LA-5525-M, Vol. 2

MANUAL

i

Guide to the Program Library and Abstracts

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PROGRAMMER'S INFORMATION MANUAL

LA-5525-M, Vol. 2
Manual
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Guide to the
Program Library and Abstracts

COMPUTER INFORMATION SERVICES
GROUP C-4, PHONE (505) 667-6946

LOS ALAMOS SCIENTIFIC LABORATORY
OF THE
UNIVERSITY OF CALIFORNIA

MANUAL REVISION

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Replace ii.
Replace all of Part II
Replace Index 1-2 thru Index 1-23 with Index 1-2 thru Index 1-24.
Replace Index 2-1

CCF Newsletters Cancelled

CCF:PIM-2: 10 thru 17, 19 thru 26, 28, 29.

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AFTER YOU HAVE UPDATED YOUR MANUAL

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PART I

PROGRAM LIBRARY USAGE

CHAPTER 1 INTRODUCTION

Experience in the computing field has shown the desirability of maintaining libraries of commonly-used programs and subroutines in order to improve programmer productivity. Group C-4 maintains such a library, the C-Division Program Library, at LASL. This library is located in Room 11 adjacent to the User's Area in Building SM-132, phone 6992.

Volume 2 of PIM is devoted to the Program Library. It contains the abstracts of the C-Division programs. It defines the program classification codes under which all C-Division programs are classified. It includes a description of how to use the library and how to submit new or revised programs.

THE PROGRAM AND WRITEUP COLLECTION

The Program Library houses several collections of programs and their documentation in order to relieve the programmer of the necessity of writing non-trivial often-used programs. Due to extensive use and multiple-user checkout, the quality of the library programs is constantly improving in accuracy and efficiency. Programs for a wide range of problems and applications are available.

The collections include more than 500 programs written and maintained by C-Division as well as programs which have been made available by other organizations such as the CDC Users' Group (VIM).

The Local Library contains two types of programs. The Type 1 collection should be considered the first source of programs. A program will be classified Type 1 if C-Division accepts responsibility for its maintenance, conversion to new CCF computers, etc. Most Type 1 programs are written

by C-Division or CCF programmers. The Program Library will act as custodian for a program, designated Type 2, which anyone desires to have placed in the centrally-located repository. The submittor retains all responsibility for the program. Some of the frequently-used programs in the Local Library are placed in the System Library or other libraries residing on disk storage in the computers.

The procedures for using any of the collections of programs are generally similar. All materials may be obtained through the librarians, although the Local Library is also self-service. The materials are found in the following files.

Local Library	Location
Abstract File	PIM Volume 2
Abstract, Writeup, and Listing File	Librarians' Office
System Library File	CDC 6600/7600 Disk
Card Deck File	Users' Area

Other Libraries	Location
Abstract, Writeup, and Listing File	Librarians' Office

THE REFERENCE COLLECTION

The Program Library houses several collections of manuals and newsletters in order to facilitate the distribution of new documents and revisions. These collections include manuals and newsletters published by C-Division and manuals published by other organizations such as Control Data.

The library also maintains distribution lists of manual holders and newsletter subscribers so that manual

updates and newsletters may be sent automatically to the people who need them.

LIBRARY STAFF

The library is basically self-service, but there are librarians and a Program Library coordinator to assist programmers in the use of the library and to be responsible for the operation and maintenance of the library. The librarians will also perform services such as the reproducing and interpreting of card decks. The C-Division Program Library personnal are:

Librarians -- Marge Olson and Sylvia Wohlberg, phone 6992
Program Library Coordinator -- Chester Kazek, phone 5284

In addition to the staff, several committees are directly associated with the library.

The Program Library Steering Committee assists the Program Library Coordinator in the formation of policies which reflect the needs of the CCF programmers.

The Program Review Committee assists the Program Library Coordinator in the evaluation of programs and assists the CCF programmers in the use of the library programs. Committee members and their areas of responsibility are indicated in Chapter 4.

The Documentation Review Committee assists the Program Library Coordinator in the evaluation of program documentation.

CHAPTER 2 - USING THE PROGRAM LIBRARY

Examine the program abstract list in Appendix A of this volume and the abstracts in the other chapters. If there is a suitable program, obtain the documentation from the Writeup and Listing File. Determine from the abstract whether the program resides on disk or cards. If it is on disk, it is in the System Library and the programmer may use the routine simply by calling it properly within his program. If it is on cards, the programmer may reproduce the library copy of the deck. The librarians are happy to reproduce library documents or library decks; writeups and cards can be put on the output shelves.

If no suitable program is listed, the programmer should look in the program abstract lists of other libraries. Books of short writeups are also available, as well as longer writeups and listings of programs which have been ordered previously. Any of these documents may be reproduced. Many of the programs not available locally may be ordered by the Program Library, an order which may result in a delay of one to three weeks.

If no suitable program can be found, the Program Review Committee or the Program Library Coordinator should be contacted. Group C-4 can be requested to assist in producing programs.

If a programmer becomes aware of a program available in another library which would be useful locally with some modifications, he should contact the Program Library Coordinator.

CHAPTER 3 - SUBMITTING MATERIAL TO THE PROGRAM LIBRARY

CONTENTS

SUBMISSION OF NEW PROGRAMS

If a programmer wishes to include a program in the Type 1 or 2 Library, he prepares documentation according to the instructions given in this section. The Program Library Coordinator will decide whether the program is of Type 1 or Type 2 and will assign a program designation. Generally, every Type 1 routine is submitted with a separate program designation and submittal sheet. However, internal routines transparent to the user may be included with the primary routines. On approval of the Program Library Coordinator, the librarian will have writeups, listings, and decks duplicated and placed in the library files.

RESPONSIBILITIES OF THE SUBMITTER

1. Writing, testing, and documentation of his own program.

2. Determining to the best of his ability that the program does not duplicate a program already in the Program Library.

3. Discussing and changing submittals as requested by the Program Library Coordinator.

4. For programs which are to be included in the System Library of a given system, assisting the systems programmers for that system as necessary in placing the routine in the Systems Library and in any necessary checkout.

5. Assisting the C-Division Consultants with questions about the program once it is included in the Program Library.

6. For subroutines and functions with long argument lists, considering the passage of arguments through a labeled CØMMØN, since dummy arguments are very expensive in space and time.

LIST OF MATERIALS WHICH MUST BE SUBMITTED WITH EACH PROGRAM

1. The submittal sheet (forms available in the Program Library) from which abstract cards will be punched. A complete description is given on page 3-4.

2. The abstract. See page 3-6.

3. The writeup. This material, combined with the listing of the abstract cards, will form the complete writeup. See page 3-8.

4. The compiler- or assembler-produced program listing. This listing will be generated by the librarian. See page 3-9.

5. The source deck. Optional for Type 2 program. See page 3-9.

6. The binary deck. This deck will be generated by the librarian. Optional for a Type 2 program. See page 3-10.

7. The test problem which was used to check out the routine. Optional for a Type 2 program. See page 3-10.

   a. Card deck
   b. Documentation, including source listing and dayfile. These listings should be exactly as they come out of the computer.
   c. Actual input
   d. Actual output

NOTE: All decks submitted, including test decks, must be those which produced the accompanying listings. Duplicates of the decks actually used are not acceptable since they may be punched incorrectly.

THE SUBMITTAL SHEET

Submittal sheets are available from the Program Library. Generally, a separate submittal sheet is submitted for each routine and for each computer (see page 3-2). An example is given on page 3-11.

Only the starred items are to be filled in by the submitter, and these items are to be filled in with pencil. Unless specifically stated, all items should be left-adjusted.

The following describes the information required on this form.

1. Date of Submittal.

2. Submitter's Installation Code - Always LA.

3. Program designation (6 characters allowed): See page 3-2.

* 4. Submitter's name (17 characters allowed): The name of the person submitting the routine, who will be contacted in case of trouble with the routine, ambiguity in the writeup, etc.

* 5. Submitter's group (12 characters allowed): e.g., GMX-3.

6. Reviewer's name (17 characters allowed): The member of the Program Review Committee who will be contacted to answer questions regarding the differences between this and similar routines, the validity of this routine in relation to a particular application, etc. (Previously, this field was used for the author of the routine.)

* 7. Year completed (2 characters allowed): Last two digits of the year completed.

* 8. Title (57 characters allowed): The title of the routine, which may include punctuation. Include nicknames or abbreviations by which the program is widely known, not just the name of the routine.

* 9. Principal Source Language (7 characters maximum). For consistency, please use the following abbreviations.

ALG	= ALGØL	F2	= FØRTRAN II
ATC	= Autocoder	GAP	= Autocoder
CØBØL	= CØBØL	LSC	= LACENT
CMP	= CØMPASS	MDC	= MADCAP
F4	= FØRTRAN IV	SPS	= Autocoder
FTN	= FØRTRAN IV Extended		

* 10. Secondary Source Language (7 characters maximum). As above if portions of the program are written in other than the primary source language.

* 11. Type of Routine (2 characters maximum). Choose from the following codes:

CD = Console Deck, a self-loading deck such as an operator's core dump.

IR = Independent Routine, loads into core and operates independently of any monitor system.

MP = Main Program, a program which is essentially independent, relies on an external monitor system for some functions.

MS = Monitor System, a complete system which provides a framework within which other programs are operated.

ØR = Open Routine, which would normally be inserted in-line in the user's program. Macro-instructions of the type allowed in assembly languages would be given this designation.

SR = Closed Subroutine, entered from some other routine, via a calling sequence.

* 12. Machine (7 characters maximum). The number of the machine, such as: 7600, 6600, or 1401.

* 13. Monitor or Operating System Required (7 characters maximum). To be filled in only if the program is system dependent; for example, it calls AFSREL in CRØS or CPAREA in SCØPE.

SCP 3.1 = SCØPE 3.1 (CDC 6600).

CRØS = CDC 7600

* 14. Special Requirements (12 characters maximum, right-justified). Describe any special facilities which must be requested by the user, e.g., Microfilm, CALCØMP, paper tape, ECS, exceptional amounts of LCM or Central Memory.

15. No longer used.

16. Documents Available (2 entries, 3 characters maximum in each, right-justified). Indicate number of pages in the listing.

17. Type of Support (1 character).

18. Primary Form (20 characters maximum). Usually source language; e.g., F4 SØURCE CARDS.

    a. Count (5 characters maximum). Number of cards.
    b. Medium (3 characters maximum). Choice of one of the following:

        BCD = cards which have only BCD punching
        BIN = cards which have any binary punching
        nTP = n reels of magnetic tape.

19. Additional Form (20 characters maximum). Usually object language; e.g., F4 ØBJECT CARDS. Same as item #18.

20. Search Key (63 characters maximum). A brief description of the program, used for permuted indexing. Every key word in the search key should be preceded by an asterisk (*). Note that the search key itself is listed in the permuted index and should, therefore, not simply be a list of subject categories.

21. Identification (5 characters maximum). Same as item #3.

22. Residence (7 characters maximum):

    ØN DISK = if in the System Library,
    CARDS = if in the Program Library on cards,
    TAPE = if in the Program Library on tape.

* 23. Language Compatibility (10 characters maximum). This routine expects the calling sequence generated by the CALL statement or its equivalent in the language listed here. Use abbreviations shown in item #9.

24. Writeup Date (8 characters maximum). Date of the current writeup in the form MM/DD/YY.

25. Writeup Revision Number (5 characters maximum). Revision number if this is a revised writeup.

26. Deck Date (8 characters maximum). Date as MM/DD/YY.

27. Deck Revision Number (5 characters maximum). Revision number if this is a revision of the original deck.

THE ABSTRACT

The abstract is included in the Programmer's Information Manual. An example is given on page 3-12. It should be brief enough to be keypunched on ten cards, 61 columns each. All characters in the abstract must be keypunchable, as defined

in PIM Volume 1, pp. 4-37 and 4-38. The abstract should be structured in the following manner.

Form:

The general form (subroutine, function, or main program and the number of arguments). All real and integer arguments should be given names which indicate the type of the argument implicitly. For example,

```
FORM:    Y=SQRT(X)
FORM:    CALL CPWØRD(A)
FORM:    MAIN PRØGRAM
```

Purpose:

A short statement of what the routine does, including some information about the arguments, such as use and dimensionality, if possible.

Storage:

The number of words of central memory and of ECS or LCM required by this routine. Indicate whether the number is octal or decimal.

Timing:

The amount of computer time required by this routine for a particular quantity of data or a typical run.

Externals: or Self Contained:

A list of externals referenced by the routine as indicated by a load map. Both the external name and the program designation, if any, should be given. Externals which are a fundamental part of the system should be marked SYSTEM. Common blocks should be given unique names, perhaps including the program designation, and marked CØMMØN. If the routine references no externals, SELF CØNTAINED should be indicated. For example,

```
LABRT(N103A)
INPUTN(SYSTEM)
M101AC(CØMMØN)
```

THE WRITEUP

The full writeup contains the abstract plus a more detailed description. The full writeup is available through the Program Library. An example is given on page 3-12. A Type 2 routine may optionally refer the user to another source, such as an LA report. The following information should be included in the more detailed description.

Function:

A description of what the routine is capable of doing. This might provide a means of choosing between several similar routines. It should be longer than the PURPOSE although a detailed description of the arguments should be saved for later.

Form:

Same or similar to FORM on abstract.

Arguments:

A complete description of each argument, including type, dimensionality, purpose, and restrictions. Indicate whether each argument is an input, output, or scratch (modified but not an output) argument. Any other input should be described in similar terms.

Method:

A precise description of the technique or mathematics used by the routine, indicating known differences from other similar routines. Include any pertinent references.

Error Conditions:

Describe those conditions which are detected as invalid and the results produced by such conditions. Possible undetectable errors should be pointed out.

Accuracy:

Information about the accuracy of the results of the routine.

Example:

A simple example which has actually been run on the computer. For a subprogram, give a simple driver program, along with sample input and the output produced by this example. Include enough comments to explain the example.

Additional Information:

If the routine is a FØRTRAN main program, the PRØGRAM card should be given, so that the user has the option of overriding the filenames via the execute (or LGØ) card.

Special input/output requirements.

Restrictions or cautions to the user.

A flowchart, if it would be useful to the general user.

THE PROGRAM LISTING

Comments should be used liberally throughout the program.

The librarian will obtain a listing of the source cards generated by the compiler or assembler and will make sure that each page is numbered and labeled with the program designation.

THE SOURCE DECK

The source deck must be the deck which generated the submitted listing, not a duplicated deck. Before submitting the program, it is recommended that the program TIDY (L301) be used to clean up the FØRTRAN statements.

The librarians will sequence and label the source deck. It will be identified by a 5-character program designation (see section on PROGRAM DESIGNATION) in cols. 73-77 of each card and will be numbered sequentially in cols. 78-80 with an increment of 1.

The first source language card will be numbered 1. If feasible, the card numbered 2 should be a comment card containing the title, #8 of the submittal sheet.

THE BINARY DECK

The librarians will generate a binary deck from the source deck.

THE TEST PROBLEM

Necessary documentation, decks, input, and sample output should be provided so that a knowledgeable programmer who is not familiar with the routine can check it out without the submitter's help in case of emergency. The test problem should be brief enough so that the system programmers can use it to check the residence of the routine, if it is included in the System Library.

Tests submitted should have as few lines of output as possible to indicate whether the routine failed or functioned properly. If possible, they should be self-checking, printing a message indicating if the test was successful or not.

SAMPLE SUBMITTAL

- PLEASE FOLLOW INSTRUCTIONS GIVEN IN PIM VOL. 2, CHAPTER 3 -

LASL - CCF PROGRAM SUBMITTAL FORM

(Programmers Fill in Only Numbers Marked with *)

1 Date of Submittal 09/23/70

2 Submitter's Installation Code	LA^	ALL CARDS	1-3
3 Program Number or Designation (and Suffix)	F415A^	ALL CARDS	4-8
* 4 Submitter's Name	MØRRIS^KLEIN		A22-38
* 5 Submitter's Department (primarily for internal use)	C-6		A39-50
6 Reviewer's Name	B.^L.^BUZBEE		A51-67
* 7 Year Completed (last 2 digits) or Status Code	70		A68-69
* 8 Title	ECS^GENERAL^LINEAR^SYSTEM^SOLVER	Title Card	B12-68
* 9 Principle Source Language	F4^^^^^		C12-18
*10 Secondary Source Language			
*11 Type of Routine	SR		C26-27
*12 Machine	6600^^^		C28-34
*13 Monitor or Operating System Required	SCP,3.1		C35-41
*14 Special Machine Requirements	ECS		C42-53
15 Non-Library Routines or Subr. Req.	.NØNE		D12-30
16 Documents Available (indicate page counts): Short Write-up	SW^^5		D31-40
Listing	LS^^3		D41-45
17 Type of Support	TYPE^1		D51-57
Program Material Avail.			
18 Primary Form	SØURCE^CARDS		E12-31
a. Count	122	b. Medium BCD	E32-39
19 Additional Form	^^^^ØBJECT^CARDS		E40-59
a. Count	39	b. Medium BIN	E60-67
20 Search Key	*ECS*GENERAL*LINEAR*SYSTEM*SØLVER	Search Card	F12-74
21 Identification	LA^F415A		Cols. 1-8
22 Residence	^G*CARDS^^		Cols. 9-18
* 23 Language Compatibility	F4^^COMPAT		Cols. 24-33
24 Write-up Date	WU^09/23/70		Cols. 37-47
25 Write-up Revision Number	REV^0		Cols. 48-52
26 Deck Date	DECK^09/23/70		Cols. 54-66
27 Deck Revision Number	REV^0	CARD G	Cols. 67-71

SAMPLE ABSTRACT

FORM: CALL ECSGLSS(IM,IN,IK,IL,NR,A,D,IR,IY,B,IB, X,JX,EPS)

PURPØSE: SØLVE IN THE LEAST SQUARES SENSE THE GENERAL LINEAR SYSTEM CX=Y WHEN C AND Y ARE STØRED CØLUMN-WISE IN ECS.

STØRAGE: 717 (ØCTAL) WØRDS. AT LEAST IM*IN+IM=IK WØRDS RESERVED IN ECS.

TIMING: DEPENDS ØN SIZE ØF PRØBLEM. SEE FULL WRITEUP.

ROUTINE NAME: ECSGLSS

ENTRY NAME: ECSGLSS

EXTERNALS: DØTPRØ(F124A), LABRT(N103A), SQRT(B408A), VECPRØD, VECSUM(F133A), ECRD, ECWR, EXIT(SYSTEM).

SAMPLE WRITEUP

Function:

ECSGLSS solves in the least squares sense the general linear system CX=Y when the C and Y matrices are stored column-wise in ECS. The IM by IN input matrix C of (1) below is stored in ECS by columns at addresses IR(i), i=1,2,...,IN. The IM by IK input matrix Y of (1) below is stored in ECS by columns at addresses IY(i), i=1,2,...,IK. The IM by NR output matrix CT of (1) below is stored in ECS by columns at addresses IR(i),i=1,2,...,NR. The IM by IK residual matrix CX-Y of (1) below is stored in ECS by columns at addresses IY(i), i=1,2,...,IK.

Form:

CALL ECSGLSS(IM,IN,IK,IL,NR,A,D,IR,IY,B,IB,X,JX,EPS)

Arguments:

IM = column length of a column in C --- input

IN = number of columns in C --- input

IK = number of columns in Y and X --- input

IL = number of rows in B --- input

NR = rank of C --- output

A,D = storage columns having length ≥IM --- scratch

IR = array of size IN containing, in location j, the ECS starting address for column j of matrix C --- input

IY = array of size IK containing, in location j, the ECS starting address for column j of matrix Y --- input

B = auxiliary matrix of size IL by IN, usually set to identity of size IN. See section entitled METHOD for further details. --- input
IL by IN matrix BT of (1) below --- output

IB = column reserved length for B in calling program --- input

X = IL by IN solution matrix BX of (1) below --- output

JX = column reserved length for X in calling program --- input

EPS = machine constant - for 6600 user should set it to 1.E-14 --- input

Method:

Given the matrices C(IM,IN), Y(IM,IK) whose column starting addresses in ECS are stored in arrays IR and IY respectively, the routine forms the factorization

$$\begin{bmatrix} C & Y \\ B & 0 \end{bmatrix} \begin{bmatrix} T & X \\ 0 & -I \end{bmatrix} = \begin{bmatrix} CT & CX-Y \\ BT & BX \end{bmatrix} \qquad (1)$$

where X is the solution to

$$CX=Y \qquad (2)$$

and the first NR columns of CT are orthonormal. Setting B=I, we obtain BX=X, as the solution to (2). When B=I and NR<N, then BT=T; and IN-NR homogeneous solutions of (2) are contained in the last IN-NR columns of T. For further details see the writeup of GLSS (F405).

Error Conditions:

a. Stops 40523, 40537, 40557, 40562, 40563, 40567, and 40570 indicate either an ECRD or ECWR error persists after three attempts.

b. ECSGLSS CALLED WITH ARRAYS DIMENSIØNED WRØNG
or
ECSGLSS CALLED WITH NØNPØSITIVE INDICES
indicates IM,IN,IK, or IL improperly set when routine called.

Accuracy and Timing:

A. Hilbert Segments N=2 to N=10

N	ECSGLSS	GLSS	AVE. NO. CORRECT DIGITS*
	SEC		
2	.002	.002	14.274
3	.002	.002	12.989
4	.004	.004	11.364
5	.006	.006	10.355
6	.008	.008	9.252
7	.012	.008	7.705
8	.014	.014	6.723
9	.016	.014	4.362
10	.022	.018	3.273**

B. Rectangular Identity Blocks

M x N		SEC	
50	3	.006	.006
1000	3	.062	.058
1000	3	.064	.060

* Average number of digits calculated by formula developed by Jordan, T. L., Math. Comp. 22, pp. 579-588, 1968. ECSGLSS, as a modification of GLSS, gives the same number of significant figures as GLSS provided the epsilons, the machine constants, are identical.

** GLSS with its present internal machine constant, failed to solve the 10 by 10 Hilbert Segment. However, resetting EPS in GLSS to 1.E-14 will rectify this problem.

Example:

```
      PROGRAM EXAMPLE (INPUT,ØUTPUT)
      DIMENSIØN C(10,10),B(10)
      DIMENSIØN A(10),AID(10,10)IR(10),IY(10),AEC(10),CEC(10)
      DATA APZERØ/1.E-14/
C EXAMPLE SHØWS A SQ MATRIX C READ INTØ CØRE, THEN WRITTEN CØLUMNWISE
C  INTØ ECS.  THE INFØRMATIØN STØRED IS THEN PRØCESSED BY ECSGLSS
      READ 2,N
    2 FØRMAT(I5)
      ND=N
      NW=N
C MATRIX C READ INTØ MEMØRY RØWWISE
      DØ 200 I=1,N
  200 READ 3,(C(I,K),K=1,N)
    3 FØRMAT(4F20.0)
C SET AID EQUAL TØ IDENTITY  AND  RT HAND SIDE B TØ (1,0,...,0)
      DØ 150 I=1,NW
      B(I)=0.
      DØ 140 K=1,NW
  140 AID(I,K)=0.
  150 AID(I,I)=1.
      B(1)=1.
C STØRE MATRICES C,B  INTØ ECS    NØTE  CA=B
      IR(1)=0
      DØ 4 IWRLP=1,3
      CALL ECWR(C,IR(1),100,JV)
      IF(JV) 5,5,4
    4 CØNTINUE
      STØP 4
    5 DØ 6 IWRLP=1,3
      CALL ECWR(B,100,N,JV)
      IF(JV) 7,7,6
    6 CØNTINUE
      STØP 6
C STØRE  CØL C(J) AT LØC (J-1)*10 IN ECS  (J .LE. 10)
C STØRE  CØL B(1) AT LØC 100
    7 DØ 8 J=1,N
    8 IR(J+1)=J*10
      IY(1)=100
      CALL ECSGLSS(ND,NW,1,NW,NRANK,AEC,CEC,IR,IY,AID,10,A,10,APZERØ)
      PRINT 52, ND,NW,NRANK
   52 FØRMAT(* RANK ØF INPUT MATRIX ØF SIZE *3X,I5,3X*BY*3X,I5,3X*IS*,
     13X,I5)
      PRINT 56, (A(K),K=1,NW)
   56 FØRMAT(*SØLUTIØN VECTØR IS = * 4(1PE20.12,2X)/5(1PE20.12,2X)/
     13(1PE20.12,2X))
      END
```

REVISION OF EXISTING PROGRAMS

A program may be revised for a number of reasons, for example, a faster, more versatile, or more correct version. When a program is revised, the procedure outlined in SUBMISSION OF NEW PROGRAMS may be followed. However, if the revision is relatively minor, the procedure may be altered. After discussing the revisions with the Program Library Coordinator, the submitter and the Program Library Coordinator can determine which parts of the procedure can be omitted. The submitter must specify any items on the submittal sheet which are altered due to revision. Sometimes the old submittal sheet can be altered and resubmitted as the new submittal sheet, thus avoiding unnecessary duplication of effort.

CHAPTER 4 - PROGRAM CLASSIFICATION CODES

The programs in the Program Library are organized according to their function. Each program has a program designation, a four or five character code assigned by the Program Library. The first two characters are the classification code, the first character indicating the primary class, the second character indicating the secondary class within the primary.

Program designations for Type 1 programs have two forms:

General Form	Example
psnn	N103
psnnv	N103A

where ps is a two-character classification code (e.g., N1), nn is a two-digit sequence number assigned by the Program Library (e.g., 03), and v is a one-letter version letter (e.g., A or B). Currently, the version letter A refers to the 6600 and B to the 7600. The program designation without the version letter is meant to refer to all versions of the program.

Program designations for Type 2 programs have the form:

General Form	Example
psxx	N1AA

where ps is a two-character classification code (e.g., N1) and xx is a two-letter sequence assigned by the Program Library (e.g., AA).

IBM 1401 program designations begin with the digit 1, followed by a three-character code assigned by the Program Library.

The classifications shall be reviewed from time to time. It is anticipated that new program developments will show the need for additional classifications. Any program for which no suitable secondary class exists may be assigned the secondary code 0 (zero). Additional secondary classes may be assigned as required to distribute the accumulation of "0"-classed programs into applicable classes. Additional primary classes may be established as required. Suggestions for additional classifications may be submitted to the Program Library Coordinator.

The list of Secondary Classification Codes on the following pages includes the names of the Program Review Committee members who have volunteered to be responsible for the quality of each area of the Type 1 library. These reviewers may be contacted for assistance whenever the C-Division Consultants are not able to help. The nature of the assistance which the reviewers are willing to provide includes answering questions regarding the differences between similar routines and the validity of particular routines in relation to a particular application. If the reviewer is not available, please contact his group leader.

PRIMARY CLASSIFICATION CODES

A. Arithmetic Routines
B. Elementary Functions
C. Polynomials and Special Functions
D. Operations on Functions and Solutions of Differential Equations
E. Approximation Theory and Curve Fitting
F. Numerical Linear Algebra
G. Statistical Analysis and Probability
H. (Not Used)
I. Input with Conversion or Interpretation
J. Output with Conversion or Interpretation
K. Information Transfer with no Particular Conversion or Interpretation Other Than Device-Dependent Requirements
L. Program Maintenance
M. Data Handling
N. Debugging
O. Simulation of Computers and Data Processors - Interpreters
P. (Not Used)
Q. Service
R. (Not Used)
S. Information Retrieval
T. Applications and Application-Oriented Programs
U. Languages
V. (Not Used)
W. File Manipulation
X. (Not Used)
Y. (Not Used)
Z. (Not Used)

SECONDARY CLASSIFICATION CODES

A. Arithmetic Routines (Wayne Fullerton, C-4)

A1. Real Numbers
E.g., multiple precision, fixed, and floating point operations; conversions between floating point and mantissa/characteristic.

A2. Complex Numbers
E.g., multiple precision, fixed, and floating point operations; complex absolute value.

B. Elementary Functions (Wayne Fullerton, C-4)

B1. Trigonometric and inverse trigonometric functions

B2. Hyperbolic functions

B3. Exponential and logarithmic functions

B4. Roots and powers

C. Polynomials and Special Functions

C1. Evaluation of polynomials (J. Hancock, C-4)

C2. Roots of polynomials (J. Hancock, C-4)

C3. Evaluation of special functions (Wayne Fullerton, C-4)
E.g., Bessel, gamma, error, elliptic integrals, exponential integrals.

C4. Simulataneous non-linear algebraic equations (J. Hancock, C-4)
Zeros of non-linear functions.

