      -                    │
    │     07    -                              17    09-117   I   03:29     │
    │     08    -                              18      -                    │
    │     09    01-021   D   00:09             19      -                    │
    │     10    -                              20      -                    │
    │                                                                       │
    └─────────────────────────────────────────────────────────────────────┘

enter ESC to exit....
```

Figure 3-11. Real-Time Monitoring

Press the <Print Scrn> key for a Printed copy of the display. Make sure that the Printer is attached to parallel port LPT1 and that the Printer is on-line and ready for Printing.

Repeater Loading

Each Model 452/459 keeps a statistical history of repeater use. This information can be used to study system usage and predict peak period congestion. Then adjust the TCBase conversation time limits accordingly to encourage off-peak usage.

To view the repeater loading history, select rptr. Loading from the Comm menu. TCBase connects to the site, retrieves the loading information and displays a screen like that shown in Figure 3-12.

Model 452/459 Database Manager V1.00 (c)1999 Zetron (SUPERVISOR mode)

```
┌────────────────────────────────────────────────────────────────────────────┐
│                   MODEL 452/459 SITE 0001 - REPEATER 01 LOADING              │
│  Date: 06/30/99  Time: 15:37:01                                              │
│                                                                              │
│  Min                                                                         │
│  60|                                                                         │
│  55|                                                                         │
│  50|               *                                                         │
│  45|               *                                                         │
│  40|               *                                                         │
│  35| *             *                                                         │
│  30| *     *       *                              +                          │
│  25| *  *  *       *           *            +  *+                            │
│  20| *  *  *       *     +  *+ *            +  *+ *+                          │
│  15| *  *  *  *    *    *+ + *+ *       *   *+ *+ *+                          │
│  10| *  *  *  *    *    *+ + *+ *+ *+ +  *+ *+ *+ *+  +                       │
│  5 | *  *  *  *  * *    *+ *+ *+ *+ *+ *+ *+ *+ *+ *+  +  +                    │
│  0 | *  *  *  *  * *  *+ *+ *+ *+ *+ *+ *+ *+ *+ *+ *+  +  +  +  +  +          │
│  HR 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23  │
│    Hit PGUP/PDGN to get next/previous repeater          * - Today            │
│    Hit ESC to exit                                      + - Yesterday        │
└────────────────────────────────────────────────────────────────────────────┘
```
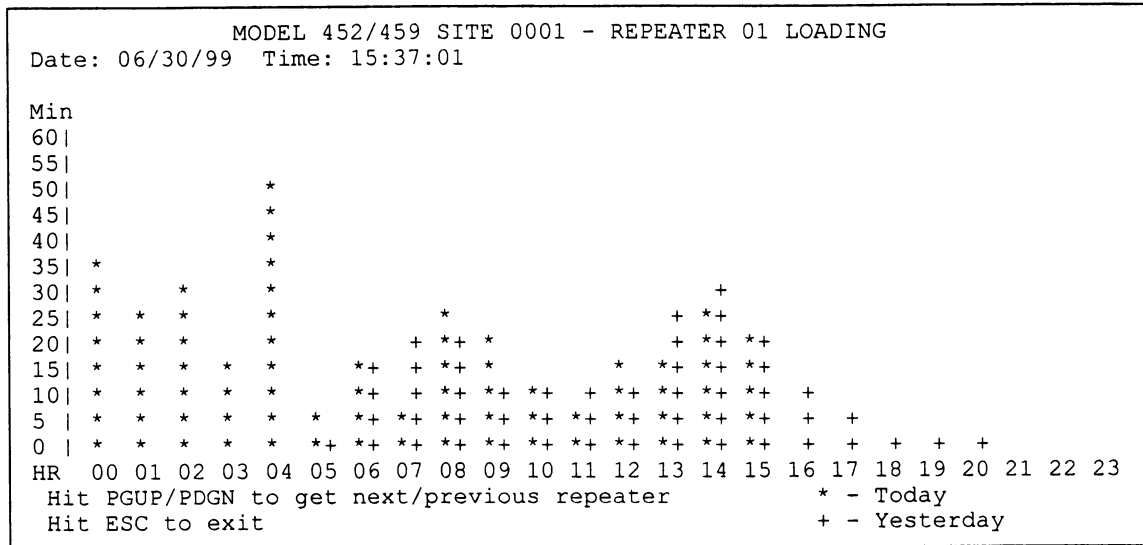
Figure 3-12. Repeater Loading

Use the <Page up> and <Page down> keys to select loading graphs for different repeaters in the system. Press <Esc> to return to the main menu. These graphs are also saved to a disk file named MMDD####.RLD, where:

- ♦ MM = month

- ♦ DD = day

- ♦ #### = site number

Status Information

Status info. in the Comm menu retrieves status information from all controllers at the selected site. The information is stored in a data file and displayed on the screen as shown in Figure 3-13. The file is named STAT####.INF, where #### is the site number.

The first bracketed number shown is the hexadecimal option byte. The second bracketed number is a status code for internal configuration for Zetron applications engineers.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)
┌─────────────────────────────────────────────────────────────────────────┐
│              MODEL 459 SITE 0002 - REPEATER 01 STATUS INFO                 │
│   Version:  1.0  Installed Options [2B]: Telco Support  SMDR              │
│                               FASTNet  Ghost Rptr.                        │
│                               Code: [44]                                  │
│ Switches and Jumpers as Last Read Telco Type: E&M                        │
│ Dip Switches: TEST   UNUSED  BAUD  MSTR  UNUSED  AREA  REPEATER           │
│               DN      DN     9600  DN    DN      0     01                 │
│                                                                           │
│ Current Switches and Jumpers Telco Type: E&M                             │
│ Dip Switches: TEST   UNUSED  BAUD  MSTR  UNUSED  AREA  REPEATER           │
│               DN      DN     9600  DN    DN      0     01                 │
│ # SMDR Records: 79                                                        │
│ Avail. Rptrs: 01 02                                                       │
│ All Alarms Disabled.                                                      │
│ Cross Busy Not Active                                                     │
│                                                                           │
│                                                                           │
│                                                                           │
│   Hit PGUP/PDGN to get next/previous repeater, ESC to exit               │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 3-13. Repeater Status Information

Resetting the Model 452/459s

Selecting Comm, reseT model 452/459s performs a soft rest of every controller in the system. When TCBase connects to the site, a prompt asks "Reset Model 452/459s (y,n)?" When a "y" is entered, TCBase automatically disconnects form the site and resets the units.

Other Communications Options

Selecting Comm, Other brings up another menu box as shown in Figure 3-14. The choices available are:

- ♦ Change Password
- ♦ Set Date & Time
- ♦ Clear Call Accumulation
- ♦ Clear Call Detail Buffers
- ♦ Clear Alarms
- ♦ Change Modem string

```
┌─────────────────────────────────┐
│ ▓Change Password▓               │
│ Set Date & Time                 │
│ Clear Call Accumulation         │
│ Clear Call Detail Buffers       │
│ Clear Alarms                    │
│ Change Modem String             │
└─────────────────────────────────┘
```
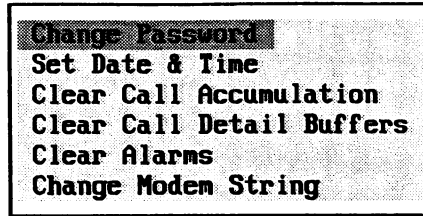
Figure 3-14. Comm, Other Menu

Select Change Password to store a new password in the Model 452/459s. When a new password is entered, it applies to both the controllers and TCBase. To change only the TCBase password, use the Other menu (See "Other Menu" on page 3-23).

Select Set Date & Time to program the Model 452/459s internal clocks. Set the time when the system is installed. Some of the Model 452/459's advanced operating features use the built-in clock chip. The time-dependent features include deferred access during non-prime time, repeater loading statistics, and call detail records.

Clear Call Accumulation

Select Clear Call Accumulation to reset the airtime files to zero.

Clear Call Detail Buffers

Select Clear Call Detail Buffers to erase the current SMDR billing files.

Clear Alarms

Select Clear Alarms to reset any existing alarms. If the condition that caused an alarm still exists, the alarm is immediately set off again.

Change Modem String

Select Change Modem String to alter the modem initialization string for an external modem connected to the controller's front panel RS-232 port.

Print Menu

The Printing menu produces hard copy listings of the database information. This menu is useful when a Printed record is needed for system management.

The selections available in the Print menu are:

- ◆ Site config
- ◆ Repeater config
- ◆ User ids
- ◆ Autodial table
- ◆ Local prefix table

Figure 3-8 on page 3-13 shows the editing menu, which is identical to the Printing menu.

The Printed output can be directed to the Printer or to a disk file. In addition, the Printout can be sorted by any data field that appears in the index window. For example, a Printout of the user information can be sorted by ID, Name, or Account number. TCBase provides sorting choices when the Print function is selected. Figure 3-15 shows the sorting options available when Print, User IDs is selected.

```
┌─STATUS────────────────────────┐
│  Print Users in which order?   │
│   I) User Id    S) Status  T) Type │
│   N) Access #   A) Customer Account │
│   C) Comments                  │
│                                │
│  Make your choice by typing one of: │
│  I, S, T, N, A or C: █         │
└────────────────────────────────┘
```
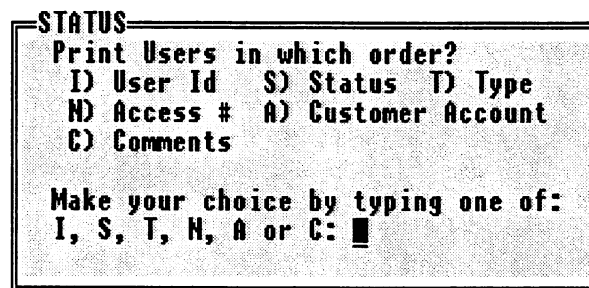
Figure 3-15. Print, User ids - Sort Options

Backup Menu

The Backup menu copies the system data to floppy disk for safe storage. This is a good precaution, in case of any accidental changes in the system configuration or unexpected crash of the office computer. Zetron recommends a daily backup of the database information.

The selections available in the Backup menu are:

- ◆ Config data
- ◆ call Accumulation
- ◆ call Detail

Figure 3-16 shows the Backup Menu options.

```
┌─────────────────────┐
│ Config data         │
│ call Accumulation   │
│ call Detail         │
└─────────────────────┘
```
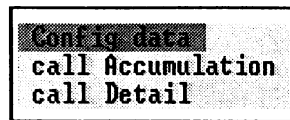
Figure 3-16. Backup Menu

Every time the database is edited, the data files change on the computer's hard disk. To avoid confusion in case of an emergency, copy the database to floppy diskettes.

Copying the Database File to Floppy Disk

1) Before beginning a backup, DOS format several blank diskettes. Every 1000 user ID's requires approximately 360 KB of free disk space. Insert the disk to be formatted and at the DOS prompt type:

    FORMAT A: (or the appropriate drive letter)

2) It is a good idea to label the diskettes with the date and sequence number. For example, "TCBase Backup - today's date - disk #n".

3) As you remove each backup disk from the computer, write-protect it. If the diskette is a 3½", open the shutter window in the lower left corner of the disk.

4) Return to TCBase and select Config data from the Backup menu.

5) Enter the appropriate drive letter when TCBase asks where the backup disks are located.

6) Follow the precise on-screen instructions TCBase gives to complete the backup procedure. Figure 3-17 shows the next screen.

```
┌─STATUS────────────────────────┐
│Place backup diskette into drive A:│
│for the configuration data.     │
│This diskette will be used to store│
│the files *.dat.                │
│Existing files will be deleted. │
│I will ask for more diskettes if│
│needed.                         │
│                                │
└────────────────────────────────┘
┌────────────────────────────────┐
│press ENTER key to proceed...   │
└────────────────────────────────┘
```
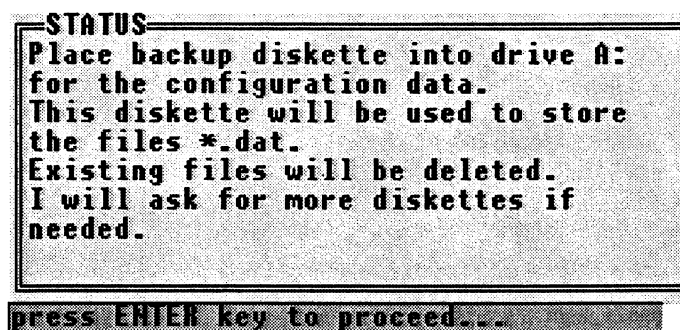
Figure 3-17. Backup Status Message

Restore Menu

The Restore menu has the same options as the backup menu, but it performs the reverse function. The Restore menu copies system data from floppy disk back to the office computer.

The selections available in the Restore menu are:

- ◆ Config data
- ◆ call Accumulation
- ◆ call Detail

If the TCBase configuration data needs to be restored from backup diskettes to the computer hard disk, select Config data from the Restore menu. Follow the on-screen instructions. It is a good idea to write-protect the backup disks before inserting them in the drive in case anything goes wrong.

Caution:

Be sure to use the most current set of backup diskettes to restore the database information. Data can only be restored from the identical version of TCBase. If the revision stamps don't match, use the version of the backups.

Other Menu

The Other menu contains miscellaneous operations that do not fall into any of the Other menu categories. The selections available in the Other menu are:

- ◆ Change pc modem parms
- ◆ change 452/459 ←→ PC password
- ◆ create User file
- ◆ Exit

Figure 3-18 shows the Other menu choices.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)

∞ Edit    View    Comm    Print    Backup    Restore    ▓Other▓∞
                                              ┌────────────────────────────────┐
                                              │ Change pc modem parms          │
                                              │ change 452/459 <-> Pc password │
                                              │ create User file               │
                                              │ Exit                           │
                                              └────────────────────────────────┘



   ┌─HELP════════════════════════╗
   ║Select item with arrow keys and ║
   ║ENTER or capital letter. ESC to quit ║
   ║                                     ║
   ║This option allows changes to be    ║
   ║made to the modem initialization    ║
   ║string sent to the modem connected  ║
   ║to your PC.                         ║
   ╚════════════════════════════════════╝
```
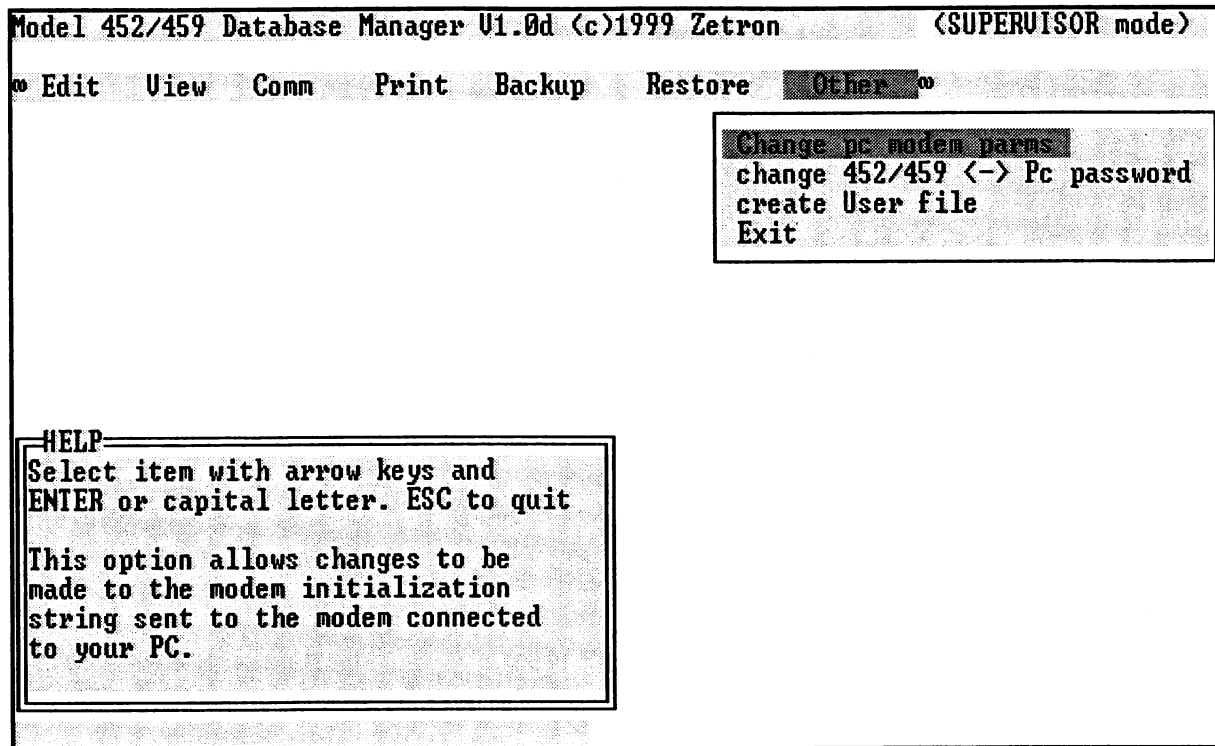
Figure 3-18. Other Menu

Change pc modem parms

The Change pc modem parms selection changes the Communications parameters between the office computer and the modem.

📖 **Note:**

For details on modem initialization strings, refer to Section 2.

---

change 452/459 ←→ PC password

If the password in TCBase does not match the password in the Model 452/459s at the site, use the Other menu to change the TCBase password. This selection changes only the password in TCBase, not in the controllers. Use Comm, Other, change Password to change the password in both TCBase and the Model 452/459s.

create User file

The create User file selection writes to a file called *.U00 for billing use. For details on the format of the user file, see Section 5.

<u>Exit</u>

Exit from TCBase by choosing Exit from the Other menu or by pressing <Esc>.

ON-SCREEN HELP BOX

The Help box is located in the lower left corner of the screen (see Figure 3-19). This window provides information about using TCBase. The help text is context sensitive and changes depending on the highlighted field.

```
┌─HELP════════════════════════════
│Select item with arrow keys and
│ENTER or capital letter. ESC to quit
│
│Comm Get/Verify verifies config. data
│in the selected Model 452/459 site
│against the current database files
│and stores site data into database if
│Entire Database is retrieved.
└─────────────────────────────────
```
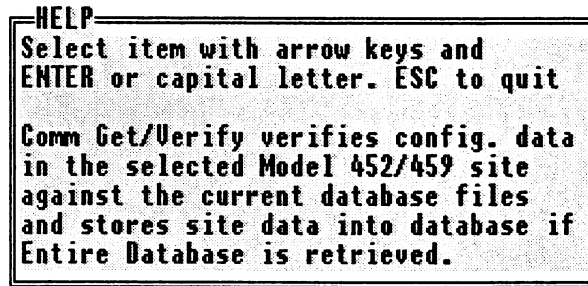
Figure 3-19. TCBase Help Example

The help text corresponds to the highlighted menu selection. In this example, the help text describes a get/Verify from the Comm menu.

ALERT AND STATUS MESSAGES

Messages displayed in the lower left corner of the computer screen below the Index window alert the system operator to special database actions.

During some operations, the Help window changes to a Status window (see Figure 3-20) to show the progress of the requested operation. For instance, the message, "connecting with the site" appears in the Status box when any Comm menu operation is selected.

```
┌─STATUS═══════════════════════════
│Output being written to printer.
│Printing detail information.
│Page: 1     Record: 1
│Done writing to printer.
│
│
│
└─────────────────────────────────
  press ENTER key to proceed...
```
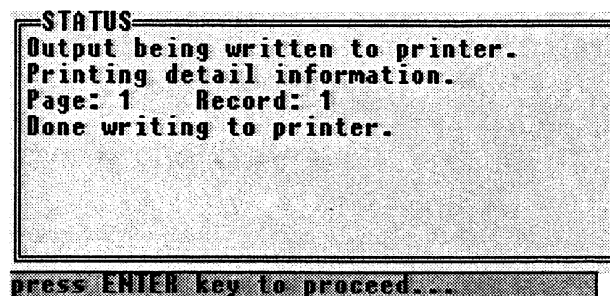
Figure 3-20. TCBase Status Message Example

3-25

4. DATABASE SETUP

DATABASE ORGANIZATION

In the default state of the controller after a hard reset, all user IDs are valid dispatch IDs. TCBase has five different database sections. Each of the sections are tied together in programming. Therefore, the order in which each section is programmed is crucial to proper integration of the system. The main Edit menu shown in Figure 4-1 lists each of the menu choices that need to be programmed.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)

∞ Edit    View    Comm     Print    Backup    Restore    Other  ∞

  Site config
  Repeater config
  User ids
  Autodial table
  Local prefix table




 ┌HELP─────────────────────────────┐
 │Select item with arrow keys and  │
 │ENTER or capital letter. ESC to quit│
 │                                 │
 │Edit Site Config allows the Site │
 │Configuration data to be changed.│
 │Additions, deletions and modifications│
 │can be done. Then use Comm Update.│
 └─────────────────────────────────┘
```

Figure 4-1. Edit Menu

When setting up a database for the first time, a new site number must be created. Select Site config from the Edit menu. Press <Enter> to move to the data window. Enter a site number and then press <Esc>. Now continue programming the following five sections in order.

If you have both Model 49 and Model 452/459 sites, ensure that no site numbers are duplicated. Billing records from each of the Zetron controllers are stored in the MOBILL49 directory and could potentially be overwritten if site numbers are reused.

Site Configuration

The Site Configuration programming is used in all channels at a site and in each Model 452 and 459. The site configuration includes PC Communications settings, Alarms monitoring functions, Interconnect settings, and FASTNet switch interface settings.

Repeater Configuration

The Repeater Configuration programming gives each channel its own operating personality. Each controller contains the programming for all channels in a system. The DIP switches on the front of the unit determine which channel or repeater programming is used for this particular channel. See the Model 452/459 installation and operation manual (Part No. 025-9450) for more information on setting the DIP switches.

User IDs

The User ID programming gives each user dispatch or interconnect calling privileges. Other options are programmed under User ID, such as the user access #, billing rate and status.

☞ **Note:**

Push-to-Connect (PTC) Users are programmed in the User ID window.

Autodial Table

The Autodial Table (also called system speed dial) is programmed to dial a preprogrammed number by pushing star and a two-digit code (*nn). Commonly used phone numbers are preprogrammed into the Autodial Table for quick access by knowledgeable mobile customers.

Local Prefix Table

The Local Prefix Table determines which FASTNet calls are routed to local phone lines. This table may be ignored for non-FASTNet systems.

STEP 1. SITE PROGRAMMING

To begin defining a database for the Model 452/459 system, a site must be programmed. The site configuration database contains information that applies to all the repeaters that are connected in a system.

1) From the TCBase main menu, select Edit, Site config and press <Enter>. The blinking cursor appears in the Index window.

2) Press <Enter> again and the cursor moves to the Site Config window on the right side of the screen. Figure 4-2 shows the Site Config window for a new data record.

3) Type in a number for the new site and TCBase starts a new data record with the default values.

Note:

For details on navigating through the database, see Section 3 .

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌INDEX────────────────────────┐        ┌SITE_CONFIG────────────────────────┐
│Site       Site Name      I  │        │Site Number: [0004]                │
│0001 FASTNET SITE #1      Y  │        │Site Name:[DIRECT E&M LINK TO 5]   │
│0002 DISPATCH W/GHOSTS    N  │        │                                   │
│0003 MISCELLANEOUS SITE   Y  │        │Site Access:U ...  PC Comm Port:U  │
│0004 DIRECT E&M LINK TO 5 Y  │        │                                   │
│0005 DIRECT E&M LINK TO 4 Y  │        │Edit Prompts:U ...  Alarms:U ...   │
│                             │        │Prime Time Intervals               │
│                             │        │  1:Start: 06:00  Stop: 12:00      │
│                             │        │  2:Start: 13:00  Stop: 18:00      │
│                             │        │                                   │
│                             │        │Unassigned Users:U                 │
│                             │        │Idle Msg. Time:U                   │
│┌HELP─────────────────────┐  │        │COR Hold Time:U                    │
││Enter a up to a 4-digit  │  │        │Repeater Hold Time:U               │
││number that uniquely     │  │        │Repeater Timeout:U                 │
││identifies this site.    │  │        │                                   │
││                         │  │        │Interconnect:[Y] ...               │
││(This code is required   │  │        │                                   │
││to program Repeater and  │  │        │Create Date: 05/27/97              │
││User settings for this   │  │        │Alter Date:  06/04/97              │
││site).                   │  │        │                                   │
│└─────────────────────────┘  │        └───────────────────────────────────┘
│type F1 for GUIDE window     │
└─────────────────────────────┘
```

Figure 4-2. Site Configuration Window

Some of the fields in the Site Configuration window call out windows with additional sub-fields. Figure 4-3 shows the organization and location of the fields that point to other fields.

Shaded boxes indicate parameters that do not apply to the Model 452, because they pertain to interconnect functions.

