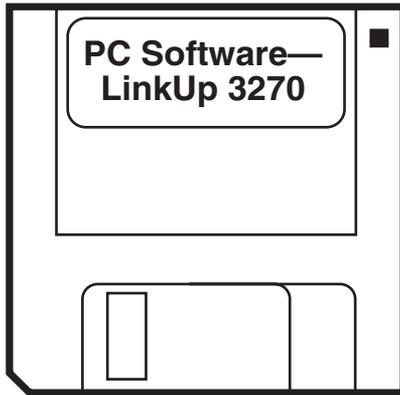




PC Software—LinkUp 3270



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1. Introduction

1.1 About This Manual

This manual assumes that you are familiar with:

- The DOS operating system and PC environment
- modems
- Microsoft Windows
- The operational principles and features of 3270 terminals

This manual is divided into the following chapters and appendixes:

- Chapter 1 provides an overview of the various features and capabilities of the software, and lists the hardware and system requirements.
- Chapter 2 explains installation and basic configuration of the software and modem configuration.
- Chapter 3 details the operation of the software and how it is used for 3270 emulation.
- Chapter 4 explains use of the TLAUTO autodialer for dialing and autologon.
- Chapter 5 shows how to perform PC-to-mainframe file transfer.
- Chapter 6 provides information on advanced configuration parameters and functions.
- Appendix A lists and defines all files contained in the PC Software LinkUp 3270 program.
- Appendix B explains how to customize the keyboard maps to support non-factory default keyboard layouts.
- Appendix C reviews the procedures involved in modifying the translation table.
- Appendix D provides a list of the factory default key sequences defined for each of the 3270 emulation functions of the PC Software—LinkUp 3270, and contains diagrams of all available keyboard maps.

- Appendix E identifies the scan codes for three of the popular personal computer keyboard layouts (IBM PC standard, IBM PC extended, IRMAkey keyboards). This is done to aid your modification efforts in case the factory default IBM PC extended keyboard is not the one you will be using with the PC Software—LinkUp 3270.
- Appendix F provides explanations of error messages that may occur during operation of the PC Software—LinkUp 3270.
- Appendix G contains the decimal to hexadecimal change table for use in configuring alternate screen sizes.
- Appendix H is a glossary.

1.2 Related Publications

The following manuals may prove useful during the installation and operation of the PC Software—LinkUp 3270:

- DOS Reference Manual
- LinkUp (PCM90A) or A/44 (Bidirectional) (PCD42A) User's Manual

1.3 Conventions

The following conventions are used throughout this manual:

<Enter>—A keyname enclosed in angle brackets indicates that you should press a specific key on your keyboard, except when used in TLAUTO. In this example, you would press the Enter key.

<Ctrl/C>—A keyname followed by a forward slash and another keyname, all enclosed in angle brackets, means that the first key should be pressed and held, then the second key should be pressed. Do not type the forward slash.

CAPS—Bold capital letters are commands to be typed.

{ }—Items inside brackets are optional parameters of a command. Do not type the brackets.

<Esc><T>—A keyname immediately followed by one or more keynames indicates that the first key should be pressed and released, then the next key should be pressed and released, and so on.

filename—Parameters in italics indicate a variable filename, drive letter, or other parameter. Type it in the position indicated by the italics.

3270 host—Refers to any of the IBM 370-type mainframe computers.

PC—refers to an IBM Personal Computer or compatible.

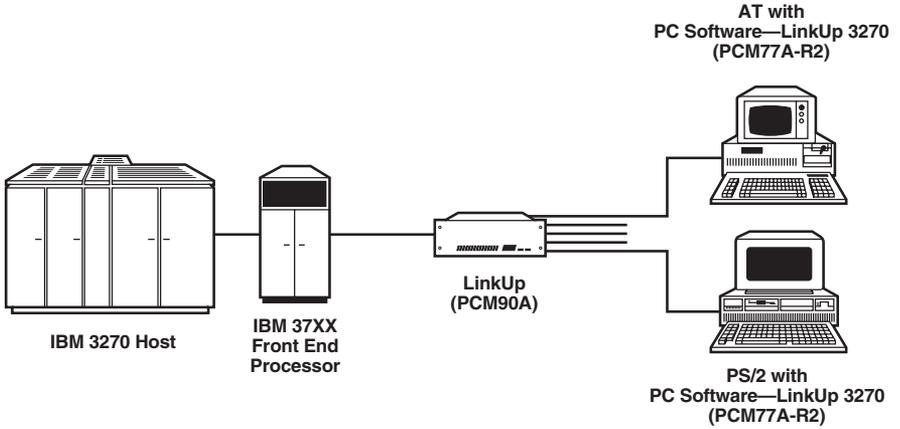
1.4 General Description

The PC Software—LinkUp 3270 is a PC software package that enables an IBM PC or compatible to do the following when used in conjunction with a controller or converter:

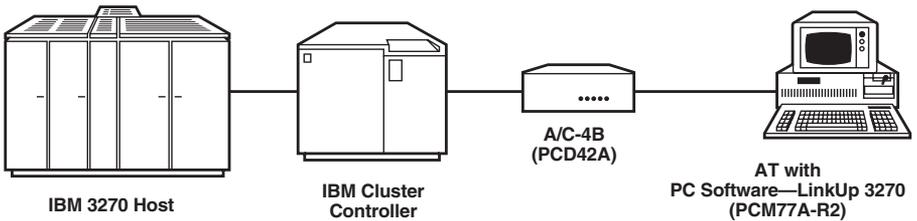
- Emulate an IBM 3278 model 1, 2, 3, 4, or 5 display terminal
- Emulate an IBM 3279 non-graphics terminal in text mode
- Emulate an IBM 3287 model 2 printer on the PC-attached printer or by “printing” to a disk file
- Transfer text or binary files between the PC and TSO, CICS and VM/CMS or VM/SP mainframes using IND\$File (send/receive)
- Automatically dial and log on to the host system

Figure 1-1 represents a typical PC Software—LinkUp 3270-to-3270 host configuration when a LinkUp (PCM90A) controller is used.

Figure 1-2 represents a typical PC Software—LinkUp 3270-to-3270 host configuration when a A/C-4B (Bidirectional) (PCD42A) is used.



**Figure 1-1. Typical Configuration with LinkUp and
PC Software—LinkUp 3270 Configuration.**



**Figure 1-2. Typical Configuration with A/C-4B and PC Software—
LinkUp 3270.**

1.5 Features

- **TSR (Terminate/Stay Resident) or Non-TSR:** PC Software—LinkUp 3270 can be invoked in either mode.
- **Print to Disk:** Allows print jobs that would ordinarily print on the PC's attached printer to print to a disk file, saving paper and allowing print jobs to be imported into word-processor programs as text files.
- **User-friendly File Transfer:** PC Software—LinkUp 3270 prompts you to enter the PC filename, the host file name, and the file transfer options.
- **Autodial/Autologon:** An enhanced autodialer has been added that allows data to be transmitted to the controller before giving control back to you, to support autologon.
- **Com 1-4 Support:** The software supports com ports 1-4 and allows you to change the port I/O address and IRQ level from standard values, if needed.
- **Model 3, 4, and 5 Support:** On PCs with EGA or higher, the software will automatically toggle the display into 80 col x 43 lines (model 4) or 132 col x 42 lines to accommodate model 5 display size. Note that support depends on the video adapter card installed.
- **Block Mode:** Provides block mode transmission for special applications.
- **DOS Shell:** Allows another DOS program to be loaded or other DOS functions to be performed without breaking the host connection.

FEATURES NOT SUPPORTED

- SG3 Graphics/APA Graphics/GDDM Graphics
- Programmed Symbols
- Triple Plane Symbol Sets
- DFT Emulation
- API/HLLAPI Support

1.6 Hardware and Software Requirements

This section describes the hardware and software requirements for operation.

1.6.1 PERSONAL COMPUTERS

PC Software—LinkUp 3270 operates on IBM PC/XT, AT, PS/2 and compatibles that meet the following minimum requirements:

- At least one diskette drive. Because of disk space considerations, a second diskette drive or hard disk is recommended if file transfer will be used.
- IBM PC DOS or MS-DOS version 2.1 or higher. If using Compaq® or Toshiba® machines, Compaq or Toshiba DOS is required.
- 512K of RAM.
- Monochrome, gray-scale, LCD, active matrix or other CGA, EGA, VGA , or compatible monitor and display adapter. An EGA or higher is required for model 3, 4, or 5 emulation.
- Internal modem or serial com port and external modem if dialing into the host, or
- One (1) serial com port if connecting to the host through non-dial up connection.
- One (1) LPT parallel port or an additional serial port if aux printing will be used. If the print-to-disk feature will be used exclusively, no printer is required.
- A parallel or serial PC-compatible printer if aux printing will be used. If a serial printer is to be used an additional serial com port is required.
- Windows™ 3.1 if PC Software—LinkUp3270 will be used as a DOS application running under Windows. Use of Windows 3.0 is not recommended, since this Windows version may cause loss of data on the com port.

For PC operating systems other than DOS or Windows, PC Software—LinkUp 3270 should work if the operating system supports DOS communications programs in a DOS-compatible environment. Please refer to the documentation for the operating system you are considering for installation and operation.

1.6.2 CONTROLLERS

The LinkUp (PCM90A) or A/C-4B (PCD42A) controller is required between

your PC running PC Software—LinkUp 3270 and the 3270 host you are accessing. You must have a minimum level of firmware installed, with the following characteristics:

PCM90A with PCM92 firmware:

- Block mode support—v3.73 or higher
- IND\$file support—yes
- Aux printer support—yes
- 7 Color/Extended Highlighting—not supported
- Model 3, 4, 5 Support—not supported

PCM90A with PCM71 firmware:

- Block mode support—not supported
- IND\$file support—yes
- Aux printer support—yes
- 7 Color/Extended Highlighting—not supported
- Model 3, 4, 5 Support—not supported

PCD42A:

- Block mode support—not supported
- IND\$file support—v2.20 or higher
- Aux printer support—screen prints only
- 7 Color/Extended Highlighting—not supported
- Model 3, 4, 5 Support—not supported

The controller displays the firmware version currently installed at every Connect Mode sign-on screen.

1.6.3 3270 HOST COMPUTER

In order to perform file transfer operations between your PC and a 3270 host, the appropriate host software must be installed.

Table 1-1 summarizes the IBM software programs compatible with the software and available for a 3270 host.

Table 1-1. IBM File-Transfer Programs.

Host Application Program	IBM File-Transfer Program	IBM Part#
VM/CMS	TL3270 Plus File Transfer Program	PP5664-281
TSO	TL3270 Plus File Transfer Program	PP5665-311
CICS	CICS/VS to TL3270 Plus File Transfer Program	PO5798-DQH

NOTE

When using CICS, the host computer must be configured with the terminal device defined as a 3278. We recommend that the same definition be assigned when using VM/CMS and TSO.

1.6.4 CABLES

Cable requirements are as follows:

- Standard EIA RS-232C interface cable(s) between your PC and the controller in a direct connection or between your PC and the asynchronous external modem in a remote connection. See Figure 1-3 for recommended cable pinouts.
- Telephone cord(s) for dial-up applications.

If desired, a PC running PC Software—LinkUp 3270 can be directly connected to a converter using 4-wire twisted pair cable. In the case, the following is required:

- PC Software—LinkUp 3270 Communications Port Menu
 - X-On/X-Off flow control must be set to ON
 - CTS/RTS flow control must be set to OFF
 - Device Ready signal must be set to NONE

- Controller Configuration
 - Device Ready Signal must be set to DTR
 - Flow control must be set to X-On/X-Off
- Cable Pinouts

Table 1-2. Cable Pinouts.

Signal	DB25 Pin	DB9 Pin
TXD	2	3
RXD	3	2
GND	7	5
DTR	20	4

DTR is recommended so that the host session will be properly terminated by the converter in case you have powered off the PC or unloaded the software without first logging off. This function also depends on proper configuration of the converter. Please refer to the appropriate converter manual for details.

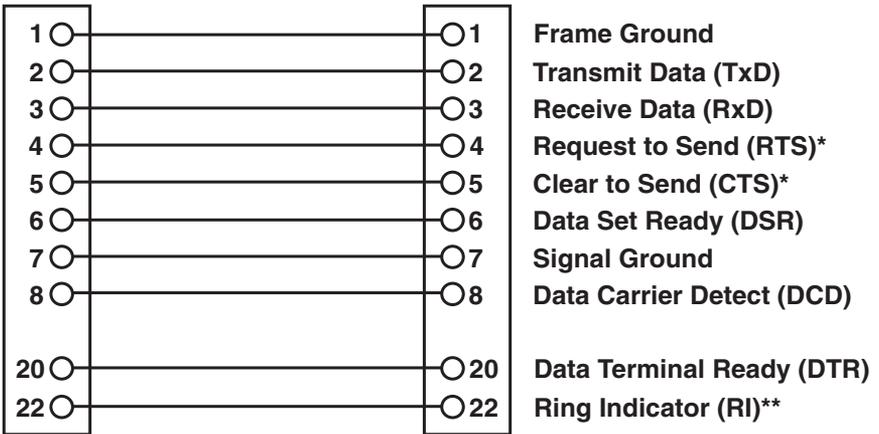
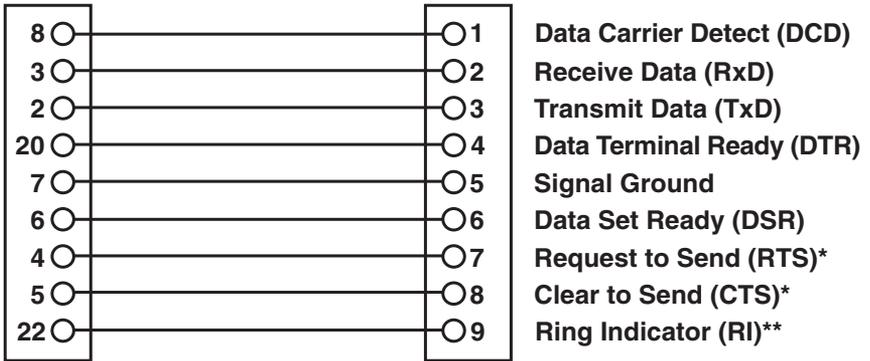


Figure 1-2. RS-232C/DB25 Cable Requirements.



*required if using CTS/RTS flow control;
 optional if using XON/OFF flow control.
 **required for dial back applications.

Figure 1-3. RS-232C DB25/DB9 Cable Requirements.

2. Installation and Basic Configuration

This chapter covers:

- How to choose between TSR and non-TSR modes
- How to anticipate and deal with PC hardware conflicts
- Special considerations concerning PCMCIA modems
- Installation of PC Software—LinkUp 3270 under DOS and Windows
- Choosing and loading the correct keyboard map
- Configuring the basic software settings
- Entering phone numbers into the TLAUTO autodialer
- Configuring the PC modem

By completing the procedures in this chapter, you will be ready to perform the following tasks, as detailed in **Chapter 3**:

- Connect directly or dial into the controller
- Log on to the host
- Perform emulation and file transfer (**Chapter 5**)
- Perform host printing to the PC printer on LPT1 when connected to the controller, if enabled on the controller
- Log off from the host
- Disconnect from the controller
- Exit PC Software—LinkUp 3270

Additional configuration options and detailed explanations of how configuration options interrelate are presented in **Chapter 6, Advanced Configuration**.

2.1 TSR and Non-TSR Mode Considerations

PC Software—LinkUp 3270 can be run as a Terminate-and-Stay-Resident (TSR) or as a non-TSR program. Although most emulation functions, such as data entry, inquiry and printing, work in the same way, there are some operational differences as listed below. Please read the following carefully to determine which mode is best for you.

2.1.1 TSR MODE

- TSR mode allows you to hotkey between the emulation session and a DOS session without breaking your host connection.
- In TSR mode, you must enter commands at the DOS prompt to activate such functions as file transfer, autodialer and to change or review the configuration.
- Allows PC Software—LinkUp 3270 and related functions to be executed from a batch file or menu program.
- TSR mode requires about 134K of memory, which cannot be freed without rebooting the PC.
- TSR mode cannot be used when running from Windows.
- Other programs will not be able to use the com port used by the software unless the software is deactivated by rebooting the computer.

2.1.2 NON-TSR MODE

- Recommended when memory constraints are tight because the memory used by the PC Software—LinkUp 3270 will be freed when exiting the program.
- DOS commands can be executed using the built-in DOS gateway without breaking the host connection.
- Provides pop-up menu access to all functions.
- Must be used when running as a DOS application under Windows.

2.1.3 CHOOSING TSR OR NON-TSR MODE

To choose between using TSR and non-TSR mode, consider how you will use PC Software—LinkUp 3270. Typically, non-TSR mode is desirable for most users, as the autodialer, file transfer and configuration menus can be “popped up” from within emulation mode, making menu access more user-friendly.

To perform the same functions in TSR mode requires first hotkeying to the DOS prompt and then entering commands to activate these functions. TSR mode is usually preferred when you need to run PC Software—LinkUp 3270 from a batch file—for example, if you want to automatically start the program, dial the host, log on and access the first application screen by typing in one command at the DOS prompt.

We strongly recommend that you use non-TSR mode until you are familiar with the operation of the program, and then use TSR mode only if you need to.

When running PC Software—LinkUp 3270 as a DOS application under Windows, you must use non-TSR mode.

2.2 PC Communications Hardware Conflicts

When you load PC Software—LinkUp 3270 for the first time, the software attempts to initialize the hardware on the communications port configured as com1. If another program (a mouse driver, for example) is resident and is already using that port, or another port or device is using IRQ4, PC Software—LinkUp 3270 will not function correctly or may fail to load, so you might need to reboot or power-cycle the PC to recover. If this occurs, try the following:

1. Temporarily disable the software that is using com1 or IRQ4. If you are loading the software in your AUTOEXEC.BAT file, you can add REM in front of the command with a text editor and reboot.
2. Load PC Software—LinkUp 3270 and reconfigure it for the desired com port. Change the IRQ and/or base I/O address only if necessary. Save the changes.
3. Edit the AUTOEXEC.BAT file if necessary to reactivate the software using com1. With this software active (reboot if necessary), reload PC Software—LinkUp 3270 to make sure that both programs co-exist.

If you plan on using PC Software—LinkUp 3270 concurrently with a program that ordinarily uses the same IRQ, you will need to change the IRQ setting on one or the other. For example, if you are using:

- A mouse on com1 (default IRQ4)
- PC Software—LinkUp 3270 on com3 (default IRQ4)
- Another device on com2 (default IRQ3)

You will need to:

- Change the mouse software and hardware to use a different, unused IRQ (i.e. IRQ5), or
- Change PC Software—LinkUp 3270 and the associated com port to use a different, unused IRQ.

To change the hardware IRQ settings usually requires moving jumpers on the card or the main board of the PC. For the details, refer to the documentation for your particular hardware.

2.2.1 PCMCIA MODEMS

Newer notebook computers often come equipped with PCMCIA (credit-card-sized) modems. Because the PCMCIA interface was not originally designed with communications in mind, you will need modem driver software to interface between the modem and the notebook PC, unless your machine BIOS recognizes the PCMCIA modem as a communications device.

This software causes the PCMCIA modem to appear as a com port in addition to the com ports physically present in the machine. With PC Software—LinkUp 3270 and other communications programs, the PCMCIA modem card appears as a card installed in the PC bus slot.

Limitation: as of this writing, the Megahertz modem software does not allow the IRQ to be reassigned independently of the com port selection. This means that if the software is configured to use com1 or com3 for the mode, the IRQ is fixed at IRQ4, and if configured for com2 or com4 the IRQ is fixed at IRQ3.

Installing PC Software—LinkUp 3270 to use a PCMCIA modem requires the same installation procedure as any other modem, but you must also configure the modem driver software, if necessary. Make sure to read the preceding **Section 2.2, PC Communications Hardware Conflicts**, before installation.

NOTE

If you will install PC Software—LinkUp 3270 on an AST PowerExec 386SL/25 notebook with the trackball that clips onto the front of the keyboard, you must configure the PCMCIA modem to use either com2 or com4. On this machine, you cannot use com3, because of a BIOS limitation related to the trackball and the mouse keys on the main keyboard. Other similar machines with pointing devices may also have this limitation.

2.3 Software Compatibility

PC Software—LinkUp 3270 is designed to be compatible with virtually any software package installed on a PC. However, since PC Software—LinkUp 3270 is a communications program, it requires constant control of its configured communications port. If you are using an auxiliary printer with the software, it too will be guarded by the software.