C5. Simultaneous transcendental equations (J. Hancock, C-4)

D. Operations on Functions and Solutions of Differential Equations

D1. Numerical integration (D. Kahaner, C-6)

D2. Numerical solution of ordinary differential equations (J. Sopka, C-4)

D3. Numerical solution of partial differential equations (F. Dorr, C-4)

D4. Numerical differentiation (D. Kahaner, C-6)

E. Approximation Theory and Curve Fitting

E1. Interpolation and table look-up (B. Swartz, C-6)

E2. Least squares approximation and curve fitting (B. Swartz, C-6)

E3. Smoothing tabular data (B. Swartz, C-6)

E4. Non-linear optimization (M. Klein, C-6)

F. Numerical Linear Algebra

F1. Vector and matrix operations (B. Buzbee, C-4)

F2. Eigenvalues and eigenvectors (B. Buzbee, C-4)
Matrix decompositions.

F3. Determinants (B. Buzbee, C-4)

F4. Simultaneous linear and linear least squares (B. Buzbee, C-4)

F5. Fast transforms (B. Hunt, C-5)
E.g., Fourier.

G. Statistical Analysis and Probability

G1. Descriptive statistics (R. Lohrding, C-5)

G2. Hypothesis testing (R. Lohrding, C-5)

G3. Analysis of experimental design data (R. Lohrding, C-5)

G4. Distribution functions and their inverse (R. Lohrding,C-5

G5. Multivariate analysis (R. Lohrding, C-5)

G6. Time series analysis and processing (R. Hunt, C-5)

G7. Regression analysis (R. Lohrding, C-5)
Includes curve fitting explicitly for statistical purposes.

G8. Random variable generators (R. Lohrding, C-5)

G9. Miscellaneous (R. Lohrding, C-5)

H. (Not Used)

I/J. Input/Output with Conversion or Interpretation

I4. Free form and NAMELIST I/O (J. Moore, C-2)

I5. Graphics (R. Frank, C-4)

K. Information Transfer with no Particular Conversion or Interpretation Other than Device-Dependent Requirements

K1. Direct access core/disk I/O (J. Moore, C-2)

K2. ECS/core, core/core (J. Moore, C-2)

K3. Sequential I/O (J. Norris, C-2)

K4. Convert sequential/random (J. Norris, C-2)

K5. Magnetic tape/tape, tape/core, etc. (J. Norris, C-2)

K6. Paper tape routines (J. Norris, C-2)

L. Program Maintenance
Routines which make it easier to maintain and document programs.

L2. Document (A. Solem, C-4)
E.g., INDEX

L3. Clean (A. Solem, C-4)
E.g., TIDY.

L4. Updating (F. McGirt, C-4)
E.g., UPDATE,AFWL.

M. Data Handling (P. Iwanchuk, C-4)

M1. Sorting

M2. Conversion/Scaling
Pertains to any conversion or scaling routine (packed or unpacked, single or multiple precision), such as card image to BCD, binary to BCD, fixed to floating. The primary function must be conversion or scaling, not input/output.

M3. Merging

M4. Bit and character manipulation
E.g., SHIFT, PUT, FETCH.

N. Debugging (A. Solem, C-4)

N1. Tracing, trapping
E.g., LABRT. Also includes some interrupt handling (see Q2).

N2. Dumping
Core, tape, disk, console printouts (on-line or off-line), e.g., ABØRT, DUMP, DMPPK.

N3. Memory verification and searching

N4. Breakpoint printing

O. Simulation of computers and data processors - Interpreters (J. Neergaard, C-7)

O1. Off-line equipment
Simulate off-line equipment.

O3. Computers
Simulate or interpret compilers for other computers or systems.

O4. Pseudo-computers
Simulation of theoretical or pseudo-computers.

P. (Not Used)

Q. Service (J. Melendez, C-4)

Q1. Time, dayfile, pause
E.g., SECØND, CLØCK, TIME, DATE, REMARK, PAUSE. Also includes some file manipulation (see W).

Q2. Interrupt handling
E.g., XIT, ENTR, RETN, ENDD. Also see N.

Q3. Dynamic storage allocation

Q. (cont'd.)

Q4. Get and set job-related information
E.g., CPAREA, field length, sense switches, package, GETQ, SETQ. Also includes some programming aids (see X) and I/O (see K).

R. (Not Used)

S. Information Retrieval (W. Draisin, C-4)

T. Applications and Application-oriented Programs (Reviewer is submitter of particular "T" routine.)

T1. Physics (including nuclear)

T2. Chemistry

T3. Other physical sciences (geology, astronomy, etc.)

T4. Engineering

T5. Business data processing

T6. Manufacturing, (non-data) processing, and process control

T7. Mathematics and applied mathematics

T8. Social and behavioral sciences and psychology

T9. Biological sciences

U. Languages (J. Moore, C-2)

U1. Assembly
E.g., LACENT, CØMPASS.

U2. Compiling
E.g., RUN, FTN.

V. (Not Used)

W. File Manipulation (J. Norris, C-2)

W1. Access
E.g., ØPEN, CLØSE, CREATE, RELEASE, MØDIFY, UNLØAD, RENAME, SWITCH, GETRQT, DATAREL. Also see Q1.

W2. Get information on status of I/O
E.g., IF(EØF), LENGTH, BØI, IØCHECK.

W. (cont'd.)

W3. Positioning
E.g., skip file, backspace, ENDFILE, REWIND.

W4. Get information on file
Dump file, CATALØG, DIRL, CRSREF.

X. (Not Used)

Y. (Not Used)

Z. (Not Used)

PART II

CATALOG OF PROGRAMS

A ARITHMETIC ROUTINES

A1 REAL NUMBERS

E.G., MULTIPLE PRECISION, FIXED, AND FLOATING-POINT OPERATIONS; CONVERSIONS BETWEEN FLOATING POINT AND MANTISSA/CHARACTERISTIC.

REVIEWER: WAYNE FULLERTON, C-4

```
A101A  A*          B. L. BUZBEE     C-4                              67
A101A  B*UNPACK A FLOATING POINT NUMBER
A101A  C*COMPASS        SR6600   SCP 3.1
A101A  D*                          SW  1     LS  1
A101A  E*COMPASS SOURCE CARDS 18   BCD  OBJECT CARDS      4     BIN
A101A  F**UNPACK A*FLOATING POINT NUMBER
A101A  G*CARDS        F4  COMPAT   WU 02/18/69REV 2 DECK 02/18/69REV 2
A101A  1*GIVEN A FLOATING POINT NUMBER X, Y=UNPAK(X,N) YIELDS A
A101A  2*FLOATING POINT NUMBER Y, WHERE .5 .LE. ABS(Y) .LT. 1.,
A101A  3*AND AN INTEGER N SUCH THAT
A101A  4*X=Y*(2**N).
A101A  5*STORAGE=7 WORDS.
A101A  6*SELF CONTAINED.
```

```
A102A  A*          B. L. BUZBEE     C-4                              67
A102A  B*UNPACK A FLOATING POINT NUMBER
A102A  C*COMPASS        SR6600   SCP 3.1
A102A  D*                          SW  2     LS  1
A102A  E*COMPASS SOURCE CARDS 12   BCD  OBJECT CARDS      4     BIN
A102A  F**UNPACK A*FLOATING POINT NUMBER
A102A  G*CARDS        F4  COMPAT   WU 02/18/69REV 2 DECK 02/18/69REV 2
A102A  1*GIVEN A FLOATING POINT NUMBER X. J=IUNPK(X,I) YIELDS TWO
A102A  2*INTEGERS J AND I SUCH THAT X= J*(2**I).
A102A  3*STORAGE=5 WORDS.
A102A  4*SELF CONTAINED.
```

```
A103A  A*          B. L. BUZBEE     C-4                              67
A103A  B*ADD AN INTEGER TO THE EXPONENT OF A FLOATING PT. NUMBER
A103A  C*COMPASS        SR6600   SCP 3.1
A103A  D*                          SW  1     LS  1
A103A  E*COMPASS SOURCE CARDS 15   BCD  OBJECT CARDS      4     BIN
A103A  F*ADD AN INTEGER TO THE*EXPONENT OF A FLOATING PT. NUMBER.
A103A  G*ON DISK      F4  COMPAT   WU 02/18/69REV 2 DECK 02/18/69REV 2
A103A  1*GIVEN A FLOATING POINT NUMBER X=A*(2**N), AND AN INTEGER I.
A103A  2*Y=EXPAD(X.I) YIELDS Y=A*(2**(N+I)).
A103A  3*STORAGE=6 WORDS.
A103A  4*SELF CONTAINED.
```

```
A104A  A*           JIM CLARK         T-1                              67
A104A  O*NUMBER RANGE
A104A  B*MATHEMATICS     A1                COMPASS        SR6600    SCOPE
A104A  C*                                SW  3      LS  1
A104A  D*COMPASS SOURCE CARDS    178CDCOMPASS OBJECT CARDS     4BIN
A104A  S**RANGE*NUMBER EVALUATION
A104A 10*ON DISK      F4  COMPAT    WU 04/15/68 REV  DECK 04/15/68 REV
A104A 11*CALL RANGE(A,IND) RESULTS IN IND HAVING AN INTEGER VALUE OF
A104A 12*ONE IF THE FLOATING POINT NUMBER A IS INFINITE, IND IS TWO
A104A 13*IF A IS INDEFINITE. AND IND IS THREE IF A IS NEITHER
A104A 14*INDEFINITE NOR INFINITE.
A104A 15*STORAGE 11 OCTAL WORDS.
A104A 16*THIS ROUTINE IS SELF CONTAINED.
```

```
A105A  A*           B L BUZBEE        C-4          I CHERRY C-4      72
A105A  B*CONVERT SINGLE PRECISION NUMBER TO DOUBLE PRECISION
A105A  C*COMPASS        SR6600   SCP 3.1
A105A  D*                     SW 1       LS 1       TYPE 1
A105A  E*SOURCE CARDS          19    BCD     OBJECT CARDS     3     BIN
A105A  F**SINGLE PRECISION*DOUBLE PRECISION
A105A  G*ON DISK      F4  COMPAT    WU 11/22/72       DECK 11/22/72
A105A  1*FORM:  DX = DBLE(X)
A105A  2*PURPOSE:  GENERATE DOUBLE PRECISION FORM DX OF A
A105A  3*   SINGLE PRECISION NUMBER X.
A105A  4*WARNING:  THIS ROUTINE IS MADE AVAILABLE FOR
A105A  5*      COMPATIBILITY CONSIDERATIONS WITH OLDER FORTRANS.
A105A  6*      SINCE DBLE IS AN EXTERNAL ROUTINE. MIXED-MODE
A105A  7*      STATEMENTS ARE PREFERRED INSTEAD OF DBLE
A105A  8*      WHEN SPEED IS A CONSIDERATION.
A105A  9*ROUTINE NAME:  DBLE
A105A 10*ENTRY NAME:  DBLE
A105A 11*STORAGE: 4 OCTAL WORDS
A105A 12*ROUTINES CALLED:  SELF CONTAINED
```

```
A105B  A*          B L BUZBEE        C-4          I CHERRY C-4      72
A105B  B*CONVERT SINGLE PRECISION NUMBER TO DOUBLE PRECISION
A105B  C*COMPASS        SR7600   CROS
A105B  D*                     SW 1       LS 1       TYPE 1
A105B  E*SOURCE CARDS          10   BCD    OBJECT CARDS    3    BIN
A105B  F**SINGLE PRECISION*DOUBLE PRECISION
A105B  G*ON DISK      F4  COMPAT   WU 11/22/72       DECK 11/22/72
A105B  1*FORM:  DX = DBLE(X)
A105B  2*PURPOSE:  GENERATE DOUBLE PRECISION FORM DX OF A
A105B  3*   SINGLE PRECISION NUMBER X.
A105B  4**WARNING:  THIS ROUTINE IS MADE AVAILABLE FOR
A105B  5*      COMPATIBILITY CONSIDERATIONS WITH OLDER FORTRANS.
A105B  6*      SINCE DBLE IS AN EXTERNAL ROUTINE, MIXED-MODE
A105B  7*      STATEMENTS ARE PREFERRED INSTEAD OF DBLE
A105B  8*      WHEN SPEED IS A CONSIDERATION.
A105B  9*ROUTINE NAME:  DBLE
A105B 10*ENTRY NAME:  DBLE
A105B 11*STORAGE: 4 OCTAL WORDS
A105B 12*ROUTINES CALLED:  SELF CONTAINED
```

```
A106A  A*          LAURI RATHMANN    C-4          W.FULLERTON       73
A106A  B*CONVERT DOUBLE TO INTEGER
A106A  C*CMP             SR6600   SCP 3.1
A106A  D*                     SW  2      LS  2      TYPE 1.1
A106A  E*                SOURCE 49   CARDS          OBJECT  5  CARDS
A106A  F**DOUBLE TO INTEGER*IDINT
A106A  G*DISK       F4  COMPAT WU 07/09/73       DECK 07/09/73
A106A  1*FORM:  I = IDINT(DX)
A106A  2*PURPOSE: CONVERT A DOUBLE PRECISION FLOATING NUMBER INTO A
A106A  3* 59 BIT SIGNED INTEGER.
A106A  4*ROUTINE NAME:  IDINT
A106A  5*ENTRY NAME: IDINT
A106A  6*STORAGE: 25 OCTAL WORDS
A106A  7*ROUTINES CALLED: SYSTEM
```

```
A106B  A*          LAURI RATHMANN   C-4          W.FULLERTON      73
A106B  B*CONVERT DOUBLE TO INTEGER
A106B  C*CMP            SR7600   CROS
A106B  D*                  SW  2     LS  2     TYPE 1.1
A106B  E*                SOURCE 49   CARDS        OBJECT  5  CARDS
A106B  F**DOUBLE TO INTEGER*IDINT
A106B  G*DISK      F4  COMPAT WU 07/09/73       DECK 07/09/73
A106B  1*FORM:  I = IDINT(DX)
A106B  2*PURPOSE: CONVERT A DOUBLE PRECISION FLOATING NUMBER INTO A
A106B  3* 59 BIT SIGNED INTEGER.
A106B  4*ROUTINE NAME:  IDINT
A106B  5*ENTRY NAME: IDINT
A106B  6*STORAGE: 25 OCTAL WORDS
A106B  7*ROUTINES CALLED: SYSTEM
```

```
A107A  A*          B L BUZBEE       C-4          I CHERRY C-4     72
A107A  B*CONVERT DOUBLE PRECISION NUMBER TO SINGLE PRECISION
A107A  C*COMPASS        SR6600   SCP 3.1
A107A  D*                  SW 1      LS 1      TYPE 1
A107A  E*CMP SOURCE CARDS    8    BCD    OBJECT CARDS    3    BIN
A107A  F**SINGLE PRECISION*DOUBLE PRECISION
A107A. G*ON DISK      F4  COMPAT   WU 11/22/72      DECK 11/22/72
A107A  1*FORM:  X = SNGL(DX)
A107A  2*PURPOSE:  GENERATE THE SINGLE PRECISION FORM X OF A
A107A  3*      DOUBLE PRECISION NUMBER DX.
A107A  4*WARNING:  THIS ROUTINE IS MADE AVAILABLE FOR
A107A  5*      COMPATIBILITY CONSIDERATIONS WITH OLDER FORTRANS.
A107A  6*      SINCE SNGL IS AN EXTERNAL ROUTINE. MIXED-MODE
A107A  7*      STATEMENTS ARE PREFERRED INSTEAD OF SNGL WHEN
A107A  8*      SPEED IS A CONSIDERATION.
A107A  9*ROUTINE NAME:  SNGL
A107A 10*ENTRY NAME:  SNGL
A107A 11*STORAGE:  3 OCTAL WORDS
A107A 12*ROUTINES CALLED:  SELF CONTAINED
```

```
A107B  A*          B L BUZBEE       C-4          I CHERRY C-4      72
A107B  B*CONVERT DOUBLE PRECISION NUMBER TO SINGLE PRECISION
A107B  C*COMPASS        SR7600   CROS
A107B  D*                     SW 1      LS 1      TYPE 1
A107B  E*CMP SOURCE CARDS    8    BCD    OBJECT CARDS    3    BIN
A107B  F**SINGLE PRECISION*DOUBLE PRECISION
A107B  G*ON DISK      F4  COMPAT   WU 11/22/72      DECK 11/22/72
A107B  1*FORM:  X = SNGL(DX)
A107B  2*PURPOSE:  GENERATE THE SINGLE PRECISION FORM X OF A
A107B  3*      DOUBLE PRECISION NUMBER DX.
A107B  4**WARNING:  THIS ROUTINE IS MADE AVAILABLE FOR
A107B  5*      COMPATIBILITY CONSIDERATIONS WITH OLDER FORTRANS.
A107B  6*      SINCE SNGL IS AN EXTERNAL ROUTINE, MIXED-MODE
A107B  7*      STATEMENTS ARE PREFERRED INSTEAD OF SNGL WHEN
A107B  8*      SPEED IS A CONSIDERATION.
A107B  9**ROUTINE NAME:  SNGL
A107B 10*ENTRY NAME:  SNGL
A107B 11*STORAGE:  3 OCTAL WORDS
A107B 12*ROUTINES CALLED:  SELF CONTAINED
```

```
A108A  A*          LAURI RATHMANN   C-4          W. FULLERTON      73
A108A  B*DOUBLE PRECISION ABSOLUTE VALUE
A108A  C*CMP            SR6600   SCP 3.1
A108A  D*                    SW  2     LS  2     TYPE 1.1
A108A  E*               SOURCE  31  CARDS          OBJECT   4  CARDS
A108A  F**ABSOLUTE VALUE DOUBLE*DABS
A108A  G*DISK       F4  COMPAT WU 05/23/73       DECK 05/23/73
A108A  1*FORM:  DY = DABS(DX)
A108A  2*PURPOSE:  TO TAKE THE ABSOLUTE VALUE OF A DOUBLE PRECISION
A108A  3*   NUMBER
A108A  4*ROUTINE NAME:  DABS
A108A  5*ENTRY NAME:  DABS
A108A  6*STORAGE:  15 OCTAL WORDS
A108A  7*ROUTINES CALLED:  SYSTEM.
```

```
A108B  A*          LAURI RATHMANN   C-4          W. FULLERTON     73
A108B  B*DOUBLE PRECISION ABSOLUTE VALUE
A108B  C*CMP             SR7600   CROS
A108B  D*                   SW  2     LS  2     TYPE 1.1
A108B  E*                SOURCE  31  CARDS          OBJECT   4  CARDS
A108B  F**ABSOLUTE VALUE DOUBLE*DABS
A108B  G*DISK       F4  COMPAT WU 05/23/73        DECK 05/23/73
A108B  1*FORM:  DY = DABS(DX)
A108B  2*PURPOSE:  TO TAKE THE ABSOLUTE VALUE OF A DOUBLE PRECISION
A108B  3*   NUMBER
A108B  4*ROUTINE NAME:  DABS
A108B  5*ENTRY NAME:  DABS
A108B  6*STORAGE:  15 OCTAL WORDS
A108B  7*ROUTINES CALLED:  SYSTEM.
```

```
A109A  A*          LAURI RATHMANN   C-4          W. FULLERTON     73
A109A  B*GENERALIZED SIGNUM FUNCTION DOUBLE PRESICION
A109A  C*CMP             SR6600   SCP 3.1
A109A  D*                   SW  2     LS  2     TYPE 1.1
A109A  E*                SOURCE  38  CARDS        OBJECT  4   CARDS
A109A  F**SIGNUM*GENERAL*DOUBLE*SIGN
A109A  G*DISK       F4  COMPAT WU 05/23/73        DECK 05/23/73
A109A  1*FORM:  CALL DSIGN(D1,D2)
A109A  2*PURPOSE:  GIVEN TWO DOUBLE PRECISION ARGUMENTS,
A109A  3*   ATTACH SIGN OF SECOND TO ABSOLUTE VALUE OF FIRST.
A109A  4*ROUTINE NAME:  DSIGN
A109A  5*ENTRY NAME:  DSIGN
A109A  6*STORAGE:  21 OCTAL WORDS
A109A  7*ROUTINES CALLED:  SYSTEM.
```

```
A109B  A*          LAURI RATHMANN   C-4          W. FULLERTON     73
A109B  B*GENERALIZED SIGNUM FUNCTION DOUBLE PRECISION
A109B  C*CMP             SR7600   CROS
A109B  D*                   SW  2     LS  2     TYPE 1.1
A109B  E*                SOURCE  38  CARDS          OBJECT   4  CARDS
A109B  F**SIGNUM*GENERAL*DOUBLE*SIGN
A109B  G*DISK       F4  COMPAT WU 05/23/73        DECK 05/23/73
A109B  1*FORM:  CALL DSIGN(D1,D2)
A109B  2*PURPOSE:  GIVEN TWO DOUBLE PRECISION ARGUMENTS,
A109B  3*   ATTACH SIGN OF SECOND TO ABSOLUTE VALUE OF FIRST.
A109B  4*ROUTINE NAME:  DSIGN
A109B  5*ENTRY NAME:  DSIGN
A109B  6*STORAGE:  21 OCTAL WORDS
A109B  7*ROUTINES CALLED:  SYSTEM.
```

A2 COMPLEX NUMBERS

E.G.. MULTIPLE PRECISION. FIXED. AND FLOATING-POINT OPERATIONS; COMPLEX ABSOLUTE VALUE.

REVIEWER: WAYNE FULLERTON, C-4

```
A202A  A*           B L BUZBEE        C-4                                  67
A202A  0*ABSOLUTE VALUE OF DOUBLE PRECISION COMPLEX NUMBER
A202A  B*MATH             A2              F4              SR6600   SCP 3.1
A202A  C*                                SW  2     LS  1
A202A  D*F4 SOURCE CARDS         11BCDF4 BINARY CARDS          10BIN
A202A  S**ABSOLUTE VALUE OF DOUBLE PRECISION COMPLEX NUMBER
A202A 10*ON DISK      F4  COMPAT        WU 1/3/69 REV. 2 DECK 1/3/69 REV. 2
A202A 11*CALLED BY A=DCABS(X,Y) WHERE X AND Y ARE THE DOUBLE PRECISION
A202A 12*REAL AND IMAGINARY COMPONENTS OF Z=X+IY.  STORAGE=135 WORDS.
A202A 13*USES DSQRT(B410A).
```

```
A203A  A*           J.L.DURAN         C-4                                  67
A203A  0*MAGNITUDE OF A COMPLEX NUMBER
A203A  B*MATH             B3                COMPASS         SR6600   SCOPE
A203A  C*                                SW  2     LS  1
A203A  D*COMPASS SOURCE CARDS    44BCDOBJECT CARDS              4BIN
A203A  S**MAGNITUDE*COMPLEX*NUMBER*FORTRAN IV COMPATIBLE 1967
A203A 10*ON DISK      F4  COMPAT    WU 04/17/68 REV  DECK 04/17/68 REV
A203A 11*F=CABS(Z) WHERE Z IS A COMPLEX ARGUMENT AND F IS THE
A203A 12*MAGNITUDE OF Z
A203A 13*STORAGE 17 WORDS
A203A 14*SQRT SURROUTINE SELF-CONTAINED.
```

B ELEMENTARY FUNCTIONS

B1 TRIGONOMETRIC AND INVERSE TRIGONOMETRIC FUNCTIONS

REVIEWER: WAYNE FULLERTON. C-4

```
B104A  A*          KARL J MELENDEZ  C-4          IVAN CHERRY      67
B104A  0*ARCTANGENT OF X OR OF Y/X
B104A  B*MATHEMATICS    B1              COMPASS       SR6600   SCOPE
B104A  C*                                SW  3     LS  3
B104A  D*COMPASS SOURCE CARDS  118BCDCOMPASS OBJECT CARDS    7BIN
B104A  S**ARCTANGENT OF X OR OF Y/X
B104A 10*ON DISK     F4  COMPAT   WU11/05/68REV 2  DECK 11/05/68REV 2
B104A 11*CALLED BY Z=ATAN(X) OR Z=ATAN2(Y,X)
B104A 12*COMPUTES- ARCTANGENT OF X OR OF Y/X
B104A 13*-PI/2 .LE. ATAN(X) .LE. PI/2
B104A 14*-PI .LE. ATAN2(Y,X) .LT. PI
B104A 15*RELATIVE ERROR FOR ATAN IS APPROXIMATELY 7.2E-15
B104A 16*RELATIVE ERROR FOR ATAN2 IS APPROXIMATELY 1.1E-14
B104A 17*STORAGE-52(DECIMAL) WORDS
B104A 18*SELF CONTAINED.
```

```
B106A  A*          KARL J. MELENDEZ C-4                          67
B106A  B*SINE OR COSINE FUNCTION FOR ARGUMENTS IN RADIANS AND DEG
B106A  C*COMPASS          SR6600    SCP 3.1
B106A  D*                   SW  3     LS  4     TYPE  1
B106A  E*SOURCE CARDS        182  BCD    OBJECT CARDS     9   BIN
B106A  F**SINE*COSINE
B106A  G*ON DISK     F4  COMPAT   WU 08/04/69REV 2 DECK 08/04/69REV 2
B106A  1*CALLED BY:  Y=SIN(X), Y=COS(X) FOR ARGUMENT IN RADIANS
B106A  2*CALLED BY:  Y=SDG(X). Y=CDG(X) FOR ARGUMENT IN DEGREES
B106A  3*PURPOSE:  COMPUTES - SINE OR COSINE OF THE ARGUMENT X.
B106A  4*RELATIVE ERROR IS APPROXIMATELY 1.5 E-14
B106A  5*ROUTINES CALLED:  SYSTEM
B106A  6*STORAGE:  76 (DECIMAL) WORDS
```

```
B107A  A*           PAUL N.IWANCHUK  C-4                              72
B107A  B*FLOATING POINT TANGENT OR COTANGENT ROUTINE
B107A  C*F-4            SR6600     SCP 3.1
B107A  D*                      SW 3       LS 2       TYPE 1
B107A  E*SOURCE CARDS          47    BCD     OBJECT CARDS     21    BIN
B107A  F**TANGENT*COTANGENT ROUTINE
B107A  G*ON DISK      F4  COMPAT    WU 04/05/72REV.2 DECK 04/05/72REV.2
B107A  1*FORM:  Y=TAN(X)
B107A  2*       Y=COT(X)
B107A  3*       Y=COTAN(X)
B107A  4*PURPOSE:  COMPUTE TANGENT OR COTANGENT OF
B107A  5*      FLOATING POINT ARGUMENT X
B107A  6*ROUTINE NAME:  TAN
B107A  7*ENTRY NAMES:  TAN, COT, COTAN
B107A  8*STORAGE:  310 (OCTAL) WORDS
B107A  9*ROUTINES CALLED:  LABRT(N103A)
```

```
B107B  A*           PAUL N.IWANCHUK  C-4          I. CHERRY          72
B107B  B*FLOATING POINT TANGENT OR COTANGENT ROUTINE
B107B  C*F-4            SR7600     CROS
B107B  D*                      SW  3      LS  2      TYPE  1
B107B  E*SOURCE CARDS          64    BCD     OBJECT CARDS     22    BIN
B107B  F**TANGENT*COTANGENT ROUTINE
B107B  G*ON DISK       F4  COMPAT    WU 10/12/72REV 1 DECK 10/12/72REV 1
B107B  1*FORM:  Y=TAN(X)
B107B  2*       Y=COT(X)
B107B  3*       Y=COTAN(X)
B107B  4*PURPOSE:  COMPUTE TANGENT OR COTANGENT OF FLOATING POINT
B107B  5*      ARGUMENT X.
B107B  6*ROUTINE NAME:  TAN
B107B  7*ENTRY NAMES:  TAN, COT, COTAN
B107B  8*STORAGE:  334 OCTAL WORDS.
B107B  9*ROUTINES CALLED:  LABRT(N103B), LIBMSG(SYSTEM).
```

```
B108A  A*          B. L. BUZBEE      C-4                                  67
B108A  B*ARCSINE OR ARCCOSINE
B108A  C*CMP             SR6600   SCP 3.1
B109A  D*                     SW  3     LS  4     TYPE 1
B108A  E*CMP SOURCE CARDS    159  BCD    OBJECT CARDS   10    BIN
B108A  F**ARCSINE*ARCCOSINE*INVERSE FUNCTION
B108A  G*ON DISK     F4  COMPAT   WU 08/02/71REV 2 DECK 08/02/71REV 2
B108A  1*FORM:  Z=ASIN(X), Z=ARSIN(X), Z=ARCSIN(X,B)
B108A  2*       Z=ACOS(X), Z=ARCOS(X), Z=ARCCOS(X,B)
B108A  3*PURPOSE:  ARCSINE OR ARCCOSINE OF A REAL ARGUMENT.
B108A  4*ROUTINE NAME:  ASIN
B108A  5*ENTRY NAMES:  ASIN, ARSIN, ARCSIN, ACOS, ARCOS, ARCCOS
B108A  6*RELATIVE ERROR APPROXIMATELY 1.1E-14.
B108A  7*STORAGE: 123 (OCTAL) WORDS.
B108A  8*ROUTINES CALLED:  LABRT(N103A), SQRT(B408A).


B108B  A*          B.L.BUZBEE       C-4                                  72
B108B  B*ARCSINE OR ARCCOSINE
B108B  C*CMP             SR7600   CROS
B108B  D*                     SW  3     LS  5     TYPE  1
B108B  E*CMP SOURCE CARDS    159  BCD    OBJECT CARDS    10   BIN
B108B  F**ARCSIONE*ARCCOSINE*INVERSE FUNCTION
B108B  G*ON DISK     F4  COMPAT   WU 08/09/72      DECK 08/09/72
B108B  1*FORM:  Z=ASIN(X),  Z=ARSIN(X), Z=ARCSIN(X,B)
B108B  2*       Z=ACOS(X), Z=ARCOS(X), Z=ARCCOS(X,B)
B108B  3*PURPOSE:  ARCSINE OR ARCCOSINE OF A REAL ARGUMENT.
B108B  4*ROUTINE NAME:  ASIN
B108B  5*ENTRY NAMES:  ASIN, ARSIN, ARCSIN, ACOS, ARCOS, ARCCOS
B108B  6*RELATIVE ERROR APPROXIMATELY 1.1E-14.
B108B  7*STORAGE:  123 OCTAL WORDS.
B108B  8*ROUTINES CALLED:  LABRT(N103B), SQRT(B408B).


B109A  A*          J. L. DURAN       T-1                                  68
B109A  0*SINE OR COSINE OF A COMPLEX NUMBER
B109A  B*MATH            B1              COMPASS       SR6600   SCOPE
B109A  C*                              SW  2     LS  2
B109A  D*COMPASS SYMBOLIC       64BCORELOCATABLE COL BIN     5BIN
B109A  S*COMPLEX*SINE*COMPLEX*COSINE
B109A 10*ON DISK     F4  COMPAT   WU 02/23/68      DECK 02/21/68
B109A 11*F=CSIN(Z) OR F=CCOS(Z). Z AND F ARE COMPLEX NUMBERS.
B109A 12*STORAGE 36 WORDS
B109A 13*USES SIN(B106A),COS(B106A),SINH(B203A),COSH(B203A).
```

