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This document is intended for users of *uniBasic* IRIS/BITS.

# ***IMT***

**IRIS Migration Toolkit™**

## **User's Manual**

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IRIS™ is a trademark of Point 4 Data Corporation

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# About this Manual

This manual supposes that you have a working knowledge of IRIS system functions. You should, for example, know how to run CLEANUP, INSTALL, and your backup programs. A knowledge of how logical units are organized on disk will also be helpful.

This manual also assumes that you understand the fundamental operations of both uniBasic and Unix. Consult the *uniBasic Reference Manual* and your Unix manuals as needed. If you experience difficulty, please contact your dealer or distributor.



# Introduction to IMT

The IRIS Migration Toolkit (IMT) is used for converting data files and Business BASIC programs from the IRIS operating system to uniBasic running under Unix. We made the IRIS Migration Toolkit as painless and simple to use as possible. We minimized the amount of monitoring required, added advanced reporting features and streamlined the conversion process to make it less labor intensive and time consuming.

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## Features

IMT incorporates the following features:

- No limit to the number of logical units that can be converted, up to the maximum allowed by your Unix file system
- Ability to convert directly from images on tape, or load selected LUs to disk and then convert
- Tape scanning to prevent problems with unused and phantom logical units
- Converted files cannot be overwritten by another file of the same name unless an Overlay option is selected
- Multitasked conversion, allowing multiple files to be converted at one time
- Operation in unattended mode, so that after IMT is configured, you just put in the tape and walk away
- Automatically move converted files and LUs to any destination directory on the new system

- Convert an entire IRIS system, selected LUs, or individual files
- Total control over what files actually get converted, including file-name wildcard matching, and the ability to choose only certain file types
- Direct support for different IRIS backup utilities, including DISCUTILITY, QICOPY, MTCOPY, STAR\*Tape, and Saint
- Convert from multi-volume tape backups
- Easy to understand, menu-driven commands
- Intelligent disk space usage
- Many report options, including file status for polyfiles and other types of files, and reporting of BASIC program errors
- Reports that list which files were converted and their conversion status
- Built in utilities to assist in post-conversion cleanup

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## How Files Are Converted

IRIS files are converted one LU at a time in several individual steps. By file type, the steps are:

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### Text files and Dumped Basic programs

Text files and Dumped Basic programs are relocated into standard Unix text files that can be manipulated by any Unix text processing system. The data is converted to 7-bit ASCII with the high-order bit set to 0. (This is the opposite of IRIS which sets the high-order bit to 1.)

## Basic programs

Basic programs are first decoded into standard Unix text files. After all of the Basic programs for an LU are extracted, they are LOAded and SAVEd. Any program errors found in this phase are saved to the log files. (See the "Reports" section for more about log files.) A subdirectory with the name "?text" is built under the logical unit being processed. For example: "/usr/ub/3" (LU 3) will have a sub-directory named "/usr/ub/3/?text". This directory contains the original source programs in text form for future reference.

The uniBasic program statement encoder is much more strict than IRIS. As a result, many errors not detected until runtime on IRIS are caught when a statement is entered into uniBasic. You will probably encounter some syntax errors when IMT loads your Basic programs. Any error generated while saving a program is written to the Basic program error log file. (See the uniBasic Reference Manual for more information on uniBasic syntax restrictions.)

---

## Formatted files

Formatted files are automatically converted using the format map contained in the file header. The resulting file is BCD format with all items copied exactly as their IRIS definitions.

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## Contiguous-Random files

Contiguous files are rebuilt with all data occupying the same record number on uniBasic as they did on IRIS.

## Contiguous-Indexed files

Indexed files are converted in stages. The uniBasic indexed file is built with its First Real Data Record set to that of the original IRIS file, then all records are allocated. The indices are then scanned and keys are copied. The records those keys point to are flagged as being in use. Next, all records are converted. Then, depending on the conversion options selected, records are released. If neither of the two options are specified, all records not previously flagged as being in use are released. The two options are mutually exclusive.

"Convert ALL indexed file data records"	"Release ALL indexed file data records based on free chain"	Result
N	N	Default behavior. Records not previously flagged as being in use are released.
Y	N	No records are released.
N	Y	Only records found in the IRIS file's free record chain are released.
Y	Y	Invalid. These two options are mutually exclusive.

Table 1

Two options are also provided to control the transfer of keys. If neither option is specified, keys are assumed to be ASCII and are toggled to the Unix format. Use the "Packed keys" option to ensure that packed keys retain their exact format for proper unpacking operations. Use the "Binary Keys" option to ensure that binary keys (keys that contain bytes both above and below \200\ ) sort in the same order as they did under IRIS.

"Build ISAM files with packed keys (no conversion)"	"Build ISAM files with Binary keys"	Result
N	N	Default behavior. Keys are assumed to be ASCII and are toggled to the Unix format
Y	N	Packed keys retain their exact format for proper unpacking operations
N	Y	Binary keys (keys that contain bytes both above and below \200\ are toggled, but will sort the same as they did under IRIS
Y	Y	Enables both options

Table 2

---

**NOTE** Contiguous-Indexed files are copied with their IRIS string and BCD record format intact. These files are displayed by QUERY as BCD files and by SCAN as having the 'Q' attribute.

---

## Polyfiles

IMT converts polyfiles by collecting the various volumes of a polyfile and converting them into a single uniBasic Indexed File. The IRIS logical unit image file is scanned and polyfile volumes are transferred to the temporary directory for polyfile conversion. This directory is specified during the IMT Initialization phase. In order to build the file, all base volumes must be loaded (for key format information) as well as volume 0. Data volumes may be copied anytime after the file is created in uniBasic. In order to copy a directory, the base and extension volumes (for that directory) must be loaded. If all of the required data is not available when attempting to process a volume, the volume is saved for later processing when all the necessary data is available. IMT will not try to process the polyfile until it has all the necessary parts. The order that polyfile volumes are loaded does not matter since the conditions described are checked for each volume encountered. However, if you load all master volumes first, IMT will use disk space more efficiently since

orphan volumes don't have to be saved. (A polyfile volume is "orphaned" if its master volume has not been loaded.)

In order to ensure accurate polyfile conversion, each volume's header information is cross-checked with the header data in volume 0. For example, for a child volume to be associated with volume 0, the LU, RDA, volume type, creation and last-access dates must all match with the master volume. Otherwise, the child volume will be considered an orphan.

Polyfile records are converted and released using the same method as contiguous-indexed files.

---

### **Other file types**

Other IRIS file types, such as devices (IRIS file type \$), processors (type P), and stand alone programs (type A) cannot be relocated to Unix. Since IMT cannot convert these file types, they are not displayed on any of the file conversion screens.

# Installing & Licensing IMT

To install IMT on your system, follow these steps:

---

## Load Files

- Insert the media containing IMT into the Unix system and sign on as "root".
- issue the command "**cd /tmp**"
- issue the command "**cpio -iavcdu </dev/{devicename}**", where {*devicename*} is the name of the tape or diskette drive on the Unix system. In Unix, device names are similar to:

<u>Device</u>	<u>Devicename</u>
5.25" floppy, 96tpi;	d096
3.5" floppy, 135tpi;	fd1135ds18
60mb QIC tape;	rct0

The device names shown here are typical for an SCO Unix/Xenix system. The device names on your system may be different. For example, the device names used on the IBM RS/6000 AIX are:

<u>Device</u>	<u>Devicename</u>
5.25" floppy, 96tpi	*not used*
3.5" floppy, 135tpi	fd0h
60mb QIC tape	rmt0

If the "cpio" command is successful, a list of filenames is displayed as they are loaded into the "/tmp" directory. The files should correspond to the file list shown below.

## Installation Utility

After the "cpio" transfer is completed, issue the command **"./ubinstall"** to load the IMT files into the proper uniBasic directories and make the necessary configuration changes to uniBasic. After "ubinstall" is completed, a message will appear saying that the installation was successful. Log off the "root" account and log back in as a normal user.

DCI strongly recommends that the IRIS conversion NOT be attempted while you are logged in as "root" on the Unix system. Any files that are converted will inherit the permissions, or lack of permissions, of the user performing the conversion. It is much easier to complete the conversion as a normal uniBasic user and modify a few file permissions than it is to complete the conversion as "root" and have to change the majority of file permissions; in other words, run the conversion from the account that will use the converted files.

---

## Supplied Files

All of the files shown below are uniBasic saved programs except "getlu" and "xferlu" which are binary executables ported to your specific OS, and an ASCII "readme" file.

getlu	imt.choosescn	imt.convpfd	imt.rewind
readme	imt.cleanup	imt.freechan	imt.rptmenu
xferlu	imt.conv	imt.getb	imt.scan
imt	imt.convctl	imt.getutilnm	imt.scanchs
imt.autoconv	imt.convfile	imt.init	imt.scanisam
imt.autoctl	imt.convfileb	imt.input	imt.scanisamvw
imt.autofltr	imt.convfiled	imt.killfile	imt.scanmgmt
imt.autoload	imt.convfilei	imt.libr	imt.view
imt.autolog	imt.convfilep	imt.librsvw	imt.viewscan
imt.automgr	imt.convfp	imt.loadlu	imt.viewtext
imt.choose	imt.convgetfl	imt.logopen	imt.viewtextf
imt.chooseblk	imt.convgetlm	imt.mkdir	
imt.chooseidst	imt.convpfbe	imt.pfstatsvw	
imt.chooselu	imt.convpfbld	imt.pfstatus	

## "readme" File

A "readme" file is included with IMT. This is an ASCII text file that can be viewed with any text editor, such as "vi". The "readme" file contains up-to-the-minute information about IMT. DCI strongly recommends that you read this file to learn about otherwise undocumented features.

