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OPERATION AND MAINTENANCE
OF THE RARE-EARTH INFORMATION
CENTER'S INFORMATION RETRIEVAL
SYSTEM (RICIRS) VERSION 2

Leonard C. Moon

AMES LABORATORY, USERDA
IOWA STATE UNIVERSITY
AMES, IOWA 6305000

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Operation and Maintenance of the
Rare-Earth Information Center's Information
Retrieval System (RICIRS) Version 2

By

Leonard C. Moon

Ames Laboratory, ERDA
Iowa State University
Ames, Iowa 50011

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ABSTRACT

The RICIRS system is a key word based retrieval system capable of retrieving bibliographic information from a direct-access device. The bibliographic information is compiled by the Rare-Earth Information Center (RIC) by careful inspection and key word extraction of the documents. This report describes the constructing of retrieval requests and the updating of the data bases for this information retrieval system. The system is written for an IBM 360-370 OSMVT environment. It is written in PL/I optimized codes.

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I. Introduction

RICIRS is a spin-off of the Selective Dissemination of Information (SDI) system developed at the Iowa State University Computation Center by James Hoekstra and Nancee Nilsen (4). They adopted many of the ideas incorporated into the SDI system from an earlier SDI system developed by John Jordan and Rowena Sun (1,2,3).

The system is a key word based retrieval system capable of retrieving bibliographic information stored on a direct-access device. Requests for information are formulated by combining key words with the boolean operators AND (*), OR (+), and NOT (-).

II. Operation

A. Use of the System

The system is a set of programs which are designed to accept information about documents and construct a set of files on a direct-access device which can be used to obtain stratified information.

1. Input for the updating program.

The document information consists of four parts:

(1) author(s), (2) title, (3) source, and (4) key words.

These must be coded under the following rules:

1. Authors and key words can not have imbedded blanks or the special symbols "@" or "/" in them.
2. Author names must be 19 characters or less in length.

3. Key words must be 14 characters or less in length.

4. Each document must have a unique document number.

Each type of card (e.g., author-type 1, title-type 2) can be continued to have up to nine cards. The type of the card is in column 75. The number of the card within the type (continuation) is in column 74. The document number is broken down into two parts, the year and the document number. Starting in column 62 is the year of the document represented as a three character year, e.g., 1971-971. From column 65 through column 70 is the document number. Authors are given nineteen characters for their name so all author names begin in column 1 or 21 or 41. Key words are given 14 characters each so all key words begin in column 1 or 16 or 31 or 46. The system uses the last column as a continuation character for both authors and key words. All input into the update program is sorted so the cards can be in any order.

Card Number	Column Number						
	1	16	21	31	41	46	62 7475
1	TASHIRO;J		KONO;M		TAKAKUWA;I		971000040 11
2	INFLUENCE OF MOISTURE ON THE SPONTANEOUS HEATING OF COAL						971000040 12
3	(JAPANESE)						971000040 22
4	J. MINING MET. INST. JAP. 87, NO. 996, 161-166 (MAR. 1971)						971000040 13
5	1971	MOISTURE	COAL		SPONTANEOUS		971000040 14
6	COMBUSTION						971000040 24

Figure 1. An Example of Document Coding.

There is one more field that is very important to the updating program. This field (column 73) tells what the user wants to do with this card. The values the field can contain are:

- "R" Replace the old card that has this number on it with this card.
- "D" Delete the card with this number on it from the file.
- "W" Wipe-out (delete) the entire document from the file associated with this document number.
- "A" Add this card to the file.

Column Number

<u>1</u>	<u>16</u>	<u>31</u>	<u>46</u>	<u>62</u>	<u>73</u>
GRAIN-ELEVATOR GRAIN				949000000	R24
1953	DUST	EXPLOSION	WOOD	953000020	W14
PHYSICAL	PROPERTIES	EXPTL-METHODS		956000080	D24
CONTROL				968000440	24

Examples of the Different Types of Cards that are Used in the Updating Procedure.

2. Input for the retrieval program.

Input for a retrieval request is given on three types of cards. The first type tells the program which options you want the program to use. Presently, there are six fields of six characters each (right justified) on this card. The first two of these fields are closely related. The first field is the overall size of the sort area in words of core memory. The second number is the size within the sort area dedicated to the sort-merge work space. The difference between the two numbers is the maximum amount of documents the program can handle per request. The third number represents the beginning index for the sort area. The fourth and fifth numbers are year stratifiers. They can be used for decade and year retrieval request stratification. Examples:

Column 24 30

74 75 This would yield documents for
the request that were written
in 1974 and 1975.

6 7 This would yield documents for
the request that were written
in the 1960's and 1970's.

6 This would yield documents for
the request that were written
in the 1960's only.

If the first yearly stratification field has a number in it and the second one is blank, the program will

set the second one equal to the first. If both fields are left blank the program will not do a Yearly stratification. The sixth field is the author-key-word index field. If it is blank no author or key word index is created, but if the program finds a non-blank field it generates the files for the author and key word indexes. Two other programs must be run to actually print-out the author and key word indexes.

