ZETRON

Model 49 Multibase
Version 6.1 or Above
Operation Manual

Part No. 025-9297D

Please check for change information at the front of this manual.

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TRADEMARKS

1. INTRODUCTION

OPERATIONAL OVERVIEW

Multibase 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. Multibase manages the Model 49 (or Uniden MRS804ZX) subscriber database information and retrieves interconnect billing data, repeater loading, and airtime accumulation information from the site equipment.

Multibase 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, Multibase is extremely flexible and can grow with a changing trunking system.

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

SPECIFIC FEATURES

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

Billing Convenience with ZEBRA Software

Billing data is easily transferred to Zetron's billing package, ZEBRA, for simple, uniform subscriber billing. Multibase retrieves airtime and interconnect billing records from the repeaters in an ASCII file format.

Repeater Loading Information

Multibase 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.

Selective Mobile-to-Mobile Calling

The Model 49 provides a software feature that allows two half-duplex interconnect mobiles to converse using only one channel. In previous applications one interconnect had to place a phone call to the other, busying up two interconnect phone lines (one outgoing, one incoming) and two repeater channels. Selective mobile-to-mobile calls increase channel efficiency and reduce telephone billing costs.

Autonet

Autonet is the Model 49's automatic networking feature. When a user is programmed for Autonet, the Model 49 automatically connects to another Model 49 and overdials an access or ID code when the user keys up. The Model 49 at the other site immediately puts the telco audio on the air. Now mobiles at the two sites can participate in a dispatch-like conversation.

Office Computer Programming

Multibase does not require any extra dedicated hardware. The program runs on any IBM-compatible personal computer.

The Multibase 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, Multibase allows flexibility in connecting to the Model 49 site. The computer can be located at the site with the repeater managers or can call up the Model 49s through an internal or external modem.

Ghost Repeaters (Optional)

Ghost repeaters is a unique feature of the Model 49. A ghost repeater is a transparent repeater number that actually homes to another physical repeater. This allows one repeater to home 500 standard LTR users instead of only 250.

Custom Voice Prompts (Optional)

When a voice prompt card is installed in the Model 49, up to 20 custom voice prompts are available for the repeater. Voice prompts create a more user-friendly environment for callers and aid in troubleshooting the system.

SYSTEM REQUIREMENTS

The Multibase database management system for the Model 49 sites and channels operates on an IBM-compatible computer. The office computer requires at least:

- PC-XT, AT, 286, 386 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
- 1200 bps Hayes-compatible modem (internal or external)
- Parallel port printer
- MS-DOS version 3.0 or later

Note:

If you are using Zetron's ZEBRA Billing System, we recommend at least a 286-based computer, 40 MB of hard disk space, and 1 MB of RAM.

MANUAL USAGE

Installing, programming, and troubleshooting your system are faster and easier when you fully understand what the manual is saying. This section orients you on the way things are presented, so that we can "speak the same language". Descriptions follow of the way things are identified throughout the manual and where to find what you are looking for quickly.

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 Multibase on your computer and connect to the repeaters at the site.

Section 3. Programming Overview

This section introduces the Multibase 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 Edit49 menu; Autodial Table, Site Configuration, Repeater Configuration, User IDs, and Local Prefix Table. In addition, Section 4 describes how to transfer updated database information to the Model 49s.

Section 5. Billing and Statistics

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

Section 6. Special Features

This section describes in detail some of the standard and optional features available in Multibase and the Model 49.

Section 7. Example Sites

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

Section 8. Glossary

This section defines many of the industry-specific technical terms used in this manual.

Text Notational Conventions

Notational conventions are the manual text styles that identify specific types of words. For instance, it is important that you know which words refer to filenames, operator commands, screen quotes, manual titles, etc. The notational conventions will 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 Multibase
'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 are designed to ensure that critical information is not overlooked. Each of these boxes includes a key word and a small picture to indicate the type and priority of the information it provides. The special notes are summarized below.

Note Boxes

A note box is identified by a pointing hand symbol (☞) and the word "Note" at the top. This box lets 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:

Zetron recommends that an expert technician be involved when installing the paging terminal.

Reference Boxes

A reference box is identified by an alternate publication symbol (📖) and the word "Note" at the top. This box lets 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 6 for the detailed pin configuration of the Zetron cable.

Caution Boxes

A caution box is identified by an open stop hand symbol (✋) and the word "Caution" at the top. This box is more serious and is intended to prevent the user from causing possible damage to the equipment. For example:

Caution:

Remember that the paging terminal is not designed for "hot" installation / removal of cards.

Warning Boxes

A warning box is identified by a skull and cross-bones symbol (☠) and the word "Warning" at the top. This box is of the highest importance and is 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

When a Model 49 system is purchased from Zetron, several manuals may be provided, depending on the products and application. Your system may use some or all of the related manuals listed below:

- *Model 49 Trunking Repeater Manager Operation and Installation Manual* (Part No. 025-9313)
- *Model 494 Universal Accounting Manager Technical Manual* (Part No. 025-9159)
- *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270)
- *Model 2540 FASTNet Switch Installation and Maintenance Manual* (Part No. 025-9260)

2. INSTALLATION

INSTALLATION OVERVIEW

Setting up Multibase to program the Model 49 site involves five main steps:

- ❑ 1. Multibase software installation
- ❑ 2. Hardware connections
- ❑ 3. Multibase site configuration programming
- ❑ 4. Making a billing directory
- ❑ 5. Setting the current time and date in the Model 49s

❑ STEP 1. MULTIBASE SOFTWARE INSTALLATION

A user-friendly installation program is included with the Multibase software. To install Multibase, 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:

```
Installation Program for Netbase/Multibase V2.6   Copyright 1996 Zetron Inc.
╔═Install Progress═══════════════════════════════════════════════════════════╗
║                                                                            ║
║                                                                            ║
║                                                                            ║
║                                                                            ║
║                                                                            ║
╚════════════════════════════════════════════════════════════════════════════╝
╔═Help═══════════════════════════════╗ ┌─User Entry──────────────────────────┐
║Enter drive and directory for       ║ │You MUST enter the drive letter and  │
║Netbase/Multibase files. If the     ║ │full directory path                  │
║directory doesn't exist, it will be ║ │i.e. C:\MODEL49                      │
║created and the new files copied    ║ │Enter Netbase/Multibase directory:   │
║into it, otherwise the old files    ║ │C:\MODEL49                           │
║will be converted into the new      ║ │                                     │
║format.                             ║ │                                     │
╚════════════════════════════════════╝ └─────────────────────────────────────┘
```

5) Follow the on-screen instructions to complete installation of Multibase.
   - If you are upgrading from a previous version of Multibase, enter the directory where the current Model 49 database files reside. All conversions are done automatically.
   - Press <Enter> to accept the default directory - C:\MODEL49.
   - 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 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 Multibase 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 Multibase 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 Multibase. 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.

Table 2-1. Multibase 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
Magenta	005	021	037	053	069	085	101	117
Brown	006	022	038	054	070	086	102	118
Light Grey	007	023	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	046	062	078	094	110	126
White	015	031	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. If the foreground and background colors are too close in shade, text and graphics are difficult to see.

The default settings for color monitors are:

- High = 31
- Normal = 30
- Reverse = 116
- Underline = 23

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 Multibase and check to see that the color changes took effect.

❒ STEP 2. HARDWARE CONNECTIONS

PC Communications with the Model 49

Multibase communicates with the Model 49 through the office computer's modem or an RS-232 local connection. Model 49 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 49. 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 49's front panel port. An external modem is used when the Model 49's internal 1200 baud modem is not fast enough or for dispatch-only units. See "Remote Connection to a Model 49 with External Modem" on page 2-8.
- Remote connection with one phone call from the personal computer to the internal modem installed in a Model 49 with optional Telephone Interconnect (Part No. 950-9563; requires an appropriate telco card). See "Remote Connection to a Model 49 with Interconnect Option" on page 2-11.

Local RS-232 Connection

The office computer connects directly to the Model 49 with RS-232 cabling. For initial setup, or for site visits with a portable computer, use a "COM" port on your computer and the Model 49 front-panel RS-232 connector.

Figure 2-1 shows the setup for local connection to the Model 49.

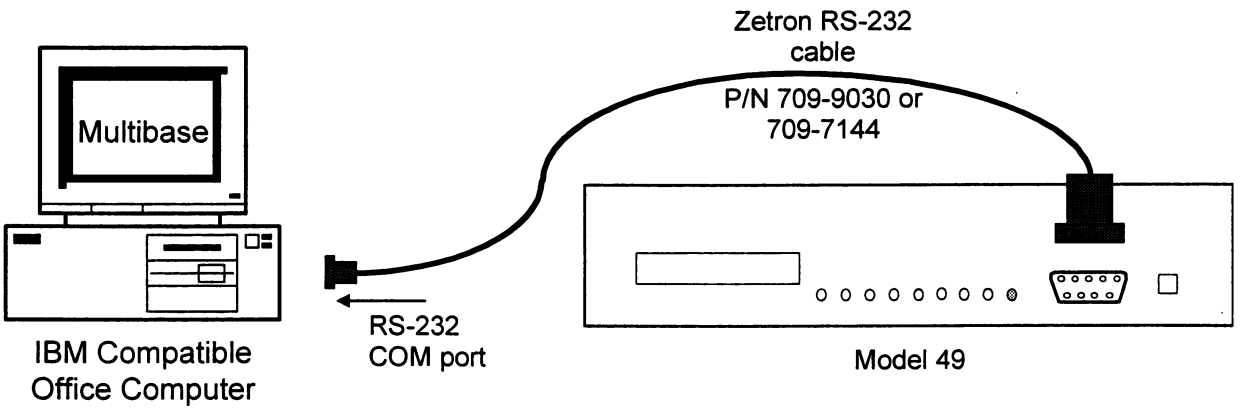

Figure 2-1. Local Serial Connection to the Model 49

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).

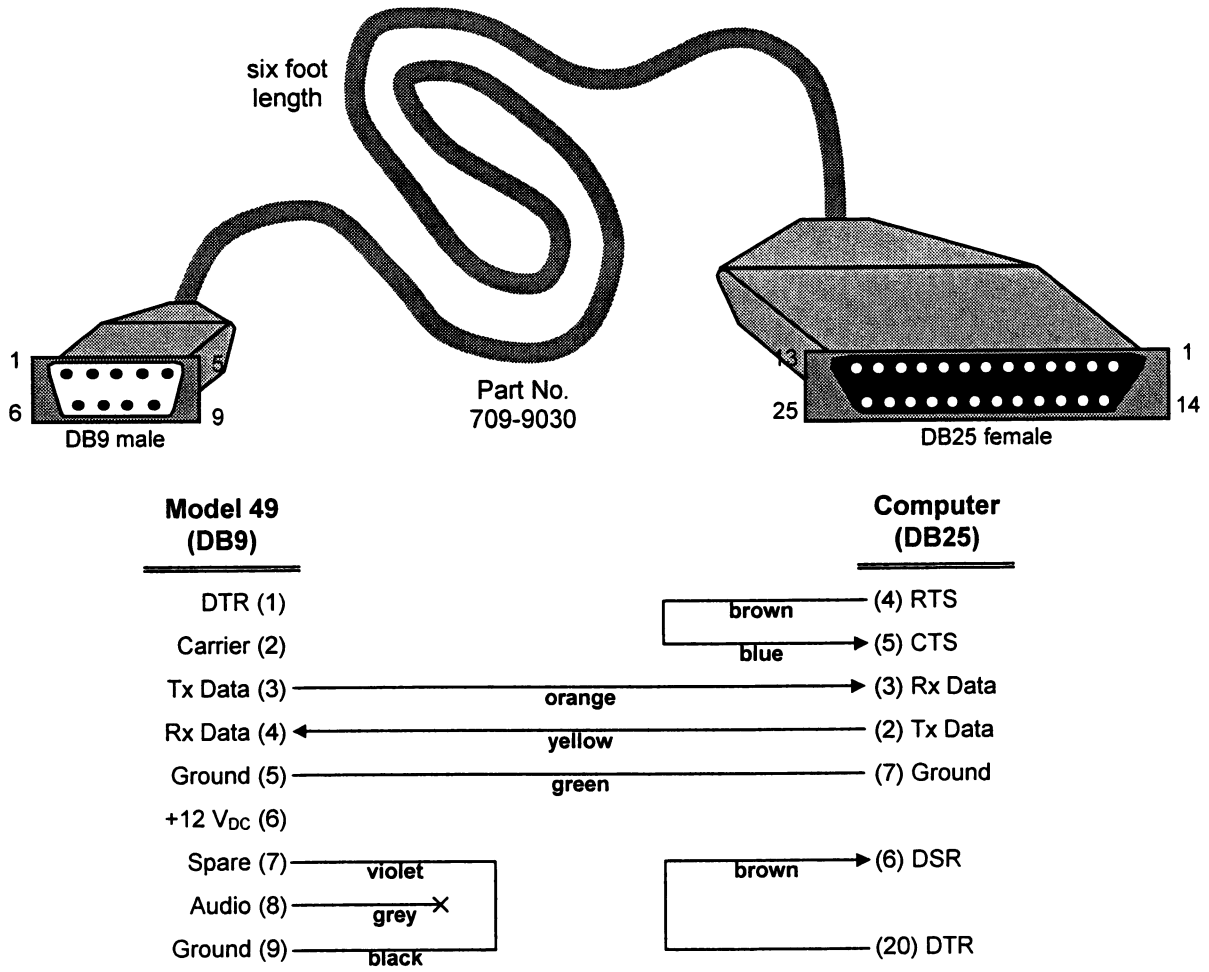

Figure 2-2. Local RS-232 DB25 Programming Cable

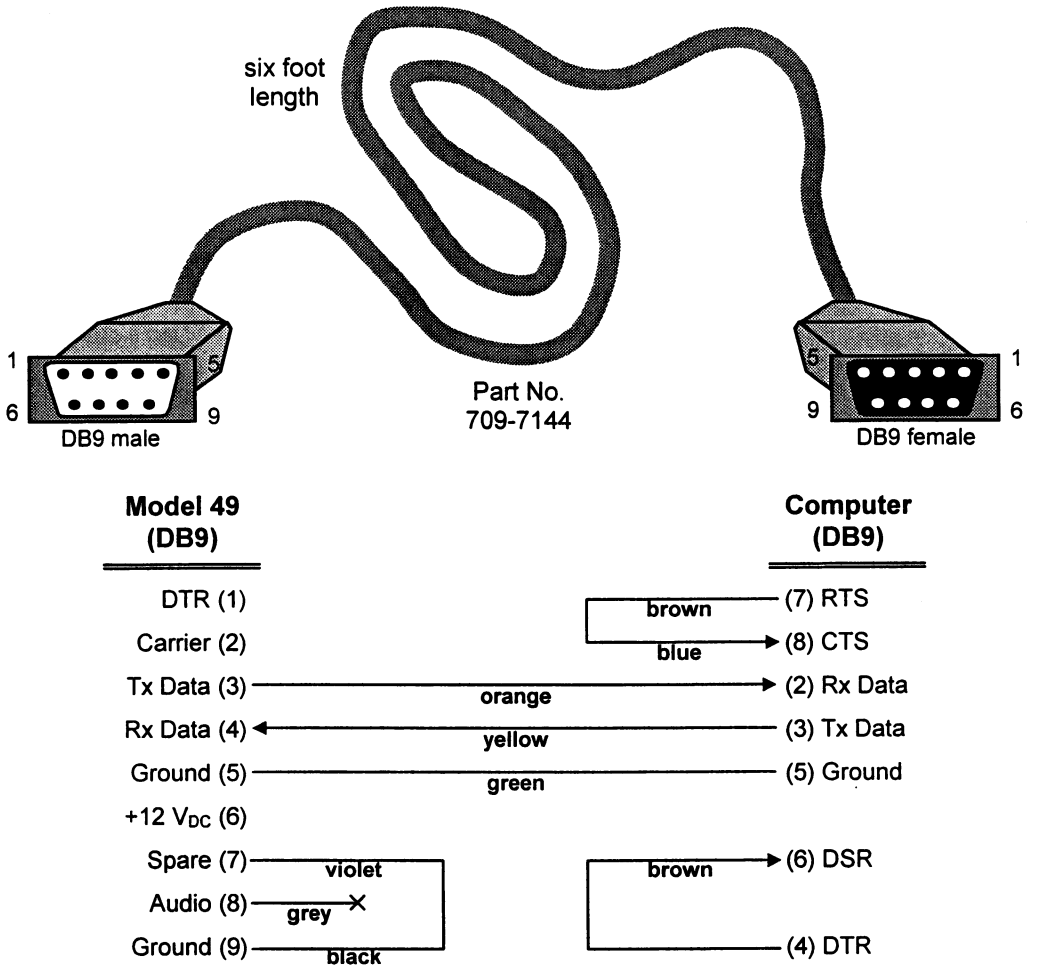

Figure 2-3. Local RS-232 DB9 Programming Cable

3) Select a communications speed on the Model 49 using the front panel DIP switches. Table 2-2 shows the DIP switch settings for SW1. To access the DIP switches, remove the red plastic cover on the left side of the Model 49 face plate. There are two sets of DIP switches; SW1 is the red one on the left with four switches. Switches three (3) and four (4) control the communications rate.

Table 2-2. Model 49 Communications Speed Settings 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
4800	up	up

> **Note:**
>
> **To make the new switch settings take effect, cycle the power on the Model 49. That is, turn the unit off and then on again.**

Modem Requirements

The office computer requires a modem if the Model 49 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. The modems listed below are known to be compatible with Multibase. The external modems listed also work when connected to the front panel of the Model 49.

Internal modems:	Hayes Smartmodem 1200B Modem Board
	Incomm Midget 241 2400 Modem Board
External modems:	Hayes Smartmodem 1200 Modem Box
	Hayes Smartmodem 2400 Modem Box
	Intel 2400EX Modem Box
	Packard Bell PB2400Plus Modem Box
	Goldstar GSM2400 Modem Box

set switches:

1 = down	2 = up
3 = up	4 = up

Remote Connection to a Model 49 with External Modem

If the Model 49 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 dispatch-only Model 49s (no interconnect option), or when high-speed modem access is desired. The Model 49 issues Hayes AT commands periodically to the modem to set its configuration.

Figure 2-4 shows the hardware connections for a remotely located Model 49 using an external modem.

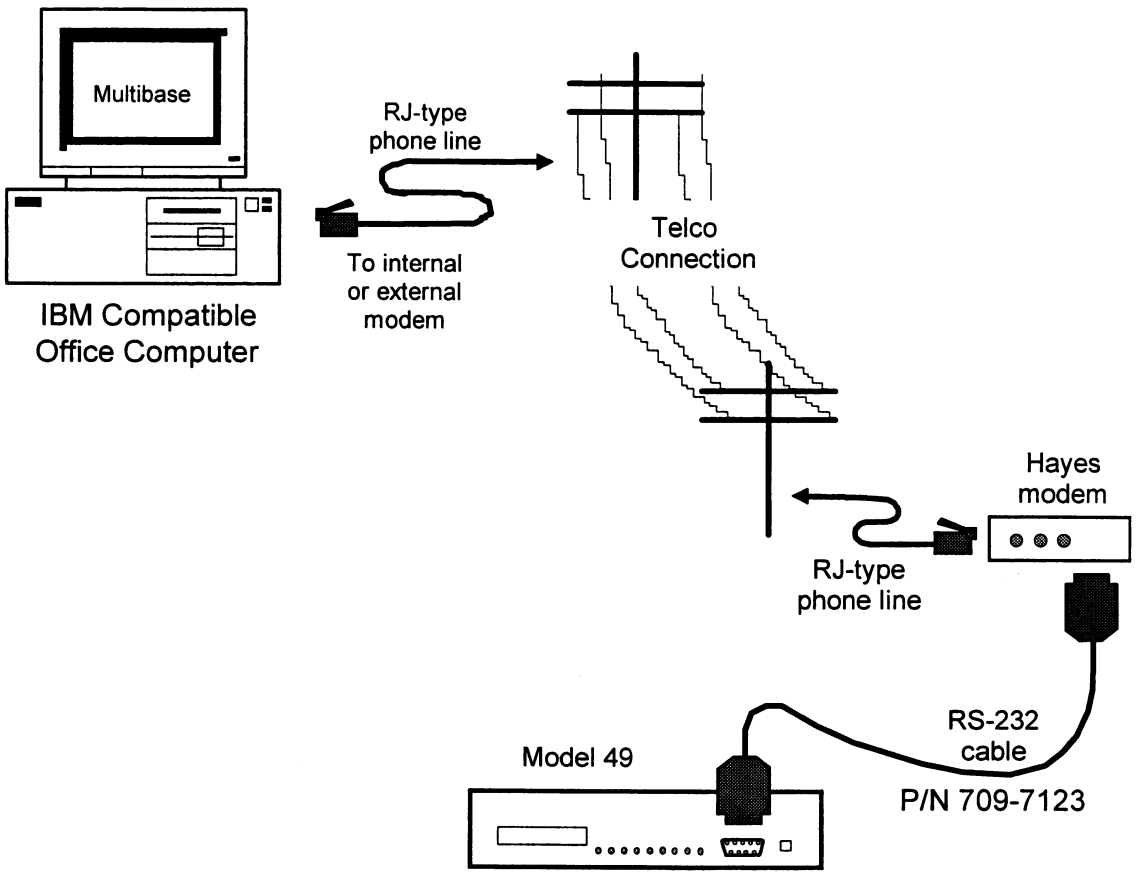

Figure 2-4. Remotely Located Model 49 with External Modem Connection

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 49 using the front panel DIP switches. Table 2-3 shows the DIP switch settings for SW1. To access the DIP switches, remove the red plastic cover on the left side of the Model 49 face plate. There are two sets of DIP switches; SW1 is the red one on the left with four switches. Switches 3 and 4 control the communications rate.

Table 2-3. Model 49 External Modem Speed Settings

Communication Baud Rate	DIP Switch #3	DIP Switch #4
300	down	down
1200	down	up
2400	up	down
4800	up	up

> **Note:**
>
> **To make the new switch settings take effect, cycle the power on the Model 49. That is, turn the unit off and then on again. After each reset, the Model 49 issues Hayes AT commands to program the modem.**

2) Obtain or make an appropriate RS-232 cable to connect the Model 49 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.

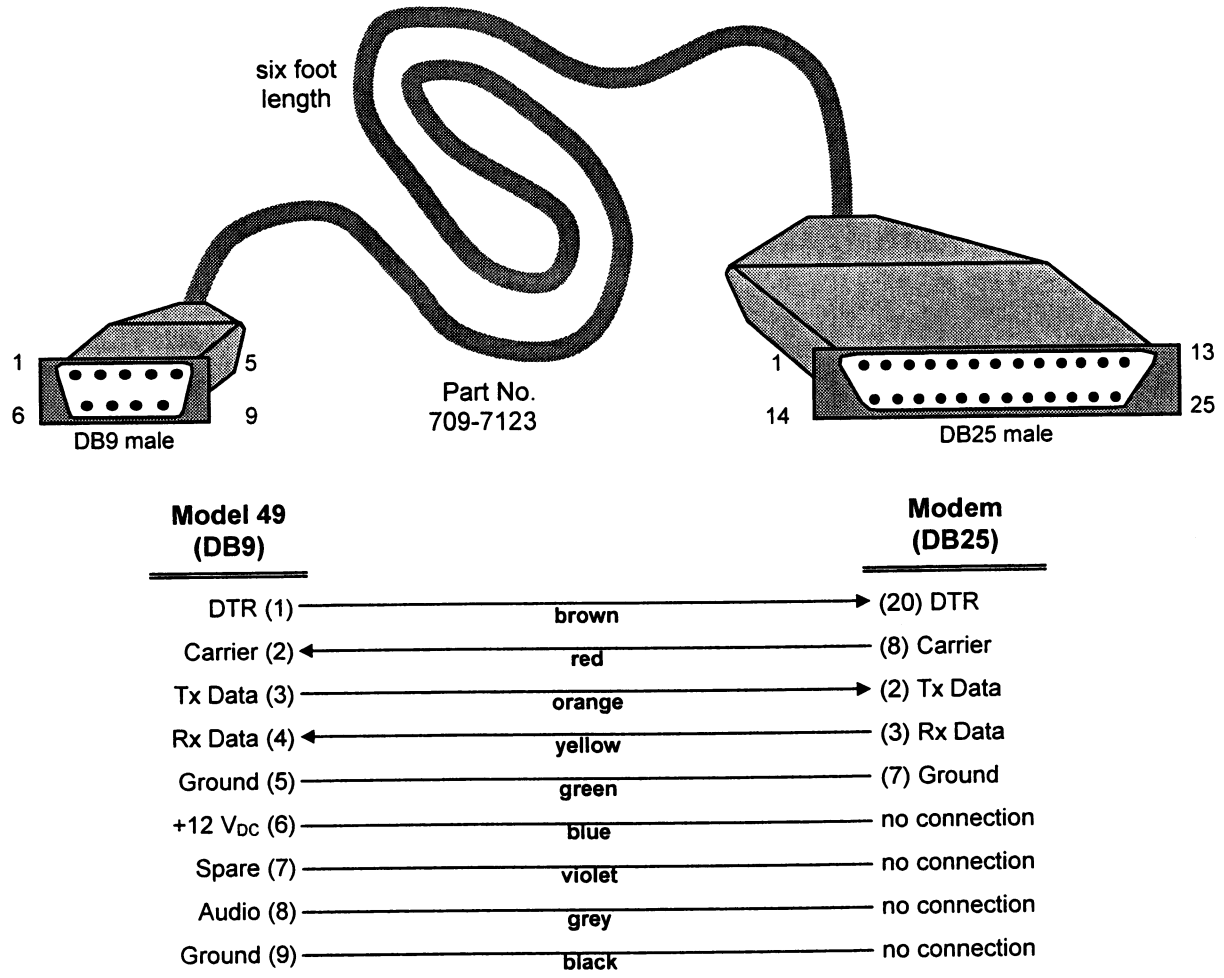

Figure 2-5. Model 49 External Modem Cable

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 49. On a 1200 baud Hayes modem, set SW1 to the UP position.

3) Connect the external modem at the Model 49 site to an appropriate telco line using RJ-type cable.

> **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.**

4) Connect the office PC modem to a standard telco line using RJ11 cable. (See "Note" above.) 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).

Remote Connection to a Model 49 with Interconnect Option

When the Interconnect Option (Part No. 950-9563) is purchased, the Model 49 comes equipped with an internal 1200 baud modem. This enables Multibase to call the Model 49 through its telco card, update database settings, and retrieve billing information.

Figure 2-6 shows the hardware connections for a remotely located interconnect Model 49 (with an internal modem).

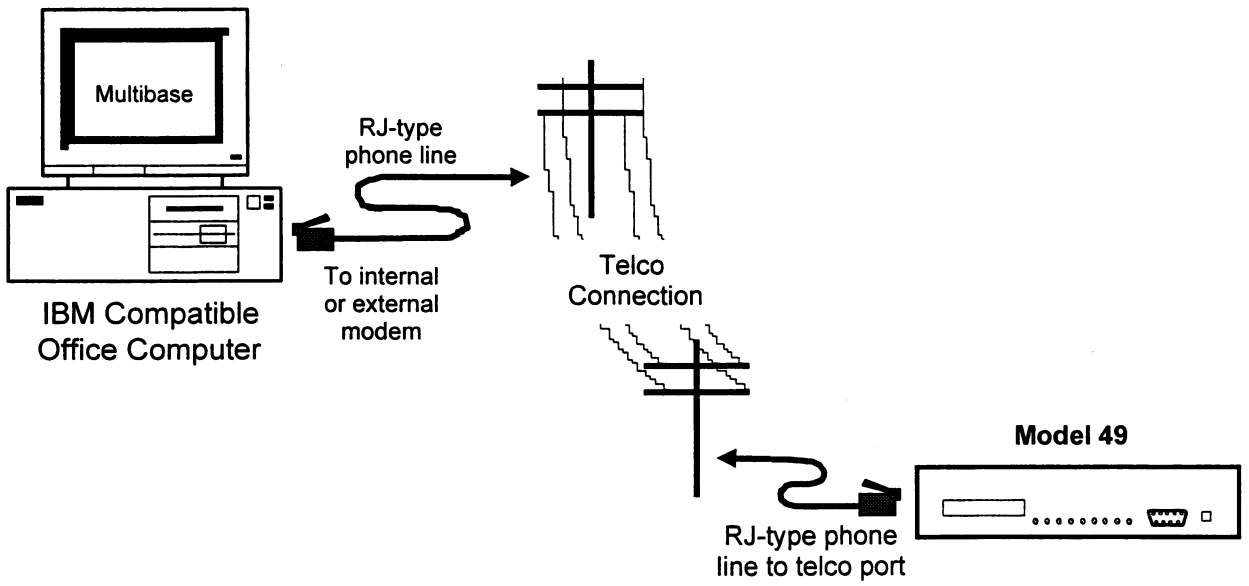

Figure 2-6. Remotely Located Interconnect Model 49

Installation Procedure

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

1) Set the modem communications speed on the Model 49 to 1200 baud using the front panel DIP switches. Table 2-4 shows the DIP switch settings for SW1. To access the DIP switches, remove the red plastic cover on the left side of the Model 49 face plate. There are two sets of DIP switches; SW1 is the red one on the left with four switches. Switches three (3) and four (4) control the communications rate.

Table 2-4. Model 49 Internal Modem Speed Settings

Communication Baud Rate	DIP Switch #3	DIP Switch #4
300	down	down
1200	down	up
2400	up	down
4800	up	up

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 49 telco port to an appropriate telephone line using RJ-type cable.

Note:

The Interconnect Option requires the purchase of a separate telco card. The type of card purchased determines which line type the Model 49 should be connected to [4-wire E&M (Part No. 950-9561), End-to-End (Part No. 950-9547), or DID (Part No. 950-9560)].

4) Adjust the audio levels on the Model 49 as described in *Model 49 Trunking Repeater Manager Operation and Installation Manual* (Part No. 025-9313) before attempting to connect to the interconnected Model 49.

❒ STEP 3. MULTIBASE COMMUNICATIONS PROGRAMMING

Once all of the necessary hardware connections are complete, Multibase needs to know what equipment is connected to the Model 49 and the office computer.

Running Multibase on the Office Computer

To get Multibase up and running, follow these steps:

1) Boot up the office computer.

2) Switch to the drive and directory where Multibase is installed. (The default directory is c:\Multibase.) For example, if Multibase 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 MULTIBAS <Enter>

3) Start the program by typing:

   MULTIBAS <Enter>

Multibase Main Screen

The Multibase main screen should come up 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.**

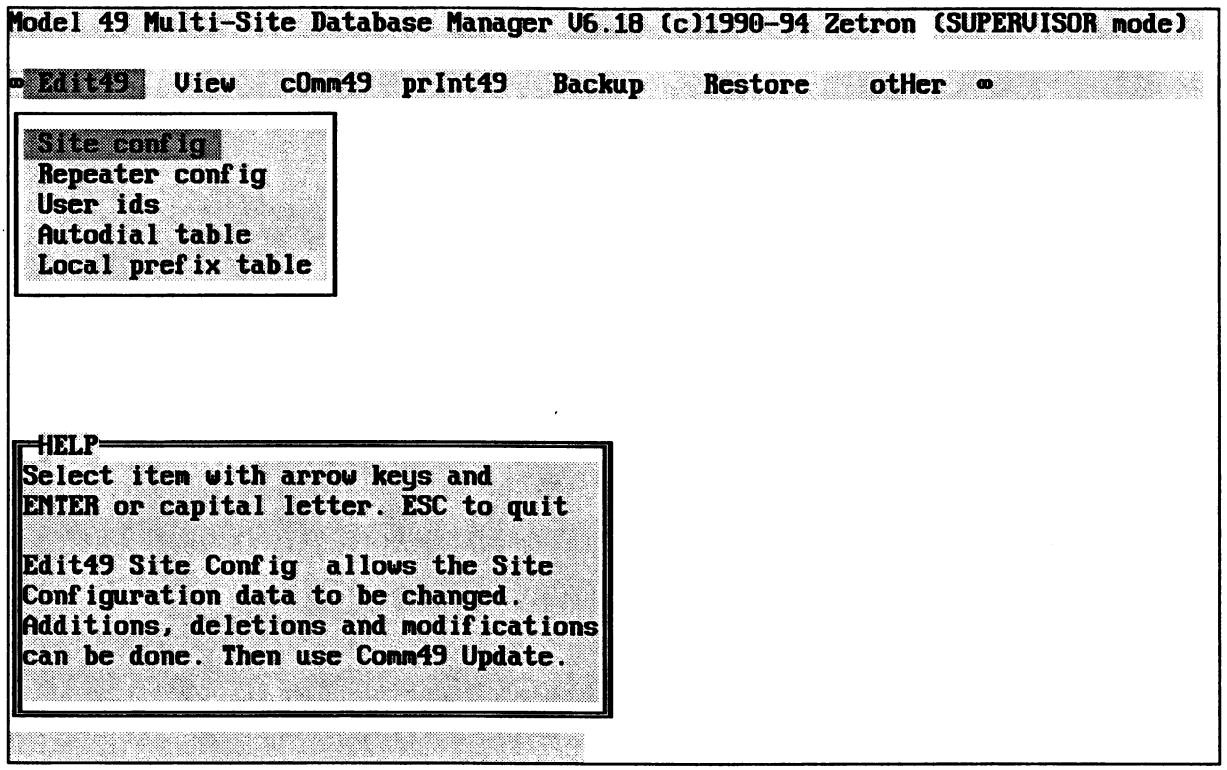

Figure 2-7. Multibase Main Menu Screen

Site Configuration Programming

To set up the Model 49 communications parameters, select Site config from the Edit49 menu. The site configuration box shown in Figure 2-8 appears.

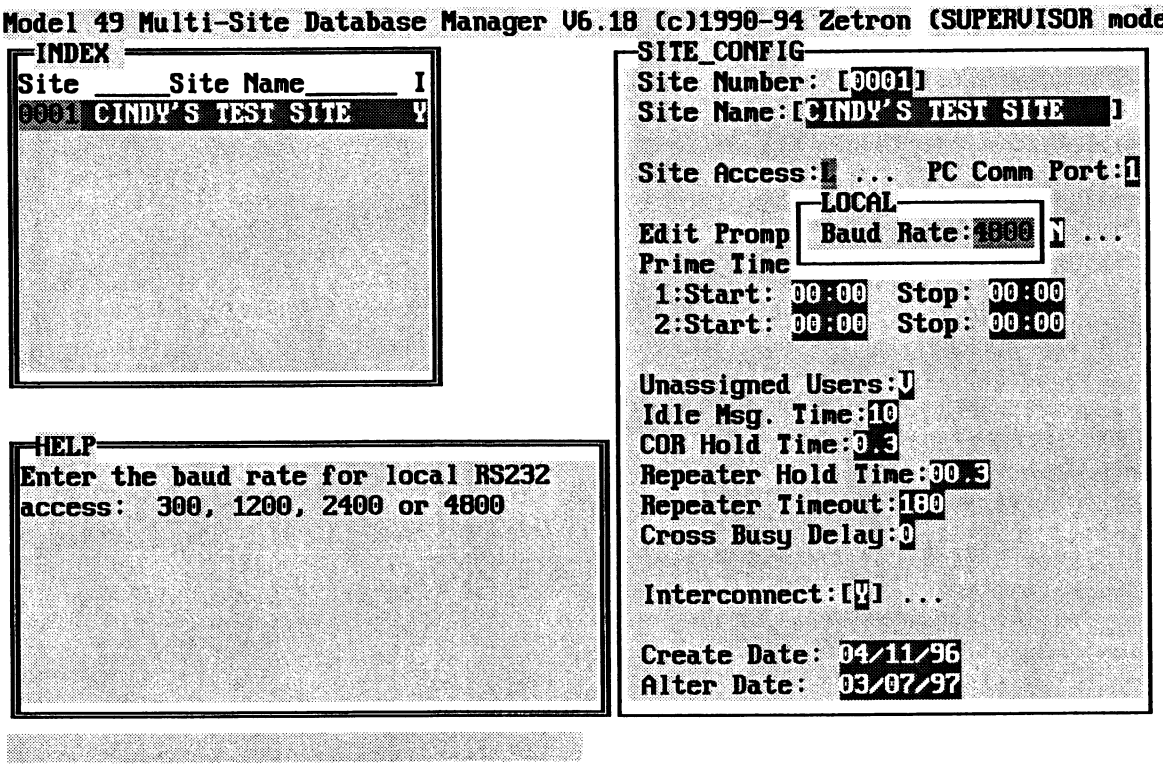

Figure 2-8. The Site Config Box

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 49 modem connection (See Figure 2-9)
   - X = external Model 49 modem connection (See Figure 2-10)

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

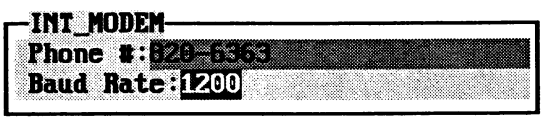

Figure 2-9. Internal Modem Parameters

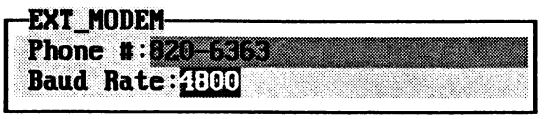

Figure 2-10. External Modem Parameters

3) Enter the baud rate as follows:

local connection:	Enter the communication speed of the Model 49. 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 4800 baud. The default baud rate is 4800. **Skip to step #5.**
interconnect Model 49 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 2400 or 4800 baud. The default baud rate is 1200.