---

## Licensing

IMT is a separate product from uniBasic and must be purchased and licensed separately. The uniBasic licensing process consists of two parts. 1) Licensing, and 2) the Software Security Number (SSN). It is the SSN number that will allow operation of IMT on your system. Therefore, even if you install IMT on your computer, you still must have proper licensing in order to run it. If you think you may have licensing problems, contact your reseller or distributor. For uniBasic licensing, please refer to the uniBasic Reference Manual.



# Getting Started

IMT must first be installed on the Unix system. If you have not yet installed IMT, see the "Install IMT" section. IMT is a collection of uniBasic programs and binary executable files that are launched and run from within uniBasic. IMT can be run while other users are on the system, but only one IMT session may be run at a time. The other users can be working at the system level or within uniBasic. Be aware that conflicts will result if other users attempt to use the same tape drive that IMT is using or try to access the same files that IMT uses. Other device-related problems could occur when IMT is scanning a tape, loading from a tape, or converting from a tape.

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## Before You Begin

### File Permissions

Most 'file open' errors arise from incorrect file permissions. Also, converted files will inherit the permissions, or lack of permissions, of the user doing the conversion. DCI strongly recommends that the IRIS conversion be run from the account that will use the converted files.

---

### uniBasic and LU 0

IMT places converted files in a default LU destination directory chosen in the IMT Initialization phase. If the default LU destination directory is "/iris", then converted LUs are placed under the "/iris" directory, e.g., LU 0 becomes "/iris/0". However, any reference to LU 0 made from within uniBasic will be mapped to the "sys" directory. If your programs have references to LU 0, either change the programs to reference a

different LU, move the necessary files to the "sys" directory, or change the programs to use the absolute pathname to LU 0.

---

## Editing In Input Fields

For IMT to operate properly, cursor tracking must be defined in the proper "term" file for uniBasic. Cursor tracking controls the arrow keys used by IMT for editing in data input fields and moving through reports displayed to the screen. See Appendix B and the uniBasic Reference Manual for "term" file setup information

IMT has several input fields of varying length identified by brackets "[ ]". All user input is limited to the area between the brackets. Commands for manipulating text in these input fields are shown below. The following editing keys are available:

<u>Key</u>	<u>Function</u>
<right arrow>	Move the cursor right one character
<left arrow>	Move the cursor left one character
<backspace>	Move the cursor left one character
^I (ctrl-I)	Insert a character at the cursor. Characters are shifted right one position.
^R (ctrl-R)	Delete a character at the cursor. Characters are shifted left one position.
^U	Undo the user's typing and start over with the original input information

---

**NOTE** If the user enters a non-control character before entering anything else, the displayed input field information is cleared. The displayed input field information is not cleared if the user enters a control character first, i.e., an arrow key.

---

## Creating Log, Error and Temporary Directories & Files

During the Initialization phase of the conversion, you will need to specify various directory names which are built by IMT if they do not already exist. Initialization also requires filenames for a general log file and a Basic program error log file. If IMT encounters a fatal error, the offending program is VSAVEd (saved with variables) in order to facilitate debugging. The logfiles and a copy of the VSAVEd program will be helpful to support personnel.

The directories and logfiles can be easily removed after the conversion is complete. IMT Main Menu selection #14, "Cleanup", has selectable options to remove some or all temporary conversion files between converting LUs, or after a conversion is complete.

---

## Conversion Procedure

Before a conversion is begun, a few options need to be considered. Refer to the "Conversion Procedures Flowchart" in Appendix C for a visual guide to these options.

---

## Normal vs. Unattended Conversion

Determine what type of conversion to run: Normal or Unattended. The Normal Conversion (Main Menu selection #4, "Convert an LU image") offers a higher level of user interaction with IMT and allows the selective conversion of specific files. "Convert an LU image" converts one LU at a time from an LU image previously loaded to disk. Available disk space must therefore be considered, since files are not converted from tape.

The Unattended Conversion (Main Menu selection #5, "Unattended Conversion") can be instructed to convert one or more LUs. Once the LUs to convert are specified

and the necessary options selected, the conversion runs on its own, requiring no further user input except to switch tapes if necessary. The Unattended Conversion is capable of either converting directly from IRIS backup tapes or image files loaded to disk. If you are converting a multi-volume IRIS backup, the Unattended Conversion will prompt for the next tape. The Unattended Conversion can also convert from image files loaded on disk. If set to convert all LU images loaded to disk, the Unattended Conversion will convert all LU images on disk with no further user input required.

---

## Convert From Tape Or Disk

The Normal Conversion converts only from LU images loaded to disk.

The Unattended Conversion can convert directly from backup tapes or from image files on disk. If converting from tape, IMT reads an LU and then can be configured to convert it while reading in the next LU image. After an LU is converted, the image file is deleted. The Unattended Conversion also has the ability to convert from image files on disk. Just scan the tapes, load the images to disk, and convert the files.

---

## Requirements of the IRIS System

The IRIS system must have compatible media with the new Unix system. That is, both systems must have compatible 1/4" QIC drives or some other type of media. Other than that, the two computer systems are hardware independent.

For software, the IRIS system must use one of the five IMT-supported backup utilities. These are DISCUTILITY, QICOPY, MTCOPY, STAR\*Tape, and Saint. A backup of the IRIS LUs to convert must be completed with one of these five utilities before the conversion can take place. IMT can support single-volume backups from any of the five utilities. IMT supports multiple-volume backups with tape breaks from DISCUTILITY and STAR\*Tape only.

When IMT copies logical units from tape, only the actual amount of a logical unit used is transferred. In other words, if a logical unit is 65,000 blocks in size, but only the first 10,000 blocks are used, then only the first 10,000 blocks are copied to the disk. You can run CLEANUP or CLEANUPX on IRIS before transferring data in order to minimize the amount of disk space needed for the conversion. If you do this, be sure to INSTALL the logical units before copying to tape in order to initialize the DMAP information.

The only other software restriction is that the IRIS system should be running Rev 8 or Rev 9 in order for IMT to convert saved Basic programs. If you are converting an IRIS Rev 7 system, your programs must be dumped to text before copying the logical units to Unix. This restriction applies only to saved Basic program files. You will then have to write a script in uniBasic to load and save those programs. Note that this must be done outside of IMT, and will therefore bypass the IMT Basic program error reporting. Other file types can be converted from IRIS Rev 7 or earlier.

---

## Backup Data And Programs On IRIS System

Follow these steps when backing up the IRIS system:

1. (optional) Make a full backup of the IRIS system. This backup can be used to restore from if any mistakes are made in the next two steps
2. (optional) KILL any unneeded files on IRIS. This results in less data to convert to uniBasic, and speeds the conversion process.
3. (optional) Run CLEANUP or CLEANUPX on all logical units that are not full. Then INSTALL each IRIS LU to initialize the DMAP. This packs all the data at the start of each logical unit so less data needs to be read from tape during the conversion.
4. Make a full backup of the IRIS system using one of the five IMT-supported utilities. The data on the tape(s) will be loaded onto the Unix system and converted to uniBasic / Unix format.

## Requirements of the Unix System

The Unix system must have some type of media that is compatible with the IRIS system, i.e., a 1/4" QIC tape drive. This is the only hardware requirement for the Unix system for the purpose of IRIS conversion. After the Unix OS itself is installed on the system, uniBasic must be installed and configured. (See the uniBasic Reference Manual for instructions on how to install uniBasic.)

For the conversion, uniBasic must be run from the Bourne shell, "sh" (On Ultrix this is the "sh5" shell). Do not use the C-shell or the Korn shell. System related functions performed by the conversion programs depend on Bourne shell command formats.

Cursor tracking is used by IMT for editing in data input fields and for report viewing commands. If cursor tracking is not defined in the "term" file, the IMT Edit Keys will not work. Extended graphics characters must also be defined in the "term" file. For more information about cursor tracking, graphics characters, and uniBasic "term" files, refer Appendix 'C', and to the uniBasic Reference Manual.

---

**NOTE** It is vital that the Unix inter-process communication (IPC) message queues are configured properly to ensure both normal uniBasic and IMT operation. (See the uniBasic Reference Manual and the Unix system manuals for more information).

---

# Running The Conversion Programs

IMT is a set of uniBasic programs that must be run from within uniBasic. To start IMT, launch uniBasic, move to the IMT directory then issue the command: "imt". The Initialization screen is displayed first (see fig 2).

```

10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1      1  1  :  5
                    Main Menu

```

Conversion Programs		R e p o r t s	
1	I n i t i a l i z e	e6	General log
2	Scan DISCUTILITY tape	7	Basic Program Error log
3	Load logical units from tape	8	Polyfile Status Report
4	Convert a LU image	9	IRIS tape scan info
5	Unattended Conversion	1	OLIBR of a LU image file
		1	1Scan IRIS contig-ISAM key

  

M i s c e l l a n e o u s	
1	2Tape scan management
1	3Rewind Tape
1	4C .l e a n u p

```

Enter desired selection, or [ESCAPE] to exit: [ ]

```

fig 1 - Main Menu Screen

The IMT Main Menu is used to select all basic IMT functions. The available selections are grouped by type: Conversion Programs, Reports, and Miscellaneous. At the bottom of the screen is the prompt "Enter desired selection, or ESCAPE to exit"

followed by an input field "[ ]". Enter the number of the desired selection, or press [ESC] to exit IMT and return to uniBasic. IMT will return to this menu after any selected function is completed.