The second type of card is the retrieval request card(s). The retrieval request can be written in free-form on 1 to 5 cards. All operators ("*", "+", "¬", "(", ")") and operands (key words or authors) must be separated by at least one blank. The retrieval request is a free-form boolean statement composed of the boolean operators (AND (*), OR (+), and NOT (¬)), parentheses, and terms (authors and key words). The request must conform to the rules of boolean algebra. Examples:

$$A * \neg (B + C)$$

$$A * B + C$$

$$A + (B * C)$$

In the first example, A must be present but B or C (or both)¹ can not be present for the program

¹The OR (+) is the "inclusive" OR. It is true when either or both of the operands is true.

to print-out the document. In the second example, either A and B must be present or C (or both) for the document to be printed. In the third example, either A or B and C (or both) must be present for the document to be printed.

The program recognizes four special cases (types) of requests and works much faster (cheaper) if the request is of one of the four forms. They are:

1. Operands connected by all '+'s,
e.g., $A + B + C + D + \dots$
2. Operand 1 and-ed to a set of
operands connected by '+'s,
e.g., $A * (B + C + D + E + \dots)$
3. The set operand 1 OR'ed with
operand 2 and then and-ed with
a set of operand connected by
'+'s, e.g., $(A + B) * (C + D + E + \dots)$
4. Each pair of operands and-ed together
and all pairs connected by '+'s, e.g.,
 $(A * B) + (C * D) + (E * F) + \dots$

There are some limitations on the requests.

They are:

1. Each request begins on a new card.
2. A single request must be contained
on no more than five cards.
3. The total number of terms, operators,
and parentheses in a request must not
exceed 100.

A feature is available which allows a match
to occur on a leading substring of a term. When

the symbol '#' is the last character of a term the program matches any term in the file which begins with the string preceding the '#'. For example, "GRAIN#" will cause a match on GRAIN, GRAIN-DUST, GRAIN-ELEVATOR, GRAINS, etc.

Note: If the request ends in a parenthesis and this parenthesis is placed in column 80 of the card, another blank card must be added to the request deck for the program to work properly. Also, multiple requests are not allowed when the author and key word indexes are desired.

The third type of card is the request-ID card. It is composed of four fields. Example:

@9999K EVANS-1

If the limit field is set to 8888, the program only lists out the number of documents for each term in the request. No evaluation of the request is done and no citations are printed. If the user wants the key words associated with each document, the area on the request-ID card for this must have a "K" in it.

		Column Number					
Card Number		1	6	9	18	24	30
1		12000		2000	1	7	69
2		(LA + LA-) * (PR + PR-)					
3		@9999KBE-1					
		Single Request with Yearly Stratification for 1969 and the 1970's.					

		Column Number			
Card Number		1	6	9	18
1		12000		2000	1
2		(DUST + EXPLOSION) * $\neg$ GRAIN			
3		@0001KBE-3			
4		(LA + LA-) * (PR + PR-)			
5		@9999KBE-1			

Multiple Request.

		Column Number				
Card Number		1	6	9	18	31
1		12000		2000	1	XREF
2		(DUST + EXPLOSION) * $\neg$ GRAIN				
3		@0001KBE-3				

Request with Author and/or Key Word Indexes Desired.

Figure 2. Example of Requests.

3. Output of the retrieval program.

The retrospective search program (RICIRS) has two types of output. The first type is information about the request and how the program handled it. The second type lists the citations for the request.

In the first type, the program prints the title, date and request, the type of the request (see request types (cases) in this paper), how much C.P.U. (central processing unit) time and real time was used by the major areas of the program, and a listing of the key words, associated with the number of documents for the key words, and the number of those documents that satisfy the request, along with the total number of documents that satisfy the request. If the # is used, only the term in the request that contains the # is printed although the other numbers associated with this group of words are the combined totals for the group.

Following this information is a description of the parameter card and how it relates to the sort area.

In the second type of output, the document number, author(s), title, and source are printed for every document that satisfies the request.

There is one special output that the user can have the program generate and this is the author and key word

indexes. More JCL is required to obtain these indexes since two more programs must be called in to handle these files and produce the indexes.

III. Updating the Data Bases

There are two types of updates, weekly and monthly updates. With weekly updates only additions can be done. Monthly updates allow additions, deletions, replacements, and wipe-outs (entire document deletions). Both types of updates create three files, one sequential source data file and two indexed sequential (ISAM) files for the citations and the terms. Figures 3 and 4 show the present update operations.

With the availability of the weekly update and the small cost associated with it, a random update scheme does not appear to be necessary. The only problem is the restriction of additions only in the weekly update operation.

IV. Present Capabilities

The RICIRS data base contains approximately 11,000 documents with approximately 10,000 authors represented and 7,500 different key words. The cost for a "typical" request is \$1.25 to \$1.75. The cost for a monthly update is about \$25.00 and the cost of a weekly update is about \$3.00. Of course, all of these costs are dependent on the amount of cards input and the amount of lines output since the computation center charges directly for these items.