SITE CONFIG

```
                    ┌──────┬──────┬──────┬──────┐
                    ▼      ▼      ▼      ▼      ▼
               ┌────────┐┌────────┐┌──────┐┌───────────┐┌──────────┐
               │  Site  ││  Edit  ││Alarms││Interconnect││   Edit   │
               │ Access ││Prompts ││Window││   Window   ││ Deferred │
               │ Window ││ Window ││      ││            ││  Table   │
               └────────┘└────────┘└──────┘└───────────┘└──────────┘
```
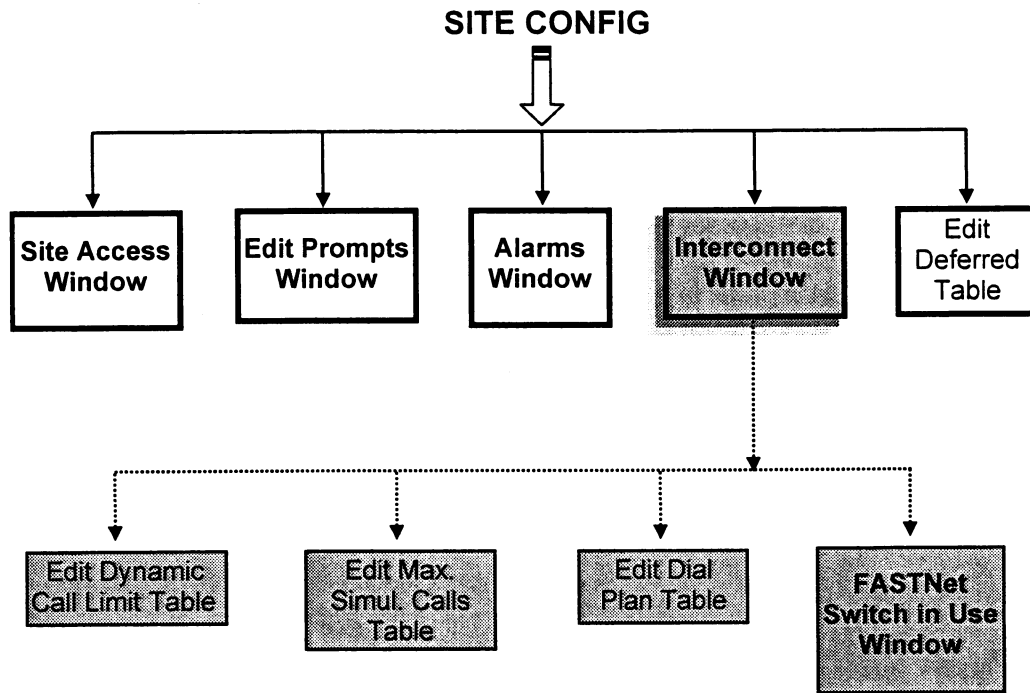
Figure 4-3. Site Configuration Fields Flowchart

The Site Configuration window contains the following fields:

Site Number

The Site Number is a four-digit number that uniquely identifies the site. This number is used to create the corresponding Repeater, User, Autodial, and Local Prefix files for each site.

The Site Number must be between 0000 and 9999. There is no default setting for the Site Number.

Site Name

The Site Name is a character string used to identify the site. This field is not required, although it can be used for sorting records for Printout, etc.

The Site Name can be up to 20 characters in length. There is no default setting for this field.

Site Access

The Site Access field indicates how the office PC Communicates with the site for programming. Depending on what is entered here, a pop-up window appears to enter the site phone number, if required, and the baud rate.

Note:

For more details on configuring TCBase for PC Communications, refer to Section 2.

The valid entries for the Site Access are I, L, and X. The default value is L.

PC Comm Port

The PC Comm Port field indicates which Communications port on the PC should be used when connecting with the Model 452/459 Site.

The valid entries for the PC Comm Port are 1-4. The default setting is 1.

Edit Prompts

The Edit Prompts field allows the tone and voice prompts to be customized for the system. To enable the voice prompts portion of this field, an optional voice prompt card (Part No. 950-9275) must be installed in the repeater. When the Edit Prompts field is set to Y a pop-up window appears as shown in Figure 4-4.

The Edit Prompts field default setting is N.

Note:

The Edit Prompts screen has more fields than just those shown in Figure 4-4. A second page of prompts is available.

```
┌─PROMPTS──────────────────────────────────┐
│ Are Voice Prompts Available?:▓           │
│                                          │
│   Message             Use Tone Voice     │
│                           M L  Asn Tm    │
│ 1 Welcome Message      V  Z 5  01* 05    │
│ 2 Call can't be cmpl.  V  Z 5  02* 03    │
│ 3 Thank You, Ringing   V  Z 5  03* 03    │
│ 4 Wait,processing call V  Z 5  04  03    │
│ 5 # Diald invalid/Rstr V  Z 5  05* 03    │
│ 6 # Invld,please retry V  Z 5  06* 04    │
│ 7 Please proceed       T  Z 5  07  02    │
│ 8 Alarm                T  Z 5  08  02    │
│ 9 Thanks for Reg. (PN) T  Z 5  09  02    │
│ 10 Call Discncting     T  Z 5  10  02    │
│  *can't alter code                       │
│ Voice Time -- Available:032 Total:032    │
│                                          │
│ Edit More Prompts?:▓                     │
└──────────────────────────────────────────┘
```

Figure 4-4. Prompts Window

Table 4-1 explains each column in the Edit Prompts window.

Table 4-1. Prompts Window Fields

Column Label	Valid Entries	Description of Function
Use	N (none) T (tone) V(voice)	USE: This field sets the type of prompt the user hears - tone or voice. Default setting is T.
M	Z (Zetron) U (Uniden) J (E.F. Johnson)	MANUFACTURER: This field sets the tone compatibility for the mobile units. Default setting is Z.
L	0 (low) - 5 (high) 0 - 7 allowed for DTMF	LEVEL: This field sets the tone level for each prompt. Default setting is 5.
Asn	01 - 20 01 - 03; 05; 06 can't be changed (indicated by *)	ASSIGN: This field tells the Model 459 when to play each individual prompt. Default settings depend on the prompt.
Tm	01 - 32 seconds	TIME: This field sets the maximum length for each voice prompt. Default settings depend on the prompt.

Enable Voice Prompts

The Voice Available field at the top of the window indicates whether a voice prompt card is installed in the Model 459. Set this field to Y if a card is installed.

The default setting is N.

Edit More Prompts

The Edit More Prompts field at the bottom of the window accesses another table of ten more tone/voice prompts.

Y (es) and N (o) are the only valid entries. The default setting is N.

> **Note:**
>
> **For more details on programming voice prompts, see Section 7.**

Alarms

The Alarms field indicates whether the system should respond to an alarm condition. Enter Y(es) to this field if the alarm feature is used at this site.

The Alarms field default setting is N.

When the Alarms field is set to Y, the window shown in Figure 4-5 appears.

```
┌ALARMS──────────────────────────┐
│ Alarm Id:██-██                 │
│ Alarm Rpts:001  Alarm Interval:060 │
└────────────────────────────────┘
```

Figure 4-5. Alarms Window

The alarms window contains the following fields:

Alarm ID

This field indicates the User ID (HH-UUU) to contact when an alarm condition is met. This feature of the alarms can be enabled or disabled for each individual alarm. When the User is contacted an "Alarm Tone" and a voice prompt (if available) are played.

If `00' is entered as the home repeater, the repeater number on which the alarm occurred is used as the home.

There is no default setting for this field.

Alarm Rpts

This field indicates the number of times the alarm should repeat once an alarm condition is met.

After the Alarm Rpts has been met for a particular condition, the alarm condition remains set and must be cleared before alarm messages will be sent again for that particular alarm condition.

The Alarm Rpts can be any number between 0 and 999. There is no default setting for this field.

Alarm Interval

This field sets the amount of time (in seconds) to wait between alarm repeats.

The Alarm Interval can be any number between 0 and 999. There is no default setting for this field.

☞   **Note:**

The Alarms fields only determine how the site responds to alarm conditions. Alarms must also be enabled in the Repeater Configuration. (See "Alarms Enabled" on page 4-25.)

Prime Time Intervals

These fields set up start and stop times for two prime time intervals. Airtime accumulation is stored either as prime or non-prime for billing extended rates during peak traffic times. If nothing is entered in these fields, or if the start time is equal to the stop time, all airtime is stored as non-prime time.

The times are set for each of the two intervals in 24-hour format (HH:MM). If only one prime time is required, simply enter "00:00" for the second period. The default setting is 00:00 for each start and stop time.

Unassigned Users

This field determines how unassigned users can access the system. By default, the controller considers all users to be unassigned and treats them all as valid dispatch. If this field is set to invalid, only those users programmed as valid in the User Config can access the system.

The Unassigned Users field can be set to I - invalid or V - valid. The default setting is V.

Idle Msg Time

This field indicates the amount of time (in seconds) the Model 452 or 459 should wait between transmitting idle repeater packets. The Idle Msg Time should normally be set to 10 seconds.

The Idle Msg Time should be a number between 0 and 25. The default setting is 10 seconds.

COR Hold Time

The COR Hold Time designates the amount of time (in seconds) that the COR signal may drop or fade without the mobile losing the repeater. It is recommended that this field be left at the default value. If this value is set too long, frequent audio squelch tails may result.

The COR Hold Time should be a number between 0 and 2. The default setting is 0.3 seconds.

Repeater Hold Time

The Repeater Hold Time sets the amount of time (in seconds) to hold the repeater keyed after transmitting a data packet. If the PTT relay is "chattering" when the home channel is free and one of the mobiles has been trunked off, this value should be increased.

The Repeater Hold Time should be a number between 0.0 and 5.0. The default setting is 0.3 seconds.

Rptr. Timeout

The Repeater Timeout is the maximum amount of time (in seconds) that a dispatch mobile may continuously occupy the repeater. Once this time elapses, the mobile is invalidated - turn-off codes are sent, and no audio is repeated. However, the mobile remains on the channel until PTT is released.
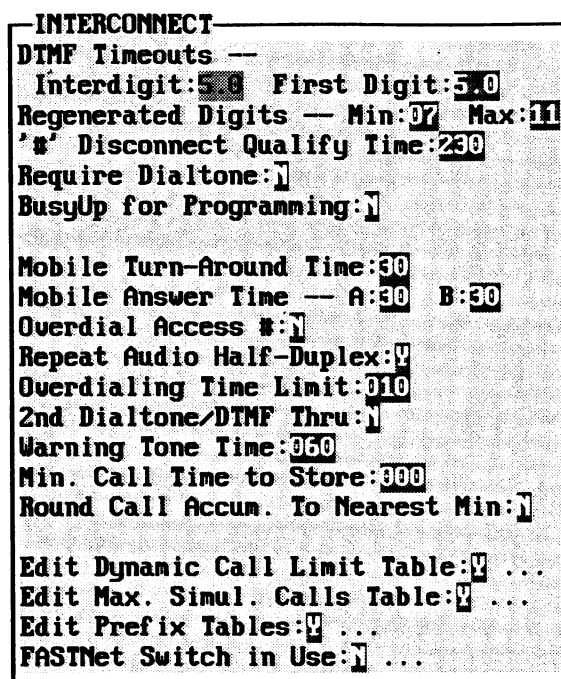
The Rptr. Timeout field should be a number between 30 and 999. The default setting is 180 seconds.

Interconnect

The Interconnect field determines if any repeaters in the system are interconnected. (Interconnect is not available for the Model 452 Trunking Controller.) When a Y is entered, a pop-up window containing fields that apply to interconnect operation appears (see Figure 4-6).

The default setting for this field is N.

```
┌─INTERCONNECT──────────────────────────┐
│DTMF Timeouts —                         │
│   Interdigit:5█  First Digit:5█0       │
│Regenerated Digits — Min:07  Max:11     │
│'#' Disconnect Qualify Time:230         │
│Require Dialtone:]                      │
│BusyUp for Programming:]                │
│                                        │
│Mobile Turn-Around Time:30              │
│Mobile Answer Time — A:30   B:30        │
│Overdial Access #:]                     │
│Repeat Audio Half-Duplex:Y              │
│Overdialing Time Limit:010              │
│2nd Dialtone/DTMF Thru:]                │
│Warning Tone Time:060                   │
│Min. Call Time to Store:300             │
│Round Call Accum. To Nearest Min:]      │
│                                        │
│Edit Dynamic Call Limit Table:Y ...     │
│Edit Max. Simul. Calls Table:Y ...      │
│Edit Prefix Tables:Y ...                │
│FASTNet Switch in Use:] ...             │
└────────────────────────────────────────┘
```

Figure 4-6. Interconnect Window

The following fields need to be programmed in the Interconnect Window:

DTMF Timeouts - Interdigit

This field sets the maximum amount of time (in seconds) that the Model 459 waits between DTMF digits before it concludes that dialing is complete. (Note: The Model 459 also stops regenerating digits on outgoing calls if PTT is released between digits.)

Enter the Timeout as a number between 2 and 9. The default setting is 5 seconds.

DTMF Timeouts - First Digit

This field sets the maximum amount of time (in seconds) that the Model 459 waits for the first DTMF digit to be entered. If the first digit is not entered within this time the call is dropped.

Enter the Timeout as a number between 2 and 9. The default setting is 5 seconds.

Regenerated Digits - Minimum

This field sets the minimum number of digits required from a mobile before the Model 459 assumes that dialing is complete. If the minimum digits are not entered and the interdigit timeout expires, the call is dropped.

Enter the Digits as a number between 1 and 12. The default setting is 7 digits (local phone number).

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Regenerated Digits - Maximum

This field sets the maximum number of digits that the Model 459 regenerates. Extra digits may or may not be lost, depending on whether the user is allowed to dial after regeneration is complete.

Enter the Digits as a number between 3 and 16. The default setting is 11 digits (long-distance phone number).

Require Dialtone

This field determines if dial tone is required for the Model 459 to make an outgoing call. If N is entered, the Model 459 dials immediately after the Start Supervision Seek Time expires, even if dial tone is not detected.

Y(es) and N(o) are the only valid entries. The default setting is N.

BusyUp for Programming

This field allows the repeater to busy up during an internal modem call to prevent attempted interconnect calls from trunking to this repeater. If BusyUp is not enabled, dispatch calls are allowed for this repeater.

Y(es) and N(o) are the only valid entries. The default setting is N.

Mobile Turn-Around Time

This field sets the maximum amount of time (in seconds) a half-duplex mobile is allowed between transmissions. A warning "beep-beep" is played 5 seconds before this time expires; the mobile must key-up immediately to prevent the call from disconnecting.

For two directly connected Model 459s with autonet enabled, this field sets the amount of time (in seconds) allowed with no mobile keyed at either site.

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

Enter the Turn-Around Time as a number between 1 and 90. The default setting is 30 seconds.

Mobile Answer Time - A (B)

This field determines the maximum period of time that a mobile has to answer an incoming landline call. Enter the maximum time (in seconds) that ringing is sent to the mobile.

The Mobile Answer Time can be between 10 and 90 seconds. The default setting is 30 seconds.

Overdial Access

This field determines whether callers must overdial the user's 4-digit access code (programmed in the User IDs) instead of the 5-digit home repeater and ID code.

For two directly connected Model 459s with autonet enabled, enter Y.

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

Y(es) and N(o) are the only valid entries. The default setting is N.

Repeat Audio Half-Duplex

This field determines whether audio should be repeated out the transmitter on half-duplex calls. This allows multiple mobiles with the same interconnect ID to hear the whole phone conversation. Otherwise, only the phone side of the conversation is heard.

For two directly connected Model 459s with autonet enabled, enter Y.

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

Y(es) and N(o) are the only valid entries. The default setting is Y.

Overdialing Time Limit

This field sets the maximum amount of time (in seconds) after the beginning of a call that DTMF overdialing is allowed. This field is only used if D or A is selected for the 2nd Dialtone/DTMF Thru field. Otherwise, full overdial is allowed.

Enter the Time Limit as a number between 0 and 250. The default setting is 0 seconds.

2nd Dialtone/DTMF Thru

This field sets some conditions that apply after DTMF regeneration is complete. The valid entries are as follows:

B	Selects disconnect on 2nd dial tone or five busy cycles
	Dial tone is only detected when the mobile is unkeyed.
D	Selects no DTMF through
	Extra digits are inserted whenever DTMF is detected from the mobile, to prevent the user from making additional calls. If the Overdialing Time Limit is greater then 0, then DTMF is allowed until that time expires.
A	Selects both conditions B and D
N	Selects None

The default setting is N.

Warning Tone Time

This field determines when call length beeps are sounded to the mobile user. Enter the time (in seconds) at which the first warning tones should sound. Beeps are repeated three times, 15 seconds apart.

Enter the Warning Tone Time as a number between 0 and 999. The default setting is 0 seconds - warning tones are disabled for the user.

Min. Call Time to Store

This field sets the minimum call length (in seconds) required on an interconnect call before an SMDR record is stored. A toll call is stored in the SMDR if the call length exceeds the minimum of 30 seconds and the Min. Call Time to Store. If this field is set to any value greater than zero, the number of records stored in the SMDR is greatly reduced since error calls are not stored.

Enter the Call Time as a number between 0 and 999. The default setting is 0 seconds.

Round Call Accum. to Nearest Min.

This field determines whether the call time for interconnect calls is rounded to the next minute before it is stored for billing. If the time over the last full minute is less then 6 seconds the time is rounded down, Otherwise it is rounded up. Dispatch call times are never rounded.

Y(es) and N(o) are the only valid entries. The default setting is N.

Edit Dynamic Call Limit Table

This field allows editing of the Dynamic Call Limit Table. The table sets up the interconnect call limits for incoming and outgoing calls based on user priority. (See "Priority" on page 4-43 for details on setting user priority.) When a Y is entered, the Dynamic Call Limit Table shown in Figure 4-7 appears.

Enter the limits in the table as minutes and seconds (MM:SS). Each limit is set to a default of 6 minutes.

```
┌─LOADING─────────────────────────┐
│      Dynamic Call Limit Table   │
│                                 │
│ System    Call Limits Priority  │
│ Loading   Low   Med   High  V.High │
│                                 │
│   <20%    06:00 06:00 06:00 06:00 │
│   <40%    06:00 06:00 06:00 06:00 │
│   <60%    06:00 06:00 06:00 06:00 │
│   <80%    06:00 06:00 06:00 06:00 │
│  <100%    06:00 06:00 06:00 06:00 │
│                                 │
└─────────────────────────────────┘
```

Figure 4-7. Dynamic Call Limit Table

Edit Max. Simul. Calls Table

This field allows editing of the Maximum Simultaneous Calls Table. The table limits the number of simultaneous calls allowed on the system. When a Y is entered, the table shown in Figure 4-8 appears.

```
┌─MAX_CALLS────────────────────────┐
│   Maximum Simultaneous Calls Table │
│                                  │
│ System  Max. Simul. Calls Allowed │
│ Loading Pri:Low  Med.  Hi.  V.High │
│                                  │
│   <20%     20    20    20    20   │
│   <40%     20    20    20    20   │
│   <60%     20    20    20    20   │
│   <80%     20    20    20    20   │
│  <100%     20    20    20    20   │
│                                  │
└──────────────────────────────────┘
```

Figure 4-8. Maximum Simultaneous Calls Table

Enter the limits for each of four priority levels in the table as numbers between 00 and 20. (See "Priority" on page 4-43 for details on setting user priority.) A setting of 00 means that

any user with the specified priority cannot access the system when the repeater loading reaches the indicated level.

The default setting is 20 calls for each priority and load level.

Edit Prefix Tables

This field provides access to the allow and restrict prefix tables (A and B) and the dial plan table (applicable to FASTNet switch calls). When a Y is entered, the secondary window shown in Figure 4-9 appears.

```
┌─RESTRICT──────────────────────────┐
│Edit Allow/Restrict Group A?:█ ... │
│Edit Allow/Restrict Group B?:░ ... │
│Edit Dial Plan Table?:░ ...        │
└───────────────────────────────────┘
```

Figure 4-9. Access Window for Prefix and Dial Plan Tables

The Restrict window provides three fields to access different tables.

Edit Allow/Restrict Group A (B)

Both prefix access fields determine what dialing prefixes the user can call. When either field is enabled by entering Y, the window shown in Figure 4-10 appears.

```
┌─PREFIX_A──────────────────┐
│                           │
│  Allow or Restrict Group A:█│
│                           │
│     Prefixes              │
│                           │
│  1. 976      2. 900       │
│  3. 555      4. 999       │
│  5.          6.           │
│  7.          8.           │
│  9.         10.           │
│ 11.         12.           │
│ 13.         14.           │
│ 15.         16.           │
└───────────────────────────┘
```

Figure 4-10. Prefix Access Table

The highlighted field at the top of the window determines whether the prefixes are allowed or restricted. The prefix tables provide the system operator extensive flexibility in programming a user's calling capabilities.

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The valid entries for the Allow or Restrict Group field are:

R   Restrict - The user cannot dial any of the prefixes listed in the table.

A   Allow - The user can only dial the prefixes listed in the table.

Then enter the prefixes into the table (1-16) as required. A question mark (?) can be used as a wildcard, to allow any digit. If a number is identified in both a restrict table *and* an allow table, it is allowed.

The default setting for the Allow/Restrict Prefixes fields is N. The default setting for the Allow or Restrict Group field is R.

☞   **Note:**

The Allow/Restrict Prefixes fields do not apply to FASTNet calls.

An emergency 911 call is always allowed regardless of the minimum required digits and the prefix restrictions.

Edit Dial Plan Table

This field provides access to the dial plan table. The table programs up to ten 16-digit dialing strings. When calls are being made through a FASTNet Switch, the digits dialed by the mobile user are matched against the strings in the dial plan table to determine the end of dialing. If a dialed number matches an entry in the dial plan table, the dialed number is immediately sent on to the FASTNet Switch without having to wait for the interdigit timeout to expire.

C, D, and N are the only valid entries for the Edit Dial Plan Table field.

To use the standard North American dialing plan, enter a D. The plan contains the following entries (see below for an explanation of the codes):

        NNXXXXX
        ANNXXXXX
        ANAXNNXXXXX
        1800XXXXXXX
        911
        411

When a C is entered, the dial plan table shown in Figure 4-11 appears. Enter the appropriate dialing entries in the dial plan table, using only the codes below. Enter each dialing string as one "word", up to 16 characters. Do not enter spaces between the codes.

0-9	match against the specified digit
A	match against a zero (0) or one (1)
X	match against any number from zero (0) to nine (9)
N	match against any number from two (2) to nine (9)
M	match against any number from one (1) to nine (9)

Figure 4-11. Dial Plan Table

Enter N to disable the dial plan.

The default setting is D (accept the North American dial plan).

Sample dialing plan strings:

    NXXXXXX (local calls)
    820XXXX (calls with the 820 prefix)
    ANXXNXXXXXX (long distance calls)

FASTNet Switch in Use

This field indicates if a FASTNet Switch is connected to this Model 452/459 site.

For two directly connected Model 459s with autonet enabled, enter N.

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

When a Y is entered, the window shown in Figure 4-12 appears.

```
┌─FASTNET────────────────────────────────────┐
│                                             │
│  FASTNet Radio Site Number: ▓▓             │
│  FASTNet Phone Number: ▓▓▓▓▓▓▓             │
│  Reporting Repeater: ▓                      │
│                                             │
│  Roaming Batch Interval: 05                 │
│                                             │
│  Message Beep Interval: 05                  │
│                                             │
│  Store SMDR Recs to FASTNet Calls: Y        │
│                                             │
└─────────────────────────────────────────────┘
```

Figure 4-12. FASTNet Window

Y(es) and N(o) are the only valid entries for the FASTNet Switch in Use field. The default setting is N.

☞   **Note:**

The Use FASTNet Switch field in Repeater Configuration must also be enabled for every controller that is connected to the FASTNet switch.

Table 4-2 describes each field in the FASTNet window.

Table 4-2. FASTNet Window Fields

Field Label	Valid Entries	Description of Function
FASTNet Radio Site Number	1 to 255	This field identifies the FASTNet radio site number. This number corresponds to the site programming in Fastbase.
FASTNet Phone Number	any valid phone number	Enter the phone number required to dial the FASTNet Switch. This information is not applicable if four-wire E&M is used. There is no default setting.
Reporting Repeater	any programmed repeater number	Enter the number of the Model 459 that should report (must be linked to the FASTNet switch). One *and only one* Model 459 at the site is used to Communicate site information to the FASTNet Switch. There is no default setting.
Roaming Batch Interval	1 to 60 minutes 0 sets 15 seconds	Enter the time (in minutes) between reports to the FASTNet Switch. The default setting is 5 minutes.
Message Beep Interval	1 to 60 minutes	Enter the time (in minutes) between beeps if a user has messages. The default setting is 5 minutes.
Store SMDR Recs to FASTNet Calls	Y (yes) N (no)	This indicates that only the records stored in the FASTNet Switch are used for billing. Enter an N if the Model 459 should not store duplicate call records. The default setting is Y.

Create Date

This field stores the date on which the record was entered into the database. TCBase automatically fills in the Create Date field with the current date when a new record is stored.

This field can be altered for Other purposes. Enter the date in the format MM/DD/YY; where MM is the month, DD is the day, and YY is the year. The default setting is the actual create date.

Alter Date

The Alter Date is the day on which the record was last changed. TCBase automatically fills in this field with the current date when a record is edited.

This field can be altered for Other purposes. Enter the date in the format MM/DD/YY; where MM is the month, DD is the day, and YY is the year. The default setting is the current date.

☞   **Note:**

The date fields cannot reflect accurate dates unless the Model 452/459 is set to the correct date and time. Use the Comm, Other, set date & Time selection to set the time in the controller. (See "Other Communications Options" in Section 3)

Saving and Exiting Site Configuration

When all the fields in the site configuration window are filled-in, press <F10> to save the record. More new sites can be programmed if applicable. Change the existing sites by typing on the screen.

When the sites are configured correctly, press <Esc> twice. The main menu appears. Then proceed to enter the repeater configurations (see the following subsection, "STEP 2. REPEATER PROGRAMMING").