Caution:

For the computer and the Model 49 to communicate properly, the baud rate programmed in Multibase must match the baud rate set on the Model 49 front panel DIP switches (See "Step 2. Hardware Connections" on page 2-5).

4) Enter the phone number that the computer should call to access the *remotely* located Model 49.

5) Select the PC Comm Port field. Enter the communications port number used to connect to the Model 49. 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 49.

Answer-Originate Mode for an Interconnected Model 49

Some PC modems are unable to communicate with the Model 49's internal modem in answer mode. To remedy the situation, the interconnect modem can be set to recognize a request for modem connection with reverse-answer origination.

Enable answer-originate mode as follows:

1) Select Edit, Site config from the Multibase main menu.
2) Select the Site Access field.
3) Program the connection as "X" - external modem.
4) Add ";00255" to the end of the telephone number. For example, if the site phone number is 820-6363, enter "8206363;00255" in the Telephone Number field.
5) Ensure that the baud rate is not set faster than 1200.
6) Select the Interconnect field.
7) Enter a "Y" for interconnect operation.
8) The Interconnect box shown in Figure 2-11 appears.

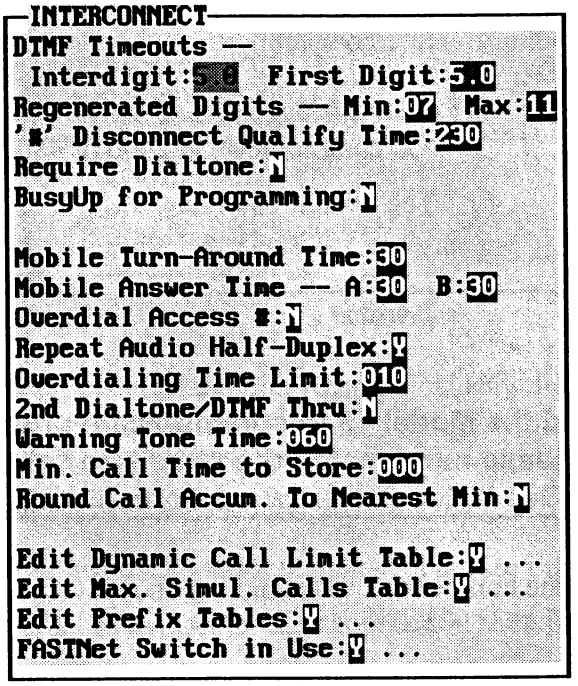

Figure 2-11. Interconnect Box in Site Config

9) Enter an "N" in the Overdial Access field (about halfway down).

In answer-originate mode, Multibase cannot connect with the Model 49 until the interconnect modem initiates communication. After Multibase calls the site and the answer prompt plays, the system operator must press any key. In response, the Model 49's internal modem emits a tone to complete the connection.

Real-Time Communications Monitoring

To confirm that all hardware connections and software settings are correct, select Monitor from the cOmm49 menu. The PC should dial the site phone number (if the Model 49 is remotely located), connect to the repeater, and display the communications monitor screen shown in Figure 2-12.

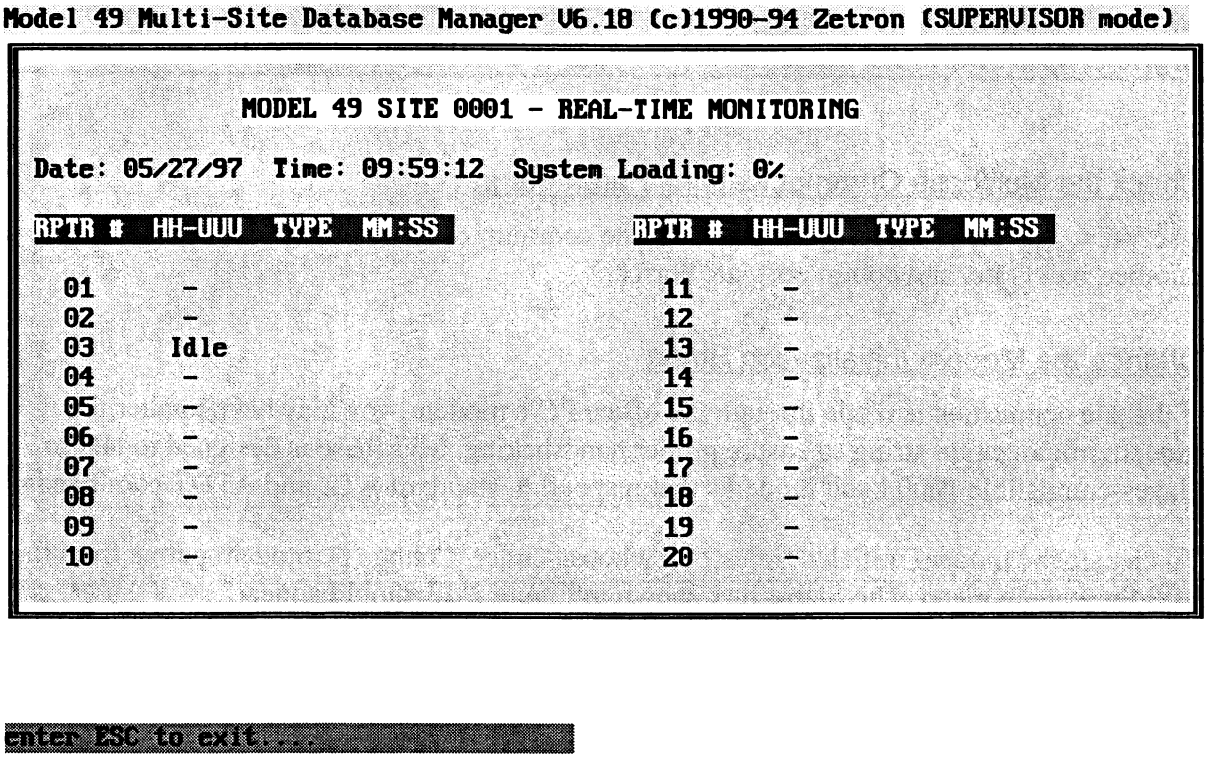

Figure 2-12. Real-Time Monitoring Screen

Troubleshooting PC Communications with the Model 49

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. HARDWARE CONNECTIONS" on page 2-5.

Note:

Perform a soft reset of the Model 49 if any hardware connections or settings are changed. The Model 49 only recognizes changes when it is reset or powered up. To perform a soft reset, push the Connect/Disconnect button twice. See *Model 49 Trunking Repeater Manager (Main Board Revision S and Higher) Operation and Installation Manual* (Part No. 025-9313) for details.

Check the Multibase 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. Multibase is designed to talk to Hayes-compatible 1200 baud modems that respond to standard ATZ and ATDT commands.

To change the modem initialization string, choose Other, Change pc modem parms from the Multibase main menu. The Status box shown in Figure 2-13 should appear.

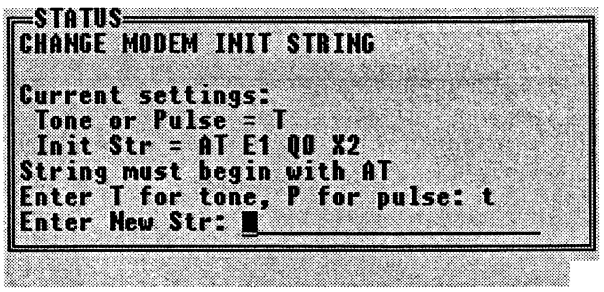

Figure 2-13. Modem Initialization String Box

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 Multibase still cannot communicate with the Model 49, contact Zetron technical support for assistance.

❒ STEP 4. MAKING A BILLING DIRECTORY

Billing files for the system are stored in either the \MODEL49 directory (or whatever alternate name was assigned during installation) or the \MOBILL49 directory. When Multibase retrieves billing files from the repeaters (cOmm49, Retrieve, Billing Records), the files are saved in the MOBILL49 directory. If that directory does not exist, Multibase stores the files in the MODEL49 directory instead.

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

Zetron's billing package, ZEBRA, automatically creates the billing directory during installation.

❒ 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 49 clock, follow these steps:

1) Choose cOmm49 from the Multibase main menu.

2) Choose Other from the communications menu.

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

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

5) The status screen shown in Figure 2-14 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.

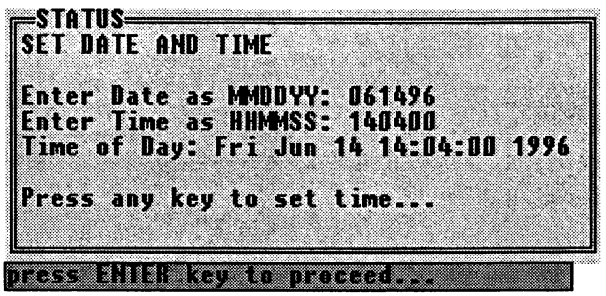

Figure 2-14. Date & Time Status Window

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

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

The Model 49s are now set to the current date and time.

3. PROGRAMMING OVERVIEW

INTRODUCTION TO DATABASE OPERATIONS

Multibase 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 Multibase. 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 Multibase 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 Multibase 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 Multibase screen. Ex. Site config is the selected item in the Edit49 menu.
box; window	Describes a framed text box on the Multibase screen. Ex. The Site Config box has 21 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 Edit49 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 Multibase 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 Multibase screen and points out the database terms defined above.

Note:

Some parts of the Multibase screen are identified by two different terms. The phrases represent common uses of the database vocabulary.

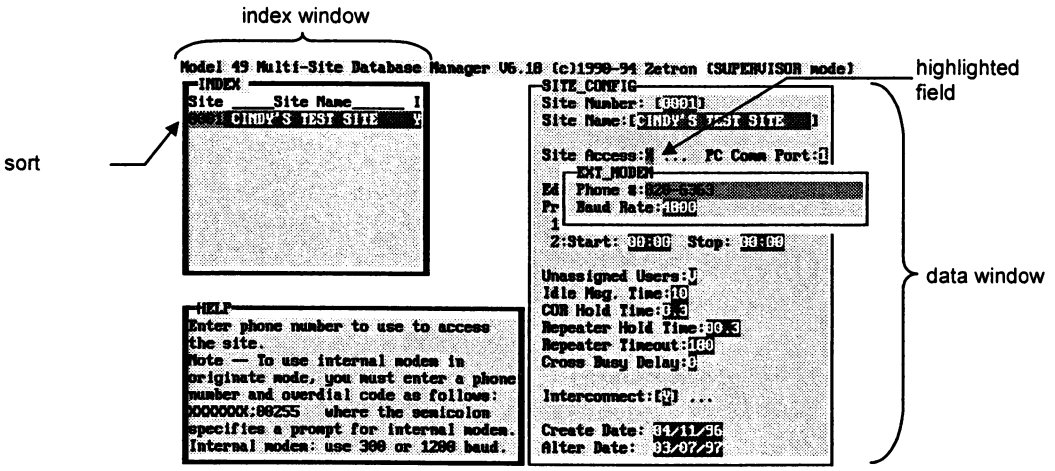

Figure 3-1. Multibase Terminology Examples

Moving through the Database

In addition to the terminology above, Multibase 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 "cOmm49". In this case, entering an "O" from the keyboard automatically selects that menu.

> **Note:**
>
> **The capital letter that selects a menu item is not always the first letter of the word.**

The Guide Window

The <F1> key performs a special function in Multibase. 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 Multibase screen.

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 Multibase. 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. Multibase 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

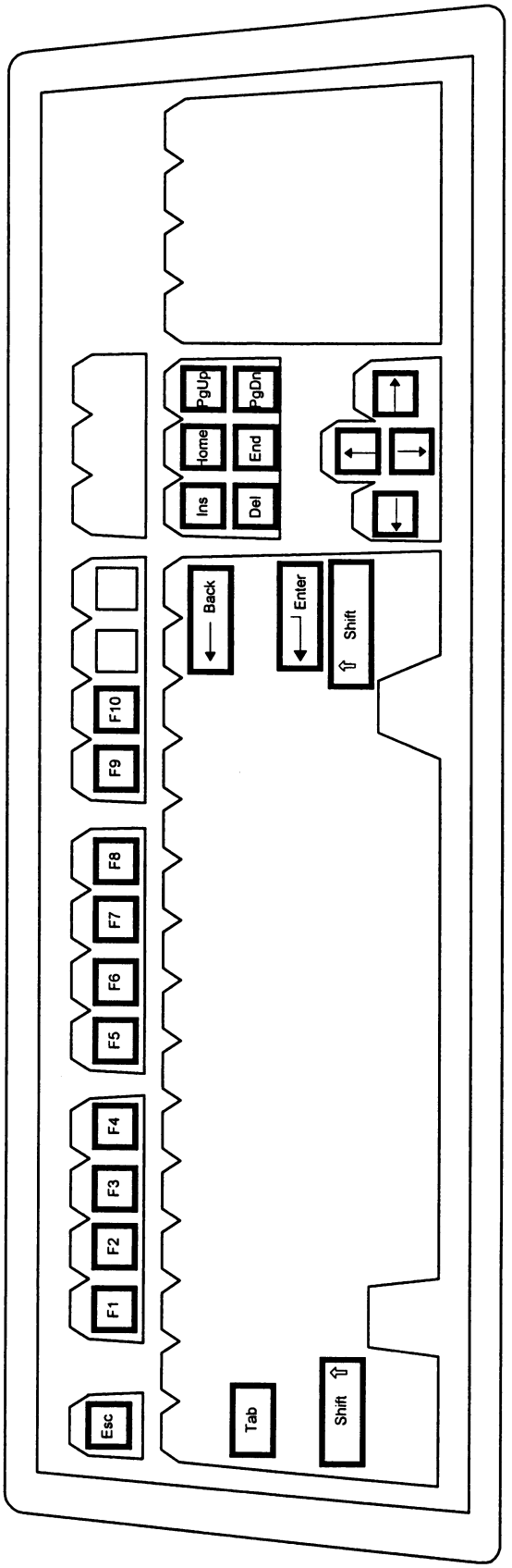

Figure 3-2. PC Keyboard for Multibase Operations

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 Edit49 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 Multibase 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. Multibase 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 Edit49 menu choices).

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

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

4) Type in the data for the desired record.

5) Press <Enter>.

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

PASSWORD PROTECTION

Multibase 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. Multibase 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.

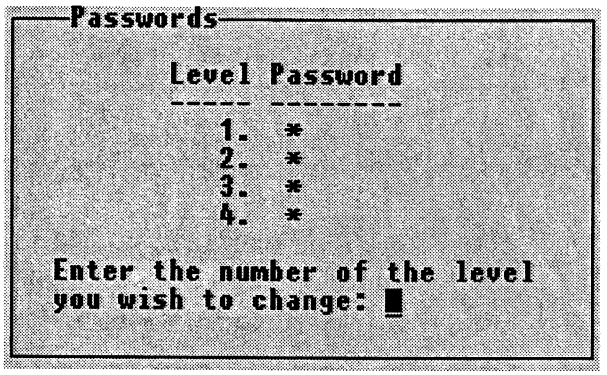

Figure 3-3. Password Protection Screen

When Multibase is first installed, the system defaults to full user-access. This is noted in the upper right corner of the Multibase 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.

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

Levels of Security

Multibase 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. Multibase Security Access Levels

Level	Main Menu	Submenu #1	Submenu #2
0	cOmm49	Monitor rptr. Loading Status info.	
	otHer	Exit	
1	Edit49, View, and prInt49	Site config Repeater config	
	cOmm49	Update get/Verify reseT model 49s Other	Change Modem string
	otHer	Change pc modem parms	
2	Edit49, View, and prInt49	User ids Autodial table Local prefix table	
	cOmm49	Update get/Verify	
	Backup and Restore	Config data call Detail	
3	cOmm49	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 Multibase 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 Multibase.**

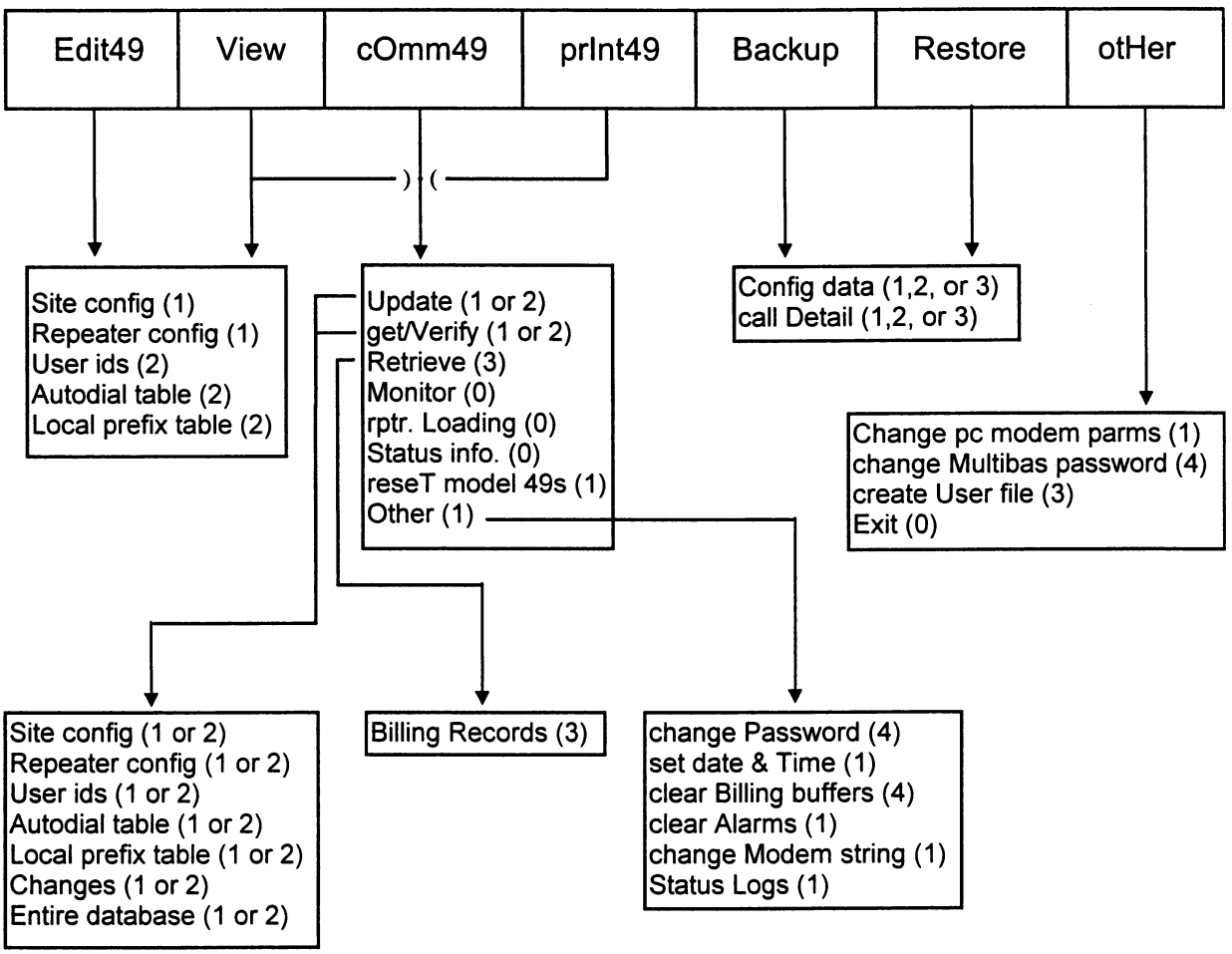

Figure 3-4. Security Level Menu Tree

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 Multibase 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 Multibase is restarted, the same main menu screen appears. If the user attempts to access a protected menu item, Multibase 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.

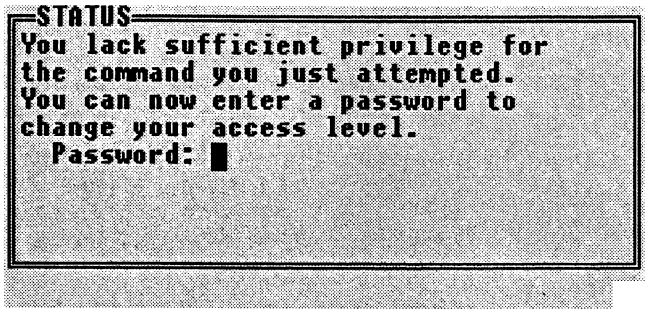

Figure 3-5. Password Entry Prompt

Users can migrate between access levels, but a level 4 user cannot change levels without exiting and restarting Multibase. In addition, once level 0 access is upgraded, it cannot be reentered without exiting Multibase. Figure 3-6 illustrates the movement between the five security access levels.

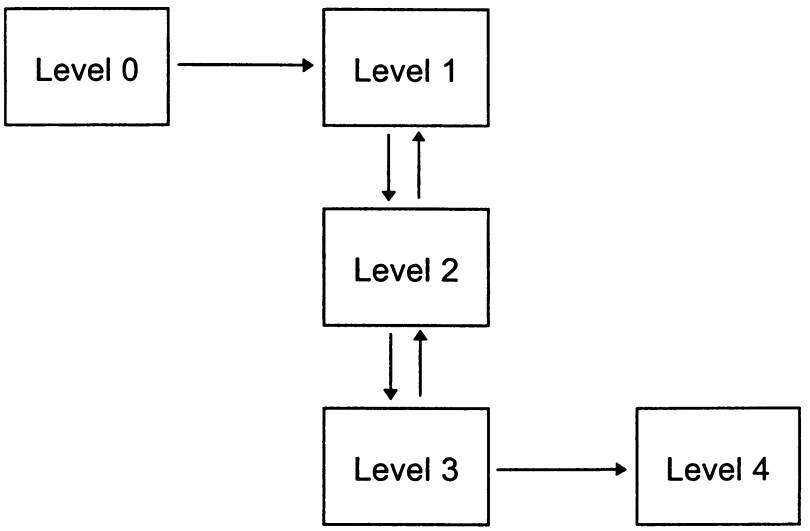

Figure 3-6. Migration Between Security Access Levels

Caution:

Users should always quit Multibase 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.

Multibase provides an emergency method of restoring passwords in the event that they are forgotten or the system locks up. If Multibase 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.)

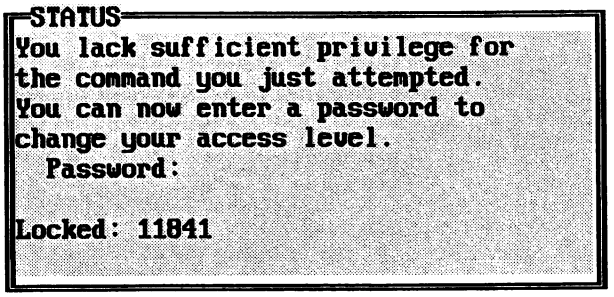

Figure 3-7. Password Restoration Help Code

Contact Zetron's 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 Multibase 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.

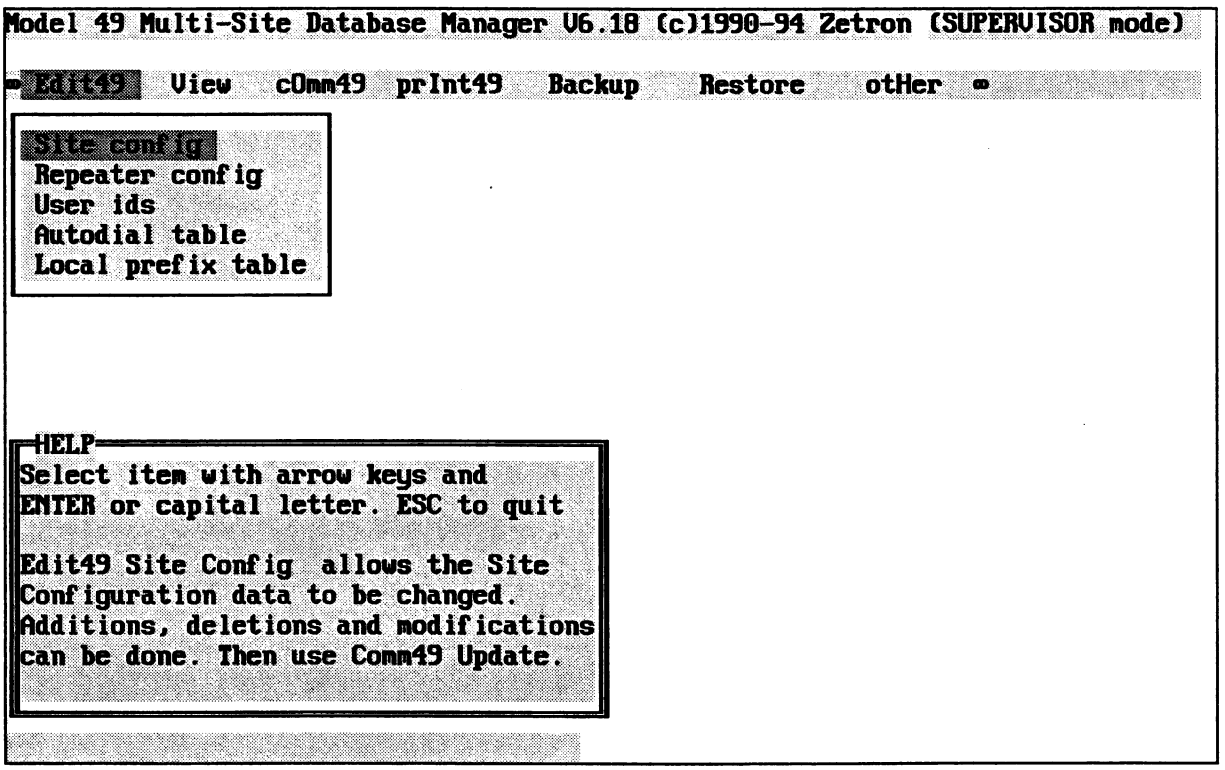

Figure 3-8. Multibase Main Menu

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

Edit49 Menu

The editing menu allows the operator to look at the way everything is configured and make changes along the way. The Edit49 menu is used on initial installation to add subscribers, sites and system configurations. The Edit49 menu is also used to alter any of those items.

The selections available in the Edit49 menu are shown in Figure 3-8 and listed below.

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

Select Edit49, 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 Edit49 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

cOmm49 Menu

The communication menu links to the Model 49 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 cOmm49 menu, the computer attempts to make a connection with the Model 49.

The selections available in the cOmm49 menu are:

- Update
- get/Verify
- Retrieve
- Monitor
- rptr. Loading
- Status info.
- reseT model 49s
- Other

Figure 3-9 shows the communications menu choices.

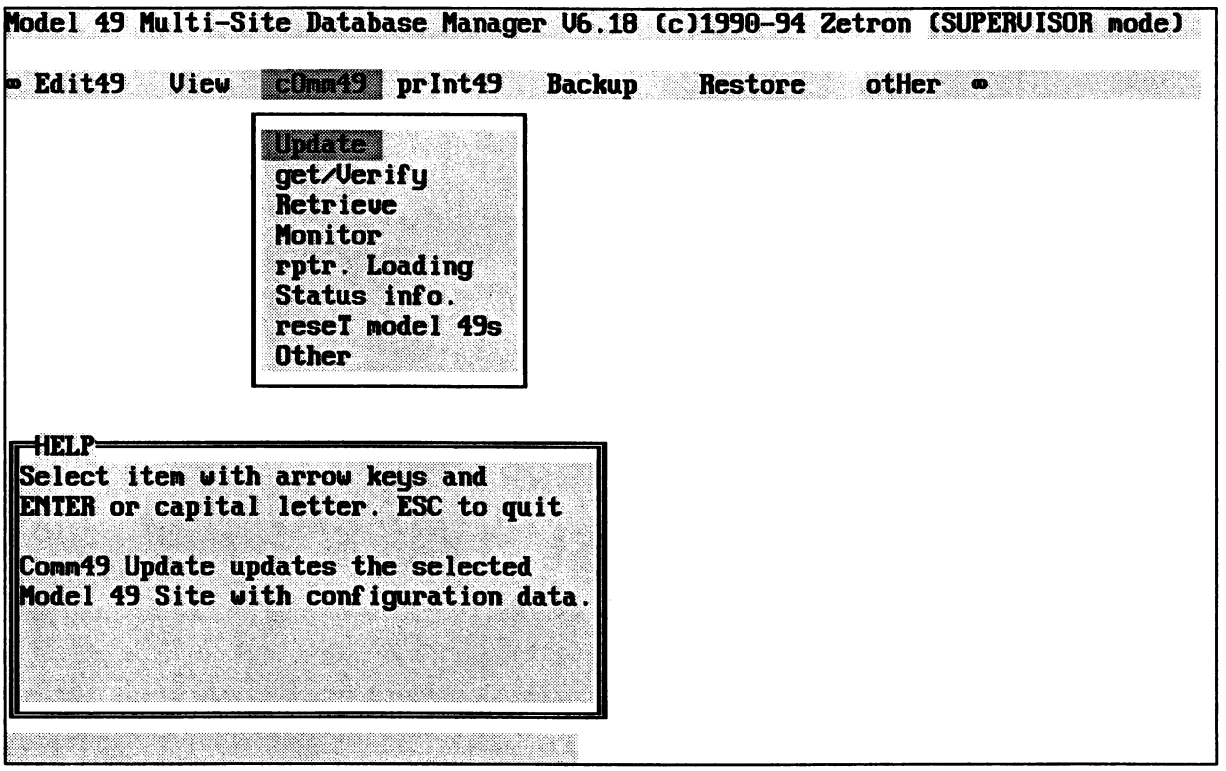

Figure 3-9. cOmm49 Menu

When cOmm49 is selected, Multibase 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 cOmm49 menu without disconnecting from the site.

Updating the Model 49 Site

To update a Model 49 site with the new or changed database information, select Update from the cOmm49 menu. Choose the appropriate site. Multibase 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.

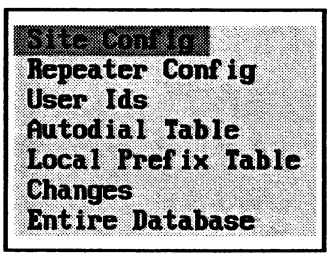

Figure 3-10. cOmm49 Update Menu

Select Entire database if this is the first site update. This ensures that the Model 49s 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 49s 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 subscriber master unit may be inoperative
- the subscriber bus cable is faulty or improperly connected
- one of the Model 49s is not set as a Polling Master on the front panel DIP switches (See *Model 49 Trunking Repeater Manager Operation and Installation Manual* [Part No. 025-9313]).

Verifying the Model 49 Site Programming

To ensure that the programming information in the Model 49 is current, select get/Verify from the cOmm49 menu. Multibase dials the selected site, checks the computer files against the Model 49's RAM contents. If a discrepancy is found, Multibase 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 cOmm49, Retrieve gathers billing data from all the Model 49s 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 cOmm49 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 cOmm49 menu and Multibase connects to the Model 49 and displays a screen like that shown Figure 3-11.

```
Model 49 Multi-Site Database Manager V6.18 (c)1990-94 Zetron (SUPERVISOR mode)

              MODEL 49 SITE 0001 - REAL-TIME MONITORING

Date: 05/30/96  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 49 keeps a statistical history of repeater use. This information can be used to study system usage and predict peak period congestion. Then adjust the Model 49 conversation time limits accordingly to encourage off-peak usage.

To view the repeater loading history, select rptr. Loading from the cOmm49 menu. Multibase connects to the Model 49, retrieves the loading information and displays a screen like that shown in Figure 3-12.

```
Model 49 Multi-Site Database Manager V6.18 (c)1990-94 Zetron (SUPERVISOR mode)

              MODEL 49 SITE 0001 - REPEATER 01 LOADING
Date: 05/30/96  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 cOmm49 menu retrieves status information from all Model 49s 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.

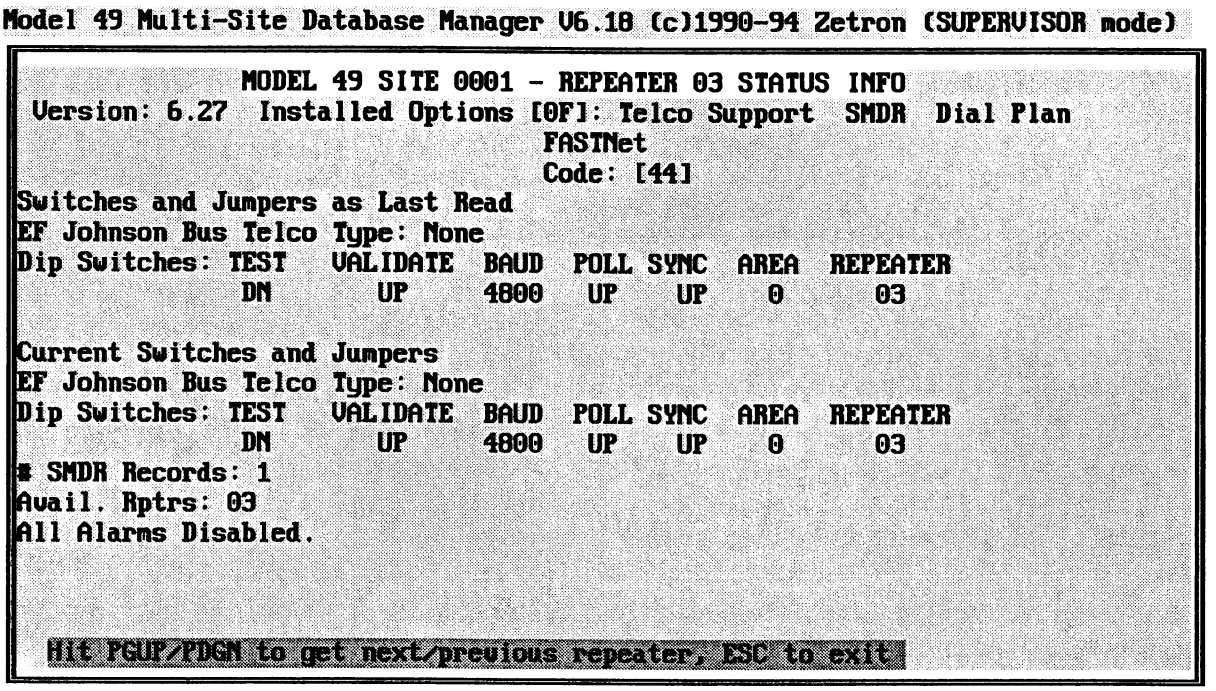

Figure 3-13. Repeater Status Information

Resetting the Model 49s

Selecting cOmm49, reseT model 49s performs a soft rest of every Model 49 in the system. When Multibase connects to the site, a prompt asks "Reset Model 49s (y,n)?". When a "y" is entered, Multibase automatically disconnects form the site and resets the units.

Other Communications Options

Selecting cOmm49, 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

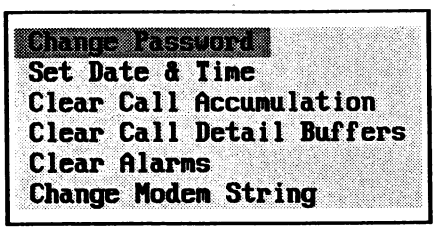

Figure 3-14. cOmm49, Other Menu

Select Change Password to store a new password in the Model 49s. When a new password is entered, it applies to both the Model 49s and Multibase. To change only the Multibase password, use the otHer menu (See "otHer Menu" on page 3-23).

Select Set Date & Time to program the Model 49s internal clocks. Set the time when the Model 49s are installed. Some of the Model 49'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.

Note:

When setting the date and time, Sunday is considered the first day of the week.

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 Model 49's front panel RS-232 port.

prInt49 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 prInt49 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. Multibase provides sorting choices when the print function is selected. Figure 3-15 shows the sorting options available when prInt49, User IDs is selected.

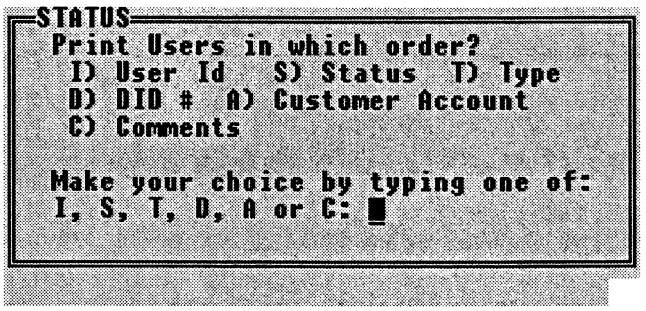

Figure 3-15. prInt49, User ids - Sort Options

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.