B2 HYPERBOLIC FUNCTIONS

REVIEWER: WAYNE FULLERTON, C-4

```
B203A  A*          J.L. DURAN        T-1                              68
B203A  O*HYPERBOLIC SINE AND COSINE
B203A  B*MATH            B2              COMPASS        SR6600   SCOPE
B203A  C*                                SW  2     LS  2
B203A  D*COMPASS SYMBOLIC       81BCDRELOCATABLE COL BIN      5BIN
B203A  S*HYPERBOLIC*SINE AND*COSINE
B203A 10*ON DISK     F4  COMPAT   WU 02/07/68 REV  DECK 01/31/68 REV
B203A 11*Y=SINH(X) OR Y=COSH(X) WHERE X IS A NORMALIZED FLOATING
B203A 12*POINT ARGUMENT.
B203A 13*STORAGE 42 FULL WORDS.
B203A 14*THIS ROUTINE USES EXP(B306A).
```

```
B203B  A*          J.L.DURAN         C-4          I.CHERRY          72
B203B  B*HYPERBOLIC SINE AND COSINE
B203B  C*COMPASS       SR7600   CROS
B203B  D*                      SW  2     LS  3     TYPE  1
B203B  E*CMP SOURCE CARDS    99   BCD    OBJECT CARDS          BIN
B203B  F**SINE*COSINE*HYPERBOLIC SINE AND *HYPERBOLIC COSINE
B203B  G*ON DISK     F4  COMPAT   WU 10/12/72      DECK 10/12/72
B203B  1*FORM:  Y=SINH(X)
B203B  2*       Y=COSH(X)
B203B  3*PURPOSE:  COMPUTE HYPERBOLIC SINE OR COSINE OF NORMALIZED
B203B  4*   FLOATING POINT ARGUMENT.
B203B  5*ROUTINE NAME:  SINH
B203B  6*ENTRY NAMES:  SINH.COSH
B203B  7*STORAGE:  60 OCTAL WORDS.
B203B  8*ROUTINES CALLED:  EXP(B306B), LIBMSG(SYSTEM).
```

```
B204A  A*          W.FULLERTON      T-4          I CHERRY C-4      67
B204A  B*HYPERBOLIC TANGENT
B204A  C*COMPASS        SR6600   SCP 3.1
B204A  D*                    SW 6      LS 2      TYPE 1
B204A  E*SOURCE CARDS         68   BCD    OBJECT CARDS    5    BIN
B204A  F**HYPERBOLIC TANGENT
B204A  G*ON DISK      F4  COMPAT   WU 12/22/72REV.2 DECK 12/22/72REV.2
B204A  1*FORM:  Y = TANH(X)
B204A  2*PURPOSE:  COMPUTE THE SINGLE PRECISION VALUE OF THE
B204A  3*      HYPERBOLIC TANGENT.
B204A  4*ROUTINE NAME:  TANH
B204A  5*ENTRY NAME:  TANH
B204A  6*STORAGE:  30 OCTAL WORDS
B204A  7*ROUTINES CALLED:  EXP(B306A)


B204B  A*          W.FULLERTON      T-4          I CHERRY C-4      72
B204B  B*HYPERBOLIC TANGENT
B204B  C*COMPASS        SR7600   CROS
B204B  D*                    SW 6      LS 2      TYPE 1
B204B  E*SOURCE CARDS         68   BCD    OBJECT CARDS    5    BIN
B204B  F**HYPERBOLIC TANGENT
B204B  G*ON DISK      F4  COMPAT   WU 12/22/72      DECK 12/22/72
B204B  1*FORM:  Y = TANH(X)
B204B  2*PURPOSE:  COMPUTE THE SINGLE PRECISION VALUE OF THE
B204B  3*      HYPERBOLIC TANGENT.
B204B  4*ROUTINE NAME:  TANH
B204B  5*ENTRY NAME:  TANH
B204B  6*STORAGE:  30 OCTAL WORDS
B204B  7*ROUTINES CALLED:  EXP(B306B)


B206A  A*          J. L. DURAN      C-4                          68
B206A  B*DOUBLE PRECISION HYPERBOLIC TANGENT
B206A  B*MATH           B2             COMPASS       SR6600   SCOPE
B206A  C*                             SW  2     LS  2
B206A  D*COMPASS SYMBOLIC       B2BCDRELOCATABLE COL BIN     4BIN
B206A  S*HYPERBOLIC*TANGENT*DOUBLE*PRECISION
B206A 10*ON DISK      F4  COMPAT   WU 01/16/68      DECK 01/16/68
B206A 11*F=DTANH(X). X AND F ARE DOUBLE PRECISION NORMALIZED FLOATING
B206A 12*POINT NUMBERS.
B206A 13*STORAGE 31 WORDS
B206A 14*USES DEXP(B308A).
```

B3 EXPONENTIAL AND LOGARITHMIC FUNCTIONS

REVIEWER: WAYNE FULLERTON, C-4

```
B305A  A*          A. SOLEM          C-4          W. FULLERTON     73
B305A  B*NATURAL LOGARITHM OR LOG TO THE BASE 10
B305A  C*CMP             SR6600   SCP 3.1
B305A  D*                    SW  1     LS  4     TYPE 1.1
B305A  E*                SOURCE 121  CARD           OBJECT  7   CARD
B305A  F**NATURAL*LOGARITHM *BASE 10
B305A  G*DISK        F4 COMPAT WU 04/25/73        DECK 04/25/73  -
B305A  1*FORM:  Y = ALOG (X)
B305A  2*       Y = ALOG10 (X)
B305A  3*PURPOSE:  ALOG COMPUTES THE NATURAL LOGARITHM.
B305A  4*          ALOG10 COMPUTES THE LOGARITHM TO THE BASE 10.
B305A  5*ROUTINE NAME:  ALNLOG
B305A  6*ENTRY NAMES:  ALOG, ALOG10
B305A  7*STORAGE:  67 OCTAL WORDS
B305A  8*ROUTINES CALLED:  SYSTEM(SYSTEM)
```

```
B305B  A*          A. SOLEM          C-4          W. FULLERTON     73
B305B  B*NATURAL LOGARITHM OR LOG TO THE BASE 10
B305B  C*CMP             SR7600   CROS
B305B  D*                    SW  1     LS  5     TYPE 1.1
B305B  E*                SOURCE 140  CARD           OBJECT  8   CARD
B305B  F**NATURAL*LOGARITHM *BASE 10
B305B  G*DISK        F4 COMPAT WU 04/25/73        DECK 04/25/73
B305B  1*FORM:  Y = ALOG (X)
B305B  2*       Y = ALOG10 (X)
B305B  3*PURPOSE:  ALOG COMPUTES THE NATURAL LOGARITHM.
B305B  4*          ALOG10 COMPUTES THE LOGARITHM TO THE BASE 10.
B305B  5*ROUTINE NAME:  ALNLOG
B305B  6*ENTRY NAMES:  ALOG,ALOG10
B305B  7*STORAGE:  77 OCTAL WORDS
B305B  8*ROUTINES CALLED:  LIBMSG(SYSTEM), SYSTEM(SYSTEM)
```

```
B305C  A*            A. SOLEM          C-4          W. FULLERTON      73
B305C  B*NATURAL LOG OR LOG TO THE BASE 10 FOR LCM ARGUMENT
B305C  C*CMP              SR7600   CROS
B305C  D*                      SW  1     LS  5     TYPE 1.1
B305C  E*                 SOURCE 154  CARD            OBJECT  9   CARD
B305C  F**NATURAL*LOGARITHM *BASE 10*LCM
B305C  G*DISK         F4 COMPAT WU 04/25/73        DECK 04/25/73
B305C  1*FORM:  LEXT ALOG                    LEXT ALOG10
B305C  2*         Y = ALOG (X)               Y = ALOG10 (X)
B305C  3*PURPOSE:  ALOG↑ COMPUTES THE NATURAL LOGARITHM.
B305C  4*          ALOG10↑ COMPUTES THE LOGARITHM TO THE BASE 10.
B305C  5*ROUTINE NAME:  ALNLOG↑
B305C  6*ENTRY NAMES:  ALOG↑, ALOG10↑
B305C  7*STORAGE:  105 OCTAL WORDS
B305C  8*ROUTINES CALLED:  LIBMSG(SYSTEM), SYSTEM(SYSTEM)
```

```
B306A  A*            B.L.BUZBEE        C-4          W. FULLERTON      67
B306A  B*EXPONENTIAL FUNCTION E**X
B306A  C*CMP              SR6600   SCP 3.1
B306A  D*                      SW  2     LS  3     TYPE 1.1
B306A  E*CMP SOURCE CARDS     97   BCD    OBJECT CARDS      6
B306A  F**EXPONENTIAL*FUNCTION*E TO THE*X
B306A  G*DISK         F4 COMPAT WU 06/15/73 REV.5 DECK 06/25/73 REV.5
B306A  1*FORM:  Y = EXP (X)
B306A  2*PURPOSE:  CALCULATE EXPONENTIAL OF X.
B306A  3*ROUTINE NAME:  EXP
B306A  4*ENTRY NAME:  EXP
B306A  5*TIMING FOR 6600:  27 MICROSECONDS
B306A  6*STORAGE:  53 OCTAL WORDS
B306A  7*ROUTINES CALLED:  LABRT(N103A).
```

```
B306B  A*            B.L.BUZBEE        C-4          W. FULLERTON      73
B306B  B*EXPONENTIAL FUNCTION E**X
B306B  C*CMP              SR7600   CROS
B306B  D*                      SW  2     LS  4     TYPE 1.1
B306B  E*CMP SOURCE CARDS    106  BCD    OBJECT CARDS      7   BIN
B306B  F**EXPONENTIAL*FUNCTION*E TO THE*X
B306B  G*ON DISK      F4  COMPAT   WU 04/12/73      DECK 04/12/73
B306B  1*FORM:  Y = EXP (X)
B306B  2*PURPOSE:  CALCULATE EXPONENTIAL OF X.
B306B  3*ROUTINE NAME:  EXP
B306B  4*ENTRY NAME:  EXP
B306B  5*STORAGE:  56 OCTAL WORDS
B306B  6*ROUTINES CALLED:  LABRT(N103B), LIBMSG(SYSTEM).
```

```
B306C  A*          F.L.BUZBEE      C-4          W. FULLERTON      73
B306C  B*EXPONENTIAL FUNCTION E**X ALLOWING LCM ARGUMENT
B306C  C*CMP            SR7600   CROS
B306C  D*                    SW  2     LS  4     TYPE 1.1
B306C  E*CMP SOURCE CARDS    119  BCD    OBJECT CARDS     7   BIN
B306C  F**EXPONENTIAL*FUNCTION*E TO THE*X*LCM
B306C  G*ON DISK     F4  COMPAT   WU 04/12/73      DECK 04/12/73
B306C  1*FORM:  LEXT EXP
B306C  2*         Y = EXP
B306C  3*PURPOSE:  CALCULATE EXPONENTIAL OF X
B306C  4*ROUTINE NAME:  EXP↑
B306C  5*ENTRY NAME:  EXP↑
B306C  6*STORAGE:  66 OCTAL WORDS
B306C  7*ROUTINES CALLED:  LABRT(N1038), LIBMSG(SYSTEM).
```

```
B307A  A*          J.L.DURAN        C-4                          67
B307A  0*COMPLEX NATURAL LOG
B307A  B*MATH            B3              COMPASS       SR6600   SCOPE
B307A  C*                               SW  2     LS  2
B307A  D*COMPASS SOURCE CARDS   81BCDOBJECT CARDS            6BIN
B307A  S**COMPLEX*NATURAL LOG*SINGLE PRECISION*FORTRAN IV COMPATIBLE
B307A 10*ON DISK     F4  COMPAT   WU 04/15/68 REV  DECK 04/15/68 REV
B307A 11*Y=CLOG(Z) WHERE Z IS A COMPLEX ARGUMENT AND Y THE COMPLEX
B307A 12*RESULT.
B307A 13*STORAGE 39 WORDS
B307A 14*ROUTINE USES ALOG(B305A),ATAN2(B104A).
```

```
B310A  A*          J.L. DURAN       T-1                  68
B310A  0*NATURAL EXPONENTIAL OF A COMPLEX NUMBER
B310A  B*MATH            B3              COMPASS       SR6600   SCOPE
B310A  C*                               SW  2     LS  1
B310A  D*COMPASS SYMBOLIC       28BCDRELOCATABLE COL BIN     3BIN
B310A  S*NATURAL*EXPONENTIAL*COMPLEX*NUMBER
B310A 10*ON DISK     F4  COMPAT   WU 02/12/68      DECK 02/05/68
B310A 11*F=CEXP(Z) F AND Z ARE COMPLEX NUMBERS IN NORMALIZED FLOATING
B310A 12*POINT.
B310A 13*ERROR MESSAGES CONTROLLED BY EXP AND COS.
B310A 14*STORAGE 15 FULL WORDS.
B310A 15*USES EXP(B306A).COS(B106A),SIN(B106A).
```

```
B313A  A*          B.L.BUZBEE       C-4          I CHERRY          72
B313A  B*EVALUATE DX**N WHERE DX IS DOUBLE PREC. AND N IS INTEGER
B313A  C*COMPASS          6600   SCP .1
B313A  D*                    SW 3      LS 3      TYPE 1
B313A  E*SOURCE CARDS         107  BCD    OBJECT CARDS     6   BIN
B313A  F**EXPONENTIATION
B313A  G*ON DISK      F4  COMPAT   WU 08/10/72      DECK 08/10/72
B313A  1*FORM:  DY=DX**N
B313A  2*PURPOSE:  PERFORM THE FORTRAN OPERATION DX**N WHERE DX
B313A  3*      IS DOUBLE PRECISION AND N IS INTEGER
B313A  4*ROUTINE NAME:  DBAIEX
B313A  5*ENTRY NAME:  DBAIEX
B313A  6*STORAGE:  57 OCTAL WORDS
B313A  7*ROUTINES CALLED:  SYSTEM (ON SYSTEM)
```

```
B313B  A*          B.L.BUZBEE       C-4          I CHERRY          72
B313B  B*EVALUATE DX**N WHERE DX IS DOUBLE PREC. AND N IS INTEGER
B313B  C*COMPASS          7600   CROS
B313B  D*                    SW 3      LS 3      TYPE 1
B313B  E*SOURCE CARDS         107  BCD    OBJECT CARDS     6   BIN
B313B  F**EXPONENTIATION
B313B  G*ON DISK      F4  COMPAT   WU 08/10/72      DECK 08/10/72
B313B  1*FORM:  DY=DX**N
B313B  2*PURPOSE:  PERFORM THE FORTRAN OPERATION DX**N WHERE DX
B313B  3*      IS DOUBLE PRECISION AND N IS INTEGER
B313B  4*TIMING:  .9 MICROSECONDS FOR N=2.
B313B  5*ROUTINE NAME:  DBAIEX
B313B  6*ENTRY NAME:  DBAIEX
B313B  7*STORAGE:  57 OCTAL WORDS
B313B  8*ROUTINES CALLED:  SYSTEM (ON SYSTEM)
```

B4 ROOTS AND POWERS

REVIEWER: WAYNE FULLERTON, C-4

```
B407A  A*          B.L. BUZBEE       C-4          C. HAMILTON      67
B407A  B*CUBE ROOT FORTRAN IV SINGLE PRECISION
B407A  C*COMPASS        SR6600   SCP 3.1
B407A  D*                    SW  2     LS  2     TYPE  1
B407A  E*SOURCE CARDS        76   BCD    OBJECT CARDS        5  BIN
B407A  F**CUBE*ROOT FORTRAN IV SINGLE PRECISION
B407A  G*CARDS        F4  COMPAT  WU 11/11/69REV 1  DECK 11/11/69REV 1
B407A  1*Y=CUBRT(X) OR Y=QBRT4(X).
B407A  2*PURPOSE-COMPUTES THE CUBE ROOT OF X.
B407A  3*STORAGE-37 (OCTAL) WORDS.  TIMING: 30 MICROSECONDS.
B407A  4*SELF CONTAINED.
```

```
B408A  A*          C-4                          W. FULLERTON     67
B408A  B*SQUARE ROOT
B408A  C*COMPASS        SR6600   SCP 3.1
B408A  D*                    SW   2    LS  3     TYPE 1.1
B408A  E*SOURCE CARDS         89   BCD    OBJECT CARDS    7    BIN
B408A  F**SQUARE ROOT
B408A  G*ON DISK      F4  COMPAT   WU 04/20/73REV.7 DECK 12/03/70REV.5
B408A  1*FORM:  Y = SQRT (X)
B408A  2*PURPOSE:  COMPUTE SQUARE ROOT OF FLOATING POINT
B408A  3*     VALUE WITHIN RELATIVE ERROR OF APPROXIMATELY 1.2E-14.
B408A  4*TIMING:  APPROXIMATELY 20 MICROSECONDS
B408A  5*ROUTINE NAME:  SQRT
B408A  6*ENTRY NAME:  SQRT
B408A  7*STORAGE:  56 OCTAL WORDS
B408A  8*ROUTINES CALLED:  LABRT(N103A),OUTPTS(SYSTEM)
```

```
B408B  A*          C-4                              W. FULLERTON     73
B408B  B*SQUARE ROOT
B408B  C*COMPASS        SR7600   CROS
B408B  D*                    SW   2    LS  3     TYPE 1.1
B408B  E*SOURCE CARDS         101  BCD    OBJECT CARDS    7    BIN
B408B  F**SQUARE ROOT
B408B  G*ON DISK      F4  COMPAT   WU 04/20/73      DECK 04/20/73
B408B  1*FORM:  Y = SQRT (X)
B408B  2*PURPOSE:  COMPUTE SQUARE ROOT OF FLOATING POINT
B408B  3*      VALUE WITHIN RELATIVE ERROR OF APPROXIMATELY 1.2E-14.
B408B  4*ROUTINE NAME:  SQRT
B408B  5*ENTRY NAME:  SQRT
B408B  6*STORAGE:  63 OCTAL WORDS
B408B  7*ROUTINES CALLED:  LABRT(N103B).OUTPTS(SYSTEM.LIBMSG(SYSTEM).
```

```
B408C  A*          C-4                              W. FULLERTON     73
B408C  B*SQUARE ROOT ALLOWING LCM ARGUMENT
B408C  C*COMPASS        SR7600   CROS
B408C  D*                    SW   2    LS  3     TYPE 1.1
B408C  E*SOURCE CARDS         114  BCD    OBJECT CARDS    8    BIN
B408C  F**SQUARE ROOT*LCM
B408C  G*ON DISK      F4  COMPAT   WU 04/20/73      DECK 04/20/73
B408C  1*FORM:  LEXT SQRT
B408C  2*       Y = SQRT(X)
B408C  3*PURPOSE:  COMPUTE SQUARE ROOT OF FLOATING POINT VALUE
B408C  4*      WHICH MAY BE IN SCM OR LCM WITHIN RELATIVE ERROR OF
B408C  5*      APPROXIMATELY 1.2E-14.
B408C  6*ROUTINE NAME:  SQRT↑
B408C  7*ENTRY NAME:  SQRT↑
B408C  8*STORAGE:  72 OCTAL WORDS
B408C  9*ROUTINES CALLED:  LABRT(N103B).OUTPTS(SYSTEM.LIBMSG(SYSTEM).
```

```
B409A  A*          B.L.BUZBEE       C-4          IVAN CHERRY      68
B409A  B*COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
B409A  C*COMPASS        SR6600   SCP 3.1
B409A  D*                    SW  2     LS  2     TYPE  1
B409A  E*SOURCE CARDS         75   BCD    OBJECT CARDS     6   BIN
B409A  F**COMPLEX*SQUARE*ROOT
B409A  G*ON DISK      F4  COMPAT   WU 10/03/72REV.6 DECK 05/03/72REV 4
B409A  1*FORM:  Y= CSQRT(Z)
B409A  2*PURPOSE:  COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
B409A  3*       ARGUMENT Z.
B409A  4*TIMING:  58 MICROSECONDS
B409A  5*ROUTINE NAME:  CSQRT
B409A  6*ENTRY NAME:  CSQRT
B409A  7*STORAGE 41 OCTAL WORDS
B409A  8*ROUTINES CALLED:  SQRT(B408A)
```

```
B409B  A*          B.L.BUZBEE       C-4          IVAN CHERRY      72
B409B  B*COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
B409B  C*COMPASS        SR7600
B409B  D*                    SW  2     LS  2     TYPE  1
B409B  E*SOURCE CARDS         75   BCD    OBJECT CARDS     6   BIN
B409B  F**COMPLEX*SQUARE*ROOT
B409B  G*ON DISK      F4  COMPAT   WU 10/03/72REV.3 DECK 05/03/72REV 1
B409B  1*FORM:  Y= CSQRT(Z)
B409B  2*PURPOSE:  COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
B409B  3*       ARGUMENT Z.
B409B  4*TIMING:  14 MICROSECONDS
B409B  5*ROUTINE NAME:  CSQRT
B409B  6*ENTRY NAME:  CSQRT
B409B  7*STORAGE 41 OCTAL WORDS
B409B  8*ROUTINES CALLED:  SQRT(B408B)
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```
B413A  A*          B.L. BUZBEE      C-4                          69
B413A  B*FOURTH ROOT OF X
B413A  C*CMP            SR6600   SCP 3.1
B413A  D*                    SW  2     LS  2     TYPE  1
B413A  E*CMP SOURCE CARDS     61   BCD    OBJECT CARDS     5   BIN
B413A  F**ROOT*FOURTH ROOT OF X
B413A  G*ON DISK      F4  COMPAT   WU 10/24/72REV 2 DECK 10/24/72REV 1
B413A  1*FORM:  Y = FOUROT(X)
B413A  2*PURPOSE:  OBTAINS THE 4TH ROOT OF X IF X IS NON-NEGATIVE:
B413A  3*   IF X IS NEGATIVE. THE RESULT IS INDETERMINATE.
B413A  4*ACCURACY:  MAXIMUM OBSERVED RELATIVE ERROR IS 3.E-14.
B413A  5*TIMING = 30 MICROSECONDS
B413A  6*ROUTINE NAME:  FOUROT
B413A  7*ENTRY NAME:  FOUROT
B413A  8*STORAGE:  35 OCTAL WORDS
B413A  9*SELF-CONTAINED.
```

```
B413B  A*           B.L. BUZBEE      C-4                              72
B413B  B*FOURTH ROOT OF X
B413B  C*CMP              SR7600   CROS
B413B  D*                    SW  2     LS  2     TYPE  1
B413B  E*CMP SOURCE CARDS     61   BCD    OBJECT CARDS     5   BIN
B413B  F**ROOT*FOURTH ROOT OF X
B413B  G*ON DISK      F4  COMPAT   WU 10/24/72       DECK 10/24/72
B413B  1*FORM:  Y = FOUROT(X)
B413B  2*PURPOSE:  OBTAINS THE 4TH ROOT OF X IF X IS NON-NEGATIVE:
B413B  3*   IF X IS NEGATIVE, THE RESULT IS INDETERMINATE.
B413B  4*ACCURACY:  MAXIMUM OBSERVED RELATIVE ERROR IS 3.E-14.
B413B  5*TIMING = 7.2 MICROSECONDS
B413B  6*ROUTINE NAME:  FOUROT
B413B  7*ENTRY NAME:  FOUROT
B413B  8*STORAGE:  35 OCTAL WORDS
B413B  9*SELF-CONTAINED.
```

```
B4AA   A*           B.L.BUZBEE       C-4          J.L.DURAN        72
B4AA   B*COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
B4AA   C*COMPASS          SR6600   SCP 3.1
B4AA   D*                    SW  2     LS  2     TYPE  2
B4AA   E*CMP SOURCE CARDS     81   BCD    OBJECT CARDS     6    BIN
B4AA   F**COMPLEX*SQUARE*ROOT
B4AA   G*CARDS          F4  COMPAT   WU 05/03/72       DECK 05/03/72
B4AA   1*FORM:  Y= CSQRT(Z)
B4AA   2*PURPOSE:   COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
B4AA   3*   ARGUMENT Z.  THE RESULT IS ON THE FIRST RIEMANN SHEET.
B4AA   4*TIMING:  58 MICROSECONDS
B4AA   5*ROUTINE NAME:  CSQRT
B4AA   6*ENTRY NAME:  CSQRT
B4AA   7*STORAGE:  42 OCTAL WORDS
B4AA   8*ROUTINES CALLED:  SQRT(B408A).
```