STEP 2. REPEATER PROGRAMMING

The Repeater database contains information about the repeaters for each site. To program the repeater configuration, follow the steps below:

1) From the TCBase main menu, select Edit, Repeater config and press <Enter>. TCBase lists the programmed sites.

2) Select one site and press <Enter>. If only one site has been programmed, that site is selected automatically. The blinking cursor appears in the Index window.

3) Press <Enter> again and the cursor moves to the Repeater Configuration window on the right side of the screen. Figure 4-13 shows the Repeater Configuration window for a new data record.

4) Type in a repeater number (1 to 20) for the new repeater and TCBase starts a new data record filled in with default values.

Figure 4-13. Repeater Configuration Window

Some of the fields in the Repeater Configuration window call out other windows with additional sub-fields. Figure 4-14 shows the organization and location of the fields that point to other fields. The shaded boxes indicate windows and fields that do no apply to the Model 452 (interconnect functions of the *Model 459 only*).
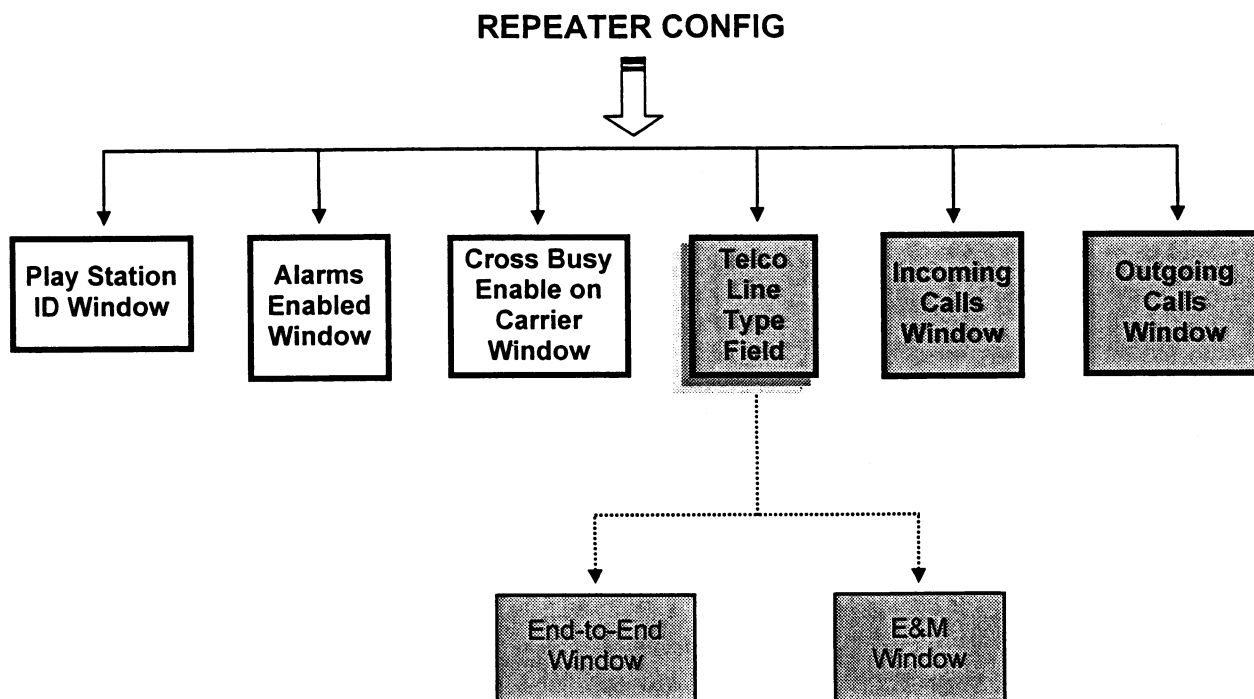
REPEATER CONFIG

Figure 4-14. Repeater Configuration Fields Flowchart

The Repeater Configuration window contains the following fields:

Repeater

The Repeater # field sets the unique repeater identification number.

The Repeater Number must be between 1 and 20 and must match the front panel DIP switch setting of the unit to which you want the information to be applied. There is no default setting.

Trunking - From

The Trunking - From field determines how the repeater trunks from itself to other channels at the site. It is recommended that this field be left as T - use Telco Line type. But for two directly connected Model 459s with autonet enabled, enter N as long as only one channel on each site is connected back to back. If all telco equipped channels are connected, enter T.

Other settings can affect the efficiency of the system if used incorrectly. Five settings are available for this field. (These settings affect how the next free repeater is determined).

T		use Telco Line Type

The repeater trunks according to its Telco Line Type. If the Telco Line Type is N (None) or the Outgoing Calls field is set to N(o), the repeater trunks to other dispatch repeaters first. If the Telco Line Type is E (End-End) or M (E&M) the repeater trunks to other interconnected repeaters first.

D   only to Dispatch channels

The repeater only trunks to other dispatch repeaters. If only interconnected channels are available, the free repeater field is set to 0 - indicating no free channels.

I   only to Interconnect channels

The repeater only trunks to other interconnect repeaters with outgoing calls allowed. If only dispatch channels are available, the free repeater field is set to 0 - indicating no free channels.

W   only to netWorked channels   .

The repeater only trunks to other repeaters designated as "Networked" in the Trunking - To field.

N   Not at all

The next free repeater is always set to 0 - indicating no free channels.

The default setting for the Trunking - From field is T.

Trunking - To

The Trunking - To field also determines how the repeater is trunked to from other channels at the site. It is recommended that this field be set to T - use Telco Line Type. But for two directly connected Model 459s with autonet enabled, enter D as long as only one channel on each site is connected back to back. If all telco equipped channels are connected, enter T.

Seven settings are available for this field. (These settings affect how the free repeater is determined.)

T   use Telco Line Type

The repeater trunks according to its Telco Line Type. If the Telco Line Type is N (None) the Outgoing calls field is N(o), the repeater trunks to other dispatch repeaters first. If the Telco Line Type is E (End-End) or M (E&M) the repeater trunks to other interconnected repeaters first.

A		as next Available

Calls always trunk to the repeater if it is available, regardless of line type.

D		as last available Dispatch

Calls only trunk to the repeater if no other dispatch units are available. (This setting overrides the Telco Line Type for trunking purposes.)

I		as last available Interconnect

Calls only trunk to the repeater if no other interconnect units are available. (This setting overrides the Telco Line Type for trunking purposes.)

L		as Last available

Calls only trunk to the repeater if all other units are busy.

W		as netWorked

Calls trunk to the repeater if all other dispatch units are busy. Calls also trunk to the repeater from units programmed as W (netWorked) in the Trunk - From field.

N		Not at all

Calls are never trunked to the repeater. However, the repeater trunks to other repeaters in the normal manner.

The default setting for this field is T.

☞ **Note:**

When two or more repeaters have the same programming for the Trunking - From and To fields, the software treats the units the same and can trunk to either channel.

Ghost Repeater

The Ghost Repeater field allows one physical repeater to act like two home channels; the physical home channel and the ghost. This feature allows up to 500 LTR user IDs to be homed on one channel, instead of only 250 per repeater. If the Ghost Repeater option is enabled, enter a repeater number that is currently unused at the site.

To disable this feature, enter 0 or leave the field blank. The default setting is a blank.

```
┌─────────────────────────────────────────────────────────┐
│  ┌──┐                                                     │
│  │📖│      Note:                                          │
│  └──┘                                                     │
│  For more details on the ghost repeaters, see Section 6. │
└─────────────────────────────────────────────────────────┘
```

Play Station ID

The Play Station ID field allows the repeater to play Morse Code station identification. When a Y is entered, the window shown in Figure 4-15 appears.

Y (es) and N (o) are the only valid entries for the Play Station ID field. The default setting is N.

```
┌STATION_ID─────────┐
│  Interval:30       │
│  Call Sign: ZETRON │
└────────────────────┘
```
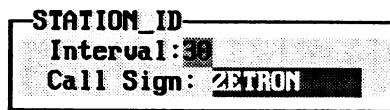
Figure 4-15. Station ID Window

The Morse Code Station ID window contains the following fields:

Interval

This field sets the time (in minutes) between each broadcast of the station identification.

Enter the interval as a number between 1 and 60 minutes. The default setting is 30 minutes.

Call Sign

This field indicates the Morse code station call sign.

Enter the assigned Federal Communications Commission character string (up to ten characters). There is no default setting for this field.

```
┌─────────────────────────────────────────────────────────────┐
│  ┌──┐                                                         │
│  │👉│      Note:                                              │
│  └──┘                                                         │
│  Only one repeater in each system should be programmed to    │
│  broadcast the station identification.                       │
└─────────────────────────────────────────────────────────────┘
```
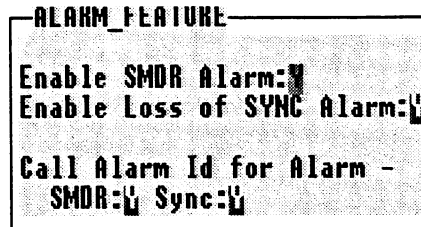
Alarms Enabled

The Alarms Enabled field sets up the controller for internal alarm monitoring capability. Each alarm is enabled individually as desired. (The Alarm ID to contact when a condition

occurs is programmed in the Site Configuration.) When Y is entered, the Alarms Feature window shown in Figure 4-16 appears.

Y (es) and N (o) are the only valid entries for this field. The default setting is N.

```
┌─ALARM_FEATURE─────────────┐
│                           │
│ Enable SMDR Alarm:Y       │
│ Enable Loss of SYNC Alarm:N│
│                           │
│ Call Alarm Id for Alarm - │
│    SMDR:N Sync:N          │
│                           │
└───────────────────────────┘
```

Figure 4-16. Alarm Feature Window

Any activated alarms do not reset until the site is called and the alarms are manually cleared from TCBase. The Alarm Feature window contains the following fields:

Enable SMDR Alarm

This field enables an alarm when the SMDR buffer is almost full. (The alarm activates when only 288 more records can be stored.)

Y (es) and N (o) are the only valid entries for this field. The default setting is N.

Enable Loss of SYNC Alarm

This field enables an alarm when repeater bus synchronization is lost.

Y (es) and N (o) are the only valid entries for this field. The default setting is N.

Call Alarm ID for Alarm

This field enables the controller to call the programmed Alarm ID when an alarm occurs on the specified condition (loss of SMDR or sync).

Y (es) and N (o) are the only valid entries for these fields. The default setting for each Call Alarm ID field is N.

Voice Prompts

This field enables Voice Prompts for the Model 459. An optional voice prompt card (Part No. 950-9275) must be installed to activate the feature. See Section 6 for detailed information on recording, erasing, and playing voice prompts.

Y (es) and N (o) are the only valid entries. The default setting is N.

Test ID Code

This field enables transmission of the ID code when the Model 459 is in test mode 2 or 3. The test ID is also used for accessing voice prompt recording mode. The home repeater transmits the ID.

Enter the Test ID Code as a number between 1 and 255. The default setting is 1.

Keyup Delay

This field sets the amount of time (in seconds) that the controller waits to send data packets after keying the transmitter. If this time is set too long or short, radios may have trouble accessing the system. It is recommended that this value initially be left at its default setting.

Enter the Keyup Delay as a number between 0.00 and 0.08. The default setting is 0.02 seconds.

Cross Busy Fields

The following parameters define cross-busy operation on a shared channel.

Hold Time

This field sets the amount of time (in seconds) to hold the Model 452/459 in the cross-busy state after the condition is no longer true.

Enter the Hold Time as a number between 0.0 and 30.0. The default setting is 0.0 seconds.

Tx. Freq. Delay

This field sets the amount of time (in seconds) the transmit frequency input must remain in the low state before the Model 452/459 goes to cross-busy mode. A request to transmit by the cross-busied equipment is still processed if the Model 452/459 is in the cross-busy state due to the Tx. Freq. monitor condition.

Enter the Tx. Freq. Delay as a number between 0.00 and 2.50. The default setting is 0.0 seconds.

Enable on Carrier

This field enables cross-busy on carrier detect when no LTR packets are received. If this feature is enabled, a request to transmit by the cross-busied equipment is still processed if the Model 452/459 is in the cross-busy state due to the carrier detect condition.

When a Y is entered, the window shown in Figure 4-17 appears. The default setting for this field is N.

```
┌─CROSS_BUSY─────────────────────────┐
│    Carrier Detect Delay: ░░░0░░    │
└────────────────────────────────────┘
```

Figure 4-17. Cross-Busy Enable on Carrier Window

The cross-busy window contains only one field.

Carrier Detect Delay

This field sets the amount of time (in seconds) carrier must be detected without LTR packets being received before the Model 452/459 goes to the cross-busy state. This setting only apples if the Enable on Carrier field is set to Y.

Enter the Carrier Detect Delay as a number between 0.20 and 2.50. The default setting for this field is 0.50 seconds.

Turn Off Idle Msg.

This field allows the idle packets to be turned off for the repeater being programmed.

Y (es) and N (o) are the only valid entries. The default setting is N.

┌───┐
│ ✋   **Caution:**   │
│   │
│ **If a Y is entered in the Turn-Off Idle Msg. field, trunking** │
│ **performance may be affected.**   │
└───┘

Telco Line Type

The Telco Line Type field determines the phone line setup for interconnect units (Model 459 only). The available line types are:

N   None

           The repeater is not interconnected.

E   An End-to-End card is installed in the repeater. Or an E&M card is installed but should be treated like an end-to-end line, e.g., a Model 810 or microwave is in use such that the actual telco line is end-to-end. When E is selected the window shown in Figure 4-18 appears.

M   E&M (DID in, End-to-End out)

           A 4-wire E&M card is installed in the repeater. When M is selected the window shown in Figure 4-19 appears.

The default setting for the Telco Line Type field is N - none.

End-to-End Lines

```
┌─END-END────────────────┐
│ Line Supervision Type:█ │
│ End of Call Conditions:█ │
│ Rings Until Answer:█    │
│ Dial Click Decode Mode:█ │
└────────────────────────┘
```
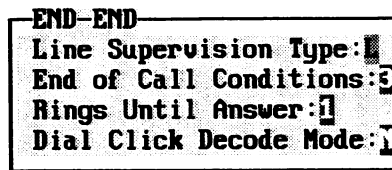
Figure 4-18. End-to-End Window

Table 4-3 describes each field in the End-to-End window.

Table 4-3. End-to-End Window Fields

Field Label	Valid Entries	Description of Function
Line Supervision Type	L - Loop start G - ground start	This field selects the supervision type for this line. To set up an E&M card as End-End, select L. The default setting is L.
End of Call Conditions	1 - battery reversal 2 - battery removal 3 - neither	This field selects the disconnect conditions. If the CO provides a disconnect signal via battery, select 1 or 2 as appropriate. If an E&M card is installed, select 2. If the CO does not provide a disconnect signal via battery, select 3. The default setting is 3.
Rings Until Answer	1 - 9	This field selects the number of rings from the landline before the Model 459 answers. The default setting is 1.
Dial Click Decode Mode	N - Dial Click not enabled 0 - Decode clicks Mode 0 1 - Decode clicks Mode 1 2 - The mobile is required to enter a leading '0' to calibrate the software 3 - The mobile is required to enter a leading '1-0' to calibrate the software	This field selects the dial click decoding operation. If a Dial Click Card is installed, it must be enabled. If dial click decoding is not needed, this field must be set to N to properly decode DTMF. The default setting is N.

E & M Lines

```
┌─E&M───────────────────────────┐
│ Line Supervision Type:▌      │
│ Signaling Type:▯             │
│ Number of Feed Digits:▯      │
│ Line Description:▯           │
└───────────────────────────────┘
```

Figure 4-19. E&M Window

Table 4-4 describes each field in the E&M window.

Table 4-4. E&M Window Fields

Field Label	Valid Entries	Description of Function
Line Supervision Type	I - immediate start W - wink start	This field selects the incoming supervision type for this line. This information should be provided by the phone company when the line is purchased. For two directly connected Model 459s with autonet enabled, enter I. The default setting is I.
Signaling Type	D - DTMF P - Pulse	This field selects the type of signaling used by the CO to send the feed digits to the Model 459. For two directly connected Model 459s with autonet enabled, enter D. The default setting is D.
Number of Feed Digits	2 - 4	This field selects the number of feed digits expected from the CO. For two directly connected Model 459s with autonet enabled, enter 4. The default setting is 2.
Line Description	1 - E&M Type I N - Normal E&M S - Special	This field selects the type of E&M phone line. Select 1 for a Type I line - the Model 459 only disconnects on loss of loop current after it has received answer supervision. Select N if the Model 459 should disconnect on loss of loop current. Select S if the Model 459 should not disconnect on loss of loop current. For two directly connected Model 459s with autonet enabled, enter N. The default setting is N.
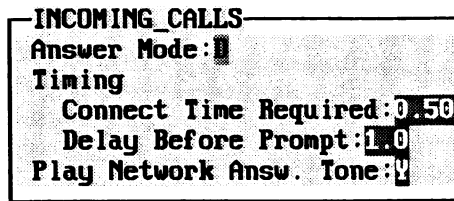
If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

Incoming Calls

This field determines whether the repeater receives incoming calls. If you wish the Model 459 to accept incoming calls or if two directly connected Model 459s use autonet or if a FASTNet Switch is connected to this Model 459 site, enter Y. This field is ignored by Model 452s.

When Y is entered, the window shown in Figure 4-20 appears.

```
┌─INCOMING_CALLS─────────────────┐
│ Answer Mode:█                   │
│ Timing                          │
│     Connect Time Required:0▓50  │
│     Delay Before Prompt:1▓0     │
│ Play Network Answ. Tone:▓       │
└─────────────────────────────────┘
```

Figure 4-20. Incoming Calls Window

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

The Incoming Calls window contains the following fields:

Answer Mode

This field sets up the incoming line answer mode. The four modes available are as follows:

B	Repeater answers and plays the 'RIC' prompt. For two directly connected Model 459s with autonet enabled, enter B.
C	Repeater answers, plays the 'RIC' prompt, and if not enough digits are entered, calls the test code ID with the calling repeater number.
	For lines using feed digits, this setting allows overdialing if the feed digits are for ID = 20-250.
D	Repeater answers and plays a dial tone.
N	Repeater calls the test code ID with the calling repeater number. The phone line isn't answered until the mobile answers the call. The Model 459 waits 20 seconds for the mobile to answer, and then goes off-hook briefly to listen for modem tones.

The default setting is B.

Timing - Connect Time Required

This field sets the amount of time (in seconds) the connect signal must be stable for the Model 459 to recognize the start of an incoming call. Set this field to about 0.5 for End-to-End, and to about 0.06 for E&M. For two directly connected Model 459s with autonet enabled, enter 0.20.

Enter the Connect Time as a number between 0 and 2.50. The default setting is 0.5 seconds.

Timing - Delay Before Prompt

This fields sets the delay time (in seconds) between answering the line and playing the prompt. It is possible for the answer prompt to false a modem calling in to do programming. In such cases, the delay before prompt should be set long enough to allow the Model 459 to detect modem carrier before it plays the prompt. For two directly connected Model 459s with autonet enabled, enter 0.1.

Enter the Delay Before Prompt as a number between 0.5 and 5.0. The default setting is 1.0 seconds.

Play Network Answ. Tone

This field enables a DTMF tone that is played upon connection. It is used by FASTNet to determine that the unit has answered an incoming call. For two directly connected Model 459s with autonet enabled, enter Y.
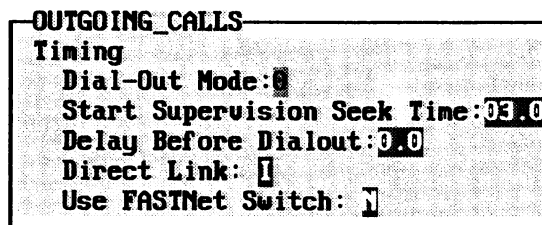
Y (es) and N (o) are the only valid entries. The default setting is Y.

Outgoing Calls

This field in the repeater configuration window (see Figure 4-13 on page 4-21) allows outgoing calls from this repeater. If the Model 459 is interconnected and you wish to allow outgoing calls or if two directly connected Model 459s use autonet or if a FASTNet Switch is connected to this Model 459 site, enable this field.

This setting is ignored by Model 452s.

The default setting for the Outgoing Calls field is N. When Y is entered, the window shown in Figure 4-21 appears.

```
┌─OUTGOING_CALLS──────────────────┐
│ Timing                          │
│   Dial-Out Mode:█               │
│   Start Superuision Seek Time:05.0│
│   Delay Before Dialout:0.0      │
│   Direct Link: []               │
│   Use FASTNet Switch: ]         │
└─────────────────────────────────┘
```

Figure 4-21. Outgoing Calls Window

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

Section 4. Database Setup

The Outgoing Calls window contains the following timing-related fields:

Dial-Out Mode

This field sets the dialing mode of the Model 459. The following modes are available:

0	Slow DTMF (5 digits/second)
1	Fast DTMF (10 digits/second)
2	Slow Pulse (10 pulses/second)
3	International Pulse (10 pulses/second, 600 ms interdigit delay)
4	DO NOT USE
5	Fast Pulse (14 pulses/second)

The default setting is 0.

Start Supervision Seek Time

This fields sets the amount of time (in seconds) the Model 459 waits for supervision after the phone line is seized. For example, this field determines the amount of time the Model 459 waits for dial tone. If the time limit expires and the repeater has not detected dial tone, it attempts to dial anyway (if the Require dialtone field in the Site Configuration is set to "N", otherwise the call is disconnected).

Enter the Seek Time as a number between 3 and 25. The default setting is 3 seconds.

Delay Before Dialout

This field sets the amount of time (in seconds) that the Model 459 waits to dial out after detecting supervision.

If Conversation Trunked Dispatch is used, then this field is also used as the "hang timer" amount of time that a channel is returned after a dispatch group member unkeys. As long as another group member keys up during this hang time, the channel is retained and no blocking of the dispatch conversation can occur.

A value of 3.0 is recommended for the hang time. However, if both trunked dispatch and mobile-to-landline calls are made on the channel, a compromise value must be found.

Enter the Dialout Delay as a number between 0.0 and 9.9. The default setting is 0.0 seconds.

Direct Link

This field indicates whether the Model 459 is directly linked to another site or another piece of equipment. Usually this indicates that the Model 459 does not have to dial a phone number to connect to the other site.

The available choices are:

N	Not a direct link
A	direct link to an LTR site, overdial the Access code. For two directly connected Model 459s with autonet enabled, enter A if the User ID Access # is set to the other site's access #.
I	direct link to an LTR site, overdial the ID code. For two directly connected Model 459s with autonet enabled, enter I if the User IDs match.
D	Direct link to a non-LTR site
S	direct link to a FASTNet Switch.

The default setting is N.

Use FASTNet Switch

If a FASTNet Switch is available, this field indicates under what conditions calls should be routed through the Model 2540. The available choices are:

N	No calls. For two directly connected Model 459s with autonet enabled, enter N.
A	All calls
L	non-Local calls only
	The Local Prefix table identifies which calls are considered local.

The default setting is N.

Saving and Exiting Repeater Configuration

When all the fields in the repeater configuration window are filled-in, press <F10> to save the record. More repeaters can be programmed if applicable.

When the repeaters are configured correctly, press <Esc> twice. The main menu appears. Then proceed to enter the autodial table settings (see the following subsection, "STEP 3. AUTODIAL PROGRAMMING").

STEP 3. AUTODIAL PROGRAMMING

Autodial entries can be created for the Model 459 system. This convenience feature simplifies common outgoing calls for the mobile users at the site. The autodial table contains information that applies to specified users in the system.

Note:

For details on user configuration, see "STEP 4. USER ID PROGRAMMING" on page 4-40.

If a user is programmed as Interconnect in User IDs, he or she can select autodial numbers from the table. When the user dials "*nn" (nn = autodial entry number), the system automatically dials the preprogrammed number.

All push-to-connect (PTC) users receive autodialing upon key-up. In addition, the controller overdials the ID or access code programmed in the PTC table on answer. Model 459 users must be programmed as Auto-overdial or Interconnect in the User Type field to access the PTC setting in the Interconnect window.

To program the Autodial Table, follow these steps:

1) From the TCBase main menu, select Edit, Autodial table and press <Enter>. The blinking cursor appears in the Index window.

2) Press <Enter> again and the cursor moves to the data window on the right side of the screen. Figure 4-22 shows the new Autodial window. If this is the first entry, the cursor automatically selects the Autodial window.

