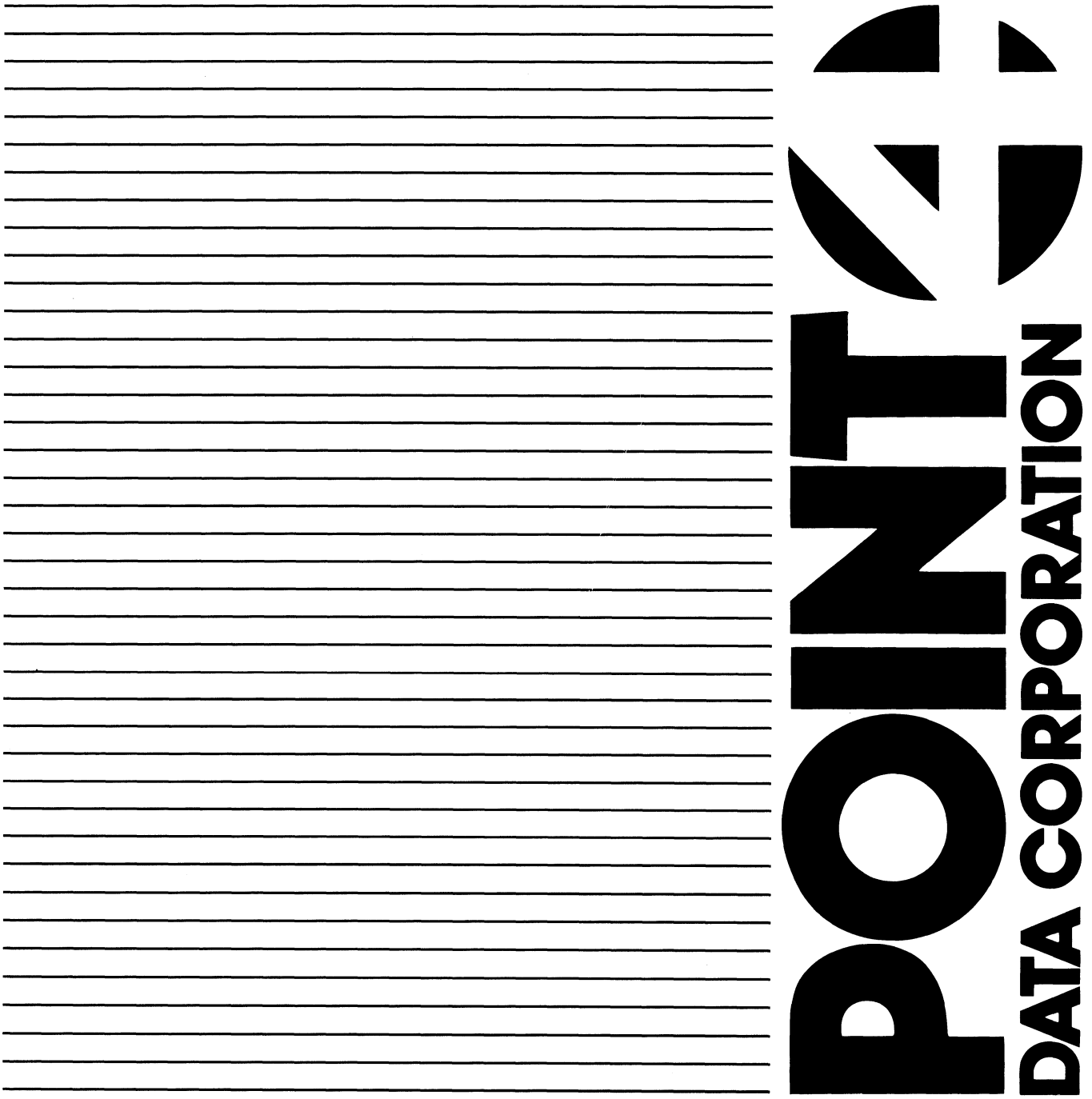
LOTUS

DISCUTILITY Manual



POINT DATA CORPORATION

LOTUS
DISCUTILITY MANUAL

Revision 04

NOTICE

Every attempt has been made to make this manual complete, accurate and up-to-date. However, all information herein is subject to change due to updates. All inquiries concerning this manual should be directed to POINT 4 Data Corporation.

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LIST OF EFFECTIVE PAGES

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PREFACE

This manual is a guide for the use of the LOTUS DISCUTILITY for POINT 4 MARK 5/9 systems. Each section provides information about the various program options including the functions, procedures, and messages generated.

Standard Notations For This Manual

This manual uses the following standard writing conventions:

User Input	User input is underlined; it may be a command shown in capital letters, a variable such as a filename shown in lower case, or locations in memory indicated by an octal number.
<RETURN>	Indicates a carriage return. It is required to activate command input. This is not shown unless it is the only command required, a second <RETURN> is required, or it follows a control character (e.g., <CTRL-Z> <RETURN>).
<ESC>	Indicates the ESC key. It can be used to exit a program module unless otherwise noted.
<CTRL-x>	Indicates a control character where x is an alpha key. It is entered by holding down the CTRL key and pressing the alpha key indicated. Both keys are then released. A <RETURN> is not required unless otherwise noted.
variable	Lower-case item in a command string represents a variable such as a filename, password, or parameter.

Related Documents

Related manuals include:

Title	Pub. Number
IRIS R8 Installation/Configuration Manual	SM-030-0009
IRIS R8 Operations Manual	SM-030-0010
IRIS R8 Peripherals Handbook	SM-030-0015
LOTUS Controllers Manual	HM-120-0033

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Section 1
INTRODUCTION

DISCUTILITY was developed by POINT 4 Data Corporation for use with the LOTUS 700/710 Disk, LOTUS 720 Tape and LOTUS 730 Multifunction controllers. It is available either on IRIS LU 0 or as a stand-alone tape. It is a utility which is run when IRIS is not in memory. DISCUTILITY contains interactive disk and 1/4-inch and 1/2-inch tape program options which are used to format disks, perform backups, and to load IRIS or other software disk-to-disk, disk-to-tape, and tape-to-disk.

One-quarter-inch tape operations require DISCUTILITY revision 2.3 or later. One-half-inch tape operations require DISCUTILITY revision 5.0 or later.

DISCUTILITY, based on DU.LOTUS 5.3 or later revisions, requires 64K words of memory. If a half-inch tape is used for SAVE and RESTORE, its controller board must be able to support a full 16-bit memory address for addressing 64K words of memory.

Support for the Priam 344MB drive is provided by revision 5.3 or later (the LOTUS 730 Multifunction Controller is also required).

NOTE

On IRIS R8.2C2 and later revisions, DISCUTILITY is delivered as DU.LOTUS. It is copied into a file named DISCUTILITY by the auto-initialization procedure. See IRIS R8.2/8.3 Release Notes, Sections 17 and 20 for more information.

1.1 PROGRAM OPTIONS

LOTUS DISCUTILITY includes the following program options:

FORMAT - Formats a specified disk and writes a unique header at the beginning of each sector (see the LOTUS Controllers Manual). It also analyzes the surfaces for errors and may perform an optional prescan before formatting to obtain a list of previously detected hard errors. Format makes a 5-pass analysis. If any bad sectors are found, they are reported as hard errors and chained to alternate tracks. Up to 160 hard errors can be chained.

QUICK FORMAT - Formats a specified disk, then makes a 2-pass analysis to detect and chain sectors with hard errors to alternate tracks. This option should not be substituted for the Format program because it is less reliable. Quick Format should only be used by a technician to format a disk for hardware testing. The regular Format program should be run before the disk is used to store data.

COPY - Writes a specified source disk to a destination disk and then performs a data-verify on the destination.

CONVERT MARK 3 - Reads data from a source disk in MARK 3 format, converts and then writes it to a destination disk in LOTUS format. This program option requires a LOTUS 710 or 730 Disk Controller which must be set to read-regardless (RR) mode.

VERIFY - Reads the source and the destination specified and compares them word by word in memory to ensure that the data on the source disk is the same as the data on the destination disk.

IPL - Allows the user to load the IRIS System into memory.

DISPLAY - Redisplays a disk error report.

SAVE - Retensions streamer tape, then transfers data from disk to streamer tape.

RESTORE - Transfers data from streamer tape to disk.

TAPE RETENSION - Retensions the streamer tape.