C POLYNOMIALS AND SPECIAL FUNCTIONS

C1 EVALUATION OF POLYNOMIALS

REVIEWER: J. HANCOCK, C-4

```
C106A  A*          R. M. FRANK      C-4          D. WILLIAMS      67
C106A  O*POLYNOMIAL COEFFICIENT GENERATOR
C106A  B*MATHEMATICS    C1              F4              SR6600   SCOPE
C106A  C*                              SW  2     LS  1
C106A  D*F4 SOURCE CARDS          248CDBINARY DECK              9BIN
C106A  S**POLYNOMIAL*COEFFICIENT GENERATOR
C106A 10*CARDS        F4  COMPAT   WU 09/18/67 REV  DECK 05/04/67
C106A 11*CALL GENPOL(N,R,P,C) GENERATES THE COEFFICIENTS OF AN NTH
C106A 12*ORDER POLYNOMIAL WHOSE ROOTS ARE STORED IN REAL ARRAY
C106A 13*R, OF DIMENSION N. P IS A TEMPORARY DBL PREC ARRAY OF DIM. 2N.
C106A 14*C IS AN ARRAY OF DIMEN. N+1 CONTAINING THE CALCULATED
C106A 15*COEFFICIENTS.
C106A 16*STORAGE= 145 (8) WORDS.
C106A 17*SELF CONTAINED.
```

```
C107A  A*          B. BUZBEE        T-1                          67
C107A  O*POLYNOMIAL COEFFICIENT GENERATOR-DOUBLE PRECISION ROOTS
C107A  B*MATHEMATICS    C1              F4              SR6600   SCOPE
C107A  C*                              SW  2     LS  1
C107A  D*SOURCE DECK              248CDBINARY DECK              9BIN
C107A  S**POLYNOMIAL*COEFFICIENT GENERATOR IN DOUBLE PRECISION
C107A 10*CARDS        F4  COMPAT   WU 05/04/67      DECK 05/04/67
C107A 11*CALL GENPDP(N,R,P,C)
C107A 12*PURPOSE - TO GENERATE THE COEFFICIENTS OF A POLYNOMIAL WHOSE
C107A 13*          ROOTS ARE GIVEN IN DOUBLE PRECISION AND ARE REAL.
C107A 14* N - NUMBER OF ROOTS
C107A 15* R - P, AND C ARE ALL DOUBLE PRECISION ARRAYS:
C107A 16* R - ARRAY OF ROOTS OF DIMENSION N
C107A 17* P - ARRAY OF 2N WORDS OF TEMPORARY STORAGE
C107A 18* C - ARRAY OF CALCULATED COEFFICIENTS. OF DIMENSION N+1,
C107A 19* WHERE C(1)=A0=1, C(2)=A1,...,C(N+1)=AN
C107A 20*STORAGE=147 WORDS.
C107A 21*SELF CONTAINED.
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```
C108A  A*           B. BUZBEE        T-1                                  67
C108A  0*POLYNOMIAL COEFFICIENT GENERATOR-COMPLEX ROOTS
C108A  B*MATHEMATICS     C1              F4              SR6600   SCOPE
C108A  C*                                 SW  2     LS  1
C108A  D*SOURCE DECK              24BCDBINARY DECK              98IN
C108A  S**POLYNOMIAL*COEFFICIENT GENERATOR FOR*COMPLEX ROOTS
C108A 10*CARDS        F4  COMPAT   WU 05/04/67      DECK 05/04/67
C108A 11*CALL GNCPX(N,R,P,C)
C108A 12*PURPOSE - TO GENERATE THE COEFFICIENTS OF A POLYNOMIAL WHOSE
C108A 13*           ROOTS ARE GIVEN AND ARE COMPLEX.
C108A 14* N - THE NUMBER OF ROOTS
C108A 15* R, P, AND C ARE COMPLEX ARRAYS:
C108A 16* R - ROOTS, OF DIMENSION N
C108A 17* P - 2N WORDS OF TEMPORARY STORAGE
C108A 18* C - CALCULATED COEFFICIENTS OF DIMENSION N+1, WHERE
C108A 19*      C(1)=A0=1.0, C(2)=A1,...,C(N+1)=AN
C108A 20*STORAGE=144 WORDS.
C108A 21*SELF CONTAINED.


C112A   *(PSI) HAS BEEN REDESIGNATED C312A
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C2 ROOTS OF POLYNOMIALS

REVIEWER: J. HANCOCK, C-4

C205A *(SRPOLY) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED C2AA.

C206A A* B.L. BUZBEE C-4 D. WILLIAMS 67
C206A B*ZEROS OF REAL POLYNOMIALS
C206A C*MATHEMATICS SR6600 SCP. 3.1
C206A D SW 2 LS 3
C206A E*SOURCE CARDS 167 BCD OBJECT CARDS 38 BIN
C206A F**ZEROS OF REAL*POLYNOMIALS
C206A G*ON DISK F4 COMPAT WU 01/28/69REV2 DECK 01/28/69REV2
C206A 1*CALL RPOLY(N,P,T,R,IE) FINDS THE ZEROS OF A REAL NTH ORDER
C206A 2*POLYNOMIAL.
C206A 3*STORAGE=512 WORDS.
C206A 4*USES SQRT(B408A).

C207A *(SCPOLY) DEMOTED TO TYPE 2 STATUS AND IS NOW C2AB.

C208A *(DRPOLY) DEMOTED TO TYPE 2 STATUS AND IS NOW C2AC.

C209A *(DCPOLY) DEMOTED TO TYPE 2 STATUS AND IS NOW C2AD.

C210A A* B. L. BUZBEE T-1 D. WILLIAMS 67
C210A 0*MTH DERIVATIVE EVALUATION OF REAL (SP) POLYNOMIAL
C210A B*MATHEMATICS C2 F4 SR6600 SCOPE
C210A C* SW 2 LS 1
C210A D*F4 SOURCE CARDS 198CDF4 OBJECT CARDS 9BIN
C210A S*MTH*DERIVATIVE*EVALUATION OF A REAL SINGLE PRECISION*POLYNOMIAL
C210A 10*CARDS F4 COMPAT WU 09/18/67 REV DECK 01/10/67
C210A 11*CALL SRPOLE(N,M,SR,DP,Z,Y) EVALUATES THE MTH DERIVATIVE OF
C210A 12*A NTH DEGREE REAL POLYNOMIAL WITH SINGLE PRECISION COEFF-
C210A 13*ICIENTS.
C210A 14*STORAGE=110 WORDS.
C210A 15*USES LAHRT(N103A),DCPOLE(C213A).

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C211A  A*          B L BUZBEE        T-1                              67
C211A  0*MTH DERIVATIVE EVALUATION  OF A COMPLEX (SP) POLYNOMIAL
C211A  B*MATHEMATICS     C2              F4              SR6600   SCOPE
C211A  C*                              SW  2      LS  1
C211A  D*F4 SOURCE CARDS         188CDF4 OBJECT CARDS          108IN
C211A  S*MTH*DERIVATIVE*EVALUATION OF COMPLEX (SP)*POLYNOMIAL
C211A 10*CARDS        F4  COMPAT    WU 01/18/67       DECK 01/18/67
C211A 11*CALL SCPOLE(N,M,SC,DP,Z,Y) EVALUATES THE MTH DERIVATIVE OF A
C211A 12*NTH DEGREE COMPLEX POLYNOMIAL WITH SINGLE PRECISION COEFF-
C211A 13*ICIENTS.
C211A 14*STORAGE=126 WORDS.
C211A 15*USES DCPOLE(C213A).
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```
C212A  A*          B L BUZBEE        T-1                              67
C212A  0*MTH DERIVATIVE EVALUATION OF A REAL (DP) POLYNOMIAL
C212A  B*MATHEMATICS     C2              F4              SR6600   SCOPE
C212A  C*                              SW  2      LS  1
C212A  D*F4 SOURCE CARDS         148CDF4 OBJECT CARDS           5BIN
C212A  S*MTH*DERIVATIVE*EVALUATION OF A REAL (DP)*POLYNOMIAL
C212A 10*CARDS        F4  COMPAT    WU 01/18/67       DECK 01/18/67
C212A 11*CALL DRPOLE(N,M,DR,DP,DZ,DY) EVALUATES THE MTH DERIVATIVE OF
C212A 12*A NTH DEGREE REAL POLYNOMIAL WITH DOUBLE PRECISION COEFF-
C212A 13*ICIENTS.
C212A 14*STORAGE=49 WORDS.
C212A 15*USES DCPOLE(C213A).
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C213A  A*          B L BUZBEE        C-4                              67
C213A  0*MTH DERIVATIVE EVALUATION OF A COMPLEX (DP) POLYNOMIAL
C213A  B*MATHEMATICS     C2              F4              SR6600   SCOPE
C213A  C*                              SW  2      LS  1
C213A  D*F4 SOURCE CARDS         418CDF4 OBJECT CARDS          158IN
C213A  S*MTH*DERIVATIVE*EVALUATION OF A COMPLEX (DP) POLYNOMIAL
C213A 10*CARDS        F4  COMPAT    WU 07/15/68 REV   DECK 07/11/68 REV
C213A 11*CALL DCPOLE(N,M,DC,DP,DZ,DY) EVALUATES THE MTH DERIVATIVE OF
C213A 12*A NTH DEGREE COMPLEX POLYNOMIAL WITH DOUBLE PRECISION COEFF-
C213A 13*ICIENTS.
C213A 14*STORAGE= 180 WORDS.
C213A 15*USES LABRT(N103A).
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C214A  A*            JOHN HANCOCK      C-4                                  70
C214A  B*DCPTACO - POLYNOMIAL AND DERIVATIVES WITH ERROR BOUNDS
C214A  C*F4               SR6600    SCP 3.1
C214A  D*                      SW  3      LS  1      TYPE  1
C214A  E*SOURCE CARDS          51  BCD      OBJECT CARDS     46   BIN
C214A  F**DCPTACO*TAYLOR*SERIES*COEFFICIENT*DOUBLE PRECISION
C214A  G*CARDS         F4  COMPAT    WU 05/06/70       DECK 05/06/70
C214A  1*CALL NAME:  CALL DCPTACO(N,M,A,Z,C,E)
C214A  2*PURPOSE:  SIMULTANEOUS EVALUATION OF FIRST M+1 TAYLOR SERIES
C214A  3*COEFFICIENTS (ESSENTIALLY THE POLYNOMIAL AND ITS DERIVATIVES)
C214A  4*OF A COMPLEX POLYNOMIAL P(Z) AT A COMPLEX POINT Z.
C214A  5*STORAGE:  1136 (OCTAL) WORDS.
C214A  6*ROUTINES CALLED:  LABRT(N103A).
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```
C215A  A*            JOHN HANCOCK      C-4                                  70
C215A  B*SCPTACO -- POLYNOMIAL AND DERIVATIVES WITH ERROR BOUNDS
C215A  C*F4               SR6600    SCP 3.1
C215A  D*                      SW  3      LS  1      TYPE  1
C215A  E*SOURCE CARDS          49  BCD      OBJECT CARDS     20   BIN
C215A  F**SCPTACO*TAYLOR*SERIES*COEFFICIENT*SINGLE PRECISION
C215A  G*CARDS         F4  COMPAT    WU 05/06/70       DECK 05/06/70
C215A  1*CALL NAME:  CALL SCPTACO(N,M,A,Z,C,E)
C215A  2*PURPOSE:  SIMULTANEOUS EVALUATION OF FIRST M+1 TAYLOR SERIES
C215A  3*COEFFICIENTS (ESSENTIALLY THE POLYNOMIAL AND ITS DERIVATIVES)
C215A  4*OF A COMPLEX POLYNOMIAL P(Z) AT A COMPLEX POINT Z.
C215A  5*STORAGE:  336 (OCTAL) WORDS.
C215A  6*ROUTINES CALLED:  LABRT(N103A).
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C215B  A*            J HANCOCK         C-4          J. HANCOCK         73
C215B  B*SCPTACO--POLYNOMIAL AND DERIVATIVES WITH ERROR BOUNDS
C215B  C*F4               SR7600    CROS
C215B  D*                      SW 3       LS 2       TYPE 1
C215B  E*SOURCE CARDS          49   BCD     OBJECT CARDS     20   BIN
C215B  F**SCPTACO*TAYLOR*SERIES*COEFFICIENT*SINGLE PRECISION
C215B  G*ON DISK       F4  COMPAT    WU 02/15/73       DECK 02/15/73
C215B  1*FORM:  CALL SCPTACO(N,M,A,Z,C,E)
C215B  2*PURPOSE:  SIMULTANEOUS EVALUATION OF FIRST M+1 TAYLOR
C215B  3*      SERIES COEFFICIENTS (ESSENTIALLY THE POLYNOMIAL
C215B  4*      AND ITS DERIVATIVES) OF A COMPLEX POLYNOMIAL P(Z)
C215B  5*      AT A COMPLEX POINT Z.
C215B  6*ROUTINE NAME:  SCPTACO
C215B  7*ENTRY NAME:  SCPTACO
C215B  8*STORAGE 372 (OCTAL) WORDS.
C215B  9*ROUTINES CALLED:  LABRT(N103B).
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C216A  A*           B L BUZBEE        C-4          J.HANCOCK        71
C216A  B*NEWPOL  ZEROS OF A POLYNOMIAL WITH OPTIONAL ERROR BOUNDS
C216A  C*F4              SR6600   SCP 3.1
C216A  D*                     SW  3     LS  5     TYPE  1
C216A  E*SOURCE CARDS         192  BCD    OBJECT CARDS    39   BIN
C216A  F**POLYNOMIAL*ZEROS
C216A  G*CARDS        F4  COMPAT   WU 01/04/73REV.2 DECK 09/19/72REV.1
C216A  1*FORM:  CALL NEWPOL(N,A,R,T,S,LE)
C216A  2*PURPOSE:  FIND ZEROS OF COMPLEX POLYNOMIAL WITH
C216A  3*      OPTIONAL ERROR BOUNDS
C216A  4*TIMING:  FOR N.LE.5 AND NO INPUT ESTIMATES, EXECUTION TIME IS
C216A  5*      1 TO 5 MILLISECONDS PER ZERO.
C216A  6*ROUTINE NAME:  NEWPOL
C216A  7*ENTRY NAME:  NEWPOL
C216A  8*STORAGE:  1006 (OCTAL) WORDS
C216A  9*ROUTINES CALLED:  CABS(A203A), COS(B106A), SIN(B106A),
C216A 10*ALOG(B305A), EXP(B306A), SCPTACO(C215A).
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```
C216B  A*           B L BUZBEE        C-4          JOHN HANCOCK     72
C216B  B*NEWPOL  ZEROS OF A POLYNOMIAL WITH OPTIONAL ERROR BOUNDS
C216B  C*F4              SR7600   CROS
C216B  D*                     SW  3     LS  5     TYPE  1
C216B  E*F4 SOURCE CARDS      192  BCD    OBJECT CARDS    40   BIN
C216B  F**POLYNOMIAL*ZEROS
C216B  G*ON DISK      F4  COMPAT   WU 01/04/73REV.1 DECK 09/19/72
C216B  1*FORM:  CALL NEWPOL(N,A,R,T,S,LE)
C216B  2*PURPOSE:  FIND ZEROS OF COMPLEX POLYNOMIAL WITH
C216B  3*      OPTIONAL ERROR BOUNDS
C216B  4*TIMING:  FOR N.LE.5 AND NO INPUT ESTIMATES, EXECUTION TIME IS
C216B  5*   LESS THAN 1 MILLISECOND PER ZERO.
C216B  6*ROUTINE NAME:  NEWPOL
C216B  7*ENTRY NAME:  NEWPOL
C216B  8*STORAGE:  1011 OCTAL WORDS
C216B  9*ROUTINES CALLED:  CABS(A203B), SIN(B106B),
C216B 10*   ALOG(B305B), EXP(B306B), SCPTACO(C215B).
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```
C2AA   A*     1     B.L. BUZBEE       C-4                                  72
C2AA   B*ZEROS OF REAL (SP) POLYNOMIAL
C2AA   C*F4              SR6600    SCP 3.1
C2AA   D*                     SW  2      LS  1      TYPE  2
C2AA   E*F4 SOURCE CARDS      23   BCD      OBJECT CARDS     9   BIN
C2AA   F**ZEROS OF REAL (SP)*POLYNOMIAL
C2AA   G*CARDS         F4  COMPAT   WU 05/18/72       DECK 05/18/72
C2AA   1*FORM:  CALL SRPOLY(N,SR,DP,Z,IE)
C2AA   2*PURPOSE:  FIND THE ZEROS OF A REAL POLYNOMIAL WITH SINGLE
C2AA   3*   PRECISION  COEFFICIENTS.
C2AA   4*ROUTINE NAME:  SRPOLY
C2AA   5*ENTRY NAME:  SRPOLY
C2AA   6*STORAGE:  85 OCTAL WORDS.
C2AA   7*USES:  DCPOLY(C2AD).


C2AB   A*           B.L. BUZBEE       C-4                                  72
C2AB   B*ZEROS OF COMPLEX (SP) POLYNOMIAL
C2AB   C*F4              SR6600    SCP 3.1
C2AB   D*                     SW  2      LS  1      TYPE  2
C2AB   E*F4 SOURCE CARDS      22   BCD      OBJECT CARDS     9   BIN
C2AB   F**ZEROS OF COMPLEX (SP)*POLYNOMIALS
C2AB   G*CARDS         F4  COMPAT   WU 05/18/72       DECK 05/18/72
C2AB   1*FORM:  CALL SCPOLY(N,SC,DP,Z,IE)
C2AB   2*PURPOSE:  FIND THE ZEROS OF A COMPLEX POLYNOMIAL WITH
C2AB   3*   SINGLE PRECISION COEFFICIENTS.
C2AB   4*ROUTINE NAME:  SCPOLY
C2AB   5*ENTRY NAME:  SCPOLY
C2AB   6*STORAGE:  89 OCTAL WORDS.
C2AB   7*USES DCPOLY(C2AD).


C2AC   A*           B.L. BUZBEE       C-4                                  72
C2AC   B*ZEROS OF A REAL (DP) POLYNOMIAL
C2AC   C*F4              SR6600    SCP 3.1
C2AC   D*                     SW  2      LS  1      TYPE  2
C2AC   E*F4 SOURCE DECK       14   BCD      OBJECT DECK      6   BIN
C2AC   F**ZEROS OF A REAL (DP)*POLYNOMIAL
C2AC   G*CARDS         F4  COMPAT   WU 05/18/72       DECK 05/18/72
C2AC   1*FORM:  CALL DRPOLY(N,DBR,DP,DZ,IE)
C2AC   2*PURPOSE:  FIND THE ZEROS OF A REAL POLYNOMIAL WITH DOUBLE
C2AC   3*   PRECISION COEFFICIENTS.
C2AC   4*ROUTINE NAME:  DRPOLY
C2AC   5*ENTRY NAME:  DRPOLY
C2AC   6*STORAGE:  48 OCTAL WORDS.
C2AC   7*USES DCPOLY(C2AD).
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```
C2AD   A*           B.L. BUZBEE       C-4                                  72
C2AD   B*ZEROS OF A COMPLEX (DP) POLYNOMIAL
C2AD   C*F4              SR6600   SCP 3.1
C2AD   D*                      SW  3     LS  4     TYPE  2
C2AD   E*F4 SOURCE CARDS     170   BCD    OBJECT CARDS    68   BIN
C2AD   F**ZEROS OF A COMPLEX (DP)*POLYNOMIAL
C2AD   G*CARDS        F4  COMPAT   WU 05/18/72       DECK 05/18/72
C2AD   1*FORM:  CALL DCPOLY(N,DC,DP,DZ,IE)
C2AD   2*PURPOSE:  FIND THE ZEROS OF A COMPLEX POLYNOMIAL WITH
C2AD   3*   DOUBLE PRECISION COEFFICIENTS.
C2AD   4*ROUTINE NAME:  DCPOLY
C2AD   5*ENTRY NAME:  DCPOLY
C2AD   6*STORAGE:  1617 OCTAL WORDS.
C2AD   7*USES:  DCABS(A202A),DSQRT(B410A), AND LABRT(N103A).
```

C3 EVALUATION OF SPECIAL FUNCTIONS

E.G., BESSEL, GAMMA, ERROR, ELLIPTIC INTEGRALS, EXPONENTIAL INTEGRALS.

REVIEWER: WAYNE FULLERTON, C-4

```
C301A  A*          R. M. FRANK      C-4          CHERRY            67
C301A  0*BESSEL FUNCTION OF THE FIRST KIND FOR INTEGRAL N
C301A  B*MATHEMATICS    C3              F4              SR6600   SCOPE
C301A  C*                            SW  3     LS  2
C301A  D*F4 SOURCE CARDS        100BCDF4 OBJECT CARDS         24BIN
C301A  S**BESSEL*FUNCTION J
C301A 10*ON DISK     F4  COMPAT   WU 09/12/66       DECK 09/08/66
C301A 11*CALL BESJN(X,N,T,B)
C301A 12*COMPUTES BESSEL FUNCTION JN(X) FOR N.LE.20 AND ALL X.
C301A 13*X IS FLOATING-POINT ARGUMENT. N IS THE ORDER.
C301A 14*T IS TEMPORARY STORAGE OF LENGTH 12+MAX(2X,N).
C301A 15*B IS THE RESULT.
C301A 16*STORAGE-296 WORDS
C301A 17*USES-LABRT(N103A). SIN(B106A).COS(B106A).
```

```
C302A  A*          B.L. BUZBEE      C-4          CHERRY            67
C302A  B*INCOMPLETE GAMMA FUNCTION
C302A  C*FORTRAN IV     SR6600   SCP 3.1
C302A  D*                     SW  3     LS  2     TYPE  1
C302A  E*SOURCE CARDS         88  BCD        OBJECT CARDS   46  BIN
C302A  F**GAMMA FUNCTION*INCOMPLETE GAMMA FUNCTION
C302A  G*ON DISK     F4  COMPAT   WU 09/15/72REV.4 DECK 06/13/68REV 1
C302A  1*FORM:  Z=GAMMA(A.X)
C302A  2*PURPOSE:  EVALUATE (GAMMA)(A.X) =THE INTEGRAL FROM
C302A  3*      X TO INFINITY OF (EXP(-U))*(U**(A-1)))*(DU)
C302A  4*ERROR CONDITIONS: 1. X.LT.0.  2. A INTEGRAL,NEGATIVE
C302A  5*      AND SMALL VALUES OF X.  (SEE WRITEUP)
C302A  6*ACCURACY:  REL. ERROR .LT. 6.E-9.
C302A  7*ROUTINE NAME:  GAMMA
C302A  8*ENTRY NAME:  GAMMA
C302A  9*STORAGE:  608 (DECIMAL WORDS)
C302A 10*ROUTINES CALLED:  E1(C309A),ALOG(B305A),EXP(B306A),
C302A 11*      LABRT(N103A).GAM1(C325A).
```

```
C304A  A*           KARL J MELENDEZ  T-1                                  68
C304A  0*COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS
C304A  B*MATH            C3              F4              SR6600   SCOPE
C304A  C*                                SW  3     LS  2
C304A  D*F4 SOURCE CARDS         92BCDF4 OBJECT CARDS         28BIN
C304A  S**ELLIPTIC*INTEGRALS OF THE FIRST AND SECOND KIND
C304A 10*CARDS       F4  COMPAT   WU 02/05/68      DECK 02/05/68
C304A 11*CALLED BY-CALL ELLI(PHI,CAY,F,E) OR CALL CELLI(PHI,CAY,F,E)
C304A 12*PURPOSE - TO COMPUTE THE INCOMPLETE OR COMPLETE ELLIPTIC
C304A 13*            INTEGRALS OF THE FIRST AND SECOND KIND.
C304A 14*PHI - THE UPPER LIMIT OF THE INTEGRAL(A DUMMY VAR IN CELLI).
C304A 15*CAY - THE PARAMETER IN THE INTEGRAL.
C304A 16*F - ON RETURN, THE ELLIPTIC INTEGRAL OF THE FIRST KIND.
C304A 17*E - ON RETURN, THE ELLIPTIC INTEGRAL OF THE SECOND KIND.
C304A 18*ACCURACY - AT LEAST TEN SIGNIFICANT FIGURES.
C304A 19*STORAGE - 335 (DEC) WORDS
C304A 20*USES - LABRT(N103A),SQRT(B408A),SIN(B106A),TAN(B107A),
C304A 21*ATAN(B104A),ALOG(B305A).


C305A   *(BESSJ) DELETED FROM THE LIBRARY-
         C301(BESJN), C328(BJYIK). AND C327(BJSN) ARE RECOMMENDED.


C306A   *(BESSY) DELETED FROM THE LIBRARY-
         C301(BESJN). C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.


C307A   *(BESSI) DELETED FROM THE LIBRARY-
         C301(BESJN). C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.


C308A   *(BESSK) DELETED FROM THE LIBRARY-
         C301(BESJN), C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.
```

```
C309A  A*           CHERRY            T-1                              67
C309A  0*EXPONENTIAL INTEGRAL E1(X)
C309A  B*MATH            C3              F4            SR6600   SCOPE
C309A  C*                               SW  2     LS  1
C309A  D*F4 SOURCE                20BCD  RELOCATABLE          10BIN
C309A  S**EXPONENTIAL*INTEGRAL*E1
C309A 10*ON DISK      F4  COMPAT   WU 09/13/67 REV  DECK 06/08/67
C309A 11*CALLED BY    Y=E1(X), X,Y,REAL
C309A 12*PURPOSE-TO COMPUTE THE EXPONENTIAL INTEGRAL E1(X)
C309A 13*RELATIVE ERROR ABOUT  1.E-13
C309A 14*STORAGE-88 WORDS.
C309A 15*USES-LABRT(N103A),GAMMA(C302A),DLOG(B309A).
```

```
C310A  A*           CHERRY            T-1                              66
C310A  0*ERROR FUNCTION
C310A  B*MATH            C3              F4            SR6600   SCOPE
C310A  C*                               SW  2     LS  1
C310A  D*F4 SOURCE DECK           30BCDF4 OBJECT DECK          14BIN
C310A  S**ERROR*FUNCTION*ERF
C310A 10*ON DISK      F4  COMPAT   WU 09/18/67 REV  DECK 12/30/66
C310A 11* Y = ERF(X)
C310A 12*ACCURACY- 6.E-14
C310A 13*STORAGE - 170 WORDS.
C310A 14*USES-LABRT(N103A) AND EXP(B306A).
```

```
C310B  A*           I. CHERRY         C-4                              72
C310B  B*ERF - ERROR FUNCTION
C310B  C*F4              SR7600   CROS
C310B  D*                      SW 2       LS 1       TYPE 1
C310B  E*F4 SOURCE CARDS      30   BCD    OBJECT CARDS    14   BIN
C310B  F**ERROR*FUNCTION
C310B  G*ON DISK      F4  COMPAT   WU 03/10/72      DECK 03/10/72
C310B  1*FORM:  Y = ERF(X)
C310B  2*PURPOSE:  COMPUTE THE ERROR FUNCTION.  SAME AS
C310B  3*      ERF(C310A).
C310B  4*ACCURACY:  6.0 E-14
C310B  5*STORAGE:  236 OCTAL WORDS
C310B  6*ROUTINES CALLED:  LABRT(N103A). EXP(B306A).
```