3) Type in a number (00-99) for the new autodial entry and TCBase starts a new data record with the default values.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌─INDEX ─────────────────┐   ┌─SITE 0001─────────────────────────────────┐
│ _#_____Autodial____    │   │              AUTODIAL TABLE                 │
│ 99  820-6363           │   │                                            │
│                        │   │   Table Entry: [99]                        │
│                        │   │   Phone Number: [820-6363           ]      │
│                        │   │                                            │
│                        │   │   Number Connects To:[]                    │
│                        │   │                                            │
│                        │   │   Interconnect Users Allowed:Y             │
│                        │   │   Toll Restrict:Y                          │
│                        │   │                                            │
│                        │   │   Addtl. Time To Wait For Answer: [00]      │
│ ┌─HELP─────────────────┐   │                                            │
│ │Enter the number of the table entry│ Comments: [                   ]   │
│ │at which you want to store this     │                                  │
│ │number. This entry corresponds to   └──────────────────────────────────┘
│ │the *nn number the user enters to   │
│ │access an Autodial Number. (00-99)  │
│ │                                    │
│ └────────────────────────────────────┘
│ Type F1 for GUIDE window
└────────────────────────────────────────┘
```

Figure 4-22. Autodial Table

The Autodial Window contains the following fields:

Table Entry

This field determines the number of the autodial entry. The Table Entry number identifies which phone number the user wants to access.

Enter the Table Entry as a number between 0 and 99. There is no default setting for this field.

Phone Number

This field stores the phone number for the autodial entry.

Enter the entire telephone number, including any area codes and dialing access codes, that the system must dial to make a connection. A Comma (,) inserts a one second pause in the dialing sequence. An exclamation mark (!) inserts a five second pause in the dialing sequence. Do not include blank spaces, hyphens or parenthesis in the Phone Number field. There is no default setting for this field.

Number Connects To

This field identifies the destination of the outgoing call. In addition, the Number Connects To field determines the type of overdialing required for system access, if the call routes to another LTR site.

The following entries are valid:

A	another LTR site; overdial the Access #
I	another LTR site; overdial the ID code
P	a regular telephone

This field is ignored unless the mobile using the autodial table entry is programmed as Push-to-connect. For PTC users, this field must correspond to the Type of Overdial field in the User IDs, PTC window.

The default setting for the Number Connects To field is P.

Interconnect Users Allowed

This field enables regular interconnect users to access the autodial entry.

Y (es) and N (o) are the only valid entries for this field. The default setting is Y.

Toll Restrict

This field enables the Toll Restriction and Toll Privileges programmed for the user. If N is entered, the system does not check the user's toll privileges before dialing the autodial number. This is useful for allowing a user to dial only one specific number that overrides his or her normal toll privileges (customer service number, emergency number, etc.).

Y (es) and N (o) are the only valid entries for this field. The default setting is Y.

Addtl. Time To Wait For Answer

This field sets the maximum amount of time (over the standard 5 seconds) that the unit should wait for an answer before overdialing.

Enter the additional time (in seconds) as a number between 0 and 30. The default setting is 0 seconds.

Comments

This field stores any useful information about the autodial entry. For example, a detailed description of who the entry calls, why, and who might want to use this entry.

Enter Comments as a character string up to 20 characters. There is no default setting for this field.

Saving and Exiting Autodial Programming

When all the fields in the Autodial window are filled-in, press <F10> to save the record. More new autodial entries can be programmed if applicable. Change the existing entries by typing on the screen.

When the entries are entered correctly, press <Esc> twice. The main menu appears. Then proceed to enter the user information (see the following subsection, "STEP 4. USER ID PROGRAMMING").

STEP 4. USER ID PROGRAMMING

The User database contains information about each user for the site. To program the User ID, follow the steps below:

1) From the TCBase main menu, select Edit, User ID and press <Enter>. TCBase lists the programmed sites.

2) Select one site and press <Enter>. If only one site has been programmed, that site is selected automatically. The blinking cursor appears in the Index window.

3) Press <Enter> again and the cursor moves to the User Status window on the right side of the screen. Figure 4-23 shows the User Status window for a new record.

```
Model 452/459 Database Manager U1.0b (c)1999 Zetron        (SUPERUISOR mode)
┌INDEX ═══════════════════════════════   ┌SITE 0001─────────────────────────
│_User_ S T ACC# _Cust Acct _Comments_│            USER STATUS
│01-001 D I 1001                       │
│01-038 U D 1038                       │   User ID:[01-250]
│01-100 U I                            │   Status:[U]
│01-124 U I 1124                       │   ID Type:[I] ...  Access #:[1250]
│01-250 U I 1250 TEST ID USE 4 PROMPTS │
│09-100 U I       09100       SWANSON  │   Cust. Acct:[TEST ID USE]
│                                      │   Rate Code:
│                                      │   Bill as Duplicate:N
│                                      │   Num. of Mobiles:
│                                      │
│                                      │   Comment 1:[4 PROMPTS ]
│                                      │   Comment 2:
├HELP══════════════════════════════════   │
│Enter the user id HH-UUU or HHUUU     │
│  where HH = Home Repeater (1-20)     │   Create Date: 03/06/97
│        UUU = Id Code (1-250).        │   Alter Date:  03/06/97
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│type F1 for GUIDE window              │
```

Figure 4-23. User Status Window

Some of the fields in the User Status window call out windows with additional sub-fields. Figure 4-24 illustrates the organization of the fields that point to other fields.
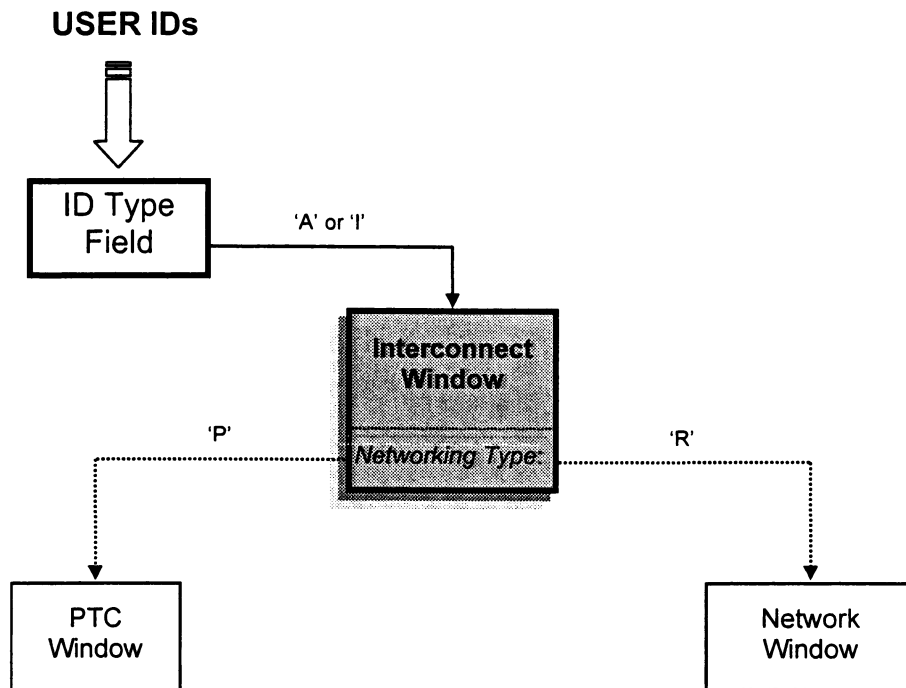
USER IDs

Figure 4-24. User ID Fields Flowchart

The User Status window contains the following fields:

User ID

This field stores the user's ID code and home repeater number in the database. The User ID has the format HH-UUU or HHUUU; where HH = home repeater, and UUU = ID code.

For two directly connected Model 459s with autonet enabled and Direct Link set to I, this field must match in the connected sites.

Enter the home repeater as a number between 01 and 20 and the user ID as a number between 1 and 250. There is no default setting for the User ID field.

Status

This field sets up the user's system access status. The following entries are available:

V	Valid - The user can access the system normally.
I	Invalid - The user cannot access the system. This setting is useful for temporarily halting service on delinquent accounts.
D	non-prime Deferred - The user can only access the system during non-prime times. Prime times are set in a table in the Site Configuration programming.

| U | Unassigned - The user cannot access the system. This setting is useful when creating blank user records to allow a new subscriber to be quickly added to the system. The entry personnel can then simply add the customer name, user id, and change the status to V to activate a new account. |

The default setting is V.

ID Type

This field identifies the type of services available to the mobile customer. The following entries are valid:

| A | Auto-overdial - Incoming calls are placed directly on the air without ringback or ringout. Auto-overdial can be used to allow: |

1. Directly linking to another LTR site and the Model 459 automatically overdials the user's ID or access code. The user must be on his or her home channel or a channel identified as networked to be validated. This function is called direct-connect autonet. (Refer to "Direct Link" on page 4-34).

2. Directly linking to a FASTNet switch, and the Model 459 automatically overdials the user's ID or access code. This function is called TeamTalk. Refer to Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

3. Conversation Trunked Dispatch, when no trunk is installed or when Direct Link is set to N and Networking Type is set to N. Conversation Trunked Dispatch allows the mobiles in a group to talk back and forth using the channel obtained on the initial keyup. The Repeater Configuration /Delay before Dialout time is used as the channel hang timer. Although less efficient than normal LTR transmission trunked dispatch, this is sometimes preferred by users who are used to conventional dispatch or by users on oversubscribed systems that frequently experience blockage at peak time. Note that for conversation trunked dispatch, the mobiles are all programmed with half-duplex interconnect IDs.

| D | Dispatch only - The user can only make and receive dispatch calls within his group. This is the normal LTR transmission trunked dispatch where each keyup or transmission is potentially on a different channel. |

| I | Interconnect - The user can place and receive telephone calls. |

The default setting is D.

If A or I is selected, the Interconnect window (see Figure 4-25) appears.

```
┌─INTERCONNECT────────────┐
│Priority:█               │
│Mobile Answer Time:]      │
│                         │
│Toll Privileges:]         │
│                         │
│Allow/Restrict Prefixes:  │
│   Group A:]  Group B:]    │
│                         │
│Turn-Around Beep: ]       │
│Audio Compandor in Use: ] │
│Full Duplex Radio in Use: ]│
│                         │
│Networking Type: ] ...    │
└─────────────────────────┘
```

Figure 4-25. Interconnect User Type Window

The Interconnect (Auto-overdial) window contains the following fields:

Priority

This field sets the priority rating for the users defined by the class of service. The priority is used to limit the number of simultaneous interconnect calls and the length of calls. (See "Edit Dynamic Call Limit Table" and "Edit Max. Simul. Calls Table" on page 4-14.) The following settings are available:

L	Low priority
M	Medium priority
H	High priority
V	Very high priority

The default setting for the Priority field is L.

Mobile Answer Time

This field determines the maximum length of time that the Model 459 allows the mobile to answer an incoming call. The valid entries are A and B. These settings correspond to the values programmed in the Site Configuration Interconnect window.

The default setting for the Mobile Answer Time is A.

Toll Privileges

This field determines what type of outgoing calls the user can initiate. The following settings are available:

N	No outgoing calls allowed
A	Autodial calls allowed
L	Local calls allowed
C	Credit card calls allowed (1+0)
O	Operator-assisted calls allowed (0)
T	Long distance calls allowed (domestic)
I	International long distance calls allowed

Each privilege level includes all calls indicated in the previous category. For example, a setting of O would allow the user to make credit card, local, and autodial calls.

The default setting for the Toll Privileges field is L.

Allow/Restrict Prefixes - Group A (B)

These fields determine whether each of the allow/restrict prefix tables apply to this user. The tables are programmed in the Site Configuration, Interconnect window (See page 4-15 for details).

Y (es) and N (o) are the only valid entries for this field. The default setting for the Allow/Restrict Prefixes Group fields is N.

☞ **Note:**

The Allow/Restrict Prefixes fields do not apply to calls routed through a FASTNet Switch.

Turn-Around Beep

This field enables a courtesy tone when the half-duplex mobile user releases PTT. This tone indicates to the Other party when a response can be received by the mobile.

Y (es) and N (o) are the only valid entries for this field. The default setting for the Turn-Around Beep field is N.

```
☞      Note:

The Turn-Around Beep field does not apply to full-duplex radios.
```

Audio Compandor in Use

This field enables the audio compandor for the user.

Y (es) and N (o) are the only valid entries for this field. The default setting for the Audio Compandor in Use field is N.

Full-Duplex Radio in Use

This field enables full-duplex operation for the mobile user. Full-duplex radios should not be used for autonet or TeamTalk operation.

Y (es) and N (o) are the only valid entries for this field. The default setting is N.

Networking Type

This field determines the user's extended calling privileges.

For two directly connected Model 459s with autonet enabled and for conversation trunked dispatch with a telco trunk not used for a direct FASTNet or autonet connection, enter N.

If a FASTNet Switch is connected to this Model 459 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

The following settings are available:

N	None
P	Push-to-connect
R	Roamer (requires connection to a FASTNet Switch)

When P or R is entered, a secondary window appears as described in the following subsections. The default setting for the Networking Type field is N.

✋ **Caution:**

The collective number of users that have P or R set for the Networking Type cannot exceed 1800.

Push-to-Connect User

When a P is entered in the Networking Type field, the window shown in Figure 4-26 appears.

```
┌─PTC_USERS──────────────────────┐
│      PUSH TO CONNECT USERS      │
│                                 │
│ Autodial Table Entry:[101]      │
│ Time Allowed to Dial Manually:0 │
│ Type of Overdial:0              │
│      Overdial - Id Code:[██─██] │
│               Access #:[████]   │
└─────────────────────────────────┘
```

Figure 4-26. Push-to-Connect Window

Table 4-5 describes the fields in the Push-to-Connect window.

Table 4-5. PTC Window Fields

Field Label	Valid Entries	Description of Function
Autodial Table Entry	0 - 99 100 - direct E&M link 101 - mobile-to-mobile selective call	This field indicates which autodial table entry to automatically call. There is no default setting for this field.
Time Allowed to Dial Manually	0 - user can't dial manually 1 - 7	This field sets the maximum time (in seconds) that the PTC user has to enter a phone number or *nn before the system auto-dials. The default setting is 0 seconds.
Type of Overdial	I - user ID code A - user Access code N - No auto-overdial	This field indicates the type of overdialing required. (See "Overdial Access #" on page 4-11) The default setting is I.
Overdial - ID Code	any valid User ID: HH-UUU or HHUUU HH - home repeater (1-20) UUU - ID (1-250)	This field sets the user ID on the other site to overdial when the other site answers. If the Type of Overdial field is set to I, enter the ID code to overdial on the other site. There is no default setting for this field.
Overdial - Access #	any valid Access # 0000 - 9999	This field sets the access number to overdial when the other site answers. If the Type of Overdial field is set to A, enter the access # of the ID on the other site. There is no default setting for this field.

Roaming User

When R is entered in the Networking Type field, the window shown in Figure 4-27 appears.

```
┌─NETWORK──────────────┐
│Phone Number: 8200000 │
└──────────────────────┘
```
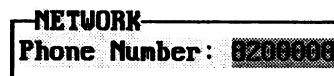
Figure 4-27. Network Phone Number Window

The Network window contains the following field:

Phone Number   This field identifies the FASTNet ID value programmed in the connected FASTNet Switch database. The Phone Number field allows the controller to identify the FASTNet ID of any roaming mobiles in its area.

The Phone Number field accepts a seven-digit number. There is no default setting for this field.

Caution:

The Phone Number must correspond to a valid Node User in the FASTNet Switch database (Fastbase). In addition, the user must have the correct overdial access digits programmed into both databases.

Access

This field allows the user to be accessed with a 4-digit access code, instead of the 5-digit user ID. This number must be *unique* to this user. The access number can be set from 0000 to 9999. In order for this entry to mean anything, the Overdial Access # field in the Site Configuration, Interconnect Window must be set to Y. With E&M lines, this allows you to map feed digits to user IDs. For autonet and FASTNet, it allows the same access number at multiple sites to map to different ID codes.

If a FASTNet Switch is connected to this Model 49 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

There is no default setting for the Access # field.

Cust. Acct

This field assigns a customer account number to the User ID for billing purposes. The Cust. Acct can be up to a 10-character text string. This field could be set to a number that combines the User ID (HH-UUU) and the Access Number (####) [9 characters (5 + 4)]. It can also be left blank.

There is no default setting for this field.

Rate Code

This field assigns a rate code to the User ID for billing purposes.

The Rate Code can be up to a 5-character text string. There is no default setting for this field.

Bill as Duplicate

This filed allows some users exemption from certain duplicate monthly charges. The user is billed on each repeater where the Bill as Duplicate field is set to N for that user. For example, a user who has been assigned two ID codes on the system should not have to pay some monthly charges twice. In this case, one of the two assigned IDs should have the Bill as Duplicate field set to Y.

Y (es) and N (o) are the only valid entries. The default setting for the Bill as Duplicate field is N.

Num. of Mobiles

This field determines the number of mobile units that are assigned to this User ID. This field is used for billing purposes only.

The Num. of Mobiles can be between 0 and 999. The default setting for this field is 1.

Comment 1

This field allows the system operator to record useful information about the user. For example, the Comment 1 field might contain "deadbeat" if the user has been invalidated for not paying his or her bills. This field is keyed and can be used for sorting.

Enter up to 10 characters in the Comment 1 field. There is no default setting for this field.

Comment 2

This field is similar to the Comment 1 field, but it is not used for sorting. It is also longer, so more information can be stored.

Enter up to 20 characters in the Comment 2 field. There is no default setting for this field.

Create Date

This field stores the date on which the record was entered into the database. TCBase automatically fills in the Create Date field with the current date when a new record is stored.

This field can be altered for Other purposes. Enter the date in the format MM/DD/YY; where MM is the month, DD is the day, and YY is the year. The default setting is the actual create date.

Alter Date

The Alter Date is the day on which the user record was last changed. TCBase automatically fills in this field with the current date when a record is edited.

This field can be altered for Other purposes. Enter the date in the format MM/DD/YY; where MM is the month, DD is the day, and YY is the year. The default setting is the current date.

☞   **Note:**

The date fields cannot reflect accurate dates unless your PC is set to the correct date and time.

Saving and Exiting User IDs

When all the fields in the user ID window are filled-in, press <F10> to save the record. More new users can be programmed if applicable. Change the existing users by typing on the screen.

When the users are set up correctly, press <Esc> twice. The main menu appears. Then proceed to enter the Local prefix table (see the following subsection, "STEP 5. LOCAL CALL PROGRAMMING").

STEP 5. LOCAL CALL PROGRAMMING

The Local Prefix Table contains calling information for the FASTNet switch. The table is useful when the FASTNet switch is not directly connected to the site.

☞ **Note:**

Skip the Local Prefix Table Programming step if the site is not connected to a FASTNet switch.

To program the Local Prefix Table follow the steps below:

1) From the TCBase main menu, select Edit, Local prefix table and press <Enter>. TCBase lists the programmed sites.

2) Select one site and press <Enter>. If only one site has been programmed, that site is selected automatically. The blinking cursor appears in the Index window.

3) Press <Enter> again and the cursor moves to the Local Prefix window on the right side of the screen. Figure 4-28 shows the Local Prefix window for a new record.

Figure 4-28. Local Prefix Table

4) Enter a page number (up to five pages of local prefixes are allowed). The cursor moves down into the body of the table.

5) Begin entering 3-digit prefixes.

- ♦ Use the up and down arrow keys to move between data fields.

- ♦ A question mark (?) can be used as a wildcard. For instance, the local prefix 82? includes 820, 821, ..., 829.

The Local Prefix Table stores up to 250 local phone number prefixes for each site. Each page holds up to fifty prefixes.

If a site is not directly connected to the FASTNet switch, the controller can use this table to determine which calls are local and do not require a Communication link to the FASTNet. The Local Prefix Table is only used when the Use FASTNet Switch field in the Repeater Configuration is set to L for non-local calls.

☞ **Note:**

The Model 459 considers the toll-free area codes (800 and 888) local calls.

STEP 6. UPDATING THE CONTROLLERS

Once the Site Configuration, Repeater Configuration, Autodial Table, User IDs, and Local Prefix Table are programmed correctly, the data must be transferred to all Model 452s and 459s. The TCBase information is stored in data files on the office computer. To send these files to the radio sites, follow the steps below:

1) Select Comm from the TCBase main menu.

2) Select Update from the Communications menu.

3) Choose the item(s) to be transferred from the Update menu. The site can be updated one part at a time (User IDs, Site config, etc.) or as a whole unit. In addition, the site can be updated only for the changes that have been made since the last update.

   When the database is configured for the first time, it is easiest to select Entire database from the Update choices.

TCBase connects to the site and completes the data transfer automatically.

Data Cloning Error Message

If the message "No bus master, cannot clone data" appears, the update unit cannot perform the automatic cloning function to the other controllers on the subscriber bus. If the unit is being updated locally, and no other units are connected to it, ignore the error message. If the site has been remotely updated, the error indicates a subscriber bus problem. One of three conditions could cause this error:

♦ The bus master is inoperative.

♦ A control bus cable is faulty or not connected properly.

♦ One of the units has not been programmed as a bus master with the front panel DIP switches. See the Model 452/459 installation and operation manual (Part No. 025-9450) for details on setting the bus master unit.

Entire Database Update

When Entire database is selected from the Update menu, all the unused parameters in the controllers are forced to the default or disabled values (as appropriate). This ensures that the repeater data matches the database.

This may not be true, however, if updates are performed for individual sections of the database. Choosing Changes from the Update menu provides a good measure of efficient and accurate data transfers.

5. BILLING AND STATISTICS

BILLING OVERVIEW

The Model 452 and 459s store airtime billing and repeater loading information for the LTR system. In addition, the Model 459 contains a call detail buffer for the storage of interconnect call records.

✋   **Caution:**

All billing data in the Model 452/459 is meaningless if the time and date are not set correctly in the unit. Be sure to set the current time and date before any calls are made on the system.

Airtime Accumulation Files

Each Model 452/459 comes equipped with airtime accumulation. Regardless of which channel a mobile actually uses to place or receive a call, the home repeater stores its airtime totals. Each user ID has two accumulators - one for prime time calls and one for non-prime time calls. (Prime time intervals are programmed in the Site Configuration.) This allows the system operator to bill for premium usage without all the hassle of sorting through cumbersome detail files.

SMDR Files

Each Model 459 stores call detail records (SMDR) in a dedicated buffer. This allows the unit to store a detailed record for every interconnect call placed through the Model 459. Since the mobiles may trunk to the Model 459 from any home channel on the system, the SMDR buffer can contain calls from any interconnected mobile on the system.

WHEN TO OBTAIN BILLING RECORDS

It is important to retrieve billing files before the Model 459 buffers become full. If billing data is not obtained in a timely manner, the information may become inaccurate or incomplete. This is especially critical for SMDR files. Although the airtime accumulators can also become full, this is less likely.

SMDR Buffer Capacity

Each Model 459 can store approximately 6000 call detail records. For an average system, each channel will process 2 minute calls for 6 hours of the day and long 10 minute calls for 10 hours of the day. This generates about 240 calls a day and 1700 calls a week. At this rate, data should be retrieved about once a week to ensure safe and accurate billing.

It is easy to track the amount of buffer space that is currently available in the Model 459s. Status information is provided via the Comm menu in TCBase. The status information screen reports the number of stored SMDR records. If this number is approaching the maximum storage level (6,000 call detail records), it is time to retrieve and clear the buffers.

☞ **Note:**

If the Model 459s are programmed to discard short local calls, the SMDR buffer can operate more efficiently. This is programmed via the Min. Call Time to Store field in the Site Configuration.

Airtime Accumulator Capacity

The Model 452/459 can store a fairly large amount of airtime accumulation. These files do not need to be retrieved nearly as often as the SMDR data. However, for optimal accuracy, Zetron recommends obtaining the files and clearing the accumulators at least once per billing cycle. This will obviously be more crucial to systems that bill for excessive dispatch calling.

RETRIEVING BILLING FILES

All billing files retrieved from the Model 452/459 can be stored on floppy disk or to the office computer's hard disk. Before attempting to retrieve files it is a good idea to ensure that the destination media has enough space to store the data. Use the guidelines below to prepare for the file transfer.

- Approximately 360 KB of disk space is required to store dispatch airtime accumulation for every 1000 user IDs. In addition, another 360 KB is required to store 6,000 call detail records.

- Use the DOS 'dir' command to determine the available space on the diskette or hard drive. The last line totals the space used and free space.

- Make sure that the space available exceeds (is greater than) the space required.

- If floppy diskettes are being used to store the retrieved billing files, format enough disks to store the data. (Use the DOS 'format' command.) This is a good idea once the data has been exported for billing.

Once the preparation is complete, follow the steps below to perform the appropriate file transfer(s).

Airtime Accumulation and User Files

❑   1.   Boot up the office computer in MS DOS or run a DOS shell from Windows.

❑   2.   Change to the TCBase installation directory (default \TCBASE), by typing:

          CD TCBASE

❑   3.   Run TCBase, by typing:

          TCBase

❑   4.   From the TCBase main menu, select Comm, Retrieve.

❑   5.   If more than one site has been programmed into TCBase, the Site Index window appears. Select the appropriate site, and press <Enter>.

❑   6.   Then select Call Accumulation from the Retrieve options and press <Enter>.

❑   7.   TCBase connects to the site and retrieves the current data. The files are automatically written to the TCBase directory created in installation or to the MOBILL49 directory, if it exists.

The airtime accumulation files are stored as ASCII text on the office computer's hard drive. The files are named as follows:

          MMDD####.A$$

Table 5-1 explains the filename meaning.

Table 5-1. Airtime Accumulation Filename Fields

Identifier	Description
MM	the current month, with a leading zero as required
DD	the day, again with a leading zero as required
####	the site number; programmed in the Site Configuration (See Section 4)
A	indicates an "Airtime accumulation" file type (this field remains constant)
$$	the repeater number; programmed in the Repeater Configuration (See Section 4)

Section 5. Billing and Statistics

Whenever the airtime accumulation is retrieved from the site, a user file is also created and stored on the office computer. The user file is named similarly to the airtime file, with the format:

MMDD####.U00

Only one user file is created for the entire site. The filename meaning is identical, except the "U" indicates a "User" file and the repeater number never changes from "00".

SMDR Files

❑ 1. Boot up the office computer in MS DOS or run a DOS shell from Windows.

❑ 2. Change to the TCBase installation directory (default \TCBASE), by typing:

CD TCBASE

❑ 3. Run TCBase, by typing:

TCBase

❑ 4. From the TCBase main menu, select Comm, Retrieve.

❑ 5. If more than one site has been programmed into TCBase, the Site Index window appears. Select the appropriate site, and press <Enter>.

❑ 6. Then select Call Detail Records from the Retrieve options and press <Enter>.

❑ 7. TCBase connects to the site and retrieves the current data. The files are automatically written to the TCBase directory created in installation or to the MOBILL49 directory, if it exists.

The SMDR files are stored as ASCII text on the office computer's hard drive. The files are named as follows:

MMDD####.D$$

Table 5-2 explains the filename meaning.

Table 5-2. Call Detail (SMDR) Filename Fields

Identifier	Description
MM	the current month, with a leading zero as required
DD	the day, again with a leading zero as required
####	the site number; programmed in the Site Configuration (See Section 4)
D	indicates a "call Detail" file type (this field remains constant)
$$	the repeater number; programmed in the Repeater Configuration (See Section 4)

Whenever the call detail data is retrieved from the site, a user file is also created and stored on the office computer. The user file is named similarly to the SMDR file, with the format:

MMDD####.U00

Only one user file is created for the entire site. The filename meaning is identical, except the "U" indicates a "User" file and the repeater number never changes from "00".

Backup to Floppy Disk

It is a good idea to backup billing records to floppy diskettes. This is crucial at the end of each billing cycle when the data has been exported for billing. Follow the steps below to backup the billing records to floppy disks:

❑ 1. Boot up the office computer in MS DOS or run a DOS shell from Windows.

❑ 2. Change to the TCBase installation directory (default \TCBASE), by typing:
   CD TCBASE

❑ 3. Run TCBase, by typing:
   TCBase

❑ 4. From the TCBase main menu, select Backup.

❑ 5. If more than one site has been programmed into TCBase, the Site Index window appears. Select the appropriate site, and press <Enter>.

❑ 6. Then select call Detail or call Accumulation from the Backup options and press <Enter>.

❑   7.   When prompted, enter the floppy drive to which the billing files should be copied.

❑   8.   TCBase copies the retrieved files to the backup diskettes. Change disks when prompted (if applicable).

Backup diskettes should be labeled with the date and disk sequence number. The disks should also be write-protected to prevent accidental erasure. On 3 ½-inch disks, open the shutter on the bottom right corner of the disk (on the back side).

BILLING FILE FORMATS

Each of the billing files retrieved from the Model 452/459 via TCBase are stored as ASCII text on the computer's hard disk. The files reside in the c:\MOBILL49 directory, if available, or in the directory in which TCBASE is located.

Each file begins with a header line that identifies the information in each record. The header is followed by lines of numeric and alphanumeric text that impart information about the Model 452/459 billing operations. Each record in a billing file is logically sorted, based on the type of data.

The columns in each file are aligned as follows:

- numeric entries are right-justified

- alphanumeric entries are left-justified

Airtime Accumulation Files

The airtime accumulation files start with a header record identifying the site, repeater, date, time of day, etc. The data records following the header record are sorted numerically by user ID. Each data record is the same fixed number of bytes in length. Only IDs with some airtime used have a corresponding accumulator record.

Figure 5-1 shows an example airtime file.

