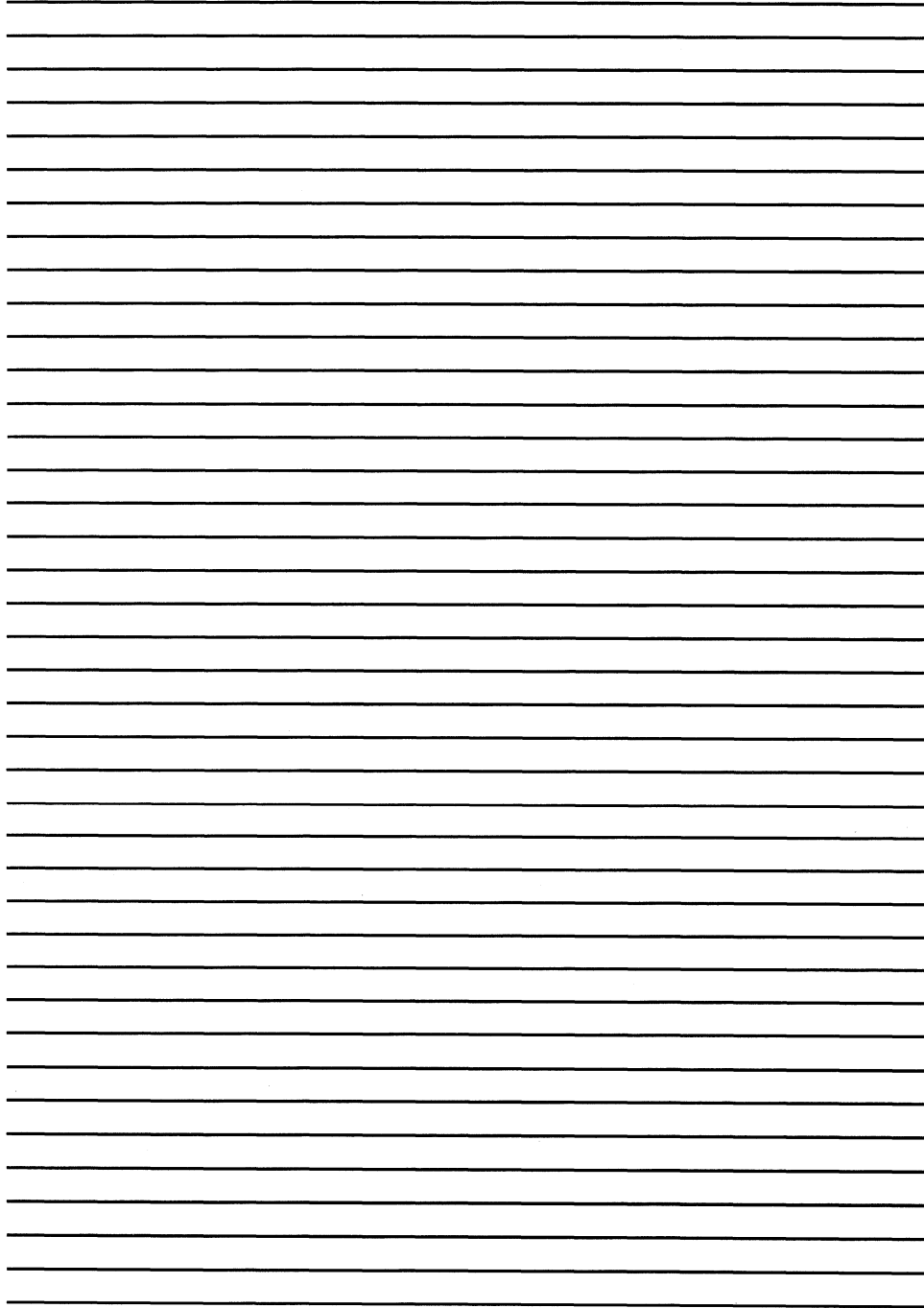


# IRIS R8

*LCM  
Installation*



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**IRIS R8  
LCM INSTALLATION  
DOCUMENT**

**Revision 06**

## NOTICE

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

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# REVISION RECORD

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01	Initial release of tech memo	07/02/82
02	Tech memo reissued	11/08/82
03	Tech memo reissued (R8.1)	01/31/83
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05	Update package for tech memo - incorporates R8.2 changes	10/01/83
06	Complete revision (in document format) - incorporates changes for R8.2C and MARK 9	07/10/84

# LIST OF EFFECTIVE PAGES

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Changes, additions, and deletions to information in this manual are indicated by vertical bars in the margins or by a dot near the page number if the entire page is affected. A vertical bar by the page number indicates pagination rather than content has changed. The effective revision for each page is shown below.

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# PREFACE

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This document describes the LOTUS Cache Memory (LCM), gives recommendations for its configuration under IRIS R8.2C, and provides an installation procedure.

Related manuals include:

<u>Title</u>	<u>Pub. Number</u>
IRIS Installation/Configuration Manual	SM-030-0009
IRIS Operations Manual	SM-030-0010
LCM Hardware Manual	HM-160-0026





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# Section 1

## INTRODUCTION

---

### 1.1 GENERAL DESCRIPTION

The LOTUS Cache Memory (LCM) is a solid state memory device which is used for storage of commonly used disc blocks. Where an LCM is used, swapping and disc transfers are eliminated or significantly reduced. Accessing data from disc requires two time delays: seek and latency. When many disc accesses are made, the effect is to slow system throughput and response time. The LCM is designed to allow frequently-required disc blocks to be accessed with no seek and latency time, thus increasing overall system performance particularly on a system which supports a large number of users.