---

## Conversion Programs Menu

The function of each selection is described below.

---

### Selection #1, Initialize

The Initialize screen is the first screen shown when IMT starts. The first time that IMT is run it must be initialized with device names, temporary directory names and log file names. Once this information is entered, the configuration file "imtconvinfo" is created in the current directory. If this is the first IMT session on this machine, or if the "imtconvinfo" file is not found, IMT will prompt for initialization input by placing the cursor in the first input field. Enter the information and press [RETURN] to move to the next field. After all necessary fields have been filled, press [ESC] to return to the Main Menu. After [ESC] is pressed, the Initialize settings are saved in the "imtconvinfo" file. Subsequent IMT sessions will read configuration information from this file at startup.

Configuration information can be changed from the Initialize screen before a conversion is begun. To modify the Initialize information, select the desired field number and press [RETURN]. Enter the corresponding information in the edit field and press [RETURN] again when complete. When modifying existing setting information, the IMT Edit keys will make input easier. Refer to the "Editing in Input Fields" section for more information. After new initialize information is entered, press [ESC] to exit the Initialize screen and return to the Main Menu.

```
10 JUL 1993  uniBasic(tm)-IRIS Migration Toolkit 1.1  11:09:57
                Initialize

1. No-rewind tape device      [/dev/nnrtp      ]
2. Rewind tape device        [/dev/rtp        ]

3. Tape utility used          [1]  DISCUTILITY

4. Temporary loadlu directory [temploadlu     ]
5. Default LU destination dir [ludest         ]
6. Temp dir for Polyfile conv [polytemp       ]
7. Temp dir for Conversion progs [convtemp       ]
8. Temp dir for tape scan info [tempscan       ]

9. General log file           [gen.log        ]
10. Basic program conv log file [basic.log      ]

Enter desired selection, or [ESC] to exit: [  ]
```

fig 2 - Initialization Input Screen

**Field #1: No-rewind Tape Device**

Enter the no-rewind device name of the tape drive used for the conversion. IMT requires intermittent, or "stop and start", use of the tape drive at the tape file marks. The no-rewind device name for the tape drive is usually very similar to the normal (rewind) device name of the tape drive. For example, if the rewind tape drive on your system is "/dev/rtp", the no-rewind device name may be "/dev/nnrtp". Refer to your system's documentation for the no-rewind device name for your system. You must enter the absolute, or complete, pathname for the device in the input field, i.e. "/dev/nnrtp".

**Field #2: Rewind Tape Device**

Enter the device name of the rewind tape drive. The rewind tape drive is usually the normal device name of the tape drive. You must enter the absolute, or complete, pathname for the device i.e., "/dev/rtp".

### Field #3: Tape Utility Used

When this field is selected, a list of supported utilities is displayed at the bottom of the screen. They are: (1) DISCUTILITY, (2) QICOPY, (3) MTCOPY, (4) STAR\*Tape, and (5) Saint. Enter the number that corresponds to the utility used on the IRIS system and press [RETURN].

### Field #4: Temporary loadlu Directory

Enter the name of the temporary "loadlu" directory. This directory is used to hold LU images loaded from tape. Enter an absolute pathname, otherwise IMT will search in it's directory only. If the directory that you specify does not exist, IMT will create it.

### Field #5: Default LU Destination Directory

Enter the name of the default LU destination directory. This directory is used to specify the destination of the converted logical units. For example, if the default LU destination directory is "/iris", then converted LUs will be placed under the "/iris" directory, e.g. LU 3 will become "/iris/3". Enter an absolute pathname, otherwise IMT will search in it's directory only. If the directory that you specify does not exist, IMT will create it.

### Field #6: Temporary Directory For Polyfile Conversion

Enter the name of the temporary Polyfile conversion directory. This directory is used to store control files and unprocessed polyfile volumes. Enter an absolute pathname, otherwise IMT will search in it's directory only. If the directory that you specify does not exist, IMT will create it.

### Field #7: Temporary Directory For Conversion Programs

Enter the name of a temporary directory for IMT to use. This directory is used by IMT to store temporary working files. Enter an absolute pathname,

otherwise IMT will search in it's directory only. If the directory that you specify does not exist, IMT will create it.

**Field #8: Temporary Directory For Tape Scan Information**

Enter the name of the temporary directory for tape scan information. This directory is used by IMT to store data generated from using Main Menu option #2, "Scan Tape". Enter an absolute pathname, otherwise IMT will search in it's directory only. If the directory that you specify does not exist, IMT will create it.

**Field #9: General Log File**

Enter the name of the general log file. The general log file is used to record all process and error information generated by IMT. Enter an absolute pathname, otherwise IMT will search in it's directory only. If the log file that you specify does not exist, IMT will create it.

**Field #10: Basic Program Conversion Log File**

Enter the name of the Basic program conversion log file. The Basic program conversion log file is used to record all process and error messages related to SAVEing converted Basic programs. Enter an absolute pathname, otherwise IMT will search in it's directory only. If the log file that you specify does not exist, IMT will create it.

---

**NOTE** Directory names must be unique or filename conflicts will occur.

---

---

## **Selection #2, Scan Tape**

With the "Scan Tape" function, IMT scans the IRIS backup tape loaded in the Unix system tape drive. LUs can be converted if Tape Scan is not run, but the results may not be as expected. When loading an LU to disk, IMT searches for the first INDEX block that matches the selected LU. In order to avoid loading phantom LUs by mistake, DCI recommends first scanning the tape and then loading logical units

using that tape scan. The scan operation records the actual tape block offsets of the logical units found. The load/convert operations then use these offsets instead of the actual logical unit numbers. The time required to run Scan Tape is directly related to system performance and the amount of data on the backup tape.

Two methods of recording tape scan information are available, New and Append. Use New to record scan information for a single tape or for the first tape in a multi-volume backup series. Use Append to build a multiple-volume tape scan.

- |                            |  |
|----------------------------|--|
| Create New Scan            | Enter a "1" and press [RETURN] to create a record of a new tape scan. Enter a description of the backup tape that is to be scanned. This description is used later to choose which tape scan to convert from. After the description is entered, press [RETURN] to begin scanning the tape. Messages about tape rewinding, volume being scanned and end-of-tape will display, as well as the LU number and corresponding decimal tape block. When the scan is complete, all LUs found on the tape are shown with the corresponding decimal block offsets. This information can be printed or redisplayed with Main Menu option #9, "IRIS tape scan info." When the tape scan is complete, press [RETURN] to go back to the Main Menu. |
| Append to an Existing Scan | Enter a "2" and press [RETURN] to add information to an existing scan. A listing of existing tape scans is displayed. Enter "PF" to page forward or "PB" to page back if the scan listing fills more than one screen. New scan information can be appended to any previous tape scan by entering the number of the scan to append to. Choose a scan number to use and press [RETURN]. The tape scan will begin immediately. When the scan is complete, the tape number for each tape scanned, the LUs found on each tape and the corresponding decimal block offsets are displayed. This information can be printed or redisplayed with Main Menu option #9, "IRIS tape  |

scan info". When the tape scan is complete, press [RETURN] to go back to the Main Menu.

The "Append to an Existing Scan" option is meant to group multiple backups, as opposed to multi-volume backups, together. Multi-volume backups are considered to be one unit and are treated as one backup even though they may span multiple tapes. This option is provided so you can group more than one backup together if necessary.

Main Menu selection #12, "Tape Scan Management," is available to add flexibility to the tape scanning and conversion process. There are four options available: Change Description, Delete, Export, and Import. Refer to section, "Tape Scan Management," for more information.

---

### **Selection #3, Load Logical Units From Tape**

This menu option is used to load logical unit image files from tape to the "temporary loadlu" directory specified during the Initialization phase. There are three methods to load LUs: load all LU images that are on the tape, load selected LU images from the tape, and load LUs based on a Tape Scan. LU images must be loaded from tape before Main Menu option #4, "Convert LU image," can be run. Main Menu option #5, "Unattended Conversion", can convert from a LU image on disk or tape. If you are running the Unattended Conversion from tape, skip to the "Unattended Conversion" section below.

When IMT copies logical units from tape, only the actual amount of a logical unit used is transferred. In other words, if a logical unit is 65,000 blocks in size, but only the first 10,000 blocks are used, then only the first 10,000 blocks are copied to the disk. You can run CLEANUP or CLEANUPX on IRIS before transferring data in order to minimize the amount of disk space needed for the conversion. If you do this, be sure to INSTALL the logical unit before copying to tape in order to initialize the DMAP information.

**NOTE** IMT will load exactly what it finds on the tape, which may lead to unexpected results. Some IRIS systems have LUs that were created around bad areas on the disk. Therefore, there may be more than one INDEX block on the tape for the same LU. These phantom LUs may be loaded by IMT and could cause problems at conversion time. DCI recommends using options #1 or #2 only if you are certain that no phantom LUs exist on the backup tape. If you are unsure, DCI recommends first running a Tape Scan and then loading logical units with option #3, "Use Existing Scan", below.