Figure 4. Monthly Update Operations.

Figure 4. Monthly Update Operation (Continued).

The disk (2314) is about half full so it should be able to hold at least another 10,000 documents before another disk would need to be purchased. At present rate of updating this will probably be at least four years from now.

V. Maintenance

After every update the RICIRS disk pack should be backed up onto magnetic tape. This allows the capability to restore the disk if something would happen to the disk. e.g., a head crash.

VI. References

1. Jordan, J. R., Sun, R. P., and Maple, C. G., "A Description of a Batch Operated Retrospective Information Retrieval System", USAEC Report IS-3387, 1974.
2. Jordan, J. R., Sun, R. P., and Maple, C. G., "Data Base Design Considerations for a Key Word Based Retrospective Information Retrieval System", USAEC Report IS-3389, 1974.
3. Jordan, J. R., Sun, R. P., and Maple, C. G., "Operation and Maintenance of the RARE-EARTH Information Center's Information Retrieval System (RICIRS)", USAEC Report IS-3388, 1974.
4. The SDI Retrospective Literature Search System, ISU Computation Center, Users Reference Memo 033.

RICIRS Retrieval Deck

```
//B383LM JOB A0129,MODN
//JCLLIB DD DSN=RIC.PROG,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//S1 EXEC PGM=SIGAR,PARM='ISA(118K)',REGION=220K,TIME=(0,15)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//CITWK DD UNIT=2314,DISP=SHR,DSN=RIC.CIT.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=RICIRS
//INDEXWK DD UNIT=2314,DISP=SHR,DSN=RIC.TERM.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=RICIRS
//INDEX DD DSN=RIC.TERM.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=RICIRS,DISP=SHR
//CITATN DD DSN=RIC.CIT.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=RICIRS,DISP=SHR
//LIBRPTR DD SYSOUT=A
//USERPRT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141,BUFNO=1)
//REQUEST DD *
      12000 2000      1
( LA + LA- ) * ( PR + PR- )
@0001KBE-3
```

VII. Appendix: User JCL Decks for both the RICIRS and the DUST
Information Retrieval Systems

RICIRS Retrieval Deck with Author and Key Word Indexes

```
//B383LM JOB AC129,MOJN
//JOB LIB DD DSN=RIC.PROG,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//S1 EXEC PGM=SIGAR,PARM='ISA(118K)',REGION=220K,TIME=(0,15)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//CITWK DD UNIT=2314,DISP=SHR,DSN=RIC.CIT.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=RICIRS
//INDXWK DD UNIT=2314,DISP=SHR,DSN=RIC.TERM.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=RICIRS
//INDX DD DSN=RIC.TERM.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=RICIRS,DISP=SHR
//CITATN DD DSN=RIC.CIT.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=RICIRS,DISP=SHR
//LIBRPTR DD SYSOUT=A
//USERPRT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141,BUFNO=1)
//REQUEST DD *
      12000 2000      1      XREF
@9999K3E-1
//AUTHOR DD DSN=88AUTH,DISP=(NEW,PASS),VOL=SER=SHORT1,UNIT=2314,
//      DCB=(RECFM=FB,LRECL=24,BLKSIZE=1800,BUFNO=1),
//      SPACE=(TRK,(1,1))
//KEYWORD DD DSN=88KEY,DISP=(NEW,PASS),UNIT=SCRTCH,
//      DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805,BUFNO=1),
//      SPACE=(TRK,(3,2))
//S2 EXEC PGM=AUTHPRT,PARM='ISA(4K)',REGION=48K
//OUT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTIN DD DSN=88AUTH,DISP=(OLD,DELETE),VOL=SER=SHORT1,UNIT=2314,
//      DCB=(RECFM=FB,LRECL=24,BLKSIZE=1800)
//SYSOUT DD SYSOUT=A
//SORTLIB DD DISP=SHR,DSN=SYS1.SORTLIB
//SORTWK01 DD UNIT=SCRTCH,SPACE=(TRK,(30),,CONTIG)
//SORTWK02 DD UNIT=SCRTCH,SPACE=(TRK,(30),,CONTIG)
//SORTWK03 DD UNIT=SCRTCH,SPACE=(TRK,(30),,CONTIG)
```

RICIRS Retrieval Deck with Author and Key Word Indexes (Continued)

```
//SORTOUT DD DSN=88TEMP,DISP=(NEW,DELETE),UNIT=SCRATCH,  
// SPACE=(TRK,(1,1)),DCB=(RECFM=FB,LRECL=24,BLKSIZE=1800)  
//S3 EXEC PGM=KEYPRT,PARM='ISA(04K),NR',REGION=48K  
//SYSPRINT DD SYSOUT=A  
//OUT DD SYSOUT=A  
//OUTCARD DD SYSOUT=B  
//SORTIN DD DSN=88KEY,DISP=(OLD,DELETE),UNIT=SCRATCH,  
// DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805)  
//SORTOUT DD DSN=88TEMP2,DISP=(NEW,DELETE),UNIT=SCRATCH,  
// SPACE=(TRK,(3,2)),DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805)  
//SYSOUT DD SYSOUT=A  
//SCRLIB DD DISP=SHR,DSN=SYS1.SCRLIB  
//SORTWK01 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)  
//SORTWK02 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)  
//SORTWK03 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)
```