C3*4

C311A *(LØGGAM) DELETED FROM THE LIBRARY:USE C326 INSTEAD.

```
C312A  A*           IVAN CHERRY      C-4                                72
C312A  B*COMPLEX DIGAMMA (PSI) FUNCTION FOR COMPLEX NUMBER Z
C312A  C*F4              SR6600   SCP 3.1
C312A  D*                     SW  2     LS  2     TYPE  1
C312A  E*F4 SOURCE CARDS     50   BCD    OBJECT CARDS    33   BIN
C312A  F**COMPLEX*DIGAMMA*PSI FUNCTION
C312A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
C312A  1*FORM:  Y = PSI (Z)
C312A  2*PURPOSE: APPROXIMATES COMPLEX DERIVATIVE OF ALOG(GAMMA(Z)).
C312A  3*NOTE-PSI MUST BE DECLARED COMPLEX IN A TYPE STATEMENT
C312A  4*     IN THE USERS PROGRAM.  Y AND Z ARE ALSO COMPLEX.
C312A  5*ROUTINE NAME:  PSI
C312A  6*ENTRY NAME:  PSI
C312A  7*ACCURACY-8 DECIMAL PLACES.
C312A  8*STORAGE:  428 OCTAL WORDS.
C312A  9*ROUTINES CALLED:  LABRT(N103A),DATAN2(B110A),DLOG(B309A).
```

```
C313A  A*           DONALD L WILLIAMST-1          IVAN CHERRY      67
C313A  0*EXPONENTIAL INTEGRAL
C313A  B*MATHEMATICS     C3              F4              SR6600   SCOPE
C313A  C*                              SW  2     LS  1
C313A  D*F4 SOURCE CARDS          98CDF4 OBJECT CARDS          4BIN
C313A  S**EXPONENTIAL*INTEGRAL
C313A 10*CARDS        F4  COMPAT   WU 03/15/67      DECK 03/15/67
C313A 11*CALLED BY Y=EXPINT(N,X)
C313A 12*ACCURACY--SEE GAMMA(A,X)(C302A)
C313A 13*STORAGE-44 WORDS.
C313A 14*USES---GAMMA(C302A).
```

```
C323A  A*           DONALD L WILLIAMST-1          IVAN CHERRY      67
C323A  0*BESSEL FUNCTION EVALUATION FOR COMPLEX ARGUMENT AND ORDER
C323A  B*MATHEMATICS     C3              F4              SR6600   SCOPE
C323A  C*                                SW  3     LS  2
C323A  D*F4 SOURCE CARDS        101BCDF4 OBJECT CARDS         56BIN
C323A  S**BESSEL*FUNCTION*EVALUATION FOR*COMPLEX*ARGUMENT AND*ORDER
C323A 10*CARDS        F4  COMPAT   WU 09/18/67 REV  DECK 05/19/67
C323A 11*CALL COMBES(Z,ANU,N,BJ,Y)
C323A 12*PURPOSE-TO COMPUTE N+1 VALUES OF THE BESSEL FUNCTIONS J(Z)
C323A 13*AND Y(Z) FOR COMPLEX ARGUMENT Z AND COMPLEX ORDERS ANU TO
C323A 14*ANU+N. BJ-COMPLEX STORAGE FOR J(Z) FOR ORDERS ANU TO ANU+N.
C323A 15*Y-COMPLEX STORAGE FOR Y(Z) FOR ORDERS ANU TO ANU+N.BJ AND Y
C323A 16*ARE OF LENGTH L WHERE L.EQ.MAX(N,2*ABS(Z))+13. NOTE-Z,ANU,
C323A 17*BJ, AND Y MUST BE DECLARED COMPLEX IN A TYPE STATEMENT IN
C323A 18*THE USERS PROGRAM.
C323A 19*STORAGE-1630(DECIMAL)WORDS.
C323A 20*USES-LNGAM(C326A).CLOG(B307A).CEXP(B310A),LABRT(N103A).
```

```
C325A  A*           DONALD L WILLIAMST-1          IVAN CHERRY      67
C325A  0*GAMMA FUNCTION
C325A  B*MATH            C3              F4              SR6600   SCOPE
C325A  C*                                SW  2     LS  1
C325A  D*F4 SOURCE CARDS        33BCDF4 OBJECT CARDS         14BIN
C325A  S**GAMMA FUNCTION
C325A 10*ON DISK      F4  COMPAT   WU 11/13/67 REV  DECK 11/09/67 REV
C325A 11*CALLED BY Z=GAM1(X)
C325A 12*ERROR CONDITIONS--
C325A 13*   (1) GAM1   ABS(ARG) TOO BIG. SEE WRITEUP.
C325A 14*   (2) GAM1   ARGUMENT A NONPOSITIVE INTEGER.
C325A 15*ACCURACY-APPROXIMATELY 13 SIGINIFICANT FIGURES.
C325A 16*STORAGE-151(DECIMAL) WORDS.
C325A 17*USES LABRT(N103A).
```

```
C326A  A*           DONALD L WILLIAMST-1          IVAN CHERRY      67
C326A  0*COMPLEX LN GAMMA
C326A  B*MATH            C3              F4              SR6600   SCOPE
C326A  C*                                SW  2     LS  1
C326A  D*F4 SOURCE CARDS        38BCDF4 OBJECT CARDS         16BIN
C326A  S**COMPLEX*LN GAMMA
C326A 10*ON DISK      F4  COMPAT   WU 02/06/67      DECK 02/06/67
C326A 11*CALLED BY Z1=LNGAM(Z),WHERE Z1,Z,AND LNGAM
C326A 12*   ARE DECLARED COMPLEX IN THE USERS PROGRAM.
C326A 13*ACCURACY-8 DECIMAL PLACES.
C326A 14*USES-LABRT.CLOG
C326A 15*STORAGE-198 WORDS.
```

```
C327A  A*           C-4                                W. FULLERTON      68
C327A  B*BESSEL FUNCTIONS FOR LARGE REAL ARGUMENTS
C327A  C*F4              SR6600   SCP 3.1
C327A  D*                     SW 3      LS 1       TYPE 1.1
C327A  E*                SOURCE   31 CARDS           OBJECT   38 CARDS
C327A  F**BESSEL*FUNCTIONS
C327A  G*DISK        F4 COMPAT WU 04/30/73 REV 2 DECK 04/30/73 REV.1
C327A  1*FORM:  CALL BASF(GAMMA,X,FJI,YK,SW)
C327A  2*PURPOSE:  COMPUTE BESSEL FUNCTIONS J AND Y OR I AND K
C327A  3*      FOR LARGE REAL ARGUMENTS.
C327A  4*ROUTINE NAME:  BASF
C327A  5*ENTRY NAME:  BASF
C327A  6*STORAGE:  742 OCTAL WORDS
C327A  7*ROUTINES CALLED:  DBLE(A105A),DCOS,DEXP,DSIN,DSQRT(ALL ON
C327A  8*      SYSTEM)
```

```
C327B  A*           C-4                                W. FULLERTON      73
C327B  B*BESSEL FUNCTIONS FOR LARGE REAL ARGUMENTS
C327B  C*F4              SR7600   CROS
C327B  D*                     SW 3      LS 1       TYPE 1.1
C327B  E*                SOURCE   31 CARDS           OBJECT   38 CARDS
C327B  F**BESSEL*FUNCTIONS
C327B  G*DISK        F4 COMPAT WU 04/30/73       DECK 04/30/73
C327B  1*FORM:  CALL BASF(GAMMA,X,FJI,YK,SW)
C327B  2*PURPOSE:  COMPUTE BESSEL FUNCTIONS J AND Y OR I AND K
C327B  3*      FOR LARGE REAL ARGUMENTS.
C327B  4*ROUTINE NAME:  BASF
C327B  5*ENTRY NAME:  BASF
C327B  6*STORAGE:  745 OCTAL WORDS
C327B  7*ROUTINES CALLED:  DBLE(A105B),DCOS,DEXP,DSIN,DSQRT(ALL ON
C327B  8*      SYSTEM)
```

```
C328A  A*           C-4                                W. FULLERTON      68
C328A  B*BESSEL FUNCTIONS FOR REAL ORDER AND ARGUMENT
C328A  C*F4              SR6600   SCP 3.1
C328A  D*                     SW 4      LS 3       TYPE 1.1
C328A  E*                SOURCE  127 CARDS           OBJECT   76 CARDS
C328A  F**BESSEL FUNCTIONS
C328A  G*DISK        F4 COMPAT WU 04/30/73 REV.2 DECK 04/30/73 REV.1
C328A  1*FORM:  CALL BJYIK(X,GAMMA,FN,FJI,YK,SW)
C328A  2*PURPOSE:  COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C328A  3*      FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS.
C328A  4*ROUTINE NAME:  BJYIK
C328A  5*ENTRY NAME:  BJYIK
C328A  6*STORAGE:  1745 OCTAL WORDS
C328A  7*ROUTINES CALLED:  DBLE(A105A),DBAIEX(B313A),GAMMA(C302A),
C328A  8* BASF(C327A),DABS,DBAREX,DEXP,DCOS,DLOG,DSIN(ALL ON SYSTEM)
```

```
C328B  A*          C-4                                W. FULLERTON     73
C328B  B*BESSEL FUNCTIONS FOR REAL ORDER AND ARGUMENT
C328B  C*F4              SR7600
C328B  D*                     SW 4      LS 3       TYPE 1.1
C328B  E*                SOURCE  127 CARDS            OBJECT   77 CARDS
C328B  F**BESSEL FUNCTIONS
C328B  G*DISK        F4 COMPAT WU 04/30/73        DECK 04/30/73
C328B  1*FORM:  CALL BJYIK(X,GAMMA,FN,FJI,YK,SW)
C328B  2*PURPOSE:  COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C328B  3*     FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS.
C328B  4*ROUTINE NAME:  BJYIK
C328B  5*ENTRY NAME:  BJYIK
C328B  6*STORAGE:  1751 OCTAL WORDS
C328B  7*ROUTINES CALLED:  DBLE(A105B),DBAIEX(B313B),GAMMA(C302B),
C328B  8* BASF(C327B),DABS,DBAREX,DEXP,DCOS,DLOG,DSIN(ALL ON SYSTEM)
```

```
C329A  *(FFT) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED C3AB.
         FFT2(F502A) IS RECOMMENDED.
```

```
C329B  *(FFT) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED C3AB.
         FFT2(F502B) IS RECOMMENDED.
```

```
C330A  *(RFFT) REDESIGNATED F501A.
```

```
C330B  *(RFFT) REDESIGNATED F501B.
```

```
C331A  *(RFSN) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F5AB.
               RFTI(F503A) IS RECOMMENDED.
```

```
C332A  A*           C-3                                W. FULLERTON      68
C332A  B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
C332A  C*F4              SR6600   SCP 3.1
C332A  D*                   SW 2      LS 2      TYPE 1.1
C332A  E*                SOURCE   72 CARDS         OBJECT   50 CARDS
C332A  F**BESSEL FUNCTIONS
C332A  G*CARDS       F4 COMPAT WU 04/30/73 REV.2 DECK 04/30/73 REV.1
C332A  1*FORM:  CALL CBSF(GAMMA,X,FJI,YK,SW)
C332A  2*PURPOSE:  COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER
C332A  3*      AND ARGUMENT.
C332A  4*ROUTINE NAME:  CBSF
C332A  5*ENTRY NAME:  CBSF
C332A  6*STORAGE:  1206 OCTAL WORDS
C332A  7*ROUTINES CALLED:  CSQRT(B409A),CEXP(B310A)
```

```
C332B  A*           C-3                                W. FULLERTON      73
C332B  B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
C332B  C*F4              SR7600   CROS
C332B  D*                   SW 2      LS 2      TYPE 1.1
C332B  E*                SOURCE   72 CARDS         OBJECT   50 CARDS
C332B  F**BESSEL FUNCTIONS
C332B  G*DISK        F4 COMPAT WU 04/30/73       DECK 04/30/73
C332B  1*FORM:  CALL CBSF(GAMMA,X,FJI,YK,SW)
C332B  2*PURPOSE:  COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER
C332B  3*      AND ARGUMENT.
C332B  4*ROUTINE NAME:  CBSF
C332B  5*ENTRY NAME:  CBSF
C332B  6*STORAGE:  1211 OCTAL WORDS
C332B  7*ROUTINES CALLED:  CSQRT(B409B),CEXP(B310B)
```

```
C333A  A*           C-3                                W. FULLERTON      68
C333A  B*COMPLEX BESSEL FUNCTIONS
C333A  C*F4              SR6600   SCP 3.1
C333A  D*                   SW 4      LS 3      TYPE 1.1
C333A  E*                SOURCE   122 CARDS         OBJECT   72 CARDS
C333A  F**BESSEL FUNCTIONS
C333A  G*CARDS       F4 COMPAT WU 04/30/73 REV.2 DECK 04/30/73 REV.1
C333A  1*FORM:  CALL CBJYIK(X,GAMMA,FN,FJI,YK,SW)
C333A  2*PURPOSE:  COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C333A  3*      FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS
C333A  4*ROUTINE NAME:  CBJYIK
C333A  5*ENTRY NAME:  CBJYIK
C333A  6*STORAGE:  1666 OCTAL WORDS
C333A  7*ROUTINES CALLED:  CABS(A203A), CSIN/CCOS(B109A),CLOG(B307A),
C333A  8*        CEXP(B310A),LNGAM(C326A),CBSF(C332A)
```

```
C333B  A*          C-3                              W. FULLERTON      73
C333B  B*COMPLEX BESSEL FUNCTIONS
C333B  C*F4              SR7600   CROS
C333B  D*                     SW 4      LS 3       TYPE 1.1
C333B  E*                SOURCE   122 CARDS          OBJECT   72 CARDS
C333B  F**BESSEL FUNCTIONS
C333B  G*DISK        F4 COMPAT WU 04/30/73        DECK 04/30/73
C333B  1*FORM:  CALL CBJYIK(X,GAMMA,FN,FJI,YK,SW)
C333B  2*PURPOSE:  COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C333B  3*     FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS
C333B  4*ROUTINE NAME:  CBJYIK
C333B  5*ENTRY NAME:  CBJYIK
C333B  6*STORAGE:  1672 OCTAL WORDS
C333B  7*ROUTINES CALLED:  CABS(A203B), CSIN/CCOS(B109B),CLOG(B307B),
C333B  8*       CEXP(B310B),LNGAM(C326B),CBSF(C332B)


C334A   *(ERFINV) HAS BEEN DEMOTED TO TYPE 2 AND IS NOW C3AD.


C334B   *(ERFINV) HAS BEEN DEMOTED TO TYPE 2 AND IS NOW C3AD.


C335A  A*          B.L. BUZBEE      C-4          D. HENDERSON      70
C335A  B*ERROR FUNCTION COMPLEMENT
C335A  C*F4              SR6600   SCP 3.1
C335A  D*                     SW  3      LS  1      TYPE  1
C335A  E*SOURCE CARDS         39   BCD    OBJECT CARDS    18   BIN
C335A  F**ERROR*FUNCTION*COMPLEMENT
C335A  G*CARDS        F4  COMPAT   WU 12/14/71REV.1 DECK 05/15/70
C335A  1*FORM: Y = ERFC(X)
C335A  2*       Y = PQERFC(X)
C335A  3*PURPOSE:  COMPUTE ERROR FUNCTION COMPLEMENT
C335A  4*STORAGE:  257 (OCTAL) WORDS
C335A  5*TIMING:  AVERAGE IS 42 MICROSEC.
C335A  6*ROUTINES CALLED:  ERF(C310A), EXP(B306A)
```

```
C335B  A*           B.L. BUZBEE       C-4          I CHERRY          73
C335B  B*ERROR FUNCTION COMPLEMENT
C335B  C*F4              SR7600   CROS
C335B  D*                    SW  3      LS  2     TYPE  1
C335B  E*SOURCE CARDS        39   BCD    OBJECT CARDS    17   BIN
C335B  F**ERROR*FUNCTION*COMPLEMENT
C335B  G*ON DISK      F4  COMPAT   WU 01/04/73      DECK 01/04/73
C335B  1*FORM: Y = ERFC(X)
C335B  2*       Y = PQERFC(X)
C335B  3*PURPOSE:  COMPUTE ERROR FUNCTION COMPLEMENT
C335B  4*ROUTINE NAME:  ERFC
C335B  5*ENTRY NAMES:  ERFC,PQERFC
C335B  6*STORAGE:  262 OCTAL WORDS
C335B  7*ROUTINES CALLED:  ERF(C310B), EXP(B356B)


C336B  A*           B L BUZBEE        C-4                          71
C336B  B*INCOMPLETE BETA FUNCTION
C336B  C*F4              SR7600   CROS
C336B  D*                    SW  3      LS  2     TYPE 1
C336B  E*F4 SOURCE CARDS     58  BCD OBJECT CARDS    16  BIN
C336B  F**INCOMPLETE*BETA FUNCTION
C336B  G*ON DISK      F4  COMPAT   WU 06/28/72REV 1 DECK 12/13/71
C336B  1*FORM:  Z = BETAIC(X,P,Q,RE)
C336B  2*PURPOSE:  EVALUATE INCOMPLETE BETA FUNCTION
C336B  3*TIMING:  FOR 8-DIGIT ACCURACY, AVERAGE 7600 TIME = .35 MS.
C336B  4*RELATIVE ERROR: SPECIFIED BY USER
C336B  5*ROUTINE NAME: BETAIC
C336B  6*ENTRY NAME:  BETAIC
C336B  7*STORAGE:  337 OCTAL WORDS
C336B  8*ROUTINES CALLED:  GAM1(C325B),RBAREX,OUTPTC(ALL ON SYSTEM)


C337A   *(FFT2) HAS BEEN REDESIGNATED F502A.


C337B   *(FFT2) HAS BEEN REDESIGNATED F502B.


C338A   *(RFTI) HAS BEEN REDESIGNATED F503A.


C338B   *(RFTI) HAS BEEN REDESIGNATED F503B.
```

```
C339A  A*          B.L. BUZBEE      C-3          W. FULLERTON      72
C339A  B*INVERSE ERROR FUNCTION
C339A  C*F4              SR6600   SCP 3.1
C339A  D*                     SW  2     LS  1     TYPE  1.1
C339A  E*F4 SOURCE CARDS      26   BCD     OBJECT CARDS      10  BIN
C339A  F**INVERSE*ERROR*FUNCTION
C339A  G*CARDS       F4 COMPAT WU 05/18/73 REV 2 DECK 05/18/73 REV.1
C339A  1*FORM:  X = ERFI(Y)
C339A  2*PURPOSE:  GIVEN Y, DETERMINE X SUCH THAT Y = ERF(X).
C339A  3*ROUTINE NAME:  ERFI
C339A  4*ENTRY NAME:  ERFI
C339A  5*STORAGE:  142 OCTAL WORDS.
C339A  6*ROUTINES CALLED:  ERF(C310A),EXP(B306A).
```

```
C339B  A*          B.L. BUZBEE      C-3          W. FULLERTON      72
C339B  B*INVERSE ERROR FUNCTION
C339B  C*F4              SR7600   CROS
C339B  D*                     SW  2     LS  1     TYPE  1.1
C339B  E*F4 SOURCE CARDS      26   BCD     OBJECT CARDS      10  BIN
C339B  F**INVERSE*ERROR*FUNCTION
C339B  G*DISK        F4 COMPAT WU 05/18/73 REV 2 DECK 05/18/73 REV.1
C339B  1*FORM:  X = ERFI(Y)
C339B  2*PURPOSE:  GIVEN Y, DETERMINE X SUCH THAT Y = ERF(X).
C339B  3*ROUTINE NAME:  ERFI
C339B  4*ENTRY NAME:  ERFI
C339B  5*TIMING:  AVERAGE 7600 EXECUTION TIME IS .14 MS.
C339B  6*STORAGE:  142 OCTAL WORDS.
C339B  7*ROUTINES CALLED:  ERF(C310B),EXP(B306B).
```

```
C340A  A*                          C-4          W.FULLERTON       73
C340A  B*REAL BESSEL FUNCTION J0 OF THE ARGUMENT X.GE.0
C340A  C*F4              SR6600   SCP 3.1
C340A  D*                     SW  2     LS  2     TYPE 1.1
C340A  E*                SOURCE  92  CARDS          OBJECT  27   CARDS
C340A  F**BESSEL FUNCTION
C340A  G*CARDS       F4  COMPAT WU 05/14/73       DECK 05/14/73
C340A  1*FORM:  RJ=FJ0(X)
C340A  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION J0 OF THE
C340A  3*          REAL ARGUMENT X.GT.0
C340A  4*ROUTINE NAME:  FJ0(X)
C340A  5*ENTRY NAME:  FJ0(X)
C340A  6*STORAGE:  440 OCTAL WORDS
C340A  7*SELF CONTAINED.
```

```
C340B  A*                                C-4          W.FULLERTON      73
C340B  B*REAL BESSEL FUNCTION J0 OF THE ARGUMENT X.GE.0
C340B  C*F4              SR7600   CROS
C340B  D*                     SW  2     LS  2     TYPE 1.1
C340B  E*                SOURCE  92  CARDS          OBJECT  26   CARDS
C340B  F**BESSEL FUNCTION
C340B  G*DISK       F4  COMPAT WU 05/14/73        DECK 05/14/73
C340B  1*FORM:  RJ=FJ0(X)
C340B  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION J0 OF THE
C340B  3*          REAL ARGUMENT X.GT.0
C340B  4*7600 TIMING:
C340B  5*       7 SECONDS FOR 1000 RANDOM VALUES 0. .LT. X .LE. 30.
C340B  6*       36 SECONDS FOR 5000 RANDOM VALUES0. .LT. X .LE. 1.
C340B  7*ROUTINE NAME:  FJ0(X)
C340B  8*ENTRY NAME:  FJ0(X)
C340B  9*STORAGE:  440 OCTAL WORDS
C340B 10*SELF CONTAINED.
```

```
C341A  A*                                C-4          W.FULLERTON      73
C341A  B*REAL BESSEL FUNCTION J1 OF THE ARGUMENT X.GE.0
C341A  C*F4              SR6600   SCP 3.1
C341A  D*                     SW  2     LS  2     TYPE 1.1
C341A  E*                SOURCE   92 CARDS          OBJECT   27  CARDS
C341A  F**BESSEL FUNCTION
C341A  G*CARDS      F4  COMPAT WU 05/14/73        DECK 05/14/73
C341A  1*FORM:  RJ=FJ1(X)
C341A  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION J1 OF
C341A  3*          THE REAL ARGUMENT X.GT.0
C341A  4*ROUTINE NAME:  FJ1(X)
C341A  5*ENTRY NAME:  FJ1(X)
C341A  6*STORAGE:  445 OCTAL WORDS
C341A  7*SELF CONTAINED.
```

```
C341B  A*                                C-4          W.FULLERTON       73
C341B  B*REAL BESSEL FUNCTION J1 OF THE ARGUMENT X.GE.0
C341B  C*F4              SR7600   CROS
C341B  D*                     SW  2     LS  2     TYPE 1.1
C341B  E*                SOURCE   92 CARDS          OBJECT   27  CARDS
C341B  F**BESSEL FUNCTION
C341B  G*DISK       F4  COMPAT WU 05/14/73        DECK 05/14/73
C341B  1*FORM:  RJ=FJ1(X)
C341B  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION J1 OF
C341B  3*          THE REAL ARGUMENT X.GT.0
C341B  4*7600 TIMING:
C341B  5*       7 SECONDS FOR 1000 RANDOM VALUES 0. .LT. X .LE. 30.
C341B  6*      36 SECONDS FOR 5000 RANDOM VALUES 0. .LT. X .LE. 1.
C341B  7*ROUTINE NAME:  FJ1(X)
C341B  8*ENTRY NAME:  FJ1(X)
C341B  9*STORAGE:  445 OCTAL WORDS
C341B 10*SELF CONTAINED.
```

```
C342A  A*                                C-4          W.FULLERTON       73
C342A  B*REAL BESSEL FUNCTION I0 OF THE ARGUMENT X.GE.0
C342A  C*F4              SR6600   SCP 3.1
C342A  D*                     SW  2     LS  2     TYPE 1.1
C342A  E*                SOURCE   88 CARDS          OBJECT   22 CARDS
C342A  F**BESSEL FUNCTION
C342A  G*CARDS      F4  COMPAT WU 05/14/73        DECK 05/14/73
C342A  1*FORM:  RJ=FI0(X)
C342A  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION I0 OF
C342A  3*          THE REAL ARGUMENT X.GT.0
C342A  4*ROUTINE NAME:  FI0(X)
C342A  5*ENTRY NAME:  FI0(X)
C342A  6*STORAGE:  331 OCTAL WORDS
C342A  7*SELF CONTAINED.
```

```
C342B  A*                                C-4          W.FULLERTON       73
C342B  B*REAL BESSEL FUNCTION I0 OF THE ARGUMENT X.GE.0
C342B  C*F4              SR7600   CROS
C342B  D*                     SW  2     LS  2      TYPE 1.1
C342B  E*                SOURCE   88 CARDS           OBJECT   21 CARDS
C342B  F**BESSEL FUNCTION
C342B  G*DISK       F4  COMPAT WU 05/14/73        DECK 05/14/73
C342B  1*FORM:  RJ=FI0(X)
C342B  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION I0 OF
C342B  3*          THE REAL ARGUMENT X.GT.0
C342B  4*7600 TIMING:
C342B  5*        7 SECONDS FOR 1000 RANDOM VALUES 0. .LT. X .LE. 30.
C342B  6*       37 SECONDS FOR 5000 RANDOM VALUES 0. .LT. X .LE. 1.
C342B  7*ROUTINE NAME:  FI0(X)
C342B  8*ENTRY NAME:  FI0(X)
C342B  9*STORAGE:  331 OCTAL WORDS
C342B 10*SELF CONTAINED.
```

```
C343A  A*                                C-4          W.FULLERTON       73
C343A  B*REAL BESSEL FUNCTION I1 OF THE ARGUMENT X.GE.0
C343A  C*F4              SR6600   SCP 3.1
C343A  D*                     SW  2     LS  2      TYPE 1.1
C343A  E*                SOURCE  89   CARDS           OBJECT  22  CARDS
C343A  F**BESSEL FUNCTION
C343A  G*CARDS      F4  COMPAT WU 05/14/73        DECK 05/14/73
C343A  1*FORM:  RJ=FI1(X)
C343A  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION I1 OF
C343A  3*          THE REAL ARGUMENT X.GT.0
C343A  4*ROUTINE NAME:  FI1(X)
C343A  5*ENTRY NAME:  FI1(X)
C343A  6*STORAGE:  342 OCTAL WORDS
C343A  7*SELF CONTAINED.
```

```
C343B  A*                                C-4          W.FULLERTON       73
C343B  B*REAL BESSEL FUNCTION I1 OF THE ARGUMENT X.GE.0
C343B  C*F4              SR7600   CROS
C343B  D*                     SW  2     LS  2     TYPE 1.1
C343B  E*                SOURCE  89   CARDS          OBJECT  22  CARDS
C343B  F**BESSEL FUNCTION
C343B  G*DISK       F4  COMPAT WU 05/14/73        DECK 05/14/73
C343B  1*FORM:  RJ=FI1(X)
C343B  2*PURPOSE:  COMPUTES THE REAL BESSEL FUNCTION I1 OF
C343B  3*        THE REAL ARGUMENT X.GT.0
C343B  4*7600 TIMING:
C343B  5*       7 SECONDS FOR 1000 RANDOM VALUES 0. .LT. X .LE. 30.
C343B  6*      37 SECONDS FOR 5000 RANDOM VALUES 0. .LT. X .LE. 1.
C343B  7*ROUTINE NAME:  FI1(X)
C343B  8*ENTRY NAME:  FI1(X)
C343B  9*STORAGE:  342 OCTAL WORDS
C343B 10*SELF CONTAINED.
```

```
C3AA  A *           W. D. BARFIELD   T-2                              69
C3AA  B *FINDMAP - COMPLEX GREEN*S FUNCTION - CONFORMAL MAPPING
C3AA  C *F4              SR6600   SCP 3.1
C3AA  D *                     SW  4     LS  3     TYPE  2
C3AA  E *SOURCE CARDS        169  BCD    OBJECT CARDS    62   BIN
C3AA  F **FINDMAP*GREEN*CONFORMAL*MAPPING
C3AA  G *CARDS        F4  COMPAT   WU 10/17/69      DECK 10/17/69
C3AA  1 *CALL NAME: FINDMAP(XO,YO,NBDY,N2,X,Y,NN,XA,YA,SIG,G,H,GA,
C3AA  2 *HA,DS,AA)
C3AA  3 *PURPOSE: TO FIND VALUES OF THE (COMPLEX) FUNCTION WHICH
C3AA  4 *CONFORMALLY MAPS A CLOSED TWO DIMENSIONAL REGION INTO THE
C3AA  5 *UNIT CIRCLE.
C3AA  6 *STORAGE: 1477 (OCTAL) + 4(NBDY) + (NBDY)**2/4
C3AA  7 *ROUTINES CALLED: ATAN2(B104A), ALOG(B305A), SQRT(B408A),
C3AA  8 *LSS(F404A).
```

```
C3AB    *(FFT) HAS BEEN REDESIGNATED F5AA.
```

```
C3AC    *(RFSN) HAS BEEN REDESIGNATED F5AB.
```

```
C3AD   A*           B. L. BUZBEE      C-4          I. CHERRY          72
C3AD   B*INVERSE ERROR FUNCTION
C3AD   C*F4              SR6600    SCP 3.1
C3AD   D*                      SW  3     LS  2     TYPE  2
C3AD   E*F4 SOURCE CARDS      44   BCD    OBJECT CARDS   12   BIN
C3AD   F**INVERSE*ERROR FUNCTION
C3AD   G*CARDS        F4  COMPAT   WU 07/20/72       DECK 07/20/72
C3AD   1*FORM:  CALL ERFINV(Y,J,X,ANSWER,TEST,VE,RATIO,OUTNO)
C3AD   2*PURPOSE:  COMPUTE INVERSE ERROR FUNCTION
C3AD   3*ROUTINE NAME:  ERFINV
C3AD   4*ENTRY NAME:  ERFINV
C3AD   5*STORAGE:  204 OCTAL WORDS.
C3AD   6*TIMING:  AVERAGE TIME = 7 MILLISEC.
C3AD   7*ROUTINES CALLED:  EXP(B306), ERF(C310).
```

C4 SIMULTANEOUS NON-LINEAR ALGEBRAIC FUNCTIONS

ZEROES OF NON-LINEAR FUNCTIONS.