---

- |                     |   |
|---------------------|---|
| All LUs on the Tape | Enter a "1" and press [RETURN] to load all the LU images that are on the IRIS backup tape. IMT will rewind the tape and begin loading the LU images into the "temporary loadlu" directory selected in the Initialization phase. After all LUs are loaded from tape, press [RETURN] to go back to the Main Menu.   |
| Enter LU #s         | Enter a "2" and press [RETURN] to load specific LUs to the "temporary loadlu" directory specified in the Initialization phase. Enter a LU number to load from tape, and press [RETURN] to continue. Continue entering LUs in this manner to build a list of LUs to load from tape. Press [ESC] at any time to abort this procedure. Press [RETURN] without entering a LU number to end the input process. When the input process is complete, the list of selected LUs is displayed. At the "OK to continue, (Y/N)?" prompt, enter "N" and press [RETURN] to enter more LU numbers. Enter "Y" and press [RETURN] to load the selected LUs from tape. Press [ESC] at any time to abort this procedure. After all LUs are loaded from tape, press [RETURN] to go back to the Main Menu. |
| Use Existing Scan   | Enter a "3" and press [RETURN] to use existing scan information to load LUs. A list of available Tape Scans is displayed. Enter the number of the Tape Scan to use, and press [RETURN].   |

After a Tape Scan is selected, a list of LUs found during the scan is displayed. Enter "PF" to page forward, or "PB" to page backward through multiple screens of LUs. Enter a file number or a range of file numbers to select LUs. Enter "A" to choose all the LUs displayed on that screen, or enter "ALL" to choose all LUs on all screens. LUs chosen to load are marked with an asterisk (\*). Enter a file number, or a range of file numbers, to de-select any LUs, or [ESC] to abort this procedure and return to the Main Menu. After all desired LUs are selected, enter "GO" and press [RETURN] to begin loading those LUs from tape. If an appended Tape Scan is used, IMT will prompt for the next tape in the series when it is required. After all LUs are loaded from tape, press [RETURN] to go back to the Main Menu.

---

### **Selection #4, Convert a LU image**

This option is used to convert one LU at a time. It is also possible to convert individual or groups of files within a LU. Before running this conversion option, load the necessary LUs from tape. See "Load LUs from Tape". If you are running the Unattended Conversion, skip to the "Unattended Conversion" section below.

IMT will not overwrite a converted file with another file of the same name unless the Overlay option is selected. All status and error messages generated by IMT are displayed on screen and also recorded in log files. Report options on the Main Menu can print or redisplay this information after the conversion is complete.

LUs loaded from tape to the temporary "loadlu" directory are displayed. Enter "PF" to page forward or "PB" to page pack through multiple screens. Enter the file number of the LU to convert (not the LU number), and press [RETURN]. The file numbers are listed under the "##." column heading.

File Types To Convert      Enter a "1" and press [RETURN] to specify which types of files to convert. The file types are:  
B, saved basic program  
T, text file  
F, formatted data file  
C, contiguous or contiguous-indexed data file  
Y, polyfiles (IRIS Rev 8 polyfiles are mapped to type "Y". They exist as file type "C" on IRIS.)

Enter one or more of these options and only those file types will be displayed for conversion. Leaving this field blank will display all file types.

Filename Wildcards      Enter a "2" and press [RETURN] to specify which files to convert by filename. Use wildcards to select a group of files, or leave this field blank to select all files. The format of the wildcard specification is the same as for the Unix "ls" command. For example, 'abc\*' selects files beginning with 'abc', '\*xyz' selects files ending with 'xyz', 'ab\*z' selects files beginning with 'ab' and ending with 'z', and '\*ijk\*' selects files with 'ijk' in the filename. You may specify more than one wildcard pattern. Separate multiple patterns with spaces.

After either or both of these edit fields have been modified, type "GO" and press [RETURN] to proceed. IMT will load the requested filenames from the selected LU image.

A table of the requested files contained in the selected LU is displayed. The file number, file type and filename are shown. Enter "PF" to page forward, or "PB" to page backward through multiple screens of files. Enter a file number or a range of file numbers to select files for conversion. Enter "A" to choose all the files displayed on the current screen, or enter "ALL" to choose all files on all screens. Files chosen for conversion are marked with an asterisk (\*). Enter a file number, or a range of file numbers, to de-select any files if necessary, or [ESC] to abort this procedure and return to the Main Menu. After all desired files are selected, enter "GO" and press [RETURN] to proceed.

```

10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1   11:59:07
                  Converting Files

Currently processing LU# 2 from file temploadlu/2

1. Destination directory for converted files [ludest/2      ]
2. Build ISAM files with BINARY keys?           [N]
3. Build ISAM files with PACKED keys? (no conversion) [N]
4. Convert ALL data records of indexed files?     [N]
5. Release ALL indexed file data records based on free chain? [N]
6. IRIS major revision converting from           [9]
7. Overlay existing files?                       [N]

Enter field number to change, or 'go' to proceed with conversion: [ ]

```

fig 3 - Convert a LU Image Options Screen

The 7 options displayed on the conversion screen are:

1. Destination directory for converted files

The directory displayed is the default LU destination directory specified in the Initialization phase . Enter a "1" and press [RETURN] to change the destination directory. If the directory you enter does not exist, it will be created.

2. Build ISAM files with BINARY keys

Enter a "2" and press [RETURN] to move to this edit field. Enter a "Y" to copy binary keys; i.e. keys that contain bytes both above and below \200\. This option ensures that binary keys sort in the same order as they did under IRIS. The default for this option is "N".

3. Build ISAM files with PACKED Keys (no conversion)

## 30 Running the Conversion Programs

---

Enter a "3" and press [RETURN] to move to this edit field. Enter a "Y" to copy packed keys that are to retain their exact format for proper unpacking operations. The default for this option is "N".

---

**NOTE** The two options shown above apply to both contiguous-indexed files and polyfiles. If neither option is chosen, i.e. both questions are answered with the default 'no', keys are assumed to be ASCII text and are toggled to the Unix format. See "How files are converted" for more information.

---

### 4. Convert ALL data records of indexed files

Enter a "4" and press [RETURN] to move to this edit field. Enter a "Y" to convert all indexed file data records and release no records after the file is converted. The default for this option is "N".

### 5. Release all indexed file data records based on free chain

Enter a "5" and press [RETURN] to move to this edit field. Enter a "Y" to convert all indexed file data records, and then release records according to the IRIS file's free record chain. The default for this option is "N".

---

**NOTE** The two options shown above are mutually exclusive and apply to contiguous-indexed files only. If neither of these two options are specified, all records not previously flagged as being in use are released. See "How files are converted" for more information.

---

### 6. IRIS major revision converting from

Enter a "6" and press [RETURN] to move to this edit field. Enter an "8" or "9" for IRIS Rev 8 or 9. Saved Basic programs from earlier versions of IRIS cannot be converted. Basic programs from earlier versions must be first dumped to text and then loaded and saved in uniBasic, or you can upgrade to IRIS Rev 8 or 9. See "How files are converted" for more information.

### 7. Overlay existing files

Enter a "7" and press [RETURN] to move to this edit field. Enter a "Y" to overlay (replace) previously converted files with newly converted files of the same name. This assumes that the same destination directory for converted files is used. The default option "N" will not allow files to be converted a second time. If an attempt is made to convert the same file a second time, a "file already converted" error is displayed and recorded in the general log file.

---

**NOTE** If the overlay option is selected and any volume of a polyfile is converted a second time, the ENTIRE original converted copy of that polyfile is removed from the destination directory. Also, all control file information for that polyfile is deleted. If you are converting a volume from one LU and the remainder of the polyfile is located on another LU, answer "N" to this option when converting the second portion of the polyfile. If "Y" is selected, the volumes from the second part of the conversion will replace the volumes from the first part of the conversion and you will need to reconvert the first part of the file again.

---

After the necessary options have been selected, type "GO" and press [RETURN] to proceed with the conversion.

```
10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1   11:59:07
                  Converting Files

Files completed:  25%  0%|-----+-----+*---+-----+-----+-----+-----|100%

Current File:    Converting 2/TF1
Status:          Converting record 600 (last = 900)
```

fig 4 - Convert a LU Image Status Screen

A screen showing conversion status indicators is displayed. A "Files Completed" graph showing the percentage of the LU that has been converted and the current file being converted are shown. Status messages and error messages are displayed when appropriate. The last phase of the conversion is the loading and saving of Basic programs. The SAVE information is displayed and may cause the screen to scroll if more than a few Basic programs are being converted. All messages displayed on this screen are sent to the general log file and messages for Basic programs are sent to the Basic program conversion log file as well as the general log file. Information from either or both of these log files can be printed with the "Report" options shown on the Main Menu. After the LU conversion is complete, press [RETURN] to go back to the Main Menu.

---

**NOTE** Do not press [ESC] during the file extraction process, (i.e., when the screen says "Extracting file"). This may cause IMT to halt unexpectedly.

---

After all desired LUs are converted, skip to section, "Reports" below.

## Selection #5, Unattended Conversion

Unattended Conversion is used to convert one or more LUs, which can be converted from images on tape or disk. To convert from tape, you must run a Tape Scan first. See "Tape Scan" for more information. To convert from LU images on disk, you need to load LU image files to disk. See "Load logical units from tape" if you have not already done so.