DUST Retrieval Program with Key Word Indexes and No Key Word Index Card Output

```
//R383DUST JOB A0129,VFRKADE
//JOB LIB DD DSN=DUST.PROG,VOL=SER=SHORT1,UNIT=2314,DISP=SHR
//S1 EXEC PGM=SIGAR,PARM='ISA(118K)',REGION=220K
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//CITWK DD UNIT=2314,DISP=SHR,DSN=DUST.CIT.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=SHORT1
//INDEXWK DD UNIT=2314,DISP=SHR,DSN=DUST.TERM.WEEK,
//      DCB=(DSORG=IS,BUFNO=1),VOL=SER=SHORT1
//INDEX DD DSN=DUST.TERM.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=SHORT1,DISP=SHR
//CITATN DD DSN=DUST.CIT.NEW,DCB=(DSORG=IS,BUFNO=1),UNIT=2314,
//      VOL=SER=SHORT1,DISP=SHR
//LIBRPTR DD SYSOUT=A
//USERPRT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141,BUFNO=1)
//REQUEST DD *
12000 2000 1 XREF
FIRE * CONTROL * ( GRAIN + AGRICULTURAL + SUGAR + FLOUR + STARCH ) * - EXPLOSION

@9999KRE-1
//AUTHOR DD DSN=EEAUTH,DISP=(NEW,PASS),VOL=SER=SHORT1,UNIT=2314,
//      DCB=(RECFM=FB,LRECL=24,BLKSIZE=1800,BUFNO=1),
//      SPACE=(TRK,(1,1))
//KEYWORD DD DSN=EEKEY,DISP=(NEW,PASS),UNIT=SCRATCH,
//      DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805,BUFNO=1),
//      SPACE=(TRK,(3,2))
//S3 EXEC PGM=KEYPRT,PARM='ISA(04K),NR',REGION=48K
//SYSPRINT DD SYSOUT=A
//OUT DD SYSOUT=A
//OUTCARD DD DUMMY
//SORTIN DD DSN=EEKEY,DISP=(OLD,DELETE),UNIT=SCRATCH,
//      DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805)
//SORTOUT DD DSN=EETEMP2,DISP=(NEW,DELETE),UNIT=SCRATCH,
//      SPACE=(TRK,(3,2)),DCB=(RECFM=FB,LRECL=19,BLKSIZE=1805)
//SYSOUT DD SYSOUT=A
```

DUST Retrieval Program with Key Word Indexes and No Key Word Index Card Output (Continued)

```
//SORTLIB DD DISP=SHR,DSN=SYS1.SORTLIB  
//SORTWK01 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)  
//SORTWK02 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)  
//SORTWK03 DD UNIT=SCRATCH,SPACE=(TRK,(30),,CONTIG)
```

Recreate DUST Files and Programs on SHORT1

```
//DUSTDUMP JOB A0129,MOON,MSGLEVFL=(1,1)
//JOB LIB DD DSN=RIC.PROG,UNIT=2314,VOL=SER=RICIRS,DISP=SHR
//S1 EXEC MOD,PACK=SHORT1
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.CIT.WEEK
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.TERM.WEEK
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.WEEK.NEW
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.PROG
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.CIT.NFW
  SCRATCH VOL=2314=SHORT1,DSNAME=DUST.TERM.NEW
//LOAD1 EXEC PGM=IEBISAM,PARM=LOAD
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD UNIT=(TAPE,,DEFER),VOL=SER=DUST01,DISP=(OLD,PASS),
// LABEL=(2,SL),DCB=(RECFM=FB,LRECL=80,BLKSIZE=640),
// DSN=DUST.CIT.NEW
//SYSUT2 DD UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),DCB=(DSORG=IS),
// SPACE=(CYL,(5,5)),DSN=DUST.CIT.NEW
//UNL JAD2 EXEC PGM=IEBISAM,PARM=LOAD
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD UNIT=(TAPE,,DEFER),VOL=SER=DUST01,DISP=(OLD,PASS),
// LABEL=(3,SL),DCB=(RECFM=FB,LRECL=80,BLKSIZE=640),
// DSN=DUST.TERM.NEW
//SYSUT2 DD UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),DCB=(DSORG=IS),
// SPACE=(CYL,(5,5)),DSN=DUST.TERM.NFW
//S25 EXEC PGM=DUM,PARM='ISASIZE(6K)',REGION=76K,COND=(9,LT)
//PLIDUMP DD SYSOUT=A
//CITWK DD DSN=DUST.CIT.WEEK,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// DCB=(RECFM=VB,LRECL=912,BLKSIZE=916,DSORG=IS,KEYLEN=4,RKP=8,
// OPTCD=U,BUFNO=1,CYLOFL=0),SPACE=(CYL,(1,1)),UNIT=2314
//INDXWK DD DSN=DUST.TERM.WEEK,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// UNIT=2314,DCB=(RECFM=VB,LRECL=7220,BLKSIZE=7233,KEYLEN=15,RKP=5,
// DSORG=IS,OPTCD=U,CYLOFL=0,BUFNO=1),SPACE=(CYL,(1,1))
//MASTER DD DSN=DUST.WEEK.NEW,DISP=(NEW,KEEP),VOL=SER=SHORT1,UNIT=2314,
// SPACE=(TRK,(1,1)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280)
//S2 EXEC PGM=IEBCOPY
//SYSPRINT DD SYSOUT=A
```