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 IDs 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, "Multibase 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. If the diskette is 5¼", affix a black label covering the notch on the upper right side of the disk.

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

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

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

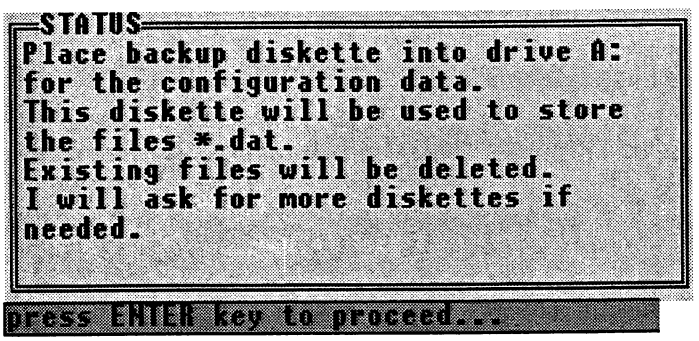

Figure 3-17. Backup Status Message

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 Multibase 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 Multibase. 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 Multibase password
- create User file
- Exit

Figure 3-18 shows the otHer menu choices.

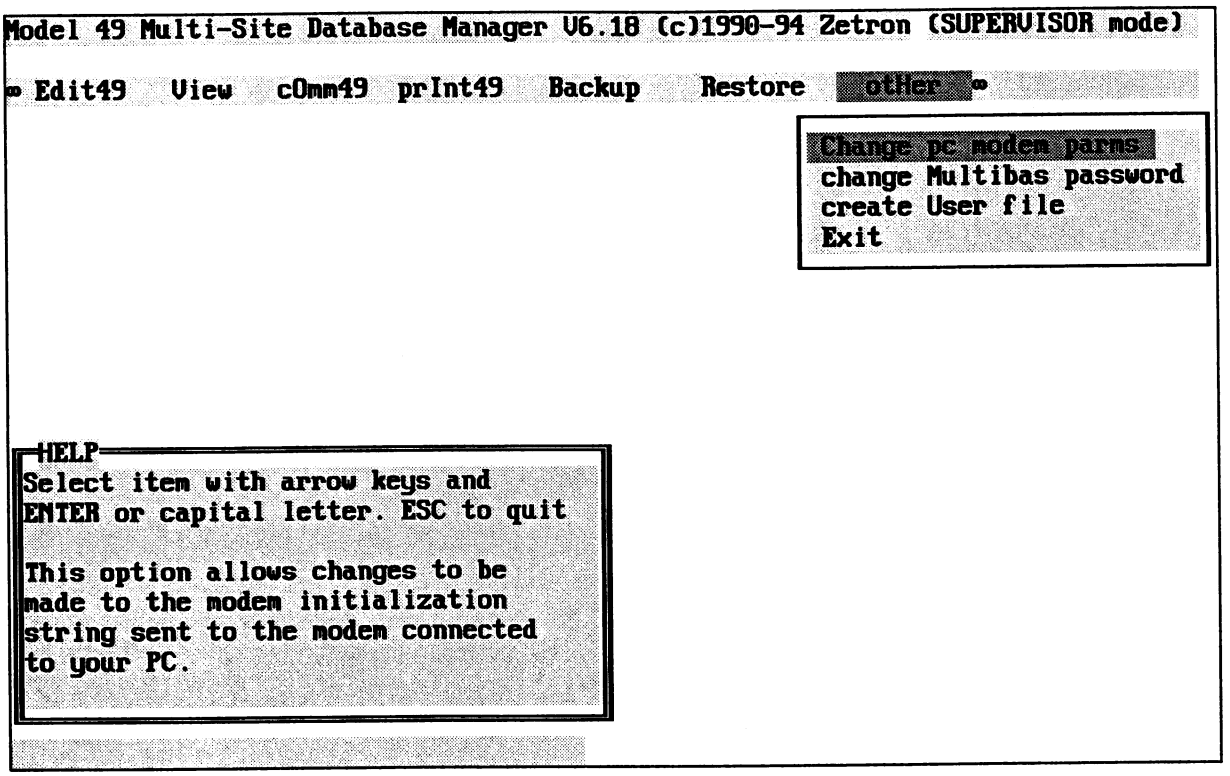

Figure 3-18. otHer Menu

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 Multibas password

If the system requires added security, use the otHer menu to change the Multibase password. This selection changes only the password in Multibase, not in the Model 49s. Use cOmm49, Other, change Password to change the password in both Multibase and the Model 49s.

create User file

The create User file selection writes to a file called *.U00 for billing use. The user file is designed for compatibility with ZEBRA, Zetron's software billing package.

Exit

Exit from Multibase 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 Multibase. The help text is context sensitive and changes depending on the highlighted field.

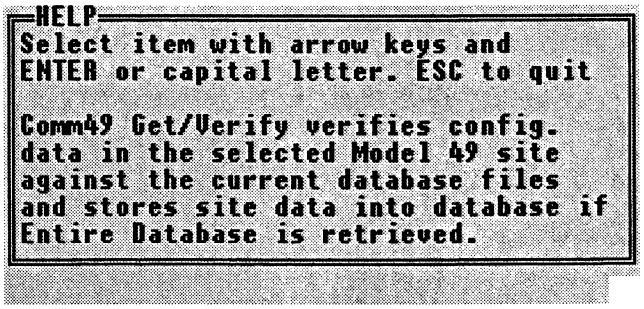

Figure 3-19. Multibase Help Example

The help text corresponds to the highlighted menu selection. In this example, the help text describes a get/Verify from the cOmm49 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 cOmm49 menu operation is selected.

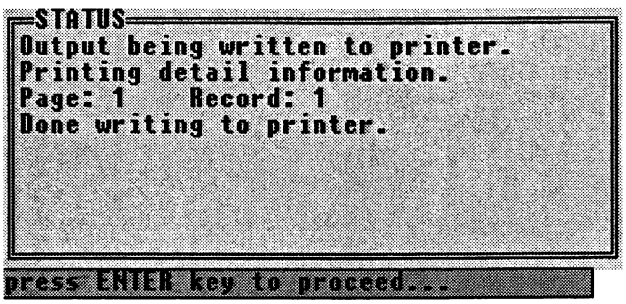

Figure 3-20. Multibase Status Message Example

4. DATABASE SETUP

OVERVIEW OF DATABASE ORGANIZATION

In the default state of the Model 49 after a hard reset, all user IDs are valid dispatch IDs. Multibase 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 Edit49 menu shown in Figure 4-1 lists each of the menu choices that need to be programmed.

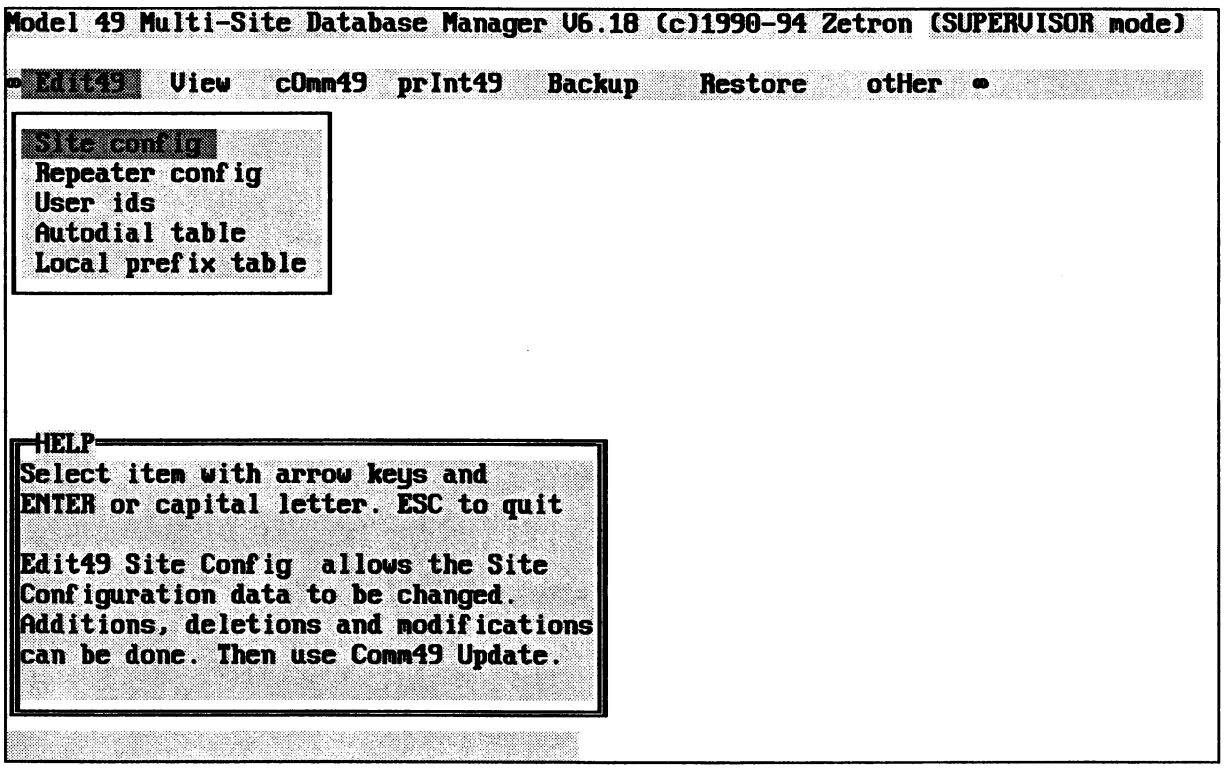

Figure 4-1. Edit49 Menu

When setting up a database for the first time, a new site number must be created. Select Site config from the Edit49 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.

Site Configuration

The Site Configuration programming is used in all channels at a site and in each Model 49. 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 Model 49 contains the programming for all channels in a system. The DIP switches on the front of the Model 49 determine which channel or repeater programming is used for this particular channel. See *Model 49 Trunking Repeater Manager (Main Board Revision S and Higher) Operation and Installation Manual* (Part No. 025-9313) for more information on setting the DIP switches.

Autodial Table

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

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.**

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 CONFIGURATION PROGRAMMING

To begin defining a database for the Model 49 LTR system, a site must be defined. The Site database contains information that applies to all the repeaters that are connected in a system.

1) From the Multibase 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 Multibase starts a new data record with the default values.

Note:

See Section 3 for details on how to navigate through the database.

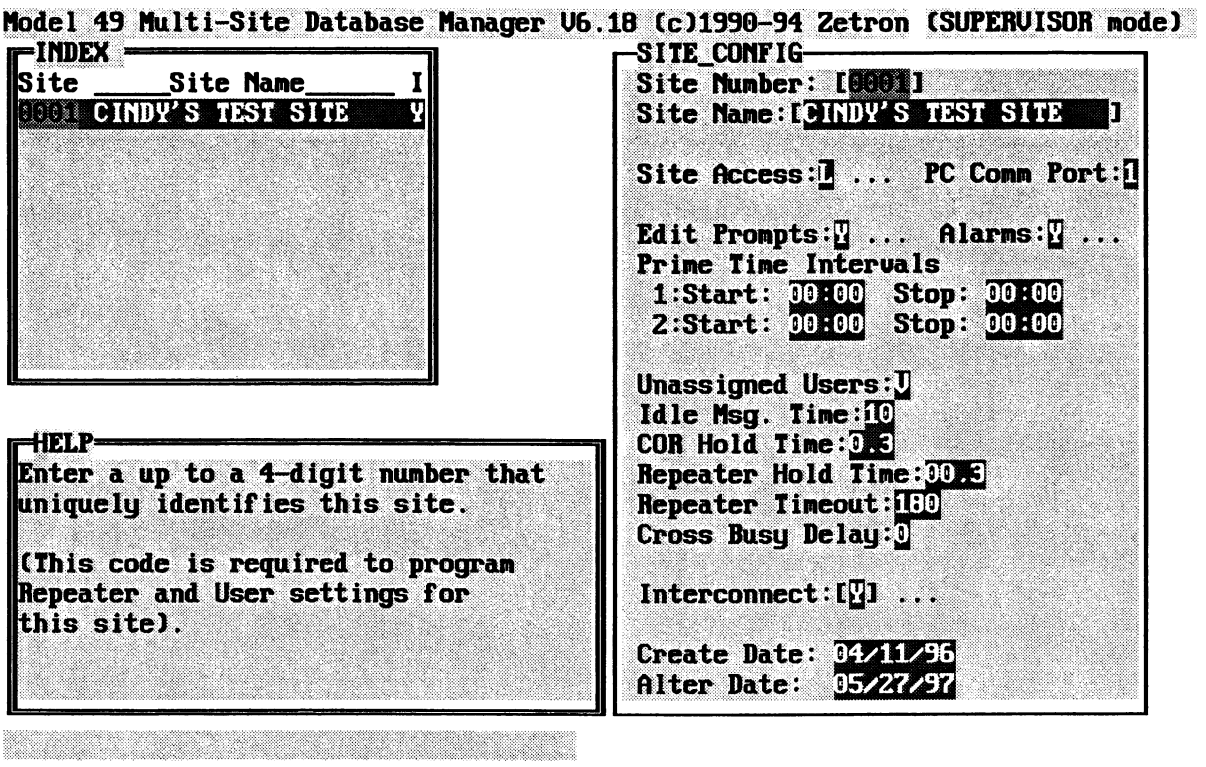

Figure 4-2. Site Configuration Window

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.

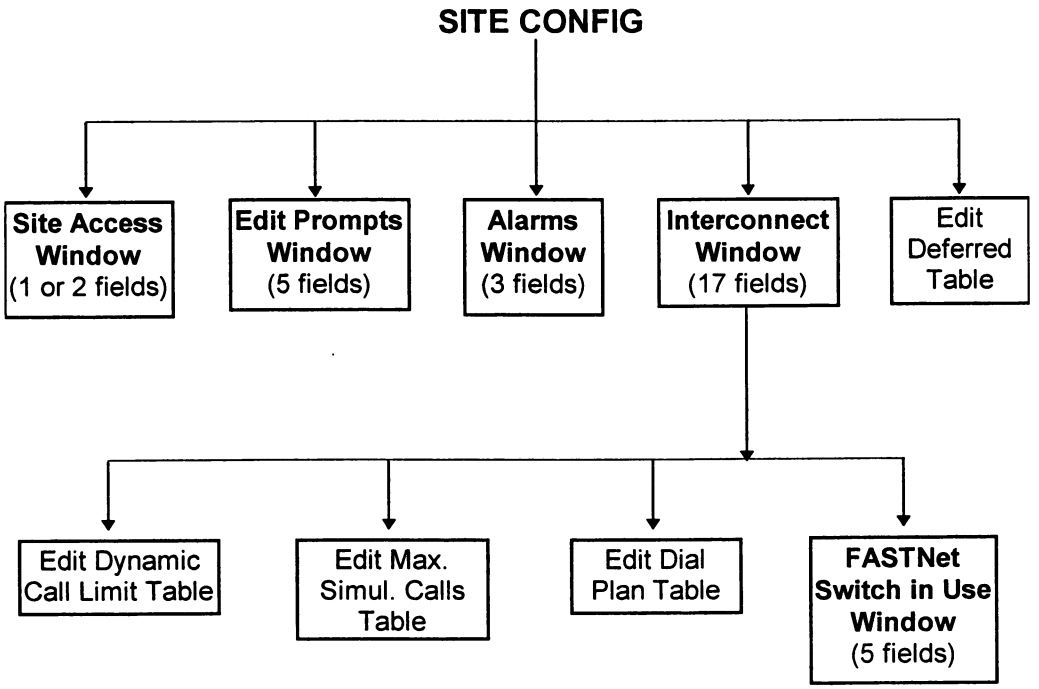

Figure 4-3. Site Configuration Fields Flowchart

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, COS tables, 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 Multibase 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 49 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.

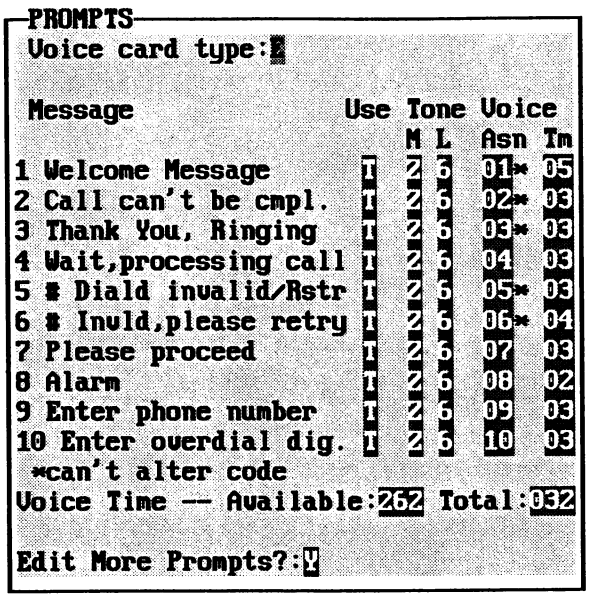

Figure 4-4. Prompts Window

There are 20 different prompts currently available in the Model 49 programming. 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) - 7 (high)	LEVEL: This field sets the tone level for each prompt. Default setting is 6.
Asn	01 - 20 01 - 03; 05; 06 can't be changed (indicated by *)	ASSIGN: This field tells the Model 49 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.

Voice Card Type

The Voice card type field at the top of the window identifies the type of voice card (if any) installed in the Model 49. The available settings are as follows:

N	none
S	Standard voice card (32 seconds of voice storage)
B	Enhanced base RAM (65 seconds of voice storage)
E	Extended enhanced RAM (262 seconds of voice storage)

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.

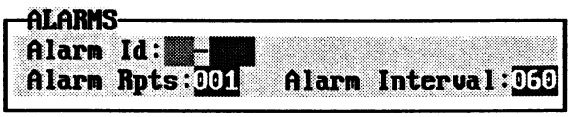

Figure 4-5. Alarms Window

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 resets. If another alarm occurs, the alarm message is sent again.

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, a new Model 49 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 49 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.

Cross Busy Delay

The Cross Busy Delay field sets the amount of time (in seconds) that the Model 49 delays busy up after detecting a "cross busy" condition on Sense 1. The delay allows time to decode LTR packets and not busy-up if the COR is from an LTR mobile. The COR should be fed into Sense 1. This field has no effect if the cross busy feature is not being used.

The Cross Busy Delay should be a number between 0 and 7 in 100 ms steps. The default setting is 0.

Interconnect

The Interconnect field determines if any repeaters in the system are interconnected. When a Y is entered, a pop-up window appears as shown in Figure 4-6, containing fields that apply to interconnect operation.

The default setting for this field is N.

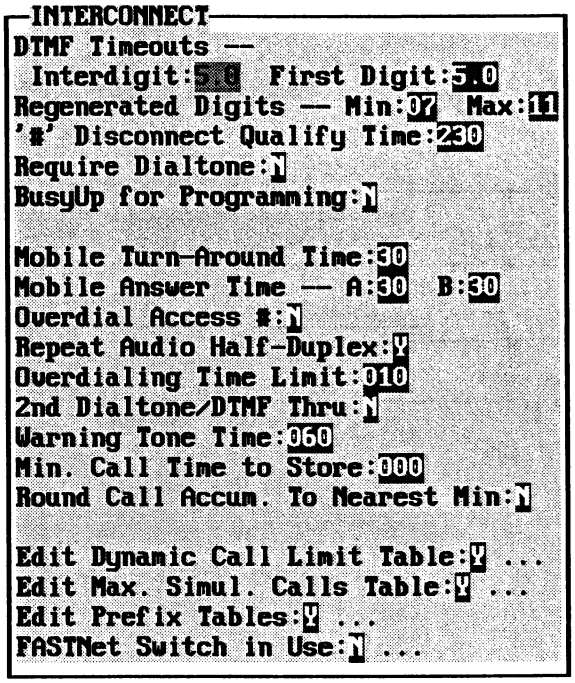

Figure 4-6. Interconnect Window

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 49 waits between DTMF digits before it concludes that dialing is complete. (Note: The Model 49 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 49 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 49 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).

Regenerated Digits - Maximum

This field sets the maximum number of digits that the Model 49 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 49 to make an outgoing call. If N is entered, the Model 49 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 49s 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 49 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 49s with autonet enabled, enter Y.

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).

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 49s with autonet enabled, enter Y.

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).

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 every 15 seconds until the call is terminated.

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 4-45 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.

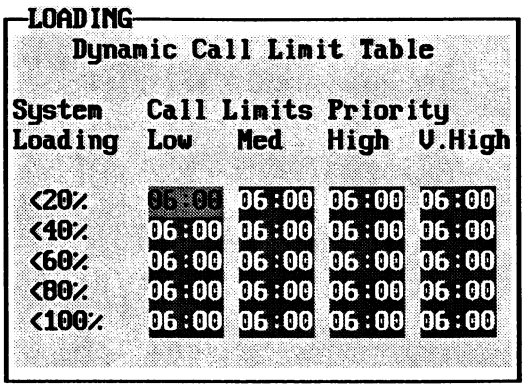

Figure 4-7. Dynamic Call Limit Table

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.

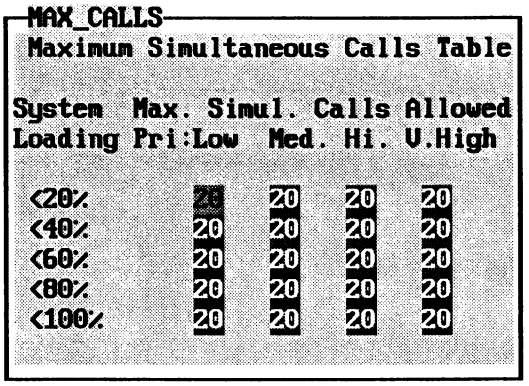

Figure 4-8. Maximum Simultaneous Calls Table

Enter the limits for each of four priority levels in the table as numbers between 00 and 20. (See "Priority" on page 4-45 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 (not applicable to FASTNet switch calls). When a Y is entered, the secondary window shown in Figure 4-9 appears.

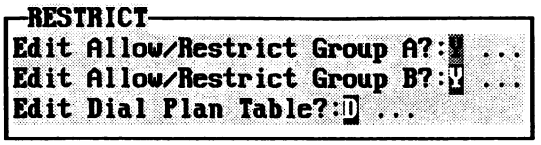

Figure 4-9. Access Window for Prefix and Dial Plan Tables

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.

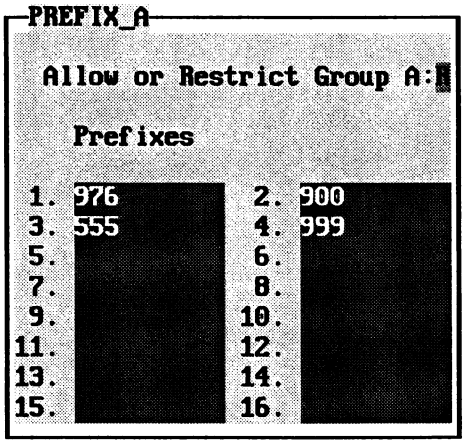

Figure 4-10. Prefix Access Table

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. 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.**

Edit Dial Plan Table

This field provides access to the dialing plan table. The table sets up ten allowable 16-digit dialing strings for interconnect calls. To use the standard North American dialing plan enter a D. The plan allows long-distance calls to any area code with a 0 or 1 as the second digit [(206), (310)].

When a C is entered, the 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	allow only the specified digit
A	allow only a zero (0) or one (1)
X	allow any number from zero (0) to nine (9)
N	allow any number from two (2) to nine (9)
M	allow any number from one (1) to nine (9)

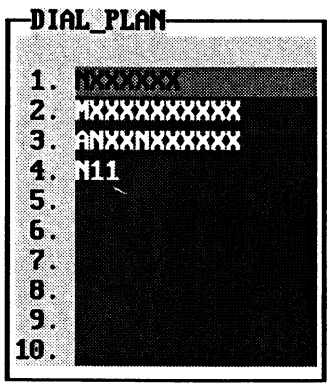

Figure 4-11. Dial Plan Table

Sample dialing plan strings:

NXXXXXX (allows only local calls)

820XXXX (allows only calls to the 820 prefix)

ANXXNXXXXXX (allows only long distance calls)

Enter N to disable the dial plan. C, D, and N are the only valid entries for the Edit Dial Plan Table field. The default setting is D - accept the North American dial plan.

> **Note:**
>
> **An emergency 911 call is always allowed regardless of the minimum required digits and the dialing plan restrictions.**

FASTNet Switch in Use

This field indicates if a FASTNet Switch is connected to this Model 49 site. For two directly connected Model 49s with autonet enabled, enter N. If this Model 49 is directly connected to a Zetron Model 7032 RACS switch, enter Y. 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).

When a Y is entered, the window shown in Figure 4-12 appears. If this Model 49 is directly connected to a RACS switch, the fields in the FASTNet window are ignored.

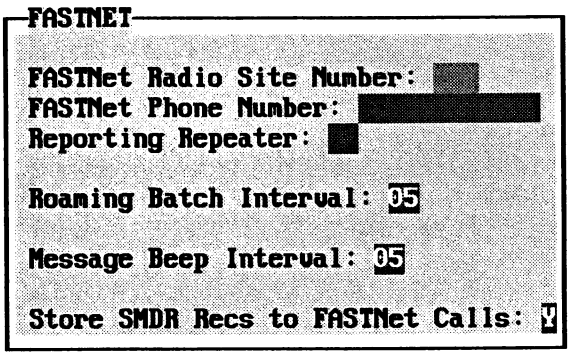

Figure 4-12. FASTNet Window

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 Model 49 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 or Netbase.
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 49 that should report (must be linked to the FASTNet switch). One *and only one* Model 49 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 49 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. Multibase 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. Multibase 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 49 is set to the correct date and time. Use the cOmm49, Other, set date & Time selection to set the time in the Model 49. (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 CONFIGURATION PROGRAMMING").

❒ STEP 2. REPEATER CONFIGURATION PROGRAMMING

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

1) From the Multibase main menu, select Edit49, Repeater config and press <Enter>. Multibase 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 Config window on the right side of the screen. Figure 4-13 shows the Repeater Config window for a new data record.

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

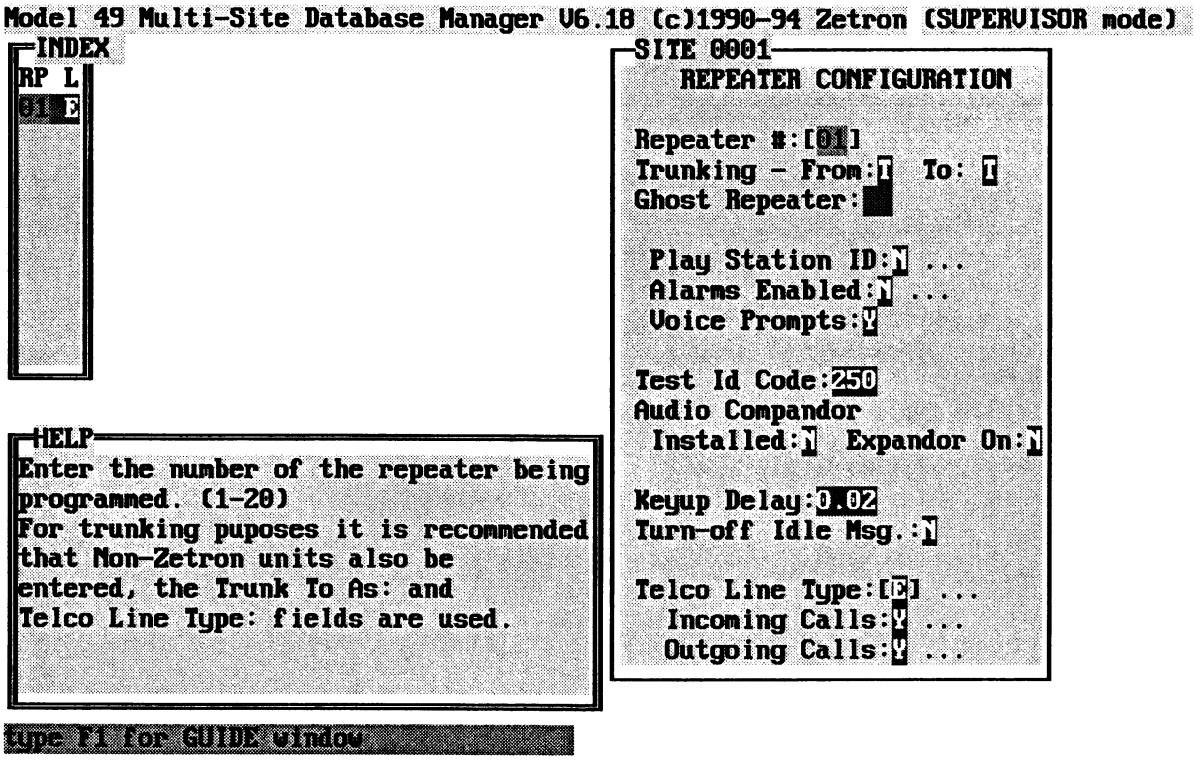

Figure 4-13. Repeater Configuration Window

Some of the fields in the Repeater Configuration window call out windows with additional sub-fields. Figure 4-14 shows the organization and location of the fields that point to other fields.

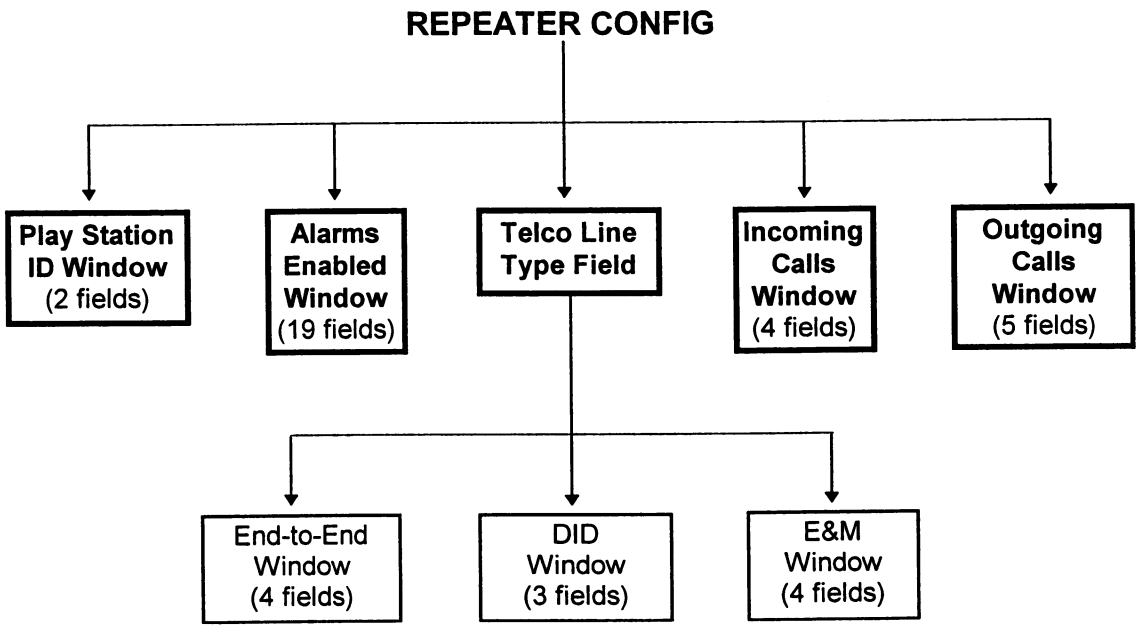

Figure 4-14. Repeater Configuration Fields Flowchart

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. 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 49s 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 D (DID), 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 49s 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), D (DID), or 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 was purchased, enable it by entering a repeater number that is currently unused at the site.

Enter an unused repeater number in this field. 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.

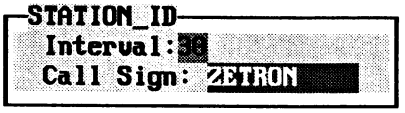

Figure 4-15. Station ID Window

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 Model 49 for 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.

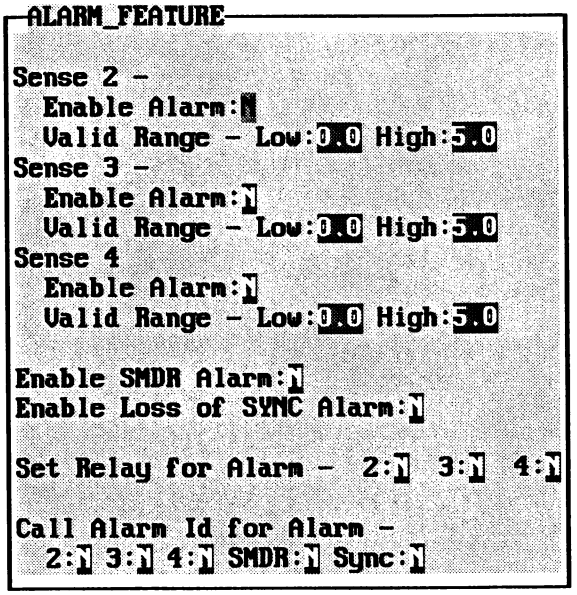

Figure 4-16. Alarm Feature Window

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

Sense n - Enable Alarm

This field enables the alarm for the identified Sense input n (n = 2, 3, or 4).

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

Sense n - Valid Range - Low

This field sets the minimum input voltage on Sense n that should trigger an alarm.

Enter the range low as a number between 0 and 5. The default setting is 0.0 volts.

Sense n - Valid Range - High

This field sets the maximum input voltage on Sense n that should trigger an alarm.

Enter the range high as a number between 0 and 5. The default setting is 5.0 volts.

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 high-speed bus synchronization is lost.

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

Set Relay for Alarm - n

These fields (Sense 2-4) set the corresponding Relay (2-4) when an alarm occurs on the sense input.

Y (es) and N (o) are the only valid entries for these fields. The default setting for each Sense Relay is N.

Call Alarm ID for Alarm - n

This field enables the Model 49 to call the programmed Alarm ID when an alarm occurs on the specified input or condition (n = 2-4, 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 49. 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 49 is in test mode 1. 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.

Audio Compandor - Installed

This field turns on audio companding capabilities for the Model 49. An optional compandor card (Part No. 950-9278) must be installed to activate the feature. The compandor is then enabled by User ID. If Y is entered and no card is installed, users that have the compandor turned on will have no audio.

The default setting is N.

Audio Compandor - Expandor On

This field turns on the expandor for all interconnect calls. An optional compandor card must be installed to activate the feature.

The default setting is N.

> **Note:**
>
> **When companding is activated, be sure that expanding is also performed by the mobile that receives the call.**

Keyup Delay

This field sets the amount of time (in seconds) that the Model 49 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.

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. 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. For example, 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 4-17 appears.
D	A DID (Direct Inward Dial) card is installed in the repeater. When D 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.

For two directly connected Model 49s with autonet enabled, enter M.

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).

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

End-to-End Lines

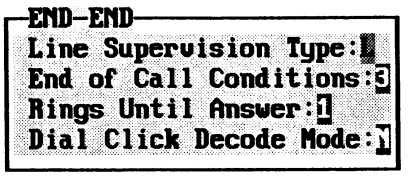

Figure 4-17. End-to-End Window

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 8 - Model 810	This field selects the supervision type for this line. To set up an E&M card as End-End, select L. For very old Model 810s only, select 8. For newer Model 810s ("810A" is stamped on the PCB), 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 49 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.

DID Lines

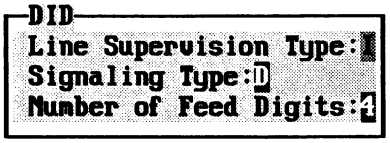

Figure 4-18. DID Window

Table 4-4 describes each field in the DID window.

Table 4-4. DID 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. The default setting is I.
Signaling Type	D - DTMF P - Pulse M - MF	This field selects the type of signaling used by the CO to send the feed digits to the Model 49. The default setting is D.
Number of Feed Digits	2 - 4	This field selects the number of feed digits expected from the CO. The default setting is 2.

E & M Lines

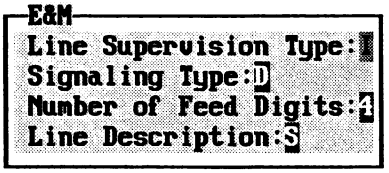

Figure 4-19. E&M Window

Table 4-5 describes each field in the E&M window.

Table 4-5. E&M Window Fields

Field Label	Valid Entries	Description of Function
Line Supervision Type	I - immediate start W - wink start 8 - Model 810	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 49s with autonet enabled, enter I. The default setting is I.
Signaling Type	D - DTMF P - Pulse M - MF	This field selects the type of signaling used by the CO to send the feed digits to the Model 49. For two directly connected Model 49s 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 49s 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 49 only disconnects on loss of loop current after it has received answer supervision. Select N if the Model 49 should disconnect on loss of loop current. Select S if the Model 49 should not disconnect on loss of loop current. For two directly connected Model 49s with autonet enabled, enter N. The default setting is N.

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).