```
M49  0001A03/22/9915:45:5603/22/9918:18:00   6
      01001   100  7    5   4
      01009    50  7    5   4
      01100    22  7    5   4
      01101     4  7    5   4
      01123    34  7    5   4
      01127   194  7    5   4
```

Figure 5-1. Airtime Accumulation File

Table 5-3 describes the format of the airtime file header. The header text is 60 characters in length.

Table 5-3. Airtime File Header Fields

Name	Type	Length	Description
Device Name	char	5	M49
Site Number	num	4	Site: these user IDs are on
A	char	1	A = airtime accumulation
Start Date	char	8	MM/DD/YY
Start Time of Day	char	8	HH:MM:SS
End Date	char	8	MM/DD/YY
End Time of Day	char	8	HH:MM:SS
Num. of Records	num	5	Number of records in the file
Processed Flag	char	1	
Spare	char	10	
CR & LF	char	2	Carriage return and linefeed

☞ **Note:**

The Device Name indicates M49 to maintain compatibility with existing Model 49 billing packages.

A diagram of the airtime file header is shown in Figure 5-2.

Device Name	Site Number	Airtime Identifier	Start Date	Start Time	End Date	End Time	Number of Record	Processed Flag	Spare	CR & LF
5	4	1	8	8	8	8	5	1	10	2

FIELD LENGTHS

Figure 5-2. Airtime File Header

Table 5-4 describes the format of the airtime file records. Each line of text is 33 characters in length.

Table 5-4. Airtime File Data Fields

Name	Type	Length	Description
Home repeater	num	2	User's home repeater (1-20)
User ID	num	3	User ID Number (1-250)
Total primetime	num	8	Accumulated seconds of use during prime time
# primetime accesses	num	5	Number of accesses during prime time
Total non-primetime	num	8	Accumulated seconds of use during non-prime time
# non-primetime accesses	num	5	Number of accesses during non-prime time
CR & LF	char	2	Carriage return & linefeed

A diagram of the airtime file data records is shown in Figure 5-3.

Home Repeater	User ID	Total Prime-time Seconds	# of Prime-time Calls	Total Non-prime-time Seconds	# of Non-prime-time Calls	CR & LF
2	3	8	5	8	5	2

FIELD LENGTHS

Figure 5-3. Airtime File Records

Call Detail (SMDR) Files

Call detail files can be retrieved as often as needed. Each day's retrieval is stored in a separate computer file. If retrieval is executed more than once per day, the data is appended to the end of the current day's file. The call detail files start with a header record identifying the site, repeater, date, time of day, etc. The data records following the header record are sorted

chronologically by call date. Each data record is the same fixed number of bytes in length and corresponds to a telephone call handled by a Model 459.

Figure 5-4 shows an example call detail file.

```
M49   0001D03/22/9915:06:3903/22/9915:33:48    3
   13235EM15:10    01            1303/22/99   4
   13235CM15:11    08206363      1303/22/99  10
   13235CM15:13   3618206363     1303/22/99   9
```

Figure 5-4. Call Detail File

Table 5-5 describes the format of the call detail file header. The header text is 60 characters in length.

Table 5-5. Call Detail File Header Fields

Name	Type	Length	Description
Device Name	char	5	M49
Site Number	num	4	Site these user IDs are on
D	char	1	D = call Detail identifier
Start Date	char	8	MM/DD/YY
Start Time of Day	char	8	HH:MM:SS
End Date	char	8	MM/DD/YY
End Time of Day	char	8	HH:MM:SS
Num. of Records	num	5	Number of records in the file
Processed Flag	char	1	
Spare	char	10	
CR & LF	char	2	Carriage return and linefeed

A diagram of the call detail file header is shown in Figure 5-5.

Device Name	Site Number	D e t a i l I d e n t i f i e r	Start Date	Start Time	End Date	End Time	Number of Record	P r o c e s s e d F l a g	Spare	C R & L F
5	4	1	8	8	8	8	5	1	10	2
FIELD LENGTHS										

Figure 5-5. Call Detail File Header

Table 5-6 describes the format of the call detail file records. Each line of text is 49 characters in length.

Table 5-6. Call Detail File Data Fields

Name	Type	Length	Description
Home Repeater	num	2	User's home repeater (1-20)
User ID	num	3	User ID Number (1-250)
Qualifier	char	1	C = Call complete N = Call not answered D = No dial tone I = Invalid user R = Restricted telco dialed E = Other error B = ID called was busy, or too many simultaneous calls
Type of Call	char	1	L = Land line initiated M = Mobile initiated S = Selective mobile-to-mobile call
Time Call Began	char	5	HH:MM
Length of Call	num	5	Length of call (seconds)
Phone # Called	char	16	Phone number dialed
Line #	num	2	Line call went through (repeater number)
Date of Call	char	8	MM/DD/YY
Actual Condition Code	char	4	For Landline-to-Mobile: 1 - Normal call 8 - System or ID busy 2 - Normal call timed out or no outgoing 3 - Not enough rings 9 - 2nd dial tone 4 - Dialing timeout 10 - # from mobile 5 - Invalid user 11 - # from landline 6 - Mobile did not answer 12 - Incorrect line type 7 - Turn around timer 13 - Battery removal / reversal For Mobile-to-Landline: 1 - Normal call 8 - Too many calls 2 - Normal call timed out 9 - 2nd dial tone 3 - Dial tone not detected 10 - # from mobile 4 - Dialing time out 11 - # from landline 5 - Restricted access dialed 12 - Incorrect line type 6 - Not used 13 - Battery removal / 7 - Turn around timer reversal
CR & LF	char	2	Carriage return and linefeed

A diagram of the call detail data records is shown in Figure 5-6.

Home Repeater	User ID	Qualifier	Call Type	Start Time	Length of Call	Phone Number Called	Repeater #	Date	Condition Code
2	3	1	1	5	5	16	2	8	4

FIELD LENGTHS

Figure 5-6. Call Detail File Record

User File

The user file is created when billing data is retrieved to help map all the data from the User ID programming to the billing program. It identifies who made calls on which mobile. The user file starts with a header record identifying the site. The data records following the header record are sorted numerically by user ID. Each data record is the same fixed number of bytes in length.

Figure 5-7 shows an example user file.

```
M49    0004U        6
01021AV01021     AUTO AUTO OVERDIAL TO #505/27/9905/27/99N
01022AV01022     AUTO AUTO OVERDIAL TO #505/27/9905/27/99N
01023AV01023     AUTO AUTO OVERDIAL TO #505/27/9905/27/99N
01121IV01121     PTC                    05/27/9905/27/99N001
01122IV01122     PTC                    05/27/9905/27/99N001
01123IV01123     PTC                    05/27/9905/27/99N001
```

Figure 5-7. User File

Table 5-7 describes the format of the user file header. The header text is 28 characters in length.

Table 5-7. User File Header Fields

Name	Type	Len	Description
Device Name	char	5	M49
Site Number	num	4	Site these user IDs are on
U	char	1	U = User
Num. of Records	num	5	Number of records in the file
Processed Flag	char	1	
Spare	char	10	
CR & LF	char	2	Carriage return & linefeed

A diagram of the user file header is shown in Figure 5-8.

Device Name	Site Number	User Identifier	Number of Record	Processed Flag	Spare	CR & LF
5	4	1	5	1	10	2
FIELD LENGTHS						

Figure 5-8. User File Header

Table 5-8 describes the format of the user file records. Each line of text is 63 characters in length.

Table 5-8. User File Data Fields

Name	Type	Len	Description
Home Repeater	num	2	User's home repeater (1-20)
User ID	num	3	User ID Number (1-250)
User Type	char	1	D = Dispatch I = Interconnect A = Auto-Overdial
User Status	char	1	V = Valid I = Invalid U = Unassigned D = Deferred
Customer Account	char	10	Account code
Rate Code	char	5	Billing rate code
Comments 2	char	19	Comments line 2
Create Date	char	8	MM/DD/YY user record created
Alter Date	char	8	MM/DD/YY user record altered
Duplicate	char	1	Y/N, bill user as duplicate
Num. of Mobiles	char	3	Number of mobiles with this ID code
CR & LF	char	2	Carriage return & linefeed

A diagram of the user file records is shown in Figure 5-9.

Section 5. Billing and Statistics

Figure 5-9. User File Record

CLEARING BILLING BUFFERS

Once the call detail data has been successfully retrieved from the Model 459, the billing buffers are automatically cleared.

If an error occurs when retrieving the information, such as an interruption of the modem call, the current file will be renamed and the records will not be cleared. The format of this file is MMDD####.T$$. If it is not possible to retrieve the call detail information completely and accurately due to a complete failure of the Model 459, this file can be renamed to the MMDD####.D$$ format for proper use by the accounting software.

Airtime Accumulators

The airtime accumulators are not reset until the system operator manually clears them. However, TCBase offers to clear the data immediately following retrieval.

Caution:

Do not clear the airtime accumulators without first retrieving the current totals. Otherwise, the data will be permanently erased.

Follow the steps below to clear the airtime accumulators:

❑   1.   Boot up the office computer in MS DOS or run a DOS shell from Windows.

❑ 2. Change to the TCBase installation directory (default \TCBASE), by typing:

> CD TCBASE

❑ 3. Run TCBase, by typing:

> TCBase

❑ 4. From the TCBase main menu, select Comm, Other.

❑ 5. If more than one site has been programmed into TCBase, the Site Index window appears. Select the appropriate site, and press <Enter>.

❑ 6. Select Clear Call Accumulation from the Other options and press <Enter>.

TCBase connects to the site and clears the accumulators.

SMDR Buffers

The call detail buffers are automatically cleared once a successful retrieval is complete. If a transfer is interrupted midstream, the records remain intact in the Model 459. However, if the SMDR buffers need to be cleared without retrieving the current records, follow the steps below:

❑ 1. Boot up the office computer in MS DOS or run a DOS shell from Windows.

❑ 2. Change to the TCBase installation directory (default \TCBASE), by typing:

> CD TCBASE

❑ 3. Run TCBase, by typing:

> TCBase

❑ 4. From the TCBase main menu, select Comm, Other.

❑ 5. If more than one site has been programmed into TCBase, the Site Index window appears. Select the appropriate site, and press <Enter>.

❑ 6. Select Clear Call Detail from the Other options and press <Enter>.

TCBase connects to the site and clears the SMDR buffers.

TRANSFERRING BILLING DATA TO AN ACCOUNTING PROGRAM

Once all three billing file types have been retrieved from the Model 452/459 to the office computer, the files can be exported to a software billing package. The program can then take the ASCII data and create useful billing information and invoices. The ASCII data can be identified with the formats shown previously and used in any way the system operator requires.

RESTORING BILLING FILES

In the event that billing records need to be restored from floppy to the office computer's hard drive, select call Accumulation or call Detail from the Restore menu. TCBase provides precise instructions on when to insert backup disks. Before beginning a restore, make sure that the disks are the most recent records and are in correct order. It is also a good idea to check that the diskettes are write-protected before executing a restore to prevent accidental erasure.

6. ADVANCED FEATURES

SELECTIVE MOBILE-TO-MOBILE CALLING

Selective mobile-to-mobile calling connects two half-duplex LTR mobiles using only one channel. Both mobiles must be interconnected for the feature to work properly. In a standard LTR application, one interconnect mobile must place a phone call to the other, busying up two interconnect telephone lines (one outgoing and one incoming) and two repeater channels.

Placing a Selective Mobile-to-Mobile Call

Selective mobile-to-mobile calling is only available when both mobile radios are half-duplex. To place a call using this feature, follow the steps below:

1) Select the assigned interconnect ID on the half-duplex mobile.

2) Key PTT to access the Model 459.

3) Release PTT and wait for dial tone from the Model 459.

4) Once the dial tone is heard, dial:

> *9*HHUUU

> HH = home repeater number
> UUU = user ID of the party being called.

> If the Overdial Access # field in the Site Configuration, Interconnect window is set to Y, dial:

> *9*AAAA

> AAAA = user access number

☞ **Note:**

The receiving mobile must have an interconnect ID code.

Once the calling party has completed dialing, one of the following conditions occurs:

♦ If the receiving mobile is already busy on another channel, the Model 459 sends a busy signal to the calling mobile and drops the call.

♦ If the receiving mobile is invalid, the Model 459 plays the reorder prompt to the calling mobile and drops the call.

♦ If the receiving mobile is valid and not busy on another channel, the Model 459 sends ringing to both mobiles. The ID code of the receiving mobile is placed on the high-speed data bus. Subaudible data packets for both mobiles are transmitted on the accessed channel.

Either mobile can press PTT to stop the ringing and complete the call.

Terminating a Selective Mobile-to-Mobile Call

Either mobile can end the call by pressing the pound key (#). The call also terminates automatically if the Call Limit Time expires or if the Mobile Turn-Around Time is exceeded.

Note:

For the details on the Call Limit and Mobile Turn-Around Times (set in the Site Configuration), refer to Section 3.

Using with the Push to Connect (PTC) Feature

Selective mobile-to-mobile calling can be implemented on key up for push-to-connect users. To program an automatic selective mobile-to-mobile call, follow the steps below:

1) Program the LTR user as PTC in the Interconnect, Networking Type field.

2) The PTC window appears. In the Autodial Table Entry field, enter 101 to indicate a selective mobile-to-mobile call.

3) Set the appropriate Overdial - Id Code or Access #.

Note:

For more details on programming User IDs, refer to Section 4.

AUTONET WIDE-AREA DISPATCH

Autonet is a feature that uses the interconnect option to connect two remote Model 459s. Autonet generally uses a 4-wire μwave or RF link with E&M telco cards to connect the channels. However, a dial-up connection using the PSTN can also be used to link the Model 459s for a dispatch call.

Autonet is a first-generation networking product and does not have any follow-me capabilities. All the IDs and phone numbers must be programmed into the Model 459s and the users must know where the other mobiles are located in order to complete a call.

> **Note:**
>
> **For detailed examples of the Model 459 TCBase programming to facilitate both types of autonet connections, see Section 7.**

Direct Connect Method

When an E&M telco card is installed in the linked Model 459 at each site, the direct connection method is most effective. An autonet dispatch call takes about 3 seconds to complete with this type of link. Figure 6-1 illustrates the hardware connections between the two autonet sites.
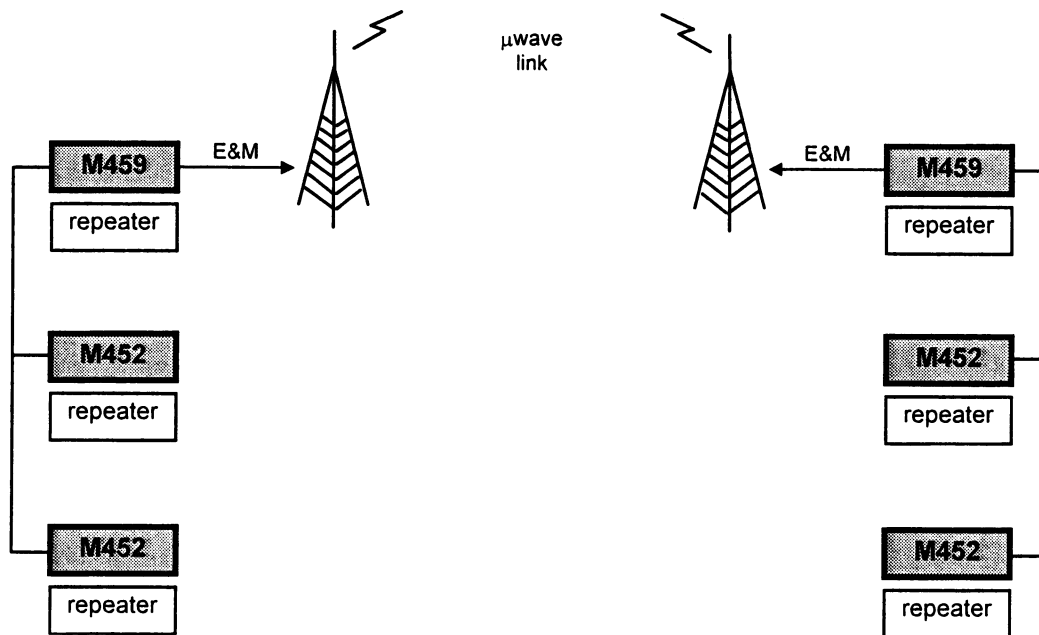
Figure 6-1. Autonet with Direct E&M Link

Section 6. Advanced Features

The procedure is as follows:

1) A user at the initiating site (#1 for this example), selects the correct autonet system and group on his home site and keys up the mobile.

2) The site #1 Model 459 signals the Model 459 at the sister site (#2 for this example) via the μwave link and sends the correct autonet ID.

3) The Model 459 at site #2 sends a DTMF B9 to site #1. The DTMF B9 confirms the connection to the originating Model 459 and is heard by the initiator as a "go ahead" indication.

4) The initiating mobile then rekeys and begins speaking.

The LTR transmitters at both sites remain keyed. The E&M leads are off-hook from a site only when a mobile is keyed up at the site.

For direct-connect autonet, the mobile radios must be programmed as interconnect IDs, not dispatch IDs. Otherwise, the mobiles will be locked out of the conversation. They will be able to listen, but not key up.

The autonet call is disconnected in one of two ways.

1) Users can allow the Model 459s to time-out if they do not have a DTMF keypad. The time-out occurs when no mobile is keyed and no off-hook from the other site is detected for the number of seconds set for the mobile turn-around time (in Site Configuration/Interconnect window of TCBase).

2) Users with a DTMF keypad can use the pound (#) key to disconnect the call.

PTC Dial-Up Connect Method

If a direct E&M link is not practical, an inexpensive and easily configured telco link is often a good alternative. An autonet dispatch call with this type of link is very similar to the direct connection. However, the time required to complete the call is dependent upon the telco CO. But a push-to-connect autonet call should process about as fast as a regular phone call through the Model 459s. Figure 6-2 illustrates the hardware connections between the two autonet sites.
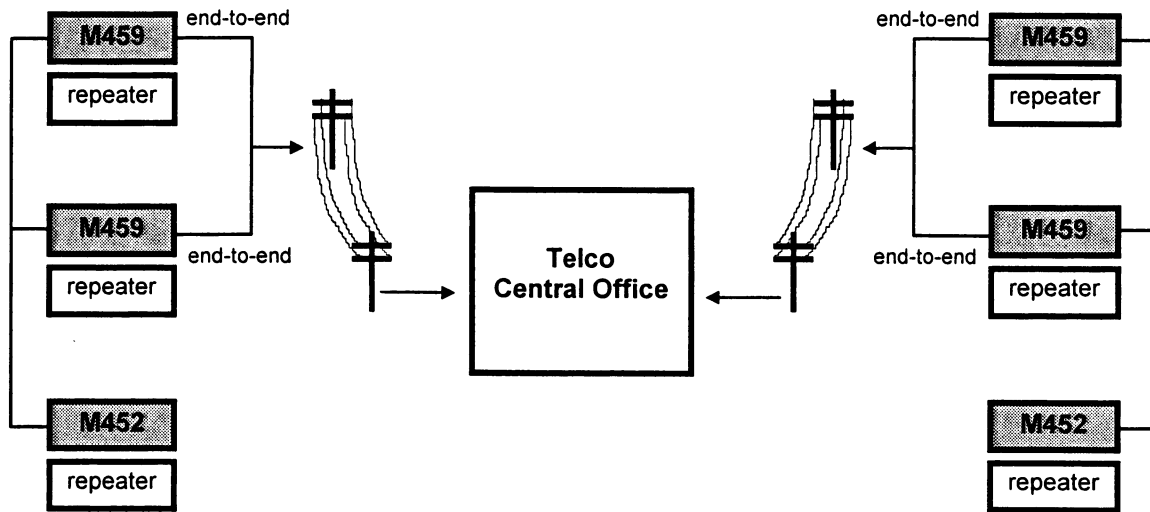
Figure 6-2. Autonet with Dial-Up Link

The procedure is as follows:

1) A user at the initiating site (#1 for this example), selects the correct autonet system and group on his home site and keys up the mobile. This is a predetermined user ID programmed into both mobiles and the Model 459s as an autonet user.

2) The Model 459 at site #1 goes off-hook using its telco card and waits for dial tone.

3) When dial tone is received, the Model 459 automatically dials the phone number of the sister site (#2 for this example). The autodial timing may be delayed depending on how the autodial table is programmed.

4) When the Model 459 at site #2 answers the autonet call the initiating Model 459 overdials the user access code or ID.

5) The receiving Model 459 validates the overdial digits and keys the transmitter.

6) User #1 is placed on the air to complete the call.

7) The call ends independently at the two sites whenever a DTMF pound (#) is detected from one of the mobiles or when there is no mobile keyed on the site for the number of seconds set for the mobile turn-around time (in Site Configuration/Interconnect window of TCBase).

TONE AND VOICE PROMPTS

The system tone and voice prompts can be customized to suit the system requirements. Tone prompts are standard on all Model 459s. If an optional voice prompt card is installed, then voice prompts are also available.

Prompts Window

To access the Prompts window shown in Figure 6-3, enter Y in the Edit Prompts field in the site configuration.