The IRIS Operating System is generally configured so that a number of user partitions reside in memory. A user partition is an area where the user program (active file) is held during execution. If there are more system users than partitions, then each time a partition is required by a user, two disc accesses must be made: one to copy the current program out to disc and one to bring the new program into the memory partition.

Discsubs are subroutines which are called regularly and so must be easily accessible. The system manager may define some discsubs as memory resident. No access time is required when a memory-resident discsub is called because it is executed in place. When a non-memory-resident discsub is called, it is read from the Discsubs file on disc into main memory.

Therefore, when active files and frequently-used non-memory-resident discsubs are made LCM resident, disc transfers are eliminated, resulting in better performance.

The LCM is designed to allow maximum flexibility. The LCM driver contains a range table which can be configured to include the most frequently used processors, programs, and files.

The LCM consists of the following software components:

- \$LCM - LCM I/O driver
- LCMC - BASIC program for configuring the LCM; it uses three modules (LCMC.1, LCMC.2, and LCMC.3) to store configuration information in a formatted file (LCMRESIDENT)

- LCMACTIVATE - processor that uses the LCMRESIDENT file to allocate and build the LCM Range Table; it initializes the LCM
- LCMDIAG1.3 - diagnostic program

## 1.2 LOTUS CACHE MEMORY THEORY OF OPERATION

The LOTUS Cache Memory (LCM) uses two methods of operation to improve system performance: one is static and the other is dynamic.

- Static allocation - Using the LCMC program, the system manager specifies the most frequently used files and disc blocks to be contained in the LCM Range Table. The memory-resident, sorted range table contains the real disc address (RDA) ranges of these disc blocks and their corresponding LCM block numbers.

Active files for as many interactive ports (including phantom ports) as possible should be statically allocated on a POINT 4 MARK 5 Computer System. For most MARK 9 Computer Systems, active files should not be included. However, on a MARK 9 system with a large number of users and a large LCM, the LCM can be used for active files as well as for static allocation and as a dynamic buffer pool. Thus, the MARK 9 map reduces most of the swapping overhead and the LCM can be used to handle the rest. Assigning active files to the LCM is only advantageous in the largest systems where all the ports are in use all the time.

An illustration of the LCM Range Table format and explanations of its fields are given in Appendix A.

- Dynamic allocation - Any LCM block which is not statically allocated becomes part of the LCM-resident buffer pool. Disc blocks that are pushed out of the memory-resident buffer pool are written to the LCM buffer pool, effectively extending the memory-resident buffer pool to include part of the LCM. Minimal overhead is achieved by the LCM buffer pool's hashing algorithm which allows a maximum of one additional LCM transfer to locate a specified block.

Apart from the obvious throughput enhancement, the LCM buffer pool approach is completely transparent to the user. Once the range table is set up for static usage, the remaining LCM buffer pool is automatically managed by an LRU (least recently used) algorithm.

When a dirty block is written to the LCM buffer pool, it is also written to disc so there are never any dirty pages on the LCM.

When a disc transfer request is received, the system conducts up to three searches in the following sequence:

1. Searches the memory-resident buffer pool
2. Searches the LCM Range Table
3. Searches the LCM-resident buffer pool

If the disc block is found on the LCM, it is transferred from the LCM to memory and a disc transfer is saved. The time used for the three search operations is negligible compared to the disc access time saved.

### **1.3 USER INTERFACE**

An IRIS system equipped with an LCM is completely transparent to the user. However, the improvement in system performance will be obvious with significantly higher throughput and faster response time. If an LCM is removed from the system after it has been in use for some time, the difference in performance will be especially noticeable.

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## Section 2

# LCM DRIVER

---

### 2.1 LCM DRIVER FUNCTIONS

The LCM driver intercepts IRIS disc and buffer pool transfers when they are directed to LCM-resident blocks. The driver converts real disc addresses (RDAs) into LCM block numbers and performs LCM transfers.

The range table and the LRU hash bucket pointers constitute the major interface between \$LCM and the system. Both the table contents and the pointers are created by the LCMACTIVATE processor and remain constant until the system is re-IPLed.

System software is able to access the LCM driver through a single vector provided in page zero. The vector points to the read/write routine. A call through this vector is allowed to bypass the range table and all checks. This is a processor call which is used for activating and modifying the LCM or for system functions requiring direct access to the LCM.

## 2.2 TROUBLESHOOTING THE LCM DRIVER

A gradual decrease in system performance, a double trap, or a trap 56 may indicate a problem with the LCM.

### 2.2.1 MAINTAINING LCM PERFORMANCE

\$LCM maintains transfer counts, error counts, and other statistical information which may be displayed by running LCMCHECK (see Section 6). The information displayed may be used to reconfigure the range table for better performance.