STREAMER VERIFY - Compares the data on tape to data on disk to ensure that they are identical.

1.2 PROGRAM REPORTS

DISCUTILITY programs that use read and write functions (such as Format, Copy, and Verify) display a report on the terminal which informs the user of the program's progress. The report lists the function (i.e., read or write) and cylinder number which is incremented at regular intervals (every 40 octal). The Format program also displays a message indicating which pass of the surface analysis has been completed, for example

```
WRITING ...
CURRENT CYLINDER IN OCTAL = nnnn
READING ...
CURRENT CYLINDER IN OCTAL = nnnn
COMPLETED PASS 1
WRITING ...
   •
   •
   •
```

where

nnnn - cylinder number which increments every 40 octal.

At the end of the progress report, an error and status report is displayed. The format and content of the status report depends on the program option being executed. Examples of error reports and messages are provided in the section describing each individual program.

1.3 PROGRAM OPTIONS WORD

LOTUS DISCUTILITY contains a Program Options word at location 200 that can be used to enable and disable various program options. The word currently includes the following options:

- Size of streamer tape
- Operator entry of hard errors during Format
- Prescan disk prior to Format

The options are changed by using DSP to set the appropriate bits at location 200 in LOTUS DISCUTILITY. When the associated bit is 0, the option is enabled. Setting the bit to 1 disables the option. All bits are set to 0 when delivered.

The bits in the Program Options word are shown in Figure 1-1.

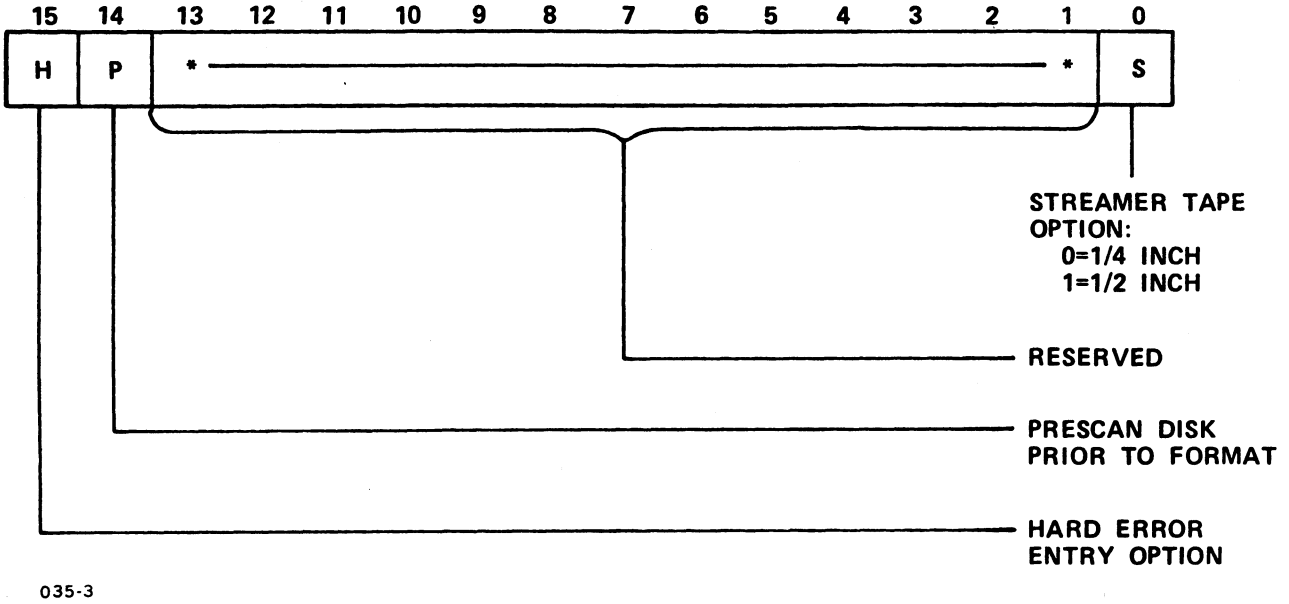

Figure 1-1. Program Options Word

1.4 1/2-INCH STREAMER TAPE DRIVE OPERATIONS

If the system is configured for both 1/4-inch and 1/2-inch tape controllers, the 1/4-inch controller is assumed unless the 1/2-inch tape option flag has been set.

The option flag is bit 0 of the Program Options word at location 200 in DISCUTILITY (see Section 1.3). It may be set by using DSP.

WARNING!

> Once the 1/2-inch tape option flag has been set, the 1/4-inch tape option is not available. A fresh copy of DISCUTILITY must be loaded without the option flag set to access the 1/4-inch tape controller.

If the 1/2-inch streamer tape drive is set off-line or powered off while any of the tape operations described in Section 3 is in progress, DISCUTILITY will hang.

To restart DISCUTILITY and ensure reliable tape operations, proceed as follows:

1. Press STOP and then APL on the computer's Mini-panel

2. Check the tape unit for the following:

   a. Is it powered on?
   b. Does it have a tape loaded?
   c. Is it on-line?

3. At the keyboard, enter

   J2

4. Repeat the operation that was in progress when DISCUTILITY stopped.

Section 2
USING DISCUTILITY

This section describes the procedure for using the DISCUTILITY program options.

If DISCUTILITY is not already on your system, it can be loaded into memory from a cassette tape or streamer tape. The procedure for loading a stand-alone program from cassette tape is described in the IRIS R8 Installation and Configuration Manual (CTUTILITY); loading DISCUTILITY from 1/4-inch or 1/2-inch-streamer tape is described in the IRIS R8 Operations Manual.

Help modules may be invoked at the program name and parameter prompts. DISCUTILITY then displays information about the input required. One of the following messages informs the user which type of tape controller, if any, is on the system.

```
QUARTER INCH TAPE AVAILABLE
HALF INCH TAPE AVAILABLE
NO TAPE AVAILABLE
```

2.1 INVOKING DISCUTILITY

To shutdown the system and invoke DISCUTILITY, at the IRIS System command prompt (#), enter

SHUTDOWN <CTRL-E>key<CTRL-E>DISCUTILITY

where key is the password assigned by the system manager (the default is X).

The program displays the following information:

```
DISCUTILITY VERSION n.n   DATED  mm-dd-yy
FOR POINT 4 LOTUS 700, 710 AND 730 DISC CONTROLLERS

- - - - N O T I C E - - - -
FIRST SURFACE OF REMOVABLE OR FIXED IN 9448 CMD DRIVE IS NUMBER 0.

ALL NUMBERS ARE OCTAL!

AT ANY TIME, YOU MAY ENTER:
    H          FOR HELP
    ESC        TO ABORT BACK TO "PROGRAM NAME:"
    CONTROL-S  TO PAUSE OUTPUT (HIT ANY OTHER CHARACTER TO RESUME)
    CONTROL-H  TO ERASE THE LAST CHARACTER INPUT (ON MOST CRT'S)

ESC MAY ALSO BE USED TO PRINT OUT THE CURRENT CYLINDER NUMBER WHILE
A PROGRAM IS RUNNING.  THEN ENTER X TO RESUME THE PROGRAM.

PROGRAM NAME:
```

where

n.n - revision number
mm-dd-yy - revision date

*or later

A program option is invoked by entering a character(s). A listing of the program options and command formats is displayed when H (help) is entered at the Program Name prompt. A screen similar to the following is then displayed:

```
PROGRAM NAME: H

 PROGRAM                        PURPOSE

 <F>ORMAT          - FORMAT DISC FOLLOWED BY 5-PASS ANALYZE TO DETECT AND
                     CHAIN ANY SECTORS WITH HARD ERRORS.
 <Q>UICK FORMAT    - FORMAT FOLLOWED BY 2-PASS ANALYZE.  THIS IS NOT AS
                     RELIABLE AS THE 5-PASS ANALYZE IN DETECTING BAD
                     SECTORS.
 <C>OPY            - COPY SOURCE DISC TO DESTINATION.
 <CON>VERT MARK3   - READS DATA FROM SOURCE IN MARK 3 DISC FORMAT AND
                     CONVERTS IT AND WRITES TO DESTINATION WHICH MUST BE
                     THE SAME DRIVE TYPE AND ALREADY BE IN LOTUS FORMAT.
                     REQUIRES LOTUS 710 DISC CONTROLLER SET TO
                     READ-REGARDLESS MODE.
 <V>ERIFY COPY     - VERIFIES IF THE SOURCE AND DESTINATION HAVE THE SAME
                     DATA.
 <I>PL             - STARTS AN IPL ON DRIVE UNIT NUMBER 0.
 <D>ISPLAY         - REDISPLAYS LAST DISC ERROR PRINTOUT.
 <S>AVE            - SAVE DISC TO STREAMER TAPE.
 <R>ESTORE         - RESTORE STREAMER TAPE TO DISC.
 <T>APE RETENSION  - RETENSION STREAMER TAPE.
 <STR>EAMER VERIFY- VERIFY DISC TO STREAMER TAPE.

    < > SHOWS SHORTHAND INPUT

 xxx INCH TAPE MODE

PROGRAM NAME:
```

where

xxx INCH - quarter inch, half inch, or no

user. The initial parameter prompts are the same for all program options except IPL (see Section 2.4) and Tape Retension (see Section 3.3). The parameter prompts are displayed in the following sequence:

1. Drive type
2. Drive unit number
3. Surface

A help module may be invoked at each of these prompts by entering H. Each help module explains and/or lists parameters that may be entered.