```
 ┌──────────────────────────────────────────────────────────────────┐
 │  ┌───┐                                                             │
 │  │   │    Note:                                                    │
 │  └───┘                                                             │
 │  For more details on site configuration, refer to Section 4.      │
 └──────────────────────────────────────────────────────────────────┘
```

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)
┌─INDEX ═══════════════════════╕   ┌─SITE_CONFIG─────────────────────────────┐
│Site      Site Name      I    │   │ Site Number: [0001]                     │
│0001 TEST SITE           Y    │   │ Site Name:[TEST SITE              ]     │
│0002 FASTNET SITE        Y    │   └─────────────────────────────────────────┘
│                              │   ┌─PROMPTS──────────────────────────────────┐
│                              │   │ Are Voice Prompts Available?:█           │
│                              │   │                                          │
│                              │   │ Message              Use Tone Voice      │
│                              │   │                        M L  Asn  Tm      │
│                              │   │ 1 Welcome Message      Y 0 0  01*  05     │
│                              │   │ 2 Call can't be cmpl.  Y 0 0  02*  03     │
│                              │   │ 3 Thank You, Ringing   Y 0 0  03*  03     │
│                              │   │ 4 Wait,processing call Y 0 0  04   03     │
│                              │   │ 5 # Diald invalid/Rstr Y 0 0  05*  03     │
├─HELP─────────────────────────┤   │ 6 # Invld,please retry Y 0 0  06*  04     │
│Enter Y if voice prompts are  │   │ 7 Please proceed       N 0 0  07   02     │
│available in this system,     │   │ 8 Alarm                N 0 0  08   02     │
│enter N otherwises.           │   │ 9 Thanks for Reg. (FN) N 0 0  09   02     │
│                              │   │ 10 Call Discncting     N 0 0  10   02     │
│                              │   │ *can't alter code                        │
│                              │   │ Voice Time — Available:332 Total:332      │
│                              │   │                                          │
│                              │   │ Edit More Prompts?:N                     │
└──────────────────────────────┘   └──────────────────────────────────────────┘
```

Figure 6-3. Prompts Window

The Are Voice Prompts Available field in the prompts window enables voice prompts for the system. The Edit More Prompts field at the bottom of the window accesses another table of prompts. The second window of voice prompts is shown in Figure 6-4.

```
┌─PROMPTS──────────────────────────────┐
│ Are Voice Prompts Available?:▓        │
│                                       │
│ Message                  Use Tone Voice│
│                              M L  Asn Tm│
┌─PROMPTS_A────────────────────────────┐
│ Message                 Use Tone Voice│
│                             M L  Asn Tm│
│ 11 Busy System/User      █ █ █  ██ ██ │
│ 12 Not Used              █ █ █  ██ ██ │
│ 13 Not Used              █ █ █  ██ ██ │
│ 14 Not Used              █ █ █  ██ ██ │
│ 15 Not Used              █ █ █  ██ ██ │
│ 16 DTMF Level            █ █ █        │
│ 17 Warning Tone          █ █ █        │
│ 18 Dial Tone             █ █ █        │
│ 19 Convrsation TimeOut   █ █ █        │
│ 20 Remaining Tones       █ █ █        │
│ Voice Time -- Available:███ Total:███ │
└───────────────────────────────────────┘
```

Figure 6-4. Second Prompts Window

Enabling Tone Prompts

If a voice prompt card is not installed, enter N (none) in the Voice card type field. Each of the available prompts can be set to tone or voice operation. Select tone prompts by entering a T in the Use column. Then modify the M and L fields appropriately. Table 6-1 describes each field in the Prompts table.

Table 6-1. Prompts Window Fields

Column Label	Valid Entries	Description of Function
Use	N (none) T (tone) V (voice)	USE: This field sets the type of prompt the user hears - tone or voice. Default setting is T.
M	Z (Zetron) U (Uniden) J (E.F. Johnson)	MANUFACTURER: This field sets the tone compatibility for interfacing with different mobiles. Default setting is Z.
L	0 (low) - 5 (high) 0-7 for DTMF level	LEVEL: This field sets the tone level for each prompt. Default setting is 5.
Asn	01 - 20 01 - 03; 05; 06 can't be changed (indicated by *)	ASSIGN: This field tells the Model 459 when to play each individual voice prompt. Use the Asn number when recording voice prompts. Default settings depend on the prompt.
Tm	01 - 32 seconds	TIME: This field sets the maximum length for each voice prompt. The total time available for voice prompts depends on the type of voice card installed in the Model 459. Default settings depend on the prompt.

Enabling Voice Prompts

Select voice prompts (instead of tone) by entering a V in the Use column. Then a voice prompt number (Asn) and time length (Tm) can be assigned as described in Table 6-1. The bottom of the window shows the total available prompt time and the time currently used.

☞ **Note:**

When voice prompts are enabled, the actual messages must be recorded and stored in the Model 459 (see "Programming Voice Prompts", on page 6-12). The voice prompt card does not have any prerecorded messages.

Assign and Time Fields

The Asn field determines how and when the system uses the voice prompts. When the Asn numbers are changed, some special situations can arise.

For example, prompt number 4 (Wait, processing call) is reassigned to an already used Asn (01 - Welcome message). Now when the Wait, processing call prompt is activated, the Welcome Message actually plays. In addition, the Wait, processing call prompt is erased

from the voice prompt card. If it is reassigned again (to its initial setting or any other), it must be re-recorded.

Furthermore, if any prompts are added to the active list, the times and or assignments must be altered. The voice prompt card has a limited amount of voice storage available. If the time limit is exceeded, TCBase won't accept the entries. The database adds up the total time allotted to all unique prompts.

✋ Caution:

When a voice prompt is added or the length (Tm) is changed, all the prompts following it in the list are erased. For example, if prompt number 3 is lengthened, prompts 4 through 11 are erased.

Prompt Messages

Each prompt is played upon the occurrence of a specific call condition. The twenty available prompt types are described below.

☞ Note:

Voice prompts 12 -`15 are not currently used. Leave these settings at their default values.

Welcome Message (1)

The Welcome message plays after the phone line is answered to prompt the caller to enter the overdial digits.. DTMF can be overdialed during the voice message. When the first DTMF digit is received, the message stops playing. Dial click detection, however, is not enabled until after the voice message.

If no voice message is recorded for the Welcome prompt, the beep or dial tone is sent immediately after the line is answered.

Call Can't Be Cmpl. (2)

The Call can't be completed message plays if the mobile does not answer the call before the Mobile Answer Time expires. The line is disconnected immediately after the message is played.

If no voice message is recorded for the Call can't be completed prompt, the reorder tone (fast busy signal) is sent to the calling party.

Thank You, Ringing (3)

The Thank you message plays when the calling party enters a valid mobile ID.

If no voice message is recorded for the Thank you prompt, the Model 459 goes directly to ringing.

Wait, Processing Call (4)

The Wait, call is being processed message plays when the Model 459 is busy setting up a PTC call.

If no voice message is recorded for the Wait, call is being processed prompt, the Model 459 issues two short beeps.

Diald Invalid/Rstr (5)

The Number dialed is invalid message plays if the calling party dials an invalid user ID (programmed in User IDs), or if a mobile dials a restricted number when making an outgoing call. This message also plays if the called user ID is programmed as Deferred and cannot receive calls at this time. The calling party gets one chance to reenter a correct ID before this message plays.

If no voice message is recorded for the Number dialed is invalid prompt, the Model 459 issues a reorder tone and disconnects the call.

Invld, Please Retry (6)

The Number is invalid, please retry message plays if the calling party overdials an invalid user ID. This message plays once and if a second incorrect ID is entered, message number 5 plays (see the previous message description).

If no voice message is recorded for the Number is invalid, please retry prompt, the Model 459 issues a reorder tone and waits for another number.

Please Proceed (7)

The Please proceed message plays when the caller is connected to an Autonet user. Since no ringing is audible to an Autonet dialing party from another LTR site, this prompt notifies the caller to begin conversation.

If no voice message is recorded for the Please proceed prompt, the Model 459 issues two quick beeps when the call is connected.

Alarm (8)

The Alarm on repeater message plays when the Alarms field is enabled (programmed in the Site Configuration) and an alarm condition has occurred. The message is sent to the mobile ID designated to receive alarm messages.

If no voice message is recorded for the Alarm prompt, the Model 459 calls the designated alarm ID and issues alarm beeps.

Thanks for Reg. (FN) (9)

The Thanks for registering tone plays when a mobile user, homed on another site, roams into a Model 459 FASTNet site and is successfully registered on the system.

If no voice message is recorded for the thanks for registering prompt, the Model 459 issues a prompt consisting of three tones played sequentially.

Call is Discncting (10)

The Call is disconnecting message plays prior to a call terminating due to a non-error condition.

If no voice message is recorded for the call is disconnecting prompt, the Model 459 issues three beeps prior to disconnecting.

Busy System/User (11)

The Busy system or user message plays when the user ID being called is already busy or the system has no available channels.

If no voice message is recorded for the busy system or user prompt, the Model 459 issues a busy tone.

DTMF Level (16)

This selection sets the DTMF level to the telephone.

The DTMF level is a tone-only prompt. A voice message cannot be recorded for this prompt.

Warning Tone (17)

The warning tone plays when the mobile user has 15 seconds remaining on their call timer.

The warning tone is a tone-only prompt. A voice message cannot be recorded for this prompt.

Dial Tone (18)

The dial tone plays when the mobile has connected to the repeater to prompt the user to enter an ID.

The dial tone is a tone-only prompt. A voice message cannot be recorded for this prompt.

Conversation TimeOut (19)

The conversation time-tone plays when a half-duplex mobile has not keyed for the Mobile Turn-Around Time or when the call has exceeded the Call Limit time (both programmed in the Site Configuration).

The conversation time-out is a tone only prompt. A voice message cannot be recorded for this prompt.

Remaining Tones (20)

The remaining tones are various tone-only prompts that play under different conditions as follows:

- ♦ The 5 seconds left in dispatch call tone plays when a dispatch call is 5 seconds from reaching the Call Limit time.

- ♦ The turn around tone plays when a half-duplex mobile is 5 seconds from disconnect.

- ♦ The pound enable and disable tones play when the pound key (#) is pressed.

- ♦ The message beeps play after a user connects to the system to indicate that he/she has a message.

Programming Voice Prompts

Follow the steps below to access programming mode for voice prompts.

Database Setup

The following procedure modifies some TCBase parameters to allow voice prompt programming access.

❏   1. Choose Site config from the Edit menu.

❏   2. Select the correct site from the index window.

❏   3. Move the cursor to the Interconnect field using the arrow keys (↑ and ↓).

❏   4. Enter Y to set up the interconnect parameters (or press <Enter> if Y is already there). The Interconnect window appears.

❑ 5. Move the cursor to the Overdial Access # field (third line in the second block of fields).

❑ 6. Enter N to temporarily disable overdial access for the repeaters. This setting is only used for the duration of the voice prompt recording session. It enables the Model 459 to recognize the five digits required to enter programming mode.

❑ 7. Use the <Esc> key to exit out of each window to the main menu.

Update Model 459

The following procedure transfers the new TCBase parameters to the Model 459.

❑ 1. Choose Update from the Comm menu.

❑ 2. Select the site to be updated. If a password is requested, enter it. TCBase dials the site and establishes a link. The Update menu appears.

❑ 3. Choose the appropriate item(s) from the Update menu. If the site needs to be updated for other modifications, choose Changes or Entire database.

☞ **Note:**

If you are unsure about what changes have been made to the database since the last update, it is a good idea to choose Entire database.

❑ 4. TCBase transfers the new database settings to the Model 459s. Press <Enter> to continue at the status message prompt when the update is complete. The Update menu reappears.

❑ 5. Press <Esc>.

❑ 6. Enter N when TCBase asks if you want to disconnect from the site.

❑ 7. Select Monitor from the Comm menu. The traffic monitoring screen makes it easy to observe your call into the Model 459 for voice prompt recording.

Dial Into the Model 459

The following procedure allows the technician to record, erase, and playback voice prompts.

☐   1. Use a touch-tone phone to dial into the Model 459.

☐   2. If the telco card is E&M without feed digits, wait for the welcome prompt and then dial:

> **00xxx**

> where 'xxx' is the Test Id Code programmed in the Repeater config.

☐   3. If the telco card is E&M with feed digits, dial an invalid user ID. After the Model 459 issues reorder tones, dial:

> **00xxx**

> where 'xxx' is the Test Id Code programmed in the Repeater config.

If everything is set up correctly, the Model 459 responds with two ding-dong tones to indicate that programming mode has been accessed.

Tone Prompts in Programming Mode

Several different tones and beeps guide you through the voice prompt programming process. Table 6-2 describes each prompt and when it is played.

Table 6-2. Tone Prompts During Voice Programming

Prompt Description	When Prompt Plays
1 ding-dong	This prompt plays after a message is erased or the maximum message length is reached.
2 ding-dongs	This prompt plays when programming mode is first accessed.
3 ding-dongs	This prompt plays after an invalid command or message number.
fast busy tone	This prompt plays if the pause between recording prompts is too long.
3 beeps	This prompt indicates disconnection of the call.
6 beeps	This prompt plays to indicate when to begin speaking the message for recording.
8 beeps	This prompt indicates that a message is being erased.

Voice Prompt Programming Commands

Once the Model 459 is in programming mode several different commands are available. Table 6-3 describes how the touch-tone telephone keys guide programming.

Table 6-3. Voice Prompt Programming Codes

Key Sequence	Function
0 + nn	Erase the voice prompt assigned to slot nn.
2 + nn	Playback the voice prompt assigned to slot nn.
9 + nn	Record the voice prompt assigned to slot nn.
*	Stop recording the voice prompt.
##	Disconnect from the voice prompt recording session.
nn	nn is the voice prompt assignment (based on the Asn column in the Prompts window). The nn number must follow another function key (0, 2, or 9)

The appropriate nn programming codes for each of the 11 voice prompts are listed below.

Asn	nn	Asn	nn	Asn	nn
01	1	05	5	09	9
02	2	06	6	10	01
03	3	07	7	11	02
04	4	08	8		

For example, to record the Welcome message (Asn = 01; nn = 1) enter:

9 + 1

GHOST REPEATERS

The ghost repeater feature basically doubles the number of user IDs available for a given channel. Ghosting allows one repeater to act as two separate units. For example, a 10-channel system with ghost repeaters purchased for every channel has 5000 ID codes available instead of only 2500.

A repeater enabled for ghosting has two home repeater numbers - the real one and a second, virtual one that is the "ghost". The second 250 users that are homed to the "ghost" channel always see a busy condition on their home channel and get trunked to another available repeater. The end result to the mobile user is seemingly normal operation.

☞ **Note:**

All brands of radios may not be compatible with this feature.

Enabling Ghost Repeaters in TCBase

To set up a repeater for ghost operation follow the steps below:

1) Select Repeater config from the Edit menu.

2) Use the arrow keys to select the Ghost Repeater field.

3) Enter a repeater number that is currently unused at the site. The repeater number entered here is the ghost repeater number for the physical repeater being configured.

✋ **Caution:**

The ghost repeater number cannot be the same number as another repeater (actual or another ghost) used at the site.

Hardware Setup for Ghost Repeaters

The DIP switches on the controller front panel must be set to the correct home repeater number for the ghost function to operate correctly. Refer to the Model 452/459 installation and operation manual (Part No. 025-9450).

In addition, the mobiles must be programmed correctly to work on a ghost repeater. A mobile that is homed on a ghost repeater must have its Federal Communications Commission channel table programmed with the frequency of the physical channel in both the physical and ghost repeater slots.

For example, a two channel system has actual repeaters on channels 1 and 6 and ghost repeaters on channels 2 and 7, respectively. Repeater 1 is on FCC channel 150 and repeater 6 is on FCC channel 400.

A mobile homed on repeater 1 has the FCC channel table shown below:

1	150	2	___	3	___	4	___	5	___
6	400	7	___	8	___	9	___	10	___
11	___	12	___	13	___	14	___	15	___
16	___	17	___	18	___	19	___	20	___

A mobile homed on ghost repeater 2 has the FCC channel table shown below:

1	150	2	150	3	___	4	___	5	___
6	400	7	___	8	___	9	___	10	___
11	___	12	___	13	___	14	___	15	___
16	___	17	___	18	___	19	___	20	___

A mobile homed on ghost repeater 7 has the FCC channel table shown below:

1	150	2	___	3	___	4	___	5	___
6	400	7	400	8	___	9	___	10	___
11	___	12	___	13	___	14	___	15	___
16	___	17	___	18	___	19	___	20	___

7. EXAMPLE SITES

OVERVIEW OF DATABASE EXAMPLES

This section is designed to illustrate a few useful applications of a Model 452/459 system. The pertinent TCBase screens are shown for each site. Most of the fields are not described here. (See Section 4 for details on specific fields.) This section only highlights the fields and subfields that require specialized settings—i.e., the tricky stuff.

SITE 0001 - DIAL-UP CONNECTION TO A FASTNet SWITCH

This site shows the configuration for a typical FASTNet interface. The site has three repeaters, all interconnected on end-to-end lines. Only repeater number 01 reports to the FASTNet switch. The fields described here are those parameters that are critical to proper setup. However, the other fields also need to be set.

Site Configuration

Several fields in the site configuration window need to be set specifically for FASTNet applications. Figure 7-1 shows the site configuration index window for this system.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron      (SUPERVISOR mode)
┌─INDEX ──────────────────────┐  ┌─SITE_CONFIG──────────────────
│Site      Site Name       I  │  │ Site Number: [0001]
│0001 FASTNET SITE #1      Y  │  │ Site Name:[FASTNET SITE #1      ]
│0002 DISPATCH W/GHOSTS    N  │  │
│0003 MISCELLANEOUS SITE   Y  │  │ Site Access:1 ...  PC Comm Port:1
│0004 DIRECT E&M LINK TO 5 Y  │  │
│0005 DIRECT E&M LINK TO 4 Y  │  │ Edit Prompts:Y ... Alarms:Y ...
│                             │  │ Prime Time Intervals
│                             │  │   1:Start: 07:00  Stop: 18:00
│                             │  │   2:Start: 13:00  Stop: 19:00
│                             │  │
│                             │  │ Unassigned Users:U
│                             │  │ Idle Msg. Time:10
│                             │  │ COR Hold Time:0.3
┌─HELP════════════════════════┐  │ Repeater Hold Time:00.8
│Is Interconnect available at │  │ Repeater Timeout:180
│site? (Y/N)                  │  │
│                             │  │ Interconnect:[Y] ...
│                             │  │
│                             │  │ Create Date: 04/11/96
│                             │  │ Alter Date:  05/29/97
└─────────────────────────────┘  └───────────────────────────────
```

Figure 7-1. Site #0001 Configuration

Interconnect Window

The Interconnect field must be set to Y for FASTNet applications. When the interconnect option is enabled, the window shown in Figure 7-2 appears. Enter Y in the FASTNet Switch in Use field at the bottom of the window and the window shown in Figure 7-3 appears.

```
┌─SITE_CONFIG──────────────────────┐
│ ┌─INTERCONNECT───────────────────
│ │DTMF Timeouts —
│ │  Interdigit:5.0  First Digit:5.0
│ │Regenerated Digits — Min:07  Max:11
│ │'#' Disconnect Qualify Time:250
│ │Require Dialtone:Y
│ │BusyUp for Programming:Y
│ │
│ │Mobile Turn-Around Time:30
│ │Mobile Answer Time — A:30  B:30
│ │Overdial Access #:Y
│ │Repeat Audio Half-Duplex:Y
│ │Overdialing Time Limit:010
│ │2nd Dialtone/DTMF Thru:Y
│ │Warning Tone Time:060
│ │Min. Call Time to Store:000
│ │Round Call Accum. To Nearest Min:Y
│ │
│ │Edit Dynamic Call Limit Table:Y ...
│ │Edit Max. Simul. Calls Table:Y ...
│ │Edit Prefix Tables:Y ...
│ └─FASTNet Switch in Use:Y ...
└──────────────────────────────────┘
```

Figure 7-2. Interconnect Window

```
┌─FASTNET──────────────────────────┐
│                                   │
│ FASTNet Radio Site Number: 001    │
│ FASTNet Phone Number: 820-0000    │
│ Reporting Repeater: 01            │
│                                   │
│ Roaming Batch Interval: 05        │
│                                   │
│ Message Beep Interval: 05         │
│                                   │
│ Store SMDR Recs to FASTNet Calls: Y │
└──────────────────────────────────┘
```

Figure 7-3. FASTNet Switch Window

Six different fields in the FASTNet window need to be programmed. In this example, the FASTNet radio site number is programmed as 001 in the switch database (Fastbase). The Model 459s must dial 820-0000 to connect to the FASTNet switch on an end-to-end line. (If the connection is made with a direct 4-wire E&M link, this field is ignored.) Repeater number 01 reports to the FASTNet switch every 5 minutes. If a user has messages, the mobile

receives beeps every 5 minutes. SMDR records are stored for FASTNet calls (also duplicated in the Model 459s).

Repeater Configuration

Several fields in the repeater configuration window need to be set specifically for FASTNet applications. Figure 7-4 shows the configuration window for the reporting repeater.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron          (SUPERVISOR mode)
┌INDEX                               ┌SITE 0001─────────────────────────
│RP L│                               │       REPEATER CONFIGURATION
│ E│                                 │
│09 E│                               │Repeater #:[  ]
│18 E│                               │Trunking - From:   To:
│                                    │Ghost Repeater:
│                                    │
│                                    │   Play Station ID:  ...
│                                    │   Alarms Enabled:  ...
│                                    │   Voice Prompts:
│                                    │
│                                    │   Test Id Code:
│                                    │   Keyup Delay:
┌HELP══════════════════════          │Cross Busy -
│                                    │   Hold Time:
│Edit: press ENTER/RETURN/<─┘        │   Tx Freq. Delay:
│                                    │   Enable on Carrier?:  ...
│Guide Window: F1                    │Turn-off Idle Msg.:
│                                    │
│Done: Esc                           │Telco Line Type:[ ] ...
│                                    │   Incoming Calls:  ...
│                                    │   Outgoing Calls:  ...
```

Figure 7-4. Repeater #01 Configuration

Incoming Calls

This field must be set to Y for all interconnected repeaters. When Incoming calls are enabled, the window shown in Figure 7-5 appears.

```
┌INCOMING_CALLS────────────────
│Answer Mode:
│Timing
│   Connect Time Required:0.50
│   Delay Before Prompt:1.0
│Play Network Answ. Tone:
```
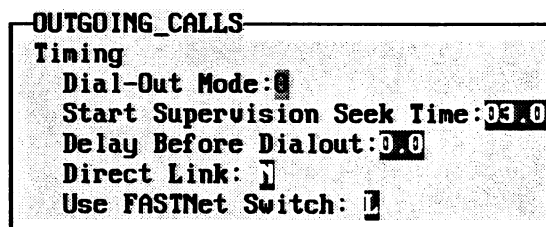
Figure 7-5. Incoming Calls Window

The Play Network Answ. Tone field enables a DTMF tone that is played upon connection. This tone signals to the FASTNet switch that the Model 459 has answered an incoming call. Set this field to Y for FASTNet applications.

Outgoing Calls

This field must be set to Y for all interconnected repeaters. When Outgoing calls are enabled, the window shown in Figure 7-6 appears.

```
┌OUTGOING_CALLS──────────────┐
│ Timing                      │
│   Dial-Out Mode:█           │
│   Start Supervision Seek Time:03.0 │
│   Delay Before Dialout:0.0  │
│   Direct Link: J            │
│   Use FASTNet Switch: █     │
└─────────────────────────────┘
```

Figure 7-6. Outgoing Calls Window

The Direct Link field indicates whether the Model 459 is directly linked to another site. For dial-up FASTNet applications, enter N. (If the Model 459 were directly connected to the switch via 4-wire E&M, this field would be set to S.) The Use FASTNet Switch field enables the repeater to connect to the switch for specific types of calls. Enter A (all calls) or L (non-local calls only; use the local prefix table) in this field.

Each repeater at the site should be configured identically for the FASTNet-related fields described above.

User IDs

Several fields in the user status window need to be set specifically for FASTNet applications. Figure 7-7 shows the configuration window for a typical FASTNet-capable user. Since the link to the Model 2540 is via dial-up connection, any users with access to the FASTNet switch must be set up for interconnect. This can be accomplished by programming the ID Type field as I or A - auto-overdial.

Allow/Restrict Prefixes

This field in the interconnect window should not be enabled for FASTNet applications. Since all long-distance calls are routed through the FASTNet switch (one telephone number for all calls), the prefix tables are unnecessary. Enter N to disable the Prefix tables for every user at this site with FASTNet privileges.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX ═══════════════════════════════  ┌SITE 0001────────────────────────┐
│_User_ S T ACC# _Cust Acct _Comments_│  │        USER STATUS               │
│01-001 V D                            │  │                                  │
│01-100 V I 1100                       │  │ User ID:[09-100]                 │
│01-101 V I 1101                       │  │ Status:[ ]                       │
│09-100 V I 9100 09100       SWANSON   │  │ ID Type:[ ] ...  Access #:[9100] │
│                                      │  │        ┌INTERCONNECT────────────┐│
│                                      │  │ Cust. A│Priority:               ││
│                                      │  │ Rate Co│Mobile Answer Time:     ││
│                                      │  │ Bill as│                        ││
│                                      │  │ Num. of│Toll Privileges:        ││
│                                      │  │        │                        ││
│                                      │  │ Comment│Allow/Restrict Prefixes:││
│                                      │  │ Comment│  Group A:   Group B:   ││
┌HELP══════════════════════════════   │  │        │                        ││
│Enter the type of networking this     │  │ Create │Turn-Around Beep:       ││
│User is allowed:                      │  │ Alter D│Audio Compandor in Use: ││
│N = None                              │  └────────│Full Duplex Radio in Use:││
│P = Push To Connect                   │          │                        ││
│R = Roamer  Requires FASTnet          │          │Networking Type:  ...    ││
│                                      │          └────────────────────────┘│
└──────────────────────────────────   └──────────────────────────────────┘
```

Figure 7-7. User #09-100 Status

Networking Type

This field at the bottom of the interconnect window can be set to N or R for FASTNet users. Refer to the help window in Figure 7-7 for the valid settings. When R is entered, the window shown in Figure 7-8 appears.