### 2.2.2 TRAP 56

Certain LCM failures cause a trap 56. The accumulators A0, A1, A2 indicate the details of the problem. A0 is the transfer-block count, A1 is the LCM block number, and A2 indicates one of the failure modes shown below:

<u>A2</u>	<u>Failure Mode</u>
0	No LCM in system
4	Permanent I/O error
5	Loss of data due to power fail
6	Data channel late
7	Illegal LCM block number
10	LCM timed out accessing a block

If the LCM is used without battery backup, data stored in the LCM is lost during a power failure. Any subsequent access to the LCM generates a trap 56 with A2=5 indicating the data is not retrievable; a double trap will probably occur. This loss of the LCM contents does not usually result in data being lost on the disc because dirty pages do not exist on the LCM (see Section 1.2). However, the regnant user may lose data that is currently being processed. As soon as power is restored, the system can be IPLed.

If the LCM has a battery backup unit, IRIS and the LCM resume operations when AC power is restored without the necessity of an IPL.

## Section 3

# LCM CONFIGURATION

---

To obtain maximum efficiency from the LCM hardware, the software must be tailored for the specific system's requirements. This configuration of the software must be done by the user when the LCM is initially installed and whenever the system requirements change. LCMC is a BASIC program provided by POINT 4 for the configuration of the LCM.

LCMC may be used to configure a system at one site for use at another site. However, an accurate picture of LCM block assignments will not be available until the disc pack is IPLed, the LCM activated, and LCMCHECK is run at the destination site after the LCM has been in use.

### 3.1 CONFIGURING THE LCM

Configuration of an LCM for a MARK 5/9 (or similar computer system) involves specifying the appropriate distribution of statically and dynamically allocated space. Any LCM space not statically assigned through range table specifications is allocated to the dynamic LCM-resident buffer pool.

The LCMC program (see Section 3.2) is used to configure the LCM. Configuration concerns five separate areas:

1. Interactive Mux Ports
2. Processors
3. Programs
4. Data Files
5. Absolute LU/RDAs

Recommendations and suggestions of items to be included are given below:

**Interactive Mux Ports** - For a MARK 5 system, specify all interactive ports if possible. For most MARK 9 systems, it is not necessary to specify any ports (see Section 1.2 for exception).

**Processors** - Specify 0/RUN for all systems. Specify 0/BASIC in an applications environment where programs are frequently entered and saved. Specify 0/SCOPE if the programs frequently do "long CHAINS". Specify other processors (like 0/ASM or 0/EDIT) only if they are used frequently.

**Programs** - Specify only those programs which are CHAINED to frequently and constantly throughout the day.

**Data Files** - Specify 0/DISCSUBS for all systems. Specify lu/INDEX for any logical unit where files are frequently opened, created or deleted. Consider especially 0/INDEX because it is not hashed, and also the system default lu/INDEX.

Specifying scratch files which are to be used for such purposes as sorting or accumulating totals can provide better performance. To keep a scratch file in the LCM, it must be reused rather than killed and rebuilt upon each use.

**Absolute LU/RDAs** - This option is used only rarely. It is provided for possible special purpose applications that may arise in the future.

It is important to keep a balance between static and dynamic allocation for optimum performance. Use the LCMCHECK static allocation transfer count (see Section 6) to determine the usefulness of each range. Remove from static allocation any file with a relatively low transfer count to allow that space to be used for dynamic allocation.

## 3.2 LCMC OPERATING INSTRUCTIONS

LCMC is an interactive program provided by POINT 4 for the configuration and maintenance of the Mux ports and LCM Range Table. It may only be run from the IRIS Manager or Utility account on LU/0.

The program performs five functions using a file called LCMRESIDENT. Four functions (add, delete, modify, and inquire) may be used to configure interactive Mux ports and the range table's processors, programs, data files, and RDAs. The fifth function, print, sends the configured or modified records of the LCMRESIDENT file to a line printer or terminal.

The LCMC program displays two menus. The first menu gives a choice of functions. The second menu lists the items on which the function may be performed. Each item is a record type in the LCMRESIDENT file. Subsequent screens contain prompts for the input of variable information particular to each item.

Each menu and screen has three lines at the bottom: comment, command, and message. The first line is used by the program to display comments to aid the user. When the cursor is at the second line, it may be used to enter a command. The third line is used by the program to display error messages.

After the last record for a particular item is displayed, the program returns to the Record Type Selection Menu. If a change of function is desired, pressing <ESC> returns to the LCM Configure Menu.

The Escape key may be used for a number of purposes:

- Abort the program and return to the system command prompt (#)
- Move the cursor to a previous prompt in a display
- Return to a previous menu

If <ESC> is pressed after partial entry of variables for a particular item, that information is not entered and the cursor is returned to the previous prompt. If the cursor is at the first prompt in a display, the program returns to the previous menu.

After entry of a command or variable requested by a prompt, <RETURN> must be pressed. This is not shown unless more than one <RETURN> is required. When existing variables need modification, a <RETURN> may be used to advance the cursor to the next prompt in a menu or as a default where a default entry is permitted.

Entry of an invalid filename, character, or <RETURN> if a default is not permitted, will produce an appropriate error message.

### 3.2.1 USING THE LCMC PROGRAM

The LCMC program must be run from the IRIS manager account. To invoke the LCMC program, at the system command prompt (#), enter

LCMC

If the LCMRESIDENT file does not exist, the following message is displayed:

FILE NOT FOUND, BUILD NEW 'LCMRESIDENT' ? ('Y' OR 'N')

If N is entered, the program terminates and the system command prompt (#) is displayed. Enter Y to build a new LCMRESIDENT file.