Incoming Calls

This field determines whether the repeater receives incoming calls. If the Model 49 is interconnected or if two directly connected Model 49s use autonet or if a FASTNet Switch is connected to this Model 49 site, enter Y.

The window shown in Figure 4-20 appears.

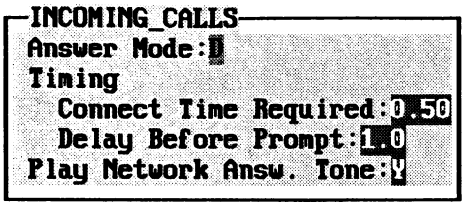

Figure 4-20. Incoming Calls Window

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).

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 49s 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 DID lines, this setting allows overdialing if the feed digits are for ID = 20-250. (Only one DID line may use the system at one time.)
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 49 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 49 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 DID and E&M. For two directly connected Model 49s 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 49 to detect modem carrier before it plays the prompt. For two directly connected Model 49s 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 Model 49 has answered an incoming call. For two directly connected Model 49s 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)allows outgoing calls from this repeater. If the Model 49 is interconnected or if two directly connected Model 49s use autonet or if a FASTNet Switch is connected to this Model 49 site, enable this field. DID outgoing calls are never allowed regardless of the Outgoing Calls setting.

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

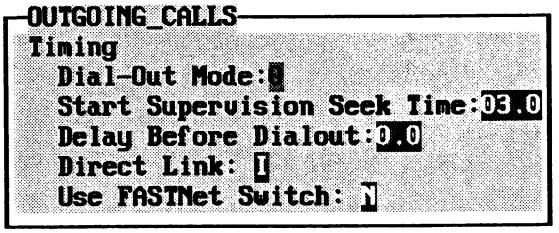

Figure 4-21. Outgoing Calls Window

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).

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

Dial-Out Mode

This field sets the dialing mode of the Model 49. For two directly connected Model 49s with autonet enabled, enter 1.

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	MF (Multi-Frequency)
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 49 waits for supervision after the phone line is seized. For example, this field determines the amount of time the Model 49 waits for dial tone. If the time limit expires and the repeater has not detected dial tone, it attempts to dial anyway.

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 49 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 49 is directly linked to another site or another piece of equipment. Usually this indicates that the Model 49 does not have to dial a phone number to connect to the other site.

The available choices are:

N	Not a direct link (default)
A	direct link to an LTR site, overdial the Access code. For two directly connected Model 49s 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 49s 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. When a system is busy, this setting speeds up FASTNet to Model 49 direct connections.

The default setting is N.

Use FASTNet Switch

This field enables the repeater to connect to the FASTNet Switch. The available choices are:

N	No calls. For two directly connected Model 49s with autonet enabled, enter N.
A	All calls
L	non-Local calls Use the Local Prefix table to determine 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 user settings (see the following subsection, "STEP 3. AUTODIAL TABLE PROGRAMMING").

❒ STEP 3. AUTODIAL TABLE PROGRAMMING

Autodialing entries can be created for the Model 49 ESAS/ LTR system. The autodial table feature simplifies common outgoing calls for the mobile users at the site. The table contains information that applies to specified users in the system. See "STEP 4. USER ID PROGRAMMING" on page 4-41.

If a user is programmed as Auto-overdial or 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 other site's phone number. Furthermore, if the user is programmed as Auto-overdial, the Model 49 then overdials the initiating mobile's access number or ID code on answer. In addition, push-to-connect users get full auto-overdialing upon key-up (no "*nn" required).

All push-to-connect (PTC) users also receive autodialing upon key-up. In addition, the Model 49 overdials the initiating PTC mobile's access number or ID code on answer. LTR users must be programmed as Auto-overdial or Interconnect in the LTR User Type field to access the PTC setting in the Interconnect window.

To program the Autodial Table, follow these steps:

1) From the Multibase 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 (1-64) for the new autodial entry and Multibase starts a new data record with the default values.

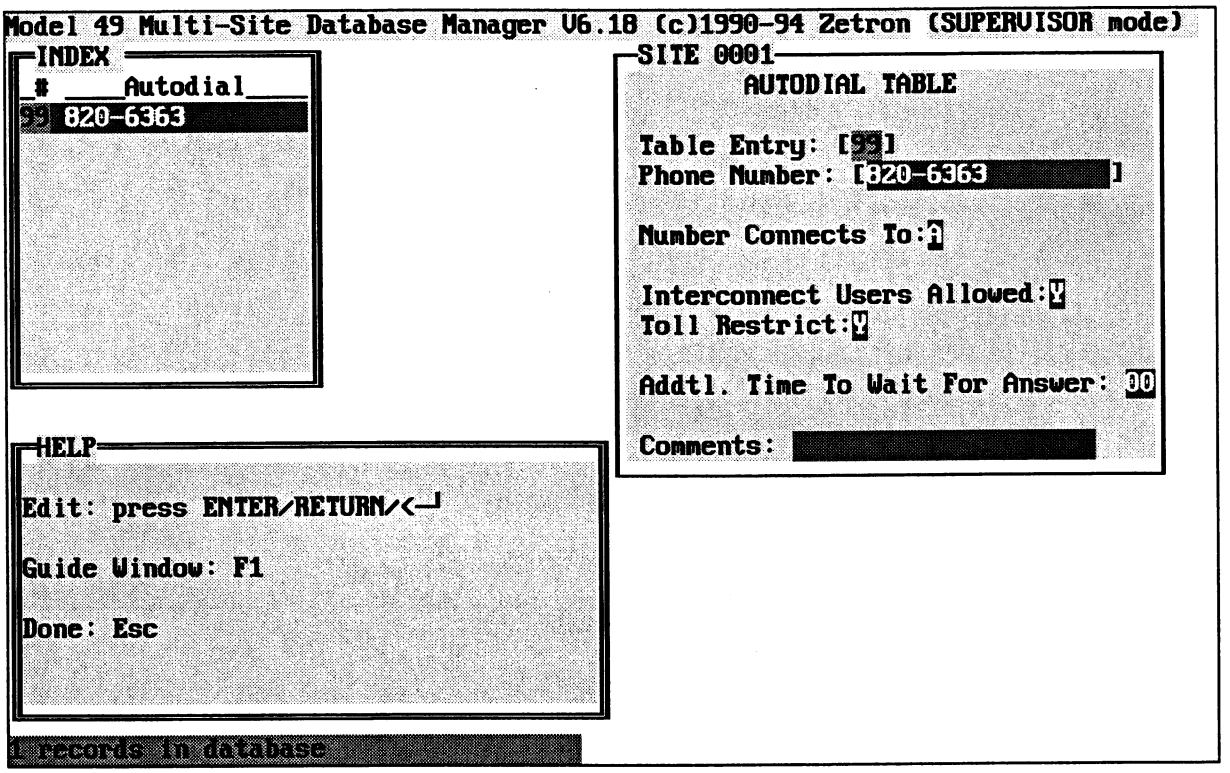

Figure 4-22. Autodial Table

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 Auto-overdial or 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's class of service. 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 Model 49 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 Table 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 site configuration (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 Multibase main menu, select Edit, User ID and press <Enter>. Multibase 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.

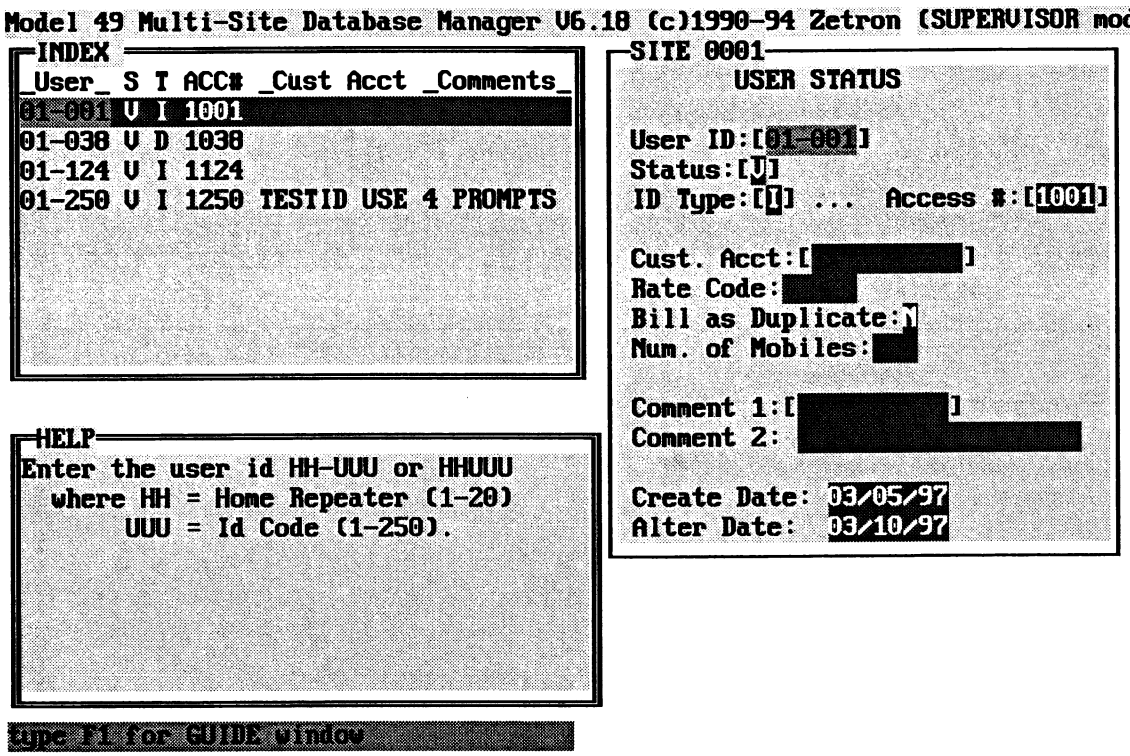

Figure 4-23. User Status Window

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 49s 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

The ID Type 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. Dialing an interconnect call according to toll privileges if the channel being accessed has a dial-out line.
2. Selecting a number from the autodial table by entering *nn. If the number selected from the autodial table connects to another LTR site, the Model 49 automatically overdials the user's ID or access code. This function is called dial-up Autonet. See "STEP 3. AUTODIAL TABLE PROGRAMMING" on page 4-37.
3. Directly linking to another LTR site, and the Model 49 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. (Refer to "Direct Link" on page 4-36). This function is called direct-connect Autonet.
4. Directly linking to a FASTNet switch, and the Model 49 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).

5. 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.

Selecting A or I calls out windows with additional sub-fields. Figure 4-24 shows the organization and location of the ID Type windows and sub-fields.

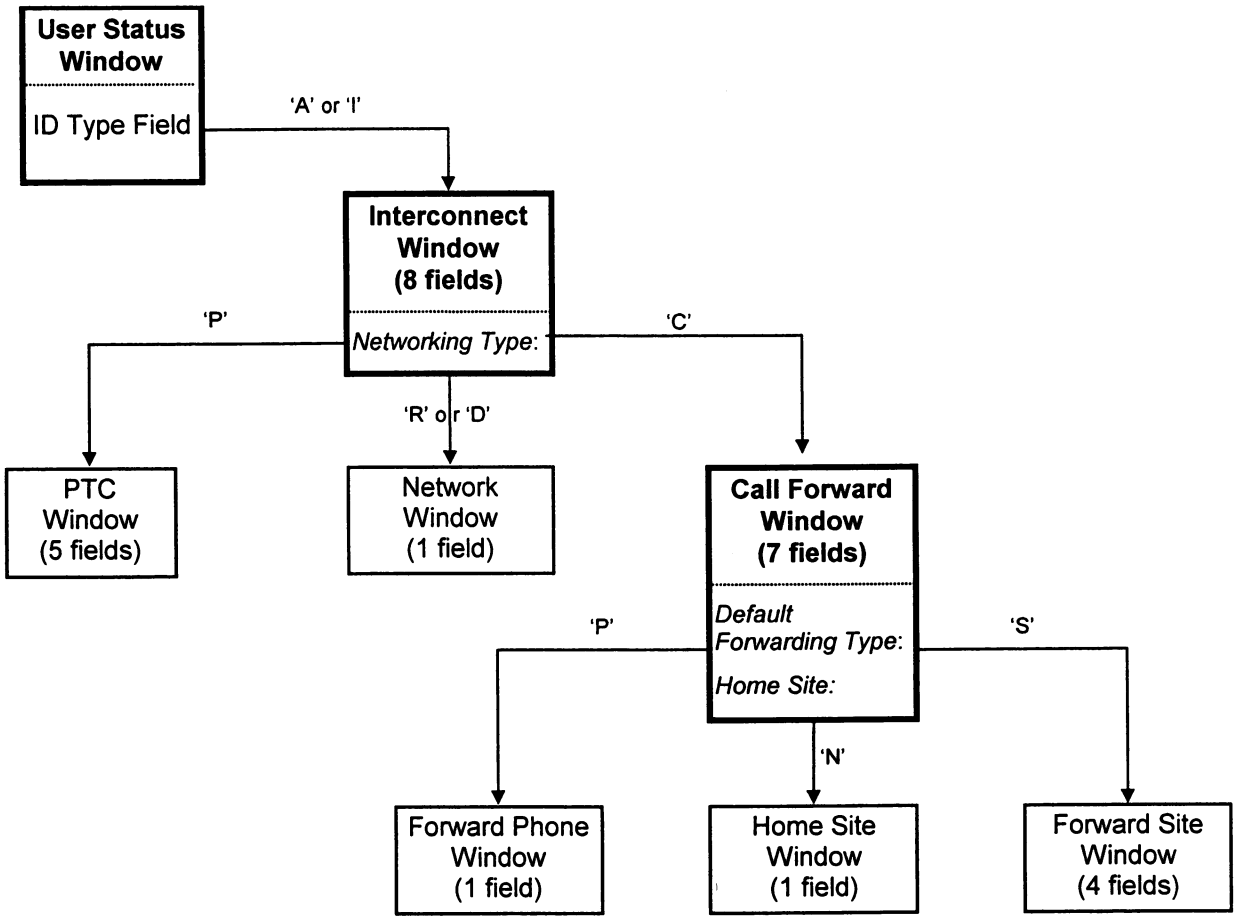

Figure 4-24. User ID Fields Flowchart

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

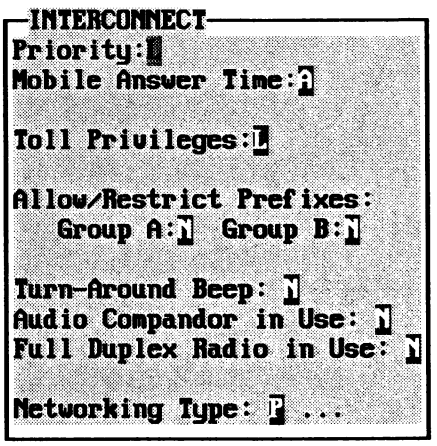

Figure 4-25. Interconnect User Type Window

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 49 allows the mobile to answer and 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 4-16 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. The field can only be enabled if an audio compandor card is installed in the repeater and the Audio Compandor Installed field in the Repeater configuration is set to Y.

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. Enable this field if the mobile radio does not automatically identify itself as full-duplex. For two directly connected Model 49s with autonet enabled, enter N.

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).

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 49s with autonet enabled and for 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 49 site, see Section 5 in *Model 2540 FASTNet Switch Operation and Programming Manual* (Part No. 025-9270).

For Conversation Trunked Dispatch with a trunk installed, enter N.

The following settings are available:

D	Dispatch network (requires connection to a FASTNet Switch) - The dispatch network user cannot make interconnected calls. However, the user can connect with other mobiles at a networked site.
C	Call forwarding (requires the Autopath option)
N	None
P	Push-to-connect
R	Roamer (requires connection to a FASTNet Switch)

The default setting for the Networking Type field is N.

Caution:

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

Call Forwarding User

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

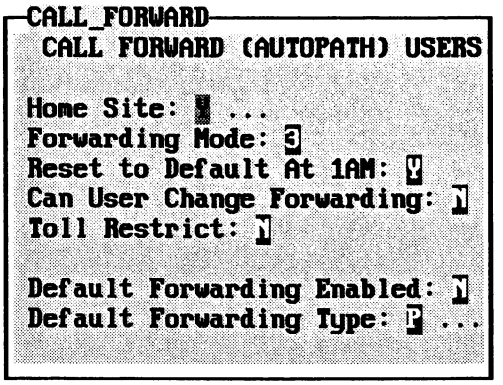

Figure 4-26. Call Forward Window

Call Forwarding or Autopath is an optional feature for the Model 49. Autopath only works when all the interconnected Model 49s at the site have call transfer operation from the telephone company. Autopath is not available on a Model 49 directly connected to a Model 2540 FASTNet Switch.

Autopath allows the mobile user to have their calls forwarded to another site ID or to a telephone number. The user can change the forwarding options (enabled or disabled, call destination, etc.) directly from the mobile, if so programmed.

The Call Forward Window contains the following fields:

Home Site	This field determines where the autopath user is homed. Currently, all users are homed on this site - default setting 'Y'. In the future, other sites may be enabled as the home site (N setting).
Forwarding Mode	This field determines how quickly the call is forwarded. The mode can be set to '1' for immediate forwarding or '3' for forwarding following three rings. A setting of 3 allows the user a chance to answer the call before it is forwarded. The default setting for the Forwarding Mode is 3.
Reset to Default at 1AM	This field determines whether the user's initial (system operator programmed) forwarding settings are restored at the end of the day - 1:00 a.m. The default setting for the Reset to Default at 1AM field is Y.
Can User Change Forwarding	This field determines whether the user can modify the forwarding settings directly from the mobile. The default setting for the Can User Change Forwarding field is N.

Toll Restrict

This field determines whether the user's toll and prefix restrictions also govern call forwarding. When this field is set to 'Y', a user cannot forward calls to a normally unavailable number to bypass the system programming. For example, if the number to which a call is supposed to be forwarded is long distance and the user is only allowed to make local calls, the forward will not work.

The default setting for the Toll Restrict field is N.

Default Forwarding Enabled

This field determines whether call forwarding should be on or off in the default state. When a 'Y' is entered in this field, calls are forwarded until the user deactivates it. When a 'N' is entered in this field, calls are not forwarded unless the user activates the feature (only available if the Can User Change Forwarding field is set to 'Y'.)

The default setting for the Default Forwarding Enabled field is N.

Default Forwarding Type

This field determines the default forwarding destination type.

When this field is set to 'S' - site, the window shown in Figure 4-27 appears.

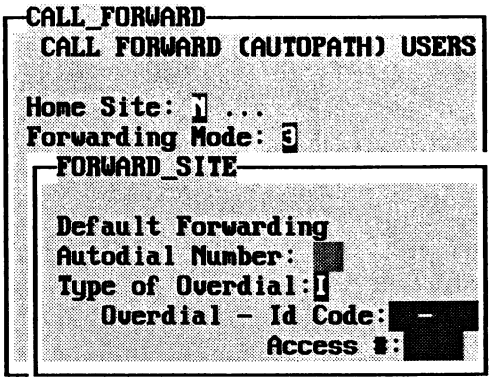

Figure 4-27. Forward Site Window

Table 4-6 describes each of the fields in the Forward Site Window.

Table 4-6. Forward Site Window Fields

Field Label	Valid Entries	Description of Function
Autodial Number	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.
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 4-12) 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 defines the user ID to overdial when the site answers. If the Type of Overdial field is set to I, enter the ID code to overdial. There is no default setting for this field.
Overdial - Access #	any valid Access # 0000 - 9999	This field defines the access number to overdial when the site answers. If the Type of Overdial field is set to A, enter the access code to overdial. There is no default setting for this field.

When the Default Forwarding Type field is set to 'P' - phone, the window shown in Figure 4-28 appears.

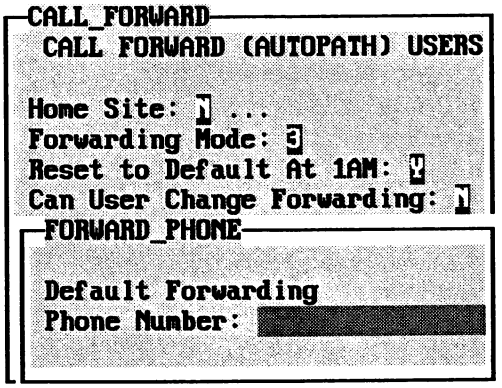

Figure 4-28. Forward Phone Window

The Forward Phone window contains one field - Phone Number. This field determines the phone number to which an incoming call should be forwarded. This field can be set to any valid phone number, up to digits in length. (Do not forget to include all applicable long-distance access and area codes.) There is no default setting for the Phone Number field.

The default setting for the Default Forwarding Type field is P.

Dispatch Network User

When a D or R is entered in the Networking Type field, the window shown in Figure 4-29 appears.

Figure 4-29. 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 Model 49 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 (Netbase or Fastbase). In addition, the user must have the correct overdial access digits programmed into both databases.

Push-to-Connect User

When a P is entered in the Networking Type field, the window shown in Figure 4-30 appears.

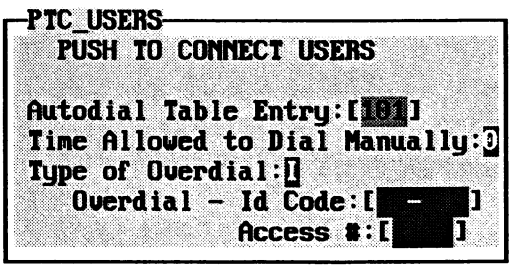

Figure 4-30. Push-to-Connect Window

Table 4-7 describes the fields in the Push-to-Connect window.

Table 4-7. 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 4-12) 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 number of the ID on the other site. There is no default setting for this field.

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 DID and E&M lines, this field allows you to map the 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.

If ZEBRA, Zetron's billing software, is used in conjunction with the Model 49 system, the customer account number should correspond to the account ID field in ZEBRA.

There is no default setting for this field.

Rate Code

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

If ZEBRA, Zetron's billing software, is used in conjunction with the Model 49 system, the rate code should correspond to the rate code field in ZEBRA.

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

Bill as Duplicate

This field determines whether the user is billed more than once. The duplicate billing situation might arise if a user makes calls on more than one repeater. The user is billed on each repeater where the Bill as Duplicate field is set to N for that user.

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. Multibase 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. Multibase 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 49 is set to the correct date and time. Use the cOmm49, Other, set date & Time selection to set the time in the Model 49. (See "Other Communications Options" in Section 3.)

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 PREFIX TABLE PROGRAMMING").

❒ STEP 5. LOCAL PREFIX TABLE 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 Multibase main menu, select Edit, Local prefix table and press <Enter>. Multibase 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 4-31 shows the Local Prefix window for a new record.

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.

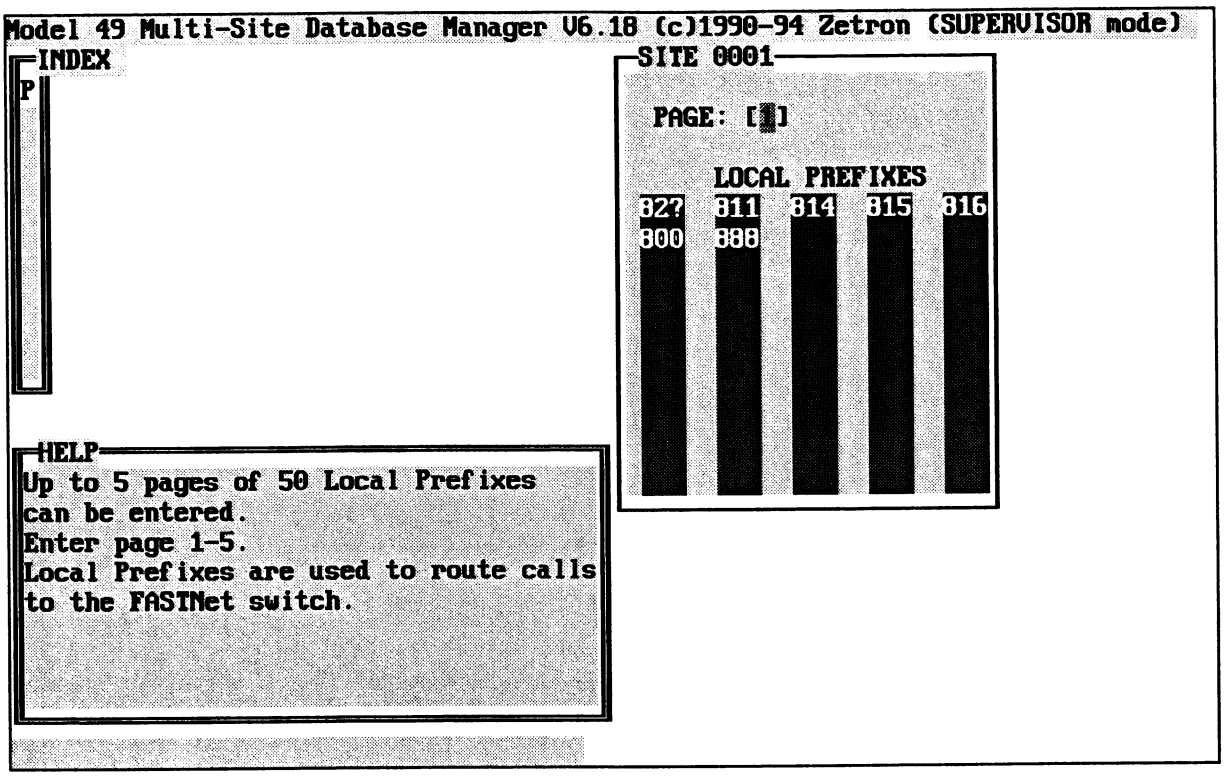

Figure 4-31. Local Prefix Table

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 Model 49 can use this table to determine which calls are local and don't 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 49 considers the toll-free area code (800) a local call.

❒ STEP 6. UPDATING DATABASE CONFIGURATION IN THE MODEL 49

Once the Site Configuration, Repeater Configuration, Autodial Table, User IDs, and Local Prefix Table are programmed correctly, the data should be transferred to all Model 49s. The Multibase information is stored in data files on the office computer. To send these files to the radio sites, follow the steps below:

1) Select cOmm49 from the Multibase 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.

Multibase 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 Model 49s 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 subscriber master is inoperative
- a subscriber bus cable is faulty or not connected properly
- one of the Model 49s has not been programmed as a Polling Master with the front panel DIP switches. See *Model 49 Trunking Repeater Manager (Main Board Revision S and Higher) Operation and Installation Manual* (Part No. 025-9313) for details on setting the Polling Master unit.

Entire Database Updates

When Entire database is selected from the Update menu, all the unused parameters in the Model 49s 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 49 stores airtime and user billing files for the LTR system. In addition, the Model 49 can be upgraded with SMDR buffers for interconnect billing. Each Model 49 Repeater Manager is equipped to store billing data for an average volume of dispatch traffic. However, if the system requires storage of very large billing files, a Model 494 Universal Accounting Manager should be added to the system.

Caution:

All billing data in the Model 49 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 49 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 49 can be equipped with an optional call detail (SMDR) buffer. This option allows the unit to store a detailed record for every interconnect call placed through the Model 49. Since the mobiles may trunk to the Model 49 from any home channel on the system, the SMDR buffer can contain calls from any interconnected mobile on the system.

User Files

In addition to the two different call billing files described above, the Model 49 stores a third file just for export to a billing package, such as Zetron's ZEBRA. A single user file is available for each repeater that stores data for each user homed on that channel. Most of the information stored in the user file comes from the User ID configuration in Multibase.

MODEL 494 USAGE

Zetron's Model 494 can be configured to store up to 58,000 call detail records with three optional memory expansion options. This allows the system operator billing flexibility and convenience. The large storage capacity of the Universal Accounting Manager means not worrying about overrunning the buffers or the ability to bill quarterly, rather than monthly.

However, the Model 494 is designed to do more than just store billing files. The unit allows the LTR system to combine Zetron Model 49s with either Uniden or E.F. Johnson logic units. The Model 494 can convert Zetron billing files to either Uniden's ICAB format or Johnson's TLA format. This allows the frugal system operator to upgrade to Zetron logic without the expense of replacing current equipment.

The Model 494 also stores repeater loading information for every unit in the system. The statistics files are updated on an hourly basis and include valuable data on peak traffic times and long term trends at the site. In addition, the Universal Accounting Manager provides user validation and can print real-time records for every call placed on the entire system.

When a Model 494 is installed in the system its operation is transparent to the operator. The unit looks like another link in the repeater daisy chain and it is controlled via a connected Model 49.

WHEN TO OBTAIN BILLING RECORDS

It is important to retrieve billing files before the Model 49 (and/or Model 494) buffers become full. If billing data isn't obtained in a timely manner, the information may become inaccurate or incomplete. This is especially crucial for SMDR files. Although the airtime accumulators can also become full, this is less likely.

SMDR Buffer Capacity

Each equipped Model 49 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 49s. Status information is provided via the cOmm49 menu in Multibase. 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 for the Model 49 or 10,000 - 58,000 for the Model 494 depending on the installed memory), it is time to retrieve and clear the buffers.

> **Note:**
>
> **If the Model 49s 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 49 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 49 (and 494) 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.

❑ 2. Change to the Multibase installation directory (default \MODEL49), by typing:

CD MODEL49

- ❑ 3. Run Multibase, by typing:

  Multibas

- ❑ 4. From the Multibase main menu, select cOmm49, Retrieve.

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

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

- ❑ 7. Multibase connects to the site and retrieves the current data. The files are automatically written to the Multibase directory created in installation.

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)

When the airtime accumulation is retrieved from the site, the user files are simultaneously transferred to the office computer. The user file is named similarly to the airtime file, with the format:

MMDD####.U$$

The filename meaning is identical, except the "U" indicates a "User" file.

SMDR Files

- ❑ 1. Boot up the office computer in MS DOS.
- ❑ 2. Change to the Multibase installation directory (default \MODEL49), by typing:

  CD MODEL49
- ❑ 3. Run Multibase, by typing:

  Multibas
- ❑ 4. From the Multibase main menu, select cOmm49, Retrieve.
- ❑ 5. If more than one location has been programmed into Multibase, the Locations Index window appears. Select the appropriate site, and press <Enter>.
- ❑ 6. Then select Call Detail Records from the Retrieve options and press <Enter>.
- ❑ 7. Multibase connects to the site and retrieves the current data. The files are automatically written to the Multibase directory created in installation.

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)

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.
- ❑ 2. Change to the Multibase installation directory (default \MODEL49), by typing:

  CD MODEL49
- ❑ 3. Run Multibase, by typing:

  Multibas
- ❑ 4. From the Multibase main menu, select cOmm49, Backup.
- ❑ 5. If more than one location has been programmed into Multibase, the Locations 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. Multibase connects to the site and retrieves the current data. Change diskettes 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). On 5 ¼-inch disks, cover the notch on the upper right corner of the disk with a black sticky label.

BILLING FILE FORMATS

Each of the billing files retrieved from the Model 49 via Multibase are stored as ASCII text on the computer's hard disk. The files reside in the c:\MOBILL49 directory, if available, or the default directory, c:\MODEL49.

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 49 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 0001A03/22/9015:45:5603/22/9018:18:00  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

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

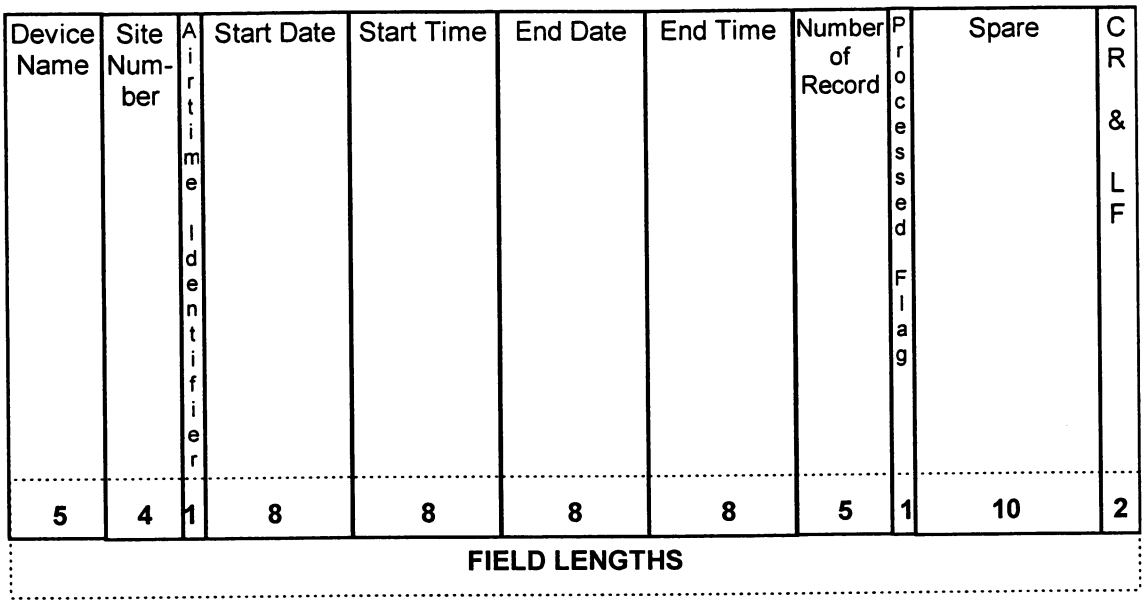

Figure 5-2. Airtime File Header

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 a 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 49.

Figure 5-4 shows an example call detail file.

```
M49  0001D03/22/9015:06:3903/22/9015:33:48    3
    13235EM15:10     01                  1303/22/90  4
    13235CM15:11     08206363            1303/22/90 10
    13235CM15:13  3618206363             1303/22/90  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.

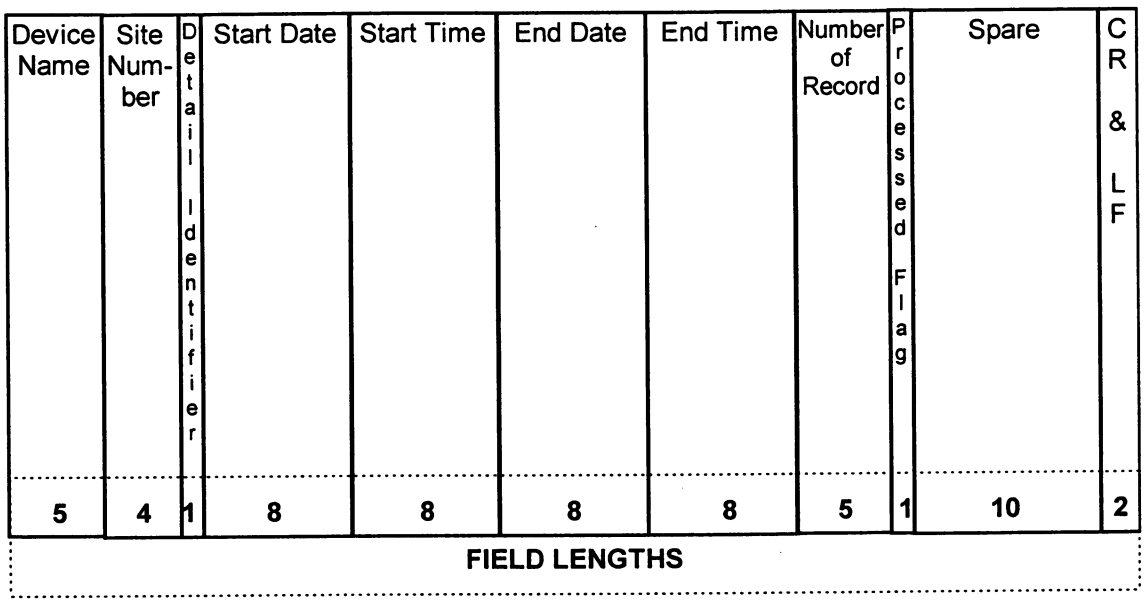

Figure 5-5. Call Detail File Header

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 D = No dial tone R = Restricted telco dialed B = ID called was busy, or too many simultaneous calls F = Received call was forwarded (Autopath) N = Call not answered I = Invalid user E = Other error
Type of Call	char	1	L = Land line initiated M = Mobile initiated S = Selective mobile-to-mobile call 1 = Forwarded call received (Autopath) 2 = Call received was forwarded twice (Autopath)
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 2 - Normal call timed out 3 - Not enough rings 4 - Dialing timeout 5 - Invalid user 6 - Mobile did not answer 7 - Turn around timer 8 - System or ID busy or no outgoing 9 - 2nd dial tone 10 - # from mobile 11 - # from landline 12 - Incorrect line type 13 - Battery removal / reversal For Mobile-to-Landline: 1 - Normal call 2 - Normal call timed out 3 - Dial tone not detected 4 - Dialing time out 5 - Restricted access dialed 6 - Mobile at other site did not answer 7 - Turn around timer 8 - Too many calls 9 - 2nd dial tone 10 - # from mobile 11 - # from landline 12 - Incorrect line type 13 - Battery removal / reversal 14 - Forwarded call (Autopath)
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 Files

The user file is included in the Model 49 to help map all the data from the User ID programming to the billing program. It helps identify who made calls on which mobile. The user files start with a header record identifying the site and repeater. 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 #505/27/9705/27/97N
01022AV01022     AUTO AUTO OVERDIAL TO #505/27/9705/27/97N
01023AV01023     AUTO AUTO OVERDIAL TO #505/27/9705/27/97N
01121IV01121     PTC                     05/27/9705/27/97N001
01122IV01122     PTC                     05/27/9705/27/97N001
01123IV01123     PTC                     05/27/9705/27/97N001
```

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.