Additional parameters are required for the Copy, Verify, Convert, and Restore programs. These parameters are discussed in the sections describing those programs.

2.1.1 DRIVE TYPE

The first parameter prompt is for drive type. The associated Help module may be invoked as follows:

```
DRIVE TYPE: H
```

The module displays a list of the drives which are currently supported by the LOTUS 700/710/730 Disk Controllers. Information is arranged by manufacturer and includes:

- Drive code
- Mnemonic
- Type
- Capacity
- Number of cylinders
- Number of heads
- Number of sectors
- Model number

Either the drive code or the mnemonic may be entered. For example, assume an 80MB CDC drive, model 9762. The Help module list indicates that the code is 6 and the mnemonic is CDC80. Therefore either of the following responses is correct:

```
DRIVE TYPE: 6
DRIVE TYPE: CDC80
```

2.1.2 DRIVE UNIT NUMBER

After the drive type is entered, the program prompts for the drive number. The Help module may be invoked as follows:

```
DESTINATION -
DRIVE UNIT NUMBER: H
```

The Help module displays

```
DRIVE UNIT NUMBER CAN BE 0, 1, 2, OR 3

NOTE THAT ON A 9448 CMD OR LMU (LARK), ONE DRIVE HAS BOTH
FIXED AND REMOVABLE MEDIA.
```

The prompt for drive unit number is then repeated.

2.1.3 SURFACE

Some disk drives have removable cartridges; other drives have only fixed platters. The surface parameter entry required depends on the type of drive: CMD, LMU (LARK), or SMD.

2.1.3.1 CMD-Type Drive

A CMD-type drive has both removable cartridges and fixed platters. Possible parameter entries are described in Table 2-1.

TABLE 2-1. SURFACE PARAMETERS FOR CMD-TYPE DRIVES

Parameter	Description
R	Removable CMD cartridge
R,0	Removable (same as R)
F,0	First fixed surface, also the only fixed surface on a 32MB CMD
F,1	Second fixed surface on 64MB and 96MB CMDs
F,2	Third fixed surface on a 96MB, third and last fixed surfaces on a 64MB CMD
F,3	Fourth fixed surface on a 96MB CMD
F,4	Fifth and last fixed surface on a 96MB CMD
R,OPT	Removable plus selective cylinder option*
R,OPT,0	Same as R,OPT
F,OPT,n	Fixed surface n plus selective cylinder option* where n may be a number from 0 to 4

*Selective cylinder option is used to specify a group of cylinders as described in Section 2.1.4.

2.1.3.2 LMU-Type (LARK) Drive

An LMU-type drive has both a removable cartridge and a fixed platter. Surface parameter entries are described in Table 2-2.

TABLE 2-2. SURFACE PARAMETERS FOR LMU-TYPE DRIVES

Parameter	Description
R	Removable LMU (LARK) cartridge
F	Fixed platter
R,OPT	Removable cartridge plus selective cylinder option*
F,OPT	Fixed platter plus selective cylinder option*
*Selective cylinder option is used to specify a group of cylinders as described in Section 2.1.4.	

2.1.3.3 SMD-Type Drive

An SMD-type drive consists of one or more platters. An IRIS logical unit generally spans all the surfaces (except for CDC 9448-type drives). DISCUTILITY prompts

```
SURFACE(S):
```

The response should be ALL. Specific surfaces are only specified for special diagnostic purposes. Surface parameter entries are shown in Table 2-3.

TABLE 2-3. SURFACE PARAMETERS FOR SMD-TYPE DRIVES

Parameter	Description
ALL	All surfaces (standard input)
OPT,ALL	All surfaces plus the selective cylinder option*
n	One specific surface
n,n,...	Several specific surfaces
OPT,n	One specific surface plus the selective cylinder option*
OPT,n,n,...	Several specific surfaces plus the selective cylinder option*
where n - octal surface number; exact values depend on number of heads in the drive directory tables (type Help for values).	
*Selective cylinder option is used to specify a group of cylinders as described in Section 2.1.4.	

2.1.4 SELECTIVE CYLINDER OPTION

The Selective Cylinder Option may be used to copy, verify, or convert a source group to a destination group of cylinders of equal size.

The option is invoked when OPT is entered at the "removable or fixed surface" prompt. It may be used with the following programs:

- Copy disk-to-disk
- Verify disk-to-disk
- Convert MARK 3 disk to LOTUS disk
- Save disk-to-tape
- Restore tape-to-disk
- Streamer Verify disk-to-tape

The option displays the total number of cylinders on the source disk. A Help module may be invoked from a disk-to-disk program which will calculate the destination cylinder range based on the specified parameters and drive type (see Section 2.1.4.1). Various error messages are displayed if the wrong cylinder numbers are entered (see Section 2.1.4.2).

When the selective cylinder option is used from a disk-to-tape program, the total number of cylinders to be written to tape affects the number of tapes needed. However, the capacity of a tape depends on its size, the hardware, and the number of retries that are attempted because of bad cylinders on disk or bad tape media.

2.1.4.1 Selective Cylinder Option Help Module

A Help module may be invoked from any prompt of the selective cylinder option module. It displays the legal values for the particular prompt. After the Help module has displayed the cylinder range, the prompt is redisplayed.

Figure 2-1 is an example showing the use of the Selective Cylinder Help module (user input is underlined).

```
PROGRAM NAME: COPY

SOURCE -
   DRIVE TYPE: CDC32
   DRIVE UNIT NUMBER: 0
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # R,OPT

THERE ARE A TOTAL OF 1467 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: H
ENTER ANY STARTING CYLINDER NUMBER IN OCTAL FROM 0 TO 1461.

SELECTIVE CYLINDER OPTION: PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 27
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: H

ENTER ANY OCTAL NUMBER OF CYLINDERS TO USE FROM 1 TO 1433.

   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 53

DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE? N

DESTINATION -
   DRIVE UNIT NUMBER: 1
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # R

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: H

ENTER ANY STARTING CYLINDER NUMBER IN OCTAL FROM 0 TO 1407.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 77

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>
COPYING ...
CURRENT CYLINDER IN OCTAL = nnnn

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.

>>>>> GOOD COMPLETION (NO HARD ERRORS).

COPY DONE.
```

Figure 2-1. Using the Selective Cylinder Option Help Module

2.1.4.2 Selective Cylinder Option Error Messages

The selective cylinder option module displays appropriate error messages when the wrong starting cylinder or a total number of cylinders is entered that does not conform to the space available.

After each error message, all of the selective cylinder option parameters must be reentered. Figure 2-2 shows an example of these error messages (user input is underlined).

```
PROGRAM NAME: COPY

SOURCE -
   DRIVE TYPE: CDC32
   DRIVE UNIT NUMBER: 0
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # R,OPT

THERE ARE A TOTAL OF 1467 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 1462

***** ERROR:  STARTING CYL # TOO LARGE.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 1461
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 3

***** ERROR: STARTING CYL # PLUS NUMBER OF CYL'S TO DO IS TOO LARGE.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 1400
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 50

DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE? Y
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # F,0

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 1450

***** ERROR: STARTING CYL # PLUS NUMBER OF CYL'S TO DO IS TOO LARGE.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER:
```

Figure 2-2. Example of Selective Cylinder Option Error Messages

2.1.4.3 Copying Selected Cylinders from LU 0

It is possible to select specific cylinders to be copied by entering the OPT parameter at the surface prompt. This is a useful feature for backing up or restoring a single logical unit without disturbing the other logical units.