```
┌NETWORK─────────────────┐
│Phone Number: 8209100   │
└────────────────────────┘
```

Figure 7-8. Network Phone Number Window

This field stores the number that identifies this user in the network. This number must match the node user phone number programmed on the FASTNet Switch.

Local Prefix Table

When the FASTNet Switch is not directly connected, the local prefix table determines which calls are considered local and which calls are considered long-distance to the Model 459s. The table can contain up to 250 prefixes. When the FASTNet switch is only used to dial non-local calls, as in this example, the prefix table lists the numbers that the Model 459s can dial without connection to the switch. An example of what the local prefix table might look like is shown in Figure 7-9.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX                                      ┌SITE 0001──────────────────┐
│P│                                         │                           │
│█│                                         │   PAGE: [1]               │
│ │                                         │                           │
│ │                                         │      LOCAL PREFIXES        │
│ │                                         │   █▀▀ █▀▀ █▀▀ █▀▀ █▀▀      │
│ │                                         │   823 811 814 815 816      │
│ │                                         │   800 888                  │
│ │                                         │   ███ ███ ███ ███ ███      │
│ │                                         │   ███ ███ ███ ███ ███      │
│ │                                         │   ███ ███ ███ ███ ███      │
│ │                                         │   ███ ███ ███ ███ ███      │
│ └                                         │   ███ ███ ███ ███ ███      │
┌HELP══════════════════════════            │   ███ ███ ███ ███ ███      │
│Up to 5 pages of 50 Local Prefixes         └───────────────────────────┘
│can be entered.
│Enter page 1-5.
│Local Prefixes are used to route calls
│to the FASTNet switch.
│
│
│
└
 Type F1 for GUIDE window
```

Figure 7-9. Local Prefix Table

SITE 0002 - DISPATCH-ONLY GHOST REPEATERS

This site shows the configuration for a typical dispatch-only ghost repeater system. The site has four repeaters, all set for ghosting. The fields described here are critical to proper setup. However, the other fields also need to be set.

The physical repeaters are numbered 1, 7, 13, and 19. The ghost repeaters are numbered 2, 8, 14, and 20, respectively.

Site Configuration

Several fields in the site configuration window need to be set specifically for this application. Figure 7-10 shows the site configuration index window for this system.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX ──────────────────────┐  ┌─SITE_CONFIG─────────────────────────────┐
│Site      Site Name       I  │  │Site Number: [0002]                      │
│0001 FASTNET SITE #1      Y  │  │Site Name:[DISPATCH W/GHOSTS    ]        │
│0002 DISPATCH W/GHOSTS    Y  │  │                                         │
│0003 MISCELLANEOUS SITE   Y  │  │Site Access:1 ...  PC Comm Port:1        │
│0004 DIRECT E&M LINK TO 5 Y  │  │                                         │
│0005 DIRECT E&M LINK TO 4 Y  │  │Edit Prompts:N ...  Alarms:N ...         │
│                             │  │Prime Time Intervals                     │
│                             │  │ 1:Start: 07:00  Stop: 17:00             │
│                             │  │ 2:Start: 00:00  Stop: 00:00             │
│                             │  │                                         │
│                             │  │Unassigned Users:U                       │
└─────────────────────────────┘  │Idle Msg. Time:10                        │
┌─HELP────────────────────────┐  │COR Hold Time:0.3                        │
│Enter a up to a 4-digit number that │ │Repeater Hold Time:00.8             │
│uniquely identifies this site.│ │Repeater Timeout:180                     │
│                             │  │                                         │
│(This code is required to program │ │Interconnect:[N] ...               │
│Repeater and User settings for │  │                                       │
│this site).                  │  │Create Date: 05/21/97                    │
│                             │  │Alter Date:  08/26/99                    │
└─────────────────────────────┘  └─────────────────────────────────────────┘
type F1 for GUIDE window
```

Figure 7-10. Site #0002 Configuration

Interconnect

Since this site is dispatch-only, the Interconnect field should be set to N.

Repeater Configuration

To set up ghost repeaters for the site, only the repeater configuration needs to be altered. Each physical repeater must be configured for ghost operation. The ghost repeater number does not require a unique repeater setup in TCBase. Figure 7-11 shows an example of the repeater configuration for the physical repeater number 01.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌─INDEX                              ┌─SITE 0002─────────────────────────────
│RP L│                              │        REPEATER CONFIGURATION
│01  │
│07 N│                              │Repeater #:[01]
│13 N│                              │Trunking - From:U  To: U
│19 N│                              │Ghost Repeater:02
│                                   │
│                                   │ Play Station ID:Y ...
│                                   │ Alarms Enabled:N ...
│                                   │ Voice Prompts:Y
│                                   │
│                                   │Test Id Code:005
│                                   │Keyup Delay:0.02
┌─HELP────────────────────          │Cross Busy -
│                                   │   Hold Time:00.0
│Edit: press ENTER/RETURN/<─┘       │   Tx Freq. Delay: 0.00
│                                   │   Enable on Carrier?:N ...
│Guide Window: F1                   │Turn-off Idle Msg.:N
│                                   │
│Done: Esc                          │Telco Line Type:[N] ...
│                                   │   Incoming Calls:N ...
│                                   │   Outgoing Calls:N ...
4 records in database
```

Figure 7-11. Repeater #01 Configuration

Ghost Repeater

This field determines the number of the ghost repeater associated with the physical repeater. In this example, the ghost repeater number is 02. Enter any unused repeater number. Be sure that another repeater, physical or ghost, does not use the number entered in the Ghost Repeater field.

Interconnect-Related Settings

The Telco Line Type, Incoming Calls, and Outgoing Calls fields should all be set to N, since the repeaters are not interconnected.

User IDs

Each user on the system should be set up similarly. Figure 7-12 shows an example of the user status configuration. Notice that in the index window, the same IDs are assigned to users homed on different repeaters (ghosts). For example, users 01-001 and 02-001 are both actually homed on repeater #01. When user 02-001 keys up, his home repeater (02 - ghost) appears to be busy and he is trunked to an available physical repeater. In effect, with the ghost option, now physical repeater #01 can actually home 500 users, rather than the usual 250.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
╔═INDEX ═══════════════════════╗  ╔═SITE 0002══════════════════════════════╗
║ _User_ S T ACC# _Cust Acct _Comments_ ║  ║         USER STATUS                   ║
║ 01-001 V D     01001     TONY    ║  ║                                      ║
║ 01-002 V D     01002     FRANKIE ║  ║ User ID:[01-001]                     ║
║ 02-001 V D     02001     BETSY   ║  ║ Status:[V]                           ║
║ 02-002 V D     02002     LARRY   ║  ║ ID Type:[D] ... Access #:[      ]    ║
║ 07-101 V D     07101     SHELLY  ║  ║                                      ║
║ 07-102 V D     07102     MARTY   ║  ║ Cust. Acct:[01001      ]             ║
║ 08-101 V D     08101     BELINDA ║  ║ Rate Code:0                          ║
║ 08-102 V D     08102     MARK    ║  ║ Bill as Duplicate:Y                  ║
║                                  ║  ║ Num. of Mobiles:010                  ║
║                                  ║  ║                                      ║
║                                  ║  ║ Comment 1:[TONY      ]               ║
╚══════════════════════════════════╝  ║ Comment 2: MARSHALL                  ║
╔═HELP══════════════════════════╗  ║                                      ║
║ Enter the user id HH-UUU or HHUUU ║  ║ Create Date: 05/27/97               ║
║  where HH = Home Repeater (1-20)  ║  ║ Alter Date:  05/27/97               ║
║         UUU = Id Code (1-250).    ║  ╚══════════════════════════════════════╝
║                                  ║
║                                  ║
╚══════════════════════════════════╝
 Type F1 for GUIDE window
```

Figure 7-12. User #01-100 Status

ID Type

This field must be set to D - dispatch for all users at the site, since no interconnect capabilities are offered.

Num. of Mobiles

Although TCBase only uses this field for billing, it is important to note that since all users are dispatch-only, every user ID will have several mobile radios assigned to it.

Hardware Settings

See Section 6 for details on setting up the FCC channel table for ghost repeaters.

See the Model 452/459 installation and operation manual (Part No. 025-9450) for details on setting the front panel DIP switches to the correct repeater number.

SITE 0003 - MISCELLANEOUS APPLICATIONS

This site is designed to show some of the other features available in the Model 452/459s and how to configure the database accordingly. This site has three repeaters: 01, 07, and 18. Each channel is set up differently to illustrate the available configurations.

Channel 01 - Tone and Voice Prompts

When an optional Voice Prompt Card (Part No. 950-9275) is combined with an interconnected repeater, voice prompt settings can be customized in TCBase.

<u>Site Configuration</u>

Prompts are enabled in the site configuration. Select the Voice Prompts field from the site configuration window. When Y is entered, the window shown in Figure 7-13 appears.

```
┌─PROMPTS──────────────────────────┐
│ Are Voice Prompts Available?:░   │
│                                  │
│ Message          Use Tone Voice  │
│                     M L  Asn Tm  │
│ 1 Welcome Message   V ░ ░ ░1* ░5 │
│ 2 Call can't be cmpl. V ░ ░ ░2* ░3│
│ 3 Thank You, Ringing V ░ ░ ░3* ░3│
│ 4 Wait,processing call V ░ ░ ░4 ░3│
│ 5 # Diald invalid/Rstr V ░ ░ ░5* ░3│
│ 6 # Invld,please retry V ░ ░ ░6* ░4│
│ 7 Please proceed    T ░ ░ ░7 ░2 │
│ 8 Alarm             T ░ ░ ░8 ░2 │
│ 9 Thanks for Reg. (FN) T ░ ░ ░9 ░2│
│ 10 Call Discncting  T ░ ░ 10 ░2 │
│  *can't alter code               │
│ Voice Time ── Available:░32 Total:░32│
│                                  │
│ Edit More Prompts?:░             │
└──────────────────────────────────┘
```

Figure 7-13. Prompts Window

In this example, six prompts are enabled for voice messages (Use column set to V). These prompts play on the occurrence of the specified condition. The assignment (Asn) and time (Tm) can be altered, but it is not recommended.

Repeater Configuration

Voice prompts are enabled and programmed on a per-repeater basis. The Voice Prompts field should be set to Y for each Model 459 at the site that has a voice card installed. Figure 7-14 shows the repeater configuration.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron      (SUPERVISOR mode)
┌─INDEX                              ┌─SITE 0003──────────────────────
│RP L│                              │     REPEATER CONFIGURATION
│                                   │
│07 H│                              │Repeater #:[01]
│12 M│                              │Trunking - From:U  To: U
│18 E│                              │Ghost Repeater:█
│    │                              │
│    │                              │ Play Station ID:Y ...
│    │                              │ Alarms Enabled:Y ...
│    │                              │ Voice Prompts:Y
│    │                              │
│    │                              │Test Id Code:0000
│    │                              │Keyup Delay:0.02
├─HELP─────────────────────┐        │Cross Busy -
│Is the Voice Prompt option installed│   Hold Time:0000
│on this channel? (Y/N)             │   Tx Freq. Delay: 0000
│                                   │   Enable on Carrier?:Y ...
│                                   │Turn-off Idle Msg.:Y
│                                   │
│                                   │Telco Line Type:[Y] ...
│                                   │  Incoming Calls:Y ...
│                                   │  Outgoing Calls:Y ...
└───────────────────────────┘        └─────────────────────────────────
```

Figure 7-14. Repeater #01 Configuration

Voice Prompt Recording

If more than one repeater uses voice prompts, then the messages must be recorded separately for each Model 459.

> 📖 **Note:**
>
> For details on recording custom voice prompts in the Model 459, refer to Section 6.

Channel 07 - Cross-Busy

Whenever the Model 452/459 shares the repeater channel with another controller, the cross-busy settings apply. This configuration is typical when the system operator wishes to make a gradual transition from conventional radio to LTR operation. Instead of having to immediately replace all controllers and mobiles at the site, the upgrade can be implemented over time as market conditions and budgets permit.

Repeater Configuration

Several timing parameters govern the cross-busy functions of the Model 452/459. The critical settings are programmed into the repeater configuration as shown in Figure 7-15.

```
Model 452/459 Database Manager V1.0d (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX                              ┌SITE 0001─────────────────────
│RP L│                             │        REPEATER CONFIGURATION
│01 E│
│   N│                             │Repeater #:[07]
│12 M│                             │Trunking - From:0  To: 0
│18 E│                             │Ghost Repeater:█
│    │
│    │                             │ Play Station ID:N ...
│    │                             │ Alarms Enabled:N ...
│    │                             │ Voice Prompts:N
│    │
│    │                             │Test Id Code:001
┌HELP                              │Keyup Delay:0.02
│Enter the amount of time carrier  │Cross Busy -
│must be detected without LTR      │   Hold Time:33.0
│packets being received before     │   Tx Freq. Delay: 3.10
│the controller is put into the    │   Enable on Carrier?:Y ...
│cross-busy state. A request to     │Turn-off ┌CROSS_BUSY─────────────────
│Transmit will still be processed in│             Carrier Detect Delay: 0.50
│this state. (0.25 - 2.50 Secs),   │Telco Li└──────────────────────────
│Default = 0.50 secs.              │ Incoming Calls:N ...
│                                  │ Outgoing Calls:N ...
```

Figure 7-15. Repeater #07 Configuration

The values shown in the example are typical for most applications.

Channel 18 - Call Limiting Tables

The Maximum Calls Table determines how many calls are allowed on the system at a given time, based on user priority. The Dynamic Call Limit Table determines the maximum length of each call based on user priority and system loading. These tables, in conjunction with the prime time and toll privileges settings, define when and how each user is allowed to access the site.

Site Configuration

Several fields in the site configuration must be set specifically to define system access parameters for the mobiles. The site configuration is shown in Figure 7-16.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX ─────────────────────┐    ┌SITE_CONFIG─────────────────────────
│Site     Site Name      I  │    │Site Number: [0003]
│0001 FASTNET SITE #1    Y  │    │Site Name:[MISCELLANEOUS SITE  ]
│0002 DISPATCH W/GHOSTS  N  │    │
│0003 MISCELLANEOUS SITE Y  │    │Site Access:Y ...  PC Comm Port:0
│0004 DIRECT E&M LINK TO 5 Y│    │
│0005 DIRECT E&M LINK TO 4 Y│    │Edit Prompts:Y ...  Alarms:Y ...
│                           │    │Prime Time Intervals
│                           │    │  1:Start: 08:00  Stop: 16:00
│                           │    │  2:Start: 16:00  Stop: 18:30
│                           │    │
│                           │    │Unassigned Users:Y
└───────────────────────────┘    │Idle Msg. Time:10
┌HELP═══════════════════════┐    │COR Hold Time:0.3
│Enter the start time of day│    │Repeater Hold Time:00.3
│(HH:MM 24-hr format) of the│    │Repeater Timeout:180
│1st Prime Time Interval. Two│   │
│non-contiguous intervals can│   │Interconnect:[Y] ...
│be defined for Prime Time.  │   │
│If you don't want to specify│   │Create Date: 04/21/97
│any Prime-Time, set the     │   │Alter Date:  08/26/99
│Start Time equal to the Stop│   │
│Time. Weekends are          │   │
│considered Non-Prime.       │   │
└───────────────────────────┘    └───────────────────────────────────
```

Figure 7-16. Site #0003 Configuration

The prime-time intervals determine when some users are allowed to make calls. These fields must be set up appropriately. The site must also be enabled for interconnect calls.

When Y is entered in the Edit Max. Simul. Calls field in the interconnect window, the table shown in Figure 7-17 appears.

```
┌─MAX_CALLS────────────────────────────┐
│ Maximum Simultaneous Calls Table     │
│                                      │
│ System   Max. Simul. Calls Allowed   │
│ Loading  Pri:Low  Med.  Hi.  U.High  │
│                                      │
│   <20%        04    04    04    04    │
│   <40%        04    04    04    04    │
│   <60%        03    04    04    04    │
│   <80%        02    03    04    04    │
│   <100%       01    02    03    04    │
│                                      │
└──────────────────────────────────────┘
```

Figure 7-17. Max Calls Table

In this example, the number of simultaneous calls is set according to priority and repeater loading. Since the site only has four repeaters, it isn't a good idea to limit the number of simultaneous calls severely. Notice that the only time when one call is the maximum allowed is when the user trying to access the system is of the lowest priority and the repeater loading is 100 percent.

When a Y is entered in the Edit Dynamic Call Limit Table in the interconnect window, the table shown in Figure 7-18 appears.

```
┌─LOADING──────────────────────────────┐
│      Dynamic Call Limit Table        │
│                                      │
│ System    Call Limits Priority       │
│ Loading   Low    Med    High  U.High │
│                                      │
│   <20%    06:00  08:00  10:00  12:00 │
│   <40%    06:00  07:00  08:00  10:00 │
│   <60%    04:00  06:00  08:00  10:00 │
│   <80%    02:00  03:00  05:00  06:00 │
│   <100%   01:00  02:00  04:00  06:00 │
│                                      │
└──────────────────────────────────────┘
```

Figure 7-18. Dynamic Call Limit Table

In this example, the call lengths are also set according to priority and repeater loading. Since the site only has four repeaters, it is a good idea to limit the length of each call so that the channels are not constantly busy.

Repeater Configuration

The Dynamic Call Limit and Maximum Simultaneous Calls Tables restrict interconnected, not dispatch calls. Consequently, at least one controller in the site should be a Model 459 with a telco card installed.

Repeater 18 configuration is shown in Figure 7-19. Notice that the Telco Line Type field is set to end-to-end. Any setting, except N - none, can be used. In addition, Outgoing Calls must be allowed.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX                                    ┌─SITE 0003─────────────────
│RP L │                                    │      REPEATER CONFIGURATION
│01 N │                                    │
│07 N │                                    │ Repeater #:[18]
│12 M │                                    │ Trunking - From:U  To: U
│18 E │                                    │ Ghost Repeater:■
│     │                                    │
│     │                                    │ Play Station ID:L ...
│     │                                    │ Alarms Enabled:L ...
│     │                                    │ Voice Prompts:L
│     │                                    │
│     │                                    │ Test Id Code:UUL
│     │                                    │ Keyup Delay:0.02
┌─HELP──────────────────────              │ Cross Busy -
│Enter the telco type for this rptr:       │    Hold Time:UULU
│ N - No Interconnect Available            │    Tx Freq. Delay: LULU
│ E - End-End (select if you               │    Enable on Carrier?:L ...
│     have an E&M card that                │ Turn-off Idle Msg.:L
│     you would like to look               │
│     like End-End on incoming)            │ Telco Line Type:[E] ...
│ M - E&M (DID in, End-End out)            │    Incoming Calls:L ...
│                                          │    Outgoing Calls:L ...
│                                          │
└──────────────────────────────           └────────────────────────────
```

Figure 7-19. Repeater #18 Configuration

User IDs

The power and application of the call limiting parameters are realized in the way each user is set up. The settings apply to every user in the system. However, different users are affected in unique ways.

High Priority

Figure 7-20 shows a user with Priority H - high, in the interconnect window.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌─INDEX ═══════════════════════════════┐ ┌─SITE 0003────────────────────────────┐
│_User_ S T ACC# _Cust Acct _Comments_ │ │           USER STATUS                │
│01-001 V I                            │ │                                      │
│07-201 V D 7201 07201      CLAIRE     │ │ User ID:[18-002]                     │
│07-250 V D 7250 07250      EMPLOYEE   │ │ Status:[V]                           │
│18-001 D I 8001 18001      BRIAN      │ │ ID Type:[I] ... Access #:[8002]     │
│18-002 V I 8002 18002      CHRIS      │ │                ┌─INTERCONNECT────────┐│
│18-101 V I 2101 12101      LISA       │ │ Cust. A│Priority:H                   ││
│                                      │ │ Rate Co│Mobile Answer Time:0         ││
│                                      │ │ Bill as│                             ││
│                                      │ │ Num. of│Toll Privileges:V            ││
│                                      │ │        │                             ││
│                                      │ │ Comment│Allow/Restrict Prefixes:     ││
│                                      │ │ Comment│   Group A:V  Group B:V      ││
└──────────────────────────────────────┘ │        │                             ││
┌─HELP═════════════════════════════════┐ │ Create │Turn-Around Beep: V          ││
│Enter the interconnect priority for   │ │ Alter D│Audio Compandor in Use: V    ││
│this User Id. This priority is used   │ │        │Full Duplex Radio in Use: V  ││
│limiting the number of simultaneous   │ │        │                             ││
│interconnect calls, and call times.   │ │        │Networking Type: V ...       ││
│   L = Low, M = Medium,               │ │        └─────────────────────────────┘│
│   H = High, V = Very High.           │ │                                      │
│(Refer to Site Configuration          │ │                                      │
│Interconnect Window)                  │ │                                      │
└──────────────────────────────────────┘ └──────────────────────────────────────┘
```

Figure 7-20. User #18-002 Status

The Dynamic Call Limits (see Figure 7-18) and Maximum Simultaneous Calls Tables (see Figure 7-17) govern this mobile. Table 7-1 shows this user's call length ability and the number of calls allowed for different system loading percentages.

Table 7-1. Restrictions for High Priority Caller

System Loading	Call Length	# of Calls
20 %	10	4
40 %	8	4
60 %	8	4
80 %	5	4
100 %	4	3

Let's consider what happens if user #18-002 tries to initiate a call when the system is at 80% loading (shaded row). He or she will be limited to a 5 minute call. In this example, the number of simultaneous calls has no baring since the site only has four channels.

Non-Prime Deferred Status

Figure 7-21 shows a user who is set up with Status D - non-prime deferred. This mobile is governed chiefly by the time of day. The system will not allow this user to make any calls within the prime times (8:00 - 10:00 a.m. and 4:00 - 6:30 p.m., set in the Site Configuration).

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX ─────────────────────────┐  ┌─SITE 0003─────────────────────────┐
│_User_ S T ACC# _Cust Acct _Comments_│      USER STATUS                │
│01-001 U I                      │                                     │
│07-201 U D 7201  07201   CLAIRE │  User ID:[18-001]                   │
│07-250 U D 7250  07250   EMPLOYEE│ Status:[D]                          │
│18-001 U I 8001  18001   BRIAN  │  ID Type:[L] ...  Access #:[8001]   │
│18-002 U I 8002  18002   CHRIS  │                                     │
│18-101 U I 2101  12101   LISA   │  Cust. Acct:[18001     ]            │
│                                │  Rate Code:DEF                      │
│                                │  Bill as Duplicate:N                │
│                                │  Num. of Mobiles:1                  │
│                                │                                     │
│                                │  Comment 1:[BRIAN      ]            │
└────────────────────────────────┘  Comment 2: WALTERS                 │
┌─HELP───────────────────────────┐                                     │
│Enter the status for this User ID:│ Create Date: 05/27/97             │
│  V = Valid                     │  Alter Date: 05/27/97               │
│  I = Invalid                   │                                     │
│  D = Non-Prime deferred        └─────────────────────────────────────┘
│      (Access allowed only during
│      Non_Prime Time.)
│  U = Unassigned
└────────────────────────────────┘
```

Figure 7-21. User #18-001 Status

☞ **Note:**

Although this mobile is most affected by the prime-time intervals, the user's priority and its relation to the call limiting tables also apply.

This example does not address those secondary factors because it is meant to illustrate the use of the prime-time intervals.

Local Toll Privileges

Figure 7-22 shows a user who has Toll Privileges L - local calls only. User priority and the Dynamic Call Limits and Maximum Simultaneous Calls Tables restrict this user, just like all the others at the site. However, in this case, the user is also not allowed to dial any long-distance numbers (anything exceeding seven digits).

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron         (SUPERVISOR mode)
┌INDEX ════════════════════════════┐ ┌SITE 0003─────────────────────────┐
│_User_ S T ACC# _Cust Acct _Comments_│        USER STATUS               │
│01-001 V I                          │                                    │
│07-201 V D 7201 07201      CLAIRE   │ User ID:[18-101]                   │
│07-250 V D 7250 07250      EMPLOYEE │ Status:[V]                         │
│18-001 D I 8001 18001      BRIAN    │ ID Type:[I] ...  Access #:[2101]   │
│18-002 V I 8002 18002      CHRIS    │  ┌INTERCONNECT───────────────────┐ │
│18-101 V I 2101 12101         LISA  │ Cust. A│Priority:1               │ │
│                                    │ Rate Co│Mobile Answer Time:0      │ │
│                                    │ Bill as│                         │ │
│                                    │ Num. of│Toll Privileges:L        │ │
│                                    │        │                         │ │
│                                    │ Comment│Allow/Restrict Prefixes: │ │
│                                    │ Comment│   Group A:A  Group B:A  │ │
│ ┌HELP══════════════════════════┐   │        │                         │ │
│ │Enter the Toll Privileges allowed for│Create│Turn-Around Beep: A     │ │
│ │this User ID. Each privilege category│Alter D│Audio Compandor in Use: A│ │
│ │includes all preceding privileges.│  └──────│Full Duplex Radio in Use: A│ │
│ │ N - No Outgoing    O - Operator  │        │                         │ │
│ │ A - Autodial Only  T - Long Distance│     │Networking Type: A ...   │ │
│ │ L - Local          I - International│     └─────────────────────────┘ │
│ │ C - Credit Card (1+0)            │                                    │
│ └──────────────────────────────┘   │                                    │
└────────────────────────────────────┴────────────────────────────────────┘
```

Figure 7-22. User #18-101 Status

SITE 0004 - μWAVE LINK TO SITE #0005

This site shows the configuration for a typical E&M 4-wire interface to another LTR site. There are three repeaters at this site, 01 (dedicated to the link), 06, and 11. The linked repeater (01) is programmed differently than the other two.

Autonet is a wide-area dispatch networking system (mobile-to-mobile) that uses the interconnect of the Model 459. Autonet Model 459s can be connected via one of two methods for dispatch calls.

- direct connection using E&M telco cards and an RF or μwave link (repeater 01)
- dial-up connection via the PSTN and the autodial feature (repeater 06 and 11)

☞ **Note:**

This site shows examples of both types of connections. Although it would be odd to use both link types at one site, this example is included for completeness.

Site Configuration

Several fields in the site configuration need to be set specifically for the direct link. Figure 7-23 shows the configuration for the site.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
 ┌INDEX ─────────────────────      ┌SITE_CONFIG──────────────────────
 │Site      Site Name      I        │Site Number: [0004]
 │0001 FASTNET SITE #1     Y        │Site Name:[DIRECT E&M LINK TO 5]
 │0002 DISPATCH W/GHOSTS   N        │
 │0003 MISCELLANEOUS SITE  Y        │Site Access:1 ...  PC Comm Port:0
 │0004 DIRECT E&M LINK TO 5 Y       │
 │0005 DIRECT E&M LINK TO 4 Y       │Edit Prompts:Y ...  Alarms:N ...
 │                                  │Prime Time Intervals
 │                                  │  1:Start: 06:00  Stop: 12:00
 │                                  │  2:Start: 13:00  Stop: 18:00
 │                                  │
 │                                  │Unassigned Users:0
 │                                  │Idle Msg. Time:10
 ┌HELP═══════════════════════      │COR Hold Time:0.5
 │Is Interconnect available at this │Repeater Hold Time:00.3
 │site? (Y/N)                       │Repeater Timeout:180
 │                                  │
 │                                  │Interconnect:[Y] ...
 │                                  │
 │                                  │Create Date: 05/27/97
 │                                  │Alter Date:  08/26/99
```

Figure 7-23. Site #0004 Configuration

Section 7. Example Sites

Interconnect

This field must be set to Y to enable the link between sites. In the interconnect window, the following fields are important.