The Unattended Conversion takes advantage of the Unix system's multitasking capabilities. There is an option within the Unattended Conversion to allow for the simultaneous conversion of between 1 and 5 files. Also, tape reads can be performed in the background as files are being converted. IMT uses phantom ports to do this and system performance will be compromised if a conversion is done on a "live" system. Since most conversions are completed on systems that are not yet in use by the customer, the option of converting 5 files simultaneously or performing tape reads while converting should cause no problems. Converting 5 files at once may not be the optimum setting for your system. For example, 3 files may actually run faster.

When IMT copies logical units from tape, only the actual amount of a logical unit used is transferred. In other words, if a logical unit is 65,000 blocks in size, but only the first 10,000 blocks are used, then only the first 10,000 blocks are copied to the disk. You can run CLEANUP or CLEANUPX on IRIS before transferring data in order to minimize the amount of disk space needed for the conversion. If you do this, be sure to INSTALL the logical unit before copying to tape in order to initialize the DMAP information.

When converting from tape, only one LU image is loaded to disk at a time. This saves disk space since the entire IRIS backup image is not copied to the disk, only the LU that is currently being converted. After a LU is converted, the LU image file is deleted.

A tape read option can be set to allow the conversion of one LU as the next LU image is read from tape. Otherwise, after an LU is converted, the LU image file is deleted before the next LU image is loaded from tape.

IMT will not overwrite a converted file with another file of the same name unless the Overlay option is selected. All status and error messages generated by IMT are displayed on screen and also recorded in log files. Report options on the Main Menu can print or redisplay this information after the conversion is complete.

The first Unattended Conversion screen has two options. Choose only one.

- |                          |  |
|--------------------------|--|
| Use A Tape Scan          | Enter a "1" and press [RETURN] if you want to convert from tape. A screen is displayed showing existing tape scans. The tape scan file number, description, and creation date are shown. Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the tape scan you want to use, and press [RETURN]. |
| Choose LU images On Disk | Enter a "2" and press [RETURN] if you want to convert from LU images loaded on the disk. A table is displayed showing the LUs loaded from tape to the temporary "loadlu" directory.  |

If you are converting using a tape scan, a table is shown on the screen consisting of the file number "##.", tape number, LU number, tape block offset, and destination directory. If you are converting from image files on disk, the table shown consists of the file number "##.", LU number, image filename, and destination directory for each LU. Enter "PF" to page forward, or "PB" to page backward through multiple screens of LUs. Enter a file number (not the LU number), or a range of file numbers, to select LUs for conversion. If a single file number is entered, the cursor will move to the destination directory edit field, allowing you to change the destination directory. Enter "A" to choose all the files displayed on the current screen, or enter "ALL" to choose all files on all screens. LUs chosen for conversion are marked with an asterisk (\*). Enter a file number, or a range of file numbers, to de-select any LUs if necessary. Press [ESC] to abort the conversion procedure and return to the Main Menu. After all desired files are selected, enter "GO" and press [RETURN] to proceed.

```

10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1   11:59:07
                Unattended Conversion

1. File types to convert (BTFCY), or blank for all      [      ]
2. Enter filename wildcards, or blank for all files
                [      ]

3. Build ISAM files with BINARY keys?                  [N]
4. Build ISAM files with PACKED keys? (no conversion)  [N]
5. Convert ALL data records of indexed files?          [N]
6. Release all indexed file data records based on free chain?[N]
7. IRIS major revision converting from                 [9]
8. Overlay existing files?                             [N]

9. Number of conversions to run concurrently (max 5)    [3]
10. Perform tape reads while conversions are running (Y/N) [Y]

Enter field number to change, or 'go' to proceed with conversion [ ]

```

fig 5 - Unattended Conversion Options Screen

The 10 options displayed on the conversion screen are:

### 1. File types to convert

Enter a "1" and press [RETURN] to specify which types of files to convert.

The file types are:

B, saved basic program

T, text file

F, formatted data file

C, contiguous or contiguous-indexed data file

Y, polyfiles (IRIS Rev 8 polyfiles are mapped to type "Y". They exist as file type "C" on IRIS)

Enter one or more of these options and only those file types will be converted. Leaving this field blank will conversion of all file types.

### 2. Filename Wildcards

Enter a "2" and press [RETURN] to specify which files to convert by filename. Use wildcards to select a group of files, or leave this field blank to select all files. The format of the wildcard specification is the same as for the Unix "ls" command. For example, 'abc\*' selects files beginning with 'abc', '\*xyz' selects files ending with 'xyz', 'ab\*z' selects files beginning with 'ab' and ending with 'z', and '\*ijk\*' selects files with 'ijk' in the filename. You may specify more than one wildcard pattern. Separate multiple patterns with spaces.

3. Build ISAM files with BINARY keys

Enter a "3" and press [RETURN] to move to this edit field. Enter a "Y" to copy binary keys; i.e. keys that contain bytes both above and below \200\. This option ensures that binary keys sort in the same order as they did under IRIS. The default for this option is "N".

4. Build ISAM files with PACKED Keys (no conversion)

Enter a "4" and press [RETURN] to move to this edit field. Enter a "Y" to copy packed keys that are to retain their exact format for proper unpacking operations. The default for this option is "N".

---

**NOTE** The two options shown above apply to both contiguous-indexed files and polyfiles. If neither option is chosen, i.e. both questions are answered with the default 'no', keys are assumed to be ASCII text and are toggled to the Unix format. See "How files are converted" for more information.

---

5. Convert ALL data records of indexed files

Enter a "5" and press [RETURN] to move to this edit field. Enter a "Y" to convert all indexed file data records, and release no records after the file is converted. The default for this option is "N".

6. Release all indexed file data records based on free chain

Enter a "6" and press [RETURN] to move to this edit field. Enter a "Y" to convert all indexed file data records, and then release records according to the IRIS file's free record chain. The default for this option is "N".

---

**NOTE** The two options shown above are mutually exclusive and apply to contiguous-indexed files only. If neither of these two options are specified, all records not previously flagged as being in use are released. See "How files are converted" for more information.

---

#### 7. IRIS major revision converting from

Enter a "7" and press [RETURN] to move to this edit field. Enter an "8" or "9" for IRIS Rev 8 or 9. Saved Basic programs from earlier versions of IRIS cannot be converted. Basic programs from earlier versions must be first dumped to text and then loaded and saved in uniBasic, or you can upgrade to IRIS Rev 8 or 9. See "How files are converted" for more information.

#### 8. Overlay existing files

Enter a "8" and press [RETURN] to move to this edit field. Enter a "Y" to overlay (replace) previously converted files with newly converted files of the same name. This assumes that the same destination directory for converted files is used. The default option "N" will not allow files to be converted a second time. If an attempt is made to convert the same file a second time, a "file already converted" error is displayed and recorded in the general log file.

---

**NOTE** If the Overlay option is selected and any volume of a polyfile is converted a second time, the ENTIRE original converted copy of that polyfile is removed from the destination directory. Also, all control file information for that polyfile is deleted. If you are converting a volume from one LU and the remainder of the polyfile is located on another LU that you will convert in a later run, answer "N" to this option when converting the second portion of the polyfile. If "Y" is selected, the volumes from the second part of the conversion will replace the volumes from the first part of the conversion and you will need to convert the first part of the file again.

---

9. Number of conversions to run concurrently, max 5

Enter a "9" and press [RETURN] to move to this edit field. This option selects the number of files to convert simultaneously. Select between 1 and 5 for the number of concurrent processes that IMT will launch to do the actual file conversions. The number that you select will affect system performance. For single-CPU environments, DCI recommends running 3 or less conversions simultaneously. Multi-processor and/or high-end systems may run up to 5 conversions simultaneously without compromising performance. Enter the number of files to convert concurrently, and press [RETURN].

10. Perform tape reads while conversions are running

Enter a "10" and press [RETURN] to move to this edit field. Enter a "N" to disallow tape reads while conversions are running, so that the next LU to convert is read from tape only after the current LU has been converted and the image file deleted. This option affects Unattended Conversions from tape only. IMT makes use of the multitasking capabilities of Unix by reading the next LU while the current LU is being converted. This option can significantly speed the conversion process. The default "Y" will allow tape reads to proceed in the background while files are being converted. Set this option to "N" if you get several tape errors.

After the necessary options have been selected, type "GO" and press [RETURN] to start the conversion.

```

10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1   11:59:07
                  Unattended Conversion

LU's completed:   25%  0% |-----+-----*---+-----+-----+-----+-----| 100%
% of lu 2 done:   95%  0% |-----+-----+-----+-----+-----+-----+*---| 100%

Tape sts:(no tape services needed)

Status:  Converting 2/TF1
         Converting record 600 (last = 900)

Status:  Converting 3/EXERCISER
         Extracting file

Status:  Converting 3/EXTRAPORT
         Extracting file

Status:  Sending command to convert file 3/FORGE1

Status:  Sending command to convert file 3/FORGE2

```

fig 6 - Conversion Status Screen

A screen showing conversion status indicators is displayed. The "LU's Completed" graph shows the percentage of all LUs that have been converted and the "% of LU 'x' done" graph shows the percentage complete of the current LU. Tape status messages will display if you are converting from tape. Conversion status and error messages for each conversion process (up to the maximum of 5) are displayed when appropriate. Error messages displayed on the screen are also sent to the general log file and messages for Basic programs are sent to the Basic program conversion log file as well. Information from either or both of these log files can be printed with the report options shown on the Main Menu. After the conversion is complete, press [RETURN] to go back to the Main Menu.