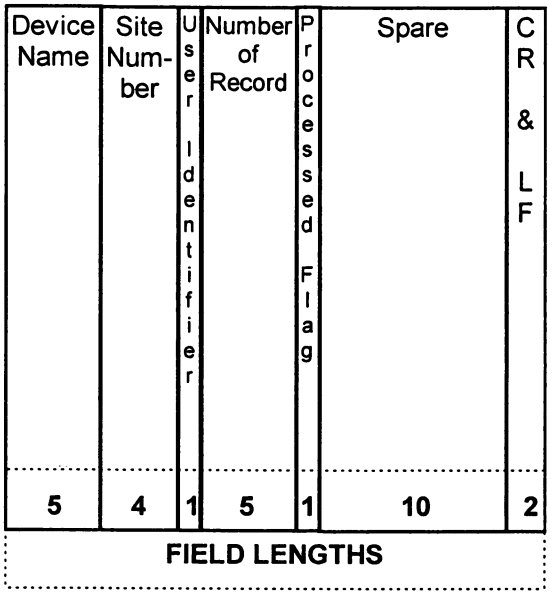

Figure 5-8. User File Header

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.

Home Repeater	User ID	User Type	User Status	Customer Account	Rate Code	Comments 2	Create Date	Alter Date	Duplicate	# of Mobiles	CR & LF
2	3	1	1	10	5	19	8	8	1	3	2
FIELD LENGTHS											

Figure 5-9. User File Record

CLEARING BILLING BUFFERS

Once the billing data has been successfully retrieved from the Model 49s (and/or Model 494), the billing buffers should be cleared to store new call information. It is a good idea to verify that the ASCII files look appropriate before clearing the buffers, just in case a communications error occurred during the file transfer.

If an error occurs when retrieving the information, such as an interruption of the modem call, the current file will be renamed. The format of this file is MMDD####.T$$. If it is not possible to retrieve the call detail information completely and accurately due to a complete failure of the Model 49, this file can be renamed to the MMDD####.D$$ format for proper use by the accounting software.

Airtime Accumulators

The airtime accumulators are not reset until the system operator manually clears them. However, Multibase 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.
- ❑ 2. Change to the Multibase installation directory (default \MODEL49), by typing:
  CD MODEL49
- ❑ 3. Run Multibase, by typing:
  Multibas
- ❑ 4. From the Multibase main menu, select cOmm49, Other.
- ❑ 5. If more than one location has been programmed into Multibase, the Locations Index window appears. Select the appropriate site, and press <Enter>.
- ❑ 6. Then select Clear Call Accumulation from the Other options and press <Enter>.
- ❑ 7. Multibase 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 49. 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.
- ❑ 2. Change to the Multibase installation directory (default \MODEL49), by typing:
  CD MODEL49
- ❑ 3. Run Multibase, by typing:
  Multibas
- ❑ 4. From the Multibase main menu, select cOmm49, Other.
- ❑ 5. If more than one location has been programmed into Multibase, the Locations Index window appears. Select the appropriate site, and press <Enter>.
- ❑ 6. Then select Clear Call Detail from the Other options and press <Enter>.
- ❑ 7. Multibase 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 49 to the office computer, the files can be exported to a software billing package, such as Zetron's ZEBRA. The program can take the ASCII data and create useful billing information and invoices.

The billing data is stored into DOS-compatible sequential data files in ASCII format for use with any alternate accounting program. If another billing system is preferred, the ASCII data can be identified with the formats shown previously and used in any way seen fit.

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. Multibase 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 backup.

6. SPECIAL FEATURES

SELECTIVE MOBILE-TO-MOBILE CALLING (Standard Feature)

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 49.

3) Release PTT and wait for dial tone from the Model 49.

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 49 sends a busy signal to the calling mobile and drops the call.

- If the receiving mobile is invalid, the Model 49 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 49 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 (Standard Feature)

Autonet is a feature that uses the interconnect option to connect two remote Model 49s. 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 49s for an autonet call.

Note:

For detailed examples of the Model 49 Multibase 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 49 at each site, the direct connection method is used. 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.

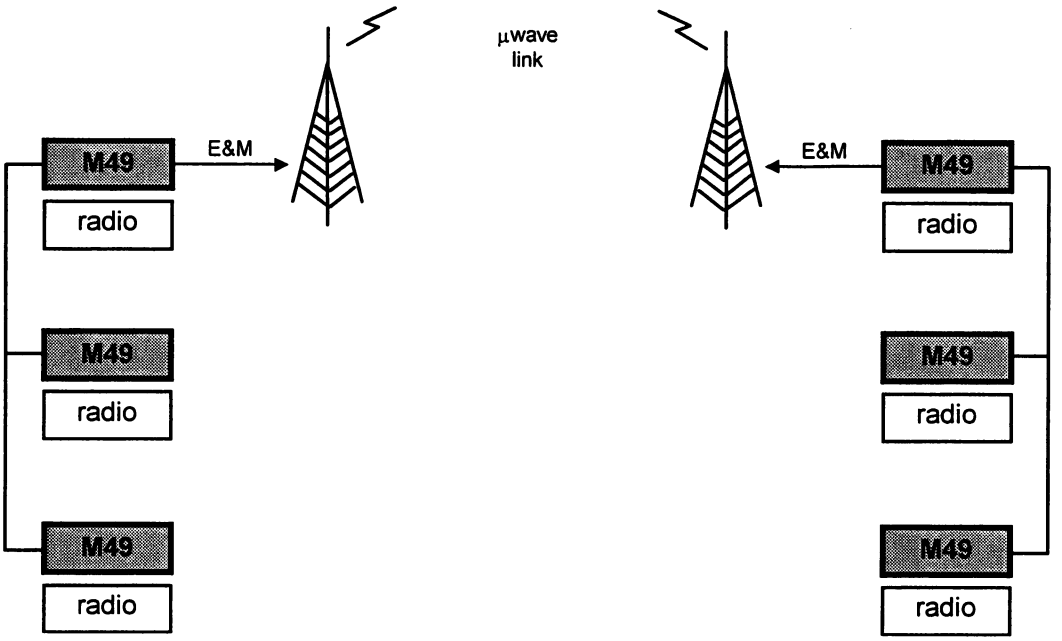

Figure 6-1. Autonet with Direct E&M Link

The call proceeds 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 49 signals the Model 49 at the sister site (#2 for this example) via the μwave link and sends the correct autonet ID.

3) The Model 49 at site #2 receives the user ID or access code and keys to call the receiving user or group.

4) The Model 49 at site #2 sends a DTMF B9 to site #1. The DTMF B9 confirms the connection to the originating Model 49 and is heard by the initiator as a "go ahead" indication.

5) 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 49s 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 Multibase).

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 49s. Figure 6-2 illustrates the hardware connections between the two autonet sites.

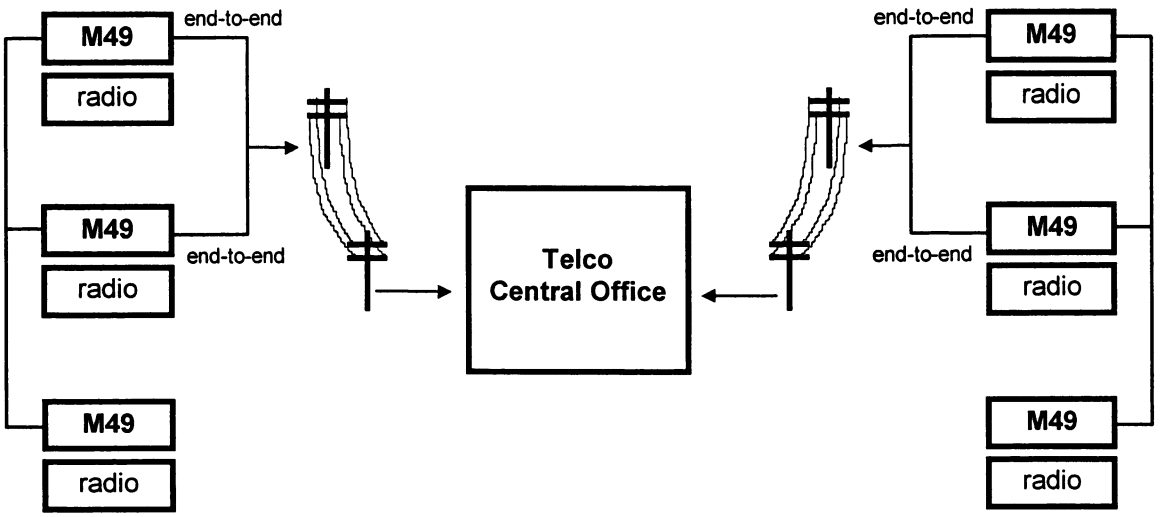

Figure 6-2. Autonet with Dial-Up Link

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 49s as an autonet user.

2) The Model 49 at site #1 goes off-hook using its telco card and waits for dial tone.

3) When dial tone is received, the Model 49 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 49 at site #2 answers the autonet call, the initiating Model 49 overdials the user access code or ID.

5) The receiving Model 49 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 Multibase).

TONE (Standard) AND VOICE (Optional) PROMPTS

The system tone and voice prompts can be customized to suit the system requirements. Tone prompts are standard on all Model 49s. 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.

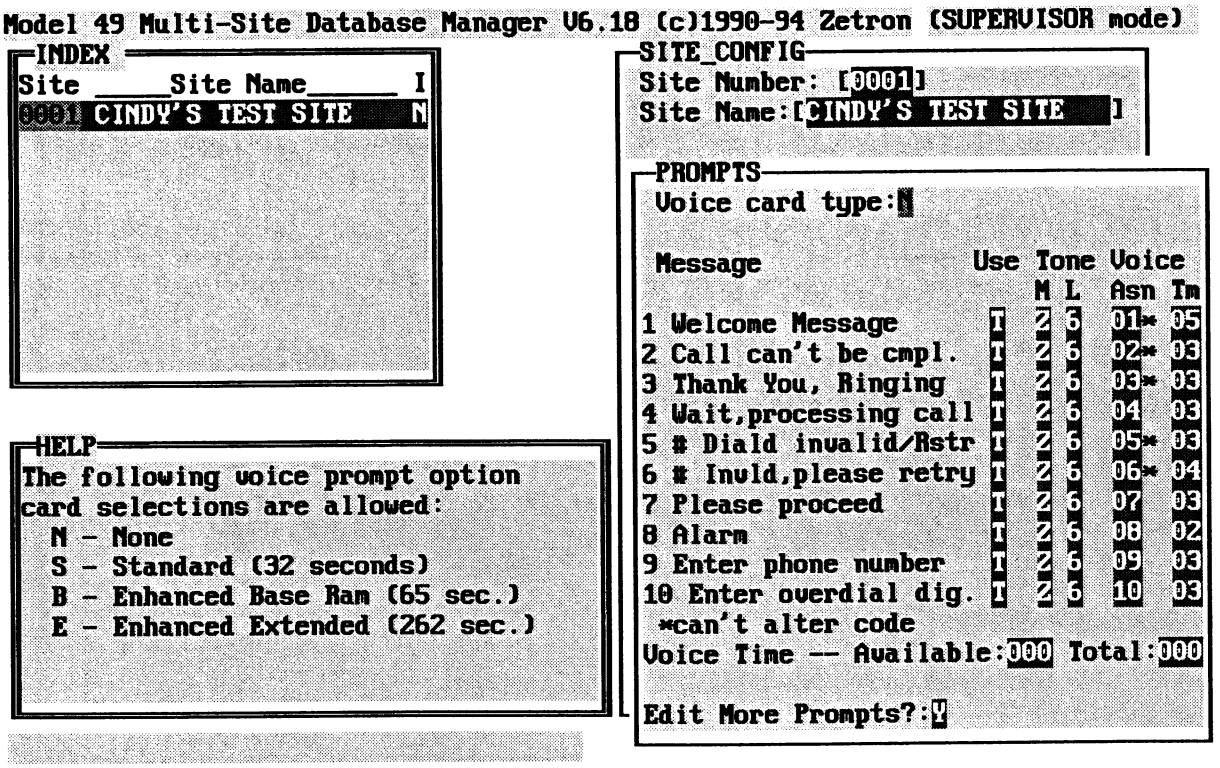

Figure 6-3. Prompts Window

The Voice card type field in the prompts window indicates the type of card (if any) installed in the repeater (see Help window in Figure 6-3). 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.

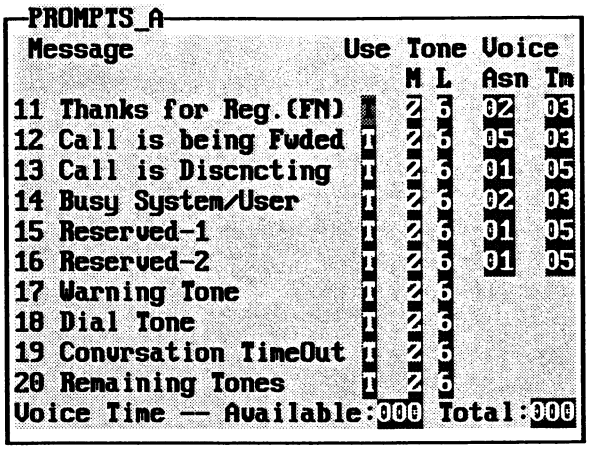

Figure 6-4. Second Prompts Window

Enabling Tone Prompts

If a voice prompt card is not installed, enter N (none) in the Voice card type field. Each of the 20 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) - 7 (high)	LEVEL: This field sets the tone level for each prompt. Default setting is 6.
Asn	01 - 20 01 - 03; 05; 06 can't be changed (indicated by *)	ASSIGN: This field tells the Model 49 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 49. 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 49 (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, Multibase 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 20 are erased.**

Prompt Messages

Each prompt is played upon the occurrence of a specific call condition. The twenty available prompt types are described below.

Welcome Message (1)

The Welcome message plays after the phone line is answered and before the beep or dial tone prompt is sent. DTMF can be overdialed during the voice message. When the first DTMF

digit is received, the message stops playing. Dial click detection 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 or if the mobile is busy. 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 49 goes directly to ringing.

Wait, Processing Call (4)

The Wait, call is being processed message plays when the Model 49 is busy redialing for PTC autodial applications.

If no voice message is recorded for the Wait, call is being processed prompt, the Model 49 issues two short beeps.

Diald Invalid/Rstr (5)

The Number dialed is invalid message plays if the mobile dialed an invalid user ID (programmed in User IDs). This message also plays if the 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 49 issues a reorder tone and disconnects the call.

Invld, Please Retry (6)

The Number is invalid, please retry message plays if the mobile 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 49 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 49 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 49 calls the designated alarm ID and issues alarm beeps.

Enter Phone Number (9)

The Enter phone number tone plays when the Model 49 is waiting for the user to enter a phone number of another user on the system.

The Enter phone number prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Enter Overdial Dig. (10)

The Enter overdial digits prompt plays when the Model 49 is waiting for the caller to overdial a user ID.

The Enter overdial digits prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Thanks for Reg. (FN) (11)

The Thanks for registering tone plays when a mobile user, homed on another site, roams into a Model 49 FASTNet site and is successfully registered on the system.

The Thanks for registering prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Call is Being Fwded (12)

The Call is being forwarded tone plays the call is being forwarded to another destination. This prompt is only used when the Model 49 site is connected to a FASTNet switch.

The Call is being forwarded prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Call is Discncting (13)

The Call is disconnecting tone plays three beeps right before a call terminates.

The Call is disconnecting prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Busy System/User (14)

The Busy system or user tone plays when the user ID being called is already busy or the system has no available channels. The Model 49 plays a reorder tone (fast busy signal).

The Busy system or user prompt is a tone-only prompt. A voice message cannot be recorded for this prompt.

Reserved-1 (15)

The Reserved-1 message is an unassigned prompt slot that can be used for future applications.

Reserved-2 (16)

The Reserved-2 message is an unassigned prompt slot that can be used for future applications.

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.

Convrsation TimeOut (19)

The conversation time-out message 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).

If no voice message is recorded for the conversation time-out prompt, the Model 49 plays two warning beeps, 5 seconds before the Mobile Turn-Around Time expires.

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 idle tone plays each time a repeater sends an idle message. (See the Idle Msg Time field in Site Configuration programming, Section 4.)
- The pound enable and disable tones play when the pound key (#) is pressed.
- The b star tone is the Model 49's standard answer prompt. The tone is played when the mobile successfully connects to the repeater.
- The pound tone plays when the pound key (#) is used to terminate a call.
- The message beeps play after a user connects to the system to indicate that he/she has a message.
- The tone delay plays to notify the mobile that the call is close to disconnection.

Programming Voice Prompts

Follow the steps below to access programming mode for voice prompts.

Database Setup

The following procedure modifies some Multibase parameters to allow voice prompt programming access.

- ❑ 1. Choose Site config from the Edit49 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 49 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.
- ❑ 8. Choose Repeater config from the Edit49 menu.
- ❑ 9. Select the appropriate repeater from the index window and press <Enter>.
- ❑ 10. Move the cursor to the Telco Line Type field.
- ❑ 11. Enter E for end-to-end lines. Again this is a temporary setting just for voice prompt recording.
- ❑ 12. Use the <Esc> key to exit out of each window to the main menu.

Update Model 49

The following procedure transfers the new Multibase parameters to the Model 49.

- ❑ 1. Choose Update from the cOmm49 menu.
- ❑ 2. Select the site to be updated. If a password is requested, enter it. Multibase 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. Multibase transfers the new database settings to the Model 49s. 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 Multibase asks if you want to disconnect from the site.

❑ 7. Select Monitor from the cOmm49 menu. The traffic monitoring screen makes it easy to observe your call into the Model 49 for voice prompt recording.

Dial Into the Model 49

The following procedure allows the technician to record, erase, and playback voice prompts.

❑ 1. Use a Touch-Tone phone to dial into the Model 49.

❑ 2. 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 or DID, the Model 49 may issue reorder tones after the first four digits of the above sequence are dialed. After the tones are played, reenter the 00xxx code.

If everything is set up correctly, the Model 49 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 49 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 20 voice prompts are listed below.

Asn	nn	Asn	nn	Asn	nn	Asn	nn
01	**1**	06	**6**	11	**02**	16	**07**
02	**2**	07	**7**	12	**03**	17	**08**
03	**3**	08	**8**	13	**04**	18	**09**
04	**4**	09	**9**	14	**05**	19	**11**
05	**5**	10	**01**	15	**06**	20	**12**

For example, to record the Welcome message (Asn = 01; nn = 1) enter:

9 + 1

Note:

Be sure to return the Overdial Access # and Telco Line Type fields to their original settings and update the Model 49 once the voice prompt recording is completed.

AUTOPATH (Optional Feature)

Autopath allows a mobile user's calls to be forwarded to another ID at a different site, or to a telephone number. If the user programming allows, he/she may change the forwarding parameters from the mobile (if equipped with DTMF keypad). The user may enable or disable forwarding, or change the phone number or site to which calls are forwarded. Every interconnected Model 49 at an autopath site must have the call transfer feature from the telephone company for the forwarding feature to work.

Networking Type

For each site with the autopath feature, 1- 800 users can be programmed with a Networking Type of push-to-connect (PTC), roamer, or call forward. Follow the steps below to set up an autopath user:

1) In Multibase, edit the user's status and bring up the interconnect window by entering an I in the ID Type field.

2) Once in the interconnect window, enter a C in the Networking Type field. The Call Forward window shown in Figure 6-5 appears.

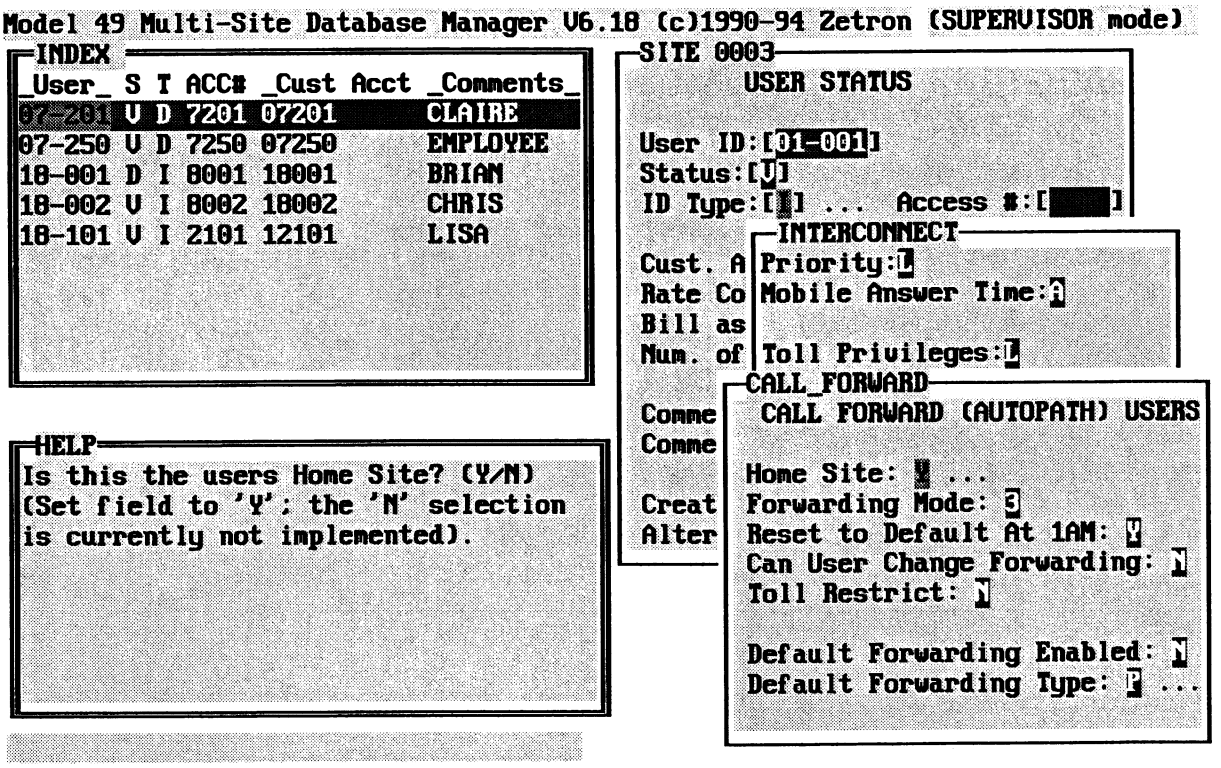

Figure 6-5. Call Forward Window

4) To forward the mobile's calls to another LTR site, enter a P in the Default Forwarding Type field. The window shown in Figure 6-6 appears.

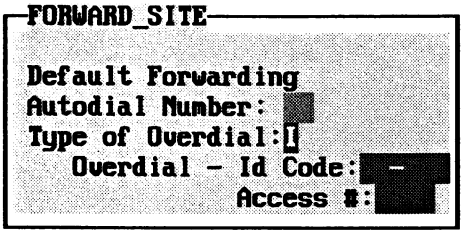

Figure 6-6. Forward Site Window

5) If the forwarded calls are directed to another site, the phone number must be programmed into the autodial table. In addition, the type of overdial settings should match in both entries. If the overdial type does not match, the setting in the call forwarding window takes precedence.

6) Alternately, to forward the mobile's calls to a regular phone number, enter a P in the Default Forwarding Type field. The window shown in Figure 6-7 appears.

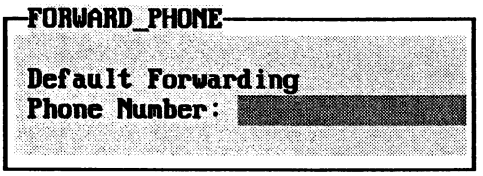

Figure 6-7. Forward Phone Window

User-Programming from the Mobile

If the mobile user is allowed to change the call forwarding parameters (Can User Change Forwarding field set to Y), he/she may:

Disable Call Forwarding

1) Key up and draw dial tone.

2) Dial *0*.

3) The Model 49 plays a confirmation tone if the change is accepted. The Model 49 plays a reorder tone if the change is not allowed.

Enable Call Forwarding

1) Key up and draw dial tone.

2) Dial *1*.

3) The Model 49 plays a confirmation tone if the change is accepted. The Model 49 plays a reorder tone if the change is not allowed.

Change Forwarding Phone Number

1) Key up and draw dial tone.

2) Dial *2*.

3) The Model 49 plays a 700 msec. burst of dial tone or voice prompt, "Please enter the phone number."

4) Dial *NN for the autodial table entry or any telephone number that is consistent with the user's toll privileges.

5) After the phone number is entered, the Model 49 plays a confirmation tone followed by a dial tone. If the number violates the user's toll restrictions or no resources are available, a reorder tone is played.

6) After an autodial number is entered, the Model 49 plays two 300-msec. bursts of dial tone or voice prompt, "Please enter overdial digits." If the number of digits match the type of overdial digits specified by the autodial entry, a confirmation tone is also played. If the digits do not match, a reorder tone is played.

Return to Default Settings

1) Key up and draw dial tone.

2) Dial *3*.

3) The Model 49 plays a confirmation tone if the change is accepted. The Model 49 plays a reorder tone if the change is not allowed.

Entering Several Commands

The mobile user can enter a series of call forwarding commands, by simply waiting for a steady dial tone and following the steps for one of the listed changes. To end a call forwarding programming session, enter a DTMF pound (#) or let the Model 49 time-out.

GHOST REPEATERS (Optional Feature)

The ghost repeater option 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.

Enabling Ghost Repeaters in Multibase

To set up a repeater for ghost operation follow the steps below:

1) Select Repeater config from the Edit49 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 front panel DIP switches on the Model 49 must be set to the correct home repeater number for the ghost function to operate correctly. Refer to the *Model 49 Trunking Repeater Manager Operation & Installation Manual* (Part No. 025-9313).

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 49 system. The pertinent Multibase 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.

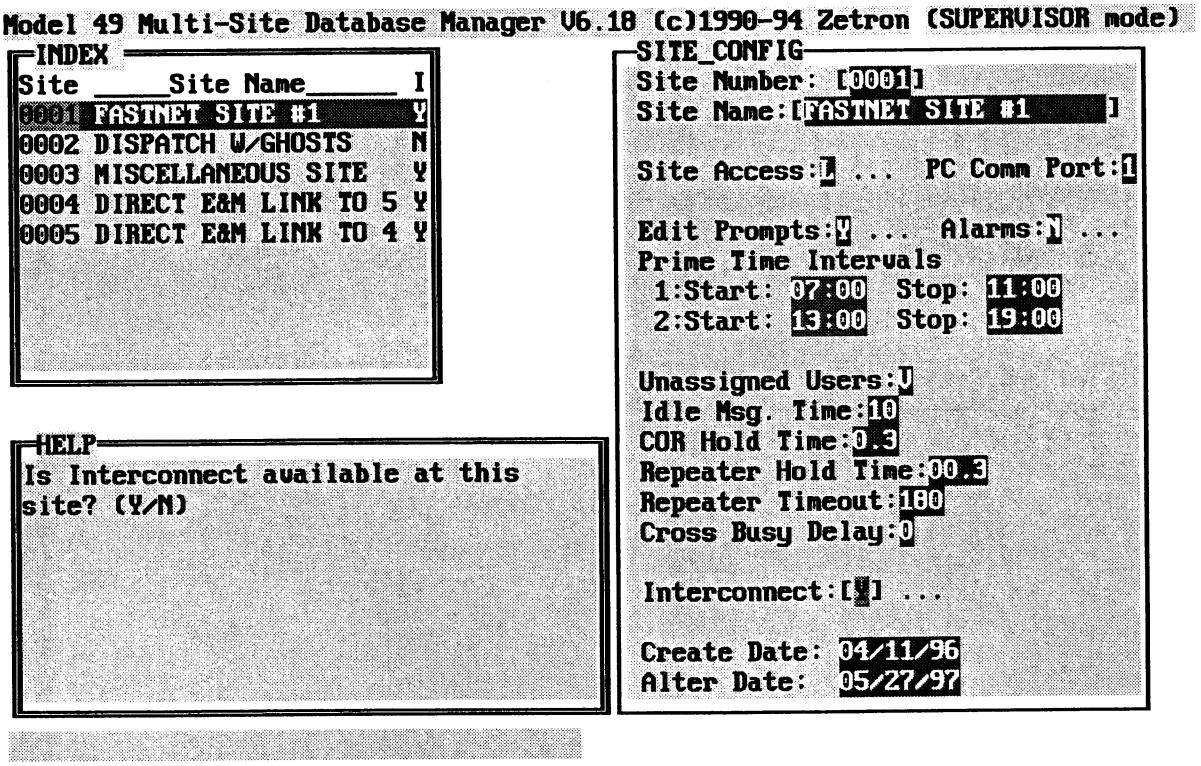

Figure 7-1. Site #0001 Configuration

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.

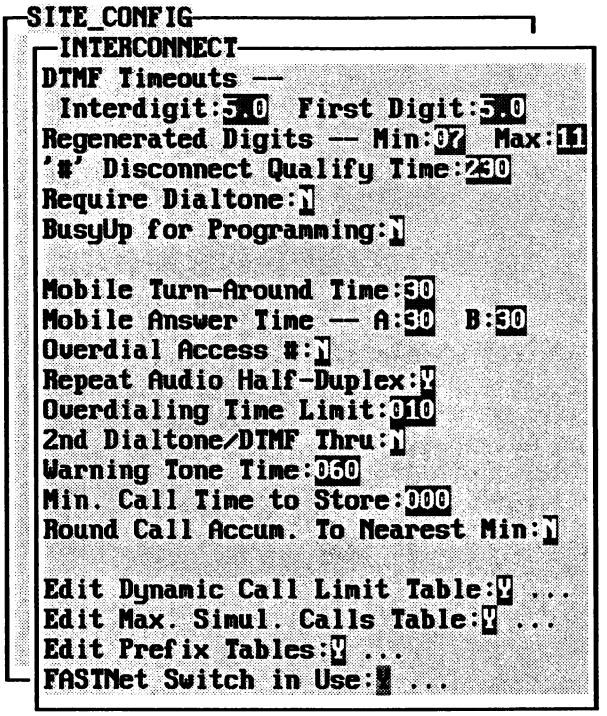

Figure 7-2. Interconnect Window

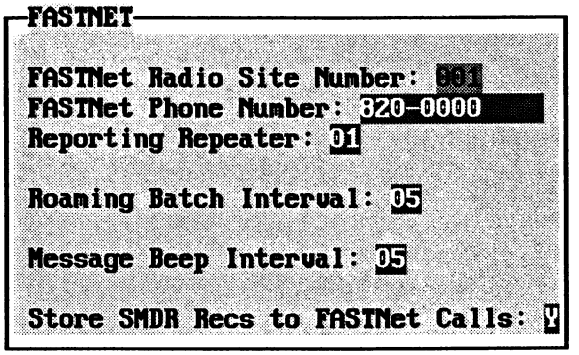

Figure 7-3. FASTNet Switch Window

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 (Netbase or Fastbase). The Model 49s 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 49s).

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.

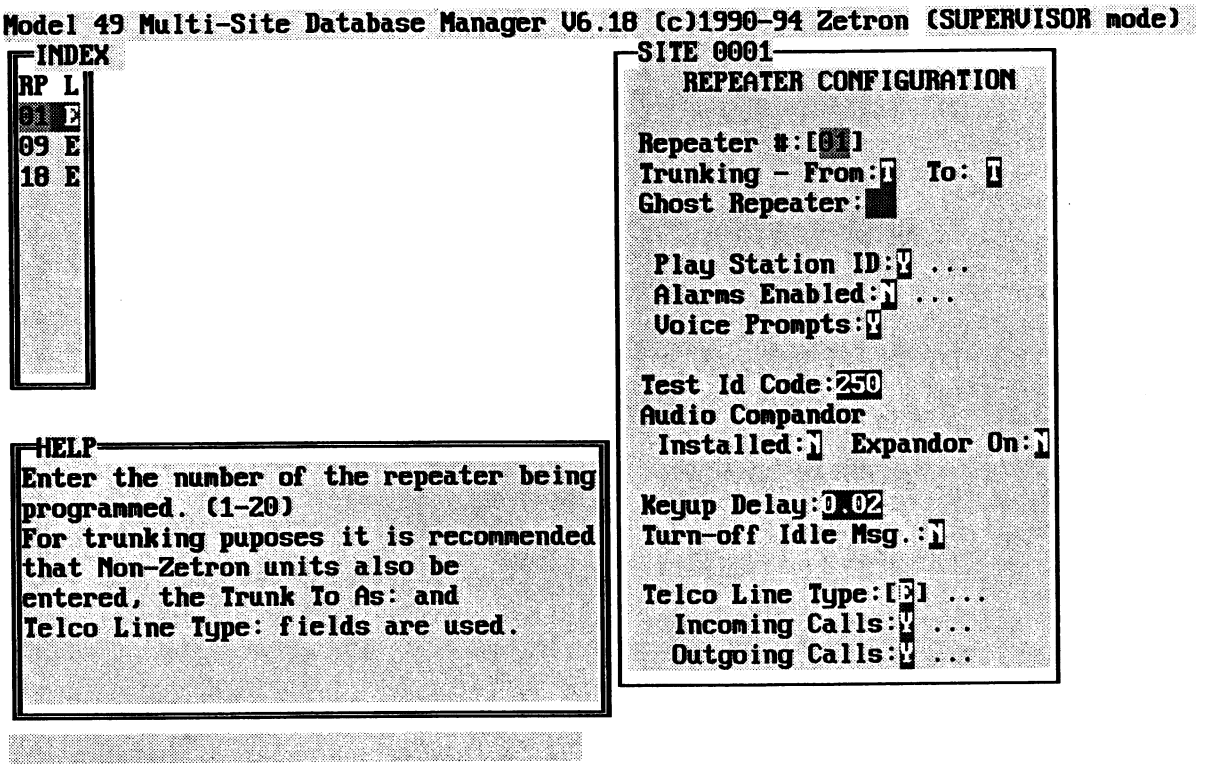

Figure 7-4. Repeater #01 Configuration

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.

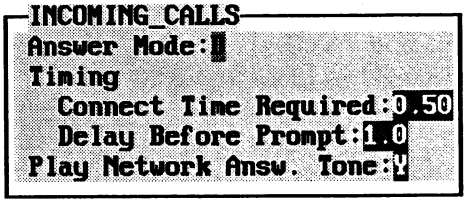

Figure 7-5. Incoming Calls Window

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 49 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.

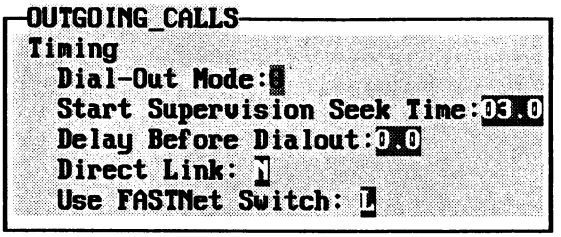

Figure 7-6. Outgoing Calls Window

The Direct Link field indicates whether the Model 49 is directly linked to another site. For dial-up FASTNet applications, enter N. (If the Model 49 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 an interconnect board, 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.