To ensure against corrupting the performance of the software and any competing program, you may have to adjust the load order of the PC Software—LinkUp 3270 and the competing program to operate through their own separate communications ports. If your PC is equipped with only one communications port, and/or an auxiliary printer will be used during the operation of each program, avoid operating PC Software—LinkUp 3270 simultaneously with other programs requiring similar control and/or auxiliary printer use.

2.4 Installing PC Software—LinkUp 3270

You can run PC Software—LinkUp 3270 as a standalone DOS application or as a DOS application under Microsoft Windows V3.1. The following installation instructions for the software assume a basic working knowledge of DOS.

If you are presently using Windows V3.0 and wish to use PC Software—LinkUp 3270, we recommend that you first upgrade to Windows V3.1 to avoid losing data when using the PC com port, especially during file transfers.

NOTE

PC Software—LinkUp 3270 can be run from a floppy drive, but for optimum performance, we recommend that you run the software from a hard drive. If you run the software from a floppy drive, there will be minimal space to store files if you use file transfer.

2.4.1 DOS INSTALLATION

To install PC Software—LinkUp 3270 as a standalone DOS program, do the following:

Hard drive

1. Make a backup copy of the original distribution diskette. Never use the original distribution diskette as the working diskette. If damaged, you will need to obtain another copy.
2. Make a directory with the desired name, e.g. LinkUp.
3. Add the directory name to the PATH statement in the AUTOEXEC.BAT file (not required, but recommended).
4. Copy the files from the distribution diskette to the hard drive directory and store the distribution diskette in a safe place away from magnetic fields and humidity.
5. Turn to Appendix D and locate the keyboard map that matches your PC keyboard. If your PC uses the PS/2 style 101-key extended/enhanced keyboard, you can proceed to **Section 2.5, Basic Configuration (non-TSR Mode)**, as the default map is KCHAR.EXT. If not, proceed to step 6.

NOTE

The default keyboard map works with most notebook/portable computers.

6. After locating the KCHAR file that matches your PC keyboard, enter the following at the DOS prompt of the LinkUp directory:

```
>COPY KCHAR.ext KCHAR.DAT
```

substituting the appropriate extension for *.ext*.

For example, if you have an AT style keyboard as shown in **Appendix D**, you would copy KCHAR.PAT as KCHAR.DAT.

7. At the DOS prompt in the LinkUp directory, type TL3270 <Enter>. You will then see Compiling keyboard profile for PCEXT if you are using KCHAR.EXT as the base. If you are using another KCHAR file, the message will indicate the chosen keyboard profile. The following message box should appear briefly on the screen:

PLEASE WAIT FOR INITIALIZATION

and then disappear, leaving the cursor in the home position of the screen. If the message box does not appear or does not clear after a short time, review **Section 2.2** to help determine the cause. On fast PCs (486 or higher), this message may appear very briefly.

8. Installation is complete. Please refer to **Section 2.5, Basic Configuration (non-TSR Mode)**, for details on how to configure PC Software—LinkUp 3270.

Floppy diskette (requires a minimum of 310 KB)

1. Copy all files except LOADCODE.EXE, LOADCNFG.EXE, READCNFG.EXE and READRAM.EXE from the distribution diskette to the target diskette.

NOTE

These four files are used only for System Transfer Utilities functions in conjunction with LinkUp (PCM90A). They are not required for normal PC Software—LinkUp 3270 emulation and file-transfer functions.

2. Perform steps 5 through 7 from the preceding section. Store the distribution diskette in a safe place away from magnetic fields and humidity.
3. Installation is complete. Please refer to **Section 2.5, Basic Configuration (non-TSR Mode)**, for details on how to configure the software.

2.4.2 WINDOWS INSTALLATION

You can also run PC Software—LinkUp 3270 as a DOS application under Windows 3.1. After performing steps 1 through 6 from the preceding DOS installation section, perform the following steps in Windows Program Manager:

1. Choose **New** from the File menu.

Program Manager displays the New Program Object dialog box.

2. Select the **Program Group** option and choose **OK**.

Program Manager displays the Program Group Properties dialog box.

3. Type a description, such as **3270**, for the group you want to create. This description appears in the title bar of the group window and just below the group icon.

Program Manager automatically creates a .GRP file for the new group, so you can leave the Group File text box blank.

4. Choose **OK**.

The Program Group Properties dialog box closes, and the 3270 group window appears.

5. Close the 3270 group window.
6. Open File Manager and position and resize it so that you can see both File Manager and Program Manager.
7. Locate and select the TL3270.EXE program file in File Manager.
8. Drag it from File Manager to Program Manager and drop it on the 3270 group icon.

To activate PC Software—LinkUp 3270:

9. Click on the TL3270 program icon. “PLEASE WAIT FOR INITIALIZATION” should appear for a moment in a message box and then clear, leaving the cursor in the home position. If the message box does not appear or does not clear, review **Section 2.2** to help determine the cause.

2.5 Basic Configuration (non-TSR Mode)

This section explains how to configure the basic settings of PC Software—LinkUp 3270. For more details, or if you need to configure other parameters not shown here, please refer to **Chapter 6, Advanced Configuration**. Basic configuration assumes the following usage:

- model 2 dialup, emulation and file transfer
- screen and/or host printing to the PC printer

Basic configuration is performed as follows:

1. If not already activated, activate the software by typing:

TL3270 <Enter> at the DOS prompt in the LinkUp directory, or
double-click on the TL3270 icon in Windows.

2. Press <Ctrl/Alt M> to pop up the master menu.
3. Use the down arrow to highlight CONFIGURATION and press <Enter>. The Configuration Menu Main Option List will appear with the first item, COMMUNICATION PORT, highlighted.

The default basic configuration settings for the COMMUNICATION PORT menu are:

Communication Port	=com1
Communication Speed	=9600
Parity	=NONE
Number of bits	=8
Stop Bits	=1
XON/XOFF flow control	=YES
CTS/RTS flow control	=NO
Device Ready Signal	=NONE

If these values match those used for your system, you do not need to configure the COMMUNICATION PORT, and you may proceed to step 8.

4. If you need to change these settings, press <Enter> to access the COMMUNICATION PORT menu.
5. Use the up arrow or down arrow to highlight the desired parameter and press <Enter> to view the choices.
6. Arrow to the desired value and press <Enter> to select it. Repeat the process for all needed changes.

NOTE

You can configure PC Software—LinkUp 3270 to check for a DCE device-ready signal on the modem or serial port. This will prevent the software from transmitting if the device-ready signal you choose is not present. If the DSR or DCD pins are not in the cable attached to the PC com port being used by the software (see Figures 1-3 and 1-4), make sure to set the device ready signal to NONE.

7. Press <Esc> when finished making changes. This will return you to the main configuration menu.
8. If you will be dialing in to a LinkUp or A/C-4BB, arrow down to **Terminal Emulation Options** and press <Enter>. Arrow to the desired converter (LinkUp or A/C-4BB) and press <Enter> to select it.
9. Press <Esc> to return to the main configuration menu. Arrow down to **Save Configuration** and press <Enter>. After storing the new values, the menu will be redisplayed.
10. Press <Esc> to return to the master menu.

If you want to use the autodialer, do the following:

1. From the master menu, arrow to **Dialer** and press <Enter>. This will display the dialer menu, with the cursor in the Name field.
2. Type in a descriptive name associated with the number and press <Tab> to move to the number field.
3. Type the phone number using:
 - 9 or 8, if necessary
 - , (comma), if necessary
 - 1, if necessary
 - area code, if necessary
 - number

NOTE

As a default, the autodialer sends ATDT followed by the contents of the number field, followed by a carriage return. To modify this, see Chapter 4.

4. Press <Tab> to move to the Send after connected with Fn field, and <Tab> again to move to the second name field.

NOTE

To use the Send after connection function, see Chapter 4.

5. Enter additional number if desired by repeating steps 2 through 4. When finished, press <Shift/F1> to save the data.
6. If desired, you can now dial the host by pressing the function key indicated to the left of the number field. If you want to exit the dialer, press <Esc> to return to emulation mode.
7. This completes basic configuration.
 - For information on using emulation mode, see **Chapter 3**.
 - For information on other configuration parameters, see **Chapter 6**.
 - For information on file transfer, see **Chapter 5**.
 - For modem configuration information, see **Section 2.5**.

To exit PC Software–LinkUp 3270, press <Ctrl/Alt/X> to display the exit option menu, then press <Enter>.

2.6 Modem Configuration

To operate properly with PC Software—LinkUp 3270, configure the PC modem as follows:

- Set DSR to high when the modem is powered on.
- Set Carrier Detect (CD or DCD) to high only when carrier is present.
- Enable result codes. The result-code format should match the format used in TLAUTO (verbose).
- Set the modem to go on-hook (hang up) when DTR is toggled.
- If using dial back, set the modem to auto-answer mode, providing that it will allow you to originate calls while in auto-answer mode. If not, you may have to manually change a switch or issue the appropriate AT command, usually ATSO=1.

An example of an AT command string that would be used with a Hayes compatible modem is shown below. This string would work for basic dialup and dialback applications. You might need additional AT commands for your modem to set MNP, LAPM or other enhanced functions. PC Software—LinkUp 3270 should work with any modem error correction or compression feature, but since requirements and usage vary from installation to installation, no recommended settings for these features are offered here.

Recommended Modem Command String:
ATSO=1&C1&D2Q0E1V1X4&W

These commands affect modem behavior as follows:

- **S0=1** Causes modem to answer after one ring. You need this when you use dial back to put the modem into auto answer mode. If you are not planning to use dialback, and you want to disable auto answer, use **S0=0** instead.
- **&C1** Causes DCD (carrier detect) to follow true/actual carrier state.
- **&D2** Causes modem to hang up/go on hook when DTR TL3270 toggles or lowers DTR.
- **Q0** Causes modem to return result codes to PC Software—LinkUp 3270.
- **E1** Causes modem to echo commands back to you.
- **V1** Causes modem to return verbose result codes that match those expected by the PC Software—LinkUp 3270 dialer.
- **X4** Causes modem to wait for dial tone before dialing and enables extended result codes.
- **&W** Saves the foregoing string to the modem's non-volatile memory so the settings are not lost when the modem is powered off.

To configure the modem:

1. Load PC Software—LinkUp 3270 and configure to match the modem with respect to com port, IRQ (if necessary), baud rate, and flow control, if applicable, and save the changes, if desired.
2. Enter emulation mode by exiting the master menu and typing the AT command string followed by <Enter>. If your modem already has command echo enabled, you will see the characters echoed.
3. If the characters do not echo as you type them, press <Enter> and then type **ATE1** <Enter>. Any characters that you now type should echo on the screen. If not, there is a mismatch between the software configuration and the modem port, a defective cable or the modem is powered off or not working properly.
4. If the command string is accepted, the modem will display OK on the screen.

2.7 Flow-Control Recommendations

Flow control should be DTE-DTE (end-to-end) or DTE-DCE depending on the type of modems being used.

- If using a “dumb” modem that does not buffer or support error correction, set the software flow control to XON/XOFF and make sure that the LinkUp or A/C-4B is also set to XON/XOFF. This is end-to-end flow control in which the modems are transparent, as these modems are typically not configurable for flow control and will pass XON/XOFF between the DTE devices.
- If using MNP/LAPM or any error correcting modem that uses a block mode transmission scheme or second-level XON/XOFF flow control, match the flow control between the modem and the attached PC Software—LinkUp 3270 and LinkUp or A/C-4B. Flow control between the two modems is handled within the error correction protocol or secondary XON/XOFF independently of the DTE-DCE flow control setting. If flow control is exerted on the RS-232C port, the modem receiving data will withhold acknowledgement on the block or partial block last received until the RS-232C flow control condition is cleared.

For example, if using CTS/RTS flow control, configure the software and the modem RS-232C port for CTS/RTS flow control. Then make sure that the LinkUp or A/C-4B and the associated modem are also configured in the same way.

NOTE

The LinkUp 3174 port configuration flow control settings apply only to the display data. Aux printing flow control is handled by printer pacing codes that are not configurable and are automatically enabled when the IBMPC or TLBLK drivers are selected.

3. Emulation and Operation

This chapter assumes that PC Software—LinkUp 3270 is installed and properly configured. If you need to perform model 3, 4, or 5 emulation, please see **Chapter 6** before attempting emulation. The topics covered include how to:

- Activate PC Software—LinkUp 3270
- Initiate connection to the host
- Use the keyboard
- Interpret the status line
- Use aux printing and block mode

3.1 Activating PC Software—LinkUp 3270

PC Software—LinkUp 3270's non-TSR mode is invoked by typing TL3270 at the DOS prompt. When in non-TSR mode, the following keys are used to invoke the following functions and are active only during emulation (not active at the DOS prompt):

- Ctrl/Alt M—to access the master menu. The master menu is used to activate the dialer, file transfer, system transfer utilities or to modify/view configuration.
- Ctrl/Alt X—to exit the program, access DOS shell or exit and stay resident.

From the Ctrl/Alt X menu, you can select three choices:

1. If you select **Exit Program**, PC Software—LinkUp 3270 memory is freed and you must re-invoke the program.
2. If you select **Execute DOS Commands**, other DOS programs or functions can be run, if enough free memory is available.

To return to emulation mode, enter **EXIT** at the DOS prompt.

3. If you select **Exit and Stay Resident**, PC Software—LinkUp 3270 will go to the DOS prompt and behave as though it was invoked in TSR mode from the command line. From this point on, you must invoke the autodialer, file transfer and configuration functions will have to be invoked from the command line. See TSR Mode below for more information.

3.1.1 TSR MODE

PC Software—LinkUp 3270's TSR mode is invoked in one of two ways:

1. From the DOS prompt, type **TL3270/tsrs** to run PC Software—LinkUp 3270 from a DOS batch file.
2. After loading PC Software—LinkUp 3270 in non-TSR mode, select **Exit and Stay Resident** from the Ctrl/Alt X menu.

In either case, you will be returned to the DOS prompt. To toggle between the DOS prompt and emulation mode, press <Left Shift/Right Shift> or <Alt/Caps Lock>.

When using TSR mode, you must invoke configuration, autodialing, and file transfer from the DOS prompt. The commands used are:

- **TLXFER.EXE**—to activate file transfer. When file transfer is complete, or <Esc> is used to exit, returns to the DOS prompt.
- **TLAUTO.EXE**—to activate the autodialer. When the call is complete, or <Esc> is used to exit, returns to the DOS prompt, unless /AUTO HOT is used.
- **TLCONFIG.EXE**—to change or review the configuration.

NOTES

1. **Activating these programs will cause the same menus to display as those used in non-TSR mode.**
2. **You do not need to enter the .EXE extension.**

3.1.2 FUNCTIONS COMMON TO TSR AND NON-TSR MODES

The following special key functions are active whenever you are in emulation mode (both non-TSR mode and TSR mode):

- Ctrl/Alt H—manually hangs up the modem by toggling DTR.
- Ctrl/Alt P—manually closes the print-to-disk file.

All other 3270 functions listed in **Appendix B** are the same in both TSR and non-TSR modes.

NOTE

PC Software—LinkUp 3270 will not allow you to reboot the PC while in emulation mode. You will need to hotkey to the DOS command prompt (TSR mode) or exit PC Software—LinkUp 3270 (non-TSR mode) if you need to reboot.

3.2 Keyboard Layout

The keyboard layout supporting each of the keyboard functions has been designed to closely resemble your PC's standard keyboard layout. This means you can process data on both your PC and 3270 host while being familiar with just one keyboard layout. Table 3-1 contains a list of the 3270 keyboard and special functions currently supported by the software.

PC Software—LinkUp 3270 provides a 3270 status line on the bottom line of the screen that simulates the format used by the IBM 3278 terminal. Table 3-2 shows the symbols used by the software and their IBM equivalents.

Refer to **Appendix D, Keyboard Maps**, for a list of the factory-default key sequences defined to each of the standard 3270 and PC Software—LinkUp 3270 extended functions.

Table 3-1. 3270 Emulation Functions.

Cursor Movement	Hex Code	Action/Usage
Cursor Up	0Bh	Moves cursor up
Cursor Down	0Ah	Moves cursor down
Cursor Left	08h	Moves cursor left
Cursor Right	0Ch	Moves cursor right
Tab	14h	Moves cursor to next input field
Backtab	02h	Moves cursor to previous input field
New Line	0Eh	Moves cursor to first unprotected position of next line
Home	1Eh	Moves cursor to first unprotected position on screen
Fast Left	N/A	Moves cursor left two columns
Fast Right	N/A	Moves cursor right two columns
Keyboard Control	Hex Code	Action/Usage
Reset	12h	Used to recover from keyboard locked condition, unless host action pending
Insert	15h	Turns insert mode on. Use Reset to turn off.

Table 3-1. 3270 Emulation Functions (continued).

Keyboard Control	Hex Code	Action/Usage
Delete	7Fh	Erases character at cursor location
Erase Input	18h	Erases any unprotected characters and moves cursor to first unprotected screen position
Erase to end of field	05h	Erases field contents from cursor to end of field
Cursor Movement		
Cursor Movement	Hex Code	Action/Usage
Shift Lock Toggle	N/A	Causes uppercase alpha characters to be input when key is pressed. Press again to turn off.
Cursor Select	03	Allows light pen selection. Requires host programming.
Field Exit		
Duplicate	04h	Indicates to host that duplicate operation is intended for remainder of current field.
Field Mark	06h	Marks end of field in unformatted screen or subfield of formatted screen

Table 3-1. 3270 Emulation Functions (continued).

Special Host	Hex Code	Action/Usage
System Request	1B 3Fh	Switches between LU-LU session and SSCP-LU or unowned session
Aid Generating		
Enter	0Dh	Causes all unprotected data to be sent to host
Clear	1B 5Eh	Causes screen to clear and cursor to go to home position
Print	10	Causes LinkUp to send copy of screen to local copy printer, if configured
Device Cancel	1B 5D	Cancels local copy print request
PF1	1B 31	Program function keys. Host action is program-dependent.
PF2	1B 32	
PF3	1B 33	
PF4	1B 34	
PF5	1B 35	
PF6	1B 36	

Table 3-1. 3270 Emulation Functions (continued).

Aid Generating	New Case	Action/Usage
PF7	1B 37	
PF8	1B 38	
PF9	1B 39	
PF10	1B 30	
PF11	1B 51	
PF12	1B 57	
PF13	1B 45	
PF14	1B 52	
PF15	1B 54	Program function keys. Host action is program-dependent.
PF16	1B 59	
PF17	1B 55	
PF18	1B 49	
PF19	1B 4F	
PF20	1B 50	
PF21	1B 41	

Table 3-1. 3270 Emulation Functions (continued).

Aid Generating	New Case	Action/Usage
PF22	1B 53	
PF23	1B 44	
PF24	1B 46	
PA1	1B 5A	Program attention. Host action is program-dependent.
PA2	1B 58	
PA3	1B 43	
Special Control Function	Hex Code	Action/Usage
Refresh Screen	17	Causes controller to resend current emulation screen
Initialize Terminal ¹	1B 3C	Exits emulation screen, goes to Enter Device Type prompt
Toggle Status Line On/Off	1B 5F	Turns emulation status line on/off
Local Copy Form Feed	1B 7C	Sends form feed to local copy printer to eject page

¹Use only if directed by your access administrator.

Table 3-1. 3270 Emulation Functions (continued).

Special Control Function	Hex Code	Action/Usage
Request Disconnect	1B 7E	Causes controller to recycle RS-232C port and hang up modem
Generate Attribute ¹	07	Used by system programmer to test screen attributes
Model 4 Page Up/Down ^{1,2}	1B 3E	Allows page up/down between top and bottom of model 4 (43-line) screen
Echoplex Toggle Enable ⁴	1B 3B	Turns keyboard echo on/off
Other		
DOS/Emulation Toggle	N/A	Active only in TSR mode, toggles between emulation and DOS session/application
Num Lock	N/A	Numeric keypad toggle
Print Screen	N/A	DOS print screen
Block Mode Toggle	01 34 01 35	Toggles LinkUp and software in/out of block mode
Break	N/A	Causes software to send a break of the configured length

¹Use only if directed by your access administrator.

²Not supported on PCM71 bisync firmware.

Table 3-2. Status Line Symbols.

PC Software - Link Up 3270	IBM 3278	MEANING
Position 1-3 (Readiness and System Connection)		
4	4	The Link Up 3174 Control Unit is ready.
B or A	B or A	The Control Unit is connected to the host using "B" rules (SNA) or "A" rules (BSC).
*	■	The terminal is working with your applications program.
f		The terminal is connected to the system operator or control program.
?	?	The terminal is connected to the host system but is not connected to your application program or to the control program.
TEST	TEST	The terminal is in test mode. Press <Test> a second time to go back online.
Position 11-27 (Input Inhibited Messages)		
X WT	X 	Wait. Allow time for the host application to perform a function. The keyboard is locked during this condition.
X?+	X ? or X ?+	Input is not understood. Press <Reset>, if necessary.
X -f	X -f	A currently unavailable function was requested.
X <F>	X 	Move the cursor to another area of the screen to perform the desired function. RESET required.
X F>	X 	Too much data for the field. RESET required.
X -S	X -s	The requested symbol is not available. RESET required.
X F X	X  X	The operator has requested a printer for which the terminal is unauthorized. RESET required.