The LCM Configure Menu screen is displayed as follows:

PORT #                    LCM CONFIGURE MENU                    LCMC            n.n

```
(0) EXIT
-----
(1) ADD
(2) MODIFY
(3) DELETE
(4) INQUIRE
-----
(5) PRINT LCM CONFIGURE
```

COMMENT: ENTER THE FUNCTION NUMBER YOU WISH TO EXECUTE.  
COMMAND:  
MESSAGE:

The following subsections discuss each of the functions.

### 3.2.1.1 Exit (Selection 0)

Selection 0 or <ESC> terminates the program and the system command prompt (#) is displayed.

### 3.2.1.2 Add (Selection 1)

When 1 is selected, the Record Type Selection Menu is displayed (see Section 3.2.2) and the add program module is invoked. Additions may be made to any or all items displayed by the Record Type Selection Menu.

The cursor waits at the first prompt of the selected item subscreen for input. If the input is not valid, the prompt is redisplayed with an appropriate message at the comment line. If the input is valid, the cursor moves to the next prompt.

After the variable information has been entered, the cursor moves to the command line and the program asks:

IS ALL THE ABOVE CORRECT ?

A Y response enters the new record into the file.

An N response returns the cursor to the last input position and any input entered previously may be corrected. Pressing <ESC> moves the cursor to the previous input position. <RETURN> may be used to move the cursor to the next prompt.

### 3.2.1.3 Modify (Selection 2)

When 2 is selected, the Record Type Selection Menu is displayed and the modification module invoked. Modifications may be made to any or all items displayed by the Record Type Selection Menu.

In this mode, the records for the selected item are displayed one at a time. As each record is displayed the program asks:

MODIFY THIS RECORD ?

Enter N to display the next record or enter Y to modify the record. To move to the next input position, press <RETURN>. To back up to the previous input position, press <ESC>.

When input for a record is completed, the program asks:

IS ALL THE ABOVE CORRECT ?

A Y response enters the modified information into the LCMRESIDENT file.

After displaying the last record type selected, the following message is displayed:

NO MORE RECORDS FOR '<record type number>'

The program chains to the Record Type Selection Menu.

### 3.2.1.4 Delete (Selection 3)

When 3 is selected, the Record Type Selection Menu is displayed and the delete module is invoked. Records for any or all items displayed in the Record Type Selection Menu may be deleted before returning to the LCM Configure Menu to select another function.

In this mode, the records for the selected item are displayed one at a time. As each record is displayed, the program asks:

DELETE THIS RECORD ?

Enter N to display the next record. A Y response deletes that record from the file and the next record is displayed. When the last record has been processed, the program displays:

NO MORE RECORDS FOR '<record type number>'

The program returns to the Record Type Selection Menu.



### 3.2.1.5 Inquire (Selection 4)

When 4 is selected, the Record Type Selection Menu is displayed and the query module invoked. Any or all items listed in the Record Type Selection Menu may be queried.

In this mode, the records for the selected item are displayed one at a time. As each record is displayed, the program prompts:

PRESS 'RETURN' TO CONTINUE

After <RETURN> is pressed the next available record is displayed until all records have been viewed. The program then displays the following message:

NO MORE RECORDS FOR '<record type number>'

The program returns to the Record Type Selection Menu.

### 3.2.1.6 Print (Selection 5)

When 5 is selected, the user may display or print all records currently in the LCMRESIDENT file.

The program asks:

DO YOU WISH TO LIST ON THE LINE PRINTER ?

To display the records on the terminal, enter N. The records are displayed, one screen at a time; press <RETURN> to continue the display. After the last record is displayed, the program returns to the LCM Configure Menu. The display may be terminated by pressing <ESC>.

To print the data contained in the LCMRESIDENT file, enter Y. The program displays the following:

DO YOU HAVE PAPER IN THE PRINTER AND IS IT ON LINE ?

Enter Y to indicate the printer is ready. Enter N to return to the LCM Configure Menu.

An example of an LCMRESIDENT file listing is given in Figure 3-1.

In this example, the active file of each port is classified as (U) and all other ranges as (C). These designations should be ignored for now. A future revision of the LCM software will allow dirty pages and the designations (C), (U) and (N) will be defined.

LCM CONFIGURE LIST

ITEM NUMBER

0 (REC-TYPE)	1	2	3	4	5
0 : PORT #	FIRST	LAST			(C)opy thru
1 : PROCESSOR				O/PROCESSOR-NAME	or
2 : PROGRAM				LU/PROGRAM-NAME	(U)pdate
3 : DATA FILE	#-OF-BLKs			LU/DATA-FILE-NAME	or
4 : RDA	LU-#	1ST-RDA	LAST-RDA		(N)o load

0 : PORT #	FIRST	LAST	
	1	2	(U)
	3	5	(U)
	111	127	(U)
	6	9	(U)

1 : PROCESSOR

O/PROCESSOR-NAME

O/P1	(C)
O/P2	(C)
O/P3	(C)
O/P4	(C)
O/P5	(C)
O/P6	(C)
O/P7	(C)
O/P8	(C)
O/P9	(C)