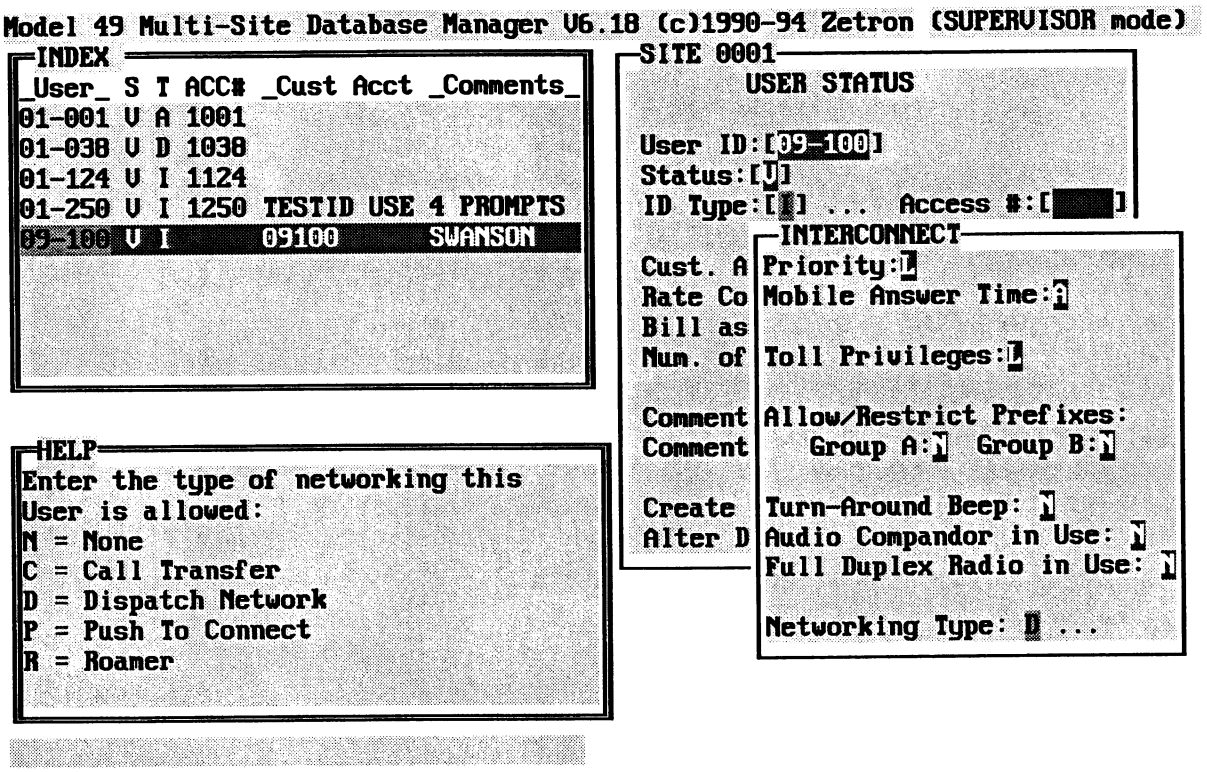

Figure 7-7. User #09-100 Status

Networking Type

This field at the bottom of the interconnect window can be set to D, R, or N (for TeamTalk) for FASTNet users. Refer to the help window in Figure 7-7 for the valid settings. When either D or R is entered, the window shown in Figure 7-8 appears.

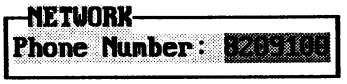

Figure 7-8. Network Phone Number Window

The phone number must match the phone number in the Fastbase Node Users database.

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 49s. 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 49s can dial without connection to the switch. An example of what the local prefix table might look like is shown in Figure 7-9.

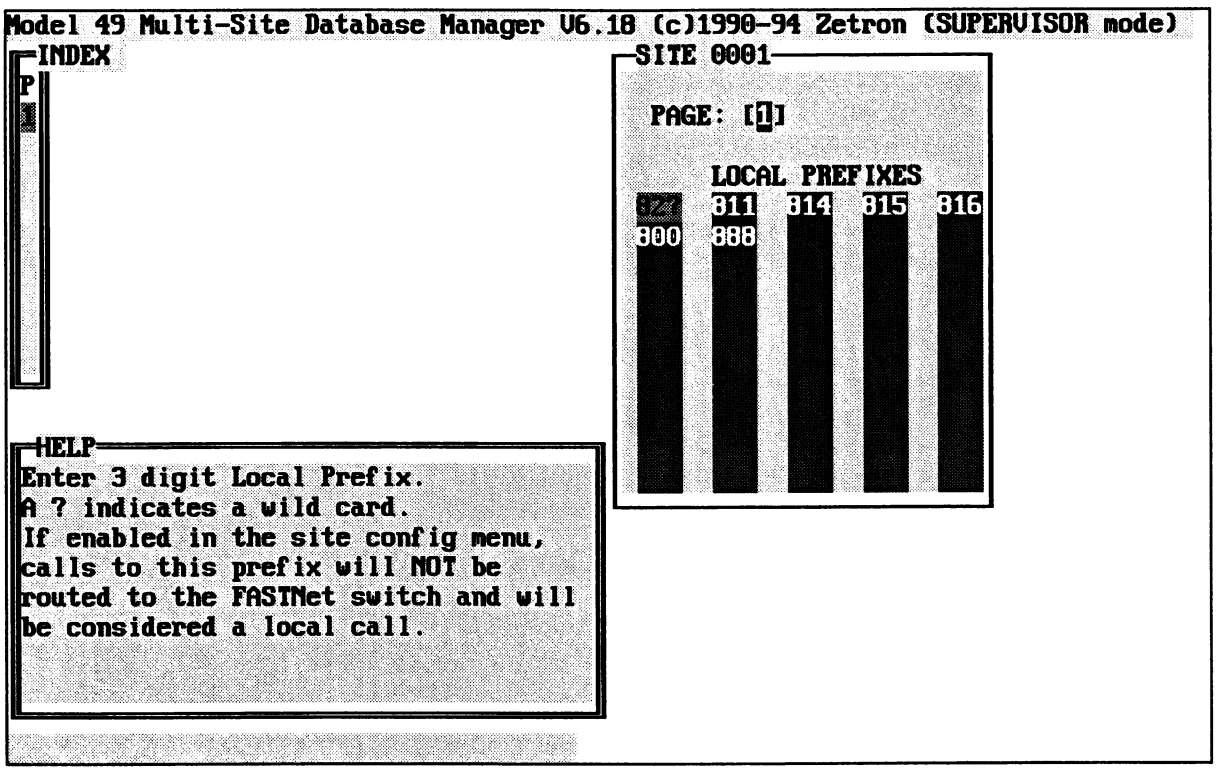

Figure 7-9. Local Prefix Table

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.

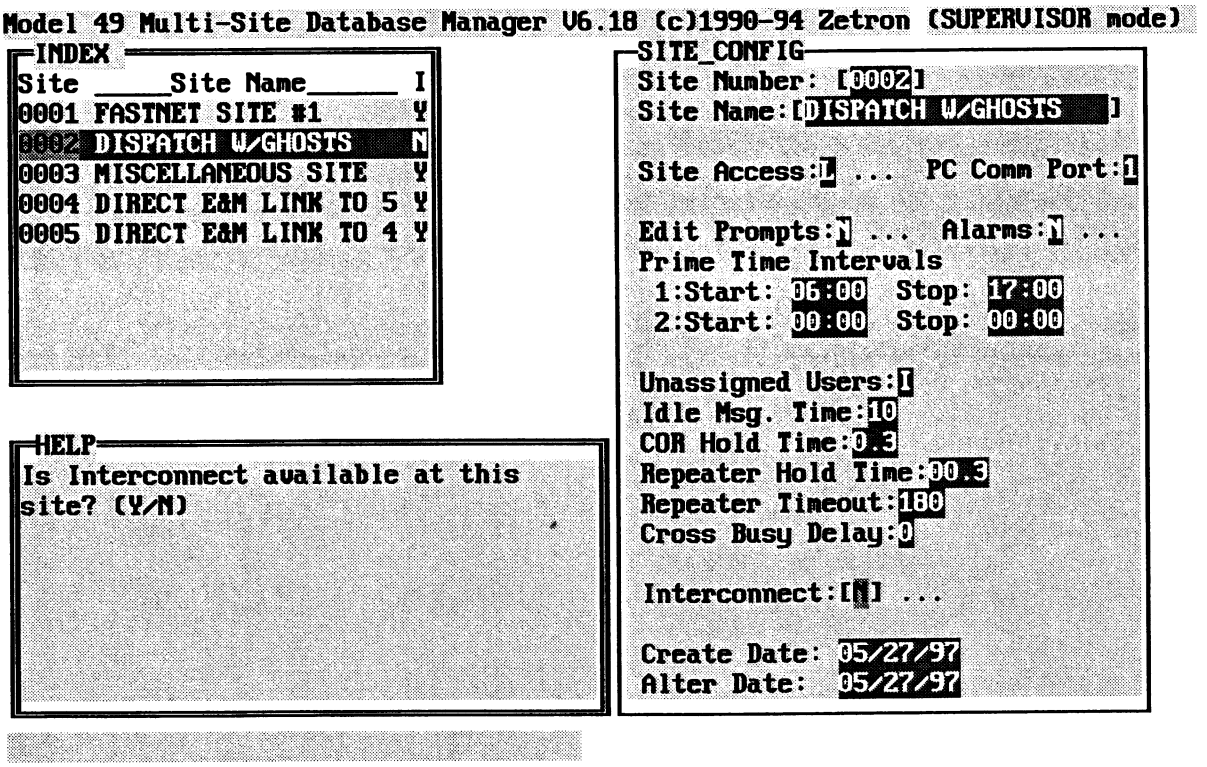

Figure 7-10. Site #0002 Configuration

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 (if equipped with the option). The ghost repeater number does not require a unique repeater setup in Multibase. The information

is automatically cloned for the ghost repeater. Figure 7-11 shows an example of the repeater configuration for the physical repeater number 01.

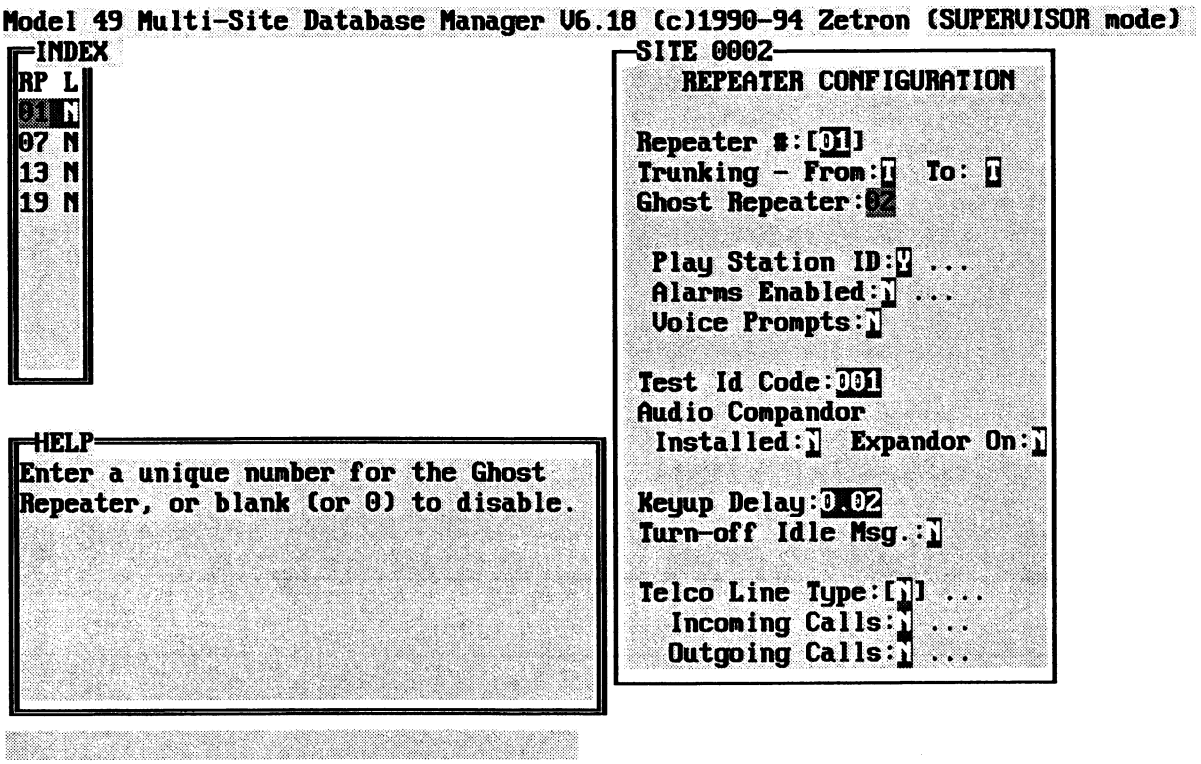

Figure 7-11. Repeater #01 Configuration

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.

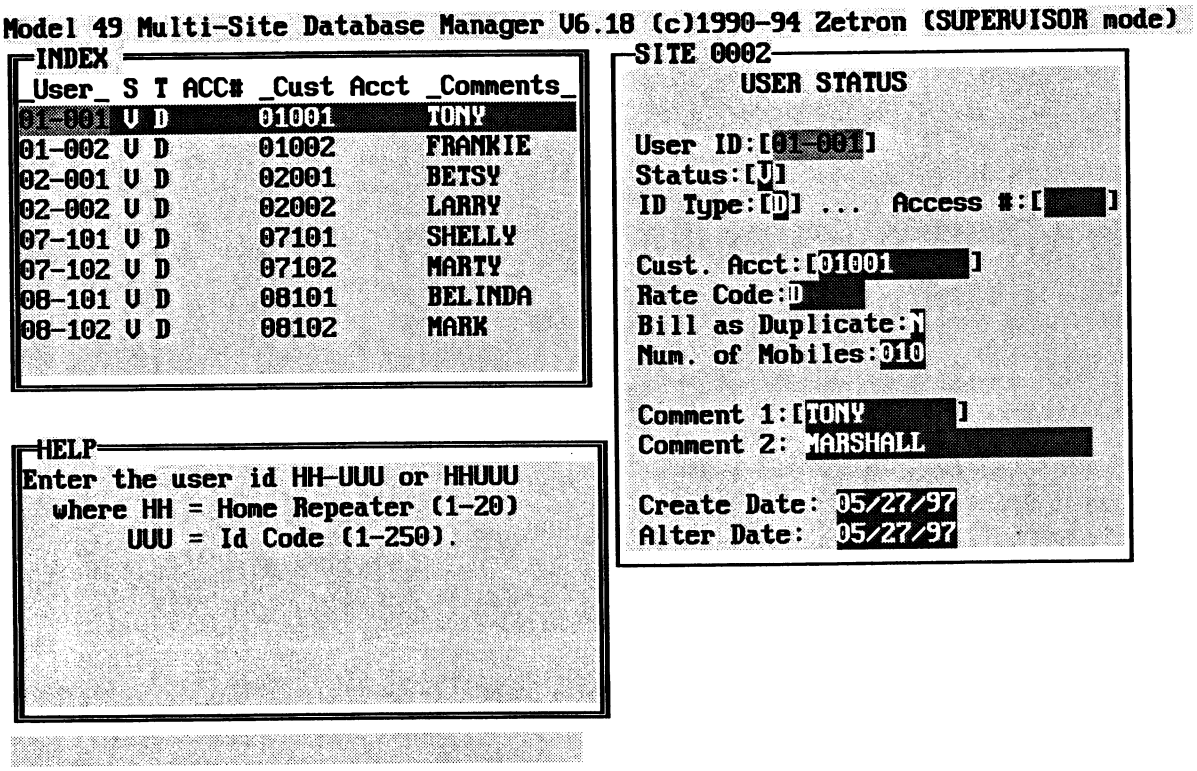

Figure 7-12. User #01-100 Status

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 Multibase 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 *Model 49 Trunking Repeater Manager (Main Board Revision S and Higher) Operation and Installation Manual* (Part No. 025-9313) 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 49s and how to configure the database accordingly. This site has four repeaters: 01, 07, 12, 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 Multibase.

Site Configuration

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.

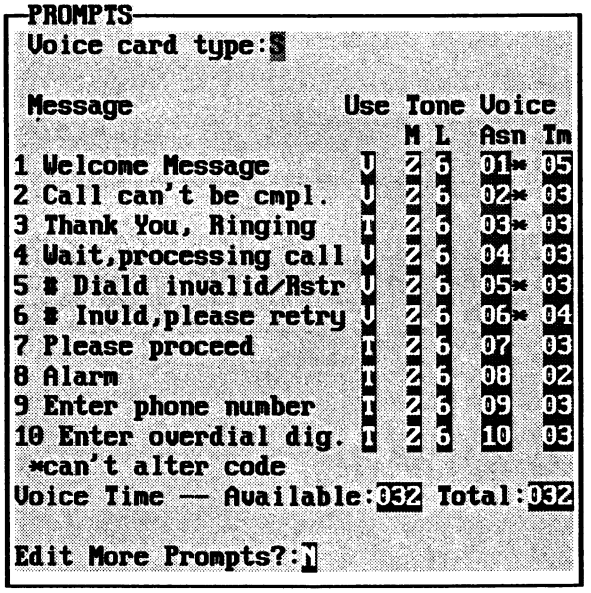

Figure 7-13. Prompts Window

The Voice card type field is set to S - standard. In this example, five 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 49 at the site that has a voice card installed. Figure 7-14 shows the repeater configuration.

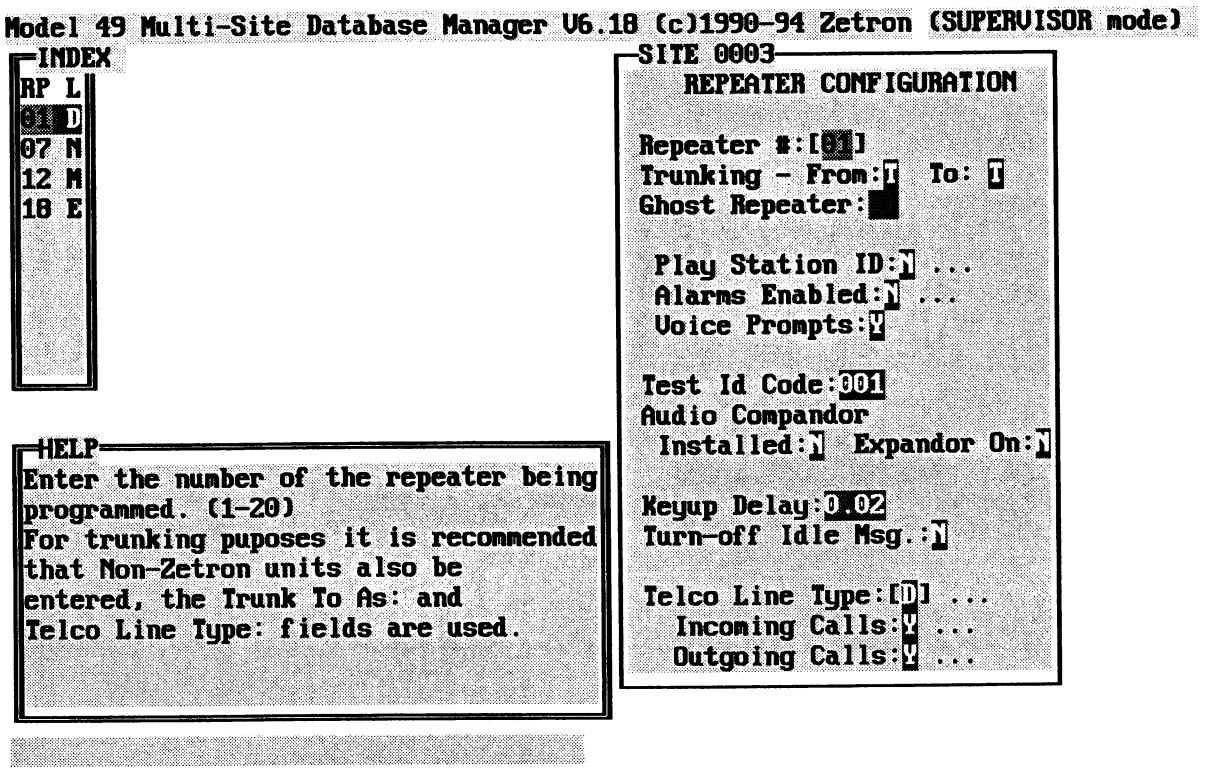

Figure 7-14. Repeater #01 Configuration

Voice Prompt Recording

If more than one repeater uses voice prompts, then the messages must be recorded separately for each Model 49.

Note:

For details on recording custom voice prompts in the Model 49, refer to Section 6.

Channel 07 - Alarm Reporting

Multibase supports monitoring of five different alarm conditions: Sense inputs 2-4, SMDR buffer full, and loss of Sync. This repeater is set up for alarm monitoring and notification.

Site Configuration

Alarms are enabled in the site configuration. When Y is entered in the Alarms field, the window shown in Figure 7-15 appears in which to program the alarm notification parameters.

In this example, the user ID 07-250 is contacted on occurrence of one of the enabled alarm conditions. The alarm message is repeated three times, with 2 minutes between notifications.

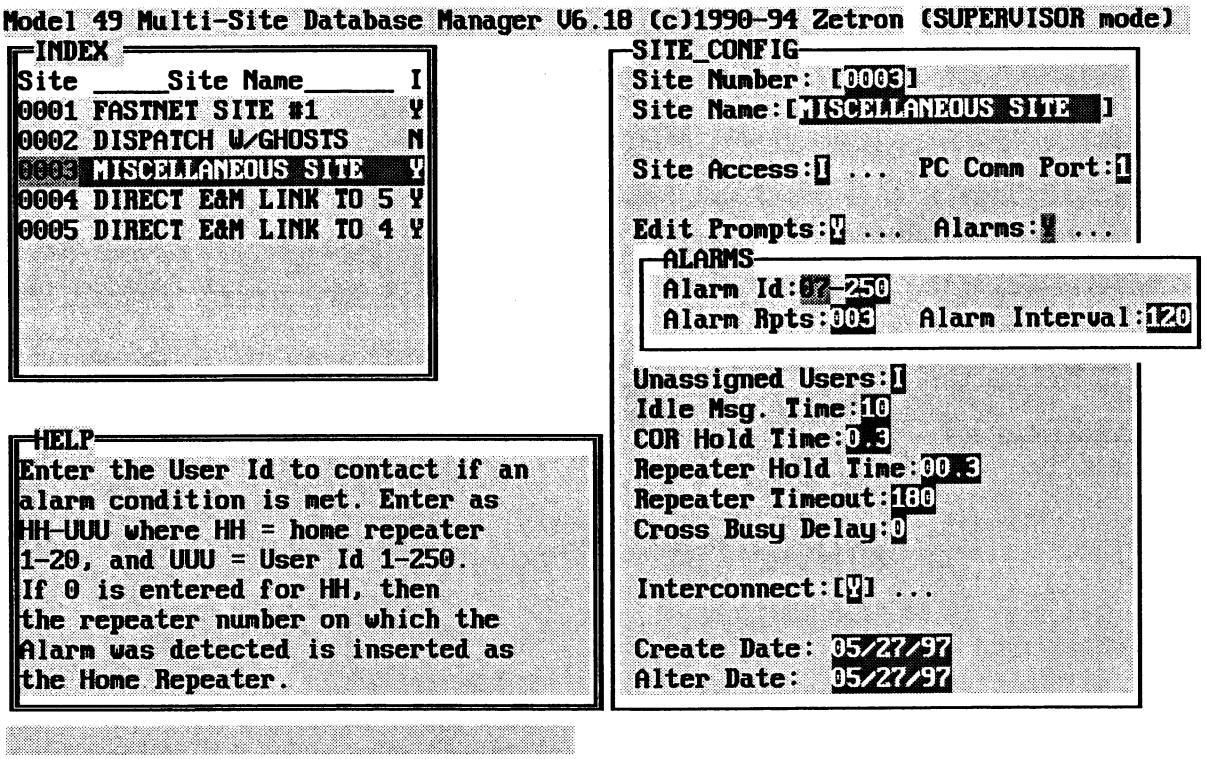

Figure 7-15. Alarm Notification Window

Notice that the ID entered in the Alarms window is homed on the repeater that is set up for alarm monitoring. If more than one repeater is enabled for alarms, enter the home repeater number as 00. In this case, the user code is contacted on the repeater where the alarm occurred. When an 00-xxx ID is entered, be sure to reserve that ID for alarms on every repeater enabled for alarms. (If 00-250 is entered and the alarm occurs on repeater #13, mobile 13-250 will be notified.)

Repeater Configuration

The alarm conditions are monitored for each channel in the system based on the repeater setup. When Y is entered in the Alarms Enabled field in the repeater configuration, the window shown in Figure 7-16 appears.

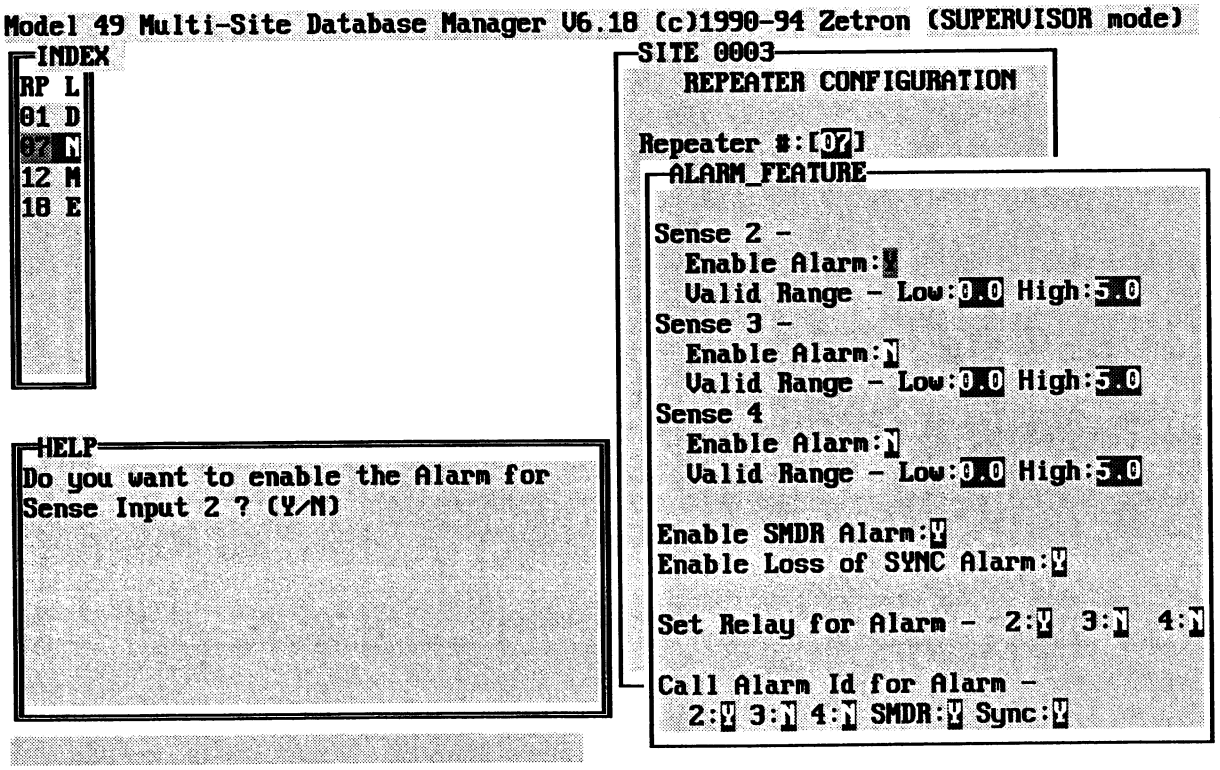

Figure 7-16. Alarm Feature Window

In this example, the Sense 2 alarm is enabled with the standard input voltage range triggering an alarm. When the Sense 2 alarm is tripped, the input relay is set. The SMDR buffer alarm is enabled to monitor the available buffer space. The Loss of Sync alarm is also enabled to monitor the high-speed data bus synchronization. When any of the enabled alarm conditions occur on this repeater, the alarm ID is called.

User IDs

Figure 7-17 shows an example of the mobile setup to receive alarm messages. The ID number is 07-250, as indicated in the site configuration.

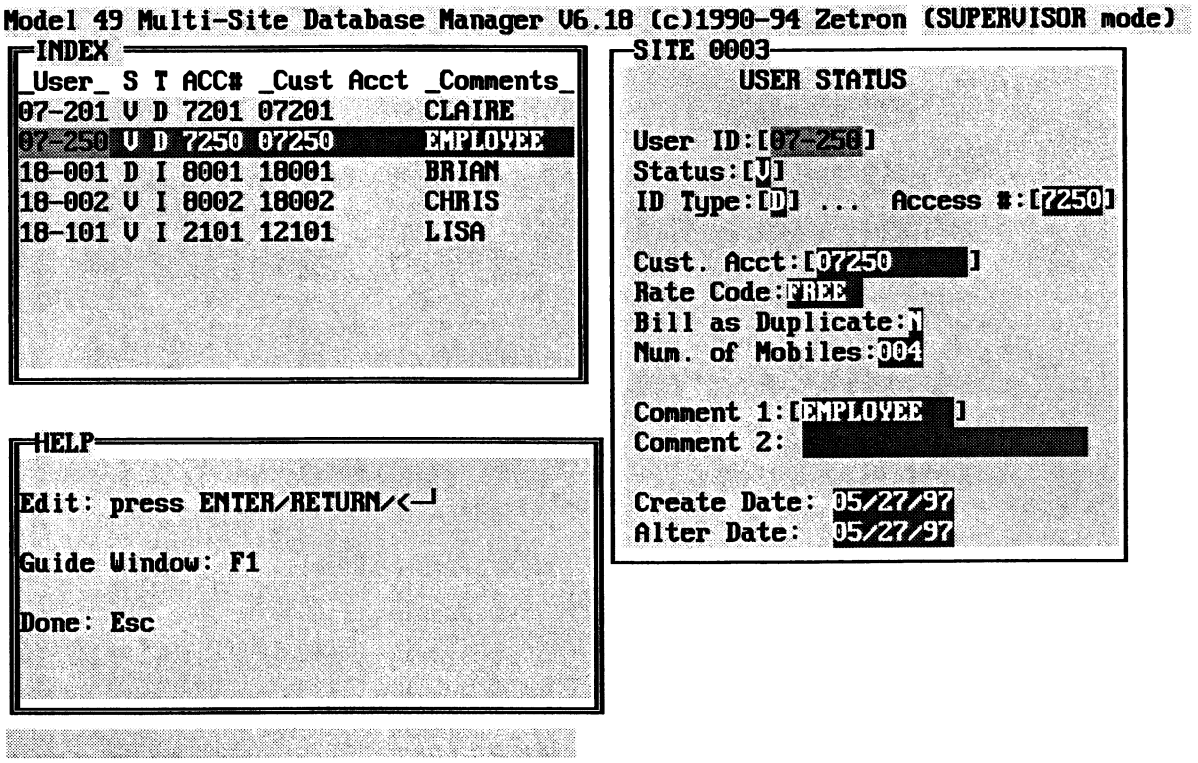

Figure 7-17. User #07-250 Status

This user ID is set up for toll-free dispatch use by the employees of the company. This ensures that if an alarm occurs, at least one of the four operators will receive notification.

Channel 12 - Dial Plan Table

The Dial Plan Table determines which dialing strings (outgoing interconnect calls) are valid from the mobiles. This repeater illustrates typical use of the dial plan.

Site Configuration

The site must be enabled for interconnect calls. When a Y is entered in the Interconnect field, the window shown in Figure 7-18 appears. Then when a Y is entered in the Edit Prefix Tables at the bottom of the interconnect window, the Restrict Window (also shown in Figure 7-18) appears.

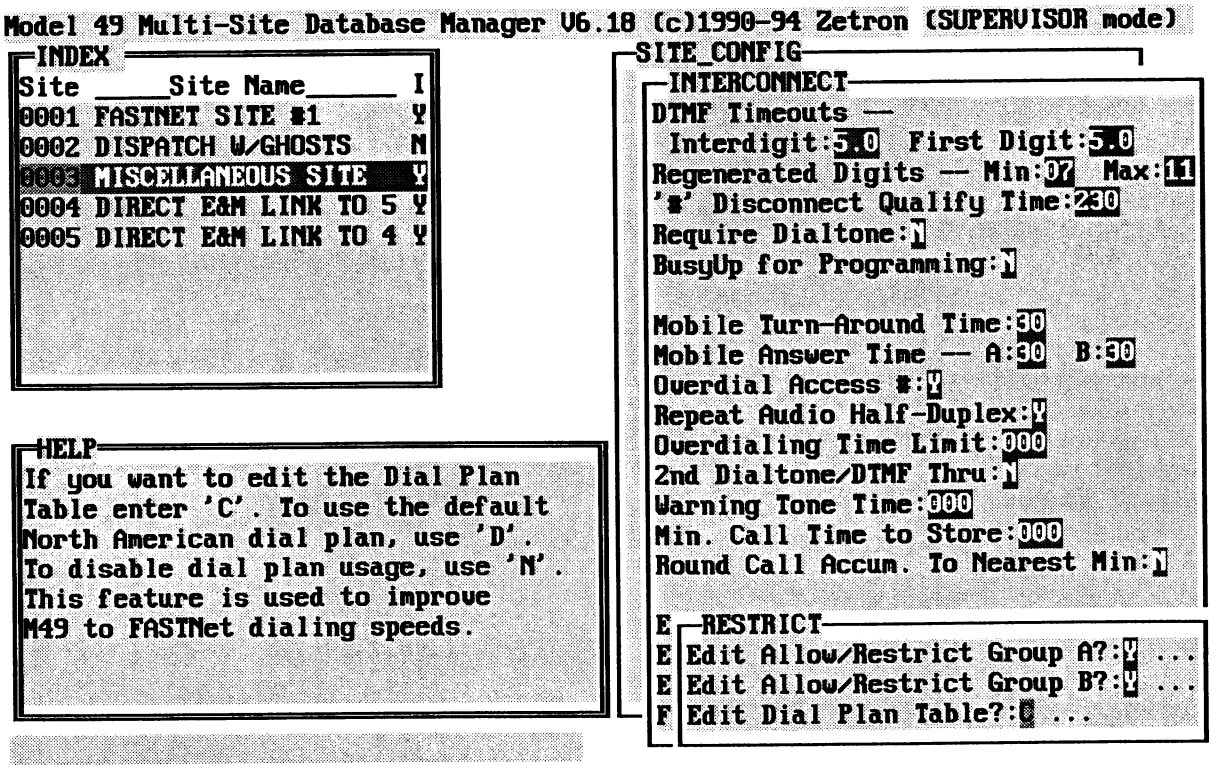

Figure 7-18. Interconnect Window

When a C is entered in the Edit Dial Plan Table field, the window shown in Figure 7-19 appears.

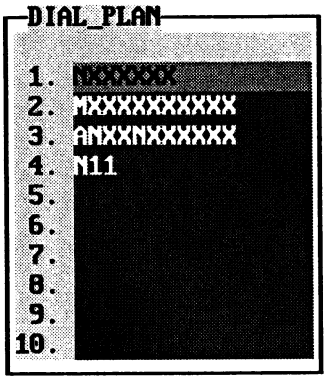

Figure 7-19. Dial Plan Table

In this example, four dialing strings are programmed for the site. The first string allows all local calls (regardless of the site location). The second string allows all non-operator-assisted long-distance calls. The third string allows long-distance calls, including operator-assisted and calling card calls. The last string allows information (411), customer service (611) and emergency (911) calls.

Repeater Configuration

The Dial Plan Table restricts interconnected, not dispatch calls. Consequently, at least one repeater in the site should have the Interconnect Option (Part No. 950-9563) and a Telco Card (Part No. 950-9561, 950-9560, or 950-9547) installed.

Repeater 12 configuration is shown in Figure 7-20. Notice that the Telco Line Type field is set to E&M. Any setting, except N - none, can be used. In addition, Outgoing Calls must be allowed.

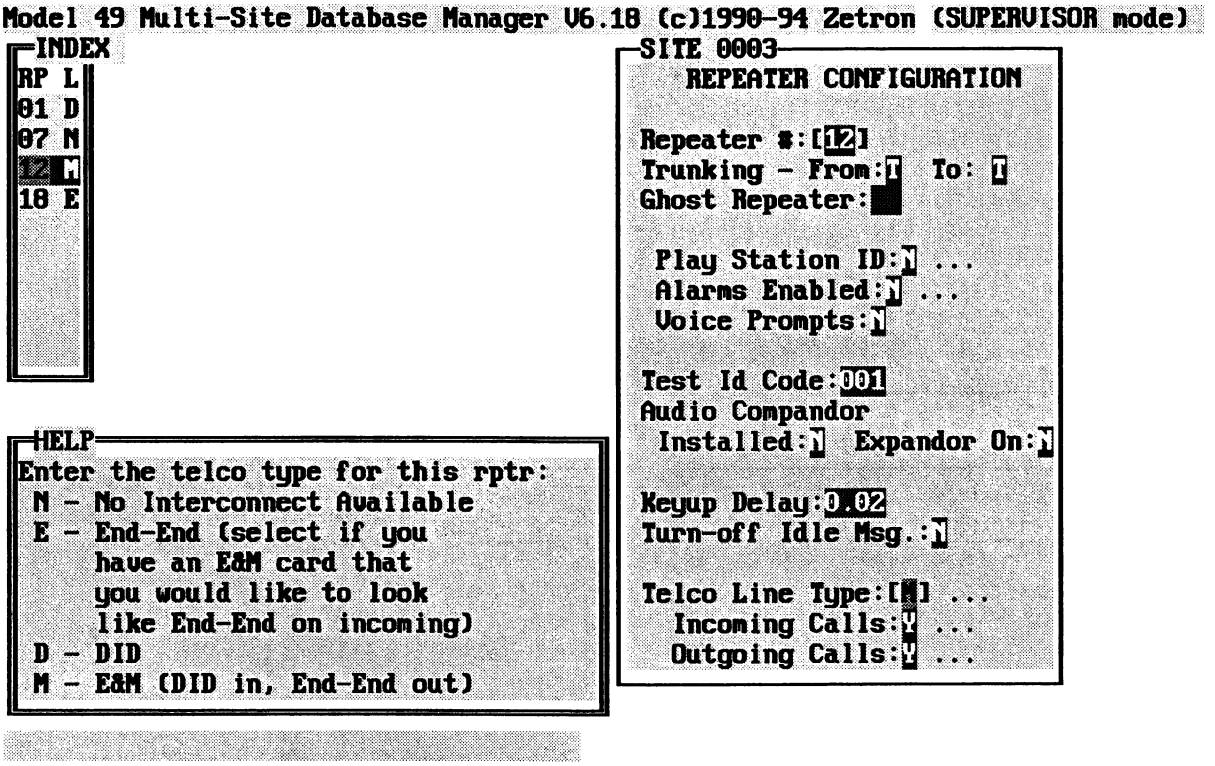

Figure 7-20. Repeater #12 Configuration

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 7-21.