REVIEWER: J. HANCOCK, C-4

C401A *(FROOT) NOW OBSOLETE-SEE C402,C403, AND C404.

```
C402A A*           JOHN HANCOCK      C-4                                  70
C402A B*SOLVE--ROOT FINDER FOR REAL EQUATIONS
C402A C*F4              SR6600   SCP 3.1
C402A D*                     SW  6     LS  15    TYPE  1
C402A E*SOURCE CARDS         697  BCD    OBJECT CARDS    160   BIN
C402A F**ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION
C402A G*CARDS        F4  COMPAT  WU  11/02/72REV 5 DECK 11/02/72REV 5
C402A 1*FORM:  CALL SOLVE(XROOT,FROOT,A,B,XIST,XABSER,XRELER,FABSER,
C402A 2*       XBOUND,X2CODE,NPRINT,NCOUNT,NCONV,NSERCH,FNAME,
C402A 3*       FUNCTN,NERROR,SOLVE).
C402A 4*PURPOSE:  LET F AND X BE REAL.  SOLVE (C402)
C402A 5*       APPROXIMATES:
C402A 6*       I) A ROOT OF F(X) = 0. OR
C402A 7*       II) A POINT AT WHICH F(X) ASSUMES ITS MAXIMUM
C402A 8*       (OR MINIMUM) VALUE.
C402A 9*ROUTINE NAME:  SOLVE
C402A 10*ENTRY NAME;  SOLVE
C402A 11*STORAGE:  4455 (OCTAL) WORDS.
C402A 12*SELF CONTAINED.
```

```
C402B  A*           JOHN HANCOCK      C-4                                  72
C402B  B*SOLVE--ROOT FINDER FOR REAL EQUATIONS
C402B  C*F4              SR7600   CROS
C402B  D*                     SW  6      LS  15      TYPE  1
C402B  E*F4 SOURCE CARDS      697  BCD     OBJECT CARDS     163  BIN
C402B  F**ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION
C402B  G*ON DISK      F4  COMPAT    WU 11/02/72REV.1 DECK 11/02/72REV.1
C402B  1*FORM:  CALL SOLVE(XROOT,FROOT,A,B,XIST,XABSER,XRELER,FABSER,
C402B  2*       XBOUND,X2CODE,NPRINT,NCOUNT,NCONV,NSERCH,FNAME,
C402B  3*       FUNCTN,NERROR,SOLVE).
C402B  4*PURPOSE:  LET F AND X BE REAL.  SOLVE (C402)
C402B  5*       APPROXIMATES:
C402B  6*       I) A ROOT OF F(X) = 0. OR
C402B  7*       II) A POINT AT WHICH F(X) ASSUMES ITS MAXIMUM
C402B  8*       (OR MINIMUM) VALUE.
C402B  9*ROUTINE NAME:  SOLVE
C402B 10*ENTRY NAME:  SOLVE
C402B 11*STORAGE:  4514 OCTAL WORDS.
C402B 12*SELF CONTAINED.
```

```
C403A  A*           J SOPKA           C-4          SANDIA MATH LIB  72
C403A  B*ZEROIN - FINDS A ZERO OF FUNCTION F(X) IN INTERVAL (B,C)
C403A  C*F4              SR6600   SCP 3.1
C403A  D*                     SW  2      LS  4      TYPE 1
C403A  E*F4 SOURCE CARDS      159  BCD     OBJECT CARDS     22   BIN
C403A  F**ZERO*ROOT*FUNCTION*INTERVAL
C403A  G*CARDS        F4  COMPAT    WU 01/31/72       DECK 01/31/72
C403A  1*FORM:  CALL ZEROIN(F,B,C,RE,AE,IFLAG)
C403A  2*PURPOSE:  SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)
C403A  3*       ON THE INTERVAL (B,C).
C403A  4*ROUTINE NAME:  ZEROIN
C403A  5*ENTRY NAME:  ZEROIN
C403A  6*STORAGE:  344 OCTAL WORDS
C403A  7*REQUIRES SYSTEM OUTPUT FILESET -OUTPUT- TO BE AVAILABLE
C403A  8*       FOR ERROR MESSAGES.
```

```
C403B  A*           J SOPKA          C-4          SANDIA MATH LIB  72
C403B  B*ZEROIN - FINDS A ZERO OF FUNCTION F(X) IN INTERVAL (B,C)
C403B  C*F4              SR7600   CROS
C403B  D*                     SW  2     LS  4     TYPE 1
C403B  E*F4 SOURCE CARDS      159  BCD    OBJECT CARDS    22   BIN
C403B  F**ZERO*ROOT*FUNCTION*INTERVAL
C403B  G*CARDS        F4  COMPAT   WU 01/31/72      DECK 01/31/72
C403B  1*FORM:  CALL ZEROIN(F,B,C,RE,AE,IFLAG)
C403B  2*PURPOSE:  SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)
C403B  3*     ON THE INTERVAL (B,C).
C403B  4*ROUTINE NAME:  ZEROIN
C403B  5*ENTRY NAME:  ZEROIN
C403B  6*STORAGE:  350 OCTAL WORDS
C403B  7*REQUIRES SYSTEM OUTPUT FILESET -OUT- TO BE AVAILABLE
C403B  8*     FOR ERROR MESSAGES.
```

```
C404A  A*           JOHN HANCOCK     C-4          J. HANCOCK       72
C404A  B*SOLVITO SEARCHES FOR A ZERO OF F(X) IN INTERVAL (A,B)
C404A  C*F4              SR6600   SCP 3.1
C404A  D*                     SW 2      LS 3      TYPE 1
C404A  E*SOURCE CARDS         107  BCD    OBJECT CARDS    13   BIN
C404A  F**SOLVE*ROOT*EQUATION
C404A  G*CARDS        F4  COMPAT   WU 01/15/73REV.2 DECK 01/15/73REV.2
C404A  1*FORM:  CALL SOLVITO(X,A,B,XTOL,F,NERROR)
C404A  2*PURPOSE:  SEARCH FOR A ROOT OF AN EQUATION F(X) IN THE
C404A  3*     CLOSED INTERVAL A.LE.X.LE.B.
C404A  4*ROUTINE NAME:  SOLVITO
C404A  5*ENTRY NAME:  SOLVITO
C404A  6*STORAGE:  231 OCTAL WORDS
C404A  7*ROUTINES CALLED:  SELF CONTAINED
```

```
C404B  A*           JOHN HANCOCK     C-4          J. HANCOCK       72
C404B  B*SOLVITO SEARCHES FOR A ZERO OF F(X) IN INTERVAL (A,B)
C404B  C*F4              SR7600   CROS
C404B  D*                     SW 2      LS 3      TYPE 1
C404B  E*SOURCE CARDS         107  BCD    OBJECT CARDS    13   BIN
C404B  F**SOLVE*ROOT*EQUATION
C404B  G*ON DISK      F4  COMPAT   WU 01/15/73REV.2 DECK 01/15/73REV.2
C404B  1*FORM:  CALL SOLVITO(X,A,B,XTOL,F,NERROR)
C404B  2*PURPOSE:  SEARCH FOR A ROOT OF AN EQUATION F(X) IN THE
C404B  3*     CLOSED INTERVAL A.LE.X.LE.B.
C404B  4*ROUTINE NAME:  SOLVITO
C404B  5*ENTRY NAME:  SOLVITO
C404B  6*STORAGE:  237 OCTAL WORDS
C404B  7*ROUTINES CALLED:  SELF CONTAINED
```

D OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS

D1 NUMERICAL INTEGRATION

REVIEWER: D. KAHANER, C-6

D109A *(SIMPSN) HAS BEEN DEMOTED TO TYPE 2 STATUS AND IS NOW D1AC.

```
D110A  A*           CHERRY           C-2                              67
D110A  B*WEIGHTS AND ZEROES OF LEGENDRE POLYNOMIALS ON (0,1)
D110A  C*MATH          D1              F4            SR6600   SCOPE
D110A  D*                            SW  1     LS  3
D110A  E*F4SOURCE CARDS    151   BCD  OBJECT CARDS        33  BIN
D110A  F**LEGENDRE*WEIGHTS*ZEROES
D110A  G*ON DISK     F4  COMPAT   WU 07/23/68 REV  DECK 06/22/67
D110A  1*  CALL  LGNDR(M,K,A,Z)
D110A  2*  SUPPLIES THE KTH ZERO AND WEIGHT OF THE LEGENDRE
D110A  3*  POLYNOMIAL OF DEGREE M.  M MUST BE IN (4,16). IF NOT, 4
D110A  4*IS USED.  USED PRIMARILY WITH GAUSS(D114A).  RESULTS
D110A  5*  IN Z (ZERO). AND A(WEIGHT).
D110A  6*  ACCURACY-  ERROR .LT.5.E-14
D110A  7*  STORAGE-214 WORDS.
```

```
D111A  A*           CHERRY           T-1                              67
D111A  0*WEIGHTS AND ZEROES OF CHEBYSHEV POLYNOMIALS
D111A  B*MATH          D1              F4            SR6600   SCOPE
D111A  C*                            SW  1     LS  2
D111A  D*F4 SOURCE DECK          83BCDREL.                    20BIN
D111A  S**CHEBYSHEV*WEIGHTS*ZEROES
D111A 10*ON DISK     F4  COMPAT   WU 09/18/67 REV  DECK 06/22/67
D111A 11*  CALL CBSHV(M,K,A,Z) SUPPLIES IN Z THE KTH ZERO
D111A 12*  AND IN A THE KTH  WEIGHT FOR MTH ORDER GAUSS-CHEBYSHEV
D111A 13*  QUADRATURE. M MUST BE IN (4,15). IF NOT, 4 IS USED.
D111A 14*USED PRIMARILY WITH GAUSS(D114A).
D111A 15*  ACCURACY-  ERROR .LT. 2.E-13
D111A 16*  STORAGE-142 WORDS.
```

```
D112A  A*           CHERRY           T-1                              67
D112A  0*WEIGHTS AND ZEROES OF HERMITE POLYNOMIALS
D112A  B*MATH           D1              F4            SR6600   SCOPE
D112A  C*                               SW  1     LS  4
D112A  D*F4  SOURCE            222BCDRELOCATABLE              48BIN
D112A  S**HERMITE*WEIGHTS*ZEROES
D112A 10*ON DISK     F4  COMPAT   WU 09/18/67 REV  DECK 06/22/67
D112A 11* CALL HRMTE(M,K,A,Z)  SUPPLIES THE KTH ZERO ,Z, AND
D112A 12* WEIGHT, A, FOR MTH ORDER GAUSS-HERMITE QUADRATURE.
D112A 13* M MUST BE IN (4,20). IF NOT, 4 IS USED.  USED PRIMARILY
D112A 14*WITH GAUSS(D114A).  ERROR .LT. 3.E-13
D112A 15* STORAGE 294 WORDS.
```

```
D113A  A*           CHERRY           T-1                              67
D113A  0*ZEROES AND WEIGHTS OF LAGUERRE POLYNOMIALS
D113A  B*MATH           D1              F4            SR6600   SCOPE
D113A  C*                               SW  1     LS  4
D113A  D*F4 SOURCE             237BCDRELOCATABLE              50BIN
D113A  S**LAGUERRE*WEIGHTS*ZEROES
D113A 10*ON DISK     F4  COMPAT   WU 09/18/67 REV  DECK 06/22/67
D113A 11* CALL LAGRE(M,K,A,Z) SUPPLIES THE KTH ZERO ,Z,
D113A 12* AND WEIGHT. A, FOR MTH ORDER  GAUSS-LAGUERRE QUADRATURE.
D113A 13* M MUST BE IN  (4,15). IF NOT, 4 IS USED.  USED PRIMARILY
D113A 14*WITH GAUSS(D114A).  ERROR .LT. 5.E-13
D113A 15* STORAGE  267 WORDS.
```

```
D114A  A*           CHERRY           T-1                              67
D114A  0*GENERALIZED GAUSS QUADRATURE
D114A  B*MATH           D1              F4            SR6600   SCOPE
D114A  C*                               SW  4     LS  1
D114A  D*F4 SOURCE DECK          60BCDREL.                      22BIN
D114A  S**GAUSS*QUADRATURE*INTEGRATION
D114A 10*ON DISK     F4  COMPAT   WU 06/22/67      DECK 06/22/67
D114A 11* CALLED BY  A=GAUSS(N,Y,M,TBL)
D114A 12*   APPROXIMATES A MULTIPLE INTEGRAL BY QUADURATURE.
D114A 13* Y IS A FUNCTION WHICH COMPUTES THE INTEGRAND
D114A 14* N IS THE NUMBER OF INTEGRALS, M IS A TABLE OF NUMBER OF
D114A 15* POINTS PER INTEGRAL
D114A 16* TBL IS A SUBROUTINE TO SUPPLY WEIGHTS AND ZEROES TO
D114A 17* GAUSS.  STORAGE-289 WORDS.
D114A 18* USES LABRT(N103A).
```

```
D115A   *(RKA,RKB) HAS BEEN REDESIGNATED D203A.
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D1158   *(RKA,RKB) HAS BEEN REDESIGNATED D203B.


D116A  A*          G. WILLBANKS      T-1                              67
D116A  0*TABULAR INTEGRATION BY TAYLOR EXPANSION AND TRAPEZOIDS
D116A  B*MATHEMATICS    D1              F4              SR6600   SCOPE
D116A  C*                              SW  2     LS  1
D116A  D*F4 SOURCE CARDS         26BCDF4 OBJECT CARDS          24BIN
D116A  S**TABULAR*INTEGRATION BY*TAYLOR*EXPANSION AND*TRAPEZOIDS
D116A 10*ON DISK     F4  COMPAT    WU 10/17/67       DECK 10/17/67
D116A 11*A = TABINT(NP,X,Y) WHERE NP = NO OF POINTS AND X,Y ARE THE
D116A 12*LOCATIONS OF TABLES IN X AND Y RESPECTIVELY.
D116A 13*STORAGE - 339 WORDS
D116A 14*THIS ROUTINE USES NO OUTSIDE ROUTINES.


D117A  A*          B. FAGAN          T-1          T. JORDAN        68
D117A  0*TABULAR AND SPLINE INTEGRATION
D117A  B*MATHEMATICS     D1              F4              SR6600   SCOPE
D117A  C*                              SW  4     LS  2
D117A  D*F4 SOURCE CARDS         81BCDF4 OBJECT CARDS          21BIN
D117A  S**TABULAR AND*SPLINE*INTEGRATION
D117A 10*ON DISK     F4  COMPAT    WU 03/15/68       DECK 03/15/68
D117A 11*Z=SPLINT(N,X,F,W,IJ,A,B) WHERE N IS NUMBER OF POINTS, X IS
D117A 12*ORIGIN OF TABLE OF INDEPENDENT VARIABLE, F IS ORIGIN OF TABLE
D117A 13*OF DEPENDENT VARIABLE. W IS ORIGIN OF TABLE OF SECOND
D117A 14*DERIVATIVES. IJ IS SPACING WITHIN F AND W TABLES, A IS THE
D117A 15*LOWER LIMIT OF THE INTEGRAL DESIRED. B IS THE UPPER LIMIT OF
D117A 16*THE INTEGRAL. ERROR COMMENTS AND RETURN WITH NO CALC. WHEN
D117A 17*A.LT.X(X), OR .B.ST.X(1Y).
D117A 18*STORAGE = 457 WORDS.
D117A 19*USES SEARCH (E101A) AND LABRT (N103A).
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D118A  A*          T JORDAN        C DO        B FAGAN          68
D118A  0*TWO-DIMENSIONAL SPLINE INTEGRATION
D118A  B*MATHEMATICS    D1              F4            SR6600   SCOPE
D118A  C*                             SW  5     LS  1
D118A  D*F4 SOURCE CARDS        37BCDF4 OBJECT CARDS        14BIN
D118A  S**TWO*DIMENSIONAL*SPLINE*INTEGRATION
D118A 10*ON DISK     F4  COMPAT   WU 09/16/68      DECK 09/16/68
D118A 11*Y=SPLINT2(NX,X,NY,Y,F,FXX,FYY,FXXYY,MAXY,A,B,C,D,T1,T2)WHERE
D118A 12*NX IS NUMBER OF X POINTS, X IS TABLE OF ASCENDING VALUES OF
D118A 13*THE X VARIABLE, NY IS NUMBER OF Y POINTS, Y IS TABLE OF
D118A 14*ASCENDING VALUES OF Y VARIABLE, F IS 2-DIMENSIONAL TABLE OF
D118A 15*FUNCTION VALUES, FXX,FYY, AND FXXYY ARE 2-DIMENSIONAL TABLES
D118A 16*OF SECOND DERIVATIVES AT EACH VALUE OF THE FUNCTION. MAXY IS
D118A 17*INTEGER EQUAL TO FIRST DIMENSION OF F TABLE, A AND B ARE THE
D118A 18*LOWER AND UPPER INTEGRATION LIMITS OF X. C AND D ARE SAME FOR
D118A 19*Y, T1 AND T2 = TEMPORARY ARRAYS EACH .GE. NY. STORAGE-217.
D118A 20*NO ERROR RETURNS.  USES SPLINT(D117A), SEARCH(E101A) AND
D118A 21*LABRT(N103A).
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D119A  A*          DAVID K. KAHANER C-6                          69
D119A  B*ADAPTIVE NEWTON COTES QUADRATURE SEVEN POINT
D119A  C*F4            SR6600   SCP,3,1
D119A  D*                    SW  2     LS  2     TYPE  1
D119A  E*SOURCE CARDS         84  BCD OBJECT CARDS        17  BIN
D119A  F**QUADRATURE*INTEGRATION*NEWTON COTES
D119A  G*CARDS       F4  COMPAT  WU 06/19/69 REV 1 DECK 02/04/69
D119A  1*QNC7 COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL FROM
D119A  2*A TO B OF THE FUNCTION. FUNC.
D119A  3*CALLING SEQUENCE IS   Y = QNC7 (FUNC,A,B,RE,KOUNT)
D119A  4*STORAGE IS 1030 (OCTAL) WORDS.
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D119B  A*          A SOLEM    C-4                D KAHANER       72
D119B  B*ADAPTIVE NEWTON COTES QUADRATURE SEVEN POINT
D119B  C*F4            SR7600   CROS
D119B  D*                    SW 1      LS 3      TYPE 1
D119B  E*SOURCE CARDS         89   BCD    OBJECT CARDS    19   BIN
D119B  F**QUADRATURE*INTEGRATION*NEWTON COTES
D119B  G*ON DISK     F4  COMPAT   WU 03/17/72      DECK 03/17/72
D119B  1*FORM:  CALL QNC7(FUNC,A,B,RE,KOUNT)
D119B  2*PURPOSE:  COMPUTE THE APPROXIMATE VALUE OF THE INTEGRAL
D119B  3*     FROM A TO B OF THE FUNCTION, FUNC.  SEE WRITEUP FOR
D119B  4*     D119A FOR FURTHER DETAILS.
D119B  5*ROUTINE NAME:  QNC7
D119B  6*ENTRY NAME:  QNC7
D119B  7*STORAGE:  1044 (OCTAL) WORDS.
D119B  8*ROUTINES CALLED:  LIBMSG(SYSTEM)
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```
D120A  A*          DAVID K. KAHANER C-6                              69
D120A  B*ADAPTIVE NEWTON COTES QUADRATURE TEN POINT
D120A  C*F4              SR6600   SCP.3.1
D120A  D*                   SW  2     LS  2     TYPE  1
D120A  E*SOURCE CARDS        92  BCD OBJECT CARDS        19  BIN
D120A  F**QUADRATURE*INTEGRATION*NEWTON COTES
D120A  G*CARDS       F4  COMPAT  WU 06/19/69 REV 1 DECK 02/04/69
D120A  1*QUAD COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL FROM
D120A  2*A TO B OF THE FUNCTION, FUNC.
D120A  3*CALLING SEQUENCE IS   Y = QUAD (FUNC,A,B,RE,KOUNT)
D120A  4*STORAGE IS 1166 (OCTAL) WORDS.
```

```
D121A  A*          DAVID K. KAHANER C-6                              69
D121A  B*SHANKS ITERATIVE QUADRATURE
D121A  C*F4              SR6600   SCP.3.1
D121A  D*                   SW  2     LS  1     TYPE  1
D121A  E*SOURCE CARDS        36  BCD OBJECT CARDS        14  BIN
D121A  F*QUADRATURE*INTEGRATION*WYNN*SHANK
D121A  G*CARDS       F4  COMPAT  WU 06/17/70REV 2  DECK 06/17/70REV 1
D121A  1*USE:  Y = SHNK(FUNC,A,B,RE,KOUNT)
D121A  2*PURPOSE:  COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL
D121A  3*FROM A TO B OF THE FUNCTION. FUNC.
D121A  4*STORAGE:  1103 (OCTAL) WORDS.
D121A  5*SELF CONTAINED.
```

```
D122A  A*          DAVID K. KAHANER  C-6                             69
D122A  B*NUMERICAL QUADRATURE BY ADAPTIVE ITERATIVE METHODS
D122A  C*F4              SR6600 SCP 3.1
D122A  D*                   SW  2     LS  2     TYPE  1
D122A  E*SOURCE CARDS       107  BCD    OBJECT CARDS    30   BIN
D122A  F**QUADRATURE*INTEGRATION*QABS
D122A  G*CARDS       F4  COMPAT   WU 10/14/69      DECK 10/14/69
D122A  1*CALL NAME:  QABS(F,A,B,EPS,NO)
D122A  2*PURPOSE:  NUMERICAL QUADRATURE TO ABSOLUTE ACCURACY.
D122A  3*STORAGE:  1,043 (OCTAL) WORDS.
D122A  4*SELF CONTAINED.
```

```
D123A  A*          DAVID K. KAHANER  C-6                              69
D123A  B*GENERALIZED GAUSS QUADRATURE
D123A  C*F4              SR6600 SCP 3.1
D123A  D*                     SW  4     LS  1     TYPE  1.1
D123A  E*SOURCE CARDS          41    BCD    OBJECT CARDS     21   BIN
D123A  F**GENGSQ*GAUSS*QUADRATURE*INTEGRATION
D123A  G*CARDS         F4  COMPAT   WU 10/14/69      DECK 10/14/69
D123A  1*CALL NAME:  GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EPS,
D123A  2*ISWTCH,NIT).
D123A  3*PURPOSE:  TO DO GENERALIZED GAUSS QUADRATURE.
D123A  4*STORAGE:  1,371 (OCTAL) WORDS.
D123A  5*ROUTINES CALLED:  PHI(D124A).STLTJS(D125A),GAUSSQ(D126A).
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D123B  A*          DAVID K. KAHANER  C-6        D KAHANER          73
D123B  B*GENERALIZED GAUSS QUADRATURE
D123B  C*F4              SR7600 CROS
D123B  D*                     SW  4     LS  2     TYPE  1.1
D123B  E*SOURCE CARDS          41    BCD    OBJECT CARDS     21   BIN
D123B  F**GENGSQ*GAUSS*QUADRATURE*INTEGRATION
D123B  G*DISK          F4  COMPAT WU 08/01/73        DECK 08/01/73
D123B  1*FORM:  CALL GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EPS,
D123B  2*     ISWTCH,NIT).
D123B  3*PURPOSE:  DO GENERALIZED GAUSS QUADRATURE.
D123B  4*ROUTINE NAME:  GENGSQ
D123B  5*ENTRY NAMES:  GENGSQ
D123B  6*STORAGE:  1377 OCTAL WORDS
D123B  7*ROUTINES CALLED:  PHI(D124B),STLTJS(D125B).GAUSSQ(D126B).
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D124A  A*          DAVID K. KAHANER  C-6        D.KAHANER          69
D124A  B*PRIVATE SUBROUTINE FOR D123A (GENGSQ)
D124A  C*F4              SR6600 SCP 3.1
D124A  D*                     SW  1     LS  1     TYPE  1.1
D124A  E*SOURCE CARDS          6     BCD    OBJECT CARDS     6    BIN
D124A  F**PHI*GAUSS
D124A  G*CARDS         F4  COMPAT   WU 05/22/73REV.1 DECK 05/22/73REV.1
D124A  1*FORM:  DX = PHI(DY,DPHI,A.B)
D124A  2*PURPOSE:  CHANGES INTERVAL FOR GENERALIZED GAUSS QUADRATURE
D124A  3*     FROM (-1,1) TO (A.B).  PRESENTLY CODED FOR A.B FINITE.
D124A  4*ROUTINE NAME:  PHI
D124A  5*ENTRY NAMES:  PHI
D124A  6*STORAGE:  52 (OCTAL) WORDS.
D124A  7*SELF CONTAINED.
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```
D124B  A*          DAVID K. KAHANER  C-6        D.KAHANER        73
D124B  B*PRIVATE SUBROUTINE FOR D123B (GENGSQ)
D124B  C*F4             SR7600   CROS
D124B  D*                    SW  1     LS  1     TYPE  1,1
D124B  E*SOURCE CARDS        6     BCD     OBJECT CARDS     6   BIN
D124B  F**PHI*GAUSS
D124B  G*DISK         F4  COMPAT   WU 05/22/73      DECK 05/22/73
D124B  1*FORM:  DX = PHI(DY,DPHI,A,B)
D124B  2*PURPOSE:  CHANGES INTERVAL FOR GENERALIZED GAUSS QUADRATURE
D124B  3*     FROM (-1,1) TO (A,B).  PRESENTLY CODED FOR A,B FINITE.
D124B  4*ROUTINE NAME:  PHI
D124B  5*ENTRY NAMES:  PHI
D124B  6*STORAGE:  55 (OCTAL) WORDS.
D124B  7*SELF CONTAINED.
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D125A  A*          DAVID K. KAHANER  C-6        D. KAHANER       69
D125A  B*PRIVATE SUBROUTINE FOR D123A (GENGSQ).--STLTJS
D125A  C*F4             SR6600 SCP 3.1
D125A  D*                    SW  1     LS  2     TYPE  1,1
D125A  E*               SOURCE   83 CARDS          OBJECT   43 CARDS
D125A  F**STLTJS*GAUSS
D125A  G*CARDS     F4  COMPAT WU 07/12/73 REV.1 DECK 07/12/73REV.1
D125A  1*FORM:  CALL STLTJS(M,NIT,B,G,FM,JS,WF,PHI,EL,ER)
D125A  2*PURPOSE:  GENERATE COEFFICIENTS OF THREE TERM ORTHOGONAL
D125A  3*     POLYNOMIAL RECURSION
D125A  4*ROUTINE NAME:  STLTJS
D125A  5*ENTRY NAMES:  STLTJS
D125A  6*STORAGE:  51111 OCTAL WORDS
D125A  7*ROUTINES CALLED:  PHI(D124A),WF
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```
D125B  A*          DAVID K. KAHANER  C-6        D. KAHANER       73
D125B  B*PRIVATE SUBROUTINE FOR D123B (GENGSQ).--STLTJS
D125B  C*F4             SR7600   CROS
D125B  D*                    SW  1     LS  2     TYPE  1,1
D125B  E*               SOURCE   83 CARDS          OBJECT   43 CARDS
D125B  F**STLTJS*GAUSS
D125B  G*DISK      F4  COMPAT WU 07/12/73       DECK 07/12/73
D125B  1*FORM:  CALL STLTJS(M,NIT,B,G,FM,JS,WF,PHI,EL,ER)
D125B  2*PURPOSE:  GENERATE COEFFICIENTS OF THREE TERM ORTHOGONAL
D125B  3*     POLYNOMIAL RECURSION
D125B  4*ROUTINE NAME:  STLTJS
D125B  5*ENTRY NAMES:  STLTJS
D125B  6*STORAGE:  51117 OCTAL WORDS
D125B  7*ROUTINES CALLED:  PHI(D124B),WF
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D126A  A*          DAVID K. KAHANER  C-6        D KAHANER        69
D126A  B*PRIVATE SUBROUTINE FOR D123A(GENGSQ). -- GAUSSQ
D126A  C*F4              SR6600 SCP 3.1
D126A  D*                    SW  1     LS  2     TYPE  1,1
D126A  E*                SOURCE   82 CARDS          OBJECT   45 CARDS
D126A  F**GAUSSQ*GAUSS*MATRIX*EIGENVALUES
D126A  G*CARDS      F4  COMPAT WU 07/12/73 REV.1 DECK 07/12/73 REV.1
D126A  1*FORM:  CALL GAUSSQ(M,ATEMP,WTEMP,B,G,FM)
D126A  2*PURPOSE:  FINDS EIGENVALUES OF TRIDIAGONAL MATRIX BY Q-R
D126A  3*     DECOMPOSITION FOR GENERALIZED QUADRATURE.
D126A  4*ROUTINE NAME:  GAUSSQ
D126A  5*ENTRY NAMES:  GAUSSQ
D126A  6*STORAGE:  2552 OCTAL WORDS
D126A  7*ROUTINES CALLED:  SELF CONTAINED
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```
D126B  A*          DAVID K. KAHANER  C-6        D KAHANER        73
D126B  B*PRIVATE SUBROUTINE FOR D123A(GENGSQ). -- GAUSSQ
D126B  C*F4              SR7600   CROS
D126B  D*                    SW  1     LS  2     TYPE  1,1
D126B  E*                SOURCE   82 CARDS          OBJECT   45 CARDS
D126B  F**GAUSSQ*GAUSS*MATRIX*EIGENVALUES
D126B  G*DISK       F4  COMPAT WU 07/12/73       DECK 07/12/73
D126B  1*FORM:  CALL GAUSSQ(M,ATEMP,WTEMP,B,G,FM)
D126B  2*PURPOSE:  FINDS EIGENVALUES OF TRIDIAGONAL MATRIX BY Q-R
D126B  3*     DECOMPOSITION FOR GENERALIZED QUADRATURE.
D126B  4*ROUTINE NAME:  GAUSSQ
D126B  5*ENTRY NAMES:  GAUSSQ
D126B  6*STORAGE:  2556 OCTAL WORDS
D126B  7*ROUTINES CALLED:  SELF CONTAINED
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D127A  A*          R M FRANK         C-4                      70
D127A  B*RECURSIVE SIMPSONS RULE INTEGRATION
D127A  C*F4              SR6600   SCP 3.1
D127A  D*                    SW  3     LS  1     TYPE  1
D127A  E*SOURCE CARDS        43   BCD    OBJECT CARDS    16   BIN
D127A  F**RECURSIVE*SIMPSON*INTEGRATION
D127A  G*CARDS       F4  COMPAT   WU 01/09/70      DECK 01/09/70
D127A  1*CALL NAME: SMPS(X1,X2,N,ANS,FUNCT,DUMMY,SMPS)
D127A  2*PURPOSE: RECURSIVELY CALLED SIMPSON INTEGRATION ROUTINE
D127A  3*STORAGE: 412 (OCTAL) WORDS.
D127A  4*SELF CONTAINED.
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```
D128A  A*          R M FRANK        C-4                              70
D128A  B*RECURSIVE SIMPSONS RULE INTEGRATION FOR TABULAR FUNCTIONS
D128A  C*F4              SR6600   SCP 3.1
D128A  D*                     SW  3     LS  1     TYPE  1
D128A  E*SOURCE CARDS         52   BCD    OBJECT CARDS    18   BIN
D128A  F*RECURSIVE*SIMPSON*INTEGRATION FOR*TABULAR*FUNCTIONS
D128A  G*CARDS        F4  COMPAT  WU 01/09/70      DECK 01/09/70
D128A  1*CALL NAME:  SIMTAB(I1,I2,DELTA,ANS,FUNCT,DUMMY,SIMTAB)
D128A  2*PURPOSE:  RECURSIVELY CALLED SIMPSON INTEGRATION ROUTINE FOR
D128A  3*TABULAR FUNCTIONS.
D128A  4*STORAGE:  444 (OCTAL) WORDS.
D128A  5*SELF CONTAINED.
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```
D129A  A*          DAVID K. KAHANER C-6          D KAHANER          71
D129A  B*QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS
D129A  C*F4              SR6600   SCP 3.1
D129A  D*                     SW  3     LS  2     TYPE 1.1
D129A  E*F4 SOURCE CARDS      58  BCD    OBJECT CARDS     16  BIN
D129A  F**QUADRATIC*INTEGRATION
D129A  G*CARDS        F4  COMPAT   WU 07/02/73REV.2 DECK 04/06/73REV.1
D129A  1*FORM:  CALL SIMPUN(XX,FX,NX,I,AX)
D129A  2*PURPOSE:  QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS.
D129A  3*  XX = INPUT ARRAY OF NX STRICTLY-INCREASING ABSCISSAS
D129A  4*       AT WHICH THE INTEGRAND IS EVALUATED.
D129A  5*  FX = INPUT ARRAY OF NX INTEGRAND VALUES AT THE
D129A  6*       POINTS XX(J). J=1,2,...,NX.
D129A  7*  NX = NUMBER OF POINTS IN XX, FX, AND AX.
D129A  8*   I = DIRECTION OF INTEGRATION.
D129A  9*  AX = OUTPUT ARRAY OF NX VALUES OF INTEGRAL ON
D129A 10*       SUBINTERVALS.  IF I.GE.0, AX(J) IS APPROXIMATELY
D129A 11*       EQUAL TO INTEGRAL FROM XX(1)  TO XX(J).  IF I.LT.0,
D129A 12*       AX(J) IS APPROXIMATELY EQUAL TO INTEGRAL FROM XX(J)
D129A 13*       TO XX(NX).
D129A 14*ROUTINE NAME:  SIMPUN
D129A 15*ENTRY NAME:  SIMPUN
D129A 16*STORAGE:  310 OCTAL WORDS
D129A 17*ROUTINES CALLED:  SELF CONTAINED
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```
D1298  A*           DAVID K. KAHANER C-6          D KAHANER          73
D1298  B*QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS
D1298  C*F4              SR7600   CROS
D1298  D*                     SW  3      LS  2      TYPE 1.1
D1298  E*F4 SOURCE CARDS      58  BCD    OBJECT CARDS      16  BIN
D1298  F**QUADRATIC*INTEGRATION
D1298  G*ON DISK      F4  COMPAT   WU 07/02/73REV.1 DECK 04/06/73
D1298  1*FORM:  CALL SIMPUN(XX,FX,NX,I,AX)
D1298  2*PURPOSE:  QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS.
D1298  3* XX = INPUT ARRAY OF NX STRICTLY-INCREASING ABSCISSAS
D1298  4*      AT WHICH THE INTEGRAND IS EVALUATED.
D1298  5* FX = INPUT ARRAY OF NX INTEGRAND VALUES AT THE
D1298  6*      POINTS XX(J), J=1,2,...,NX.
D1298  7* NX = NUMBER OF POINTS IN XX, FX, AND AX.
D1298  8*  I = DIRECTION OF INTEGRATION.
D1298  9* AX = OUTPUT ARRAY OF NX VALUES OF INTEGRAL ON
D1298 10*      SUBINTERVALS.  IF I.GE.0, AX(J) IS APPROXIMATELY
D1298 11*      EQUAL TO INTEGRAL FROM XX(1)  TO XX(J).  IF I.LT.0,
D1298 12*      AX(J) IS APPROXIMATELY EQUAL TO INTEGRAL FROM XX(J)
D1298 13*      TO XX(NX).
D1298 14*ROUTINE NAME:  SIMPUN
D1298 15*ENTRY NAME:  SIMPUN
D1298 16*STORAGE:  313 OCTAL WORDS.
D1298 17*ROUTINES CALLED:  SELF CONTAINED
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D1AA   A*           D. KAHANER       C-6                              71
D1AA   B*CIRCLE - INTEGRATE F(X,Y) OVER CIRCUMFERENCE OF A CIRCLE
D1AA   C*F4              SR6600   SCP 3.1
D1AA   D*                     SW  1      LS  1      TYPE 2
D1AA   E*F4 SOURCE CARDS  14 BCD      OBJECT CARDS    7   BIN
D1AA   F**CIRCLE*INTEGRATE
D1AA   G*CARDS        F4  COMPAT   WU 09/27/71      DECK 09/27/71
D1AA   1*FORM:  Y = CIRCLE (F, U, V, R, M)
D1AA   2*PURPOSE: INTEGRATE FUNCTION F OF 2 VARIABLES OVER THE
D1AA   3*     CIRCLE WITH CENTER (U,V) AND RADIUS R.  M DENOTES
D1AA   4*     THE ORDER OF THE APPROXIMATION.  METHOD IS THE
D1AA   5*     STANDARD GAUSS FORMULA.
D1AA   6*ROUTINE NAME: CIRCLE
D1AA   7*ENTRY NAME: CIRCLE
D1AA   8*STORAGE:  104 OCTAL WORDS
D1AA   9*ROUTINES CALLED:  SIN(B106A), COS(B106A).
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```
D1AB   A*          D. KAHANER       C-6                              71
D1AB   B*SPHERE - INTEGRATE F(X,Y,Z) OVER UNIT SPHERE
D1AB   C*F4              SR6600   SCP 3.1
D1AB   D*                     SW 1      LS 3      TYPE 2
D1AB   E*F4 SOURCE CARDS     137  BCD    OBJECT CARDS    33   BIN
D1AB   F**SPHERE*INTEGRATE
D1AB   G*CARDS        F4  COMPAT   WU 09/27/71       DECK 09/27/71
D1AB   1*FORM  Y = SPHERE (F,NPTS)
D1AB   2*PURPOSE:  INTEGRATE FUNCTION F OF 3 VARIABLES OVER THE
D1AB   3*      UNIT SPHERE.   NPTS CAN BE 50. 72, OR 128. AND
D1AB   4*      INDICATES THE NUMBER OF POINTS TO BE USED IN THE
D1AB   5*      APPROXIMATION. INCORRECT NPTS GIVES WARNING MESSAGE
D1AB   6*      AND RUNS LIKE NPTS = 128.  FOR NPTS = 50 AND 72,
D1AB   7*      METHOD IS IN A.D. MCLAREN, MATH COMP
D1AB   8*      V 17, P.361-383 (1963).
D1AB   9*      FOR NPTS = 128 METHOD IS THE STANDARD SPHERICAL PRODUCT
D1AB  10*      GAUSS FORMULA.
D1AB  11*ACCURACY:  FOR NPTS = 50 IT IS EXACT FOR SPHERICAL
D1AB  12*      POLYNOMIALS OF DEGREE 11 OR LESS.
D1AB  13*      FOR NPTS = 72 IT IS EXACT FOR SPHERICAL POLYNOMIALS
D1AB  14*      OF DEGREE 14 OR LESS.
D1AB  15*ROUTINE NAME: SPHERE
D1AB  16*ENTRY NAME: SPHERE
D1AB  17*STORAGE: 564 OCTAL WORDS
D1AB  18*ROUTINES CALLED:  SQRT (B408A), SIN (B106A), COS (B106A)
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D1AC   A*          DUANE HARDER     C-4          D.KAHANER        72
D1AC   B*SIMPSONS RULE INTEGRATION
D1AC   C*F4              SR6600   SCP 3.1
D1AC   D*                     SW  3     LS  3     TYPE  2
D1AC   E*F4 SOURCE CARDS     87   BCD    OBJECT CARDS    21   BIN
D1AC   F**ADAPTIVE*SIMPSONS RULE*INTEGRATION
D1AC   G*ON DISK      F4  COMPAT   WU 09/22/72       DECK 09/22/72
D1AC   1*FORM:  ANS = SIMPSN(ARG,A,B,EPS).
D1AC   2*PURPOSE:  SIMPSONS RULE INTEGRATION
D1AC   3*      ARG IS A FUNCTION SUBPROGRAM WHICH EVALUATES THE
D1AC   4*           FUNCTION BEING INTEGRATED.
D1AC   5*      A IS THE LOWER LIMIT OF INTEGRATION,
D1AC   6*      B IS THE UPPER LIMIT.
D1AC   7*      EPS IS A CONVERGENCE CRITERION.
D1AC   8*ROUTINE NAME:  SIMPSN
D1AC   9*ENTRY NAME:  SIMPSN
D1AC  10*SELF CONTAINED.
```

```
D1AD   A*           M. BOLSTERLI     T-9          D. KAHANER        72
D1AD   B*ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE INTEGRATION
D1AD   C*FORTRAN       SR6600   SCP 3.1
D1AD   D*                    SW  2     LS  1     TYPE  2
D1AD   E*F4 SOURCE CARDS      21  BCD    OBJECT CARDS     9   BIN
D1AD   F**ABSCISSAS AND*WEIGHTS FOR*GAUSS-LAGUERRE*INTEGRATION
D1AD   G*CARDS        F4  COMPAT   WU 10/31/72      DECK 10/31/72
D1AD   1*FORM:  CALL ABWTLAG(N,X,W,C,T)
D1AD   2*PURPOSE:  COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE
D1AD   3*   INTEGRATION.
D1AD   4*ROUTINE NAME:  ABWTLAG
D1AD   5*ENTRY NAME:  ABWTLAG
D1AD   6*STORAGE:  147 OCTAL WORDS
D1AD   7*TIMING:  SEE WRITEUP
D1AD   8*ACCURACY:  SEE WRITEUP
D1AD   9*ROUTINES CALLED:  S3DVAL(F222).
```

```
D1AE   A*           M. BOLSTERLI     T-9          D. KAHANER        72
D1AE   B*ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE INTEGRATION
D1AE   C*FORTRAN       SR6600   SCP 3.1
D1AE   D*                    SW  2     LS  1     TYPE  2
D1AE   E*F4 SOURCE CARDS      23  BCD    OBJECT CARDS    10  BIN
D1AE   F*ABSCISSAS AND*WEIGHTS FOR*GAUSS-LEGENDRE*INTEGRATION
D1AE   G*CARDS        F4  COMPAT   WU 10/31/72      DECK 10/31/72
D1AE   1*FORM:  CALL ABWTLEG(N,X,W,C,T)
D1AE   2*PURPOSE:  COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE
D1AE   3*   INTEGRATION
D1AE   4*ROUTINE NAME:  ABWTLEG
D1AE   5*ENTRY NAME:  ABWTLEG
D1AE   6*STORAGE:  160 OCTAL WORDS
D1AE   7*TIMING:  SEE WRITEUP
D1AE   8*ACCURACY:  SEE WRITEUP
D1AE   9*ROUTINES CALLED:  S3DVAL(F222).
```