To copy a single logical unit, it is necessary to know the starting cylinder number and the total number of cylinders to be copied. In the example shown in Figure 2-3, LU 0 is to be copied from the removable to a fixed surface on a 9448 CMD drive. The starting cylinder number is zero and the total number of cylinders is 140 (octal).

```
PROGRAM NAME: C

SOURCE -
   DRIVE TYPE: CDC32
   DRIVE UNIT NUMBER: 0
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # R,OPT

THERE ARE A TOTAL OF 1467 CYLINDERS ON THIS DISC STARTING AT
CYLINDER 0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE
SECTOR CHAINING AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION: PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 140

DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE? Y
   ENTER R FOR REMOVABLE OR F,# FOR FIXED SURFACE # F,0

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>
COPYING ....

CURRENT CYLINDER IN OCTAL = nnnn

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.

>>>>> GOOD COMPLETION (NO HARD ERRORS).

COPY DONE.
```

Figure 2-3. Copying LU 0 from the System Disk

2.2 FORMAT AND QUICK FORMAT OPTIONS

The Format and Quick Format options format a disk and analyze the cylinders to check for bad media in the following sequence:

1. Prescans the disk.
2. Formats the disk.
3. Writes the headers of all sectors to disk.
4. Analyzes headers to make sure media has retained the data.
5. Performs surface analysis.
6. Accepts additional hard errors from operator.
7. Chains hard errors to alternate sectors.

Prescan reads the current headers of all sectors for existing hard errors. If any are found, they are placed in a log of hard errors that DISCUTILITY keeps in upper memory. Prescan may be disabled by setting bit 14 in the Program Options word (location 200) to 1. For example, it may be disabled the first time the disk is formatted using a LOTUS controller as there will be no hard errors recorded.

Format overwrites all information on the disk. New headers are written and analyzed to ensure they have not been corrupted. Any errors are recorded in the log of hard errors.

Several passes of the disk surfaces themselves are then made and analyzed. Each pass consists of writing a different data pattern out to disk, then reading it back to check for errors. On each pass, three read attempts are made before a sector is rejected as containing a hard error and recorded in the log of hard errors. The Format option makes five passes to analyze the disk while the Quick Format option makes only two passes and thus may not detect all media errors.

Once the system has performed all of its analyses, the operator is given an option to enter additional errors which are then added to the error log. This option to add hard errors may be disabled by setting bit 15 in the Program Options word to 1.

When all errors have been detected and entered in the error log, the hard errors are chained to alternate sectors and Format returns to the PROGRAM NAME prompt.

The program displays its progress on the terminal.

NOTE

The LOTUS 700/710/730 Disk Controller's error correction code (ECC) capability makes it unnecessary for the Format program to detect and chain every sector that contains subtle errors. ECC handles subtle one-bit and two-bit errors while Format detects and chains gross media errors.

For the Format and 5-pass analysis option, enter the following at the prompt PROGRAM NAME:

F

For the Quick Format option, enter the following at the prompt PROGRAM NAME:

Q

CAUTION

Quick Format is designed to be used by a technician in the field for hardware testing. It must be followed by the regular Format option before the disk is used to store data.

The following prompts are displayed for both the Format and Quick Format option:

Drive type
Drive unit number
Surface

Refer to Sections 2.1.1 through 2.1.4 for descriptions of these parameters.

WARNING!

When using the FORMAT option, enter ALL for SURFACE(S). If individual surface numbers are entered, the chaining set up on those surfaces will not be consistent with the chaining on the other surfaces. This can result in corrupted data on any of the surfaces. To correct the problem, FORMAT the disk and enter ALL for SURFACE(S).

When these parameters have been specified, DISCUTILITY displays the following prompt:

WHEN DRIVE IS READY, PRESS RETURN TO START:

When <RETURN> is pressed, the system starts the prescan if bit 14 in the Program Options word is set to 0; otherwise, the system starts formatting the disk. Figure 2-4 shows the messages displayed by each of the functions of the format option.

Before Prescan begins, it determines if the disk has previously been formatted on a LOTUS controller. If it has not, the following prompt is displayed:

DISK HAS NOT BEEN FORMATTED ON A LOTUS CONTROLLER.

PRESS RETURN TO CONTINUE.

To continue with the formatting portion, press <RETURN>. Prescan is not performed. To abort the entire Format option and return to the PROGRAM NAME prompt, press <ESC>.

Option	Message
Prescan	SCANNING DISK FOR ALTERNATE SECTORS ... CURRENT CYLINDER = nn
Format	FORMATTING ... CURRENT CYLINDER = nn
Analyze Headers	ANALYZING HEADERS CURRENT CYLINDER = nn
Surface Analysis	WRITING ... CURRENT CYLINDER = nn READING ... CURRENT CYLINDER = nn COMPLETED PASS p

Figure 2-4. Format Messages

When the last pass has been completed, the option to enter additional hard errors is offered if bit 15 in the Program Options word is set to 0. The following prompt is displayed:

```
THIS OPTION ALLOWS MARGINAL OR KNOWN BAD SECTORS TO BE RE-ASSIGNED.

TYPE 'Y' TO ENTER BAD SECTORS OR RETURN. _
```

If there are no bad sectors, press <RETURN>. If there are additional bad sectors to enter, enter Y.

If bit 15 in the Program Options word is set to 1, the option to enter additional hard errors is not displayed.

The system then prompts for the display mode for the error log:

```
ERROR LOG PRINTOUT & INSERTION IN DECIMAL? Y OR CR, CR INDICATES OCTAL
```

To have both the error log display and the hard error insertion be in decimal, enter Y. To use octal, press <RETURN>. The log is then displayed as shown in Section 2.2.1 and the hard errors are chained to alternate tracks. Chaining may take several minutes, depending on the quantity of hard errors.

If hard errors are to be inserted, the following message is displayed after the log has been displayed:

```
RULES FOR ENTERING BAD SECTORS.

ENTER SURFACE, TRACK, AND SECTOR FOR EVERY BAD AREA.


SOURCE -
   DRIVE TYPE:  type
   VALID SURFACES:  a THROUGH b
   VALID TRACKS: c THROUGH d
   VALID SECTORS: e THROUGH f

IF NO MORE ENTRIES HIT RETURN AT SURFACE PROMPT


SURFACE _
```

Enter the surface number in the mode selected (either decimal or octal). The track and sector are then requested. The next surface is requested. Continue to add the hard error information.

When finished, press <RETURN> at the SURFACE prompt. The revised error log is displayed as shown in Section 2.2.1 and the hard errors are chained. (Chaining may take several minutes, depending on the quantity of hard errors.)

2.2.1 HARD ERRORS LOG

When all passes have been completed and any hard errors have been entered by the operator, the program displays the log of hard errors. Figure 2-5a shows an example of a Format operation without hard errors.

```
TOTAL DISC ERRORS (IN OCTAL): 0 HARD,   0 SOFT.

>>>>> NO HARD ERRORS SO NO CHAINING OR FLAGGING NECESSARY.

FORMAT/ANALYZE GOOD COMPLETION.
```

Figure 2-5a. Example of a Format Status Report without Hard Errors

Figure 2-5b shows an example of a Format status report where hard errors were detected and successfully chained.

```
TOTAL DISC ERRORS (IN OCTAL): 3 HARD,  1 SOFT.

      TOTAL    DRIVE
      DISC     UNIT    SURFACE  CYLINDER  SECTOR
      ERRORS    #        #        #        #

HARD    17       0        12       14       12    IRRECOVERABLE DISC ERROR
        1        0        3        231      37    WAS CORRECTABLE BY RETRY
HARD    3        0        6        363      14    IRRECOVERABLE DISC ERROR
HARD    6        0        12       551      24    IRRECOVERABLE DISC ERROR

PRESS RETURN TO CONTINUE

>>>>> HARD ERROR CHAINING IN PROGRESS, PLEASE WAIT ...

>>>>> ALL HARD ERRORS WERE CHAINED TO ALTERNATE SECTORS SUCCESSFULLY.

FORMAT/ANALYZE GOOD COMPLETION.
```