Table 3-2. Status Line Symbols.

PC Software - Link Up 3270	IBM 3278	MEANING
X FNUM	X  NUM	A non-numeric entry was made at a display screen location reserved for numeric data. RESET required.
X 0C#	X 	The printer assigned to the display station is not functional. DEVICE CANCEL must be used.
X 0C0WT	X 	The printer assigned to the display station is currently busy. (Printer very busy is not supported.)
X #nnn	X  nnn	MACHINE Error. The display station is not working properly.
X COMMnnn	X  nnn	COMMUNICATIONS Error. A problem exists with the communication link.
X PROGnnn	X PROGnnn	PROGRAM Error. A programming error was detected in the data received by the control unit.
Position 52		
I	^	Insert on.
Position 55-60 (Printer Messages)		
0C0nn	 nn	This is followed by the LU number of the local copy printer. It indicates the status of the printer assigned to the terminal.
Position 64-71		
XXXXXXXX		LU Name. An identification name of from 1 to 8 alpha or numeric characters in any combination.
Position 73		
P	X 	The printer is currently printing.
Position 75		
		Shift key pressed or caps lock on.
Position 78		
	N/A	Block Mode on.

3.3 Auxiliary Printing

When connected to the LinkUp, the PC printer can be used for 3270 local copy/screen dumps, 3270 host-addressable printing (3287 model emulation) and DOS print screens. When connected to A/C-4B, local copy screen prints can be performed only by using the DOS print-screen function. A/C-4B does not support host-addressable aux printing.

Support of aux printing requires that LinkUp be properly configured. Please refer to the configuration chapter in the LinkUp manual or contact your system manager for additional information or assistance.

3.3.1 AUX PRINTING PERFORMANCE CONSIDERATIONS

Both LinkUp and PC Software—LinkUp 3270 are designed to allow you to perform display-related functions while an aux host print or local copy print is printing, either on the PC printer or as a print-to-disk file. Likewise, the printer can continue to print even if the display keyboard is locked or flow control is exerted.

This will, however, affect performance by causing the display to pause while print data is being received or possibly causing the printer to pause while display data is being received or transmitted. This effect is most noticeable at lower baud rates—2400 baud, for example.

This is because both display data and print data are transmitted over a single serial connection. The display and print data are interleaved or packetized into blocks, much like the boxcars in a train, in order to share the connection. The data is then routed to either the display monitor or to the printer by PC Software—LinkUp 3270.

If using the display while the aux printer is in use causes undesirable delays, wait for the print job to finish before performing display-session functions, or increase the baud rate, if possible.

3.3.2 AUX PRINTER PACING

During host-addressed aux print operations, print data might be received by PC Software—LinkUp 3270 faster than the printer can accept it. This could be because of a slow printer or a printer fault, such as a paper jam or paper-out condition.

To prevent the loss of print data in such cases, PC Software—LinkUp 3270 maintains an aux printer buffer and uses printer data pacing, which is a flow-control method independent of the display session. If the printer is unable to accept data, PC Software—LinkUp 3270 will start buffering the print data. If the buffer becomes full, PC Software—LinkUp 3270 will send the printer-pacing-off code back to the LinkUp 3174, which will cause the LinkUp to suspend transmission of aux print data. When the printer resumes accepting data, the software will transmit the printer-pacing-on code to the LinkUp, which will resume transmitting aux print data.

Printer pacing is always enabled on both the LinkUp and PC Software—LinkUp 3270 and is not configurable.

3.3.3 AUX PRINTING WHILE IN DOS

We recommend that you leave PC Software—LinkUp 3270 in emulation mode while host aux printing is in process, as at minimum the print job will not continue to print in the background.

If PC Software—LinkUp 3270 was invoked in TSR mode and you hotkey to the DOS prompt while the print job is in process, the print job will be suspended until you hotkey back to emulation.

3.3.4 PRINT TO DISK

When connected to the LinkUp, host or local copy aux printing can be stored to disk files for paperless printing, allowing you to manipulate print data before printing. Print-to-disk support on A/C-4B is limited to DOS screen prints. Operation will depend on the settings you choose in the Print Setup configuration menu as follows:

PRINT SETUP MENU

PRINTER PORT—Selects the port for auxiliary printing. It has no effect on print-to-disk and is ignored if print-to-disk is enabled. If a serial port is selected, make sure to use the DOS **MODE.COM** command to properly initialize the serial port before loading the software with respect to baud rate.

PRINT TO DISK—Enables or disables print-to-disk. If set to no, the aux prints will go to the printer port specified above and the following settings are ignored.

PRINT NAME FOR PRINTER DATA—Allows use of a default disk/path and print-data file name. If a new file name is not used for each print job, succeeding print jobs will be appended to this file. To be prompted to supply a unique file name for each print job, see the next menu item.

ASK BEFORE WRITING FILE—If set to yes, and print-to-disk is enabled, you will be prompted to take the default file name as configured above or to supply a file name for that print job. If set to no, the default file name will be used and the print job will be appended to the file if it already exists.

CLOSE FILE IF PRINTER INACTIVE—If set to yes, causes PC Software—LinkUp 3270 to automatically write the print file to disk if print data has not been received by the software within the configured timeout. The recommended setting is yes.

This allows you to continue to perform display-terminal work without having to remember to manually close the file using <Ctrl/Alt P>. If set to no, and the disk file is not manually closed, the data will be lost.

INACTIVE MINUTES BEFORE CLOSING FILE—Enabled if item above is set to yes. Choose a value that covers the worst case, based on your system performance.

NOTE

The print file can be manually closed and written to disk at any time by using <Ctrl/Alt P>. Make sure that the print job has finished. A flashing P will appear at the right-hand side of the status line when print data is being transmitted to the printer or disk file.

3.4 Asynchronous Communications Errors

Once installed, PC Software—LinkUp 3270 maintains constant control of its configured communications port. The software alerts you by emitting a very short, high-pitched beep.

NOTE

Longer, lower-pitched beeps are not because of errors detected by the software. They are the result of bell characters sent to your PC's communications port by the controller, or by the software if it is being operated in Block Mode.

To correct communications errors and restore screen data, press <Refresh Screen>. This will cause the controller to retransmit the last screen of data it has stored in its screen buffer.

If so configured in the Communication Port menu, PC Software—LinkUp 3270 will monitor Data Set Ready (DSR) or Carrier Detect (CD). The software uses these signals to determine if a viable connection exists between your PC and the DCE device attached to its configured communications port. If the configured device ready signal drops, the software will stop transmitting data until the signal is raised.

If the device ready signal is configured for None, the software will attempt to transmit data even if nothing is connected to the serial port.

3.5 Block Mode

Block Mode is typically used only when it is undesirable to have the user-typed characters echoed back to the PC from LinkUp, but can be used instead of the normal full duplex mode. In Block Mode, data is transmitted or received in blocks (screens) instead of character by character.

The following limitations and exclusions apply:

- Not supported on A/C-4B
- Make sure that you have answered all LinkUp prompts and are at the SSCP/VTAM screen before entering Block Mode
- Light pen and cursor select not supported
- Typeahead/pageahead not supported
- LinkUp view attribute and generate attribute are not supported.

To enter Block Mode, press <Alt/Backspace>.

CAUTION

Unless you are using Block Mode with an async port access system that ensures that you can reconnect to the same LinkUp async port, we recommend that the LinkUp Reconnect Time Limit configuration parameter be set to zero (0), which will cause the LinkUp to automatically terminate the session in case of an accidental disconnect. If Reconnect Time Limit is set to a non-zero value, someone else can connect to the same port, and the port will appear to be out of order, since it will not respond unless you first toggle the software into Block Mode. Additionally, security will be compromised unless an LU password and reconnect password are used on the LinkUp. Please refer to the LinkUp manual for further details.

In normal non-Block Mode, the software relies on the LinkUp to control all of its screen attributes, editing and cursor positioning functions. LinkUp accomplishes this by maintaining an associated screen buffer for PC Software—LinkUp 3270. This means that every time you press a key on your keyboard, the character is sent through your PC's communications port to the LinkUp. When LinkUp receives the character, it records the character's proper location within its associated screen buffer and then echoes the character back across the communications line for display at the appropriate position on your PC screen.

When Block Mode is invoked, the LinkUp transfers its entire associated screen buffer (which includes all of the attributes and cursor positions) to the software, permitting the software to locally control all of the software screen handling and editing functions. This means that nothing needs to be transmitted through your PC's communications port to the LinkUp until processing by the 3270 host is required. Whenever an Aid Generating key is pressed, all of your data input is transmitted to the LinkUp and, in turn, to the host, with one exception (<Device Cancel>, which does not qualify because it is not used to transmit data to the host).

3.5.1 BLOCK MODE OPERATION

This section examines the distinctive operating characteristics and restrictions of PC Software—LinkUp 3270 when it is operated in Block Mode.

NOTE

Block Mode should only be used after signing on to the host and should be disabled after logoff, since data entry in an unformatted screen may cause problems when Block Mode is in use.

Before PC Software—LinkUp 3270 can be operated in Block Mode, the following conditions must exist:

1. Your PC Software—LinkUp 3270 version must be 3.05 or above.
2. The LinkUp controller you are accessing must have the appropriate version of firmware installed. (See **Section 1.3, Hardware and Software Requirements.**)
3. You must specify TLBLK at the “LinkUp Device Type” prompt.
4. The LinkUp controller you are accessing must have its Packet Network Access option configured to N for none, even if you are accessing a packet network.
5. If you are accessing a packet network, the network terminal PAD to which your PC is connected must be configured as follows:
 - To allow escape to PAD Mode; that is, to allow PC Software—LinkUp 3270 to communicate with the terminal PAD itself.
 - Turn local echo off
 - Forward data upon encountering a <CR>
 - Timer packet forwarding
 - Accept XON/XOFF from host PAD
 - Send PAD messages to your PC
 - Ignore a break from your PC
 - Normal data delivery
 - No padding
 - No line folding
 - Accept XON/XOFF from your PC
 - No LF insertion
 - No padding after LF
 - No editing

Once these conditions are met and you are in session, you can enable or disable Block Mode by pressing <Alt/Backspace>. To advise you that Block Mode has been turned on, the software displays a block symbol on the bottom right corner of your screen.

All input keys are locally processed by the software, except for the functions identified in Table 3-3. The processing for all of these, however, will remain the same in Block Mode as in Character Mode.

Table 3-3. Behavior of Function Keys while PC Software—LinkUp 3270 is in Block Mode.

Function	Processed Action	Keyboard State
PF1 through PF24 PA2 through PA3 Enter, Clear	All characters that have been changed are sent to the LinkUp followed by the AID key.	Locked
Device Cancel Toggle Status Line Reset	Control codes are sent to LinkUp without data, even if changes have been made and regardless of the LinkUp keyboard lock status.	Unlocked
Attn Refresh Sys Req	A control code is sent to LinkUp without data, even if changes have been made.	Locked
Initialize Terminal Request Disconnect	Block Mode is exited. No data is sent to LinkUp.	Unlocked
Print	Characters that have been changed are sent to the LinkUp followed by the PRINT function sequence.	Locked

As additional keyboard lock may occur when PC Software—LinkUp 3270 detects an invalid input key while you are processing data. Table 3-4 identifies the most common situations under which the software would lock your keyboard.

Table 3-4. PC Software—LinkUp 3270 Plus-implemented Keyboard Lock Situations.

Operation/Condition	Action Resulting in Keyboard Lock
Insert Mode	<ol style="list-style-type: none">1. Pressing a data character while the cursor is in a protected field.2. Attempting text entry in an unprotected field which is full (no nulls in the field).
Rubout (Destructive Backspace)	<ol style="list-style-type: none">1. Pressing <Rubout> while the cursor is on an attribute or one position to the right of an attribute, or in a protected field.
Delete	<ol style="list-style-type: none">1. Pressing <Delete> while the cursor is in a protected field.
Numeric Field	<ol style="list-style-type: none">1. Entering an alpha character in a field defined as numeric.
Data Entry	<ol style="list-style-type: none">1. Entering data in a protected field.

4. The TLAUTO Menu

This chapter describes the options presented in the TLAUTO menu and how they interrelate, and explains how to use TLAUTO and the autologon function.

Up to 10 phone numbers can be stored and dialed from TLAUTO using a modem. In most cases, the default settings in fields 1-6 of the TLAUTO screen will work with any modem that uses the Hayes AT command set. If needed or desired, these fields can be changed. A description of the fields is as follows:

1. **SEND TO MODEM BEFORE NUMBER** contains the commands that are to be sent to the modem to initialize it. These commands are immediately followed by the phone number.

The default is ATDT, which causes a Hayes AT-compatible modem to perform tone dialing as opposed to pulse dialing. If you need to use pulse dialing, change this field to ATDP.

2. **SEND TO MODEM AFTER NUMBER** contains the commands that are to initiate dialing.

The default is <CR>, which causes a carriage return to be sent immediately following the number, which initiates dialing on Hayes-compatible modems.

3. **RECEIVED FROM MODEM WHEN CONNECTED** contains the result that informs TLAUTO that the modem has successfully completed the call. This field is enabled only if hardware Carrier Detect is disabled (see field 5 below).

The default is CONNECT, which will work with verbose result code format and will support a wide variety of modems, speeds and error correction protocols. We recommend using numeric codes, since only one result code can be entered in this field.

4. **RECEIVED FROM MODEM IF CANNOT CONNECT** contains the result code that informs TLAUTO that the dialing attempt has failed.

The default is NO CARRIER.

5. **CARRIER SIGNAL DETECTED BY HARDWARE** specifies whether or not TLAUTO is to use the Carrier Detect (CD or DCD) signal to determine if the call attempt was successful or not. The setting of this field also enables or disables fields 3 and 4 above.

The default is N, which causes TLAUTO to look for the results in fields 3 and 4. We recommend that you use result codes instead of CD.

If you decide to use CD instead of result codes, change the setting to Y and make sure that your modem is configured to raise CD only when a call is established. If the modem forces CD artificially high, TLAUTO will not work properly.

6. **TIME TO WAIT FOR CONNECTION** specifies the time interval in seconds that TLAUTO will wait for indication that the call has been completed. Valid values are 1-999 seconds.

The default is 60 seconds, which should work with any mode, but may be increased if necessary.

7. **NAME** is a descriptive field that allows a name to be associated with the phone number. This entry is optional.
8. **NUMBER** is a mandatory-fill field that contains the number and any other characters needed, such as commas to cause the modem to pause.
9. **SEND AFTER CONNECTED WITH Fn** is an optional field used for autologon and other functions. Up to 418 characters may be entered in this field. There are 10 fields total, one for each phone number.

See **Section 4.2** for more details on how to use the Send After Command function for automating logon.

4.1 Using TLAUTO

TLAUTO is used either manually from the TLAUTO menu (TSR or non-TSR) or in command line mode from the DOS prompt (TSR only). If used from the menu, TLAUTO will return to the emulation screen (non-TSR) or to the DOS prompt (TSR) upon successful completion of the call, and after transmission of the Send After Connected string, if used. If desired, TLAUTO can automatically toggle into emulation mode when running in TSR mode from the command line.

To use TLAUTO in menu mode:

1. Press <Ctrl/Alt M> and select DIALER (non-TSR mode) or enter TLAUTO at the DOS prompt to bring up the TLAUTO menu (TSR mode).
2. The cursor will appear in the Name field associated with the first phone number. This field is optional and is used to name the host or service that is being accessed.
3. After entering the name, tab to the phone number field and enter the phone number. If you are dialing through a PBX and need to dial 8 or 9 to access an outside line, you should enter it in this field, along with a comma for delay, if required.
4. Tab to reach the desired field and continue to enter phone numbers or Send After Connected strings. Press <Shift/F1> to save the data.
5. To dial a number, press the F1-F10 key associated with the desired number. A status box will pop up to display call progress. The number will then be dialed using the current com port settings in TLCONFIG. If a Send After Connected string has been associated with the number, the status box will indicate that the string is being sent.
6. After the phone number and Send After Connected string have been sent, you will return to emulation (non-TSR mode) or to the DOS prompt (TSR mode). If TLAUTO is unsuccessful at completing the call or sending the string, you will be notified and returned to the TLAUTO screen.

TLAUTO can be used in two different ways from the DOS prompt: in menu mode or automatic mode.

1. To use in Menu mode, enter TLAUTO at the DOS prompt. TLAUTO now functions the same as in non-TSR mode, except that it will return you to the DOS prompt after completing the call and sending the Send After Connected string, if used.

2. To use TLAUTO in automatic mode, type **TLAUTO** *Fn/a* at the DOS prompt, where *Fn* is one of the values F1-F10 that is associated with one of the phone numbers in the TLAUTO menu. The **/A** is the optional “Autohot” switch that causes TLAUTO to automatically toggle into emulation mode instead of returning to the DOS prompt. When used as above, TLAUTO will load, dial the referenced number and go into emulation mode after completing the call and sending the autologon string.

NOTE

There must be a space between TLAUTO and Fn, and a space between Fn and /A.

4.2 Autologon

By using the TLAUTO Send After Connected string in conjunction with the phone number, the connection can be established and the host logon can be performed automatically without your intervention. Although not as sophisticated as a script language, with some experimentation most logons can be automated with this facility.

4.3 Autosignon Mnemonics

The following mnemonics are used to perform the most commonly used emulation keystrokes. Type them into the Send After Connected field exactly as shown in the Mnemonic column in either verbose or numeric format. You must include the < and > brackets.

When a displayable character is shown in conjunction with a mnemonic, enter it into the string as shown. Other displayable text is added to the string “as is.”

Table 4-1. Autosignon Mnemonics.

Function	Mnemonic	Hex Code	Comments
Wait	W:n	N/A	n=1-999 seconds
Enter	<CR>	0Dh	Also used to autobaud
Escape	<ESC>	1Bh	Never used by itself
Clear	<ESC>	1Bh 5Eh	
Home	<RS>	1Eh	
Tab	<DC4>	14h	
Backtab	<STX>	02h	

An example of a send-after-connected string used for autologon through LinkUp 3174 is as follows:

```
<CR><W:1>IBMPC<CR><W:1>LU2<CR><W:2>TSO<CR><W:3>
John Doe<14><W:2>password<CR>
```

This string would:

1. <CR> send carriage return to autobaud LinkUp or A/C-4B
2. <W:1> wait 1 second for LinkUp response
3. IBMPC<CR> select device type
4. <W:1> wait 1 second for LinkUp response
5. LU 2<CR> enter LU number or access group name
6. <W:2>TSO<CR> wait 2 seconds, select TSO
7. <W:3>John Doe<14><W:2>password<CR>
wait 3 seconds, enter user ID, tab to password field and enter password

4.4 Autologon Considerations

TLAUTO transmits the Send After Connected string at the full, actual configured baud rate. This differs from you manually keying the information, which is much slower. For this reason, you need to add one second waits to allow the converter/controller time to react.

Similarly, enough time must be allowed for the host to respond before sending the next command or data. The delay values must in all cases accommodate the “worst case” response from the host. Host response time can vary depending on use, while the response of the converter is more predictable.

If enough delay is not used, the transmitted data will become “lost” and autologon will not properly execute. For optimum results, start with delays that are very conservative. After autologon is functioning reliably, try decreasing the delays judiciously, if desired.

5. File-Transfer Operations

If you are already familiar with IND\$File file transfer, you can proceed with the Quick Start Guide in **Section 5.1** to start transferring files. If you are not familiar with IND\$File, we recommend that you read the background sections that follow the Quick Start Guide before trying to transfer files. Because PC Software—LinkUp 3270 file transfer is intuitive and prompts you for the specifics, it is very easy to use. Once you have read the background sections, the Quick Start Guide can be used as a “how to” reference.

This chapter provides background information on file transfer and explains how to transfer binary and text files between the personal computer and the mainframe host using the IBM IND\$File utility, also known as SEND/RECEIVE under TSO, VM/CMS and CICS. While this manual explains usage of IND\$File and related options, you will need to consult with your host system administrator if you have questions about the requirements of the particular mainframe system(s) that you will be accessing.

In this manual, the term “upload” refers to the process of transferring a file from the PC to the mainframe, and the term “download” refers to the process of transferring a file from the mainframe to the PC.