D2 NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

REVIEWER: J. SOPKA, C-4

```
D203A  A*           DON DICKMAN      C-4          J.SOPKA          72
D203A  B*RK - INTERVAL DETERMINING RUNGE-KUTTA
D203A  C*CMP            SR6600   SCP 3.1
D203A  D*                  SW  5     LS 19     TYPE  1
D203A  E*CMP SOURCE CARDS    804  BCD    OBJECT CARDS    34   BIN
D203A  F**RK*INTERVAL*DETERMINING*RUNGE*KUTTA
D203A  G*ON DISK     F4  COMPAT   WU 08/29/72      DECK 08/29/72
D203A  1*INITIALIZING CALL FORM:
D203A  2*      CALL RKA(XZ,HZ,YI,UP,Y4,FY,ACC,XF,SH,NF,IND,N)
D203A  3*INTEGRATION CALL FORM:
D203A  4*      CALL RKB
D203A  5*PURPOSE:  INTEGRATE N SIMULTANEOUS, FIRST ORDER,
D203A  6*          DIFFERENTIAL EQUATIONS.  ROUTINE IS SELF
D203A  7*          TESTING AND INTERVAL DETERMINING.
D203A  8*ROUTINE NAME:  RKB
D203A  9*ENTRY NAMES:  RKA,RKB
D203A 10*STORAGE:  410 LOCATIONS PLUS DATA IN CALL SEQ.
D203A 11*ROUTINES CALLED:  LABRT(N103A).
```

```
D203B  A*           DON DICKMAN      C-4          J.SOPKA          72
D203B  B*RK - INTERVAL DETERMINING RUNGE KUTTA
D203B  C*CMP            SR7600   CROS
D203B  D*                  SW  1     LS 19     TYPE  1
D203B  E*CMP SOURCE CARDS    810  BCD    OBJECT CARDS    35   BIN
D203B  F**RK*INTERVAL*DETERMINING*RUNGE*KUTTA
D203B  G*ON DISK     F4  COMPAT   WU 08/29/72      DECK 08/29/72
D203B  1*INITIALIZING CALL FORM:
D203B  2*      CALL RKA(XZ,HZ,YI,YP,Y4,FY,ACC,XF,SH,NF,IND,N)
D203B  3*INTEGRATION CALL FORM:
D203B  4*      CALL RKB
D203B  5*PURPOSE:  INTEGRATE N SIMULTANEOUS, FIRST ORDER DIFFERENTIAL
D203B  6*      EQUATIONS.  ROUTINE IS SELF TESTING AND INTERVAL
D203B  7*      DETERMINING.  SEE WRITUP FOR RKB(D203A) FOR FURTHER
D203B  8*      DETAILS.
D203B  9*ROUTINE NAME: RKB
D203B 10*ENTRY NAMES:  RKA,RKB
D203B 11*STORAGE:  635 (OCTAL) WORDS
D203B 12*ROUTINES USED:  LABRT(N103B) LIBMSG(SYSTEM).
```

D3 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

REVIEWER F DORR, C-4

```
D301A  A*           B L BUZBEE        C-4                                  73
D301A  B*TRUNCATED BUNEMAN POISSON SOLVER
D301A  C*F-4              SR6600   SCP 3.1
D301A  D*                    SW 12     LS  8     TYPE 1
D301A  E*SOURCE CARDS         359  BCD    OBJECT CARDS  85     BIN
D301A  F**SOLVER*BUNEMAN POISSON SOLVER
D301A  G*CARDS        F4  COMPAT   WU 04/11/73REV.1 DECK 02/15/73
D301A  1*FORM:  CALL TBPSDN(N,NY,U,LX,T,LB,DZDX,DRDY,CC,ETA,LC,R1)
D301A  2*PURPOSE:  USING A UNIFORM RECTANGULAR MESH, SOLVE THE
D301A  3*      FIVE POINT DIFFERENCE APPROXIMATION TO POISSON*S
D301A  4*      EQUATION IN X-Y OR Z-R COORDINATES.
D301A  5*ROUTINE NAME:  TBPSDN
D301A  6*ENTRY NAME:  TBPSDN
D301A  7*STORAGE:  2144 (OCTAL) WORDS
D301A  8*ROUTINES CALLED:  FACTTD(F418A), SOLTDM(F419A)
```

```
D301B  A*           B L BUZBEE        C-4                                  73
D301B  B*TRUNCATED BUNEMAN POISSON SOLVER
D301B  C*F-4              SR7600   CROS
D301B  D*                    SW 12     LS  8     TYPE 1
D301B  E*SOURCE CARDS         359  BCD    OBJECT CARDS  85     BIN
D301B  F**SOLVER*BUNEMAN POISSON SOLVER
D301B  G*ON DISK      F4  COMPAT   WU 04/11/73REV.1 DECK 02/15/73
D301B  1*FORM:  CALL TBPSDN(N,NY,U,LX,T,LB,DZDX,DRDY,CC,ETA,LC,R1)
D301B  2*PURPOSE:  USING A UNIFORM RECTANGULAR MESH, SOLVE THE
D301B  3*      FIVE POINT DIFFERENCE APPROXIMATION TO POISSON*S
D301B  4*      EQUATION IN X-Y OR Z-R COORDINATES.
D301B  5*ROUTINE NAME:  TBPSDN
D301B  6*ENTRY NAME:  TBPSDN
D301B  7*STORAGE:  2151 (OCTAL) WORDS
D301B  8*TIMING:  WITH N=41 AND NY=65, AVERAGE 7600 TIME IS 36MS.
D301B  9*ROUTINES CALLED:  FACTTD(F418B), SOLTDM(F419B)
```

E APPROXIMATION THEORY AND CURVE FITTING

E1 INTERPOLATION AND TABLE LOOK-UP

REVIEWER: B. SWARTZ, C-6

E101A *(SEARCH) HAS BEEN REDESIGNATED M118A.

```
E102A  A*           TOM JORDAN        CDO          BERTHA FAGAN      67
E102A  B*SPLINE INTERPOLATION-COEFFICIENT EVALUATION
E102A  C*FORTRAN        SR6600   SCP 3.1
E102A  D*                      SW  4      LS  3      TYPE  1
E102A  E*F4 SOURCE CARDS     174  BCD    OBJECT CARDS       57   BIN
E102A  F**FIND*COEFFICIENTS OF*CUBIC FOR*SPLINE*INTERPOLATION
E102A  G*ON DISK      F4  COMPAT   WU 04/25/69 REV3 DECK 01/20/67
E102A  1*CALL SPL1D1(N,X,F,W,IOP,IJ,A,B,C) WHERE N,.GE.3, IS NUMBER
E102A  2*OF POINTS, X IS ORIGIN OF TABLE OF INDEPENDENT VARIABLE, F
E102A  3*IS ORIGIN OF TABLE OF DEPENDENT VARIABLE, IOP IS AN ARRAY
E102A  4*OF DIMENSION 2 CONTAINING COMBINATIONS OF INTEGERS 1 THRU 5
E102A  5*FOR SPECIFYING BOUNDARY CONDITIONS, IJ IS SPACING IN TABLES
E102A  6*F AND W. A,B,C ARE ARRAYS OF DIMENSION N USED FOR TEMPORARY
E102A  7*STORAGE. N SECOND DERIVATIVES ARE COMPUTED AND STORED
E102A  8*IN W, AT STORAGE INTERVAL IJ. TIME IS A LINEAR FUNCTION OF N,
E102A  9*STORAGE=12+14 WORDS.
E102A 10*THIS SUBROUTINE IS SELF CONTAINED.
```

```
E103A  A*           TOM JORDAN        T-1                           67
E103A  0*SPLINE INTERPOLATION-FUNCTION EVALUATION
E103A  B*MATHEMATICS    E1              F4            SR6600   SCOPE
E103A  C*                             SW  2      LS  1
E103A  D*F4 SOURCE CARDS          45BCDF4 OBJECT CARDS        11BIN
E103A  S**SPLINE*INTERPOLATION*FUNCTION*EVALUATION
E103A 10*ON DISK      F4  COMPAT   WU 07/12/67 REV  DECK 01/20/67
E103A 11*CALL SPL1D2(N,X,F,W,IJ,Y,TAB) WHERE N IS NUMBER OF POINTS,
E103A 12*X IS ORIGIN OF TABLE OF INDEPENDENT VARIABLE, F IS ORIGIN
E103A 13*OF TABLE OF DEPENDENT VARIABLE. W IS ORIGIN OF TABLE OF
E103A 14*SECOND DERIVATIVES, IJ IS SPACING IN TABLES F AND W, Y IS
E103A 15*THE POINT AT WHICH INTERPOLATION IS DESIRED, TAB IS AN
E103A 16*ARRAY OF DIMENSION ,GE.3 WHICH CONTAINS THE RESULTS OF THE
E103A 17*INTERPOLATION: TAB(1) CONTAINS F(Y), TAB(2) CONTAINS F*(Y),
E103A 18*AND TAB(3) CONTAINS F**(Y).
E103A 19*STORAGE=276 WORDS.
E103A 20*THIS ROUTINE USES SEARCH(E101A).
```

```
E104A  A*          THOMAS L. JORDAN T-1                                  67
E104A  0*TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION-COEFF. CALC.
E104A  B*BASIC NUMERIC  E1              F4              SR6600   SCOPE
E104A  C*                             SW  8     LS  1
E104A  D*FORTRAN SOURCE CARDS   38BCDFORTRAN OBJECT CARDS   14BIN
E104A  S*TWO*DIMENSIONAL*BICUBIC*SPLINE*INTERPOLATION
E104A 10*ON DISK     F4  COMPAT  WU  12/15/67      DECK 11/03/67
E104A 11*CALL SPL2D1 (NBRX, X, NBRY, Y, F, FX, FY, FXY, MAXY, IBD,
E104A 12*             T1, T2, T3)
E104A 13*PURPOSE - TO CALCULATE THE COEFFICIENTS OF A BICUBIC
E104A 14*          POLYNOMIAL FOR USE IN SMOOTH TWO DIMENSIONAL
E104A 15*          INTERPOLATION
E104A 16*TIMING - TIME IS A LINEAR FUNCTION OF M*N
E104A 17*STORAGE - 227 WORDS
E104A 18*USES SPL1D1(E102A).
```

```
E105A  A*          THOMAS L. JORDAN T-1                                  67
E105A  0*TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION-FUNCT.EVAL.
E105A  B*BASIC NUMERIC  E1              F4              SR6600   SCOPE
E105A  C*                             SW  3     LS  2
E105A  D*FORTRAN SOURCE CARDS   71BCDFORTRAN OBJECT CARDS   22BIN
E105A  S*TWO*DIMENSIONAL*BICUBIC*SPLINE*INTERPOLATION
E105A 10*ON DISK     F4  COMPAT   WU 12/15/67      DECK 11/03/67
E105A 11* Y = SPL2D2(XB,YB,NBRX,X,NBRY,Y,F,FX,FY,FXY,MAXY,K,L)
E105A 12* AND
E105A 13* Y = SPL2D3(K,L). THIS IS IN LIB AS E107A.
E105A 14*PURPOSE   TO INTERPOLATE FOR A FUNCTION VALUE OR A
E105A 15*          SPECIFIED DERIVATIVE OF A TWO DIMENSIONAL
E105A 16*          FUNCTION.  E104A MUST BE USED PRIOR TO USING
E105A 17*          THIS PROGRAM TO COMPUTE INTERPOLATION COEFFS.
E105A 18*TIMING-THE CALCULATION IS EQUIVALENT TO 5 CUBIC EVALUATIONS
E105A 19*          FOR EACH INTERPOLATION.
E105A 20*STORAGE - 345 WORDS.
E105A 21*USES SEARCH(E101A).
```

```
E106A  A*          BILL BUZBEE      C-4          B. SWARTZ          68
E106A  B*INTERPOLATION BY AITKENS REPEATED PROCESS
E106A  C*F4              SR6600   SCP 3.1
E106A  D*                   SW  2     LS  2     TYPE  1,1
E106A  E*                SOURCE   68 CARDS          OBJECT   20 CARDS
E106A  F**INTERPOLATION*AITKENS*REPEATED*PROCESS
E106A  G*DISK       F4 COMPAT WU 05/31/73 REV 4 DECK 05/31/73 REV.4
E106A  1*FORM:  A = AKNINT(XBAR,N,M,X,Y,T)
E106A  2*PURPOSE:  GIVEN IABS(N) POINTS FROM THE GRAPH OF A FUNCTION,
E106A  3*   I.E. (X(I),F(X(I)),I=1,2,...,IABS(N), AKNINT EVALUATES A
E106A  4*   MTH DEGREE LAGRANGIAN INTERPOLANT OF THIS FUNCTION AT
E106A  5*   XBAR.
E106A  6*ROUTINE NAME:  AKNINT
E106A  7*ENTRY NAME:  AKNINT
E106A  8*STORAGE:  354 OCTAL WORDS.
E106A  9*ROUTINES CALLED:  LABRT(N103A).
```

```
E106B  A*          BILL BUZBEE      C-4          B SWARTZ           72
E106B  B*INTERPOLATION BY AITKENS REPEATED PROCESS
E106B  C*F4              SR7600   CROS
E106B  D*                   SW  2     LS  2     TYPE  1 ,1
E106B  E*                SOURCE   68 CARDS          OBJECT   20 CARDS
E106B  F**INTERPOLATION*AITKENS*REPEATED*PROCESS
E106B  G*DISK       F4 COMPAT WU 05/31/73 REV 1 DECK 05/31/73 REV 4
E106B  1*FORM:  A = AKNINT(XBAR,N,M,X,Y,T)
E106B  2*PURPOSE:  GIVEN IABS(N) POINTS FROM THE GRAPH OF A FUNCTION.
E106B  3*   I.E. (X(I),F(X(I)),I=1,2,...,IABS(N), AKNINT EVALUATES A
E106B  4*   MTH DEGREE LAGRANGIAN INTERPOLANT OF THIS FUNCTION AT
E106B  5*   XBAR.
E106B  6*ROUTINE NAME:  AKNINT
E106B  7*ENTRY NAME:  AKNINT
E106B  8*TIMING:  AVERAGE TIME PER CALL ON THE 7600 IS .8 MS.
E106B  9*STORAGE:  361 OCTAL WORDS.
E106B 10*ROUTINES CALLED:  LABRT(N103B).
```

```
E107A  A*          THOMAS L. JORDAN CDO                          67
E107A  0*SPLINE INTERPOLATION FUNCTION TO BE USED ONLY WITH E105A
E107A  B*BASIC NUMERICS E1              F4            SR6600   SCOPE
E107A  C*                            SW  2     LS  1
E107A  D*FORTRAN SOURCE CARDS   168CDFORTRAN OBJECT CARDS    8BIN
E107A  S*TWO*DIMENSIONAL*SPLINE*INTERPOLATION
E107A 10*ON DISK     F4  COMPAT   WU 11/03/67      DECK 11/03/67
E107A 11*THIS FUNCTION SUBPROGRAM IS USED BY E105A WHEN A
E107A 12*SUCCESSION OF VALUES IS DESIRED.
E107A 13*STORAGE - 98 WORDS
E107A 14*USES SPL2D2. SPL2D3(E105A).
```

E109A *(ESEARCH) HAS BEEN REDESIGNATED M119A.

```
E1AA  A*           R. MILLS          MP-9        JAMESON AND MILLS 72
E1AA  B*SIOG20 - 2D SEARCH, INTERPOLATION ON DISTORTED RECT. GRID
E1AA  C*F4              MP6600   SCP 3.1
E1AA  D*                      SW  4     LS  3     TYPE  2
E1AA  E*F4 SOURCE CARDS     155   BCD    OBJECT CARDS    NONE
E1AA  F*TWO-DIMENSIONAL*SEARCH*INTERPOLATION*DISTORTED*RECTANGULAR GRD
E1AA  G*CARDS       F4  COMPAT   WU 03/15/72       DECK 03/15/72
E1AA  1*FORM:  MAIN PROGRAM
E1AA  2*PURPOSE:  RESTORE DATA FROM A KNOWN, BUT DISTORTED,
E1AA  3*    RECTANGULAR GRID TO A TRUE GRID.  THIS WRITEUP IS THE
E1AA  4*    SAME AS THE INFORMAL REPORT LA-4891-MS.
```