Figure 2-5b. Example of a Format Status Report with Chained Hard Errors

2.2.2 ERROR MESSAGES

The error messages displayed by a program give a description of the error condition that was encountered.

```
WARNING.    CHAINING WAS NOT SUCCESSFUL
    DUE TO HARD ERROR SECTORS IN THE ALTERNATE TRACKS.
    POINT 4 RECOMMENDS YOU USE A DIFFERENT DISC FOR RELIABLE OPERATION.


WARNING.    CHAINING WAS NOT SUCCESSFUL
    DUE TO EXCESSIVE HARD ERRORS ON SURFACE 0.
    POINT 4 RECOMMENDS YOU USE A DIFFERENT DISC FOR RELIABLE OPERATION.


WARNING.    CHAINING WAS NOT SUCCESSFUL
    DUE TO BAD HEADER MEDIA PREVENTING CHAINING OR FLAGGING.
    POINT 4 RECOMMENDS YOU USE A DIFFERENT DISC FOR RELIABLE OPERATION.


ERROR: EXCESSIVE # OF ERRORS ENCOUNTERED.
    PROGRAM ABORTED BEFORE COMPLETION.
    CURRENT CYLINDER IN OCTAL = nnn ON DRIVE UNIT NO. 0.
```

where
nnn - cylinder number

Generally, a hardware problem in the disk controller, disk drive, or power supply is indicated if the program aborts because of excessive errors.

2.3 COPY, VERIFY, AND CONVERT PROGRAM OPTIONS

The parameters requested for the Copy, Verify, and Convert program options are the same as for the two Format programs (i.e., drive type, drive unit number, and surface). Please refer to Sections 2.1.1 through 2.1.4 for descriptions of the appropriate parameter entries. The additional prompts for destination parameters are discussed in the subsections describing each program.

Where possible, the source disk should be write protected.

2.3.1 COPY PROGRAM FUNCTIONS

The Copy program performs three disk operations on each sector:

1. Reads the source
2. Writes to the destination
3. Verifies the data at the destination

The source and destination may be on the same or different disk drives. If the drive is a CMD or LMU type, data may be copied to a different surface on the same drive.

2.3.1.1 Using the Copy Program

At the prompt, PROGRAM NAME, enter

C

Copy then prompts for the source drive parameters as follows:

```
SOURCE -
   DRIVE TYPE:
   DRIVE UNIT NUMBER:
```

This is followed by the surface prompt. Sections 2.1.1 through 2.1.4 contain information about the requested drive parameters.

After the source drive parameters have been entered, Copy prompts for the destination drive parameters as follows:

```
DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE?
```

Enter Y to specify the same drive unit. The program then prompts for cylinder parameters as described in Section 2.1.4.

Enter N to specify a different drive and the program asks

```
DESTINATION -
  DRIVE UNIT NUMBER:
```

This is followed by the surface prompt. The format of this prompt depends on the drive type. Section 2.1.2.3 contains information about the surface parameters requested.

2.3.1.2 Interpreting the Copy Program's Error Reports

The error reports generated by the Copy program may give an indication that a disk requires reformatting or that it should be replaced.

If the Copy program finds an error condition during its read operation, the error correction code (ECC) capability of the LOTUS hardware attempts to correct the read error. If the correction is successful, the Copy status report shows a soft error on the source. The corrected data is then written to the destination disk.

For example, in the reports for the two copy operations shown in Figures 2-6 and 2-7, the first was successful with a soft error reported for cylinder number 163. The second operation was unsuccessful because of a hard error on the same cylinder. This is no coincidence because the program was run in the following sequence:

1. Disk A copied to disk B (successful) as shown in Figure 2-6
2. Disk B copied to disk A (unsuccessful) as shown in Figure 2-7

The copy program reads from the source disk, writes to the destination disk, and then verifies the data.

During the first copy procedure (A to B), ECC corrected the data read from a bad cylinder on disk A. The data was then written to disk B and verified as correct.

During the second procedure, the copy program read the corrected data from disk B and wrote it to the bad sector on disk A. When the program attempted to verify the data it failed to do so in 15 tries (3 tries for each pass) and reported a hard error. The hardware data-verify command used by DISCUTILITY does no error correction, it only retries a sector for a maximum of 15 times.

If a disk has an unchained bad sector, ECC allows the data to be successfully copied off the disk. Copying onto the disk will generate a hard error. This tells the user that the disk should be reformatted or replaced before a serious loss of data occurs.

```
>>>>> GOOD COMPLETION NO HARD ERRORS
TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  1 SOFT.

   TOTAL   DRIVE
   DISC    UNIT   SURFACE   CYLINDER   SECTOR
   ERRORS   #        #          #        #

     2      2        1         163       7   WAS CORRECTABLE BY RETRY

PRESS RETURN TO CONTINUE

>>>>> GOOD COMPLETION NO HARD ERRORS

COPY DONE.
```

Figure 2-6. Example of a Successful Copy Operation

```
>>>>> OPERATION COMPLETE BUT UNSUCCESSFUL DUE TO 1 HARD ERROR(S).

TOTAL DISC ERRORS (IN OCTAL): 1 HARD,  1 SOFT.

     TOTAL   DRIVE
     DISC    UNIT   SURFACE   CYLINDER   SECTOR
     ERRORS   #        #          #        #

HARD   17      2        1         163       7   IRRECOVERABLE DISC ERROR
       4       2        1         164       7   WAS CORRECTABLE BY RETRY

PRESS RETURN TO CONTINUE

>>>>> OPERATION COMPLETE BUT UNSUCCESSFUL DUE TO 1 HARD ERRORS

COPY DONE.
```

Figure 2-7. Example of an Unsuccessful Copy Operation

2.3.2 VERIFY PROGRAM FUNCTIONS

Verify performs a disk read from the specified source and destination disks into two separate memory buffers. It then does a word-for-word compare.

At the prompt, PROGRAM NAME, enter

V

Verify then asks for the source drive parameters. After these parameters have been entered, Verify prompts for the destination drive:

```
DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE?
```

Enter Y to specify the same drive unit. Cylinder parameters must then be specified (see Section 2.1.4).

Enter N and DISCUTILITY prompts for the destination drive number:

```
DESTINATION -
   DRIVE UNIT NUMBER:
```

Enter the desired drive unit number. DISCUTILITY prompts for the surface type as described in 2.1.3.

If the Verify program finds a discrepancy between the source and destination data, it aborts. Verify may then be restarted using the Selective Cylinder Option. For example, Figure 2-8 shows that Verify aborted at cylinder 674. The program may be restarted at cylinder 675.

Figure 2-9 shows a successful completion. The Verify status report repeats the completion message after the error count is given. This assures that the completion message has not scrolled off the screen because of a large number of error count messages.

Some installations prefer to verify after every copy for maximum security. POINT 4 recommends that Verify be done at least periodically (e.g., once a week) as a check that hardware, software, and backups are reliable.

```
SOURCE -
   DRIVE TYPE: CDC40
   DRIVE UNIT NUMBER: 0
   SURFACE(S): ALL

DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE: N

DESTINATION -
   DRIVE UNIT NUMBER: 1
   SURFACE(S): ALL

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>
VERIFYING SOURCE AGAINST DESTINATION ...

OPERATION TERMINATED

>>>>> DISCREPANCY FOUND BETWEEN SOURCE AND DESTINATION
CURRENT CYLINDER IN OCTAL = 674 ON DRIVE UNIT NUMBER 0

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,   0 SOFT.

>>>>> DISCREPANCY FOUND BETWEEN SOURCE AND DESTINATION
CURRENT CYLINDER IN OCTAL = 674 ON DRIVE UNIT NUMBER 0
```

Figure 2-8. Example of an Aborted Verify Status Report

```
SOURCE -
   DRIVE TYPE: CDC40
   DRIVE UNIT NUMBER: 0
   SURFACE(S): ALL

DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE: N

DESTINATION -
   DRIVE UNIT NUMBER: 1
   SURFACE(S): ALL

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>
VERIFYING SOURCE AGAINST DESTINATION ...
CURRENT CYLINDER = nnnn

>>>>>  SOURCE AND DESTINATION CONTENTS ARE VERIFIED TO BE THE SAME

       GOOD COMPLETION (NO HARD ERRORS)

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.

>>>>>  SOURCE AND DESTINATION CONTENTS ARE VERIFIED TO BE THE SAME

       GOOD COMPLETION (NO HARD ERRORS)

VERIFY DONE.
```

Figure 2-9. Example of a Successful Verify Status Report

2.3.3 CONVERT PROGRAM

The Convert program provides a fast and reliable method for transferring large amounts of data from a MARK 3 system to a MARK 5/9 system. The MARK 5/9 system must have a LOTUS 710 or 730 Disk Controller and the same type of drive as the MARK 3 system.