5.1 Quick Start Guide

5.1.1 READ THIS FIRST!

1. If you are accessing a CMS system, please see **Section 5.9.1, Prerequisites**, before attempting to transfer files.
2. Do not use a PC or host file name that already exists unless you wish to overwrite the existing file with the file that is being transferred. The exception is when uploading and using the APPEND option.
3. While the transferred files can be sent or retrieved from any drive or directory, for best results all file transfer operations should be initiated from the PC Software—LinkUp 3270 directory containing the program files.
4. All file transfer operations must be initiated only after you have logged on to the host and are at the appropriate screen. If you are not sure which screen is appropriate, please see **Section 5.7.1, Prerequisites**, before attempting to transfer files.
5. If you make a mistake and want to abort the file transfer before answering the Mainframe File Options prompt, press <Esc>.

5.1.2 NON-TSR MODE

1. When using PC Software—LinkUp 3270 in non-TSR mode, press <Ctrl/Alt/M> to display the master menu. Arrow to **Mainframe File Transfer** and press <Enter> to display the file transfer menu.
2. Press <Enter> to select **Send a PC File (upload)** or arrow down to the appropriate download option and press <Enter>.
3. For an upload, type the PC drive, directory and file name with extension, if used, and press <Enter>. If the file to be uploaded is in the PC Software—LinkUp 3270 (TL3270) directory, the drive and directory do not need to be entered.

For a download, type the destination PC drive, directory, and file name with extension, if used, and press <Enter>. If you do not specify a drive and directory, the file will be downloaded to the PC Software—LinkUp 3270 (TL3270) directory by default.

4. Type the mainframe file name with the appropriate host file specifications and press <Enter>.
5. Type the mainframe file options, if used, and press <Enter>.
6. PC Software—LinkUp 3270 will now initiate the file transfer and display status messages indicating progress, success, or failure. After the software has succeeded or aborted the attempt, it will return to the emulation screen.

5.1.3 TSR MODE

1. When using PC Software—Link Up 3270 in TSR mode, type **TLXFER** at the DOS prompt, followed by <Enter>, to go directly to the file transfer menus.
2. Operation from this point on is the same as non-TSR mode, shown in steps 2 through 6 above, with one exception: after the file transfer has completed or aborted, you will be returned to the DOS prompt instead of the emulation screen. To return to the emulation session after file transfer, press <Lft Shift/Rt Shift>.

5.2 Overview

PC Software—LinkUp 3270 lets you transfer files between the PC and the mainframe in either text mode or binary mode. Other IND\$File options that affect the format and disposition of the file are also supported. While other programs require that IND\$File commands be entered at the DOS prompt, user-friendly PC Software—LinkUp 3270 prompts you to specify the PC and host file names, as well as the options.

If your file transfer needs require repeatedly using the same file names and options, you can configure the software for those user defaults so that you don't have to enter them every time. Please refer to **Section 5.13, File Transfer Setup**, for more details.

5.3 Text Mode vs. Binary Mode

PC Software—LinkUp 3270, in conjunction with IND\$File, can transfer files between the PC and mainframe without translation (binary format) or with translation (text format). Binary format is used primarily for transferring program files, printer font files or any other file that needs to be transferred without being translated or altered. Text mode causes the EBCDIC data on the host to be converted to ASCII data during a download and vice versa on an upload. This ensures that the text data is in a format that is readable by the destination machine.

5.4 Host File Name Conventions

The host file name format and syntax will vary based on the type of system. Please refer to the individual section pertaining to TSO, CICS, or CMS (**Sections 5.7, 5.8, and 5.9**) for the particular details.

5.5 PC File Name Conventions

The PC file name follows DOS conventions, consisting of one to eight DOS-legal alphanumeric characters with an optional three-character extension.

When performing an upload, PC Software—LinkUp 3270 will check for the existence of the specified file in the current directory if no path is specified, or in the specified directory path. If the file is not found, the software will display an error message and prompt you to try again.

5.6 File-Transfer Options

A number of IND\$File options are used with MVS/TSO, CICS, and VM/CMS systems. However, these options can have different effects depending on which system is being used; some options are mutually exclusive while other options are valid for some systems, but not for others. For details, please refer to the following section that applies to the system being accessed. If an option is not listed for a particular system, it is not valid for that system.

UPPER/LOWERCASE

All file names and options can be entered in either upper- or lowercase.

5.7 TSO File Transfer

This section explains prerequisites, the TSO data set (file name) format, and the IND\$File file-transfer options that pertain to TSO systems.

5.7.1 PREREQUISITES

TSO file transfer with PC Software—LinkUp 3270 requires the following:

- IBM 3270-PC File Transfer Program for MVS/TSO PP5665-311 must be installed on the host.
- You must be logged on to the host and at the TSO ready prompt before initiating file transfer.

5.7.2 COMMAND LINE EXAMPLES

Even though the software does not require you to enter the file transfer commands at the DOS prompt, it is helpful to look at such examples, since the software assembles your responses to the prompts into this format and then sends the file transfer command to the IND\$File program.

```
IND$FILE PUT PCFILE.EXT HOSTFILE(MEMBER) ASCII CRLF  
IND$FILE GET PCPROG.EXE HOSTFILE BINARY
```

5.7.3 DATA SET/FILE NAME FORMAT

Under TSO, files are called data sets. A TSO data set can be a sequential data set or a member of a partitioned data set. Valid data set names consist of one to eight upper- or lowercase alphanumeric characters, the first of which must be an alpha character.

If the data set is partitioned, a member name is required and must be entered along with the data set name and enclosed in parentheses.

5.7.4 TSO FILE-TRANSFER OPTIONS

These options are optional in the sense that while the file transfer may not be prevented from completing if they are omitted, the file format of the transferred file may not be what is desired or expected. Note that if no option is specified, the transfer will take place under default conditions, as indicated in the text explaining the options.

The following options have the indicated effects and limitations when used with MVS/TSO IND\$File file transfer:

NOTE

TSO file transfer options are not enclosed in parentheses. Only data-set member names (if used) are enclosed in parentheses. Options must be separated by spaces.

APPEND

- Attaches a file to the end of an existing file. If a data set already exists with the same name as the file being uploaded, and APPEND is not specified, the pre-existing data set will be replaced with the new file/data set.
- May not be used with uploads to partitioned data sets.
- When used to upload a file, overrides the LRECL and RECFM values, if also specified.

ASCII

- Used to translate downloaded text files from EBCDIC to ASCII and uploaded text files from ASCII to EBCDIC.
- Use only for text files, omit for binary files.
- If ASCII is omitted, the file will be transferred without translation as a binary file.

BLKSIZE

- Valid only on uploads.
- Used to specify the upload block size of the host data set. It is ignored if APPEND is used or if a data set is replaced/overwritten.
- The option format is BLKSIZE(n) where n is the length in bytes of the data block.
- If not specified, LRECL(n) becomes the default for the file.

CRLF

- Use only for text files, omit for binary files.
- Inserts an ASCII carriage return/line feed as PC file delimiters on downloads in place of host logical record breaks.
- Deletes ASCII carriage returns and line feeds on uploads.

LRECL

- Valid only on uploads.
- Format is LRECL(n) where n is the number of characters in each record. When omitted, 80 is used for new files as the default.
- When APPEND is used, or a file is being replaced (overwritten), LRECL is ignored if specified.

/password

- Not a file-transfer option per se, but the valid data-set password must follow the host file name if the data set is password-protected.

RECFM

- Valid only on uploads.
- Used to set the record format of the host file. The syntax of the command is RECFM(n), where n must be enclosed in parentheses as shown and is one of the following values:
 - **F** for fixed length records
 - **V** for variable length records

- **U** for undefined length records

The default record format for new files is **F** if RECFM is not specified unless CRLF is used, which causes the default to be **V**.

If **F** is specified, any uploaded records that are actually shorter than the fixed length will be padded to the fixed record length with spaces as trailing characters.

If consecutive pairs of CR/LFs are received by the host, a space character will be substituted for each if **v** or **u** is specified. If **f** is specified, a fixed record of space characters is created for each.

- Ignored if APPEND is used or if replacing an existing file.

SPACE

- Valid only on uploads.
- Used to specify the amount of space to be allocated for a new data set. The format of this option is SPACE(q,i)unit where:
 - q is the number of units to be added if and when the previous allocation is used up.
 - i is the initial number of units to allocate.
 - unit is optional and can be one of the following:
 - AVBLOCK(n) where n is the number of bytes.
 - TRACKS or CYLINDERS where q and i become the multiplier.
- The maximum number of units allowable is $q+15i$.
- If unit is not specified, BLKSIZE is used.
- If BLKSIZE is not specified, the default of 80 is used.

5.8 CICS File Transfer

This section explains prerequisites, the CICS Transaction Identifier/program name (file) format and IND\$File file-transfer options that pertain to CICS systems.

For further details beyond what is presented in this manual, please refer to the IBM publication *CICS/VS 3270-PC File Transfer Program: Program Description/Operations Manual*, SH20-6306.

5.8.1 PREREQUISITES

CICS file transfer with PC Software—LinkUp 3270 requires the following:

- IBM CICS/VS to 3270-PC File Transfer Program PO5798-DQH must be installed on the host.
- You must be in command mode.

5.8.2 CICS FILE-NAME FORMAT

In CICS, files are called transaction identifiers or programs and are not called files as such. However, for convenience, they will be referred to as files in this manual. The CICS file name consists of one to eight alphanumeric characters, which are written into the first record of the file.

5.8.3 CICS FILE COMMENTS

Under CICS, control comments can also be added to the first record of the file during uploads. These comments, if used, are entered at the “Please Specify Mainframe File Options” prompt, following the options. If no options are used, a set of parentheses must precede the comments, as in “() comments,” or the host program will incorrectly interpret the comments.

5.8.4 CICS COMMAND LINE EXAMPLES

Even though PC Software—LinkUp 3270 does not require you to enter the file transfer commands at the DOS prompt, it is helpful to look at such examples, since the software assembles your responses to the prompts into this format and then sends the file transfer command to the IND\$File program.

IND\$FILE PUT PCFILE.EXT HOSTFILE(ASCII CRLF)COMMENTS

IND\$FILE GET PCPROG.EXE HOSTFILE (BINARY)

5.8.5 CICS FILE TRANSFER OPTIONS

These options are optional in the sense that while the file transfer may not be prevented from completing if they are omitted, the file format of the transferred file may not be what is desired or expected. Note that if no option is specified, the transfer will take place under default conditions, as indicated in the text explaining the options.

The following options have the indicated effects and limitations when used with CICS/VS IND\$File file transfer:

NOTE

The following options can be combined, as allowed, but must be separated by a space and must be preceded by a left parenthesis when entered at the PC Software—LinkUp 3270 options prompt. If using comments, you must also enter a right parenthesis followed by a space. For example:

(ASCII CRLF or (ASCII CRLF) comments

ASCII

- Used to translate downloaded text files from EBCDIC to ASCII and uploaded text files from ASCII to EBCDIC.
- Use only for text files.
- Cannot be specified concurrently with **BINARY**.
- If both **BINARY** and **ASCII** are omitted, the file will be transferred as though **ASCII** was specified.

BINARY

- Used to transfer a file without translation in binary format.
- Must be used for binary files.
- Cannot be specified concurrently with **ASCII**.
- If both **BINARY** and **ASCII** are omitted, the file will be transferred as though **ASCII** was specified.

CRLF

- Inserts an ASCII carriage return/line feed as PC file delimiters on downloads in place of host logical record breaks.
- Use only for text files.
- Deletes ASCII carriage returns and line feeds on uploads.
- Cannot be used concurrently with **NOCRLF**.
- If neither **CRLF** or **NOCRLF** is specified, **CRLF** mode is used as the default.
- If specified on a text file upload containing null records (a carriage return/line feed immediately followed by carriage return/line feed), PC Software—LinkUp 3270 will convert the null records to space characters. If the file is translated (text mode), the spaces will be in EBCDIC (40h); if not translated (binary mode), the spaces will be in ASCII (20h).
- If the maximum logical record length of 32767 bytes is exceeded on an upload, a warning message will appear at the end of the file transfer, indicating that the record formatting may be incorrect. No data loss should occur.

NOCRLF

- Transfers the file in a single long string of data. Using this option, the host does not split the file records.
- Must be used for binary files.
- Cannot be used concurrently with **CRLF**.
- If neither **NOCRLF** or **CRLF** is used, **CRLF** mode is enabled as the default.

5.9 VM/CMS File Transfer

This section explains prerequisites, the CMS file format, and the IND\$File file-transfer options that pertain to the VM/CMS systems.

5.9.1 PREREQUISITES

CMS file transfer with PC Software—LinkUp 3270 requires the following:

- IBM 3270-PC File Transfer Program for VM/SP PP5664-281 must be installed on the host.
- You must be in command mode.
- A CMS EXEC needs to be created to prevent unsolicited user messages from being sent to PC Software—LinkUp 3270. This EXEC should be named IND\$File. If another character is being used instead of the \$, use that character instead of the \$. The EXEC is made up of the following statements:

```
&CONTROL OFF
CP SET MSG OFF
CP SET SMSG OFF
CPSET WNG OFF
IND$FILE &1 &2 &3 &4 &5 &6 &7 &8 &9 &10 &11 &12
CP SET MSG ON
CP SET WNG ON
```

5.9.2 VM/CMS FILE NAME FORMAT

Under VM/CMS, in addition to the file name, the file can be distinguished by file type and file mode (optional), each separated by spaces when entered at the software host file name prompt.

The file name and file type may consist of one to eight alphanumeric characters. If a file mode is not specified, A1 is assigned by the host as the default.

5.9.3 COMMAND-LINE EXAMPLES

Even though PC Software—LinkUp 3270 does not require you to enter the file-transfer commands at the DOS prompt, it is helpful to look at these examples, since the software assembles your responses to the prompts into this format and then sends the file-transfer command to the IND\$File program.

IND\$FILE PUT *PCFILE.EXT HOSTFILE* (ASCII CRLF)

IND\$FILE GET *PCPROG.EXE HOSTFILE* (BINARY)

5.9.4 VM/CMS FILE TRANSFER OPTIONS

These options are optional in the sense that while the file transfer may not be prevented from completing if they are omitted, the file format of the transferred file may not be what is desired or expected. Note that if no option is specified, the transfer will take place under default conditions, as indicated in the text explaining the options.

The following options have the indicated effects and limitations when used with VM/CMS IND\$File file transfer:

NOTE

The following options can be combined, as allowed, but must be separated by a space and must be preceded by a left parenthesis when entered at the PC Software—LinkUp 3270 options prompt. There is no space between the parenthesis and the option. For example:

(ASCII CRLF

APPEND

- If omitted when a transferred file has the same name as an existing file, the transferred file replaces the existing file.
- When used to upload a file, overrides the LRECL and RECFM values.

ASCII

- Used to translate downloaded text files from EBCDIC to ASCII and uploaded text files from ASCII to EBCDIC.
- Use only for text files, omit for binary files.
- If ASCII is omitted, the file will be transferred without translation as a binary file.

CRLF

- Inserts an ASCII carriage return/line feed as PC file delimiters on downloads in place of host logical record breaks.
- Use for text files, omit for binary files.
- Deletes ASCII carriage returns and line feeds on uploads.

LRECL

- Valid only on uploads.
- Format is **LRECL(*n*)** where *n* is the number of characters in each record. When omitted, 80 is used for new files as the default.
- Ignored if **APPEND** is specified.
- If an upload is replacing an existing file and LRECL is omitted, the default value will be equal to the pre-existing file's number of characters.
- When transferring variable-length records, *n* can equal the maximum size the host will accept. If the longest record sent is shorter, the LRECL value will be adjusted to match the longest record actually sent.

RECFM

- Valid only on uploads.
- Used to set the record format of the host file. The syntax of the command is **RECFM(*n*)** where *n* must be enclosed in parentheses as shown and is one of the following values:
F for fixed length records
V for variable length records
- The default record format for new files is **F** if RECFM is not specified unless CRLF is used, which causes the default to be **V**.
- If **F** is specified, any uploaded records that are actually shorter than the fixed length will be padded to the fixed record length with spaces as trailing characters.
- Ignored if **APPEND** is used or replacing an existing file.

5.10 File Transfer Status Messages

When you initiate IND\$File file transfer, PC Software–LinkUp 3270 initiates the IND\$File program. If this is successful, file transfer begins and continues until it completes or is aborted because of transmission errors. During this process, the software displays status messages informing you of its progress.

Note that the IND\$File protocol does not provide a way for the host to inform PC Software—LinkUp 3270 of the size of the host file. For this reason, PC Software—LinkUp 3270 will indicate the number of blocks in the file only on uploads.

After the final PC Software—LinkUp 3270 file transfer prompt has been answered, the software displays a status message box that indicates the file transfer progress. The messages associated with a successful file transfer are shown below in the order that they would be displayed. The bracketed comments indicate if the message is displayed on uploads, downloads, or both.

Initializing File Transfer [upload/download]
Initialization Completed Successfully [upload/download]
Establishing Link With Host [upload/download]
Link Established With Host [upload/download]
Transmitting Block Number n [upload only]
Receiving Block Number n [download only]
Waiting for Host Response [upload/download]
Transmitting Final Block [upload only]
Restoring Terminal Emulator [upload/download]
Host Msg -> TRANS03 File Transfer Complete\$ [upload/download]
.....press any key to continue.....[upload/download]

If a communications error occurs during file transfer, PC Software—LinkUp 3270 will resend or request a retransmission of the bad block a maximum of three times. When this occurs, the following message will display:

Retrying Block Number n [upload/download]

If the retries are unsuccessful, or if the connection is lost, the following messages will display:

Dialogue With Host Has Been Broken [upload/download]
.....press any key to continue.....[upload/download]

If a key is pressed during file transfer, PC Software—LinkUp 3270 will prompt you with:

```
Wish to Abort File Transfer?  
YES  
NO
```

If you are having problems transferring files, refer to these messages for possible causes and resolutions. If you need to contact Technical Support, make sure to record these messages before calling.

5.11 Communications Error Recovery

During dial-up file transfer, it is possible for communications errors to occur because of phone line noise or other causes. This can have the effect of corrupting the file transfer data. To ensure data integrity, both the IND\$File host program and PC Software—LinkUp 3270 attach block check characters to blocks before transmission. The block is checked after receipt and compared with the block check.

If it does not match, the receiver will request a retransmission of the bad block from the sender. The IND\$File protocol provides for up to three retries before aborting the file transfer. Retries will be indicated in the PC Software—LinkUp 3270 File Transfer Status box.

If this occurs repeatedly, the cause of the data corruption will need to be isolated and corrected. In cases where the phone lines are chronically noisy, it may be advisable to invest in error-correcting modems (e.g. MNP) if the line noise cannot be corrected.

This type of problem should not occur on non-dialup connections. If it does, a cabling or intermediate connection or device problem is indicated.

5.12 Re-establishing the Connection

If a communications line disturbance causes the modem connection to drop, it is possible that the host IND\$File program could still be active, depending on how the controller is configured. If the controller is configured to terminate the session in case of a “dirty” or inadvertent disconnect, you will need to log on at the host signon screen after reconnecting.

If the controller is configured to allow you to reconnect to the same session (reconnect time limit other than 0), it is possible that you will get a blank screen or strange characters in the home position of the screen instead of the signon screen after reconnecting. If this happens, press PA1 once or PF3 three times followed by <Enter> to terminate the IND\$File program and return to the emulation session.

5.13 File Transfer Setup

The PC Software—LinkUp 3270 configuration File Transfer Setup menu provides the means to configure file transfer parameters and is accessed from the master menu. This menu is used only if:

- You need to increase the PC Software—LinkUp 3270 File Transfer Delay setting
- Your host program is using a character other than the \$ sign in the IND\$File program name
- Your file transfers repetitively use the same file names or options
- You need to enable Debug mode at the direction of Technical Support

If you need to perform any of these tasks, the File Transfer Setup menu items are set according to the following considerations:

5.13.1 FILE TRANSFER DELAY

PC Software—LinkUp 3270 will wait for the host response on any file transfer activity up to the time value set in the PC Software—LinkUp 3270 File Transfer Options configuration menu. If the host still has not responded within this time, PC Software—LinkUp 3270 will abort the file transfer attempt. If the host responds at any time before this timeout has expired, the software will continue with the file transfer.

On some systems, the response time may be such that the host does not respond within the default of 15 seconds. Also, the host response time might be affected by how busy the system is at the time of the file transfer attempt. In such cases, a file will often transfer when the system is not busy, but fail repeatedly during peak processing hours. In such cases, you must increase the PC Software—LinkUp 3270 timeout value to cover the worst case.

5.13.2 IND_FILE CHARACTER

The \$ character is usually used in the IND\$File program name, but this character would typically not be used in countries outside of the United States. This menu item is configurable for the other valid characters.