Recreate DUST Files and Programs on SHORT1 (Continued)

```
//SYSUT1 DD DSN=PIG.PROG,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//SYSUT2 DD DSN=DUST.PROG,UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// SPACE=(TRK,(8,2,2))
//SYSIN DD *
COPY OUTDD=SYSUT2,INDD=SYSUT1
SELECT MEMBER=(SIGAP,KEYDRT,AUTHPRT)
```


Weekly Update for RICIRS

```
//A245GSUP JOB A0129,EVANS,MSGLEVEL=(1,1)
/*JOBPARM LINES=30
//JOB LIB DD DSN=RIC.PROG,UNIT=2314,VOL=SER=RICIRS,DISP=SHR
//S0 EXEC PGM=IEFHRI4,REGION=32K
//DD3 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=RIC.WORD
//DD4 DD DSN=RIC.SORTWD,VOL=SER=SHORT1,UNIT=2314,DISP=(OLD,DELETE)
//DD5 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.CIT.WEEK
//DD6 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.TERM.WEEK
//DD7 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.WEEK.OLD
//S0 EXEC MOD,PACK=RICIRS
  RENAME DSN=RIC.WEEK.NEW,VOL=2314=RICIRS,NEWNAME=RIC.WEEK.OLD
//S1 EXEC PRC=SORTD,TIME=(1,30)
//SORTIN DD *
//SORTOUT DD UNIT=SCRTCH,DISP=(NEW,PASS),DSN=88TRANS,
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=3520),
//      SPACE=(CYL,(15,5),RLSE)
//SORTWK01 DD UNIT=SCRTCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK02 DD UNIT=SCRTCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK03 DD UNIT=SCRTCH,SPACE=(CYL,(20),,CONTIG)
//SYSIN DD *
  SORT FIELDS=(62,9,CH,A,75,1,CH,A,74,1,CH,A)
//S2 EXEC PGM=UPDAT2,REGION=76K,PARM='ISASIZE(4K)',COND=(9,LT),TIME=2
//SYSPRINT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A
//TRANS DD DSN=88TRANS,UNIT=SCRTCH,DISP=(OLD,PASS)
//MASTER DD DSN=RIC.WEEK.NEW,UNIT=2314,VOL=SER=RICIRS,
//      DISP=(NEW,KEEP),SPACE=(CYL,(1,1)),
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280,BUFNO=1)
//MASTER1 DD DSN=RIC.WEEK.OLD,UNIT=2314,VOL=SER=RICIRS,
//      DISP=(OLD,KEEP),DCB=BUFNO=1
//WEEK DD *
//S1 EXEC PGM=CITN,PARM='[SA(6K)',REGION=72K,COND=(9,LT)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//DATAIN DD DSN=RIC.WEEK.NEW,DISP=SHR,VOL=SER=RICIRS,UNIT=2314,
```

Weekly Update for RICIRS (Continued)

```
// DCH=BUFNO=1
//CITATN DD DSN=RIC.CIT.WEEK,DISP=(NEW,KEEP),UNIT=2314,VOL=SER=RICIRS,
// SPACE=(CYL,(6)),DCH=(CYLOFL=0,OPTCD=U,DSORG=IS)
//WORD DD DSN=RIC.WORD,VOL=SER=SHORT1,UNIT=2314,DISP=(NEW,KEEP),
// SPACE=(CYL,(15,5)),DCH=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//MSGPRT DD SYSOUT=A
//SORTCD DD DSN=88SORTCARD,UNIT=SCRTH,DISP=(NEW,PASS),SPACE=(TRK,1)
//S2 EXEC SYMSORT,TRACKS=500,TIME=2
//SYSIN DD DSN=88SORTCARD,DISP=(OLD,DELETE)
//SORTIN DD DSN=RIC.WORD,DISP=(OLD,KEEP),VOL=SER=SHORT1,UNIT=2314,
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//SORTOUT DD DSN=RIC.SORTWD,UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290),
// SPACE=(CYL,(15,5))
//S4 EXEC PGM=TERM,PARM='ISA(16K)',REGION=72K,COND=(9,LT)
//SYSPRINT DD SYSOUT=A,DCH=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//TERMOUT DD DSN=RIC.TERM.WEEK,UNIT=2314,VOL=SER=RICIRS,
// DISP=(NEW,KEEP),
// DCB=(CYLOFL=0,OPTCD=U,DSORG=IS),SPACE=(CYL,(3))
//DOCWORD DD DSN=RIC.SORTWD,DISP=(OLD,KEEP),UNIT=2314,VOL=SER=SHORT1
//MSGPRT DD SYSOUT=A
//BWDPRD DD SYSOUT=A
//S1 EXEC PGM=PRINTM,PARM='ISASIZE(35K),NR',REGION=86K
//AUTHOR DD SYSOUT=A
//KEYWORD DD SYSOUT=A
//TERM DD DSN=RIC.TERM.WEEK,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//SEI EXEC LIST,PACK=RICIRS,COND=(9,LT)
LISTVTEC FORMAT,VOL=2314=RICIRS
LISTPDS VOL=2314=RICIRS,DSNAME=RIC.PROG
```