Once this conversion status screen is displayed, IMT can be left unattended. When the conversion is complete, press [RETURN] to go back to the Main Menu.

The conversion process can be aborted after it has begun by pressing [ESC]. The conversion will halt and options will display at the bottom of the screen. The 3 options displayed are:

### 1. Orderly Shutdown

Enter "1" and press [RETURN] to execute this option. IMT will finish converting the current files, if any, and then send conversion information to the log files. An 'Aborted Conversion' entry is made in the general log file, showing the conversion status at the time of the abort and which files were affected.

### 2. Immediate Shutdown

Enter a "2" and press [RETURN] to execute this option. IMT will terminate the conversion immediately and will not complete the conversion of files in progress, if any. IMT then sends conversion information to the log files. An 'Aborted Conversion' entry is made in the general log file, showing the conversion status at the time of the abort and which files were affected.

### 3. Escape to continue

Press [ESC] to continue with the conversion. No record will be kept of the temporary stoppage and files in the process of being converted will not be affected.

While waiting for an orderly shutdown, you may resume the conversion by pressing [ESC] again and answering "1" to resume. You may not abort an immediate shutdown.

---

## Reports Menu

The reports section of the Main Menu has six different reports that can be printed or displayed to the screen. Each report covers a different aspect of the conversion process. The log files and data files that these reports use will remain in the "imt"

directory until removed, so reports need not be run immediately after converting each LU. See the "Cleanup" section below for removal of the log files, data files, and temporary directories.

Reports displayed to the screen feature special move/search commands. The commands are:

- |                       |   |
|-----------------------|---|
| Up Arrow / Down Arrow | Press the 'Up Arrow' / 'Down Arrow' keys to scroll up or down the reports one line at a time. Cursor tracking must be defined in order to use the arrow keys. See Appendix B for more information.  |
| "PF" / "PB"           | Enter "PF" or "PB" and press [RETURN] to Page Forward or Page Backward throughout the reports one screen at a time. You may also press [RETURN] to Page Forward.  |
| "TOP" / "END"         | Enter "TOP" and press [RETURN] to go to the top of the report. Enter "END" and press [RETURN] to go to the bottom of the report.  |
| "/"                   | Enter "/" followed by a word or phrase and then [RETURN] to search forward for that word or phrase. The report moves to the first occurrence of the word or phrase, and the line containing the desired text is dimmed. This search is case-insensitive.  |
| "?"                   | Enter "?" followed by a word or phrase and then [RETURN] to search backward for that word or phrase. The report moves to the first occurrence of the word or phrase, and the line containing the desired text is dimmed. This search is case-insensitive. |

"N"	Enter "N" and press [RETURN] to move to the next occurrence of selected text when using the search forward "/" or search backward "?" features described above.
[ESC]	Press [ESC] to return to the Main Menu.

---

## **Selection #6, General Log**

Enter a "6" and press [RETURN] to run this report option. Enter a "1" and press [RETURN] to change the report destination, i.e. to '\$lpt', or a disk file. If this field is left blank, the report will print to the screen. Enter "GO" and press [RETURN] to display the general log report.

The general log records selected settings and output from all of the conversion programs. Information from displaying reports or running miscellaneous options is not sent to the general log file. The general log records the date and time that it was first created, along with information from each conversion program. If any operation is aborted, the operation name and the message "[ESCAPE] pressed!" is recorded. If IMT is launched and a general log file already exists, it will be appended to with the message "Log file opened..." with the date and time. The information sent to the log file from each of the conversion programs is as follows:

1. Initialize

The Initialize configuration settings are sent to the general log file each time you exit from the Initialize screen.

2. Tape Scan

All tape number, LU number and block offset information generated by the Tape Scan is sent to the general log file upon exit from the Tape Scan screen.

3. Load LU from tape

The list of LUs loaded from tape with the tape number, LU number and tape block offset are sent to the general log file upon exit from the Load LU screen.

#### 4. Convert a LU image

The conversion options, destination directory for converted files, destination directory for text copies of Basic programs and conversion status information are all sent to the general log file. Status information is sent to the log file as each LU is converted. In the first status section, each converted file's LU number, type, filename and conversion status are shown. If the status field is blank, then the file was extracted and converted successfully. The second status section shows the LU number, filename and status for loading and saving converted Basic programs. As above, if the status field is blank, the program was loaded and saved with no problems. Basic program load errors are also sent to the Basic Program Error log. For more information about syntax errors generated by uniBasic, see the "How files are converted" and "Troubleshooting" sections and the uniBasic Reference Manual.

#### 5. Unattended Conversion

The conversion options and conversion status information are sent to the general log file. Status information is sent to the log file after each LU is converted. Since smaller LUs take less time to process than larger ones, they may appear in the log in a different order than on tape. The status section, each file's LU number, type, filename, and status are shown in the report. If the status field is blank, then the file was extracted and converted successfully. Load errors, (i.e. syntax errors), generated while loading and saving Basic programs, are shown in the status field. Error information for Basic programs is also sent to the Basic Program Error log. For more information about syntax errors generated by uniBasic, see the "How files are converted" and "Troubleshooting" sections and the uniBasic Reference Manual.

If an Unattended Conversion is aborted with [ESC] before it is complete, an 'Aborted Conversion' message is recorded in the general log file, with the names of the files whose conversion was interrupted, and the type of Abort (orderly or immediate) that was used.

## Selection #7, Basic Program Error Log

Enter a "7" and press [RETURN] to go to this report option. Enter a "1" and press [RETURN] to change the report destination, i.e. to '\$lpt' or a disk file. If the destination field is left blank, the report will print to the screen.

Enter "GO" and press [RETURN] to display the Basic Program Error log report.

This report contains status information for Basic programs that had conversion errors. When you convert Basic programs, any extraction or save errors are recorded in this log file. Error information for Basic programs with conversion errors is sent to this log file after each LU is converted. These errors are shown with the LU number, the program filename, and the status field containing the offending line numbers with a carrot (^) symbol printed above the error point when possible. The total number of Basic program conversion errors is shown for each LU. For more information about syntax errors generated by uniBasic, see the "How files are converted" and "Troubleshooting" sections and the uniBasic Reference Manual.

---

## Selection #8, Polyfile Status Report

Enter an "8" and press [RETURN] to go to this report option. Enter a "1" and press [RETURN] to change the report destination, i.e. to '\$lpt' or a disk file. If the destination field is left blank, the report will print to the screen. Enter a "2" and press [RETURN] to change the "Print all polyfiles or only orphans" option field. Enter an "A" for all, or an "O" for orphans. The default, "All" creates a polyfile report that gives status information for all volumes. The "Orphan" option gives status information for orphaned volumes only. After these options are selected, enter "GO" and press [RETURN] to generate the report.

The Polyfile Status Report is compiled from information in the control files used for polyfile conversion. These files are located in the temporary directory for polyfile conversion. This directory is specified in the Initialization phase at IMT startup. The polyfile status report shows the filename, LU number, volume number, type and conversion status for each polyfile volume. See "How files are converted" for more information. Normal status messages are:

'Converted'	Corresponding polyfile volume converted successfully.
'Read, awaiting conversion'	Corresponding polyfile volume has been read from an LU image file and placed in the temporary polyfile conversion directory, but it is not yet converted. This situation can occur if a polyfile volume is read before the corresponding master volume, or if other volumes are needed before this one can be converted.
'Not yet read'	Corresponding polyfile volume has not been read from the LU image file.

---

## Selection #9, IRIS Tape Scan Info

Enter a "9" and press [RETURN] to select this report option. Enter a "1" and press [RETURN] to change the report destination, i.e. to '\$lpt' or a disk file. If the destination field is left blank, the report will print to the screen. Enter "GO" and press [RETURN] to run the IRIS tape scan information report.

A screen is displayed showing tape scans created with the "Tape Scan" function. The tape scan file number, description and creation date are shown. Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the tape scan you want and press [RETURN]. Press [ESC] to abort this procedure and return to the Main Menu.

The IRIS tape scan information report shows the scan description, the creation date for that tape scan, the tape number, LU number and decimal tape block offset for each LU that was scanned.

---

## Selection #10, LIBR Of a LU image File

Enter "10" and press [RETURN] to select this report option. LU image files in the temporary "loadlu" directory are displayed. (An LU image must be loaded to disk be-

fore you can use this function.) Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the LU to run LIBR on (not the LU number), and press [RETURN]. The file numbers are listed under the "##." column heading.

```

10 JUL 1993      uniBasic(tm)-IRIS Migration Toolkit 1.1   11:59:07
                Perform an IRIS LIBR on a LU image

Currently processing LU# 2 from file temploadlu/2

1. File types to convert (BTFCY), or blank for all      [  ]
2. Enter filename wildcards, or blank for all files    [  ]
3. Report destination (blank for screen)               [  ]
4. Display/print detail file information?               [N]

Enter field number to change, or 'go' to proceed with conversion: [  ]

```

fig 7 - IRIS LIBR Report Options Screen

#### 1. File types to convert

Enter a "1" on the options screen and press [RETURN] to specify on which types of files to run LIBR. The file types are:

B, saved basic program  
T, text file  
F, formatted data file  
C, contiguous or contiguous-indexed data file  
Y, polyfiles

Enter one or more of these options and only those files types will be displayed. Leave this field blank to display all file types.