5.13.3 TRANSFER MODE

This item can be configured for text or binary if you want either choice to be active as the default file-transfer mode.

5.13.4 DEFAULT PC FILE NAME

If you repeatedly transfer the same file or append to the same file, you can configure this menu item to present that PC file name as the response to the prompt when file transfer is invoked.

5.13.5 DEFAULT HOST FILE NAME

If you repeatedly transfer the same file or append to the same file, you can configure this menu item to present that host file name as the response to the prompt when file transfer is invoked.

5.13.6 DEFAULT HOST TRANSFER OPTIONS

If you repeatedly use the same file-transfer options, you can configure this menu item to present those options as the response to the prompt when file transfer is invoked.

5.13.7 ENABLE DEBUG MODE

This menu item should only be enabled at the request of Technical Support and is not used for normal file transfer.

6. Advanced Configuration

This chapter provides detailed explanations of PC Software—LinkUp 3270 advanced configuration parameters and settings, and describes how to load alternate keyboard maps for countries other than the U.S.

For easy reference, the configuration parameters and settings are presented in a quick reference table that lists the valid choices for each parameter and indicates the factory default. The Comments column explains the settings or refers you to the following text sections that further explain the parameter.

6.1 Configuration Parameters Quick Reference

NOTE

Defaults are in *bold italics*.

Table 6-1. Configuration Menu.

Communications Port Parameter	Options	Comments
Communication Port	Com1 , Com2, Com3, Com4	Set as required by your computer
Communication Speed	19200, 9600 , 7200, 4800, 2400, 1200, 300	Set as required
Parity	NONE , ODD, EVEN, SPACE, MARK	Set as required
Number of Bits	7, 8	Set as required
Stop Bits	1 , 2	Set as required

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
XON/XOFF Flow Control	ON , OFF	Set as required. See Section 2.7.
RTS/CTS Flow Control	OFF , ON	Set as required. See Section 2.7.
Break Length (in milliseconds)	0-999 (350)	Default should work for most applications. Increase or decrease if necessary.
Device Ready Signal	NONE , DSR, DCD	See Section 2.5, Step 6
IRQ Number for Specified Port	IRQ 1-8 (IRQ for Com1)	See Section 2.2
I/O Port Address	3f8 . Any hexadecimal value, but care must be taken to ensure that the address is valid. Unpredictable results will occur if the address is not the address of the target com port.	In case of installation difficulties, make sure that another port or device is not using the same I/O address

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
UART Interrupt Number	<i>c.</i> Any hexadecimal value, but care must be taken to ensure that the number is valid. Unpredictable results will occur if the number is incorrect.	Change only under the advice of Technical Support
Print Options		
Printer Port	<i>LPT1</i> , LPT2, LPT3	Set as required by your computer
Print to Disk	<i>No</i> , Yes	See Section 3.3
File Name for Printer Data	Any "legal" DOS FILENAME.EXT (<i>PRT2DSK.DAT</i>)	See Section 3.3
Ask Before Writing File	<i>No</i> , Yes	See Section 3.3
Close File if Printer Inactive	<i>No</i> , Yes	See Section 3.3
Inactive Minutes Before Closing File	1, 2, 3 , 4, 5, 10, 15, 30	See Section 3.3

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
Terminal Options		
Protocol Converter	LinkUp A/C-4B	Set as required
Screen Rows	25 (no options)	
Screen Columns	80 (no options)	
Slow Screen Write	OFF , ON	Set to ON if using a CGA adapter and “snow” appears on the screen during screen writes. Set to OFF for EGA or higher.
Translation Table	OFF , ON	Enables changes to translation tables. See Appendix C.
Country	United States , Denmark/Norway, France, Germany, Italy, Spain, Sweden/Finland, United Kingdom	Set as required
Change Translation Table	US English , User modifiable	Use if individual values need to be changed. See Appendix C.

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
Terminal Options		
Alternate Screen Rows	25 , 27, 43	See Section 6.2
Alternate Screen Columns	80 , 132	See Section 6.2
Alternate Screen Address	B800 , B000	See Section 6.2
Alternate Screen Video Mode	7 . Two-digit hexadecimal value	See Section 6.2
Alternate Screen BX-DX Registers	0 . Two-digit hexadecimal value	See Section 6.2
API Interrupt Number	59 . Two-digit hexadecimal value	Not used at this time; no options
File Transfer Options		
File Transfer Delay	15 , 20, 25, 30, 35, 40, 45, 50	See Section 5.13
IND File Character	\$	Set as required by your host system
Transfer Mode	Text , Binary	Optional; set default as desired.

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
File Transfer Options		
Default PC File Name	Enter a string (no default)	Optional; set default as desired
Default Host File Name	User choice (no default)	Optional; set default as desired
Default Host Transfer Options	User choice (no default)	Optional; set default as desired
Enable Debug Mode	OFF , ON	Set to ON only if requested by Technical Support
Color Options		
Display Type	Color , Monochrome	Set as required by your computer

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
Color Options		
Normal	foreground colors: (black/green) black , blue, green, cyan, red, magenta, brown, white, gray, bright blue, bright green, bright cyan, bright red, bright magenta, yellow, bright white background colors: black, blue, green , cyan, red, magenta, brown, white	Default colors provide IBM 3279 emulation. Change only if required for readability on notebook LCD screens
Intensified	Black/Red (see Normal above)	
Protected Normal	Black/Cyan (see Normal above)	
Protected Intensified	Black/White (see Normal above)	

Table 6-1. Configuration Menu (continued).

Communications Port Parameter	Options	Comments
--	----------------	-----------------

Color Options

The following configuration items apply only to non-emulation PC Software—LinkUp 3270 screens:

Normal Text Attribute	<i>Black/White</i> (see Normal above)	Change if needed or desired
Header Attribute (color of software header)	<i>Cyan/Black</i> (see Normal above)	
Attention Attribute (color of advisory box)	<i>Blue/Bright White</i> (see Normal above)	
Error Attribute (color of error message box)	<i>Red/Bright White</i> (see Normal above)	

6.2 Alternate Screen Size Support Configuration

For proper automatic toggling of the display to 80 col x 32 rows (model 3), 80 col x 43 rows (model 4), or 132 col x 43 rows (model 5), the following must be configured in the TERMINAL EMULATION OPTIONS configuration menu:

- **ALTERNATE SCREEN ROWS**—Possible values are 32 for model 3, 43 rows for model 4 and 27 rows for model 5. Set for the number of rows that correspond to the number of rows in the display adapter mode being used. The mode used should be such that it has the same number of rows or a greater number of rows than the 3270 model being emulated. For example, if you are using model 5 (27 rows) but your adapter modes are either 25 or 43 rows, use the 43 line mode.
- **ALTERNATE SCREEN COLUMNS**—Possible values are 80 or 132. Set this for the number of columns that correspond to the adapter mode being used. The mode setting used should match the 3270 model size being emulated (132 for model 5, 80 for all others).

NOTE

If both of the above parameters are left at defaults, PC Software—LinkUp 3270 will not toggle to the alternate screen size.

- **ALTERNATE SCREEN ADDRESS**—This value should be left at default unless your VGA adapter uses the B000 address. Refer to your VGA adapter documentation in case of difficulty.
- **ALTERNATE SCREEN VIDEO MODE**—This must be set to the value that corresponds to the display mode that best fits the model size being emulated. Note that some VGA adapters support 132 col x 43 rows but do not support 80 col x 43 lines. In such cases, you must use the 132 x 43 mode for model 4 emulation. Please refer to your VGA adapter documentation for the correct mode number.

NOTE

The mode number must be entered in hexadecimal. If your VGA documentation gives the mode number in decimal, make sure to convert it to hexadecimal before entering it. See Appendix H for a decimal to hexadecimal conversion table.

- **ALTERNATE SCREEN BX-DX REGISTERS**—The default should work for most cases. If not, refer to your VGA adapter documentation.

PREREQUISITES FOR ALTERNATE SCREEN SIZE

For proper support of alternate screen sizes, LinkUp 3174 must have firmware version 7.1x installed. The IBM PC and TLBLK drivers have been modified. A/C-4B supports model 2 only.

In addition, the associated LinkUp display LU buffer size must be set to match or exceed the buffer size of the largest display size being emulated; the VTAM mode tables must also be likewise defined. The size of the LinkUp buffer depends on the model of display the LinkUp is emulating:

Model 2=1920
Model 4=3440

Model 3=2560
Model 5=3564

6.3 “Sensitive” Configuration Parameters

The following Communication Port Menu parameters should be left at defaults and changed only in case of hardware conflicts. If these values are changed to settings that are incompatible with the system hardware, erratic or unpredictable operation will result.

IRQ LEVEL—IRQ 0-8 can be configured

I/O PORT ADDRESS

UART INTERRUPT NUMBER

NOTE

Make sure to record the existing settings for these parameters before making any changes.

NOTE

Selecting a different com port after configuring the items above will cause the software to override your changes with the defaults. Select the desired com port first and then make the changes.

6.4 PC Software—LinkUp 3270 Keyboard Maps

PC Software—LinkUp 3270 is distributed with a variety of keyboard maps. Each map is based on one of the following PC keyboard styles:

KCHAR.PPC—PC style emulation on PC keyboard, 10-key functions.

KCHAR.PAT—PC style emulation on AT keyboard, 10-key functions.

KCHAR.EXT—PC style emulation on an enhanced keyboard (PS/2) with 101 keys (factory default).

KCHAR.DCA—3270 style emulation on a DCA IRMAkey/3270 keyboard with 127 keys.

KCHAR.DAT—Active keyboard map.

NOTE

Because of the lack of keyboard standardization on notebook and portable computer keyboards, model-specific maps are not provided for these computers. However, most will work with the default map, and customized maps can be created. (See Appendix B, Customizing Keyboard Maps.)

Diagrams of these keyboard maps are shown in **Appendix D, Keyboard Maps**.

Non-USA users may also use the LDKB.BAT file to install an alternate keyboard map that has been modified for their country's character set.

LDKB.BAT is in the root directory of the diskette. You must be in this directory when you invoke the LDKB.BAT file. For instructions for using this batch file, type the following:

```
LDKB <Enter>
```

When you invoke this file, you will be asked to supply the correct abbreviation for your country. The two-letter abbreviations used follow the IBM standard for country name abbreviations:

DK—Denmark

FR—France

GR—Germany

IT—Italy

SP—Spain

SV—Sweden

UK—United Kingdom

US—United States

Use the following command sequence:

LDKB *ab abc d:\pathname* <Enter>

Where:

ab is the abbreviation for your country

abc is the file extension of the keyboard map you want to use, as given earlier in this section

d:\pathname is the target drive and directory pathname (if any). The completed keyboard file must be in the same directory or disk as the KBPROC.EXE program. If no drive or pathname is specified, the completed keyboard file is copied onto the root directory of the C:drive.

Here is a sample command line:

LDKB GR PAT C:\TL3270 <Enter>

The above example would create a keyboard map compatible with the German AT keyboard and copy it to the \TL3270 directory on the C: drive.

NOTE

You must run KBPROC.EXE or reload PC Software—LinkUp 3270 before the new map becomes active. You can tell if the proper keyboard has been implemented from the message displayed while KBPROC is running. See Section 2.4, Installing the PC Software—LinkUp 3270.

If the display translation table is not compatible with your application, you may select another one using the TLCONFIG.EXE program.

Appendix A: PC Software—LinkUp 3270 Program Files

TL3270.EXE—The main program; it must be active in order to perform any PC Software—LinkUp 3270 function.

TLCONFIG.EXE—The configuration program, which will not run unless TL3270.EXE is resident. When in TSR mode, TLCONFIG must be entered at the DOS prompt to invoke it.

TL3270.CNF—The configuration file created by TLCONFIG.EXE. This file contains all of the configuration data.

TLAUTO.EXE—The dialer/autologon program, which will not run unless TL3270.EXE is resident.

TLAUTO.DAT—The dialer data file created by TLAUTO.EXE, containing the phone numbers and autologon strings.

TLXFER.EXE—The IND\$File PC-mainframe file transfer program. It will not run unless TL3270.EXE is resident.

TERMLYNX.\$\$\$—Compiled keyboard map file.

TERMLYNX.@@@—Used when PC Software—LinkUp 3270 is initialized.

KCHAR.DAT—Active keyboard map file.

KCHAR.EXT—Keyboard map file for 101-key extended keyboard.

KCHAR.PAT—Keyboard map file for AT style keyboard.

KCHAR.PPC—Keyboard map file for PC style keyboard.

KCHAR.DCA—Keyboard map file for DCA 3270 keyboard.

TLMASTER.EXE—Used to activate the master menu.

TESTKB.EXE—Used to read keyscan codes when customizing the keyboard.

KBPROC.EXE—Compiles keyboard map.

XCHAR.DAT—Performs display character translation.

The following program files are used only for LinkUp 3174 system management and are not used for emulation or file transfer:

LOADCODE.EXE—Used for downloading new versions of firmware to LinkUp 3174.

READCNFG.EXE—Used to archive a bit-mapped image of LinkUp 3174 configuration in a PC DOS file.

LOADCNFG.EXE—Used to load a configuration file previously created with **READCNFG.EXE** into LinkUp.

READRAM.EXE—Used for LinkUp diagnostic memory dump under the direction of Technical Support.

Appendix B: Customizing Keyboard Maps

This appendix provides instructions for customizing the PC Software—LinkUp 3270 keyboard layouts.

The keyboard maps (also called keyboard profiles) that come with PC Software—LinkUp 3270 are designed to be as useful as possible. However, some users, especially those in countries outside the U.S.A., need a method to implement different keyboards or change existing keyboard maps. This section explains how.

PC Software—LinkUp 3270 keyboard maps are text files with the name KCHAR and an extension that identifies the type of keyboard map. Four keyboard maps come with PC Software—LinkUp 3270:

KCHAR.EXT
KCHAR.PAT

KCHAR.PPC
KCHAR.DCA

See **Appendix D, Keyboard Maps**, for a diagram and description of each map.

A keyboard map is an assignment of each key on a keyboard to one or more 3270 (or PC Software—LinkUp 3270 extended) functions. Because these keyboard maps are text files, they are easily modified.

Perform the following steps to modify a keyboard map.

- Step 1—Decide which keyboard map will be your base by selecting the appropriate KCHAR file. If there are more keys on your keyboard than there are in the map, you must create an ADDKEYS.DAT file. See **ADDKEYS.DAT File** on page 113.
- Step 2—Determine which keys you wish to change. You may either move a function from one key to another or add entirely new functions and key combinations. You may define a specific key on your keyboard with different functions for different shift states.

NOTE

If you would like to implement special display characters only, see **Appendix C, Customizing the PC Software—LinkUp 3270 Plus Translation Table.**

- Step 3—(Do not perform this step if you will be using the default keyboard map KCHAR.EXT.) Copy your chosen KCHAR file to the KCHAR.DAT file with the following command:

COPY KCHAR.??? KCHAR.DAT

where ??? is the file extension of your chosen KCHAR file.

- Step 4—Determine the specific lines that need to be added or modified in the KCHAR.DAT file. To do this correctly, you should be familiar with two things:
 - KCHAR file line syntax
 - Line order in the KCHAR file

File line syntax is described on the next few pages, followed by line order. If you only want to move functions between keys or key combinations that are already defined in the KCHAR.DAT file, you do not need to learn about line order as long as the existing order of lines in the KCHAR file is not altered. However, if you wish to define new keys or key combinations, you must follow correct line order.

The information in this step covers many pages. After this step, there are two more steps to perform before a modified keyboard map may be implemented. Step 5 starts on page 109.

KCHAR FILE LINE SYNTAX

Part of a KCHAR file is shown below.

```

/*_____
KEYBOARD PROFILE FOR THE IBM PC EXTENDED KEYBOARD
_____*/

base=pext

def capslock=[capslock]      /*          MODE          */
def numlock=[numlock]        /*          */
def leftshift=[leftshift]    /*          K              */
def rightshift=[rightshift]  /*          E              */
def leftalt=[leftalt]        /*          */
def rightalt=[rightalt]      /*          */
def ctrl=[leftctrl]          /*          DEFINITIONS    */
def rightctrl=[rightctrl]
def esc=[escleadin]

def a-capslock=[hotkey]      /*          HOTKEY FROM    */
def rs-leftshit=[hotkey]    /*          EMULATION      */
def ls-rightshift=[hotkey]  /*          TO DOS         */

```

Figure B-1. Excerpt from the KCHAR.EXT File.

At the beginning of each KCHAR file is a banner message identifying the file. The next line identifies the keyboard base, which is the physical keyboard on which the map is based (in this case, base=pext). The keyboard base can be one of four IBM or IBM compatible PC keyboard types:

- pext for the IBM PC and PC/XT keyboards
- pcat for the IBM AT keyboard
- pext for the IBM extended keyboard
- dca for the DCA IRMAkey/3270 keyboard

Comments may be added to the file by preceding them with /* and ending them with */, as shown in the example in Figure B-1. PC Software—LinkUp 3270 will ignore any comments entered in this manner.

Each line subsequent to the keyboard base line (lines starting with "def...") defines a key or key combination and its function. These lines must follow the syntax shown below. Each line can have a maximum of 140 characters.

```
DEFINE {CA-}{NL-}{KB-mode-}keyname={text[function name]}
```

The only space required in the above syntax line is the one immediately after the word DEFINE. All other spaces may or may not be used, depending on your desire to improve readability.

As indicated by the braces, not all of the parameters identified in the KCHAR syntax line are required. Some parameters need only be used when you wish to associate a PC key with a particular shift state. Each parameter is described below.

- **DEFINE**—The word DEFINE may be types in its entirety or in the abbreviated form DEF. Either upper- or lowercase characters may be used.
- **{CA-}**—This corresponds to the PC keyboard when CapsLock is enabled.
- **{NL-}**—This corresponds to the PC keyboard when NumLock is enabled.
- **{KB-mode-}**—This parameter corresponds to the PC keyboard when either LeftShift, RightShift, Alt, and/or Ctrl (and in the case of the IBM PC extended keyboard, Left/Right Alt or Left/Right Ctrl) is pressed concurrently with any other PC key.

To define one of these shift states to a key, you must type the mnemonic corresponding to the desired shift state. Figure B-2 lists the mnemonic for each shift state.

```
DEFINE {CA-}{NL-}{KB-mode-}keyname={text[function name]}
```

- *keyname*—This is a required syntax entry. It corresponds to the actual name of a key on the PC keyboard. When defining it, however, you must type it exactly as given in the following figures. Refer to Figures B-3 through B-10 for the keyname diagram and keyname mnemonics list appropriate to your keyboard base. Each diagram shows the layout of the keyboard with the correct mnemonic on the appropriate key. The mnemonics in the list following each keyboard diagram are identical to the mnemonics in the diagrams.

Parameter	Mnemonic	Function
{CA-}	CA-	CapsLock enabled
{NL-}	NL-	NumLock enabled
{KB-mode-}	s-	either Shift key enabled
	ls-	Left Shift key enabled
	rs-	Right Shift key enabled
	c-	Ctrl key enabled ²
	lc-	Left Ctrl key enabled ¹
	rc-	Right Ctrl key enabled ¹
	a-	Alt key enabled ²
	la-	Left Alt key enabled ¹
	ra-	Right Alt key enabled ¹
	as-	Alt key enabled with either Shift key ³
	ac-	Alt key enabled with either Ctrl key ³
	e-	Escape key enabled ⁴

Figure B-2. Shift State Mnemonics for the KCHAR Files.

NOTES

1. Applicable to the IBM PC extended keyboard only.
2. In the case of the IBM PC extended keyboard, defining this mnemonic shift state enables both the left and right keys.
3. Applicable to some International IBM PC keyboard shift states only. When defined, the Right Ctrl shift state is implemented.
4. Escape (e-) is not a shift key. It is included in this chart because it is a valid mnemonic. See *Defining the Escape Key* on page 104 for the proper use of this mnemonic.