Edited Key Word Index Card Printing JCL

```
//H383LM JOB A0129,MOON
//SI EXEC PGM=CARDPRT,PARM='ISA(4K)',REGION=36K
//STEPLIB DD DSN=RIC.PROG,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//OUT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A
//IN DD *
BINARY          974009721,999999999,999999999,999999999,
CRYSTAL-STRUC    974009721
ETCHING          973009880
GDFE03          973009880,974009720
LAFE03          974009720
LATTICE-PARAM    973009880
PREPARATION      973009880,974009720,974009721
SINGLE-CRYSTAL    973009880,974009720,974009721
SMFE03          973009880,974009720,974009721
SYSTEM          974009721
TBFE03          973009880,974009720,974009721
```

DUST Update JCL

```
//R383LM2 JOB A0129.MOON.MSGLEVEL=(1,1)
/*JOBPARM LINES=30
//JOBLIB DD DSN=RIC.PROG,UNIT=2314,VOL=SER=RICIRS,DISP=SHR
//S0 EXEC PGM=IEFBR14,REGION=32K
//DD1 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=DUST.CIT.NEW
//DD2 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=DUST.TERM.NEW
//DD3 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=RIC.WORD
//DD4 DD DSN=RIC.SORTWD,VOL=SER=SHORT1,UNIT=2314,DISP=(OLD,DELETE)
//DD5 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=DUST.CIT.WEEK
//DD6 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=DUST.TERM.WEEK
//DD7 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=DUST.WEEK.OLD
//DD8 DD DSN=DUST.MASTER.NEW,UNIT=2314,VOL=SER=SHORT1,DISP=(OLD,DELETE)
//S1 EXEC PROC=SORTD,TIME=(1,30)
//SORTIN DD *
/*
//SORTOUT DD UNIT=SCRATCH,DISP=(NEW,PASS),DSN=88TRANS,
//      DCC=(RECFM=FB,LRECL=80,BLKSIZE=3520),
//      SPACE=(CYL,(15,5),RLSE)
//SORTWK01 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK02 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK03 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SYSIN DD *
      SORT FIELDS=(62,9,CH,A,75,1,CH,A,74,1,CH,A)
/*
//S1 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//SYSUT1 DD UNIT=(2400,,DEFER),DISP=(OLD,KEEP),LABEL=(1,SL),
//      DSN=DUST.MASTER.NEW,VOL=SER=DUST01
//SYSUT2 DD DSN=DUST.MASTER.OLD,UNIT=2314,VOL=SER=SHORT1,
//      DISP=(NEW,KEEP),SPACE=(CYL,(2,2))
//S2 EXEC PGM=UPDAT2,REGION=76K,PARM='ISASIZE(4K)',COND=(9,LT),TIME=2
//SYSPRINT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A
//TRANS DD DSN=88TRANS,UNIT=SCRATCH,DISP=(OLD,PASS)
```