#### 2. Filename Wildcards

Enter a "2" and press [RETURN] to specify which files to display by filename. Use wildcards to select a group of files, or leave this field blank to select all

files. The format of the wildcard specification is the same as for the Unix "ls" command. For example, 'abc\*' selects files beginning with 'abc', '\*xyz' selects files ending with 'xyz', 'ab\*z' selects files beginning with 'ab' and ending with 'z', and '\*ijk\*' selects files with 'ijk' in the filename. You may specify more than one wildcard pattern, separated by spaces.

### 3. Report Destination

Enter a "3" and press [RETURN] to change the report destination, i.e. to '\$lpt' or a disk file. If the destination field is left blank, the report will print to the screen.

### 4. Display/print detail file information

Enter a "4" and press [RETURN] to move to the "Display/print detail file information" edit field. The default for this option is "N", which will display a normal IRIS LIBR on the selected LU image file. Enter a "Y" to display a LIBR that has additional information for formatted, contiguous, indexed files and polyfile volumes. The detail information displayed is:

File Type	Detail Information
Formatted	number of records, record size in words, number of records per block and format
Contiguous	number of records and record size in words
Contiguous-indexed	number of records, record size in words, key size in bytes for each directory and first data record number
Polyfile	number of records, record size in words, volume type (base, extension, data, or unknown), number of directories and key size in bytes for each directory

Table 3

When the above options have been selected, enter "GO" and press [RETURN] to execute the report.

## Selection #11, Scan IRIS Contiguous ISAM key Structure

This report shows the actual internal key structure of an IRIS contiguous ISAM file and can be especially useful if a file of this type fails to convert properly. This report applies to contiguous-indexed files only, not to contiguous, formatted, or polyfiles.

Enter "11" and press [RETURN] to select this report option. LU image files in the temporary "loadlu" directory are displayed. (An LU image must be loaded to disk before you can use this function.) Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the LU to scan (not the LU number) and press [RETURN]. The file numbers are listed under the "##." column heading.

Enter a "1" on the options screen and press [RETURN] to specify by wildcards which files to scan. Use wildcards to select a group of files, or leave this field blank to select all type 'C' files. The format of the wildcard specification is the same as for the Unix "ls" command. For example, 'abc\*' selects files beginning with 'abc', '\*xyz' selects files ending with 'xyz', 'ab\*z' selects files beginning with 'ab' and ending with 'z', and '\*ijk\*' selects files with 'ijk' in the filename. You may specify more than one wildcard pattern, separated by spaces.

Enter a "2" and press [RETURN] to change the report destination, i.e. to '\$lpt' or a disk file. If the destination field is left blank, the report will print to the screen.

When the above options have been selected, enter "GO" and press [RETURN] to execute the report.

The report will display the following data:

- header block address in decimal
- file size in blocks
- record length in words
- number of records
- first data record
- number of indexes, with the defined key size in bytes for each index

Also shown is the key structure for each directory, which consists of:

the number of keys found, that is key 0 up to 'maxkey'  
directory number,  
key number,  
actual key size  
ASCII key contents (non-displayable characters shown as "\\###\\")  
corresponding record number

---

## Miscellaneous

The Miscellaneous section of the Main Menu contains three options, Tape Scan Management, Rewind Tape and Cleanup.

---

### Selection #12, Tape Scan Management

Tape Scan Management is a set of utilities designed to make tape scan information easier to deal with, since tape scanning is a vital function of IMT. Tape scan management allows you to change the text description of tape scans, delete scans and export or import scan information from another IMT session.

Enter "12" and press [RETURN] to select this option. A screen is displayed with the four tape scan management choices. Enter the appropriate number and press [RETURN]. Press [ESC] at any time to abort this procedure and return to the Main Menu. The options are:

1. Change Description      Enter a "1" and press [RETURN] to select this option. A screen is displayed showing tape scan file number, description, and creation date. Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the tape scan you want to modify and press [RETURN]. An edit field with the existing description is displayed. Enter the new tape scan description and press [RETURN]. An "OK to continue?" option will appear at the bottom of the screen. Enter a

"N" and press [RETURN] to abort the change and return to the edit field. Accept the default "Y" and press [RETURN] to change the tape scan description. After the description is changed, you will return to the Tape Scan management options screen.

2. Delete

Enter a "2" and press [RETURN] to select this option. A screen is displayed showing tape scan file number, description, and creation date. Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the tape scan you want to delete and press [RETURN]. The selected tape scan description is displayed with an "OK to continue?" option at the bottom of the screen. Enter a "N" and press [RETURN] to abort this operation and return to the Tape Scan Management options screen. Enter a "Y" and press [RETURN] to delete the tape scan. After the tape scan is deleted, you will return to the Tape Scan management options screen.

3. Export

Enter a "3" and press [RETURN] to select this option. A screen is displayed showing tape scan file number, description and creation date. Enter "PF" to page forward or "PB" to page back through multiple screens. Enter the file number of the tape scan you want to export and press [RETURN]. The selected tape scan description is displayed with an "Enter export destination file" edit field. Enter a filename for the exported tape scan and press [RETURN]. The filename must conform to the Unix/Xenix filename restrictions. If a file with the same name already exists, the message "File already exists, use '!' to replace" is displayed. If you want to overwrite the existing file with your exported tape scan, add a "!" to the end of the filename and press [RETURN]. An "OK to continue?" option will appear at the bottom of the screen. Enter an "N" and press [RETURN] to go back to the "Export Destination file" edit field. Enter a "Y" and press [RETURN] to export the tape scan information to the selected file and return to the Tape Scan Management op-

tions screen. The exported file may then be transferred to another system.

#### 4. Import

Enter a "4" and press [RETURN] to select this option. A screen with an "Enter exported scan filename" edit field is displayed. Enter the filename for the tape scan that you exported using #3 above, and press [RETURN]. An "OK to continue?" option will appear at the bottom of the screen. Enter a "N" and press [RETURN] to cancel the operation, and return to the Tape Scan management options screen. Accept the default "Y" and press [RETURN] to import the tape scan. When the import procedure is complete, you will return to the Tape Scan management options screen.

---

### Selection #13, Rewind Tape

The rewind tape function is self explanatory and is used when a conversion halts before completion.

Enter a "13" and press [RETURN] to select this menu option. A screen will display the tape rewind status. After the operation is complete, press [RETURN] again to go back to the Main Menu.

---

### Selection #14, Cleanup

The Cleanup options allow you to purge temporary conversion files and directories when the conversion is complete.

Enter a "14" and press [RETURN] to select this menu option. A screen of Cleanup options is displayed. Enter the desired options and answer "Y" to select them. Enter "GO" and press [RETURN] to continue. Press [ESC] at any time to abort this procedure. The 6 cleanup options are:

1. Purge LU images in the temp loadlu directory
2. Clear temp polyfile directory, including log data
3. Clear the temp conversion directory
4. Clear the tape scan info directory
5. Delete the general log file
  
6. Delete the Basic program error log file

A cleanup verification screen will display the exact Unix commands that are used to delete the specified files and directories. Also shown is a description of each file, or the contents of each directory, chosen to be deleted. Press [ESC] to abort the procedure and go back to the Main Menu, or enter "CONTINUE" and press [RETURN] to delete these files and directories.

If "CONTINUE" is entered, a screen displays the execution of the selected Unix commands. When the files and directories have been cleared, press [RETURN] to go back to the Main Menu.

---

**NOTE**    When you are finished with your conversion, be sure to print out all logs before you delete them. They comprise the total record of your conversion and should be kept for later reference.

---

# Appendix A: Troubleshooting

The most common problems using IMT are addressed in this section. This manual assumes a basic knowledge of both uniBasic and Unix. For problems pertaining to uniBasic, consult the uniBasic Reference Manual. For problems related to Unix, consult your Unix manuals. If your problems cannot be resolved by any of these methods, call your dealer. DCI regrets that we cannot accept direct support calls from customers that do not have a DCI Support Agreement.

**Q** **IMT has quit with the message 'Communication buffer is full'.**

**A** The IPC message queues may not be configured properly for your system. IMT and uniBasic rely heavily on the Unix IPC message queues for communication between processes. See the "Preparation for Conversion" section for more information.

**Q** **IMT does not run properly, or it behaves erratically.**

**A** Make sure no one else is running IMT on your system. Also, for IMT to run properly, uniBasic must be run from the Bourne shell "sh". (on Ultrix, use the "sh5" shell). Do not use the C-shell or the Korn shell. This is necessary because some system-related functions performed by IMT depend on Bourne shell command formats. Do not use the environment variable ALTCALL to change call numbers while running IMT.

**Q** **IMT had an error and VSAVED, but exited to the BITS prompt (\*\*). I had originally launched IMT from the IRIS prompt ('#')**

**A** The BASIC program portion of IMT is written in uniBasic under BITS mode. IMT checks your BASICMODE setting at startup, and changes it to BITS mode if necessary. If you exit IMT normally, BASICMODE is reset, but if

there is an error, you will find yourself at the BITS prompt. Issue "bye" to log out of uniBasic and log back in.

**Q I converted Basic programs, but there are errors in the Basic program error log. These programs ran under IRIS.**

**A** The uniBasic program statement encoder is much more strict than the one on IRIS. As a result, many errors not detected until runtime on IRIS will be caught when a statement is entered into uniBasic. You will probably encounter several syntax errors when IMT loads your Basic programs. Refer to the uniBasic Reference Manual for more information on uniBasic syntax restrictions.