The Convert program performs two functions: it moves a nonzero logical unit from a MARK 3 to a MARK 5/9 system and it converts the data from MARK 3 to LOTUS format. Convert performs these functions in the following sequence:

- Reads the source in Read-Regardless mode
- Performs a CRC check to ensure data integrity
- Writes to the destination
- Verifies the data

2.3.3.1 Convert Program Requirements

The Convert program cannot be run unless the following requirements are met:

- The MARK 5/9 system must have a LOTUS 710 or 730 Disk Controller which is set to Read-Regardless mode (i.e., the RB/RR switch on the controller board must be set to the RR position as described in the LOTUS Controllers Manual).
- Source and destination drives must be of the same type.
- The source disk must be in MARK 3 format.
- The destination disk must be in LOTUS format (i.e., formatted by the Format program described in Section 2.2).

2.3.3.2 Using the Convert Program

At the prompt, PROGRAM NAME, enter

CON

The program first prompts for the source drive parameters (drive type, unit number, and surface type). Convert then prompts for the destination as follows:

```
DESTINATION -
   IS DESTINATION DRIVE UNIT SAME AS SOURCE?
```

Enter N to specify the destination drive unit number. The program then prompts

```
DRIVE UNIT NUMBER:
```

Enter the appropriate number (0 to 3) and the program prompts for surface type (see Section 2.1.3).

If the program aborts, the cause may be:

- The source is not in MARK 3 format.
- The disk controller is a LOTUS 700 and not a LOTUS 710 or 730.
- The disk controller switch is set to read block mode (RB) instead of read regardless (RR).

Figure 2-10 shows a status report of an aborted Convert procedure. Note that the status report displays three messages listing the most common reasons for a Convert program failure.

```
PROGRAM NAME: CON

NOTE: CONVERT REQUIRES A LOTUS 710 DISC CONTROLLER IN
  READ-REGARDLESS MODE
  THE SOURCE SHOULD BE IN MARK 3 FORMAT.
  THE DEST MUST BE THE SAME DRIVE TYPE IN LOTUS FORMAT.


SOURCE -
   DRIVE TYPE: PRIAM70
DRIVE UNIT NUMBER: 1
   SURFACE(S): ALL

DESTINATION -
   IS DESTINATION DRIVE UNIT THE SAME AS SOURCE? N

DESTINATION -
   DRIVE UNIT NUMBER: 0
   SURFACE(S): ALL

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>

CONVERTING MARK3 ...


***** ERROR:
EVERY SECTOR OF FIRST SOURCE TRACK GIVES HARD ERRORS.

PLEASE CHECK THAT:
  THE SOURCE WAS LAST FORMATTED AND USED ON A MARK 3 SYSTEM.
  THE DISC CONTROLLER IS A LOTUS 710 AND NOT A LOTUS 700.
  THE DISC CONTROLLER SWITCH IS SET TO RR AND NOT RB.

!!!!! PROGRAM ABORTED.
```

Figure 2-10. Example of an Unsuccessful Convert Procedure

2.4 IPL PROGRAM OPTION

DISCUTILITY requires that the operating system be shut down. However, it is possible to re-IPL the system directly from DISCUTILITY. The procedure is as follows:

1. At the prompt, PROGRAM NAME, enter

   I

   or

   IPL

   DISCUTILITY then displays the following message:

   ```
   IPL INITIATED ...


   WHEN DRIVE IS READY, PRESS RETURN TO START
   ```

2. Press <RETURN>. Control passes to the IPL sequence and the system displays the IPL option prompt

   ```
   PRESS RETURN
   ```

3. Enter 1, 2, 3 or press <RETURN> to initiate the desired IPL option. Refer to the IRIS R8 Installation and Configuration Manual for a description of the various IPL options.

   IRIS identifies itself with its name, revision number, and a copyright message.

The user may then continue with the IPL procedure as described in the IRIS R8 Operations Manual.

If <ESC> is pressed after the IPL program is invoked, the following message is displayed:

```
!!!!! ABORT REQUESTED VIA ESC KEY.
CURRENT CYLINDER IN OCTAL = n ON DRIVE UNIT NUMBER m.
```

2.5 DISPLAY PROGRAM

The Display program redisplays the last error report. Display can only be used after a program such as Format, Copy, or Restore has been run. Display should not be run as the first program option in a DISCUTILITY procedure because the error log is not retained once the system has been IPLed.

Running the Display program is particularly useful if the error report has scrolled off the screen or after ESC has been used to abort a Format, Copy, or Restore operation. The report displayed by the program shows any errors detected before ESC was pressed.

At the prompt, PROGRAM NAME, enter

D

The last error report is then displayed.

Section 3
STREAMER TAPE PROGRAM OPTIONS

This section describes DISCUTILITY's streamer tape program options which include Save, Restore, Tape Retension, and Streamer Verify.

3.1 SAVE PROGRAM

The Save program copies from disk to tape in three steps:

1. Reads from disk and performs error corrections via the ECC capability of the LOTUS Disk Controller.

2. Writes to tape. If the tape medium is bad, the program tries up to 16 times to rewrite the data.

3. Optional verification of the data. A three-word checksum of the tape and of the disk is performed. The checksums are compared and then displayed as described in Section 3.1.3. After a Save operation, the three-word checksum should be written on the external tape label. On a subsequent Verify after a Restore, the same three-word checksum should be displayed. If the checksum is not the same, both the data and the hardware are suspect.

<ESC> may be used to abort the program.

3.1.1 SOURCE PARAMETER PROMPTS

The initial prompts for the source parameters and messages are the same as for the disk-to-disk Copy program:

```
SOURCE -
   DRIVE TYPE:
   DRIVE UNIT NUMBER:
   SURFACE(S):
```

Refer to Sections 2.1.1 through 2.1.4 for information on the required parameters.

3.1.2 TAPE LABELS

The Save program has additional prompts for the creation date and a descriptor as follows:

```
KEY IN CREATION DATE MM-DD-YY:
DESCRIPTOR:
```

The descriptor is a short description of the contents of the tape not to exceed 57 characters.

The creation date and descriptor are used for the following:

- Tape label
- Tape verification for the Restore and Streamer Verify programs

The save program writes a tape label including the date, descriptor, and reel number at the beginning of each tape. When all the specified cylinders have been written to tape, the program writes a trailer including an end-of-file (EOF) notation.

One tape may not have enough capacity to hold all the cylinders to be copied from disk. The capacity of a tape depends on its size, the type of hardware being used, and the number of retries written to tape. If an end-of-reel mark is detected before all the specified cylinders have been written to tape, the program writes the trailer with an end-of-reel (EOR) notation. It then prompts the user to remove the current cartridge and insert a new one with the following messages:

```
REMOVE TAPE & LABEL AS FOLLOWS:
CREATION DATE mm-dd-yy SEQUENCE 1
DESCRIPTOR:  SYSTEM A FINANCIAL DATA
MOUNT TAPE 2 AND PRESS RETURN
```

where

mm-dd-yy - date
SYSTEM A FINANCIAL DATA - descriptor

3.1.3 OPTIONAL VERIFICATION OF DATA

The Verify stage of the Save or Restore program is optional but POINT 4 recommends that it be used for every Save or Restore operation to ensure that the data was copied correctly.

After the copy process is completed, the program displays tape labeling instructions. This is followed by the optional verification stage. The program prompts

```
VERIFY TAPE AGAINST DISC?
```

Enter N if verification is not desired. Enter Y to initiate the verification procedure. The program then checksums the tape and displays the result in the following format:

```
CHECKSUMMING TAPE
CHECKSUMS= xxxxxx xxxxx xxxxxx
  BLOCK COUNT= nnnnnn
```

The program then checksums the disk and displays the result in the following format:

```
CHECKSUMMING DISC
CURRENT CYLINDER IN OCTAL = nnn
CHECKSUMS= xxxxxx xxxxx xxxxxx
  BLOCK COUNT= nnnnn
```

If the data on tape is the same as on disk, the program displays the following:

```
GOOD VERIFY - RECORD CHECKSUMS FOR FUTURE REFERENCE
```

If the checksums do not match, an error message is displayed. Perform another Save operation and repeat the verification process.