2 : PROGRAM

LU/PROGRAM-NAME

1/AAA	(C)
1/BBB	(C)
1/CCC	(C)
1/DDD	(C)
1/EEE	(C)
1/FFF	(C)
3/GGG	(C)
3/HHH	(C)
9/III	(C)
3/JJJ	(C)
2/KKK	(C)
1/LLL	(C)
9/MMM	(C)
9/NNN	(C)
3/OOO	(C)
2/PPP	(C)
2/QQ	(C)

Figure 3-1. Sample LCMRESIDENT File Listing (1 of 2)

LCM CONFIGURE LIST

I T E M N U M B E R					
0 (REC-TYPE)	1	2	3	4	5
0 :	PORT #	FIRST	LAST		(C)opy thru
1 :	PROCESSOR			0/PROCESSOR-NAME	or
2 :	PROGRAM			LU/PROGRAM-NAME	(U)pdate
3 :	DATA FILE	#-OF-BLKs		LU/DATA-FILE-NAME	or
4 :	RDA	LU-#	1ST-RDA	LAST-RDA	(N)o load
-----					
2 :	PROGRAM			LU/PROGRAM-NAME	
-----					
				4/RRR	(C)
				5/SSS	(C)
				2/UUU	(C)
				3/VVV	(C)
				3/WWW	(C)
				3/XXX	(C)
				3/YYY	(C)
				2/ZZ	(C)
-----					
3 :	DATA FILE	#-OF-BLKs		LU/DATA-FILE-NAME	
-----					
		ALL		2/DF1	(C)
		22		2/DF2	(C)
		323		3/DF3	(C)
		65		4/DF11	(C)
		124		3/DF12	(C)
		44		4/DF22	(C)
-----					
4 :	RDA	LU-#	1ST-RDA	LAST-RDA	
-----					
		0	2	55	(C)
		0	33	122	(C)
		5	9	12	(C)

Figure 3-1. Sample LCMRESIDENT File Listing (2 of 2)

### 3.2.2 RECORD TYPE SELECTION MENU

Selection of one of the four functions (1 through 4) displays the Record Type Selection Menu; the selected function may be performed on any or all of the items listed in this menu before another function is selected. After a record type is chosen, an appropriate screen is displayed for that item. After all the records for that item have been processed, the program chains to the Record Type Selection Menu. Another item may then be selected for the same function. Press <ESC> to return to the LCM Configure Menu.

Record Type Menu selections are as follows:

PORT #	RECORD TYPE SELECTION TO	<function>	LCMC	n.n
--------	--------------------------	------------	------	-----

(1) INTERACTIVE MUX PORTS

(2) PROCESSORS

(3) PROGRAMS

(4) DATA FILES

(5) ABSOLUTE LU/RDA's

COMMENT: ENTER THE RECORD TYPE NUMBER TO <function>.

COMMAND:

MESSAGE:

The following sections describe the screens displayed for each selection.

### 3.2.2.1 Interactive Mux Ports (Selection 1)

The active file for an interactive Mux port, any other interactive port, or a phantom port may be configured for the LCM using this option. An interactive port is one that has a nonzero active file size set up in the Port Definition Table of the appropriate driver file (i.e., \$MMUX, \$PHA, \$DGMX, \$TTY, etc., see Section 3.1). Line printer ports are not interactive.

When 1 is selected, the program displays

```
PORT #          <function> - PORTS          LCMC.1   n.n
```

```
1ST PORT : _____
```

```
LAST PORT : _____
```

```
COMMENT:  
COMMAND:  
MESSAGE:
```

Enter the range of logical port numbers to be configured.

The number displayed on the CRT when a user logs on is the logical port number assigned by the system. It is not necessarily the same as the physical Mux port number. Valid logical port numbers are 0 to 127.

Port numbers may be specified as a range. For example, entry of 5 for the first port and 10 for the last port would result in ports 5, 6, 7, 8, 9, and 10 being added or deleted, etc. depending on the function chosen. If numbers 8 and 13 are entered when the prompts are repeated, only ports 11 to 13 are actually processed since 8, 9, and 10 were processed earlier. The records in the LCMRESIDENT file show the actual input but the duplication is ignored.

### 3.2.2.2 Processors (Selection 2)

Depending on the function previously selected, processors may be added to, or deleted from the LCM Range Table. When 2 is selected, the program displays

PORT #                    <function> - PROCESSOR                    LCMC.2    n.n

PROCESSOR NAME : \_\_\_\_\_

COMMENT:  
COMMAND:  
MESSAGE:

Enter the name of a processor. If the name entered is not a valid IRIS name, the program displays an error message and redisplay the prompt.

### 3.2.2.3 Programs (Selection 3)

Frequently-run programs may be added to the LCM Range Table or a program may be deleted, etc., depending on the function previously selected. When 3 is selected, the program displays

PORT #                    <function> - PROGRAM                    LCMC.2    n.n

PROGRAM NAME : \_\_\_\_\_  
LOGICAL UNIT : \_\_\_\_\_

COMMENT:  
COMMAND:  
MESSAGE:

Enter a valid IRIS filename, and the number of the logical unit on which the program resides. A <RETURN> at the logical unit field defaults to logical unit 0.

### 3.2.2.4 Data Files (Selection 4)

The beginning portion of a data file or the complete file may be included in the LCM Range Table. Depending on the function selected, these may be added to, deleted, modified, etc.