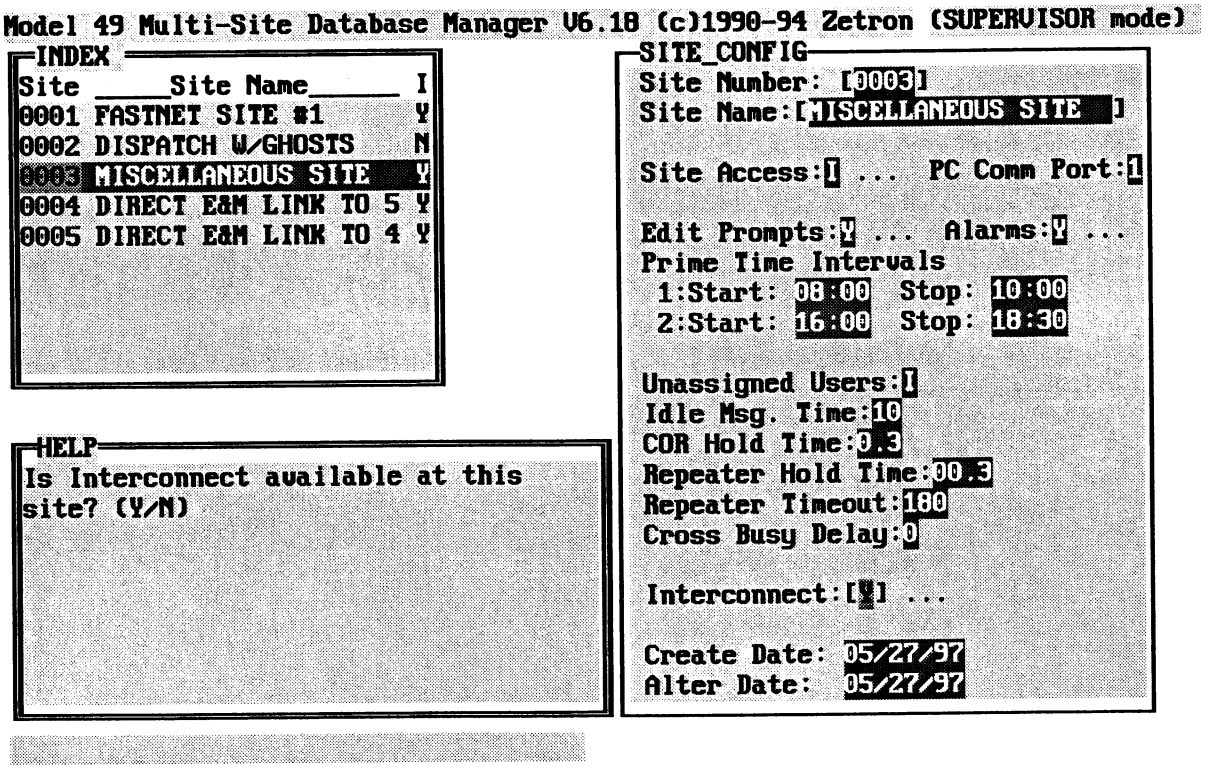

Figure 7-21. Site #0003 Configuration

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 7-22 appears.

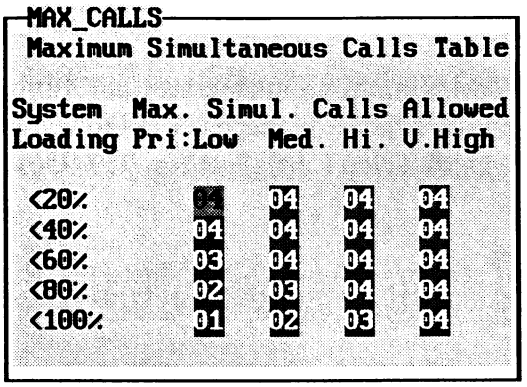

Figure 7-22. Max Calls Table

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 7-23 appears.

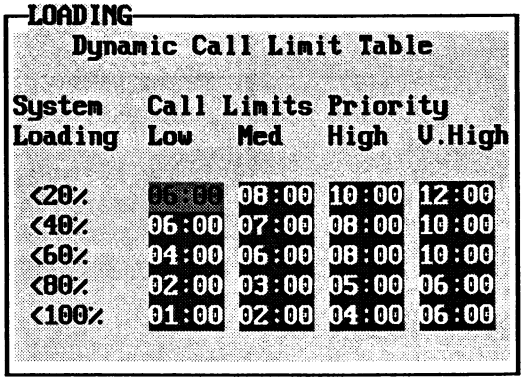

Figure 7-23. Dynamic Call Limit Table

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 repeater in the site should have the Interconnect Option (Part No. 950-9563) and a Telco Card (Part No. 950-9561, 950-9560, or 950-9547) installed.

Repeater 18 configuration is shown in Figure 7-24. 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.

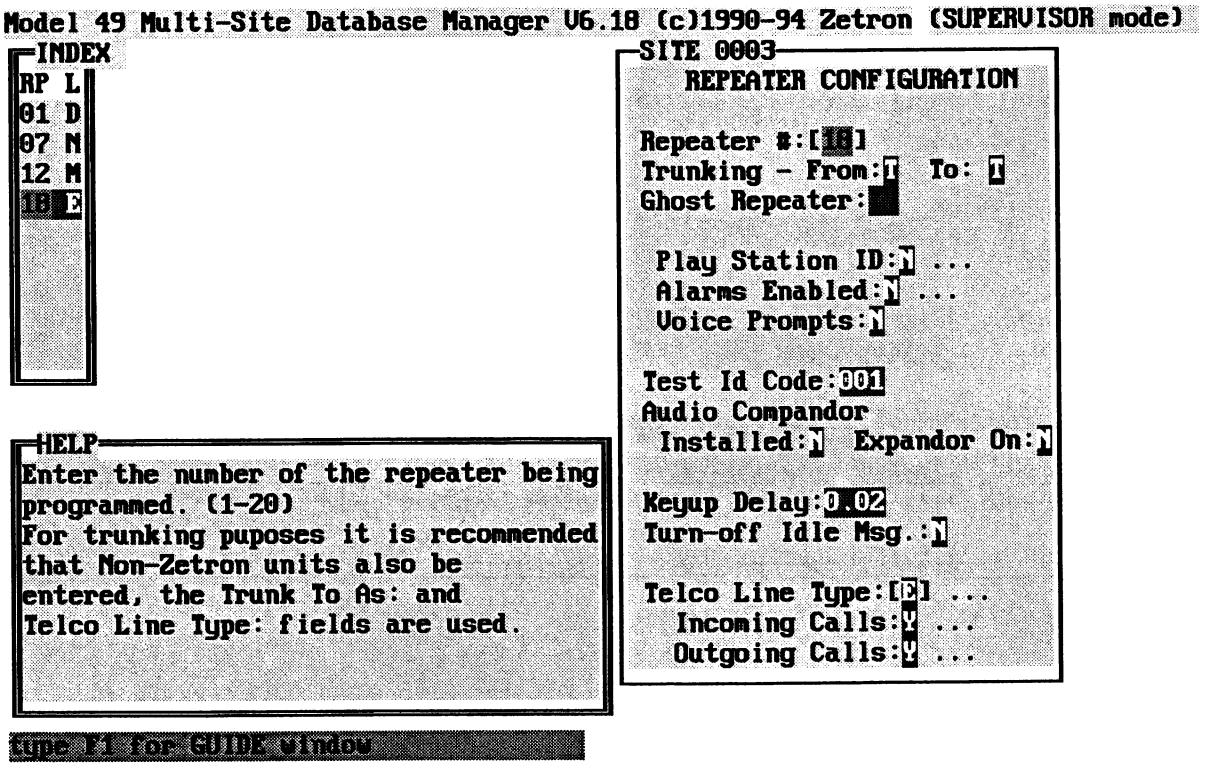

Figure 7-24. Repeater #18 Configuration

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 7-25 shows a user with Priority H - high, in the interconnect window.

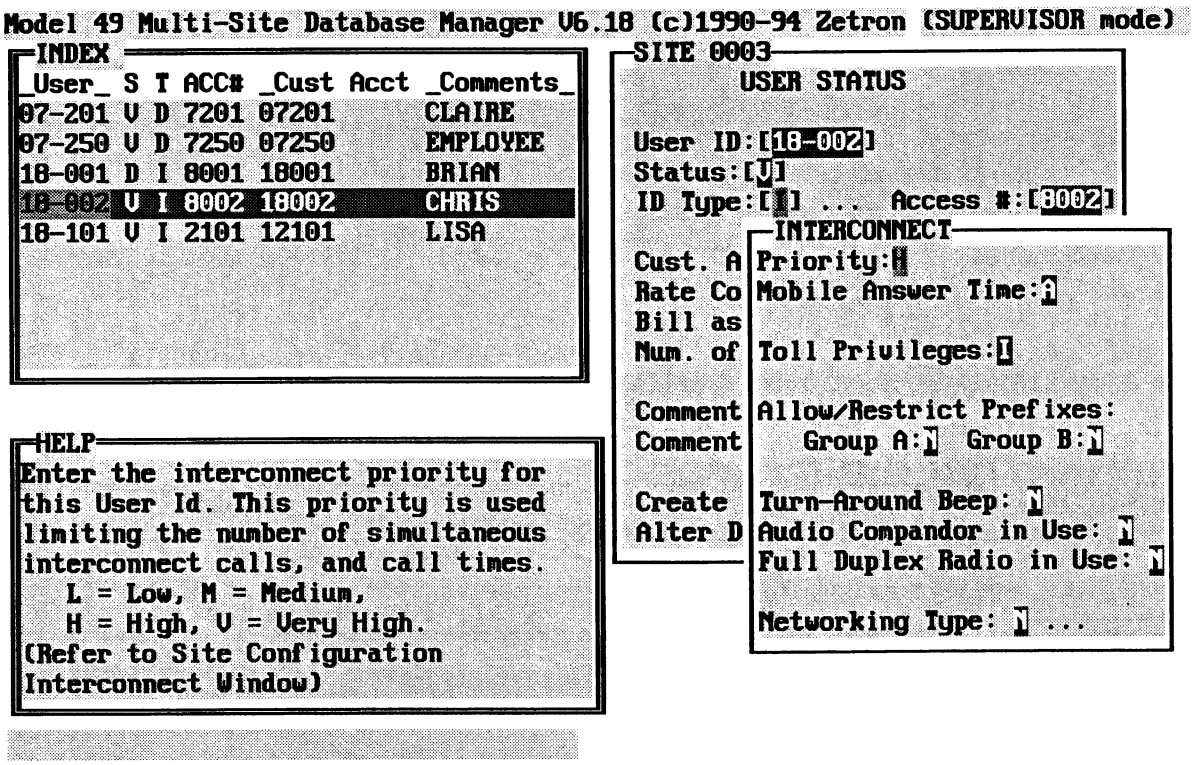

Figure 7-25. User #18-002 Status

The Dynamic Call Limits (see Figure 7-23) and Maximum Simultaneous Calls Tables (see Figure 7-22) 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 7-26 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).

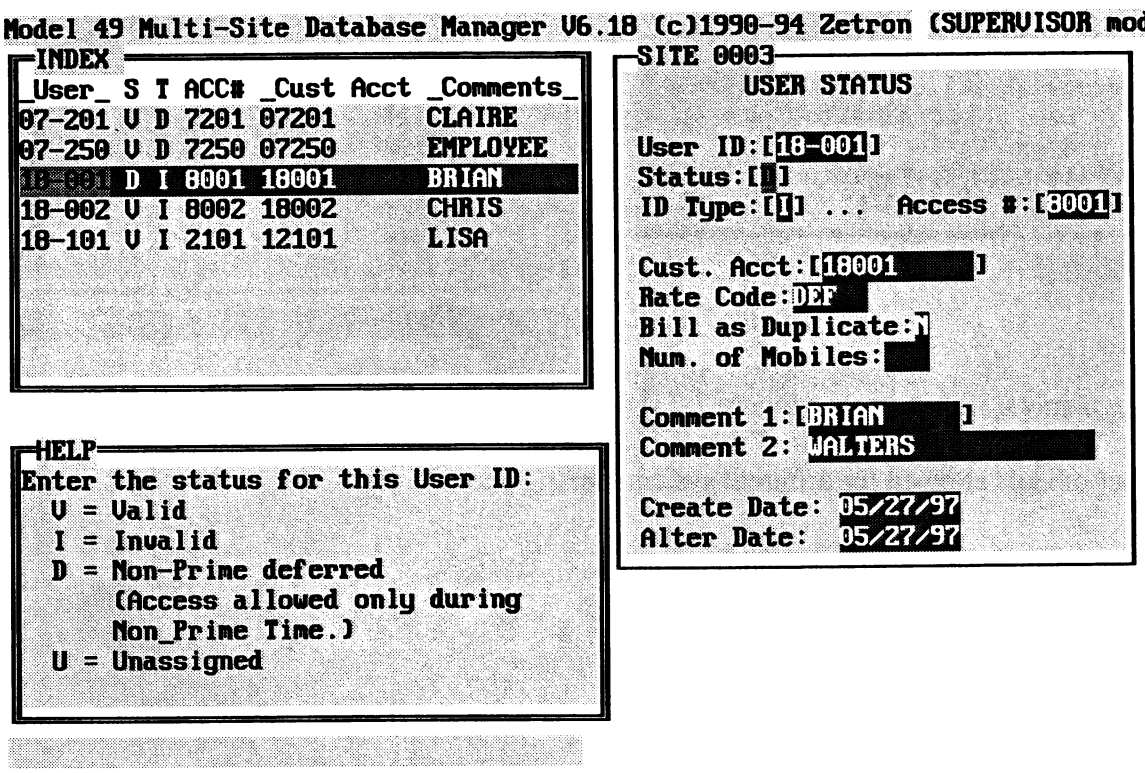

Figure 7-26. User #18-001 Status

> **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 7-27 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 site. However, in this case, the user is also not allowed to dial any long-distance numbers (anything exceeding seven digits).

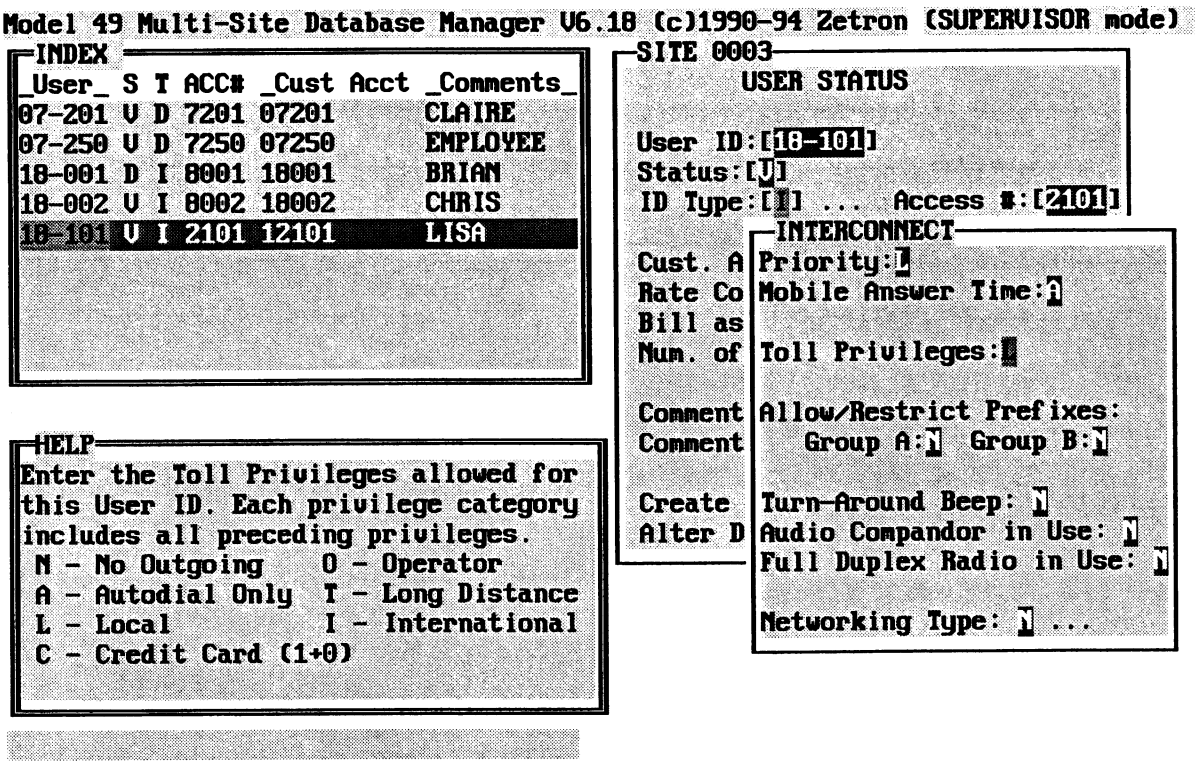

Figure 7-27. User #18-101 Status

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 option of the Model 49. Autonet Model 49s 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 7-28 shows the configuration for the site.

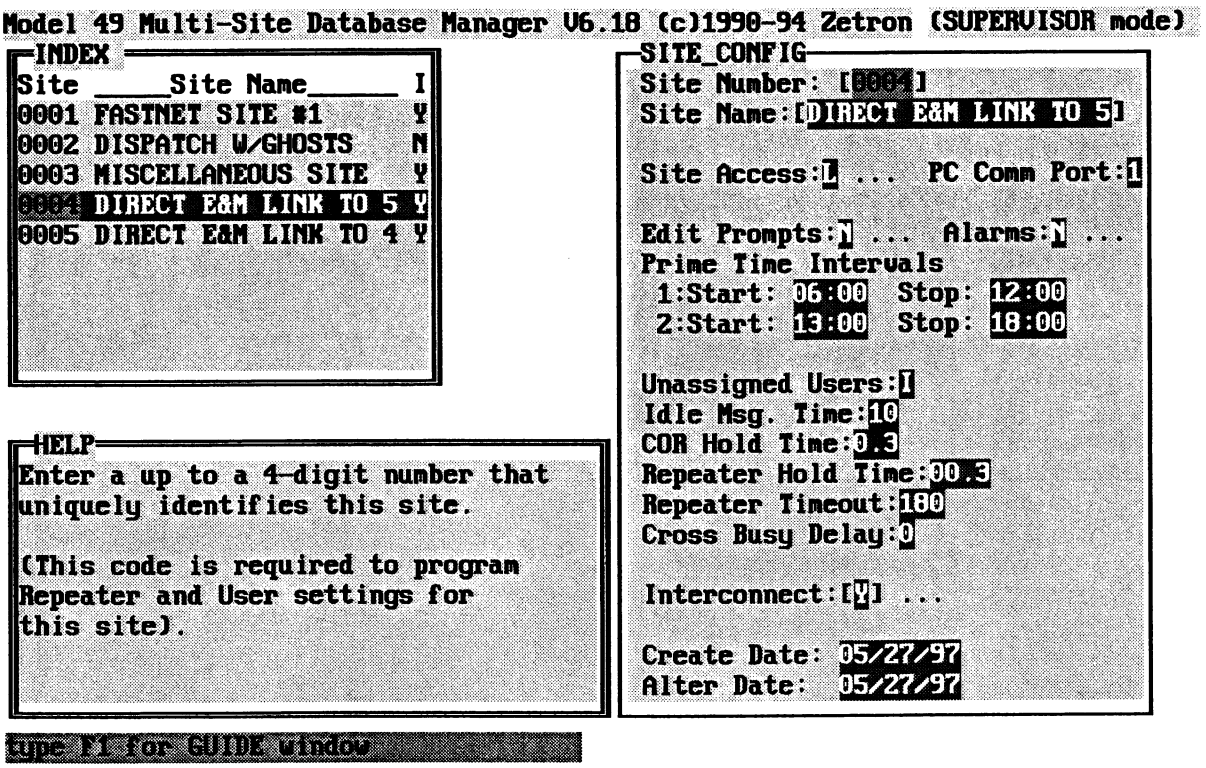

Figure 7-28. Site #0004 Configuration

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 7-29.

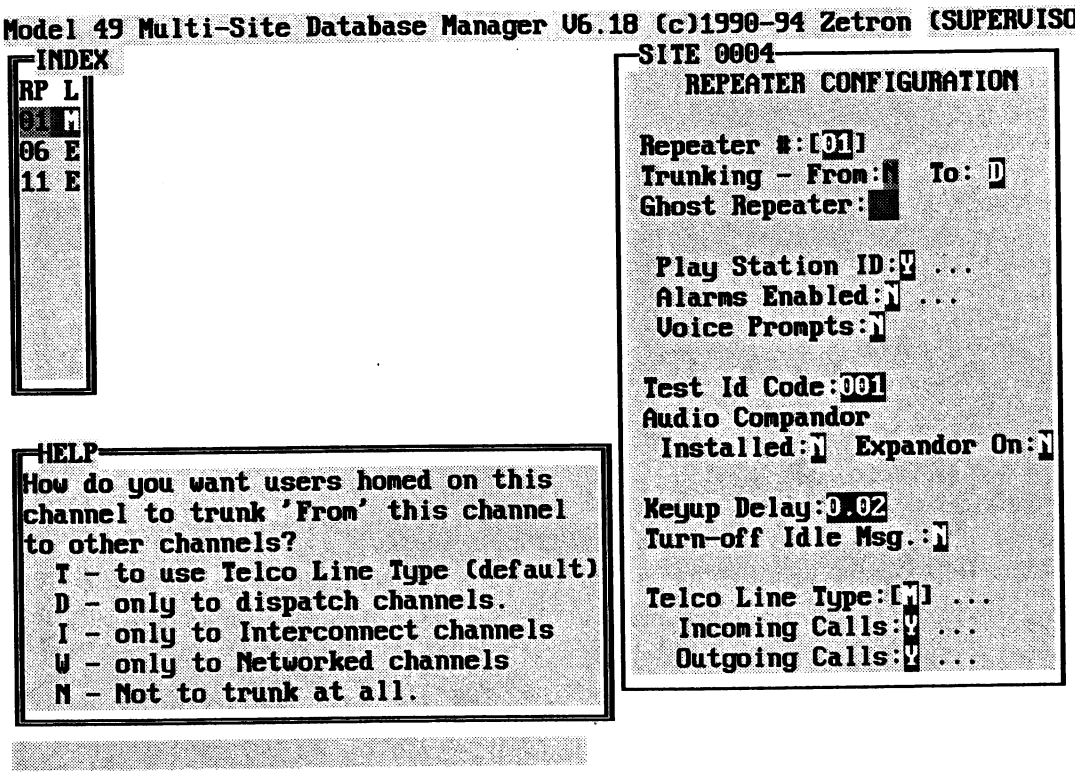

Figure 7-29. Repeater #01 Configuration

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.

If all the channels at site 0004 are directly connected to the channels at site 0005, the default setting, T, for Trunking From: and Trunking To: is correct.

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 7-30 appears.

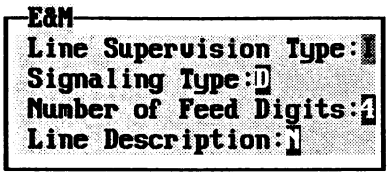

Figure 7-30. E&M Window

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 49 can send and receive overdial access numbers to and from the linked Model 49 at the other site.

Incoming Calls

This field enables incoming calls. When a Y is entered, the window shown in Figure 7-31 appears. The settings shown are fairly standard for a direct E&M link.

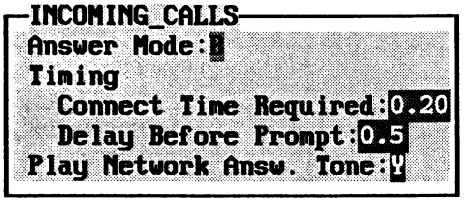

Figure 7-31. Incoming Calls Window

Outgoing Calls

This field enables outgoing calls. When a Y is entered, the window shown in Figure 7-32 appears.

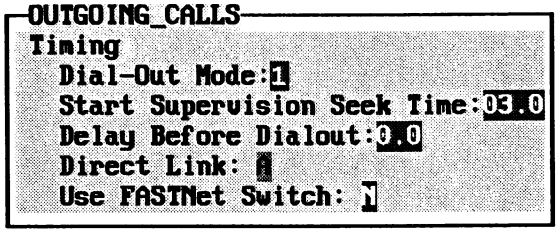

Figure 7-32. Outgoing Calls Window

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 7-33 shows the setup for the other two repeaters at the site. Both are programmed similarly for the dial-up link between sites.

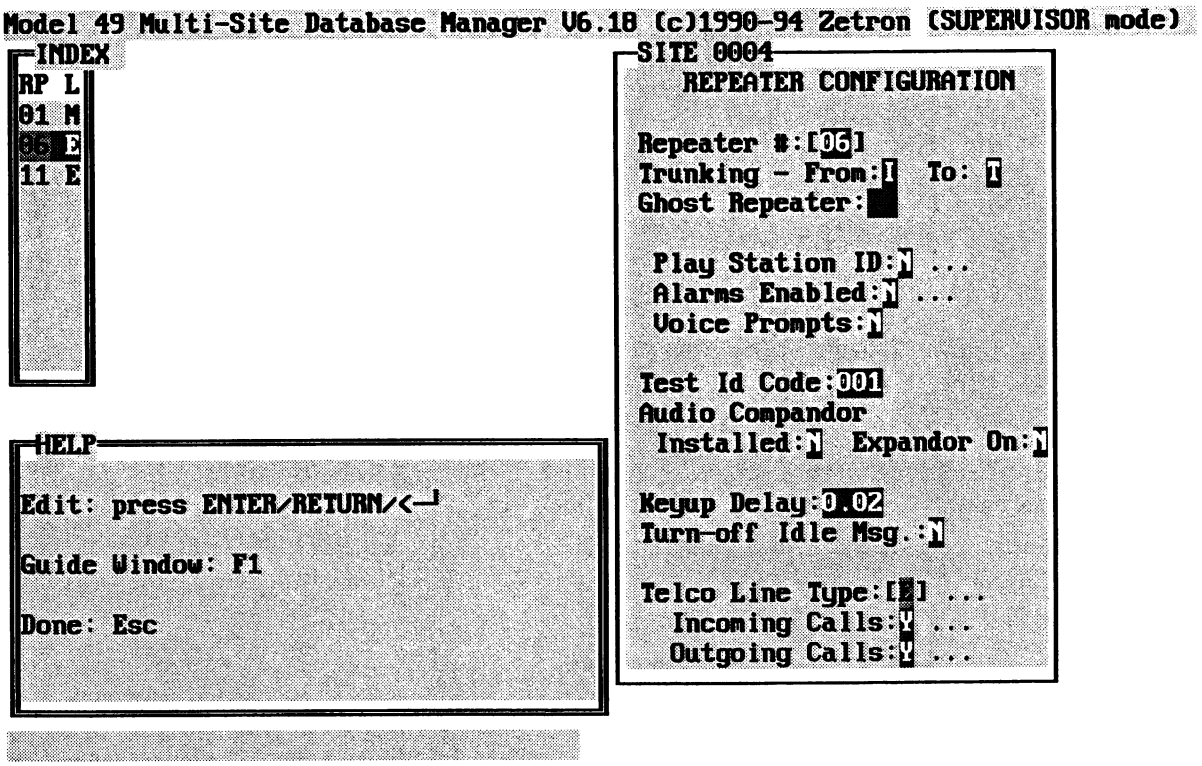

Figure 7-33. Repeater #06 Configuration

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 7-34 appears.

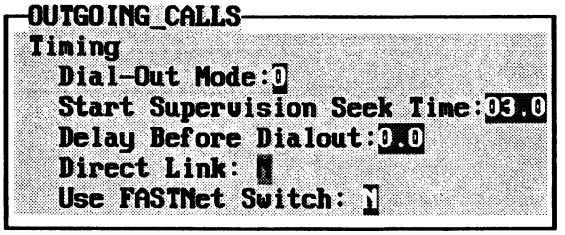

Figure 7-34. Outgoing Calls Window

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.**

Dial-Up Autonet Users

Figure 7-35 shows a typical configuration for a dial-up autonet mobile. When this user keys up on their home channel (01), a connection is made to site #0005 and the Model 49 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.

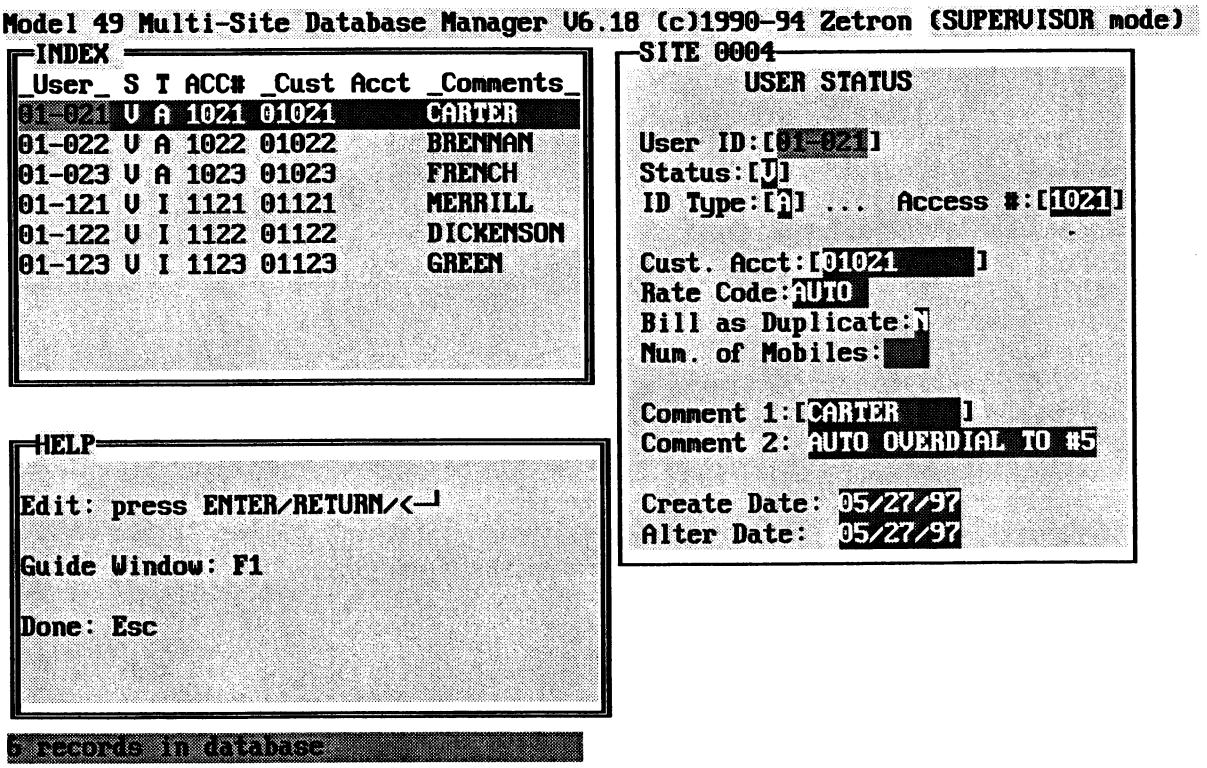

Figure 7-35. User #01-021 Status

ID Type

This field should be set to A - auto-overdial for autonet applications. When an A is entered, the window shown in Figure 7-36 appears.

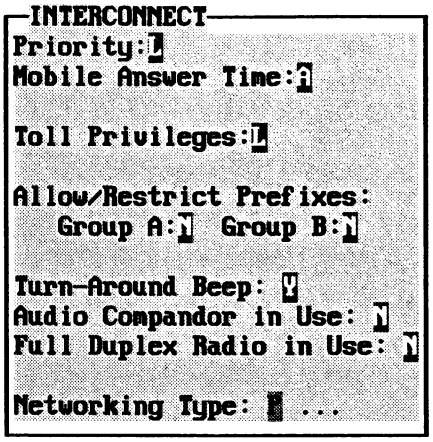

Figure 7-36. Interconnect Window

The Networking Type field is set to P - push-to-connect in this example. When a P is entered, the window shown in Figure 7-37 appears.

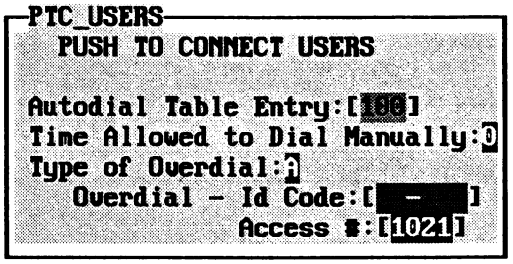

Figure 7-37. Push-to-Connect Window

The Autodial Table Entry is programmed for selective mobile-to-mobile calling (enter 100). In addition, the Type of Overdial is set to A - for access code and the Access # corresponds to the user's own Access # (refer to Figure 7-35).

Push-to-Connect Users

Figure 7-38 shows a typical configuration for a push-to-connect mobile. When this user keys up on their home channel (01), the Model 49 dials the phone number to site #0005 (autodial entry #02). Once a connection is made, the initiating Model 49 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.

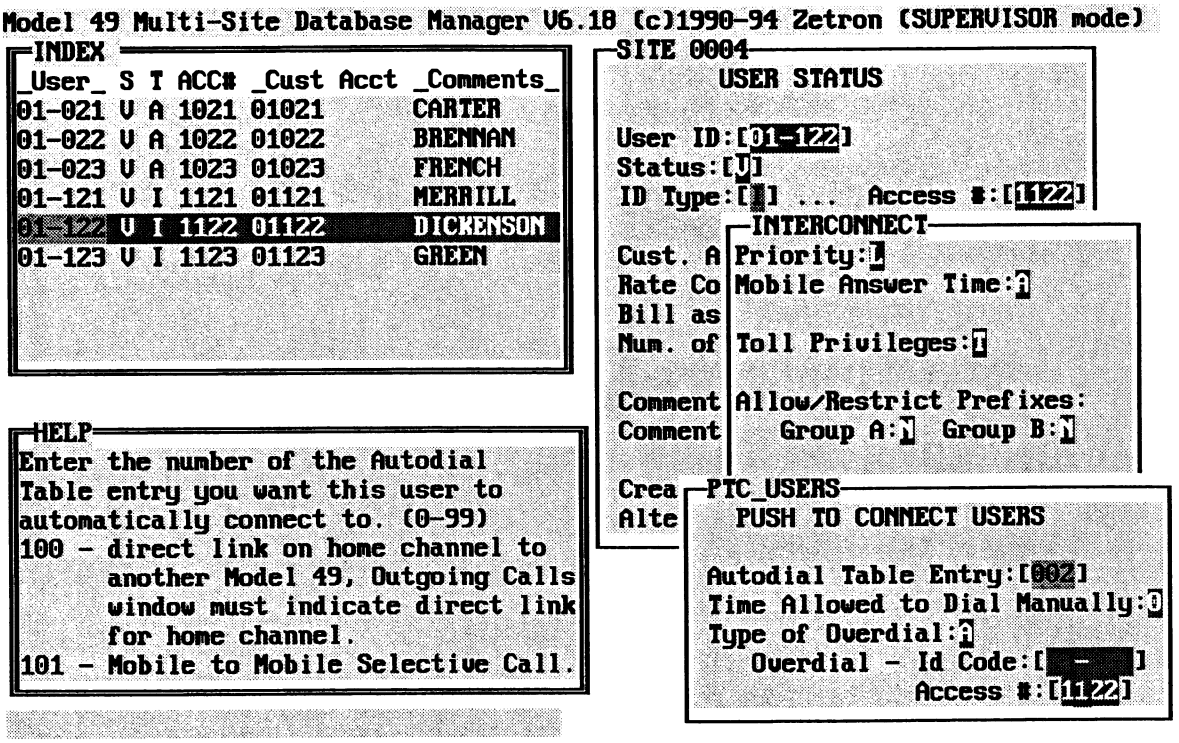

Figure 7-38. User #01-122 Status

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 49 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 7-39 and Figure 7-40. One uses an autodial entry that connects to another dial-up LTR site and the other connects to a regular telephone.