DUST Update JCL (Continued)

```
//MASTER2 DD DSN=DUST.MASTER.NEW,UNIT=2314,VOL=SER=SHORT1,
// DISP=(NEW,KEEP),SPACE=(CYL,(2,2)),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280,BUFNO=1)
//MASTER1 DD DSN=DUST.MASTER.OLD,UNIT=2314,VOL=SER=SHORT1,DISP=SHR,
// DCB=BUFNO=1
//WEEK DD *
//S1 EXEC PGM=CITN,PARM='ISA(6K)',REGION=72K,COND=(9,LT)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//DATAIN DD DSN=DUST.MASTER.NEW,DISP=SHR,VOL=SER=SHORT1,UNIT=2314,
// DCB=BUFNO=1
//CITATN DD DSN=DUST.CIT.NEW,DISP=(NEW,KEEP),UNIT=2314,VOL=SER=SHORT1,
// SPACE=(CYL,(4)),DCB=(CYLOFL=0,OPTCD=U,DSORG=IS)
//WORD DD DSN=RIC.WORD,VOL=SER=SHORT1,UNIT=2314,DISP=(NEW,KEEP),
// SPACE=(CYL,(15,5)),DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//MSGPRT DD SYSOUT=A
//SORTCD DD DSN=SSORTCARD,UNIT=SCRTCH,DISP=(NEW,PASS),SPACE=(TRK,1)
//S2 EXEC SYMSORT,TRACKS=500,TIME=2
//SYSIN DD DSN=SSORTCARD,DISP=(OLD,DELETE)
//SORTIN DD DSN=RIC.WORD,DISP=(OLD,KEEP),VOL=SER=SHORT1,UNIT=2314,
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//SORTOUT DD DSN=RIC.SORTWD,UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290),
// SPACE=(CYL,(15,5))
//S4 EXEC PGM=TERM,PARM='ISA(16K)',REGION=72K,COND=(9,LT)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//TERMOUT DD DSN=DUST.TERM.NEW,UNIT=2314,VOL=SER=SHORT1,
// DISP=(NEW,KEEP),
// DCB=(CYLOFL=0,OPTCD=U,DSORG=IS),SPACE=(CYL,(2))
//DOCWORD DD DSN=RIC.SORTWD,DISP=(OLD,KEEP),UNIT=2314,VOL=SER=SHORT1
//MSGPRT DD SYSOUT=A
//BWDPRD DD SYSOUT=A
//S EXEC PGM=IEFBR14,COND=(9,LT),REGION=32K
//DD1 DD DSN=DUST.WEEK.NEW,VOL=SER=SHORT1,UNIT=2314,DISP=(OLD,DELETE)
```

DUST Update JCL (Continued)

```
//S25 EXEC PGM=DUM,PARM='ISASIZE(6K)',REGION=76K,COND=(9,LT)
//CITWK DD DSN=DUST.CIT.WEEK,VOL=SER=SHORT1,DISP=(NEW,KEEP),UNIT=2314,
// DCB=(DSORG=IS,OPTCD=U,CYLOFL=0,BUFNO=1),SPACE=(CYL,(1))
//INDXWK DD DSN=DUST.TERM.WEEK,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// UNIT=2314,
// DCB=(DSORG=IS,OPTCD=U,CYLOFL=0,BUFNO=1),SPACE=(CYL,(1))
//MASTER DD DSN=DUST.WEEK.NEW,DISP=(NEW,KEEP),VOL=SER=SHORT1,UNIT=2314,
// SPACE=(TRK,(1,1)),DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280)
//PLIDUMP DD SYSOUT=A
//S1 EXEC PGM=PRINTM,PARM='ISASIZE(36K),NR',REGION=86K
//AUTHOR DD SYSOUT=A
//KEYWORD DD SYSOUT=A
//TERM DD DSN=DUST.TERM.NEW,VOL=SER=SHORT1,UNIT=2314,DISP=SHR
//S2 EXEC PGM=IFHCOPY
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSN=PICT.PROG,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//SYSUT2 DD DSN=DUST.PROG,UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// SPACE=(TRK,(8,2,2))
//SYSIN DD *
COPY OUTDD=SYSUT2,INDD=SYSUT1
SELECT MEMBER=(SIGAR,KEYPRT,AUTHPRT)
```

Monthly Update for RICIRS

```
//A245GSUP JOB A0129,EVANS,MSGLEVEL=(1,1)
/*JCHPARM LINES=30
//JOHLIB DD DSN=RIC.PROG,UNIT=2314,VOL=SER=RICIRS,DISP=SHR
//S0 EXEC PGM=IEFBR14,REGION=32K
//DD1 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.CIT.NEW
//DD2 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.TERM.NEW
//DD3 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=SHORT1,DSN=RIC.WORD
//DD4 DD DSN=RIC.SORTWD,VOL=SER=SHORT1,UNIT=2314,DISP=(OLD,DELETE)
//DD5 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.CIT.WEEK
//DD6 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.TERM.WEEK
//DD7 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.WEEK.OLD
//DD8 DD DISP=(OLD,DELETE),UNIT=2314,VOL=SER=RICIRS,DSN=RIC.MASTER.OLD
//S0 EXEC MOD,PACK=RICIRS
  RENAME DSN=RIC.MASTER.NEW,VOL=2314=RICIRS,NEWNAME=RIC.MASTER.OLD
//S1 EXEC PROC=SORTD,TIME=(1,30)
//SORTIN DD *
/*
//SORTOUT DD UNIT=2314,DISP=(NEW,KEEP),DSN=TRANS,
// VOL=SER=SHORT1,
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=3520),
//      SPACE=(CYL,(15,5),RLSE)
//SORTWK01 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK02 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SORTWK03 DD UNIT=SCRATCH,SPACE=(CYL,(20),,CONTIG)
//SYSIN DD *
      SORT FIELDS=(62,9,CH,A,75,1,CH,A,74,1,CH,A)
/*
//S2 EXEC PGM=UPDATE,REGION=66K,PARM='ISA(4K)',COND=(9,LT),TIME=2
//OUT DD SYSOUT=A
//PLIDUMP DD SYSOUT=A
//TRANS DD DSN=TRANS,UNIT=2314,DISP=(OLD,KEEP),VOL=SER=SHORT1
//MASTER2 DD DSN=RIC.MASTER.NEW,UNIT=2314,VOL=SER=RICIRS,
// DISP=(NEW,KEEP),SPACE=(CYL,(28,2)),
//      DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280,BUFNO=1)
//MASTER1 DD DSN=RIC.MASTER.OLD,UNIT=2314,VOL=SER=RICIRS,
```