NOTE

If the checksums do not match, the tape may be bad or a problem may have developed in the tape hardware subsystem.

3.1.4 ERROR MESSAGES

If a 1/4-inch tape was not inserted, was not inserted properly, or is removed before any stage of the program is completed, the program displays the following error message:

```
CARTRIDGE NOT IN PLACE
```

If a Save operation requires multiple tapes, wait for the program to request a new tape before removing the current one.

If the tape is write protected, the program displays the following message:

```
TAPE IS WRITE PROTECTED. HIT 'C' WHEN WRITE ENABLED
```

3.1.5 EXAMPLES OF USER INPUT FOR THE SAVE PROGRAM

The Save program is fully interactive. It prompts the user for the parameters required and a help module may be invoked at any prompt.

An example of a Save operation using a single 1/4-inch tape is shown in Figure 3-1. Figure 3-2 shows an example of a Save operation using multiple 1/4-inch tapes. User input is underlined in both examples.

The dialogue for a 1/2-inch tape Save operation is the same as for a 1/4-inch tape with one exception. Instead of displaying the tape status upon a good completion, the following message is displayed:

```
NO TAPE ERRORS.
```

```
PROGRAM NAME: S

   DRIVE TYPE: 124
   SURFACE(S): OPT,ALL

THERE ARE A TOTAL OF 1115 CYLINDERS ON THIS DISC STARTING AT CYLINDER 0.
THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING AND ARE
NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 16

KEY IN CREATION DATE MM-DD-YY     11-21-83
DESCRIPTOR: TIME = 10:19

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>
STREAMING TO TAPE
CURRENT CYLINDER IN OCTAL = 15

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.
TAPE STATUS:
   NUMBER OF BLOCKS REWRITTEN: 0
   NUMBER OF EXTENDED GAPS: 0

COPY DONE.

REMOVE TAPE & LABEL AS FOLLOWS:
CREATION DATE 11-21-83 SEQUENCE 1 OF 1
DESCRIPTOR: TIME = 10:19

VERIFY TAPE AGAINST DISC? Y

CHECKSUMMING TAPE
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

CHECKSUMMING DISC
CURRENT CYLINDER IN OCTAL = 15
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

GOOD VERIFY - RECORD CHECKSUMS FOR FUTURE REFERENCE
```

Figure 3-1. Single-Tape Save Operation

```
PROGRAM NAME: S

   DRIVE TYPE: 124
   SURFACE(S): OPT,ALL

THERE ARE A TOTAL OF 1115 CYLINDERS ON THIS DISC STARTING AT CYLINDER 0.
THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING AND ARE
NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 300

KEY IN CREATION DATE MM-DD-YY    11-21-83
DESCRIPTOR: 10:39

WHEN DRIVE IS READY, PRESS RETURN TO START:
STREAMING TO TAPE
CURRENT CYLINDER IN OCTAL = 0

REMOVE TAPE & LABEL AS FOLLOWS:
CREATION DATE 11-21-83 SEQUENCE 1
DESCRIPTOR: 10:39
MOUNT TAPE 2 AND PRESS RETURN
TAPE IS WRITE PROTECTED. HIT 'C' WHEN WRITE ENABLED C
STREAMING TO TAPE
CURRENT CYLINDER IN OCTAL = 277

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.
TAPE STATUS:
   NUMBER OF BLOCKS REWRITTEN: 0
   NUMBER OF EXTENDED GAPS: 0

COPY DONE.

REMOVE TAPE & LABEL AS FOLLOWS:
CREATION DATE 11-21-83 SEQUENCE 2 OF 2
DESCRIPTOR: 10:39

VERIFY TAPE AGAINST DISC? Y
MOUNT TAPE 1 AND PRESS RETURN
```

Figure 3-2. Multiple-Tape Save Operation

3.2 RESTORE PROGRAM

The Restore program copies (i.e., streams) tape-to-disk. It also performs the following functions:

- Compares the destination parameters with the original source parameters entered when the tape was created
- Optionally checksums the destination data to the data on tape

<ESC> may be used to abort the program.

3.2.1 DESTINATION PARAMETERS

After the program name or code is entered, the destination (i.e., the disk) parameters are requested in the following sequence:

```
DESTINATION -
   DRIVE TYPE:

DESTINATION -
   DRIVE UNIT NUMBER:
   SURFACE(S):
```

Refer to Sections 2.1.1 through 2.1.4 for information on the required parameters.

If the selective cylinder option is specified by entering OPT at the surface(s) prompt, the program prompts for those parameters. Refer to Section 2.1.4 for a description of the optional cylinder parameters.

The program then asks whether the user wishes to verify the descriptor and date entered at the time the tape was created

```
IF VALIDATION OF DESCRIPTOR & DATE IS NOT DESIRED, ENTER A '!'
```

If ! is entered, the program will not ask the user to enter the date and descriptor and the tape is not validated.

Press <RETURN> to validate the tape label (i.e., date and descriptor). The program then prompts for the date:

```
KEY IN CREATION DATE MM-DD-YY:
```

The date must be entered exactly as it was entered for the Save operation when the tape was created. This should correspond to the date recorded on the tape cartridge label.

After the date has been entered, DISCUTILITY prompts

```
DESCRIPTOR:
```

The descriptor must be entered exactly as it was entered for the Save operation when the tape was created. It should correspond to the descriptor recorded on the tape cartridge label.

The program compares the information entered with the information encoded in an internal tape label. If the label information entered does not correspond to the information on the internal label, an appropriate error message is displayed

```
THE FOLLOWING TAPE LABEL IS IN ERROR:
    VOLUME SEQUENCE #: x
    CREATION DATE: xx-xx-xx
    DESCRIPTOR: xxx xxxx xxx...

THE CORRECT VOLUME LABEL MUST BE AS FOLLOWS:
    VOLUME SEQUENCE #: n
    CREATION DATE: nn-nn-nn
    DESCRIPTOR: nnnn nnn nnnn...

TO CONTINUE WITH THIS TAPE ENTER A '!'
```

If the user wishes to proceed despite the discrepancy, ! should be entered. Otherwise, the procedure should be aborted by pressing <ESC>.

3.2.2 OPTIONAL DATA VERIFICATION

The verification function of the Restore program is optional but POINT 4 recommends that it be used after every Restore operation to ensure that the data was copied correctly. Refer to Section 3.1.3 for a description of the Verify function.

3.2.3 ERROR MESSAGES

If the cylinder parameters entered for the destination differ from those entered when the tape was created, the program displays an error message and displays both the original parameters and those input for the Restore program:

```
THE DISC PARAMETERS USED WHEN THIS TAPE WAS CREATED DISAGREE
WITH THOSE YOU HAVE SPECIFIED FOR THIS OPERATION:

                        WHEN CREATED          YOUR INPUT

STARTING CYLINDER:        nnnnnn  DIFFERS FROM  nnnnnn
NO. OF CYLINDERS:         nnnnnn                nnnnnn
DRIVE TYPE:               nnnnnn                nnnnnn
NO. OF HEADS:             nnnnnn                nnnnnn
NO. OF SECTORS/TRACK:     nnnnnn                nnnnnn
NO. CYLS ON THIS DISC:    nnnnnn                nnnnnn
DISCUTILITY USED:         LOTUS                 LOTUS

TO CONTINUE THIS OPERATION USING YOUR INPUT, ENTER A '!'
```

The program allows the user to continue the Restore operation even when the original parameters do not agree with the ones entered for the program. For example, this option may be used to copy data to a different location on disk.