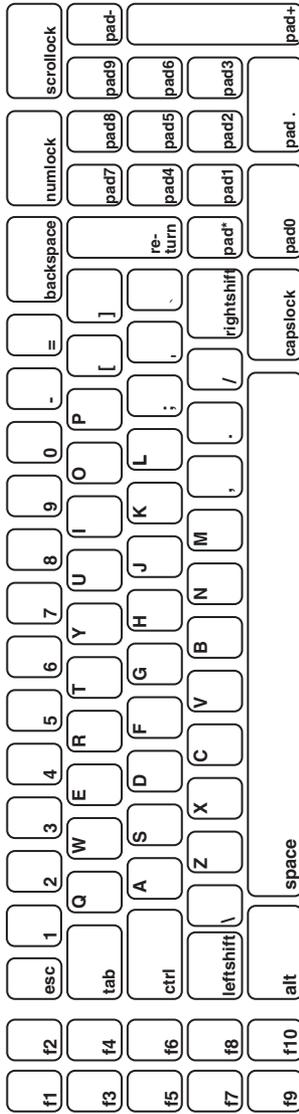


Figure B-3. Valid Keynames for the IBM PC Standard Keyboard.

esc	e	h	.	numlock
1	r	j	/	scrollock
2	t	k	rightshift	pad7
3	y	l	pad*	pad8
4	u	;	alt	pad9
5	i	'	space	pad-
6	o	'	capslock	pad4
7	p	leftshift	f1	pad5
8	[	\	f2	pad6
9	]	z	f3	pad+
0	return	x	f4	pad1
-	ctrl	c	f5	pad2
=	a	v	f6	pad3
backspace	s	b	f7	pad0
tab	d	n	f8	pad,
q	f	m	f9	
w	g	'	f10	

Figure B-4. Keyname List for the IBM PC Standard Keyboard.

esc	t		capslock	pad6
1	y	‘	f1	pad+
2	u	‘	f2	pad1
3	i	leftshift	f3	pad2
4	o	\	f4	pad3
5	p	z	f5	pad0
6	[	x	f6	pad.
7	]	c	f7	sysreq
8	return	v	f8	
9	ctrl	b	f9	
0	a	n	f10	
-	s	m	numlock	
=	d	,	scrollock	
backspace	f		pad7	
tab	g	/	pad8	
q	h	rightshift	pad9	
w	j	pad*	pad-	
e	k	alt	pad4	
r	l	space	pad5	

Figure B-6. Keypname List for the IBM AT Keyboard.

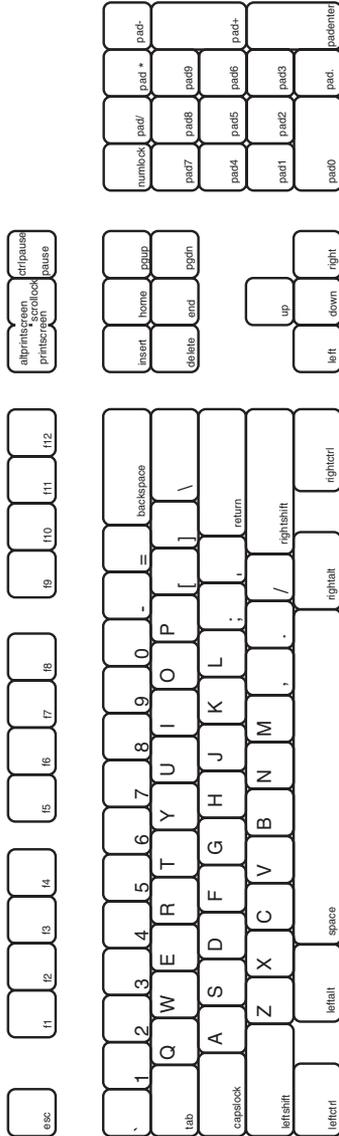


Figure B-7. Valid Keyname for the IBM PC Extended (PS/2 Keyboard).

esc	]	/	pad6
1	return	rightshift	pad+
2	leftctrl	pad*	pad1
3	a	leftalt	pad2
4	s	space	pad3
5	d	capslock	pad0
6	f	f1	pad.
7	g	f2	pad/
8	h	f3	padenter
9	i	f4	printscreen
0	k	f5	altprintscreen
-	l	f6	pause
=	;	f7	ctrlpause
backspace	,	f8	insert
tab	'	f9	home
q	leftshift	f10	pgup
w	\	f11	delete
e	z	f12	end
r	x	numlock	pgdn
t	c	scrollock	down
y	v	pad7	left
u	b	pad8	right
i	n	pad9	up
o	m	pad-	rightalt
p	,	pad4	rightctrl
[	.	pad5	key102

Figure B-8. Keyname List for the IBM PC Extended (PS/2) Keyboard.

'	p	n	pf4
1	[	m	pf5
2	]	,	pf6
3	return	.	pf7
4	capslock	/	pf8
5	a	rightshift	pf9
6	s	alt	pf10
7	d	ctrl	pf11
8	f	space	pf12
9	g	reset	pf13
0	h	enter	pf14
-	j	f1	pf15
=	k	f2	pf16
backspace	l	f3	pf17
tab	;	f4	pf18
q	,	f5	pf19
w	\	f6	pf20
e	leftshift	f7	pf21
r	<	f8	pf22
t	z	f9	pf23
y	x	f10	pf24
u	c	pf1	dup
i	v	pf2	FM
o	b	pf3	*
newline	right	pad7	pad1
ins	dca3	pad8	pad2
del	down	pad9	pad3
dca1	dca4	padtab	padenter
up	esc	pad4	pad0
dca2	numlock	pad5	pad.
left	scrollock	pad6	
home	pad=	pad-	

Figure B-10. Keyname List for the DCA IRMAkey/3270 Keyboard.

```
DEFINE {CA-}{CL-}{KB-mode-}keyname={text[function name]}
=(equal sign)
```

This must be entered immediately following the *keyname* parameter, with or without spaces on either side of it.

```
{text[function name]}
```

This corresponds to what you want the PC key to transmit and/or implement. Each part of this parameter, text or [function name], may be used by itself.

The first half of this parameter, *text*, can be composed of any text you wish to transmit whenever the defined key is pressed. This means you can define a PC key to send a single word or a string of words (including spaces, if needed). The only syntax requirement is that whatever you decide to input must be enclosed in either single or double quotation marks (' or ").

The choice of whether to use single or double quotation marks depends on whether you use one or the other in your text. For example, if you use single quotes in your desired text, you must use double quotes to enclose the text (example: **def f1="JACK'S PASSWORD"**). This does not have to be consistent throughout the KCHAR file, however, so at the next occurrence of this kind of text, you may again use either single or double quotes.

[function name] can be composed of one or more of the 3270 or PC Software—LinkUp 3270 functions or characters you wish to implement whenever the defined PC key is pressed. Each function or character must be enclosed separately in square brackets []. This parameter may be placed either in front of or behind text entries, as desired.

Refer to Figure B-11 for a keyboard diagram showing the standard 3278 keys and keynames. Refer to Figures B-12 and B-13 for a list of the 3270 standard and PC Software—LinkUp 3270 extended functions. When entered in a KCHAR file, the names must be typed exactly as shown in the figures (except that either upper- or lowercase letters may be used) and they must be enclosed in square brackets.

For example, when defining a key as the function **Print Host**, it must be typed in the KCHAR file line as [**printhost**], using no space between **print** and **host**.

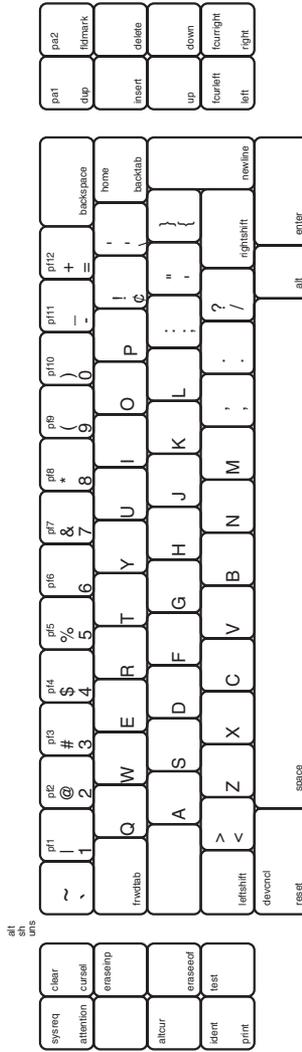


Figure B-11. 3270 Function Names Keyboard Diagram.

nothing	+	U	p
backtab	,	V	q
fldup	-	W	r
eraseof	.	X	s
fldmark	/	Y	t
left	0	Z	u
down	1	[	v
up	2	\	w
right	3	]	x
newline	4	^	y
print	5	`	z
reset	6	'	{
frwdtab	7	a	|
insert	8	b	}
eraseinp	9	c	~
home	:	d	delete
space	;	e	enter
!	<	f	cursor
"	=	g	clear
#	?	h	pa1
\$	@	i	pa2
%	O	j	pa3
&	P	k	sysreq
'	Q	l	test
(	R	m	attention
)	S	n	devcncl
*	T	o	
pf1	pf10	pf19	backspace
pf2	pf11	pf20	altcur
pf3	pf12	pf21	ident
pf4	pf13	pf22	leftshift
pf5	pf14	pf23	rightshift
pf6	pf15	pf24	alt
pf7	pf16	rubout	
pf8	pf17	fcurlleft	
pf9	pf18	fcurright	

Figure B-12. 3270 Standard Functions.

genattr	disconct	prtscrn	leftalt
xon	status	prtecho	rightalt
xoff	blmdon	break	escleadin
viewatst	blkmdoff	capslock	echotgl
numovrd	blkmdtgl	numlock	swess
refresh	altdisp	leftctrl	esc
initterm	prtstrt	rightctrl	hotkey
formfeed	prtcan	ctrl	

Figure B-13. Extended and Miscellaneous Functions.

NOTE

The shift functions must be defined to keynames before they can be used. The shift function names are:

alt	leftalt	numlock
capslock	leftctrl	rightctrl
ctrl	leftshift	rightshift

The shift keys (Shift, Ctrl, Alt, CapsLock, and NumLock) may be assigned to a function by themselves and still act as a shift key. Example:

```
def ctrl=[enter]
def c-i=[tab]
```

(If the **Ctrl** key is pressed in combination with the **i** key, [tab] is sent. If no other key is pressed while the **Ctrl** key is pressed and released, [enter] is sent.)

DEFINING THE ESCAPE KEY

Defining an Escape function in KCHAR.DAT first requires that the following line be entered in the KCHAR.DAT file:

```
def keyname=[escleadin]
```

Where *keyname* is the mnemonic of any key. This line must be placed before any other Escape key definition in the KCHAR.DAT file. Note that this definition already exists in all KCHAR files included with PC Software—LinkUp 3270.

Subsequent Escape key definitions require slightly different syntax than regular key definitions:

DEFINE e=[*function name*]=[*text*{*function name*}]

escape (e-) is defined with a 3270 or PC Software—LinkUp 3270 function name on the left side of the equal sign. The function name must be inside brackets as shown. When this defined key combination is pressed, the text and/or function on the right side of the equal sign is sent. For example:

def e=[clear]=[reset]

NOTE

Escape may not be defined with any shift state (Shift, Ctrl, Alt, Caps Lock or Num Lock).

To invoke an Escape function from the keyboard, press <Esc> and release, then press the other indicated key. This is different from ordinary shift keys, where both keys are pressed simultaneously.

If your application requires that the Escape sequence (hex 1B) be sent to the controller by itself, define one of the user keys in the XCHAR.DAT file as **1B**. See **User-Definable Functions** on page 115 for instructions on editing XCHAR.DAT.

KCHAR LINE ORDER

The key definitions in a KCHAR file are placed in a certain sequence based on the shift state of the key definition. For example, the definition of unshifted M (m) would come before the definition of Ctrl/M. The correct sequence for lines in the KCHAR file is shown in Figure B-14.

First: **def keyname =[function]**

Second: **def s-keyname=[function]**
def a-
def c-

Third: **def ls-keyname=[function]**
def rs-
def la-
def ra-
def lc-
def rc-

Fourth: **def CA-keyname=[function]**
def NL-

Fifth: **def CA-keyname=[function]**
def CA-a-
def CA-c-
def NL-s-
def NL-a-
def NL-c-

Sixth: **def CA-ls-keyname=[function]**
def CA-rs-
def CA-la-
def CA-ra-
def CA-lc-
def CA-rc-
def NL-ls-
def NL-rs-
def NL-la-
def NL-ra-
def NL-lc-
def NL-rc-

Seventh: **def CA-NL-keyname=[function]**

Eighth: **def CA-NL-skeyname=[function]**
def CA-NL-a-
def CA-NL-c-

Ninth: **def CA-NL-ls-keyname=[function]**
def CA-NL-rs-
def CA-NL-la-
def CA-NL-ra-
def CA-NL-lc-
def CA-NL-lc-

Figure B-14. KCHAR Line Order.

CAUTION

If the line order in Figure B-14 is not followed, PC Software—LinkUp 3270 will not perform as expected.

NOTE

This line order applies only to the definitions of individual keynames. It does not mean that, for example, you have to group all unshifted keyname definitions first in the KCHAR file, then all definitions with s-, a- or c- next, etc.

LINE ORDER EXAMPLE

Assume that the following keys are defined in the order shown:

```
def enter=[enter]
def c-enter=[clear]
def CA-c-enter="password"
```

Given these definitions in this order, pressing <Enter> by itself will send the 3270 function [enter], pressing <Ctrl/Enter> will send the 3270 function [clear] and pressing <Ctrl/Enter> when Caps Lock is on will send the text string **password**. If the order of the three definitions were changed, there would be a different effect:

```
def c-enter=[clear]
def CA-c-enter="password"
def enter=[enter]
```

If the definitions were placed in this order, then <Enter>, <Ctrl/Enter>, and <Caps Lock/Ctrl/Enter> would all send [enter] when pressed, even though <Ctrl/Enter> is defined to send [clear] and <Caps Lock/Ctrl/Enter> is defined to send **password**. The effect of the first two definitions is canceled by the third definition, because the correct line order has been violated.

Refer to Figure B-15 for a chart of shift state assumptions.

Assumed Shift States
Shift state
defined to a
keyname in
KCHAR file

	Normal			Caps Lock			Num Lock			Caps Lock/ Num/Lock		
	shift	alt	ctrl	shift	alt	ctrl	shift	alt	ctrl	shift	alt	ctrl
	lr	lr	lr	lr	lr	lr	lr	lr	lr	lr	lr	lr
(blank)	••	••	••	••	••	••	••	••	••	••	••	••
s-	••			••			••			••		
ls-	•			•			•			•		
rs-	•			•			•			•		
a-		••			••			••			••	
la-		•			•			•			•	
ra-		•			•			•			•	
c-			••			••			••			••
lc-			•			•			•			•
as-/ac-/rc-			•			•			•			•
CA-				••	••	••				••	••	••
CA-s-				••						••		
CA-ls-				•						•		
CA-rs-				•						•		
CA-a-					••						••	
CA-la-					•						•	
CA-ra-					•						•	
CA-c-						••						••
CA-lc-						•						•
CA-rc-						•						•
NL-							••	••	••	••	••	••
NL-s-							••			••		
NL-ls-							•			•		
NL-rs-							•			•		
NL-a-								••			••	
NL-la-								•			•	
NL-ra-								•			•	
NL-c-									••			••
NL-lc-									•			•
NL-rc-									•			•
CA-NL-										••	••	••
CA-NL-s-										••		
CA-NL-ls-										•		
CA-NL-rs-										•		
CA-NL-a-											••	
CA-NL-la-											•	
CA-NL-ra-											•	
CA-NL-c-												••
CA-NL-lc-												•
CA-NL-rc-												•

Figure B-15 Shift State Assumption Table.

STEP 5.

The previous step laid out the rules for modifying a KCHAR file. At this point, the file can be edited.

You should know what changes you want to make and be familiar with the line syntax laid out in Step 4. If you are adding new lines to the file, you should also be familiar with correct line order, which is also given in Step 4.

Open the KCHAR.DAT file with a text editing program. The file must be opened as an ASCII text file. (For example, if you are using WordStar, the KCHAR file must be opened as a non-document file.)

We recommend that you do not edit any KCHAR file except KCHAR.DAT. This way, the factory standard KCHAR files will be preserved for future use.

A KCHAR file can be edited in two ways:

- Moving the existing text and 3270 or PC Software—LinkUp 3270 function values between already defined keys or key sequences. Use this method if the specific keys and key sequences already specified are acceptable to you, but the function values defined to them are not.
- Defining additional keys or key sequences (other than those already defined) by adding entirely new key definition lines to the file.

Example

Figure B-16 shows an excerpt from a KCHAR file. Figure B-17 shows the same excerpt after modification, with the changed lines highlighted in bold.

```
def a-1=[pf1]
def a-2=[pf2]
def a-3=[pf3]
def a-4=[pf4]
def f1=[attention]
```

Figure B-16. Excerpt from a KCHAR File.

```

def a-1=[pf11]
def a-2=[pf12]
def a-3=[pf3]
def a-4=[pf4]
def f1=[attention]
def a-f1="userid"[frwdtab]"passwd1"[enter]

```

Figure B-17. Modified Excerpt from a KCHAR File.

The changes made in Figure B-17 are summarized in Table B-1 below.

Table B-1. Changes Made in Figure B-17.

Key Combination	Original Function	New Function
Alt/1	PF1	PF11
Alt/2	PF2	PF12
Alt/F1	F1	text userid, Tab text passwd1, Enter

The original functions of Alt/1 and Alt/2 (PF1 and PF2) were simply replaced with different functions (PF11 and PF12). If you still wanted the PF1 and PF2 functions to be implemented, you would have to define them to other keys or key combinations.

Alt/F1 had no specific definition in the KCHAR file, so an entirely new line had to be added. The correct line order of the Alt/F1 definition had to be determined by referring to Figure B-14. Alt/F1 is the second line order, so it had to be placed after the definition of the F1 key.

STEP 6

After the KCHAR file has been edited, the last step is to initialize PC Software—LinkUp 3270. Do this by running KBPROC.EXE. At the DOS prompt of the drive containing this program, type:

```
KBPROC <Enter>
```

When this program is successfully completed, the new keyboard map will be implemented, and it is ready for use when you hotkey into Emulation Mode.

If you make a syntax error while editing the KCHAR file, an error message will be displayed showing the incorrect line and KBPROC will be aborted. If this occurs, reopen the KCHAR.DAT file, correct it and run KBPROC again.

NOTE

The following information is provided for those who want more information about how PC Software—LinkUp 3270 implements keyboard maps.

To successfully emulate a 3270 keyboard, PC Software—LinkUp 3270 reads from the TERMLYNX.*** file. The TERMLYNX.*** file is created by PC Software—LinkUp 3270 when KBPROC is first executed (and, if any changes are detected, whenever KBPROC is re-executed) through the KBPROC.EXE program. The KBPROC.EXE program uses the KCHAR.DAT, TERMLYNX.*** and XCHAR.DAT files. A file called ADDKEYS.DAT will also be referred to by KBPROC.EXE in this procedure if you have created an ADDKEYS.DAT file on the PC Software—LinkUp 3270 working disk or diskette. Refer to **ADDKEYS.DAT File** on page 113 for further information.

Once compiled, the TERMLYNX.*** file allows PC Software—LinkUp 3270 to convert the scan codes generated by your PC keyboard into IBM 3270 key numbers. These transcribed key numbers are then handed off to the XCHAR.DAT file for conversion into ASCII hexadecimal codes, thereby enabling PC Software—LinkUp 3270 to communicate with the controller. The controller echoes display characters back to your PC screen and/or transmits the data to the host for processing.

EDITING NON-USA STANDARD KEYBOARDS

The vocabulary of US keyboard labels is used to identify the various PC key names and 3270 function names in a KCHAR file key definition. Keep in mind that these labels are mnemonics only. They actually represent the key-scan codes generated by each key according to the specific position occupied by that key on the keyboard. This means that if you are using a non-USA keyboard, you cannot simply select a key name to define on the basis of the labels marked on your keyboard alone. Instead, you must;

1. Identify the scan code of the key on your PC keyboard to which you wish to define a 3270 or PC Software—LinkUp 3270 function.
2. Go to **Appendix E, Scan Code Tables**, to find which key on the appropriate U.S. keyboard sends that scan code.
3. Using the appropriate keyboard map from Figures B-3 through B-10, identify the label or key name marked on that (US keyboard) key position and type it as the valid keyname on the appropriate key definition line in the KCHAR.DAT file. (You have already copied your chosen keyboard map to the KCHAR.DAT file.)

NOTE

A key's scan code should be listed in your keyboard manufacturer's technical reference guide. If it is not, do the following:

Invoke the TESTKB.EXE program (included on the PC Software—LinkUp 3270 distribution diskette) by typing TESTKB at the corresponding DOS prompt and pressing <Enter>. Next, press a key. The program will respond by displaying that key's make and break codes. The first half of the displayed code is the key's make code; the second half is its break code. For example, a display of 0e 31 0e 50 translates as follows: Make Code=0e 31; Break Code=03 50. The make code and the scan code are synonymous.

In order to type the correct 3270 function mnemonic to complete your edited key-definition line, you must:

1. Identify the position of the key on your 3270 keyboard you wish to be implemented by the key name you have just specified.
2. Cross-reference the US 3270 keyboard diagram provided in Figure B-11 and match the position of your key with that on the US diagram.
3. Identify the label marked on that (US keyboard) key position, and type it as the valid 3270 function on the key definition line in the KCHAR file you are editing.