Monthly Update for RICIRS (Continued)

```
// DISP=(OLD,KEEP),DCB=BUFNO=1
//WEEK DD DSN=RIC.WEEK.NEW,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//S1 EXEC PGM=CITN,PARM='ISA(6K)',REGION=72K,COND=(9,LT)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//DATAIN DD DSN=RIC.MASTER.NEW,DISP=SHR,VOL=SER=RICIRS,UNIT=2314,
// DCB=BUFNO=1
//CITATN DD DSN=RIC.CIT.NEW,DISP=(NEW,KEEP),UNIT=2314,VOL=SER=RICIRS,
// SPACE=(CYL,(40)),DCB=(CYLOFL=0,OPTCD=U,DSORG=IS)
//WORD DD DSN=RIC.WORD,VOL=SER=SHORT1,UNIT=2314,DISP=(NEW,KEEP),
// SPACE=(CYL,(15,5)),DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//MSGPRT DD SYSOUT=A
//SORTCD DD DSN=88SORTCARD,UNIT=SCRTCH,DISP=(NEW,PASS),SPACE=(TRK,1)
//S2 EXEC SYMSORT,TRACKS=500,TIME=2
//SYSIN DD DSN=88SORTCARD,DISP=(OLD,DELETE)
//SORTIN DD DSN=RIC.WORD,DISP=(OLD,KEEP),VOL=SER=SHORT1,UNIT=2314,
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290)
//SORTOUT DD DSN=RIC.SORTWD,UNIT=2314,VOL=SER=SHORT1,DISP=(NEW,KEEP),
// DCB=(RECFM=FB,LRECL=18,BLKSIZE=7290),
// SPACE=(CYL,(15,5))
//S4 EXEC PGM=TERM,PARM='ISA(16K)',REGION=72K,COND=(9,LT)
//SYSPRINT DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//PLIDUMP DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//TERMOUT DD DSN=RIC.TERM.NEW,UNIT=2314,VOL=SER=RICIRS,
// DISP=(NEW,KEEP),
// DCB=(CYLOFL=0,OPTCD=U,DSORG=IS),SPACE=(CYL,(10))
//DOCWORD DD DSN=RIC.SORTWD,DISP=(OLD,KEEP),UNIT=2314,VOL=SER=SHORT1
//MSGPRT DD SYSOUT=A
//BWDPRD DD SYSOUT=A
//S EXEC PGM=IEFBRI4,COND=(9,LT),REGION=32K
//DD1 DD DSN=RIC.WEEK.NEW,VOL=SER=RICIRS,UNIT=2314,DISP=(OLD,DELETE)
//S25 EXEC PGM=DUM,PARM='ISASIZE(6K)',REGION=76K,COND=(9,LT)
//PLIDUMP DD SYSOUT=A
//CITWK DD DSN=RIC.CIT.WEEK,VOL=SER=RICIRS,DISP=(NEW,KEEP),UNIT=2314,
// DCB=(DSORG=IS,OPTCD=U,CYLOFL=0,BUFNO=1),SPACE=(CYL,(1))
```


Monthly Update for RICIRS (Continued)

```
//INDEXWK DD DSN=RIC.TERM.WEEK,VOL=SER=RICIRS,DISP=(NEW,KEEP),UNIT=2314,
// DCB=(DSORG=IS,OPTCD=U,CYLOFL=0,BUFNC=1),SPACE=(CYL,(1))
//MASTER DD DSN=RIC.WEEK.NEW,DISP=(NEW,KEEP),VOL=SER=RICIRS,UNIT=2314,
// SPACE=(TRK,(1,1)),DCB=(RECFM=FB,LRECL=30,BLKSIZE=7280)
//SI EXEC PGM=PRINTM,PARM='ISASIZE(36K),NR',REGION=86K
//AUTHOR DD SYSOUT=A
//KEYWORD DD SYSOUT=A
//TERM DD DSN=RIC.TERM.NEW,VOL=SER=RICIRS,UNIT=2314,DISP=SHR
//SE1      EXEC LIST,PACK=RICIRS,COND=(9,LT)
           LISTVTDC FORMAT,VOL=2314=RICIRS
           LISTPDS VOL=2314=RICIRS,DSNAME=RIC.PROG
```