At the end of the Restore operation, the program displays a status report which includes a hard and soft error count for the disk. For 1/4-inch tape, the status report includes read errors and the number of buffer underruns. For example:

```
>>>>> GOOD COMPLETION

TOTAL DISC ERRORS (IN OCTAL): n  HARD;  n  SOFT.
TAPE STATUS:
   NUMBER OF SOFT READ ERRORS: n
   NUMBER OF READ BUFFER UNDERRUNS: n
```

For a 1/2-inch tape, the status report includes the hard and soft error count for the disk but not for the tape. Upon a good completion, the tape status is reported, as follows:

```
NO TAPE ERRORS
```

If tape errors were found, the following message is displayed:

```
TAPE STATUS:
   PARITY ERRORS
```

3.2.4 EXAMPLES OF USING THE RESTORE PROGRAM

Figure 3-3 shows an example of a simple 1/4-inch tape Restore operation. User input is underlined. Notice that no label validation is specified. This stops the program from checking the tape label but the label information is still displayed.

The procedure for a 1/2-inch tape Restore operation is identical except for the tape status messages.

```
PROGRAM NAME: R

DESTINATION
   DRIVE TYPE: 124

DESTINATION -
   DRIVE UNIT NUMBER: 0
SURFACE(S): OPT.ALL

THERE ARE A TOTAL OF 1115 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 16
 IF VALIDATION OF DESCRIPTOR & DATE IS NOT DESIRED, ENTER A '!' !

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>

THE TAPE BEING PROCESSED CONTAINS THE FOLLOWING LABEL:

VOLUME SEQUENCE #: 1
CREATION DATE 11-21-83
DESCRIPTOR: TIME = 10:19
STREAMING FROM TAPE

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.
TAPE STATUS:
   NUMBER OF SOFT READ ERRORS: 0
   NUMBER OF READ BUFFER UNDERRUNS: 0

VERIFY TAPE AGAINST DISC? Y

CHECKSUMMING TAPE
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

CHECKSUMMING DISC
CURRENT CYLINDER IN OCTAL = 15
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

GOOD VERIFY - RECORD CHECKSUMS FOR FUTURE REFERENCE
```

Figure 3-3. Example of a Simple Restore Operation

Figure 3-4 shows an example of an error in the drive type parameter entered. Note that the Restore program displays the different parameters for number of heads, sectors/track, and cylinders.

Under IRIS 8.2A or earlier, a logical unit that is to be INSTALLed after the Restore operation should not show any discrepancy in the number of heads and sectors/tracks.

Under IRIS 8.2B or later, the number of heads and sectors/tracks may show discrepancies if CLEANUPX was run on the logical unit before a Save operation.

```
PROGRAM NAME: R

DESTINATION
   DRIVE TYPE: 121

DESTINATION -
   DRIVE UNIT NUMBER: 0
   SURFACE(S): OPT,ALL

THERE ARE A TOTAL OF 1015 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 16
 IF VALIDATION OF DESCRIPTOR & DATE IS NOT DESIRED, ENTER A '!' 1

WHEN DRIVE IS READY, PRESS RETURN TO START:

THE DISC PARAMETERS USED WHEN THIS TAPE WAS CREATED DISAGREE WITH
THOSE YOU HAVE SPECIFIED FOR THIS OPERATION:

                        WHEN CREATED                YOUR INPUT

   STARTING CYLINDER:      00000                       00000
   NO. OF CYLINDERS:       00016                       00016
   DRIVE TYPE:             00124  DIFFERS FROM         00121
   NO. OF HEADS:           00007  DIFFERS FROM         00005
   NO. OF SECTORS/TRACK:   00040  DIFFERS FROM         00026
   NO. CYLS ON THIS DISC:  01115  DIFFERS FROM         01015
   DISCUTILITY USED:       LOTUS                       LOTUS

TO CONTINUE THIS OPERATION USING YOUR INPUT.  ENTER A '!' 1
```

Figure 3-4. Example of a Restore Program Parameter Error

The destination parameter prompts may be used to copy data to a different location on disk. Figure 3-5 illustrates such a procedure. User input is underlined.

```
PROGRAM NAME: R

DESTINATION
   DRIVE TYPE: 124

DESTINATION -
   DRIVE UNIT NUMBER: 0
   SURFACE(S): OPT,ALL

THERE ARE A TOTAL OF 1115 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 200
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 16
 IF VALIDATION OF DESCRIPTOR & DATE IS NOT DESIRED, ENTER A '!' 1

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>

THE DISC PARAMETERS USED WHEN THIS TAPE WAS CREATED DISAGREE WITH
THOSE YOU HAVE SPECIFIED FOR THIS OPERATION:

                        WHEN CREATED          YOUR INPUT

   STARTING CYLINDER:      00000  DIFFERS FROM   00200
   NO. OF CYLINDERS:       00016                 00016
   DRIVE TYPE:             00124                 00124
   NO. OF HEADS:           00007                 00007
   NO. OF SECTORS/TRACK:   00040                 00040
   NO. CYLS ON THIS DISC:  01115                 01115
   DISCUTILITY USED:       LOTUS                 LOTUS

TO CONTINUE THIS OPERATION USING YOUR INPUT.  ENTER A '!' 1
STREAMING FROM TAPE
CURRENT CYLINDER IN OCTAL = 200

>>>>> GOOD COMPLETION (NO HARD ERRORS).

TOTAL DISC ERRORS (IN OCTAL): 0 HARD,  0 SOFT.
TAPE STATUS:
   NUMBER OF SOFT READ ERRORS: 0
   NUMBER OF READ BUFFER UNDERRUNS: 0

VERIFY TAPE AGAINST DISC? Y

CHECKSUMMING TAPE
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

CHECKSUMMING DISC
CURRENT CYLINDER IN OCTAL = 200
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100
```

Figure 3-5. Example of Restoring Data to a Different Location on Disk

3.3 TAPE RETENSION PROGRAM

The Tape Retension program functions differently for 1/4-inch and 1/2-inch tape. For 1/4-inch tape, the program winds the tape forward to the end and then rewinds it. Retensioning the tape helps maintain reliable operation. The program should be used every time a particular tape cartridge is used. The Tape Retension program takes little time and can prevent tape malfunction.

For a 1/2-inch tape, the program merely rewinds the tapes. It does not wind the tape forward.

After entering the program name or code, the following prompt is displayed:

```
WHEN DRIVE IS READY, PRESS RETURN TO START
```

Press <RETURN> to start the procedure.

3.4 STREAMER VERIFY PROGRAM

The Streamer Verify program performs the same function as the Verify option of the Save and Restore program. It may be used to verify data when no Restore or Save operation is required. However, the checksums will not correspond to those generated by the Verify option of a Restore or Save if an IPL was performed or the disk was reformatted.

The destination drive parameters must be entered. The program then reads the tape and checksums the data. The specified surfaces are then read from disk and checksummed. Figure 3-6 shows an example of using the Streamer Verify program (user input is underlined). Note that the date entered does not correspond to that on the tape label. After noting the discrepancy, the user decided to proceed anyway by entering "!".

<ESC> may be used to abort the program.

```
PROGRAM NAME: STR

SOURCE -
   DRIVE TYPE: 124
   DRIVE UNIT NUMBER: 0
   SURFACE(S): OPT,ALL

THERE ARE A TOTAL OF 1115 CYLINDERS ON THIS DISC STARTING AT CYLINDER
0.  THE LAST 5 CYLINDERS ARE RESERVED FOR ALTERNATE SECTOR CHAINING
AND ARE NOT AVAILABLE TO COPY.

SELECTIVE CYLINDER OPTION:  PLEASE ENTER -
   (OCTAL) STARTING CYLINDER NUMBER: 0
   TOTAL (OCTAL) NUMBER OF CYLINDERS TO USE: 16
IF VALIDATION OF DESCRIPTOR & DATE IS NOT DESIRED, ENTER A '!'

KEY IN CREATION DATE MM-DD-YY   11-20-83
DESCRIPTOR: TIME = 10:19

WHEN DRIVE IS READY, PRESS RETURN TO START: <RETURN>

TAPE IS INCORRECT & CONTAINS THE FOLLOWING LABEL:

VOLUME SEQUENCE #: 1
CREATION DATE 11-21-83
DESCRIPTOR: TIME = 10:19

TO CONTINUE WITH THIS TAPE, ENTER A ! (EXCLAMATION POINT) !

CHECKSUMMING TAPE
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

CHECKSUMMING DISC
CURRENT CYLINDER IN OCTAL = 15
CHECKSUMS= 117524 64337 172674
   BLOCK COUNT= 06100

GOOD VERIFY - RECORD CHECKSUMS FOR FUTURE REFERENCE
```

Figure 3-6. Example of Using the Streamer Verify Program

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