Mobile Turn-Around Time

The setting for this field, "xx," is the number of seconds that the channel is held busy by the autonet ID when no mobile is keyed. After the timer expires, the call is ended.

Overdial Access

Zetron recommends that this field be set to Y for two reasons:

1) It is faster to signal four digits than five digits.

2) It is easier to make the user access numbers the same at different sites, rather than making the LTR IDs the same.

Repeat Audio Half-Duplex

This field must be set to Y so that the other mobiles in the group on the same site as the currently keyed mobile can hear what is said.

Repeater Configuration - Channel 01

The repeater programming for the linked sites is crucial. The setup for the µwave connected repeater is shown in Figure 7-24.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron      (SUPERVISOR mode)
┌─INDEX                              ┌─SITE 0004
│RP L│                              │    REPEATER CONFIGURATION
│01 ▓│                              │
│06 E│                              │Repeater #:[01]
│11 E│                              │Trunking - From:N  To: D
│    │                              │Ghost Repeater:▓
│    │                              │
│    │                              │ Play Station ID:Y ...
│    │                              │ Alarms Enabled:N ...
│    │                              │ Voice Prompts:N
│    │                              │
│    │                              │Test Id Code:0001
│    │                              │Keyup Delay:0.02
┌─HELP                              │Cross Busy -
│Enter the telco type for this rptr:│  Hold Time:00.0
│ N - No Interconnect Available     │  Tx Freq. Delay: 0.00
│ E - End-End (select if you        │  Enable on Carrier?:N ...
│     have an E&M card that         │Turn-off Idle Msg.:N
│     you would like to look        │
│     like End-End on incoming)     │Telco Line Type:[M] ...
│ M - E&M (DID in, End-End out)     │ Incoming Calls:N ...
│                                   │ Outgoing Calls:N ...
```

Figure 7-24. Repeater #01 Configuration

Trunking From

This field should be set to N - not to trunk at all. This is because the direct link is on this repeater and calls should not be trunked to another channel.

Trunking To

This field should be set to D - from dispatch channels. This ensures that only dispatch calls get trunked to this channel. Interconnect calls cannot be routed to this repeater because it is not connected to a phone line.

Play Station ID

This field is set to Y. Repeater #01 is the only channel at the site transmitting station ID.

Telco Line Type

This field is set for E&M. When an M is entered, the window shown in Figure 7-25 appears.

```
┌─E&M────────────────────────┐
│ Line Supervision Type:█    │
│ Signaling Type:░           │
│ Number of Feed Digits:▓    │
│ Line Description:░         │
└────────────────────────────┘
```

Figure 7-25. E&M Window

The Line Supervision Type I (immediate start) can be set to W (wink start), although W is slower (both sites must be set the same).

The Number of Feed Digits should be set to 4 since this site is programmed for overdial access. This way the Model 459 can send and receive overdial access numbers to and from the linked Model 459 at the other site.

Incoming Calls

This field enables incoming calls. When a Y is entered, the window shown in Figure 7-26 appears. The settings shown are fairly standard for a direct E&M link.

```
┌─INCOMING_CALLS──────────────┐
│ Answer Mode:█               │
│ Timing                      │
│   Connect Time Required:0.60│
│   Delay Before Prompt:1.0   │
│ Play Network Answ. Tone:Y   │
└─────────────────────────────┘
```

Figure 7-26. Incoming Calls Window

Outgoing Calls

This field enables outgoing calls. When a Y is entered, the window shown in Figure 7-27 appears.

```
┌─OUTGOING_CALLS──────────────────┐
│ Timing                          │
│   Dial-Out Mode:0               │
│   Start Supervision Seek Time:03.0 │
│   Delay Before Dialout:0.0      │
│   Direct Link:  A               │
│   Use FASTNet Switch:  N        │
└─────────────────────────────────┘
```

Figure 7-27. Outgoing Calls Window

The settings shown are typical for a direct E&M link. Notice, however, that the Direct Link field is set to A - direct link to LTR site, overdial Access code.

Repeater Configuration - Channels 06 and 11

Figure 7-28 shows the setup for the other two repeaters at the site. Both are programmed similarly for the dial-up link between sites.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX─────┐                         ┌─SITE 0004────────────────────────┐
│RP L       │                         │       REPEATER CONFIGURATION     │
│01 M       │                         │                                  │
│06 E       │                         │ Repeater #:[06]                  │
│11 E       │                         │ Trunking - From:U  To: U         │
│           │                         │ Ghost Repeater:                  │
│           │                         │                                  │
│           │                         │  Play Station ID:N  ...          │
│           │                         │  Alarms Enabled:N  ...           │
│           │                         │  Voice Prompts:N                 │
│           │                         │                                  │
│           │                         │ Test Id Code:000                 │
│           │                         │ Keyup Delay:0.02                 │
├─HELP──────┤                         │ Cross Busy -                     │
│Are mobile to landline calls         │    Hold Time:00.0                │
│allowed? (Y/N)                       │    Tx Freq. Delay: 0.00          │
│This field is used only if           │    Enable on Carrier?:N  ...     │
│Interconnect is available on         │ Turn-off Idle Msg.:N             │
│this channel. It is ignored          │                                  │
│otherwise.                           │ Telco Line Type:[ ]  ...         │
│                                     │    Incoming Calls:Y  ...         │
│                                     │    Outgoing Calls:Y  ...         │
└─────────────────────────────────────┴──────────────────────────────────┘
 Type F1 for GUIDE window
```

Figure 7-28. Repeater #06 Configuration

Section 7. Example Sites

Trunking From

This field should be set to I - only to interconnect channels. This ensures that calls only get passed to other interconnected repeaters.

Trunking To

This field should be set to T - use telco line type. This ensures smooth transition between channels.

Telco Line Type
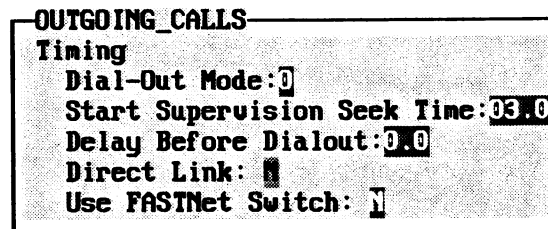
This field should be set to any valid interconnected line type.

Incoming Calls

This field should be set to Y to enable this channel to receive incoming interconnect calls.

Outgoing Calls

This field enables outgoing calls. When Y is entered, the window shown in Figure 7-29 appears.

```
┌─OUTGOING_CALLS──────────────────┐
│ Timing                          │
│   Dial-Out Mode:0               │
│   Start Supervision Seek Time:03.0│
│   Delay Before Dialout:0.0      │
│   Direct Link: N                │
│   Use FASTNet Switch: Y         │
└─────────────────────────────────┘
```

Figure 7-29. Outgoing Calls Window

The Direct Link field should be set to N - not a direct link. This is important since only one repeater at the site has the direct connection to site #0005.

User IDs

This site has been programmed with two different types of mobiles - auto-overdial and push-to-connect. These user configurations illustrate the application of the μwave link to site #0005.

☞ **Note:**

Any mobiles that connect to the sister site (0005) via the μwave link should have corresponding user IDs programmed at that site.

Autonet Users

Figure 7-30 shows a typical configuration for an autonet mobile. When this user keys up on their home channel (01), a connection is made to site #0005 and the Model 459 on the initiating site automatically overdials the user's access code. Once dialing is complete, the caller can key up and begin speaking. Notice that users 01-021 through 01-023 in the index window are programmed this way.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX ══════════════════════════════════╗┌SITE 0004─────────────────────┐
│ _User_ S T ACC#  _Cust  Acct  _Comments_│        USER STATUS            │
│ 06-021 V A 6021 06021         CARTER     │                              │
│ 06-022 V A 6022 06022         BRENNAN    │ User ID:[06-021]             │
│ 06-023 V A 6023 06023         FRENCH     │ Status:[V]                   │
│ 11-121 V I 1121 01121         MERRILL    │ ID Type:[A] ... Access #:[6021] │
│ 11-122 V I 1122 01122         DICKENSON  │                              │
│ 11-123 V I 1123 01123         GREEN      │ Cust. Acct:[06021        ]   │
│                                          │ Rate Code:AUTO               │
│                                          │ Bill as Duplicate:N          │
│                                          │ Num. of Mobiles:1            │
│                                          │                              │
│                                          │ Comment 1:[CARTER       ]    │
│┌HELP═══════════════════════════════════╗│ Comment 2: AUTO OVERDIAL TO #5 │
││Enter the User Id Type:                 ││                              │
││  D = Dispatch                          ││ Create Date: 05/27/97        │
││  I = Interconnect                      ││ Alter Date:  06/04/97        │
││  A = Auto-Overdial, Incoming calls     │└──────────────────────────────┘
││      placed directly on the air with   ││
││      no ringback or ringout. If user   ││
││      dials LTR site autodial # then    ││
││      ID/access # overdialed to site.   ││
│└────────────────────────────────────────┘│
└───────────────────────────────────────────────────────────────────────────┘
```

Figure 7-30. User #01-021 Status

ID Type

This field should be set to A - auto-overdial for autonet applications. When an A is entered, the window shown in Figure 7-31 appears.
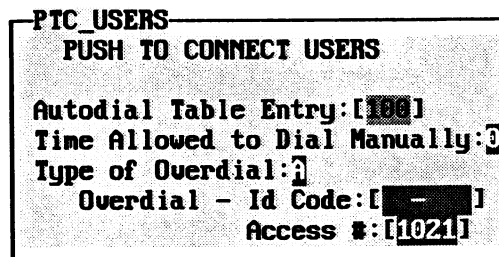
```
┌─INTERCONNECT──────────────┐
│ Priority:▌                │
│ Mobile Answer Time:▌      │
│                           │
│ Toll Privileges:▌         │
│                           │
│ Allow/Restrict Prefixes:  │
│    Group A:▌  Group B:▌   │
│                           │
│ Turn-Around Beep: ▌       │
│ Audio Compandor in Use: ▌ │
│ Full Duplex Radio in Use: ▌│
│                           │
│ Networking Type: █ ...    │
└───────────────────────────┘
```

Figure 7-31. Interconnect Window

The Networking Type field is set to P - push-to-connect in this example. When a P is entered, the window shown in Figure 7-32 appears.

```
┌─PTC_USERS─────────────────┐
│    PUSH TO CONNECT USERS   │
│                            │
│ Autodial Table Entry:[███] │
│ Time Allowed to Dial Manually:▌│
│ Type of Overdial:▌         │
│      Overdial - Id Code:[███─███] │
│               Access #:[1021] │
└────────────────────────────┘
```

Figure 7-32. Push-to-Connect Window

The Autodial Table Entry is programmed for direct link to another Model 459 (enter 100). In addition, the Type of Overdial is set to A - for access code.

Push-to-Connect Users

Figure 7-33 shows a typical configuration for a push-to-connect mobile. When this user keys up on their home channel (01), the Model 459 dials the phone number to site #0005 (autodial entry #02). Upon connection, the initiating Model 459 automatically overdials the user's access code. The net effect of this configuration is nearly identical to the µwave autonet setup. However, the autonet programming does not require the use of a telco line. Notice that users 01-121 through 01-123 in the index window are programmed this way.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌INDEX ══════════════════════════╗  ┌SITE 0004─────────────────────────────┐
│ User  S T ACC#  Cust Acct  Comments_ │        USER STATUS                 │
│06-021 V A 6021 06021     CARTER    │                                      │
│06-022 V A 6022 06022     BRENNAN   │  User ID:[11-122]                    │
│06-023 V A 6023 06023     FRENCH    │  Status:[V]                          │
│11-121 V I 1121 01121     MERRILL   │  ID Type:[I] ... Access #:[1122]     │
│11-122 V I 1122 01122     DICKERSON │  ┌INTERCONNECT───────────────────┐   │
│11-123 V I 1123 01123     GREEN     │  Cust. A│Priority:0               │   │
│                                    │  Rate Co│Mobile Answer Time:0     │   │
│                                    │  Bill as│                         │   │
│                                    │  Num. of│Toll Privileges:0        │   │
│                                    │         │                         │   │
│                                    │  Comment│Allow/Restrict Prefixes: │   │
│                                    │  Comment│    Group A:0  Group B:0  │   │
┌HELP════════════════════════════╗  │         │                         │   │
│Enter the number of the Autodial │  Crea┌PTC_USERS──────────────────────┐  │
│Table entry you want this user to│  Alte│     PUSH TO CONNECT USERS      │  │
│automatically connect to. (0-99) │      │                               │  │
│100 - direct link on home channel to │  │  Autodial Table Entry:[002]    │  │
│      another Model 459, Outgoing │     │  Time Allowed to Dial Manually:0│ │
│      Calls window must indicate  │     │  Type of Overdial:0             │  │
│      direct link for home channel.│    │      Overdial - Id Code:[   -  ]│  │
│101 - Mobile to Mobile Selective Call.│ │                Access #:[1022] │  │
└═════════════════════════════════╝  └───────────────────────────────────┘  │
```

Figure 7-33. User #01-122 Status

The ID Type field is set to I - interconnect. Then in the interconnect window, the Networking Type field is set to P - push-to-connect. Notice this mobile actually uses the autodial table (entry #02). Again, the Model 459 is directed to overdial the user's access code upon connection to the other site.

Two other push-to-connect users are shown in Figure 7-34 and Figure 7-35. One uses an autodial entry that connects to another LTR site (not the μwave linked system) and the other connects to a regular telephone.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX ══════════════════════════════════     ┌SITE 0004─────────────────────
│_User_ S T ACC#  _Cust Acct  _Comments_          USER STATUS
│06-021 V A 6021 06021      CARTER
│06-022 V A 6022 06022      BRENNAN            User ID:[11-121]
│06-023 V A 6023 06023      FRENCH             Status:[U]
│11-121 V I 1121 01121      MERRILL            ID Type:[I] ... Access #:[1121]
│11-122 V I 1122 01122      DICKENSON          ┌INTERCONNECT────────────────
│11-123 V I 1123 01123      GREEN              Cust. A│Priority:1
│                                              Rate Co│Mobile Answer Time:0
│                                              Bill as│
│                                              Num. of│Toll Privileges:U
│                                              
│                                              Comment│Allow/Restrict Prefixes:
┌HELP══════════════════════════════            Comment│   Group A:1  Group B:1
│Enter the amount of time the
│user is given to dial                         Crea┌PTC_USERS─────────────────
│manually before automatic                     Alte│    PUSH TO CONNECT USERS
│dialing takes place. (0-7secs)                    │
│If 0 is enter user can't                          │Autodial Table Entry:[001]
│dial manually.                                    │Time Allowed to Dial Manually:3
│                                                  │Type of Overdial:U
│                                                  │   Overdial - Id Code:[06-21]
│                                                  │          Access #:[      ]
└─────────────────────────────────            └──────────────────────────────
```

Figure 7-34. User #01-121 Status

User #11-121 is given some additional time (3 seconds) to dial another number, before the push-to-connect function begins dialing. However, if a digit is not keyed from the mobile within 3 seconds of keying up, the Model 459 calls autodial entry #01 and overdials the user ID.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron         (SUPERVISOR mode)
┌INDEX ═══════════════════════      ┌SITE 0004┐
│_User_ S T ACC# _Cust Acct _Comments_│        USER STATUS
│06-021 V A 6021 06021     CARTER    │
│06-022 V A 6022 06022     BRENNAN   │ User ID:[11-123]
│06-023 V A 6023 06023     FRENCH    │ Status:[V]
│11-121 V I 1121 01121     MERRILL   │ ID Type:[I] ... Access #:[1123]
│11-122 V I 1122 01122     DICKENSON │        ┌INTERCONNECT────────────
│11-123 V I 1123 01123     GREEN     │ Cust. A│Priority:0
│                                    │ Rate Co│Mobile Answer Time:0
│                                    │ Bill as│
│                                    │ Num. of│Toll Privileges:0
│                                    │        │
│                                    │ Comment│Allow/Restrict Prefixes:
│                                    │ Comment│   Group A:0   Group B:0
┌HELP════════════════════════        │        │
│Enter the number of the Autodial    │ Crea┌PTC_USERS────────────
│Table entry you want this user to   │ Alte│   PUSH TO CONNECT USERS
│automatically connect to. (0-99)    │     │
│100 - direct link on home channel to│     │ Autodial Table Entry:[003]
│      another Model 459, Outgoing   │     │ Time Allowed to Dial Manually:3
│      Calls window must indicate    │     │ Type of Overdial:0
│      direct link for home channel. │     │    Overdial - Id Code:[    -    ]
│101 - Mobile to Mobile Selective Call.│   │               Access #:[       ]
```

Figure 7-35. User #01-123 Status

This mobile (#11-123) is set up for autodial of a standard telephone number. No overdialing is identified and the user also has 3 seconds to initiate dialing to another number.

Autodial Table

The autodial table must be set up appropriately for each of the users described above. Figure 7-36 shows the autodial entry that calls site #0005 via the telco.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX ═════════════════════╗        ┌─SITE 0004──────────────────────────┐
│ _#____Autodial____         ║              AUTODIAL TABLE                  │
│ 01 360-555-1000            ║                                             │
│ 02 253-555-2000            ║        Table Entry: [02]                    │
│ 03 800-555-3000            ║        Phone Number: [253-555-2000        ] │
│                            ║                                             │
│                            ║        Number Connects To:A                 │
│                            ║                                             │
│                            ║        Interconnect Users Allowed:Y         │
│                            ║        Toll Restrict:Y                       │
│                            ║                                             │
│                            ║        Addtl. Time To Wait For Answer: 00   │
│                            ║                                             │
│ ┌─HELP══════════════════════╗       Comments: REMOTE LTR SITE #3         │
│ │This autodial number connects to:  └─────────────────────────────────────┘
│ │  A = Another LTR site - overdial
│ │      Access Number.
│ │  I = Another LTR site - overdial
│ │      Id Code.
│ │  P = A regular telephone.
```

Figure 7-36. Autodial Entry #02

User #11-122 is programmed to use this autodial entry. This entry connects to site #0005 via phone call, rather than the direct μwave link and overdials the access number. This is an unusual way to configure things, but it is shown to contrast the two different types of users. Normally, the μwave link would be used because it bypasses the telco and is faster.

In contrast, user #11-121 is programmed to use autodial entry #01 (see Figure 7-37). This number also connects to another LTR site, but on a standard phone line. In addition, the remote site is set up to expect overdialing of the user ID instead of the 4-digit access code used in the other examples.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX ─────────────────┐   ┌─SITE 0004──────────────────────────────────┐
│ _#_____Autodial___     │   │           AUTODIAL TABLE                    │
│ 01 360-555-1000        │   │                                            │
│ 02 253-555-2000        │   │ Table Entry: [01]                          │
│ 03 800-555-3000        │   │ Phone Number: [360-555-1000        ]       │
│                        │   │                                            │
│                        │   │ Number Connects To:                        │
│                        │   │                                            │
│                        │   │ Interconnect Users Allowed:                │
│                        │   │ Toll Restrict:                             │
│                        │   │                                            │
│                        │   │ Addtl. Time To Wait For Answer: [00]       │
└────────────────────────┘   │                                            │
┌─HELP═══════════════════┐   │ Comments: REMOTE LTR SITE #2               │
│This autodial number connects to:└───────────────────────────────────────┘
│    A = Another LTR site - overdial
│        Access Number.
│    I = Another LTR site - overdial
│        Id Code.
│    P = A regular telephone.
│
│
│
└────────────────────────┘
 type F1 for GUIDE window
```

Figure 7-37. Autodial Entry #01

The last autodial entry, shown in Figure 7-38, illustrates a connection to a standard telephone. User 11-123 is set up to autodial the customer service telephone number for the system upon key. (This may be useful for contacting customers with delinquent accounts.)

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌─INDEX ─────────────────────┐  ┌─SITE 0004──────────────────────────────┐
│ _#____Autodial____         │  │            AUTODIAL TABLE               │
│ 01 360-555-1000            │  │                                         │
│ 02 253-555-2000            │  │ Table Entry: [03]                       │
│ 03 800-555-3000            │  │ Phone Number: [800-555-3000      ]      │
│                            │  │                                         │
│                            │  │ Number Connects To: █                   │
│                            │  │                                         │
│                            │  │ Interconnect Users Allowed: Y           │
│                            │  │ Toll Restrict: Y                        │
│                            │  │                                         │
│                            │  │ Addtl. Time To Wait For Answer: █       │
└────────────────────────────┘  │                                         │
┌─HELP───────────────────────┐  │ Comments: CUSTOMER SERVICE              │
│ This autodial number connects to:  └──────────────────────────────────────┘
│    A = Another LTR site - overdial
│        Access Number.
│    I = Another LTR site - overdial
│        Id Code.
│    P = A regular telephone.
│
│
│
└────────────────────────────┘
  type F1 for GUIDE window
```

Figure 7-38. Autodial Entry #03

SITE 0005 - µWAVE LINK TO SITE #0004

This site shows the configuration for a typical E&M 4-wire interface to another LTR site. There are three repeaters at this site, 01 (dedicated to the link), 06, and 11. The programming for this site is almost identical to site #0004. Only the differences are illustrated here.

Site Configuration

The site configuration is shown in Figure 7-39.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron          (SUPERVISOR mode)
┌INDEX ════════════════════════     ┌SITE_CONFIG──────────────────────
│Site      Site Name      I     │Site Number: [0005]
│0001 FASTNET SITE #1      Y     │Site Name:[DIRECT E&M LINK TO 4]
│0002 DISPATCH W/GHOSTS    N
│0003 MISCELLANEOUS SITE   Y     │Site Access:  ...  PC Comm Port:L
│0004 DIRECT E&M LINK TO 5 Y
│0005 DIRECT E&M LINK TO 4 Y     │Edit Prompts:Y ...  Alarms:N ...
│                                 │Prime Time Intervals
│                                 │ 1:Start: 06:00  Stop: 12:00
│                                 │ 2:Start: 13:00  Stop: 18:00
│
│                                 │Unassigned Users:U
│                                 │Idle Msg. Time:10
┌HELP─────────────────────        │COR Hold Time:0.3
│Model 452/459 connects to PC via:│Repeater Hold Time:00.3
│ L - Local connection to the unit's│Repeater Timeout:180
│     front panel serial port.
│ I - Model 459's 1200 baud       │Interconnect:[Y] ...
│     internal modem in answer mode
│ X - external modem connected to the│Create Date: 05/27/97
│     front panel serial port. Also:│Alter Date:  05/27/97
│     internal modem in originate mode
```

*Figure 7-39. Site #0005 Configuration*

User IDs

The users at this site should correspond to those at the remote site connected via the μwave link. This means that the sister site mobiles become part of a user's dispatch group, although they are remotely located. Figure 7-40 shows the index window and the identically programmed users.

```
Model 452/459 Database Manager V1.0b (c)1999 Zetron        (SUPERVISOR mode)
┌INDEX                                    ┌SITE 0005
 _User_ S T ACC# _Cust Acct _Comments_              USER STATUS
 01-021 U A 1021 01021        CARTER
 01-022 U A 1022 01022        BRENNAN     User ID:[01-021]
 01-023 U A 1023 01023        BICKNELL    Status:[U]
 01-024 U A 1024 01024        TARKER      ID Type:[A] ... Access #:[1021]
 01-025 U A 1025 01025        FRENCH
                                          Cust. Acct:[U1021      ]
                                          Rate Code:AUTO
                                          Bill as Duplicate:N
                                          Num. of Mobiles:

                                          Comment 1:[CARTER      ]
 ┌HELP                                    Comment 2: AUTO OVERDIAL ID #5

 Edit: press ENTER/RETURN/<─┘             Create Date: 05/27/97
                                          Alter Date:
 Guide Window: F1

 Done: Esc
```

Figure 7-40. User Status