**Q I get the error message 'Someone else is running the uniBasic IRIS Migration Toolkit now. Only one user may run this at a time. Try again later.'**

**A** Only one IMT session can be run at a time. If an attempt is made to launch a subsequent session, this message will display.

**Q I have an Exabyte (8mm) tape drive, and I get a 'Device not ready' error.**

**A** Exabyte tape drives sometimes timeout and report this error, especially if the system is busy with other users. These drives also take longer to come 'ready' than other tape drives. You may need to try again and wait longer between inserting the tape and running IMT.

**Q When I scan a tape or read from a tape, no information is saved and the program ends immediately.**

- A** The tape device was probably not ready. Wait for the ready light to come on and try again.
- Q** **The IMT Edit Key commands do not work on my terminal.**
- A** IMT Edit Keys use the uniBasic Cursor Tracking feature. Cursor Tracking must be defined in your "term" file in order for the Edit Keys to work. IMT will run without the Edit Keys, but it may be less convenient to use. Refer to Appendix B, "Sample 'term' file definitions", or to the uniBasic Manual under "Cursor Tracking" and "term files" for more information.
- Q** **My Main Menu screen does not look like the one pictured in the IMT Manual.**
- A** IMT uses Extended Graphics Characters to draw borders for some of the IMT menus. Extended graphics characters must be defined in your "term" file in order for IMT to operate properly here. Refer to Appendix B, "Sample 'term' file definitions", or to the uniBasic Manual under "Extended Graphics Characters" and "term files" for more information.
- Q** **I'm converting from IRIS Rev 7, and am having problems with getting Basic programs to convert.**
- A** The Basic program decoder used by IMT does not work on IRIS Rev 7 and earlier Basic programs. The way the programs were saved on IRIS changed with the advent of IRIS Rev 8. DCI recommends either dumping the programs to text before copying the logical units to Unix or upgrading the IRIS system to IRIS Rev 8, or preferably, IRIS Rev 9. If you dump the programs to text, you will need to write a script to load and save them in uniBasic, and IMT's Basic program error reporting features will not be available.

- Q I am getting 'variable not DIMensioned' errors in the Basic program error log.**
- A** READING a variable from a DATA statement without DIMensioning that variable first may lead to a program error in uniBasic. Make sure your variables are DIMensioned.
- Q I'm having problems with CALLs in my converted Basic programs.**
- A** uniBasic CALL numbers are different than IRIS CALL numbers, therefore you will need to add the ALTCALL environment variable to your ".profile" file. This applies to numeric CALLs only, not to named CALLs like \$STRING or \$ECHO.
- Q My Basic programs depend on static data file size, and they are having problems with data files under uniBasic.**
- A** Data files on uniBasic are dynamic; they expand as needed. If your programs require that the data file size remains static, as it did on IRIS, set the environment variable PREALLOCATE to 128. In general, allowing the files to expand dynamically eliminates file expansion problems that occur on IRIS, such as expanding a polyfile by adding a new volume.
- Q I get a 'cannot create' message while trying to print a report.**
- A** Check the file permissions on the printer driver in the "/usr/ub/sys" directory. If uniBasic can't open the driver, it can't create a pipe to it. Printer drivers must also have the 'x' permission.
- Q My Basic programs are loaded into the "?text" directory, but they are not saved in the main directory.**

**A** Make sure the PORT and PORTS environment variable are not set. When the Basic programs are LOAded and SAVEd, uniBasic is spawned to perform the task. If one of these environment variables is defined, the spawned uniBasic process wants to run on the same port number. This creates an error condition and the spawned uniBasic processes will terminate. As a result, your programs are not loaded or saved.

**Q** **IMT seems to run slow, how can I speed it up?**

- A**
1. Be the only user on the Unix system. This allows the conversion programs to run faster and lowers the risk of a device timeout error.
  2. Purge any unnecessary files on the IRIS system, leaving fewer files to convert.
  3. Resolve polyfile and ISAM filename conflicts. Remember that, on uniBasic, polyfile filenames of the form "XXX@" are converted to "XXX", and uniBasic considers these two distinct IRIS files to have the same Unix filename. Try to remove any "@" symbols in filenames on IRIS before converting to uniBasic.
  4. Run CLEANUP or CLEANUPX on IRIS. This packs all files as close as possible to the INDEX at the front of the logical unit, and lowers the amount of disk space needed to copy logical units from tape. If you do this, be sure to INSTALL each logical unit before copying to Unix. This will re-initialize the DMAP so that the IMT programs operate properly.

**Q** **My converted programs cannot access LU/0**

**A** Your files are converted into the "0/" directory since IMT uses absolute pathnames when creating files. However, unless your programs also use absolute pathnames, you will be unable to access those files since references to "0/" are mapped by uniBasic to the "sys/" directory. You should either change your programs to use absolute pathnames, or move the necessary files from "0/" to the "sys/" directory.

**Q How much space does IMT need?**

**A** The Unattended Conversion from tape loads one LU at a time, converts the files in that LU, then purges the LU image. As a result, you need 32 megabytes, (the maximum size of an IRIS logical unit) beyond the total space required for your converted files. Note also that most LUs are not full and won't need as much space on Unix as they took on IRIS. If you load all the LUs and then convert them, you are responsible for disk space management, and must allow for the raw IRIS data and converted files on the system.

**Q I'm having problems reading IRIS bootable backup tapes.**

**A** You can use an IRIS bootable backup if it was created by one of the IMT-supported utilities: DISCUTILITY, QICOPY, MTCOPY, STAR\*Tape, or Saint. If you use a different utility, create a tape without headers or multiple volumes, and specify QICOPY or MTCOPY format. If one doesn't work, try the other one.

**Q My file structure after conversion is not the same as it was on the IRIS system.**

**A** It will appear exactly the same to your programs if the LUST environment variable is set correctly. Refer to the uniBasic Reference Manual for more information on LUST. The actual disk representation of files is different on Unix than on IRIS, but uniBasic maps the IRIS logical unit numbers to Unix directories based on the LUST environment variable.

**Q My maintenance programs do not work under uniBasic.**

**A** Programs that open files in maintenance mode ('OPEN #C=1' or 'OPEN #C=2') may be unusable, especially if they examine the internal structure of ISAM or system files. Maintenance mode is not well supported in uniBasic, though

there are other ways to accomplish the same tasks. See the RDREL, WRREL and CONV statements in the uniBasic Reference Manual.

**Q I ran IMT from "root" and now my converted programs will not run, and I can't access my data files.**

**A** DCI recommends that you run IMT from the account that will actually use the programs. Converted files will have the same permissions as the user doing the conversion. You must be logged in as "root", however, to install IMT and uniBasic. If you run IMT while logged in as "root", you must eventually change the permissions on each program and data file so the end-users can access them.

**P I'm running an Unattended Conversion and I am getting tape errors.**

**S** Set the "Perform tape reading while conversions running" option to "N".



---

# Appendix B: Sample "Term" File Definitions

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## Cursor Tracking

IMT Edit Key commands use uniBasic Cursor Tracking. Cursor Tracking must be defined in your "term" file in order for the Edit Keys to work. IMT will run without the Edit Keys, but it may be less convenient to use. Below are sample Cursor Tracking mnemonics used by IMT for Wyse 60 terminals and SCO ANSI consoles. Refer to the uniBasic Reference Manual under "Cursor Tracking" and "term files" for more information.

These mnemonics have been tested under SCO Unix. Do not include the descriptions in the "term" file.

Wyse 60 and ANSI  
mnemonic:replacement string (description)

^H:22 (left arrow)  
^J:21 (down arrow)  
^K:20 (up arrow)  
^L:23 (right arrow)

SCO Unix has a utility called "setkey" that can be used to map functions to specific keys for the console tty. You can issue the following commands at the command prompt in order define arrow keys:

```
setkey 50 "\013"  
setkey 53 "\010"  
setkey 55 "\014"  
setkey 58 "\012"
```

Refer to your Unix system documentation under "setkey" for more information.

---

## Extended Graphics Characters

IMT uses Extended Graphics Characters to draw borders for some of the IMT menus. Extended graphics characters must be defined in your "term" file in order for IMT to operate. IMT will run without the menu borders, but it may be less convenient to use. Below are sample Extended Graphics Character mnemonics used by IMT for Wyse 60 terminals and SCO ANSI consoles. Refer to the uniBasic Manual under "Extended Graphics Characters" and "term files" for more information.

These mnemonics have been tested under SCO Unix. Do not include the descriptions in the "term" file.

### Wyse 60

mnemonic:replacement string (description)

G1:2	(upper left corner)
G2:3	(upper right corner)
G3:1	(lower left corner)
G4:5	(lower right corner)
G5::	(horizontal bar)
G6:6	(vertical bar)
BG:\33\H\2\	(Begin Graphics)
EG:\33\H\3\	(End Graphics)

### SCO-ANSI

mnemonic:replacement string (description)

G1:\332\	(upper left corner)
G2:\277\	(upper right corner)
G3:\300\	(lower left corner)
G4:\331\	(lower right corner)

G5:\304\ (horizontal bar)  
G6:\263\ (vertical bar)

If you do not know the graphics sequences for your terminal, you must use spaces instead. The menu borders will not display, but IMT will run.

No Graphics, print spaces instead  
mnemonic:replacement string

G1:\40\  
G2:\40\  
G3:\40\  
G4:\40\  
G5:\40\  
G6:\40\  
BG:\40\  
EG:\40\



# Appendix C: Conversion Procedure Flowchart