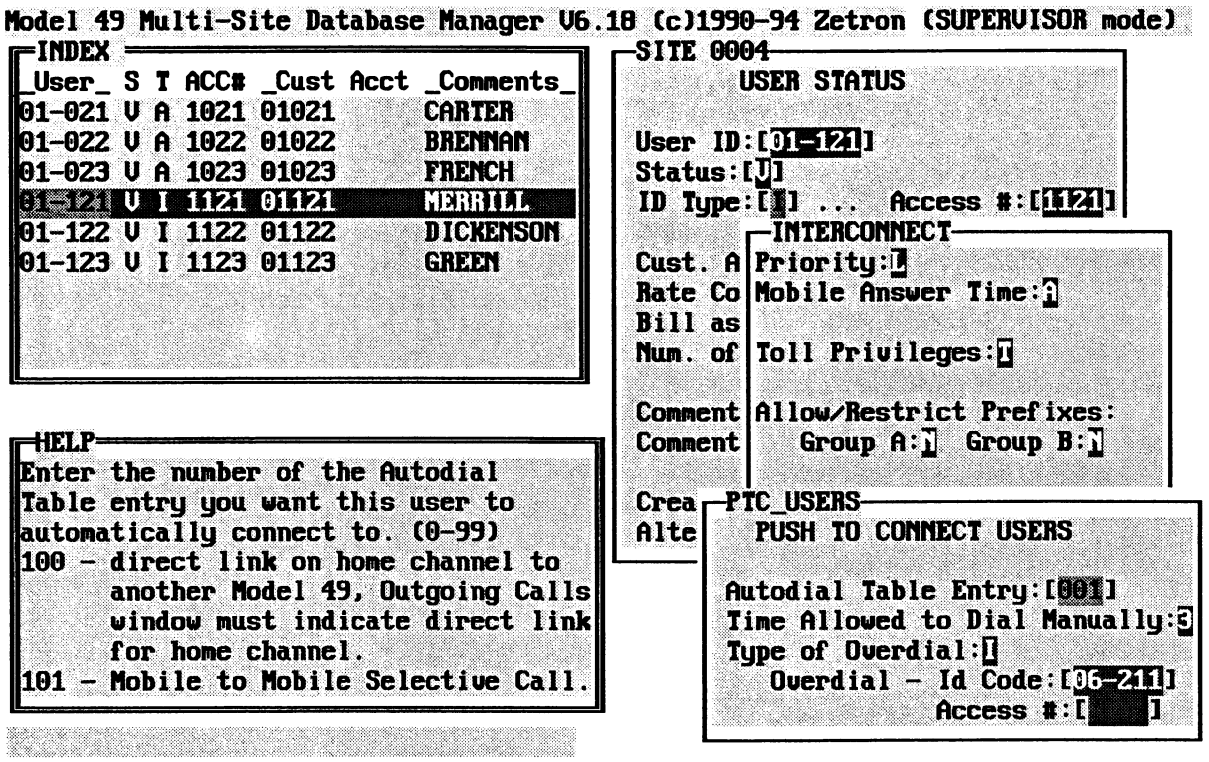

Figure 7-39. User #01-121 Status

User #01-121 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 49 calls autodial entry #01 and overdials the user ID. Additionally, user 01-121 overdials the LTR ID 06-211 at the other site.

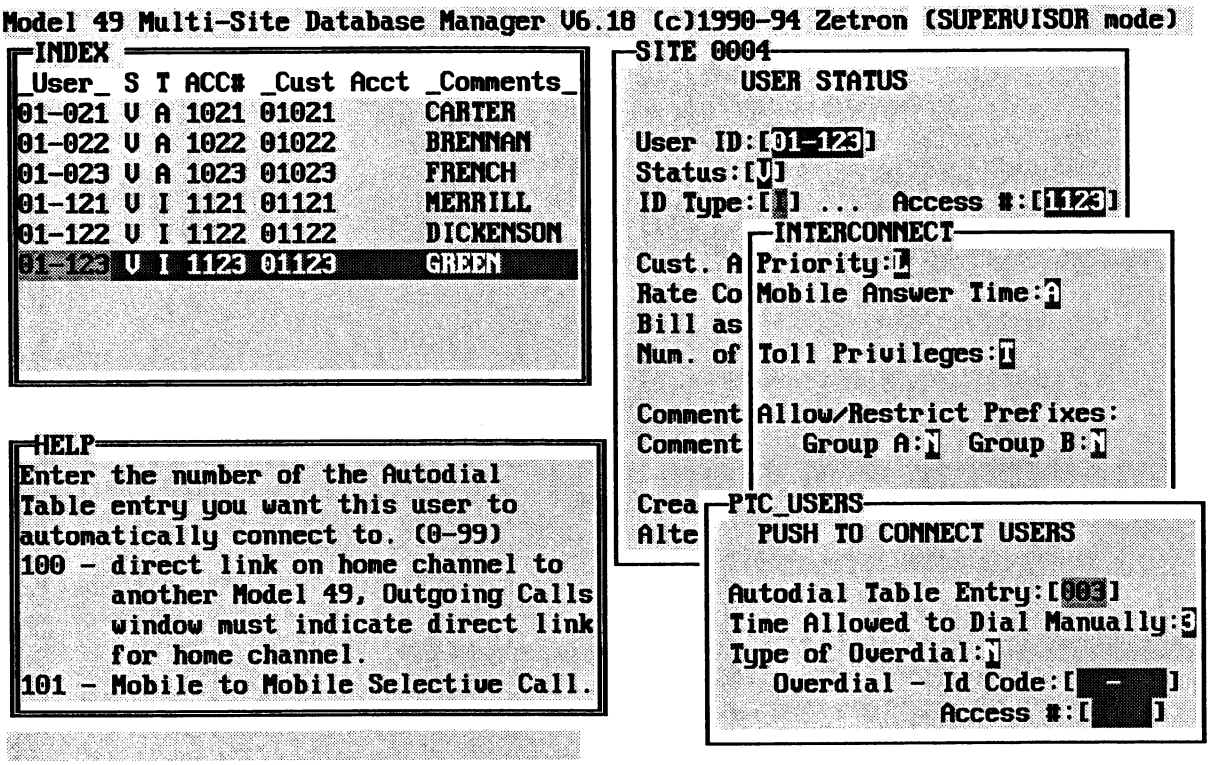

Figure 7-40. User #01-123 Status

This mobile (#01-123) 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 7-41 shows the autodial entry that calls site #0005 via the telco.

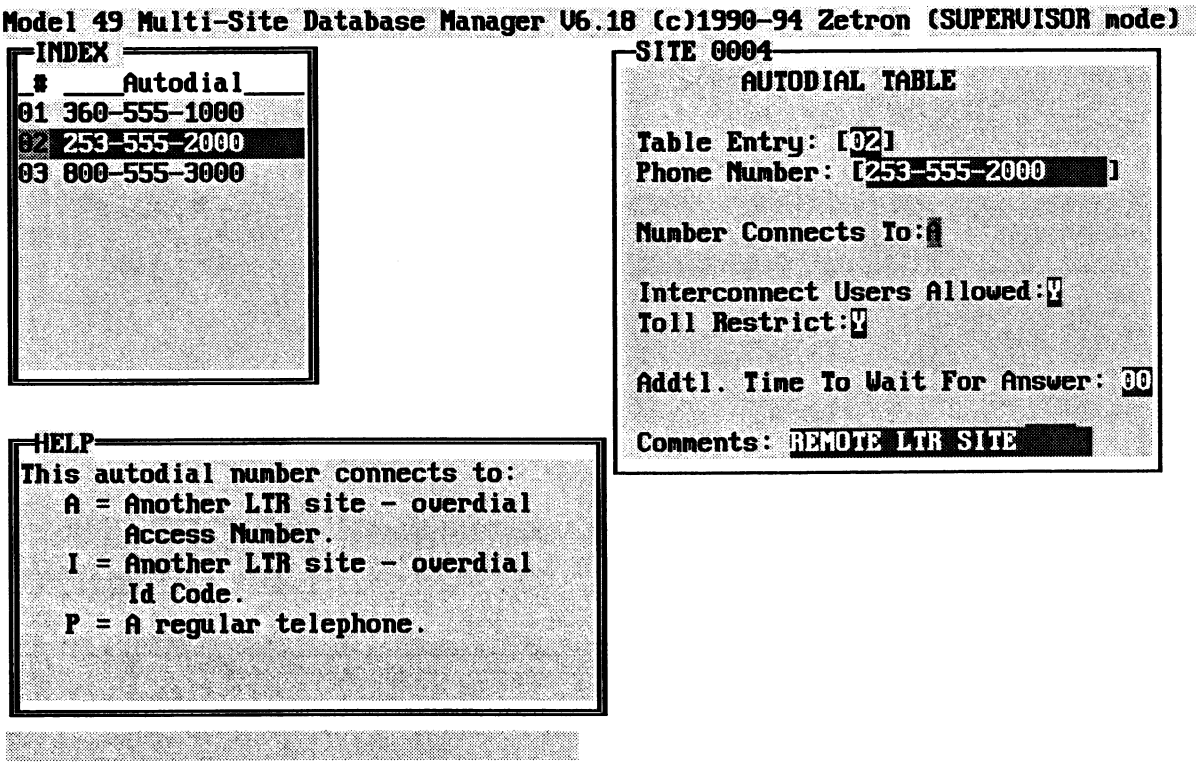

Figure 7-41. Autodial Entry #02

User #01-122 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 #01-121 is programmed to use autodial entry #01 (see Figure 7-42). 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.

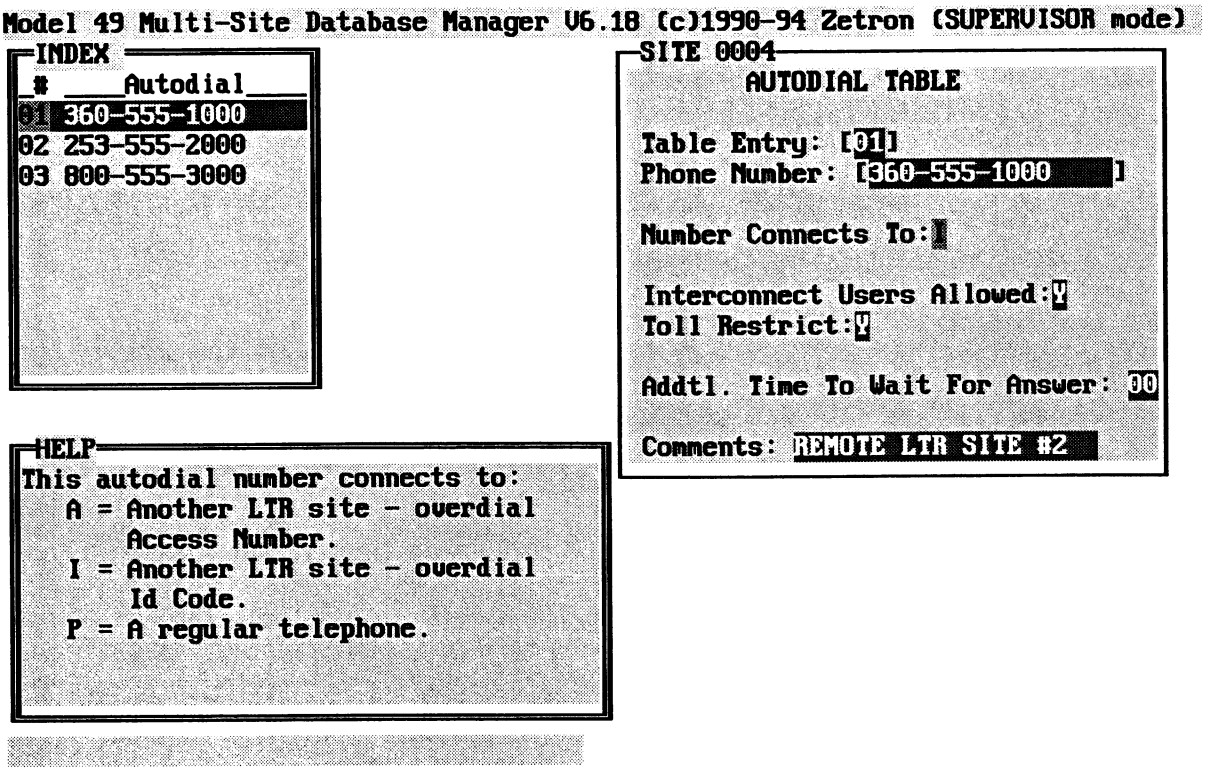

Figure 7-42. Autodial Entry #01

The last autodial entry, shown in Figure 7-43, illustrates a connection to a standard telephone. User 01-123 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.)

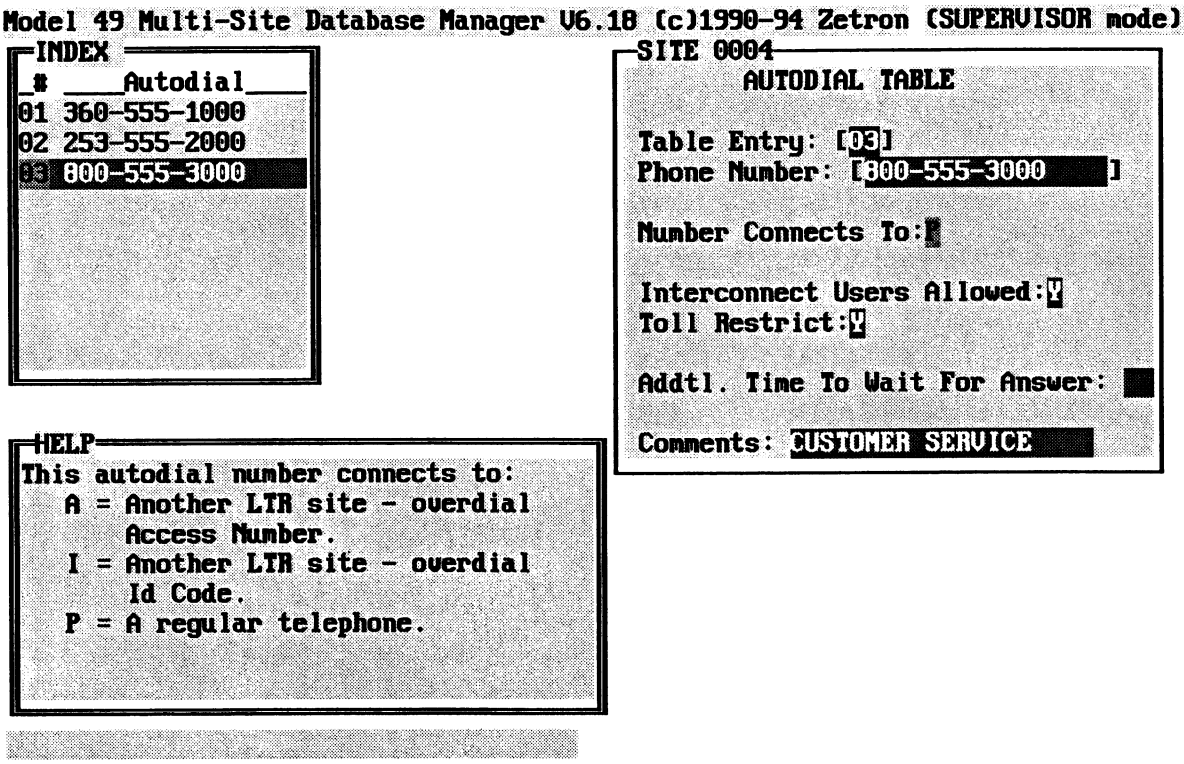

Figure 7-43. Autodial Entry #03

SITE 0005 - μWAVE DIRECT 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 7-44.

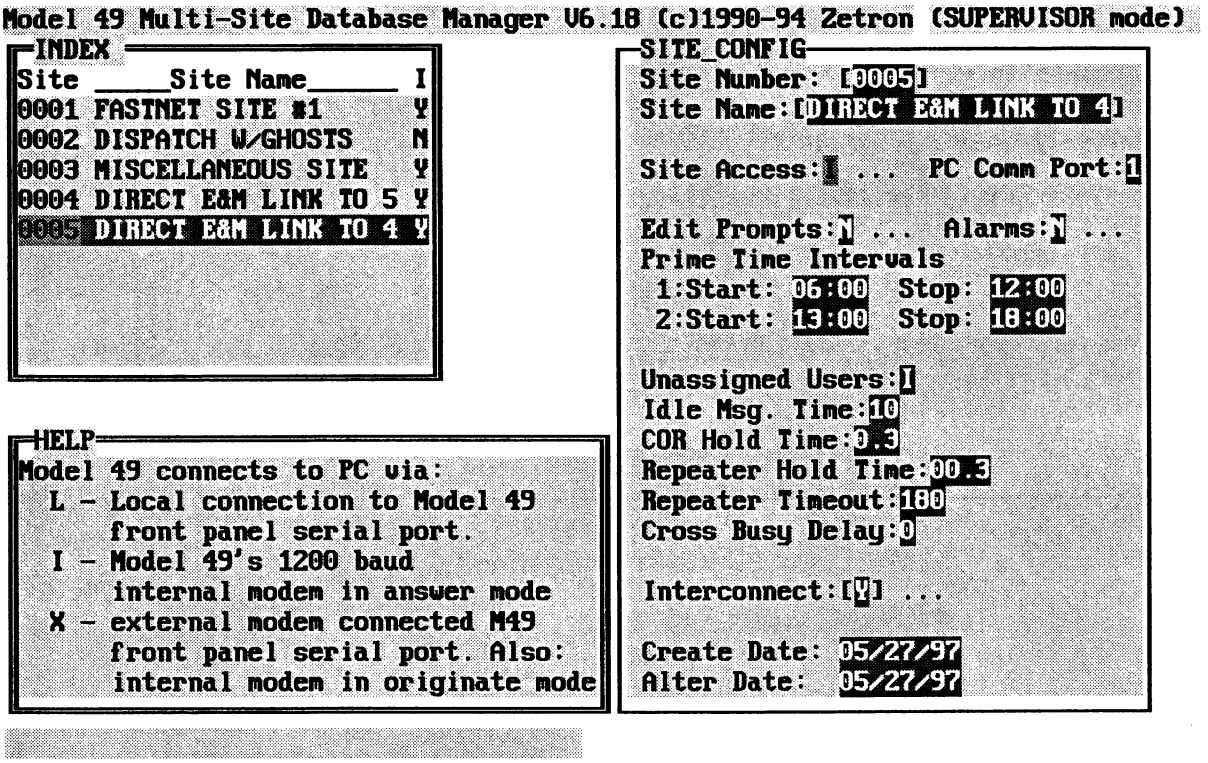

Figure 7-44. Site #0005 Configuration

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 7-45 shows the index window and the identically programmed users.

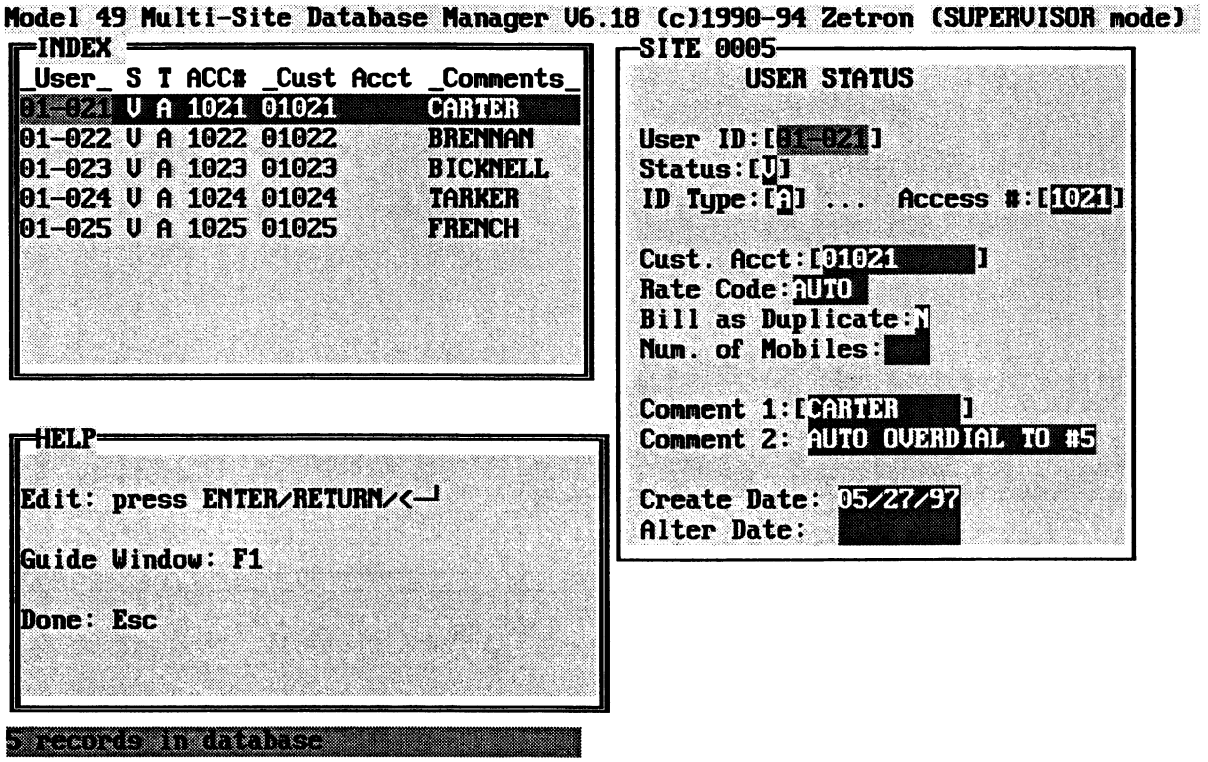

Figure 7-45. User Status

If the Direct Link (set in the Outgoing Calls window) is set to I, the User ID must be the same at each site. If the Direct Link is set to A, the Access # must be the same at each site. For information about the settings for Direct Link, see "Step 2. Repeater Configuration Programming" in Section 4.

The ID Type A causes the Interconnect window to appear. The Networking Type should be set to N (none) for direct-connect autonet. The setting, P (push-to-connect), is used for dial-up autonet.

8. GLOSSARY OF TERMS

This glossary provides definitions of some industry-specific terms. Many of the glossary words are defined loosely because they are used in a wide variety of applications. In addition, some of the glossary words can be defined differently when they are out-of-context. These glossary definitions are meant to be applied only to the text of this and other related Zetron manuals.

- A -

Address — The "location" of a user; usually the ID code.

Alarm — A monitor of specific critical conditions at the site.

Answer-originate — A method of establishing a modem communications link. When the site answers the phone line, the calling modem emits answer tone, which is detected by the site modem.

ASCII Character — A letter, number, or symbol belonging to the American Standard Character set. The standard includes 256 different characters, each identified by a three-digit decimal number (000-255).

Audio — Identifies anything that is "heard," either by the human ear or by some equipment. In the Model 49, audio can indicate incoming or outgoing voice, DTMF, or serial data.

- B -

Batch — A set of information generated by the radio equipment that is transferred to other equipment at a specified interval.

Broadcast — A transmission delivery to at least two radio stations simultaneously. A broadcast is usually received over a bus-type local network or satellite.

Buffer — A temporary storage area for holding pages or other data. Most buffers operate generally on a first-in, first-out (FIFO) basis like a fast-food drive-through line.

Busy — An already-in-use condition in the mobile or repeater.

- C -

Cable — An electrical interface comprised of one or more wires used to transmit a current or signal.

Call Detail — A file that contains billing information for interconnect phone calls processed by the FASTNet Switch. The call detail record includes the phone number of the FASTNet Node user, the time, date, and length of the call, and the status of the call.

Capacity — An average amount of traffic that a circuit can handle. The capacity is given as a guide for maximum consistent load on a system.

Call Forwarding — A method of making a "second effort" to complete an incoming call to a FASTNet Node User. When the mobile does not answer the call within a specified time period, the call is rerouted to another phone number, or voice messaging, or a paging terminal, etc. Call forwarding is designed to keep the users always in-touch.

Carrier — A physical connection carrying more than one communication channel.

Carrier Operated Relay (COR) — A data input that determines when the transmission path is already busy.

Central Office (C.O.) — The telephone company's switch that connects a phone line to the public switched network.

Channel — An electronics communications path (a single repeater). A narrow band of frequencies that a radio system must operate within to avoid interference with other adjacent channels.

Class-of-Service (COS) — A set of operating parameters that define certain users.

Clear to Send (CTS) — A data input that determines when the line is clear (not busy) for transmission of information.

Co-located — Refers to two or more pieces of paging equipment that are located at the same site. This type of system allows for direct cable hookup, rather than modem or RF-type connections.

Compandor — A circuit that compresses the dynamic range of an input signal to eliminate noise and interference.

Coverage The useable radio time and geographic area of a system.

- D -

Database A software program that stores many different records of information. Each record shares the same parameters (with different settings). A database can be sorted by each of its characteristics.

Data Terminal Ready (DTR) A data output that determines when the receiving party is set to accept information.

Decoder A device that receives input data and translates it into a usable format.

Delay The time difference between initiation of an event and the response.

Dial Click The audio data produced by a rotary dial telephone. The "clicks" are a result of the phone line loop current being broken and reconnected via a relay. Each digit is a series of one to ten audible clicks.

Dialing Plan A set of digit strings that Node users are allowed to dial. The dialing plan sets up the correspondence between the number dialed and the best least cost routing.

Dialtone A phone line condition that indicates to the calling party that the exchange is ready to receive information.

Direct Inward Dial (DID) A type of phone line (from the C.O.) that transfers the last few digits of the phone number dialed. A DID line allows direct dialing to a PBX network without operator assistance.

Dispatch The common term for the normal method of transmission between radios in the same group. Using a repeater, one radio broadcasts to one or more radios, all with the same LTR ID. Dispatch calls are normally transmission trunked, meaning that every time a group member keys up another channel may be used.

Dual Tone Multi-Frequency (DTMF) A Touch-Tone protocol used in telephone equipment. DTMF uses two voice-band tone signals at the same time.

- E -

E & M — A telephone line type that indicates seizure and supervision on two separate wires. E and M refer to the two data wires - Ear (receive) and Mouth (transmit).

End-to-End — A standard telephone line type like that available in a home. Also referred to as a POTS line.

Expandor — A circuit that expands the dynamic range of an output signal that was companded.

- F -

FASTNet — Zetron's high-speed digital switching network that connects LTR and/or conventional systems for wide-area coverage.

FCC — Federal Communications Commission. The U.S. government agency that regulates non-governmental domestic communications systems.

Feed Digits — The DTMF signals sent to the equipment by the telco CO. The Number of Feed Digits field identifies how many digits the repeater manager should expect to receive on a given trunk.

Follow-Me Roaming — An optional feature that enables FASTNet users to travel to another, networked node and register. Once the user is registered as a roamer at the host node, all of the calls and message beeps (if enabled) are forwarded to the mobile. The net result is the user can enjoy "true" roaming privileges.

Foreign Exchange (FX) — Phone lines from a central office that is not the local central office.

Frequency — An alternating current (AC) signal's cycles per second (measured in Hertz).

Full-duplex — A mobile radio that can transmit and receive simultaneously. Requires two separate frequencies for data transmission in both directions.

- G -

Ground Start — A telephone signaling protocol where a ground condition represents seizure of the phone line by the originating equipment.

Guide Window — A help screen in Fastbase and TCE that provides shortcut key sequences for database operations. Two different guide windows are available; the Data Window Guide and the Index Window Guide. Pressing the <F1> key accesses the Guide Windows.

- H -

Half-duplex — A mobile radio that can only perform one-way communications at any given time - transmit or receive.

Handshaking — The initial communications between modems to establish a connection. Handshaking allows modems to confirm communications parameters such as baud rate, parity, and number of stop bits.

Hook — Refers to the telephone cradle. A phone is idle in the on-hook condition and busy (in use) in the off-hook condition. Generally, loop current flows during the off-hook condition.

- I -

Immediate Start — A telephone signaling protocol that does not require a start indication. The CO sends digits to the equipment immediately after the line is taken offhook.

Interconnect — A transmission link between trunking repeaters (radio) and standard telco lines. In the Model 49, interconnect is a purchased option.

Interface — A connection between multiple pieces of hardware equipment.

Interference — Any noise source that impairs the communications link between two pieces of equipment. In a paging system, interference can effect telephone connections, RF and μwave connections, and paging transmissions.

Initialization String — See **Modem Initialization String**.

- J -

Jumper — A hardware connection between two pins. A jumper is a small plastic rectangle with metal pin holes in the center.

- L -

Least Cost Routing — A method of directing each call through the FASTNet Switch in the most efficient, cost-effective manner. Least cost routing does a sequential search of the programmed trunks to determine which lines are available and most desirable.

Line Type — The signaling format used by the telco CO to connect the phone line. The line type usually determines the number of signal leads used, their functions, and the way a call is initiated. The most commonly used types are E&M, end-to-end, and DID.

Link — A communications connection. A link is used to pass information to a remote location or another piece of equipment. See also **RF Link**.

Local Connection — A cable interface between two pieces of equipment that are located at the same site. For example, a local connection can be between the office computer and the paging terminal or the paging terminal and the transmitter equipment.

Loop Start — A telephone signaling protocol that initiates a call upon connection of the tip and ring leads (loop closed).

LTR — Logic Trunking Radio. E.F. Johnson's protocol for mobile trunking radios.

- M -

Maintenance Port — A port on the Model 2540 chassis for PC communications with the FASTNet Switch. The maintenance port can be either a local, serial connection or a remote, modem connection. The maintenance port in needed for updating the database and modifying system operating characteristics.

Zetron strongly recommends that a modem maintenance port is available for factory support and troubleshooting.

Menu — Any set of options that allows the user to navigate through the database or communication functions. A menu doesn't allow the operator to enter or alter any data directly, it simply provides a path to a database record or another menu.

Message Beeps — Several short beeps issued to the mobile upon key-up to indicate that the user has unretrieved voice message(s) waiting in their mailbox.

Microwave (µwave) — Radio frequency commonly used for long-distance telephone communications. (Frequencies above one gigahertz - 1,000 MHz.)

Mobile — A hand-held LTR radio unit.

Modem — A computer communications device that transmits and receives data over telephone lines for remotely located systems.

Modem Initialization String — A set of commands issued to a modem to define its operating characteristics. The modem initialization string usually consists of standard Hayes "AT" commands. Refer to the modem manual for model-specific commands.

Morse Code ID — A station identification sequence assigned by the FCC when an RF transmission site license is acquired. The Morse code ID is usually a set of 8 to 10 call letters that uniquely identify the licensee. The ID is played over the air at a specified interval to meet FCC compliance standards.

Multibase — Zetron's trademarked database program for managing the Zetron Model 49 Trunking Repeater Manager (and the Uniden MRS804ZX Repeater).

Multi-frequency (MF) — A Touch-Tone protocol used in telephone equipment. MF is similar to DTMF, but uses different combinations from another tone set.

- N -

Netlink — A Zetron proprietary serial communications program for use with the FASTNet Switch. Netlink is used for transferring files back and forth between the Model 2540 and the office PC and modifying various system parameters.

Netview — An optional on-screen display of FASTNet system traffic. Netview is useful for monitoring system loading and call routing.

Network — A set of communications lines or devices that are connected together to provide greater coverage area and availability.

Network Dispatch — A Model 49 plus FASTNet feature that allows multiple-site group calls with directly connected and dial-up sites. The radios operate in half-duplex mode. A telephone caller may initiate and participate in a Network Dispatch call. See also TeamTalk.

Node — A single FASTNet Switch. A unique three-digit number from 0 to 255 identifies each node.

Noise — Any interference in a communications link. In the paging world, noise can cause missed or garbled pages, false alerts, and inaccurate data.

- O -

Outdial Table — A command set that determines how the FASTNet Switch processes the feed digits it receives from a mobile unit. Outdial commands define the type of signaling (pulse, DTMF, or MF) and the outbound dialing sequence (including pauses and dialtone detection).

Overdial — Touch-Tone signals sent to the hardware from a modem or telephone keypad. Overdial often indicates that tones are dialed before the prompt is through playing.

- P -

Password — Any security word (letters or numbers) that is required for access to a specific part of the Model 49's operation. Multibase allows password programming to communicate with the Model 49 and edit specific databases, individual trunks, and subscribers. All passwords can be bypassed - that is, made inoperable.

PBX — Private Branch Exchange. A private telephone switch network that connects lines at a single site to the public switched network.

Pin-out — A description of each signal lead for a interface connector or cable. The pin-out identifies each signal by name, number, and function so that the proper connections can be made between equipment.

Port — A pathway for information passing. Most ports have connectors for hookup to other equipment. For example, RS-232 serial ports - DB9, DB25, etc., RJ-type telephone connectors - RJ21, RJ11, etc., and Weidmüller connectors.

Potentiometer (pot) — An analog circuit adjustment control for setting levels. Most pots look like screws and can be set using a small flathead screwdriver.

Prompts — A tone or voice message that guides a caller in using the radio system. Prompts tell the user when and what type of action is appropriate.

Protocol — The rules of operation that govern a communication network.

PSTN — Public Switched Telephone Network. A commonly accessed domestic telecommunications network provided by the telephone company.

PTC (Push-to-Connect) — On a mobile radio, the button that must be pushed to access the communication system and transmit. In the Model 49, PTC also refers to a type of user programming that immediately dials a specific number upon key up.

Pulse Dialing — The signaling of digits 1 to 9 and 0 by breaking (disconnecting) and making (reconnecting) the phone line connection quickly one to ten times. A rotary phone uses this type of dialing.

- R -

Radio Site — Any radio system that is connected (either directly or through a remote media - i.e. microwave) to the FASTNet Switch. Radio Sites can include any equipment from a Zetron Model 49 to a paging terminal.

Range — The usable coverage area of a radio system or transmitter.

Remote Connection — A communications interface made between two pieces of equipment that are not located at the same site. The remote connection can refer to a modem link between the office computer and the Model 49 or an RF or μwave link between repeater sites.

Repeater — A radio station that receives a signal on one frequency and immediately rebroadcasts it on another frequency. Repeaters are used to increase the coverage area of a given system.

Request to Send (RTS) — A data output that announces to the receiving party that data is ready for transmission and requests a chance to send it.

RF Link — A communications interface between equipment via the radio frequency. RF links are commonly used to send paging data to remotely located transmitters to increase the coverage area.

RIC — Repeater Interconnect. A radio station that is connected to other radio station(s) through telephone lines to increase the coverage area.

Rotary Dialing — See **Dial Click**.

Routing — The data path through which calls or information are passed. In an LTR system, routing is the sequence in which a call is trunked between repeaters.

- S -

Site — The radio equipment at a single location. The site may consist of a single repeater or an entire bank of repeaters with connected accessories.

SMDR — Specialized Mobile Detail Record. A billing record for LTR calls. The file contains specific information about each call made on a system.

SMR — Specialized Mobile Radio. A group of several different types of two-way radio communications systems. See also **LTR**.

Sorting — A method of organizing database records so the pertinent data is easily recognized. For example, it may be useful to sort the user database by name to locate a specific customer's record. The Model 49 database can be sorted by any field.

Squelch — Audio receiver circuitry that turns off output when a desired radio signal is not present.

Statistics — A mathematical analysis of some data. The Model 49 offers statistics on many different characteristics of the paging system. For example, statistics show repeater loading that identifies average and peak traffic times during each day. Statistics help the system operator manage the trunking system more efficiently, identify the need for more resources, and troubleshoot problems.

Supervision When a switching network monitors the status of a line for the duration of a call.

Switch A telephone device that connects multiple inputs and outputs. The switch controls the routing and organization of the data transmission paths.

- T -

TeamTalk A Model 49 plus FASTNet feature that allows multiple-site group calls with directly connected sites. The radios operate in half-duplex mode. A telephone caller may initiate and participate in a TeamTalk call. A TeamTalk multi-site call sets up faster than a Network Dispatch call, but does not allow dial-up sites.

Telco A local telephone service provider. The telco leases different line types and services to customers.

Time-out A specified time limit in which a certain condition must be met before a default action takes place. For example, the maximum time a caller is allowed between keying DTMF digits before the paging terminal considers the page complete.

Touch-Tone AT&T's registered trademark name for push-button dialing. See **DTMF**.

Traffic The frequency, volume, and duration of calls on a radio system.

Transmission Broadcast of communications data over a specific frequency range.

Trunk A wireline data path between communications switching equipment. On the paging terminal, a trunk describes an input/output port for passing paging information.

Trunk Card Editor (TCE) A user-friendly database program used for modifying the operating characteristics of the FASTNet Switch trunk cards.

Trunking The process of rerouting calls between repeaters in an LTR system.

- U -

UPS (uninterruptible power supply)

A power source that obtains standby power from storage batteries to sustain system operation through brownouts and blackouts.

- V -

Voice Prompts

A voice message that guides a caller in using the paging system. Voice prompts tell the user when and what type of action is appropriate. In the Model 49, voice prompts are not prerecorded, so the system operator can record anything they like.

- W -

Wink Start

A telephone signaling protocol where the initiating offhook from equipment A is acknowledged with a brief offhook and onhook from equipment B. Equipment A waits for the response from equipment B before proceeding to signal digits.