When 4 is selected, the program displays

```
PORT #          <function> - DATA FILE          LCMC.2   n.n
```

```
          DATA FILE NAME : _____  
          LOGICAL UNIT   : _____  
# OF BLKs TO RESIDENT : ALL
```

COMMENT:  
COMMAND:  
MESSAGE:

DATA FILE NAME - Enter a valid IRIS filename; if entry is not valid, the program displays an appropriate error message and repeats the prompt. A specific volume of a polyfile may be entered by giving the filename@volume number. For example, entry of

CUSTFILE@2

specifies volume 2 of the polyfile named CUSTFILE.

LOGICAL UNIT - Enter the number of the logical unit on which the file resides; no default is allowed.

# OF BLKs TO RESIDENT - Enter <RETURN> to accept the default of ALL to add to, delete, or modify the complete file. A number entered in this field overrides the 'ALL' displayed in the prompt.

If only the beginning portion of a file is to be made LCM resident (e.g., the directory section of an indexed file), the exact number of blocks for that portion of the file must be given. The number of blocks used by the directory section of an indexed file (i.e., all directories plus header) can be calculated as follows

$$1 + \text{INT} \frac{\text{FRDR} * \text{WPR}}{256(\text{decimal})}$$

where

FRDR = first real data record number (mode 1, d=0, v2=0)  
WPR = number of words per record



### 3.2.2.5 Absolute LU/RDAs (Selection 5)

This option may be used if a small logical unit is to be made LCM resident in its entirety or if the previous four selections do not meet a user's needs. Generally, this option is not used for IRIS systems.

When 5 is selected, the program displays

PORT #      <function> - ABSOLUTE LU/RDA's      LCMC.1    n.n

LOGICAL UNIT : \_\_\_\_\_

1ST RDA : \_\_\_\_\_

LAST RDA : \_\_\_\_\_

COMMENT:

COMMAND:

MESSAGE:

Enter the number of the logical unit (1 to 127); a default is not allowed.

Enter the range of RDAs (must be entered in decimal).



# Section 4

## MODIFICATION OF SYSTEM CONFIGURATION

---

The number of user partitions is dependent upon user requirements. Generally, a single partition is optimal.

POINT 4 recommends that the SETUP utility be used to configure or modify the system. Refer to the IRIS R8 Installation and Configuration Manual for information on the procedure.

Three steps are required to configure the system:

1. Set partition parameters in SETUP's control file for the General Information Table, i.e.,

<u>INFO Table</u>	<u>Description</u>
PSIZ	User partition size
NPART	Number of user partitions
MTYPE	Memory type: 0 = not mapped (MARK 3, 5, or equivalent) 1 = MARK 9 mapped memory

2. Run SETUP's update module.
3. Upon completion of SETUP's update phase, shutdown and re-IPL.

Make sure that the active file size in the Port Definition Table of each appropriate driver file (e.g., \$MMUX, \$PHA) and master port 0 in REX is equal to

PSIZ/400 (octal)

Any DISCSUBS that are to be LCM-resident may be removed from the memory-resident DISCSUB list at location 1000 in CONFIG. However, memory-resident DISCSUBS are still the most efficient so it remains desirable to keep the most frequently-used DISCSUBS memory resident.

Check the files on LU/0, they should include LCMC and LCMACTIVATE. If these files are not present, the IRIS Operating

System is not a current one. Earlier versions of IRIS may contain the following files:

LCMLUSR  
LUSRLCM  
ACTIVATE (superseded by LCMACTIVATE)  
LCMRESIDENT (as a text file - superseded by formatted file)  
LCMCONFIGURE (superseded by LCMC)

These files are no longer used and should be deleted from the IRIS Operating System.

# Section 5

## INSTALLATION PROCEDURE

---

The following is a step-by-step procedure for installing the LCM. User input is underlined to distinguish it from system display.

1. Check whether the LCMRESIDENT file currently on the system is a text or formatted file by entering

QUERY 0/LCMRESIDENT <RETURN>

If it is a text file, it must be deleted before proceeding with the installation.

2. Activate the LCM subsystem under IRIS R8.2C by activating the \$LCM driver. At the system prompt (#), enter

#CHANGE LCM <RETURN>  
NEW NAME?\$LCM <RETURN>  
NEW COST? <ESCAPE>

3. Run LCMC as described in Section 3 to configure the LCM.
4. Re-IPL the system and install all logical units specified in the LCMRESIDENT file entries.
5. Run LCMACTIVATE to build the range table, download disc blocks to the LCM, initialize the LCM-resident buffer pool, and turn on the LCM-Active flag in the INFO table. LCMACTIVATE may be run only once per IPL.

At the system prompt (#), enter

#LCMACTIVATE <RETURN>

When the LCM is successfully activated, the program displays

LCM IS NOW ACTIVE  
#

6. Run LCMCHECK as described in Section 6 to make sure there are no error messages.

7. It is recommended that EXERCISER and SWAPTEST be run for several hours to test the LCM.

**NOTE**

List these two programs. Each program listing contains instructions for its use.