NOTE

As stated previously, PC Software—LinkUp 3270 supports several extended functions that may also be defined to selected key definitions; the names of these functions are provided in the table in Figure B-13. However, if you elect to define one of these extended functions to a selected key (or key sequence) in the KCHAR file you are modifying, you do not need to follow the second cross-reference procedure above since they are not standard functions with strategic positions on a 3270 keyboard.

ADDKEYS.DAT FILE

Suppose you are using a keyboard that contains keys not included in the KCHAR file you have chosen for your base keyboard (see Figures B-3 through B-6). If you wish to assign text or a 3270 function to one of these unrecognized keys, you must create a file called ADDKEYS.DAT and add the new key (or keys) you wish to define. This can be done using a text editor, as with the KCHAR files. Once ADDKEYS.DAT is created, you must edit your KCHAR.DAT file to add these new key definitions. Copy your ADDKEYS.DAT file to the PC Software—LinkUp 3270 working disk or diskette so when PC Software—LinkUp 3270 loads it can check this file and add the list of new keys to its own known keys.

The line syntax for a new key addition is as follows:

NEWKEY *added keyname*= *xx xx xx...* / *yy yy yy...*

NOTE

The spaces shown in the above line of syntax are placed appropriately. Either upper- or lowercase characters may be used.

NEWKEY is the cue word of this formula, indicating to PC Software—LinkUp 3270 that what follows is:

- the name of the new key to be added, *added keyname*, where a string of up to 14 characters can be used to identify its name;
- the make code of the new key (corresponding to the scan code generated by the key when it is pressed), *xx xx xx...*, where up to 10 hexadecimal bytes can be defined if needed;
- a space, a forward slash and another space;
- the break code of the new key (corresponding to the scan code generated by the key when it is released), *yy yy yy ...*, where up to 10 hexadecimal bytes can be defined if needed.

Comments may also be added to the ADDKEYS.DAT file if desired. To do so, precede the comment with a slash followed immediately by an asterisk (/ *). Then, at the close of your comment, terminate it with an asterisk followed immediately by a slash (* /). For example, if you wanted to include the comment, NEW KEY ADDITIONS IN SUPPORT OF THE XYZ DELUXE KEYBOARD, you would type it so that it would appear as follows:

```
/*NEW KEY ADDITIONS IN SUPPORT OF THE XYZ  
DELUXE KEYBOARD*/
```

NOTE

If more than one new keyboard base (in addition to the four standard bases) needs to be supported by PC Software—LinkUp 3270, it is possible to create more than one ADDKEYS.DAT file. To accomplish this, create and store multiple ADDKEYS files in the same way that the variety of KCHAR files are stored; that is, by creating and storing them with unique file name extensions. Then, whenever one of them is needed, you can rename the selected one with the file name and extension recognized by PC Software—LinkUp 3270: ADDKEYS.DAT.

As an example, suppose you wish to use a keyboard that offers the following two keys, EXIT and SAMPLE. Assume that these two keys are new and are not presently included in the list of key names that PC Software—LinkUp 3270 supports. Before you can define specific 3270 functions to these keys, you must first add them to the PC Software—LinkUp 3270 repertoire. To do this, you must know the make and break codes of each of these keys, and you must create an ADDKEYS.DAT file.

NOTE

A key's make and break codes should be listed in your keyboard manufacturer's technical reference guide. If they are not, use the TESTKB.EXE program as previously discussed.

For demonstration purposes, assume the following make and break codes for the previously suggested new keys:

New Key	Make Code	Break Code
EXIT	E1 18 1B	E1 11 1B
SAMPLE	B4 12	12 C4

Now, using your text editor, create ADDKEYS.DAT. Then, in accordance with the previously discussed syntax rules, enter the new keys to this file. The required lines should appear as below:

```
newkey exit=e1 18 1b / e1 11 1b
newkey sample= b4 12 / 12 c4
```

After saving this file and then editing a selected KCHAR file to define the new keys, you will be able to load PC Software—LinkUp 3270 and implement the keys.

NOTE

PC Software—LinkUp 3270 cannot support any new keys added via the creation of an ADDKEYS.DAT file unless that ADDKEYS.DAT file is on the PC Software—LinkUp 3270 working disk or diskette along with the KCHAR.DAT, XCHAR.DAT, TERMLYNX.@@@ and KBPROC.EXE file, and PC Software—LinkUp 3270 is loaded from that same disk or diskette.

USER-DEFINABLE FUNCTIONS

Modifying lines 220 through 235 in the XCHAR.DAT file enables you to define 16 extra functions.

CAUTION

Do not alter any lines in the XCHAR.DAT file other than the user function key lines (220 through 235).

```
DC 00 00 00      ;USERFUNC1
DD 00 00 00      ;USERFUNC2
DE 00 00 00      ;USERFUNC3
DF 00 00 00      ;USERFUNC4
```

Figure B-18. Excerpt from the XCHAR.DAT File.

The XCHAR.DAT file may be edited with any text editor, such as the DOS EDLIN program. The syntax of the XCHAR.DAT file must be followed. See Figure B-18.

1. At the beginning of each line in the XCHAR.DAT file is a hexadecimal number. Each number represents an ASCII character or control code. It may be up to three bytes long.
2. Following each ASCII hex codes is the terminator character, or null (00). Anything following the null on that line is interpreted as a comment and will be ignored by PC Software—LinkUp 3270.
3. A comment may be added to describe the user function. The maximum line length in the XCHAR.DAT file is 80 characters.

To define an extra function, delete the existing code at the beginning of the line and type the desired ASCII hexadecimal code in its place. Only one null character (00) is necessary to terminate the line. Leave the existing comment on the line for identification. Define any other user function keys you want and save your changes. Then open the KCHAR.DAT file, define these new extended 3270 functions to the key name (or shifted key name) you wish to press to invoke the functions (following the procedure given in this appendix) and type in the appropriate user function name (USERFUNC1, USERFUNC2, etc.). Make sure that the function is spelled exactly as shown in Figure B-12, and enclose it in square brackets.

Appendix C: Customizing the PC Software—LinkUp 3270 Translation Table

PC Software—LinkUp 3270 supports the ISO 7-bit ASCII character set. If you want to use an 8-bit character in place of one of the 7-bit displayable characters, you can assign the new character to be displayed in place of the old character by using the Change Translation table menu choice in the Terminal Options configuration menu.

Limitations:

- Changing values in the PC Software—LinkUp 3270 translation table does not change the hex code sent by the controller.
- Changing values in the PC Software—LinkUp 3270 translation table does not change the translation used by the PC printer, because PC Software—LinkUp 3270 only passes the printer data on to the printer as received from the controller. For this reason, screen prints will not display the new character.
- If you need to change the code being sent by the LinkUp controller, please refer to the LinkUp manual for details. If you are using the A/C-4B, a firmware patch will be required. Note that this does not change the actual hex code sent to PC Software—LinkUp 3270 by the controller.

Hex Code	Sym- bol	Hex Code	Sym- bol	Hex Code	Sym- bol	Hex Code	Sym- bol
00		20		40	@	60	`
01	☐	21	!	41	A	61	a
02	☐	22	"	42	B	62	b
03	♥	23	#	43	C	63	c
04	♦	24	\$	44	D	64	d
05	♣	25	%	45	E	65	e
06	♠	26	&	46	F	66	f
07	●	27	`	47	G	67	g
08	☐	28	(	48	H	68	h
09	○	29	)	49	I	69	i
0A	☐	2A	*	4A	J	6A	j
0B	♀	2B	+	4B	K	6B	k
0C	♀	2C	'	4C	L	6C	l
0D	♪	2D	-	4D	M	6D	m
0E	♪	2E	.	4E	N	6E	n
0F	♯	2F	/	4F	O	6F	o
10	⌞	30	0	50	P	70	p
11	⌞	31	1	51	Q	71	q
12	↕	32	2	52	R	72	r
13	!!	33	3	53	S	73	s
14	♯	34	4	54	T	74	t
15	§	35	5	55	U	75	u
16	▬	36	6	56	V	76	v
17	↕	37	7	57	W	77	w
18	↑	38	8	58	X	78	x
19	↓	39	9	59	Y	79	y
1A	→	3A	:	5A	Z	7A	z
1B	←	3B	;	5B	[	7B	{
1C	┌	3C	<	5C	\	7C	|
1D	↕	3D	=	5D	]	7D	}
1E	▲	3E		5E	^	7E	~
1F	▼	3F	?	5F	_	7F	D

Figure C-1 (part 1 of 2). PC Display Characters Table.

Hex Code	Sym- bol	Hex Code	Sym- bol	Hex Code	Sym- bol	Hex Code	Sym- bol
80	Ç	A0	á	C0		E0	∞
81	Û	A1	í	C1		E1	β
82	é	A2	ó	C2		E2	Γ
83	â	A3	ú	C3		E3	Π
84	ä	A4	ñ	C4		E4	Σ
85	à	A5	Ñ	C5		E5	σ
86	å	A6	ª	C6		E6	μ
87	ç	A7	º	C7		E7	τ
88	ê	A8	¿	C8		E8	Φ
89	ë	A9	—	C9		E9	θ
8A	è	AA	¬	CA		EA	Ω
8B	ï	AB	1/2	CB		EB	δ
8C	î	AC	1/4	CC		EC	∞
8D	ì	AD	¡	CD		ED	∅
8E	Ä	AE	«	CE		EE	ε
8F	Å	AF	»	CF		EF	∩
90	É	B0		D0		F0	≡
91	æ	B1		D1		F1	≥
92	Æ	B2		D2		F2	≤
93	ô	B3		D3		F3	∫
94	ö	B4		D4		F4	∫
95	ò	B5		D5		F5	∫
96	ù	B6		D6		F6	+
97	ù	B7		D7		F7	≈
98	ÿ	B8		D8		F8	•
99	Ö	B9		D9		F9	•
9A	Ü	BA		DA		FA	•
9B	¢	BB		DB		FB	√
9C	£	BC		DC		FC	n
9D	¥	BD		DD		FD	2
9E	Pt	BE		DE		FE	■
9F	f	BF		DF		FF	

Figure C-1 (part 2 of 2). PC Display Characters Table.

Changing Display Characters

To change the character displayed upon receipt of a particular ASCII hex code, use the following example as a guideline when referring to Figure C-2.

For example, to change the # character (23h) to another character, proceed as follows:

1. From the configuration main menu, select **Terminal Emulation Options** and press <Enter> to display the menu.
2. Arrow down to **Change Translation Table** and press <Enter> to display the table.
3. Press the right arrow key until the # character is highlighted. Press <Spacebar> until the new character is displayed, or press <Enter> and enter the ASCII hex value for the new character (see Figure C-1).
4. Press <Esc> to exit the menu. Arrow up to **Translation Table** and press <Enter>.
5. Use the down arrow to select ON and press <Enter> to select it. Press <Esc> to return to the main configuration menu.
6. Arrow down to SAVE CONFIGURATION and press <Enter> to save the change.
7. Connect to the controller, and while at a host screen press <Shift/3>. The new character should now be displayed instead of the # character.

Configuration Menu—TRANSLATION TABLE

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
20		!	"	#	\$	%	&	'	()	*	+	,	-	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
60	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	

Press the SPACE BAR to change values
 Press the ESC key to exit

Figure C-2. Configuration menu—Display Translation Table.

Appendix D: Keyboard Maps

In this appendix, the key functions of the default keyboard map are described first. Then a diagram of each available keyboard map is shown.

D.1 Default Keyboard Map (KCHAR.EXT)

This section contains a list of the factory default key sequences assigned to implement each of the 3270 standard and PC Software—LinkUp 3270 extended functions supported by the PC Software—LinkUp 3270 for the IBM PC extended keyboard.

Table D-1. Key Functions.

Function	Key Sequence	Notes
<u>Cursor Movement</u>		
Cursor Up	up arrow	
Cursor Down	down arrow	
Cursor Left	left arrow	
Cursor Right	right arrow	
Tab	Tab	
Backtab	Shift/Tab	
New Line	NK Enter	NK=Numeric Keypad
Fast Left	Ctrl/left arrow	
Fast Right	Ctrl/right arrow	
<u>Special Control</u>		
Reset	F9	
Insert	Insert	
Delete	Delete	
Erase Input	F5	
Erase to End of Field	F6	
Home	Home	
Cursor Select	F8	Not in Block Mode
Field Exit		
Duplicate	Ctrl/D	

Table D-1. Key Functions.

Function	Key Sequence	Notes
Field Mark	Ctrl/F	
Special Host		
System Request	Esc ?	Press separately
Test	Esc N or Alt/F10	Press separately
Signal		
Attention	Esc I or F1	Press separately
Aid Generating		
Enter	Enter or F10	
Clear	F4	
Print	Ctrl/P	
Device Cancel	Esc]	
PF1	Alt/1	
PF2	Alt/2	
PF3	Alt/3	
PF4	Alt/4	
PF5	Alt/5	
PF6	Alt/6	
PF7	Alt/7	
PF8	Alt/8	
PF9	Alt/9	
PF10	Alt/0	
PF11	Alt/Q	
PF12	Alt/W	
PF13	Alt/E	
PF14	Alt/R	
PF15	Alt/T	
PF16	Alt/Y	
PF17	Alt/U	
PF18	Alt/I	
PF19	Alt/O	

Table D-1. Key Functions.

Function	Key Sequence	Notes
PF20	Alt/P	
PF21	Alt/A	
PF22	Alt/S	
PF23	Alt/D	
PF24	Alt/F	
PA1	Alt/Z	
PA2	Alt/X	
PA3	Alt/C	
<u>Extended Functions</u>		
Refresh Screen	Ctrl/W	
Initialize Terminal	Esc < or F11	Press separately
Request Disconnect	Esc ~	Press separately
Toggle Status Line	Esc _	Press separately
View Attribute	Ctrl/V	Not in Block Mode
Generate Attribute	Ctrl/G	Not in Block Mode
Numeric Override	Esc [or Alt/Num/Lock	Press separately
Caps Lock	CapsLock	
Num Lock	NumLock	
Print Screen	PrintScreen or Shift/pad*	
Local Copy Print Request	Ctrl/P	
Local Copy Form Feed	Esc \	Press separately
Print Cancel	Esc PrintScreen or Esc pad*	Press separately
Print Restart	Alt/PrintScreen or Ctrl/pad*	

Table D-1. Key Functions.

Function	Key Sequence	Notes
Alter Cursor	F7	
Alter Display	Alt/ScrollLock	Not in Block Mode
Break	Ctrl/ScrollLock	
Toggle DOS/Emulator	Alt/CapsLock or Shift/Shift	
Toggle Block Mode	Alt/Backspace	
Echoplex Toggle Enable	Esc ;	Press separately
Switch to Next Session	Esc > or F12	Press separately

D.2 Keyboard Maps

This section contains separate diagrams for each of the KCHAR keyboard maps. A total of four maps is available.

Two diagrams are shown for each keyboard. One diagram shows Unshifted, Alt and Shifted functions, while the other shows Unshifted, Escape, and Escape-Shifted functions. An Escape function is invoked by first pressing <Esc> and releasing it, then pressing the indicated key or key combination.

Examine each map and select the one that best satisfies your application requirements.

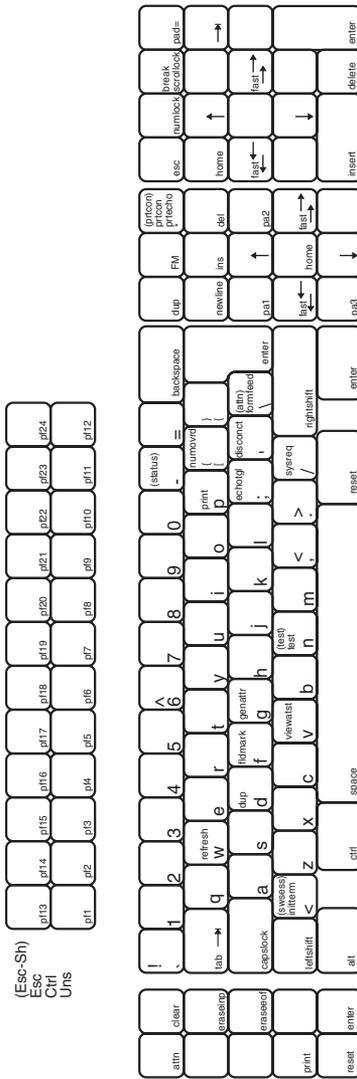


Figure D-2 (part 2 of 2). KCHAR.DCA—3270-style emulation on a DCA IRMAkey keyboard with 127 keys.

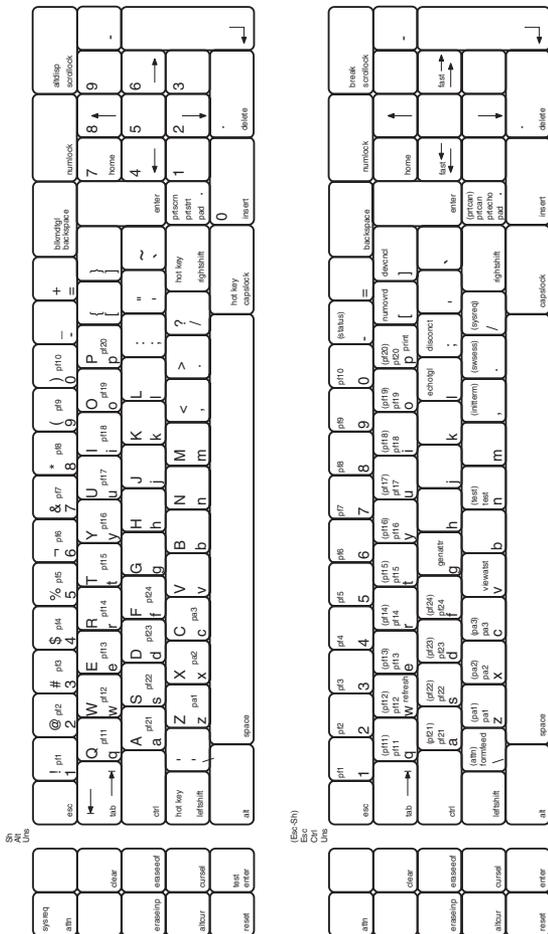


Figure D-3. KCHAR.PPC—PC style emulation on a PC keyboard.

Appendix E: Scan-Code Tables

This appendix provides a scan code table for each of four commonly used PC keyboards. Included are the scan codes for the IBM PC standard, IBM AT, IBM PC extended, and DCA IRMAkey keyboards. The scan codes are provided in both decimal and hexadecimal forms.

Refer to this appendix and **Appendix B, Customizing Keyboard Maps**, when you wish to customize your PC Software—LinkUp 3270 keyboard layout.

Table E-1. IBM PC Standard and IBM AT Keyboards.

Scan Code		Key Cap	Scan Code		Key Cap	Scan Code		Key Cap
Dec	Hex		Dec	Hex		Dec	Hex	
1	01	Esc	29	1D	Ctrl	57	39	Spacebar
2	02	1	30	1E	A	58	3A	Caps Lock
3	03	2	31	1F	S	59	3B	F1
4	04	3	32	20	D	60	3C	F2
5	05	4	33	21	F	61	3D	F3
6	06	5	34	22	G	62	3E	F4
7	07	6	35	23	H	63	3F	F5
8	08	7	36	24	J	64	40	F6
9	09	8	37	25	K	65	41	F7
10	0A	9	38	26	L	66	42	F8
11	0B	0	39	27	;	67	43	F9
12	0C	-	40	28	'	68	44	F10
13	0D	=	41	29	'	69	45	Num Lock
14	0E	left arrow	42	2A	L-Shift	70	46	Scroll Lock
15	0F		43	2B	\	71	47	NK 7
16	10	Q	44	2C	Z	72	48	NK 8
17	11	W	45	2D	X	73	49	NK 9
18	12	E	46	2E	C	74	4A	NK -
19	13	R	47	2F	V	75	4B	NK 4
20	14	T	48	30	B	76	4C	NK 5
21	15	Y	49	31	N	77	4D	NK 6
22	16	U	50	32	M	78	4E	NK +
23	17	I	51	33	,	79	4F	NK 1
24	18	O	52	34	.	80	50	NK 2
25	19	P	53	35	/	81	51	NK 3
26	1A	[	54	36	R-Shift	82	52	NK 0
27	1B	]	55	37	*(Prt Sc)	83	53	NK
28	1C	Return	56	38	Alt	84	54	AT SysReq

NOTE: The only difference between these two keyboards is scan code 84 (hex 54): the SysReq key is only on the AT.