If an error occurs and the LCM is not activated, one of the following messages is displayed:

<u>Message</u>	<u>Action/Explanation</u>
\$LCM NOT ACTIVE	\$LCM driver is not enabled. Change LCM to \$LCM and re-IPL.
LCM HAS ALREADY BEEN ACTIVATED	LCM can only be activated once per IPL.
CAN'T OPEN 'LCMRESIDENT'	Generate 'LCMRESIDENT' file with LCMC.
ERROR READING 'LCMRESIDENT'	Re-create 'LCMRESIDENT' using LCMC.
PROCESSOR OR PROGRAM 'LU/Filename' NOT FOUND	A processor or program listed in the 'LCMRESIDENT' file could not be found. May also be caused by the LU not being installed.
NOT ENOUGH BLOCKS ON LCM	Reduce LCM requirements or get a larger LCM.
INVALID PORT#	Port number specified in 'LCMRESIDENT' file is invalid for present configuration. Correct 'LCMRESIDENT' or re-configure system ports.
RANGE TABLE FULL	The range table is dynamically built using memory-resident buffer pool blocks. If such a message occurs, and you have POINT 4's subscription service, contact IRIS Customer Support.

## Section 6

# CHECKING CURRENT LCM CONFIGURATION

---

LCMCHECK is a BASIC program that can be used by the system manager to examine the status of the memory-resident \$LCM driver. LCMCHECK may be used only while the LCM is activated; it should be run periodically as part of your shutdown procedure. The output includes all information set by LCMACTIVATE plus any statistical information accumulated by \$LCM. Data concerning the following items is displayed:

- Options installed
- LCM size
- Active ranges
- Number of transfers on each range
- Number of corrected errors on each range
- LCM-resident buffer pool information

To check the current configuration, at the system prompt (#), enter

LCMCHECK <RETURN>

The system requests that the operator specify the device/file to receive output of the inquiry. The following entries are acceptable:

- <RETURN> - displays output on the operator's terminal
- IRIS filename - formats output into designated text file. Contents will be identical to that output on the operator's terminal.
- IRIS device (e.g., \$LPT) - opens the specified device for reception of output.

When output is specified to appear on the operator's terminal, a pause occurs after each twenty lines to allow examination of screen contents. To continue to the next twenty lines, press <RETURN>.

The first items output are the parameters set for the entire LCM. These are followed by range table entries and related information. All real disc addresses (RDAs) are specified in octal.

- Note the number of transfers on each range. If any range shows a consistently low number of transfers, use the LCMC program to delete that range. This provides space for other frequently used files or generates a larger LCM buffer pool for dynamic allocation.
- Check the number of corrected errors on each range. If an LCM block range consistently shows corrected errors, run the LCM diagnostics (LCM.DIAG1.3). If the diagnostics show any errors or if the corrected errors persist, the hardware should be checked out.

The LCM-resident buffer pool information that follows gives some statistics which correlate to how many disc accesses are eliminated by the dynamic allocation. However, the statistics printed for this dynamic area are primarily for use by POINT 4.



# Section 7

## LCM INTERACTION WITH OTHER IRIS PROCESSORS

---

When an LCM is activated, it has an effect on the function of the following IRIS processors:

- CLEANUP
- KILL
- REMOVE
- CHANGE
- SHUTDOWN

These effects are discussed in the following subsections.

### 7.1 CLEANUP

CLEANUP should only be run when the LCM is not activated. After CLEANUP is run, the LCM may be activated by using LCMACTIVATE (see Section 5).

### 7.2 KILL

When the LCM is active, the effects of deleting files from logical unit zero (LU/0) and a nonzero logical unit are different.

- If a file that is statically allocated to the LCM (i.e., entered in the LCM Range Table), is deleted from LU/0, the affected blocks on LU/0 are not available for use until the next IPL.
- If a file that is statically allocated to the LCM is deleted from a nonzero logical unit, the blocks thus freed on that LU become immediately available but continue to take up space in the statically allocated LCM Range Table. For optimum LCM performance, run LCMC to remove the names of deleted files from the range table entries. Either add new files or permit these blocks to become part of the LCM-resident buffer pool. Then IPL the system, and run LCMACTIVATE.

## 7.3 REMOVE

REMOVE may take longer to run if blocks from the logical unit being processed are allocated to the LCM. DO NOT halt the processor during the REMOVE process or some data may be lost.

A logical unit may be REMOVED and then INSTALLED without a SHUTDOWN while the LCM is active.

### **WARNING**

If a logical unit is REMOVED and a different disc pack with the same logical unit number is then INSTALLED, a loss of data will occur. To avoid this problem, either change the logical unit number by running INSTALL or SHUTDOWN and re-IPL before the new disc pack is INSTALLED.

## 7.4 CHANGE

If the name of a statically allocated file is CHANGED, the old filename still remains in the LCMRESIDENT file. The next time LCMACTIVATE is run, the program will abort and display the following error message:

LU/Filename NOT FOUND

Run LCMC to change the filename in the LCMRESIDENT file and then rerun LCMACTIVATE.

## 7.5 SHUTDOWN

SHUTDOWN may take longer to complete when the LCM is active. DO NOT halt the processor during the SHUTDOWN process or some data may be lost.