Table E-2. IBM PC Extended Keyboard.

Scan Code		Key Cap	Scan Code		Key Cap	Scan Code		Key Cap
Dec	Hex		Dec	Hex		Dec	Hex	
41	29	'	36	24	J	69	45	Num Lock
2	02	1	37	25	K	71	47	NK 7
3	03	2	38	26	L	75	4B	NK 4
4	04	3	39	27	;	79	4F	NK 1
5	05	4	40	28	'	224 53	E0 35	NK /
6	06	5	28	1C	Enter	72	48	NK 8
7	07	6	42	2A	L-Shift	76	4C	NK 5
8	08	7	44	2C	Z	80	50	NK 2
9	09	8	45	2D	X	82	52	NK 0
10	0A	9	46	2E	C	55	37	NK *
11	0B	0	47	2F	V	73	49	NK 9
12	0C	-	48	30	B	77	40	NK 6
13	0D	=	49	31	N	81	51	NK 3
14	0E	Backspace	50	32	M	83	53	NK Del
15	0F	Tab	51	33	,	74	4A	NK -
16	10	Q	52	34	.	78	4E	NK +
17	11	W	53	35	/	224 28	E0 1C	NK Enter
18	12	E	54	36	R-Shift	1	01	Esc
19	13	R	29	1D	L-Ctrl	59	3B	F1
20	14	T	56	38	L-Alt	60	3C	F2
21	15	Y	57	39	Space	61	3D	F3
22	16	U	224 56	E0 38	R-Alt	62	#e	F4
23	17	|	224 29	E0 1D	R-Ctrl	63	3F	F5
24	18	O	224 82	E0 52	Insert	64	40	F6
25	19	P	224 83	E0 53	Delete	65	41	F7
26	1A	[	224 75	E0 4B	L-Cursor	66	42	F8
27	1B	]	224 71	E0 47	Home	67	43	F9
43	2B	\ see note 1	224 79	E0 4F	End	68	44	F10
58	3A	Caps Lock	224 72	E0 48	Up Cursor	87	57	F11
30	1E	A	224 80	E0 50	Dn Cursor	88	58	F12
31	1F	S	224 73	E0 49	Page Up	see note 2		PrintScreen
32	20	D	224 81	E0 51	Page Dn	84	54	Alt/Prt Sc
33	21	F	224 77	E0 4D	R-Cursor	70	46	Scroll Lock
34	22	G	69	45	NumLock	see note 3		Pause
35	23	H	71	47	NK 7	224 70	E0 46	Ctrl/Pause

NOTE 1: Extended keyboard with 101 keys only.

NOTE 2: Scan code: 224 42 224 55 (hex E0 2A E0 37)

NOTE 3: Scan code: 224 29 69 (hex E0 1D 45)

Table E-3 (Part 1 of 2). DCA IRMAkey Keyboard.

Scan Code		Key Cap	Scan Code		Key Cap
Dec	Hex		Dec	Hex	
1	01	Esc	33	21	F
2	02	1	34	22	G
3	03	2	35	23	H
4	04	3	36	24	J
5	05	4	37	25	K
6	06	5	38	26	L
7	07	6	39	27	;
8	08	7	40	28	'
9	09	8	41	29	a delete a
10	0A	9	42	2A	Shift
11	0B	0	43	2B	\
12	0C	_	44	2C	Z
13	0D	=	45	2D	X
14	0E	Backspace	46	2E	C
15	0F	Tab	47	2F	V
16	10	Q	48	30	B
17	11	W	49	31	N
18	12	E	50	32	M
19	13	R	51	33	,
20	14	T	52	34	.
21	15	Y	53	35	/
22	16	U	54	36	Shift
23	17	I	55	37	Prt Sc
24	18	O	56	38	Alt
25	19	P	57	39	Spacebar
26	1A	[	58	3A	Caps Lock
27	1B	]	59	3B	F1
28	1C	Return	60	3C	F2
29	1D	Ctrl	61	3D	F3
30	1E	A	62	3E	F4
31	1F	S	63	3F	F5
32	20	D	64	40	F6

Table E-3 (Part 2 of 2). DCA IRMAkey Keyboard.

Scan Code		Key Cap	Scan Code		Key Cap
Dec	Hex		Dec	Hex	
65	41	F7	97	61	PF14
66	42	F8	98	62	PF15
67	43	F9	99	63	PF16
68	44	F10	100	64	PF17
69	45	Num Lock	101	65	PF18
70	46	Scroll Lock	102	66	PF19
71	47	NK 7	103	67	PF20
72	48	NK 8	104	68	PF21
73	49	NK 9	105	69	PF22
74	4A	NK -	106	6A	PF23
75	4B	NK 4	107	6B	PF24
76	4C	NK 5	108	6C	<
77	4D	NK 6	109	6D	Reset
78	4E	NK +	110	6E	Enter
79	4F	NK 1	111	6F	Dup Fld
80	50	NK 2	112	70	Fld Mark
81	51	NK 3	113	71	Back Tab
82	52	NK 0	114	72	Insert
83	53	NK Del	115	73	Delete
84	54	PF1	116	74	DCA1
85	55	PF2	117	75	Up Cursor
86	56	PF3	118	76	DCA2
87	57	PF4	119	77	L-Arrow
88	58	PF5	120	78	Home
89	59	PF6	121	79	R-Cursor
90	5A	PF7	122	7A	DCA3
91	5B	PF8	123	7B	Dn Cursor
92	5C	PF9	124	7C	DCA4
93	5D	PF10	125	7D	NK =
94	5E	PF11	126	7E	NK Tab
95	5F	PF12			
96	60	PF13			

Appendix F: Error Messages

PC Software—LinkUp 3270 is initialized by running TL3270.EXE, as explained in **Chapter 3, Emulation and Operation**. As TL3270.EXE runs, a number of different messages may be displayed on your PC screen. Whether or not a message is displayed depends on the conditions under which PC Software—LinkUp 3270 is loaded. Each of these messages is explained in this appendix, along with suggested corrective action, if appropriate.

Compiling Keyboard Profile ERROR: Invalid base Specified in file KCHAR.DAT
New Keyboard Profile NOT Installed.

This message indicates that the keyboard base defined in the first line of the KCHAR.DAT file is not a valid one.

Recommended Action: Re-edit the KCHAR.DAT file by replacing the incorrect keyboard base mnemonic with one of the four valid ones; then execute TL3270.EXE. (Refer to **Appendix B, Customizing Keyboard Maps**.)

Compiling Keyboard Profile ERROR: MAXIMUM NUMBER OF CHARACTERS PER NAME EXCEEDED
New Keyboard Profile NOTE Installed.

This indicates that the number of characters used to add a new key in the ADDKEYS.DAT file has exceeded the maximum of 15.

Recommended Action: Re-edit the ADDKEYS.DAT file by shortening the new key's name to comply with the size restriction, then execute TL3270.EXE. (Refer to ADDKEYS.DAT File in **Appendix B**, page 113.)

Compiling Keyboard Profile ERROR: MAXIMUM NUMBER OF KEYS EXCEEDED
New Keyboard Profile NOT Installed.

Indicates that more than 150 keys have been defined to the KCHAR.DAT file.

Recommended Action: Re-edit the KCHAR.DAT file to bring the number of keys defined in line with the 150-key restriction, then execute TL3270.EXE.

**Compiling Keyboard Profile ERROR: Maximum Storage for Compounded Functions Exceeded
New Keyboard Profile NOT Installed.**

Indicates that the cumulative total of text defined to a key or key sequence in the KCHAR.DAT file has been exceeded. The maximum permitted is 500 bytes.

Recommended Action: Re-edit the KCHAR.DAT file by reducing the amount of text defined to the keys and/or key sequences in this file, then execute TL3270.EXE.

**Compiling Keyboard Profile ERROR: Missing base statement in file KCHAR.DAT
New Keyboard Profile NOT Installed.**

Indicates that the first line in the KCHAR.DAT file, which defines the keyboard base to be used, is missing.

Recommended Action: Re-edit the KCHAR.DAT file by adding this line; then execute TL3270.EXE.

**File ADDKEYS.DAT exceeds its size limit.
New Keyboard Profile NOT Installed.**

Indicates that the ADDKEYS.DAT file has exceeded its maximum size limit (1024 bytes). TL3270.EXE will only look for this file when it is attempting to compile a new keyboard profile that includes keys previously unknown and unsupported.

Recommended Action: Re-edit the ADDKEYS.DAT file until you have brought it in line with its size restriction, then execute TL3270.EXE.

**File KCHAR.DAT exceeds its size limit.
New Keyboard Profile NOT Installed.**

Indicates that the KCHAR.DAT file has exceeded its maximum size limit (10240 bytes). TL3270.EXE will only look for this file when it is attempting to compile a new keyboard profile.

Recommended Action: Re-edit the KCHAR.DAT file until you have brought it in line with its size restriction, then execute TL3270.EXE.

**File KCHAR.DAT not found.
New Keyboard Profile NOT Installed.**

Indicates that the KCHAR.DAT file is not installed on the PC Software—LinkUp 3270 working disk or diskette. PC Software—LinkUp 3270 will only look for this file when it is attempting to compile a new keyboard profile.

Recommended Action: Since PC Software—LinkUp 3270 will not load under this circumstance, you must install the KCHAR.DAT file (containing the keyboard layout of your choice) onto the PC Software—LinkUp 3270 working disk or diskette and then execute TL3270.EXE.

**File TERMLYNX.@@@ exceeds its size limit.
New Keyboard Profile NOT Installed.**

Indicates that the TERMLYNX.@@@ file has exceeded its maximum size limit (12288 bytes). PC Software—LinkUp 3270 will only look for this file when it is attempting to compile a new keyboard profile.

Recommended Action: We recommend that you never modify this file. However, to restore the original file, copy the unaltered version of TL3270.@@@ from the distribution diskette, then execute TL3270.EXE.

**File TERMLYNX.\$\$\$ cannot be created.
New Keyboard Profile NOT Installed.**

Indicates that the TERMLYNX.\$\$\$ file cannot be compiled. PC Software—LinkUp 3270 compiles this file the first time it is run, and thereafter only when it is loaded with a new keyboard layout definition.

Recommended Action: Confirm that the disk or diskette on which you have installed PC Software—LinkUp 3270 has enough space to store this file (on the average, it requires 12270 bytes) and/or that the disk (or diskette) is not damaged. If there is not enough storage space or if there is damage, you must transfer the PC Software—LinkUp 3270 file onto another working disk or diskette and reload it.

File TERMLYNX.@@@ not found.

New Keyboard Profile NOT Installed.

Indicates that the TERMLYNX.@@@ file is not installed on the PC Software—LinkUp 3270 working disk or diskette. PC Software—LinkUp 3270 will only look for this file when it is attempting to compile a new keyboard profile while loading.

Recommended Action: Install the TERMLYNX.@@@ file onto the PC Software—LinkUp 3270 working disk or diskette and then run TL3270.EXE.

**SYNTAX ERROR ENCOUNTERED PROCESSING ADDKEYS.DAT LINE:
New Keyboard Profile NOT Installed.**

Indicates that a syntax error has been detected in a line of the ADDKEYS.DAT file. The involved line of text in the ADDKEYS.DAT file will be identified immediately behind this message.

Recommended Action: Re-edit the identified line within the ADDKEYS.DAT file so that it conforms to the required syntax conventions and then run TL3270.EXE.

**SYNTAX ERROR ENCOUNTERED PROCESSING KCHAR.DAT LINE:
New Keyboard Profile NOT Installed.**

Indicates that a syntax error has been encountered in a line of the KCHAR.DAT file. The involved line of text in the KCHAR.DAT file will be identified immediately behind this message.

Recommended Action: (1) Re-edit the identified line within the KCHAR.DAT file so that it conforms to the required syntax conventions, then run TL3270.EXE. (2) If you have defined a new key in the KCHAR.DAT file, confirm that you have indeed added that keyname to the ADDKEYS.DAT file. Also make sure you have installed the ADDKEYS.DAT file onto the PC Software—LinkUp 3270 working disk or diskette, then run TL3270.EXE.

**SYNTAX Compiling Keyboard Profile ERROR: End of Comment expected
in KCHAR.DAT.
New Keyboard Profile NOT Installed.**

Indicates that PC Software—LinkUp 3270 has not loaded because the comment entered to the KCHAR.DAT file has not been properly terminated.

Recommended Action: Re-edit the KCHAR.DAT file by terminating all comments appropriately (/*) or by removing the mistakenly entered comment prefix (/*), then reload PC Software—LinkUp 3270.

SYNTAX Compiling Keyboard Profile ERROR: End of Comment expected in ADDKEYS.DAT.

New Keyboard Profile NOT Installed.

Indicates that the comment entered to the ADDKEYS.DAT file has not been properly terminated.

Recommended Action: Re-edit the ADDKEYS.DAT file by terminating all comments appropriately (*/) or by removing the mistakenly entered comment prefix (/*), then run TL3270.EXE.

***WARNING* File TERMLYNX.@@@ has been modified**

Indicates that PC Software—LinkUp 3270 is loading with a customized TERMLYNX.@@@ file.

Recommended Action: None, since this warning does not prevent PC Software—LinkUp 3270 from running. If, however, the modified file is not what you wish PC Software—LinkUp 3270 to operate from, you must reinstall the unmodified version of the TERMLYNX.@@@ file onto your PC Software—LinkUp 3270 working disk or diskette, and run TL3270.EXE.

XCHAR.DAT file invalid.

New Keyboard Profile NOT Installed.

Indicates that PC Software—LinkUp 3270 has not been initialized because the XCHAR.DAT file has been modified or corrupted in such a way that it is not usable to PC Software—LinkUp 3270.

Recommended Action: Since PC Software—LinkUp 3270 will not run as expected without a valid version of this file, you must copy a corrected version of XCHAR.DAT to your PC Software—LinkUp 3270 working disk or diskette and execute TL3270.EXE.

**XCHAR.DAT file not found.
New Keyboard Profile NOT Installed.**

Indicates that PC Software—LinkUp 3270 has not been initialized because the XCHAR.DAT file is not on the working disk or diskette.

Recommended Action: Since PC Software—LinkUp 3270 will not run without this file, you must copy it to the PC Software—LinkUp 3270 working disk and execute TL3270.EXE.

Appendix G: Decimal to Hexadecimal Conversion Table

Dec.	Hex.	Dec.	Hex.	Dec.	Hex	Dec.	Hex.
0	00	27	1B	54	36	81	51
1	01	28	1C	55	37	82	52
2	02	29	1D	56	38	83	53
3	03	30	1E	57	39	84	54
4	04	31	1F	58	3A	85	55
5	05	32	20	59	3B	86	56
6	06	33	21	60	3C	87	57
7	07	34	22	61	3D	88	58
8	08	35	23	62	3E	89	59
9	09	36	24	63	3F	90	5A
10	0A	37	25	64	40	91	5B
11	0B	38	26	65	41	92	5C
12	0C	39	27	66	42	93	5D
13	0D	40	28	67	43	94	5E
14	0E	41	29	68	44	95	5F
15	0F	42	2A	69	45	96	60
16	10	43	2B	70	46	97	61
17	11	44	2C	71	47	98	62
18	12	45	2D	72	48	99	63
19	13	46	2E	73	49	100	64
20	14	47	2F	74	4A	101	65
21	15	48	30	75	4B	102	66
22	16	49	31	76	4C	103	67
23	17	50	32	77	4D	104	68
24	18	51	33	78	4E	105	69
25	19	52	34	79	4F	106	6A
26	1A	53	35	80	50	107	6B

Dec.	Hex.
108	6C
109	6D
110	6E
111	6F
112	70
113	71
114	72
115	73
116	74
117	75
118	76
119	77
120	78
121	79
122	7A
123	7B
124	7C
125	7D
126	7E
127	7F
128	80

Appendix H: Glossary

application program—A program that performs a specific user function.

ASCII—American Standard Code for Information Interchange. The standard code for PC characters, using a coded character set consisting of seven-bit coded characters (eight bits including parity check).

asynchronous—Transmission in which each character, word, or small block is individually synchronized (timed).

auxiliary equipment (port, printer)—Equipment not under direct control of the processing unit.

binary—A coding system characterized by only two states, conditions, or numbers; where only the numbers 0 and 1 are used.

BSC (Binary Synchronous Communication)—A data-link control procedure developed by IBM using character synchronization.

CICS (Customer Information Control System)—An IBM host application program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs.

CICS/VS (Customer Information Control System/Virtual Storage)—An IBM host application program/operating system.

CMS (Conversational Monitor System)—An IBM host application program.

communication link—All the software and hardware (cables, connectors, converters, etc.) required for two devices, such as a computer and a terminal, to communicate. Telephones and telephone lines are a familiar communication link.

CPU (Central Processing Unit)—The circuitry of a computer controlling the interpretation and execution of instructions.

device—A piece of computer equipment, such as a display or a printer, that performs a specific task.

device driver—A program or command file with an extension of SYS that tells DOS how to use a particular device.

device name—The name by which DOS refers to a device, such as CON for console, PRN for printer, and AUX for auxiliary. Device names are treated like file names by DOS.

DOS—Disk Operating System for personal computers.

DOS commands—The instructions (usually single words, followed by qualifying parameters), used to control DOS. For example:

Copy—to duplicate a file.

CD—to change directories, as on a hard disk.

Format—to prepare a diskette or disk for use.

MD—to make/create subdirectories, as on a hard disk.

DOS file extensions—A suffix of up to three characters that, when preceded by a period, can be added to a file name to identify the contents of the file more precisely. For example:

BAT—Short for Batch. (A set of DOS commands.)

COM—Short for Command. (Run by DOS.)

EXE—Short for Executable. (Run by DOS.)

SYS—Short for System. (Used by DOS.)

DOS session—The Disk Operating System in execution.

download—To transmit data from a CPU or mainframe computer to another device, such as a terminal, personal computer or printer.

drive letter—The letter that identifies a disk drive.

EBCDIC—Extended Binary Coded Decimal Interchange Code. A coded character set consisting of eight-bit coded characters, used on larger IBM computers.

EDLIN—The DOS line editor program used to create, change, and display source files or text files.

emulation session—The operating session of an executable program enabling the performance of activities on a personal computer equivalent to those performed by another device.

fixed disk—A large-capacity disk of 10 megabytes or more that cannot be removed from its drive.

hard disk—Usually the same as a fixed disk, but some hard disks can be removed from their drives.

hotkey switch—A keystroke sequence enabling a fast change from the session of one program to another.

member name—A sub-group within a partitioned file.

modem (modulator-demodulator)—A device used to connect a computer to communication lines. Modems are used in pairs; for example, one at the personal-computer end of the communication line and the other at the protocol-converter end of the communication line. The transmitting modem prepares data for sending across the line and the receiving modem changes the data back the way it was before it went through the transmitting modem.

MVS (Multiple Virtual Storage)—An IBM operating system.

parameters—Variables that are given constant values for specific applications. Also refers to a name in a procedure used to pass an independent variable (or argument) to that procedure.

protocol—The rules or methods of communication.

protocol converter—A device enabling communication between computers operating under different protocols.

RS-232C—A set of communication standards governing electrical and mechanical interface characteristics for computers, terminals, and modems. (RS-232C transmissions most often use a cable with 25-pin connectors.)

SDLC (Synchronous Data Link Control)—A communications line discipline associated with the IBM system network architecture, SNA. SDLC initiates, controls, checks, and terminates information exchanges or communications lines. Designed for full duplex operations that simultaneously send and receive data.

serial port—The communication port to which devices such as a modem or a serial printer can be attached.

session—Includes the time from when a user signs on to a CPU to access and manipulate a program until he or she signs off.

shelling—Use of a secondary command processor to interpret incoming and

outgoing commands for executed programs. Sometimes used in nested batch files; for example, a batch file call included within a batch file.

SNA (Systems Network Architecture)—An IBM design for the integration of data processing (DP) and data communications (DC) components to produce a total DP/DC system.

subdirectory—A named group of files or directories.

synchronous—Transmission wherein a constant time interval is used between successive bits or characters.

system diskette—A diskette containing the program (such as DOS) whose purpose is to control the operation of all or part of the computer system, such as to interpret the commands you enter or to manage the printer.

terminal emulator—A program enabling a personal computer to imitate another computer system and execute the programs written for that other system as though they were written for the personal computer.

TSO (Time Sharing Option)—An optional configuration of the operating system that provides conversational time sharing from remote stations.

unattended file transfer—Permits the transmission and reception of messages on an unattended basis.

upload—To transmit data from a device such as a terminal or personal computer to a CPU or mainframe computer.

utility program—A program that aids in accomplishing a specific user task.

VM/SP (Virtual Machine/System Product)—An IBM operating system.



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