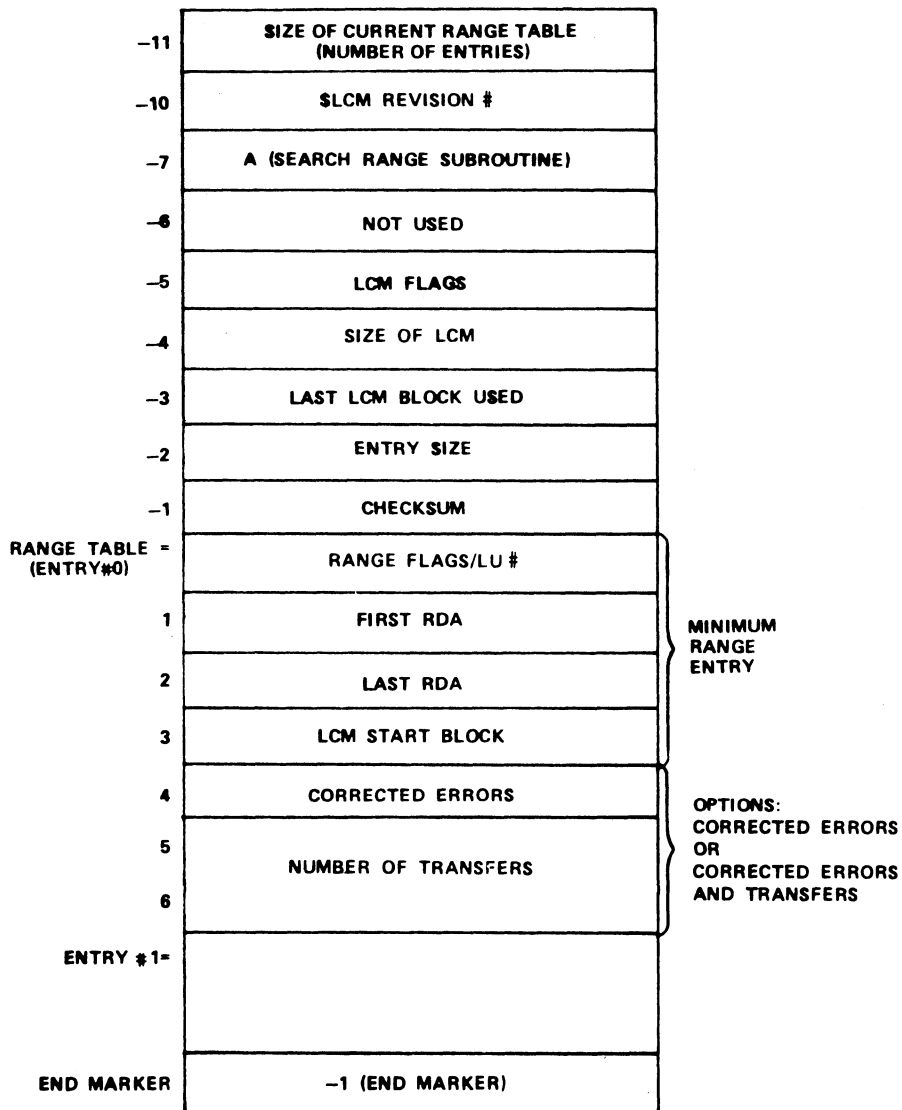
# **APPENDICES**



# Appendix A

## RANGE TABLE LAYOUT

The range table layout and field definitions are provided for your information.



160-006

**Figure A-1. Range Table Format**

**TABLE A-1. RANGE TABLE FIELD DEFINITIONS**

Field	Definition
Size of Range Table	Size of current range table (number of entries)
\$LCM Revision #	\$LCM driver assembly parameter
A (Search Range Subroutine)	Address of search range subroutine in memory
Date Last Configured	Not used.
LCM Flags	Bit Mask 1 octal - Hamming enabled Bit Mask 2 octal - Battery Backup installed Bit Mask 4 octal - \$LCM active Bit Mask 10 octal - Battery Backup functional Bit Mask 20 octal - \$LCM did not survive power-fail Bit Mask 100 octal - \$LCM driver initialized
Size of LCM	Set by \$LCM at initialization, measured in blocks.
Last LCM Block Used For Range Table	Set by LCMACTIVATE. The difference between this value and Size of LCM equals the number of LCM blocks available for other use.
Entry Size	Specifies size of each entry in range table. Size = 7 indicates that both access count and corrected error count are recorded.
Checksum	Not used.

TABLE A-1. RANGE TABLE FIELD DEFINITIONS (Cont)

Field	Definition
<p>NOTE: The following fields are repeated for each range table entry.</p>	
Range Flags	<p>Bit Mask 200 octal - This range is inactive.            Bit Mask 400 octal - Copy all writes to disc.            Bit Mask 2000 octal - Don't write disc block to LCM on startup.</p>
LU#	<p>Number of logical unit for this range.</p>
First RDA	<p>First real disc address included in this range.</p>
Last RDA	<p>Last real disc address included in this range.</p>
LCM Start	<p>Indicates the first LCM block in this range.</p>
Corrected Error Count	<p>Incremented each time a corrected error is detected (optional field as determined by entry-size parameter).</p>
Number of Transfers	<p>Records the total number of accesses to this range. This field can be used to determine the most beneficial ranges to optimize system operation (optional field as determined by entry-size parameter).</p>





# COMMENT SHEET

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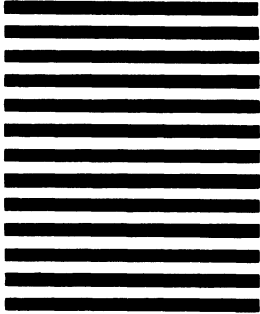
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