E2 LEAST SQUARES APPROXIMATION AND CURVE FITTING

REVIEWER: B. SWARTZ, C-6

```
E203A  A*           T. JORDAN         CDO                              67
E203A  0*LEAST-SQUARE SPLINE APPROXIMATION
E203A  B*MATH            E2              F4              SR6600   SCOPE
E203A  C*                                SW  5     LS  6
E203A  D*F4 SOURCE CARDS        335BCDREL COL BIN CARDS       93BIN
E203A  S**LEAST-SQUARES*SPLINE*APPROXIMATION
E203A 10*ON DISK      F4  COMPAT   WU 01/20/67       DECK 01/20/67
E203A 11*CALL SMOOTH(J,I,IOP,T,X,Y,W,F,A) WHERE J IS NUMBER OF DATA
E203A 12*POINTS, I IS TWICE THE NUMBER OF KNOTS, IOP IS ARRAY OF
E203A 13*DIMENSION 2 CONTAINING COMBINATIONS OF INTEGERS 1 THRU 5
E203A 14*FOR SPECIFYING BOUNDARY CONDITIONS, T IS TABLE OF ABSCISSAS
E203A 15*OF DATA POINTS, X IS TABLE OF KNOTS, Y IS TABLE OF
E203A 16*ORDINATES OF DATA POINTS, W IS TABLE OF WEIGHTS, A IS ARRAY
E203A 17*OF DIMENSION .GE. I**2 USED FOR TEMPORARY STORAGE. SECOND
E203A 18*DERIVATIVES AND FUNCTION VALUES ARE COMPUTED AND STORED IN
E203A 19*F, LENGTH I. THERE ARE NO ERROR MESSAGES. CODE OCCUPIES OCT
E203A 20*STORAGE-4212 WORDS. USES SEARCH(E101A) AND LSS(F404A).
```

```
E205A  A*           T. JORDAN         CDO          B. FAGAN          67
E205A  0*ORTHOGONAL POLYNOMIAL LEAST SQUARES PACKAGE
E205A  B*MATHEMATICS    E2              F4              SR6600   SCOPE
E205A  C*                                SW  7     LS  6
E205A  D*F4 SOURCE CARDS        306BCDF4 OBJECT CARDS         98BIN
E205A  S*ORTHOGONAL*POLYNOMIAL*LEAST SQUARES
E205A 10*CARDS          F4  COMPAT   WU 03/08/68 REV  DECK 03/08/68 REV
E205A 11*ORTHOGONAL POLYNOMIAL LEAST SQUARES ROUTINE. PACKAGE BINARY
E205A 12*DECK NEEDS ID CARD IN FRONT, DATA CARDS IN BACK. FITS POLYNO
E205A 13*MIALS UP TO A SPECIFIED MAXIMUM WITH OPTIONS TO PLOT, OBTAIN
E205A 14*LEGENDRE COEF, EVALUATE FIT OVER A SPECIFIED INTERVAL, WITH
E205A 15*OR WITHOUT WEIGHTS, VARIABLE INPUT FORMAT. FITS OBTAINED IN
E205A 16*TERMS OF ORTHOGONAL POLYNOMIALS. MAXIMUM DEGREE OF
E205A 17*FIT=20, FOR LEGENDRE POLYN.=10. FIELD LENGTH ON JOB CARD
E205A 18*IS 060000.
E205A 19*CONTAINS POLEY1
E205A 20*USES PLT(J516A) AND GRAPH(J511A) FOR PLOTTING.
```

```
E207A  A*           B L BUZBEE        C-4          B. SWARTZ         67
E207A  B*RATIONAL APPROXIMATION ROUTINE
E207A  C*F4              SR6600   SCP 3.1
E207A  D*                      SW  5     LS  4     TYPE  1
E207A  E*F4 SOURCE CARDS     178  BCD    OBJECT CARDS    87   BIN
E207A  F**RATIONAL*APPROXIMATION ROUTINE
E207A  G*CARDS        F4  COMPAT   WU 08/02/72REV 3 DECK 11/14/68REV 2
E207A  1*FORM:  CALL RAPROX(N,M,NP,N2,X,Y,S,EPS,A,B,IE,AA,U,W,E)
E207A  2*PURPOSE:  COMPUTE A RATIONAL APPROXIMATION, P (N)/Q(M),
E207A  3*   TO A TABULAR FUNCTION.
E207A  4*STORAGE:  2262 OCTAL WORDS.
E207A  5*ROUTINES CALLED:  DRPOLY(C2AC), DCPOLY(C2AD), DRPOLE(C212A),
E207A  6*   DCPOLE(C213A), DGLSS(F406A), AND LABRT(N103A).
```

```
E208A  A*           BLAIR SWARTZ     C-6                          67
E208A  O*ORTHOGONAL POLYNOMIAL LEAST SQUARES SUBROUTINE
E208A  B*MATHEMATICS    E2              F4              SR6600   SCOPE
E208A  C*                              SW  6     LS  5
E208A  D*F4 SOURCE CARDS       251BCDF4 OBJECT CARDS        77BIN
E208A  S**ORTHOGONAL*POLYNOMIAL*LEAST SQUARES
E208A 10*CARDS        F4  COMPAT   WU 07/14/67      DECK 07/07/67
E208A 11*  CALL PFTS(M,KM,IW,IOR,LP,IP,LOOK,MID,K,SIGMA,X,F,W,Y,DELY,
E208A 12*  B,SB,T,ST,C,SC,A).  PFTS PRODUCES (WEIGHTED) LEAST SQUARES
E208A 13*  POLYNOMIAL FITS, Y(X), OF DEGREE KM LE. 29, TO POINTS
E208A 14*  (X(I), F(I)), I=1,...,M LE. 300.  ARGUMENTS IW THROUGH MID
E208A 15*  CONTROL OPTIONS CONCERNING THE WEIGHTS, THE TYPE OF RESULTS
E208A 16*  PRINTED, AND EXAMINATION OF THE INTERMEDIATE FITS.  SIGMA
E208A 17*  AND Y THROUGH A ARE COMPUTED FOR EACH FIT TO DEGREE KM,
E208A 18*  E.G. B CONTAINS THE COEFFICIENTS OF Y(X).  X THRU A HAVE
E208A 19*  DIMENSION REQUIREMENTS, E.G. A(30,30). STORAGE IS 2187 WDS.
E208A 20*  PFTS USES SQRT(B408A).
```

E3 SMOOTHING TABULAR DATA

REVIEWER: B. SWARTZ, C-6

```
E302A  A*          BAKER,L. H.      ENG-7       GAYER,STEPHEN J. 71
E302A  B*TIMAV TABULAR FUNCTION SMOOTHING ROUTINE
E302A  C*F4              SR6600   SCP 3.1
E302A  D*                   SW  2     LS  4     TYPE 1
E302A  E*F4 SOURCE CARDS     160  BCD    OBJECT CARDS    41   BIN
E302A  F**TIMAV*TABULAR*SMOOTHING
E302A  G*CARDS       F4  COMPAT   WU 09/02/71      DECK 09/02/71
E302A  1*FORM:  CALL TIMAV(TMCON,ARRAY,LRAY,ORRAY,ISING)
E302A  2*PURPOSE:  GIVEN A TABULAR SET OF ABSCISSAS AND ORDINATES,
E302A  3*  PRODUCE A NEW SET OF SMOOTHED ORDINATES.
E302A  4*ROUTINE NAME:  TIMAV
E302A  5*ENTRY NAME:  TIMAV
E302A  6*STORAGE:  1012 OCTAL WORDS
E302A  7*ROUTINE CALLED:  TINT(E302A).
```

```
E302B  A*          BAKER, L. H.     ENG-7       GAYER, STEPHEN J. 71
E302B  B*TIMAV TABULAR FUNCTION SMOOTHING ROUTINE
E302B  C*F4              SR7600   CROS
E302B  D*                   SW  2     LS  5     TYPE  1
E302B  E*F4 SOURCE CARDS     160  BCD    OBJECT CARDS    41   BIN
E302B  F**TIMAV*TABULAR*SMOOTHING
E302B  G*CARDS       F4  COMPAT   WU 09/02/71      DECK 09/02/71
E302B  1*FORM:  CALL TIMAV(TMCON,ARRAY,LRAY,ORRAY,ISING)
E302B  2*PURPOSE:  TO PRODUCE VALUES FOR A SMOOTHED OUT TABULAR
E302B  3*  FUNCTION AT TIMES INPUT WITH ORIGINAL TABLE
E302B  4*ROUTINE NAME:  TIMAV
E302B  5*ENTRY NAME:  TIMAV
E302B  6*STORAGE:  1020 OCTAL WORDS
E302B  7*ROUTINE CALLED:  TINT(E302B).
```

E4 NON-LINEAR OPTIMIZATION

REVIEWER: M. KLEIN, C-6

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E4AA  A*           TOM DOYLE        C-6          M. KLEIN          71
E4AA  B*OPTIMIZ A CONTINUOUS N-PARAMETER SYSTEM
E4AA  C*F4              SR7600    CROS
E4AA  D*                     SW  12    LS  0     TYPE 2
E4AA  E*                SOURCE TAPE NO. LE441L00
E4AA  F**OPTIMIZE*CONTINUOUS*N-PARAMETER*SYSTEM
E4AA  G*TAPE         F4  COMPAT   WU 04/27/73REV.2 DECK 04/27/73REV.2
E4AA  1*FORM:  CALL OPTIMIZ(U,V)
E4AA  2*       CALL PHIGRAD(V)
E4AA  3*PURPOSE:  TO OPTIMIZ A CONTINUOUS N-PARAMETER SYSTEM
E4AA  4*      BY EITHER MINIMIZING OR MAXIMIZING A SUM OF SQUARES
E4AA  5*ROUTINE NAME:  OPTIMIZ
E4AA  6*ENTRY NAMES:  OPTIMIZ,PSEARCH,GLSS,BOUNDS,HSHLECS,ETASRCH,
E4AA  7*      PHIGRAD
E4AA  8*STORAGE:  66800 OCTAL WORDS OF SCM
E4AA  9*          ALL OF LCM
E4AA 10*ROUTINES CALLED:  SECOND(Q115B),DOTPRO(F124B),SQRT(B408B),
E4AA 11*      LABRT(N103B),VECPROD(F133B),VECSUM(F133B),ADDVEC(F133B),
E4AA 12*      DSQRT(B410B),ECRD/ECWR(SYSTEM)
E4AA 13*OTHER EXTERNALS:
E4AA 14*      DOYLE1,DOYLE2,DOYLE3,DOYLE4,DOYLE5,DOYLE6,
E4AA 15*      DOYLE7 (ALL COMMONS), PHIGRAD (ALSO A COMMON BLOCK)
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F NUMERICAL LINEAR ALGEBRA

F1 VECTOR AND MATRIX OPERATIONS

REVIEWER: B. BUZBEE, C-4

```
F115A  A*          J. DURAN          T-1          I. CHERRY          68
F115A  0*VECTOR MAXIMUM,MINIMUM,MAXIMUM ABS.,OR MINIMUM ABS.
F115A  B*VECTORS          F1                    F4        SR6600   SCOPE
F115A  C*                                SW  1     LS  1
F115A  D*F4SOURCE DECK          328CD                              9BIN
F115A  S**VECTOR*MAXIMUM*MINIMUM
F115A 10*ON DISK     F4  COMPAT   WU 06/03/68 REV  DECK 04/16/68 REV
F115A 11* CALLED BY MAXV(X,IX,N,I,Y),OR MINV, MAXAV, MINAV
F115A 12* DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F115A 13* MINIMUM ABSOLUTE OF N NUMBER OF ELEMENTS OF A VECTOR X.
F115A 14* IX IS THE SPACING AT WHICH THE X VALUES ARE TO BE EXAMINED.
F115A 15* THE LENGTH OF VECTOR X MUST BE AT LEAST(N-1)*IX +1.
F115A 16* THE DESIRED ELEMENT IS STORED IN Y AND I .GE.1 AND
F115A 17* I.LE.N IS THE ELEMENT NUMBER.  96 WORDS OF STORAGE.
F115A 18*SELF-CONTAINED.
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F115B  A*          J.DURAN          C-4          B.BUZBEE          72
F115B  B*VECTOR MAXIMUM MINIMUM MAXIMUM ABS., OR MINIMUM ABS.
F115B  C*F4              SR7600   CROS
F115B  D*                    SW  1     LS  2     TYPE  1
F115B  E*F4 SOURCE CARDS     52   BCD    OBJECT CARDS    15   BIN
F115B  F**VECTOR*MAXIMUM*MINIMUM
F115B  G*ON DISK     F4  COMPAT   WU 10/12/72      DECK 10/12/72
F115B  1*FORM:  CALL MAXV(X,IX,N,I,Y) OR MINV, MAXAV, MINAV
F115B  2*PURPOSE:  DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F115B  3*   MINIMUM ABSOLUTE OF N NUMBER OF ELEMENTS OF A VECTOR X.
F115B  4*     IX IS THE SPACING AT WHICH THE X VALUES ARE TO BE
F115B  5*     EXAMINED.  THE LENGTH OF VECTOR X MUST BE AT LEAST
F115B  6*     (N-1)*IX+1.  THE DESIRED ELEMENT IS STORED IN Y AND
F115B  7*      I .GE.1 AND I.LE.N IS THE ELEMENT NUMBER.
F115B  8*ROUTINE NAME:  MAXV
F115B  9*ENTRY NAMES:  MAXV,MINV,MAXAV,MINAV
F115B 10*STORAGE:  245 OCTAL WORDS
F115B 11*ROUTINES CALLED:  LIBMSG(SYSTEM).
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```
F116A  A*           CHERRY            T-1          R. ANDERSON      68
F116A  0*MATRIX MAXIMUM,MINIMUM,MAXIMUM ABSOLUTE,MINIMUM ABS.
F116A  B*MATRICES       F1                F4              SR6600   SCOPE
F116A  C*                                SW  1     LS  1
F116A  D*F4 SOURCE DECK          35BCDBINARY                    12BIN
F116A  S**MAXIMUM*MINIMUM*MATRIX ELEMENT
F116A 10*ON DISK      F4  COMPAT   WU 04/18/68       DECK 04/18/68
F116A 11*CALLED BY MAXM(A,IA,N,M,I,J,B) OR MINM,MAXAM,MINAM
F116A 12*DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F116A 13*OR MINIMUM ABSOLUTE ELEMENT AND THE INDICES OF THAT
F116A 14*ELEMENT IN MATRIX A. IA IS THE COLUMN LENGTH OF A AS
F116A 15*SPECIFIED IN THE DIMENSION STATEMENT, I.E. DIMENSION
F116A 16*A(IA,KA).  N AND M ARE THE NUMBER OF ROWS AND COLUMNS
F116A 17*RESPECTIVELY. I IS THE ROW(FIRST) INDEX TO THE
F116A 18*RESULTANT ELEMENT. J IS THE COLUMN(SECOND) INDEX TO
F116A 19*THE RESULTANT ELEMENT. B CONTAINS THE DESIRED ELEMENT.
F116A 20* 120 WORD STORAGE.  SELF CONTAINED.
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```
F116B  A*           I.CHERRY          C-4          B.BUZBEE         72
F116B  B*MATRIX MAXIMUM.MINIMUM.MAXIMUM ABSOLUTE,MINIMUM ABS.
F116B  C*F4             SR7600   CROS
F116B  D*                     SW  1     LS  2     TYPE  1
F116B  E*F4 SOURCE CARDS      55   BCD    OBJECT CARDS    18   BIN
F116B  F**MAXIMUM*MINIMUM*MATRIX ELEMENT
F116B  G*ON DISK      F4  COMPAT   WU 10/12/72       DECK 10/12/72
F116B  1*FORM:  CALL MAXM(A,IA,N,M,I,J,B) OR MINM,MAXAM,MINAM
F116B  2*PURPOSE:  DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F116B  3*    OR MINIMUM ABSOLUTE ELEMENT AND THE INDICES OF THAT
F116B  4*    ELEMENT IN MATRIX A.
F116B  5*       IA IS THE COLUMN LENGTH OF A AS SPECIFIED IN THE
F116B  6*         DIMENSION STATEMENT, I.E. DIMENSION A(IA,KA).
F116B  7*       N AND M ARE THE NUMBER OF ROWS AND COLUMNS RESPECTIVELY.
F116B  8*       I IS THE ROW(FIRST) INDEX TO THE RESULTANT ELEMENT.
F116B  9*       J IS THE COLUMN(SECOND) INDEX TO THE RESULTANT ELEMENT.
F116B 10*       B CONTAINS THE DESIRED ELEMENT.
F116B 11*ROUTINE NAME:  MAXM
F116B 12*ENTRY NAMES:  MAXM,MINM,MAXAM,MINAM
F116B 13*STORAGE:  312 OCTAL WORDS
F116B 14*ROUTINES CALLED:  LIBMSG(SYSTEM).
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```
F117A  A*           PAUL HARPER       T-1                              67
F117A  O*MATRIX IDENTITY GENERATOR
F117A  B*MATRICES       F1              F4              SR6600   SCOPE
F117A  C*                              SW  1     LS  1
F117A  D*F4 SOURCE CARDS          8RCDREL BIN                    4BIN
F117A  S**IDENTITY*MATRIX*GENERATOR
F117A 10*ON DISK      F4  COMPAT   WU 08/25/67       DECK 08/25/67
F117A 11*CALL GENID(A,N,IA).  GENERATES A STANDARD N BY N IDENTITY
F117A 12*MATRIX IN A WHERE N IS THE ORDER OF A AND IA IS THE SPACING
F117A 13*BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION STATEMENT.
F117A 14*USEFUL FOR SOLVING BX = I.  THE TEST PROGRAM PRINTS EITHER
F117A 15*(GENID   RESULTS ARE CORRECT) OR (GENID   RESULTS ARE INCOR-
F117A 16*RECT).  STORAGE - 30 WORDS.
F117A 17*SELF CONTAINED.
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F117B  A*           B.L.BUZBEE        C-4                              72
F117B  B*MATRIX IDENTITY GENERATOR
F117B  C*F4              SR7600   CROS
F117B  D*                       SW  1     LS  1     TYPE  1
F117B  E*F4 SOURCE CARDS     13   BCD    OBJECT CARDS     6   BIN
F117B  F**IDENTITY*MATRIX*GENERATOR
F117B  G*ON DISK      F4  COMPAT   WU 10/12/72       DECK 10/12/72
F117B  1*FORM:  CALL GENID(A,N,IA)
F117B  2*PURPOSE:  GENERATES A STANDARD N BY N IDENTITY MATRIX IN
F117B  3*   A WHERE N IS THE ORDER OF A AND IA IS THE SPACING
F117B  4*   BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION
F117B  5*   STATEMENT.  USEFUL FOR SOLVING BX = I.
F117B  6*ROUTINE NAME:  GENID
F117B  7*ENTRY NAME:  GENID
F117B  8*STORAGE:  52 OCTAL WORDS.
F117B  9*ROUTINES CALLED:  LIBMSG(SYSTEM).
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```
F119A  A*          IVAN CHERRY      T-1          TOM JORDAN       67
F119A  O*MATRIX TRANSPOSE IN PLACE
F119A  B*MATRICES       F1              F4            SR6600   SCOPE
F119A  C*                              SW  1     LS  1
F119A  D*F4 SOURCE CARDS        15BCDF4 OBJECT CARDS          5BIN
F119A  S**MATRIX*TRANSPOSE
F119A 10*ON DISK     F4  COMPAT   WU 01/23/67      DECK 01/23/67
F119A 11*CALLED BY-MATTRS (A,IA,N,M)
F119A 12*PURPOSE. TO TRANSPOSE THE MATRIX A. THAT IS,
F119A 13*A(N,M) IS REPLACED BY A(M,N).
F119A 14*A IS THE ORIGIN OF MATRIX A. IA IS THE SPACING BETWEEN
F119A 15*COLUMNS OF A. I.E.. A(IA,J) AS SPECIFIED BY THE DIMENSION
F119A 16*STATEMENT. N IS THE NUMBER OF ROWS. M IS THE NUMBER
F119A 17*OF COLUMNS. IA MUST BE GREATER THAN OR EQUAL TO
F119A 18*THE MAXIMUM OF M AND N. THE DIMENSIONS OF A MUST
F119A 19*BE AT LEAST AS GREAT AS THE MAXIMUM OF MXM AND NXN.
F119A 20*SELF CONTAINED  STORAGE REQUIREMENT 46 WORDS
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F119B  A*          IVAN CHERRY      C-4          B.BUZBEE         72
F119B  B*MATRIX TRANSPOSE IN PLACE
F119B  C*F4             SR7600   CROS
F119B  D*                     SW  1     LS  1     TYPE  1
F119B  E*F4 SOURCE CARDS     20   BCD    OBJECT CARDS     7   BIN
F119B  F**MATRIX*TRANSPOSE
F119B  G*ON DISK     F4  COMPAT   WU 10/12/72      DECK 10/12/72
F119B  1*FORM:  CALL MATTRS(A,IA,N,M)
F119B  2*PURPOSE:  TRANSPOSE THE MATRIX A.  THAT IS, A(N,M) IS
F119B  3*   REPLACED BY A(M,N).
F119B  4*      A IS THE ORIGIN OF MATRIX A.
F119B  5*      IA IS THE SPACING BETWEEN COLUMNS OF A,  I.E., A(IA,J)
F119B  6*   AS SPECIFIED BY THE DIMENSION STATEMENT.
F119B  7*      N IS THE NUMBER OF ROWS.
F119B  8*      M IS THE NUMBER OF COLUMNS.
F119B  9*      IA MUST BE GREATER THAN OR EQUAL TO THE MAXIMUM
F119B 10*   OF M AND N.  THE DIMENSIONS OF A MUST BE AT LEAST AS
F119B 11*   GREAT AS THE MAXIMUM OF MXM AND MXN.
F119B 12*ROUTINE NAME:  MATTRS
F119B 13*ENTRY NAME:  MATTRS
F119B 14*STORAGE:  70 OCTAL WORDS.
F119B 15*ROUTINES CALLED:  LIBMSG(SYSTEM).
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```
F120A  A*          IVAN CHERRY      T-1          TOM JORDAN       67
F120A  0*MATRIX MOVE
F120A  B*MATRICES       F1              F4              SR6600   SCOPE
F120A  C*                              SW  1     LS  1
F120A  D*F4 SOURCE CARDS          78CDF4 OBJECT CARDS          5BIN
F120A  S**MATRIX*MOVE
F120A 10*ON DISK     F4  COMPAT   WU 01/23/67      DECK 01/23/67
F120A 11*CALLED BY- MATMOV (N,M,A,IA,B,IB)
F120A 12*TO MOVE AN N X M MATRIX EMBEDDED IN A TO A MATRIX B WITH
F120A 13*POSSIBLY DIFFERENT DIMENSIONS. N IS THE NUMBER OF ROWS IN A
F120A 14*M IS THE NUMBER OF COLUMNS IN A.
F120A 15*A IS THE ORIGIN OF THE MATRIX A
F120A 16*B IS THE ORIGIN OF THE MATRIX B
F120A 17*IA AND IB ARE THE SPACINGS BETWEEN COLUMNS OF THE MATRICES A
F120A 18*AND B RESPECTIVELY, I.E.,A(IA,J) AS SPECIFIED IN THE
F120A 19*DIMENSION STATEMENT.
F120A 20*SELF CONTAINED. STORAGE REQUIREMENT 35 WORDS
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F120B  A*          IVAN CHERRY      C-4          B.BUZBEE         72
F120B  B*MATRIX MOVE
F120B  C*F4             SR7600   CROS
F120B  D*                    SW  1     LS  1     TYPE  1
F120B  E*F4 SOURCE CARDS     12   BCD    OBJECT CARDS     6   BIN
F120B  F**MATRIX*MOVE
F120B  G*ON DISK     F4  COMPAT   WU 10/12/72      DECK 10/12/72
F120B  1*FORM:  CALL MATMOV (N,M,A,IA,B,IB)
F120B  2*PURPOSE:  MOVE AN N X M MATRIX EMBEDDED IN A TO A MATRIX B
F120B  3*    WITH POSSIBLY DIFFERENT DIMENSIONS.
F120B  4*      N IS THE NUMBER OF ROWS IN A
F120B  5*      M IS THE NUMBER OF COLUMNS IN A
F120B  6*      A IS THE ORIGIN OF THE MATRIX A
F120B  7*      B IS THE ORIGIN OF THE MATRIX B
F120B  8*      IA AND IB ARE THE SPACINGS BETWEEN COLUMNS OF THE
F120B  9*    MATRICES A AND B RESPECTIVELY, I.E.,A(IA,J) AS SPECIFIED
F120B 10*    IN THE DIMENSION STATEMENT.
F120B 11*ROUTINE NAME:  MATMOV
F120B 12*ENTRY NAME:  MATMOV
F120B 13*STORAGE:  60 OCTAL WORDS
F120B 14*ROUTINES CALLED:  LIBMSG(SYSTEM).
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F121A  A*           IVAN CHERRY      T-1          TOM JORDAN       67
F121A  0*MATRIX MOVE AND TRANSPOSE
F121A  B*MATRICES       F1              F4              SR6600   SCOPE
F121A  C*                                SW  1     LS  1
F121A  D*F4 SOURCE CARDS          78CDF4 OBJECT CARDS          5BIN
F121A  S*MATRIX*TRANSPOSE*MOVE
F121A 10*ON DISK      F4  COMPAT   WU 01/23/67      DECK 01/23/67
F121A 11*CALLED BY- MATTRA(N,M,A,IA,B,IB)
F121A 12*PURPOSE- STORES THE TRANSPOSE OF THE NXM MATRIX IN MATRIX B.
F121A 13*N IS THE NUMBER OF ROWS (1ST INDEX) IN THE MATRIX.
F121A 14*M IS THE NUMBER OF COLUMNS (2ND INDEX) IN THE MATRIX.
F121A 15*A AND B ARE THE ORIGINS OF THE MATRICES.
F121A 16*IA AND IB ARE THE SPACINGS BETWEEN THE COLUMNS OF THE
F121A 17*MATRICES A AND B RESPECTIVELY, E.G., A(IA,J) AS SPECIFIED
F121A 18*IN THE DIMENSION STATEMENT.
F121A 19*SELF CONTAINED, STORAGE REQUIREMENT 37 WORDS.
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F121B  A*           IVAN CHERRY      C-4          B.BUZBEE         72
F121B  B*MATRIX MOVE AND TRANSPOSE
F121B  C*F4             SR7600   CROS
F121B  D*                    SW  1     LS  1     TYPE  1
F121B  E*F4 SOURCE CARDS     12   BCD    OBJECT CARDS     6   BIN
F121B  F**MATRIX*TRANSPOSE*MOVE
F121B  G*ON DISK      F4  COMPAT   WU 10/12/72      DECK 10/12/72
F121B  1*FORM:  CALL MATTRA(N,M,A,IA,B,IB)
F121B  2*PURPOSE:  STORES THE TRANSPOSE OF THE NXM MATRIX A IN
F121B  3*      MATRIX B.
F121B  4*    N IS THE NUMBER OF ROWS (1ST INDEX) IN THE MATRIX.
F121B  5*    M IS THE NUMBER OF COLUMNS (2ND INDEX) IN THE MATRIX.
F121B  6*    A AND B ARE THE ORIGINS OF THE MATRICES.
F121B  7*    IA AND IB ARE THE SPACINGS BETWEEN THE COLUMNS OF THE
F121B  8*      MATRICES A AND B RESPECTIVELY, E.G., A(IA,J) AS
F121B  9*      SPECIFIED IN THE DIMENSION STATEMENT.
F121B 10*ROUTINE NAME:  MATTRA
F121B 11*ENTRY NAME:  MATTRA
F121B 12*STORAGE:  62 OCTAL WORDS
F121B 13*ROUTINES CALLED:  LIBMSG(SYSTEM).
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F122A  A*          B. L. BUZBEE     C-4          IVAN CHERRY      67
F122A  O*MATRIX MULTIPLY ROUTINE
F122A  B*MATRICES       F1              F4              SR6600   SCOPE
F122A  C*                                SW  1     LS  1
F122A  D*F4 SOURCE CARDS          78CDF4 OBJECT CARDS          6BIN
F122A  S**MATRIX*MULTIPLY
F122A 10*ON DISK      F4  COMPAT   WU 10/18/68REV   DECK 10/18/68REV
F122A 11* CALLED BY- MATMPY (N,M,L,A,IA,B,IB,C,IC)
F122A 12* MULTIPLIES NXM MATRIX A BY MXL MATRIX B
F122A 13* TO FORM NXL MATRIX C. IA, IB, IC ARE THE
F122A 14* COLUMN LENGTHS AS SPECIFIED IN DIMENSION STATEMENT,
F122A 15* I.E. DIMENSION A(IA,KA), B(IB,KB), C(IC,KC).
F122A 16* THE ELEMENTS OF THE PRODUCT ARE COMPUTED IN DOUBLE
F122A 17* PRECISION PRIOR TO STORING IN C.
F122A 18* USES DOTPRO (F124A). STORAGE REQUIREMENT 51 WORDS.
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F123A  A*          B BUZBEE         C-4          B BUZBEE         67
F123A  B*MATRIX TRANSPOSE MULTIPLY ROUTINE
F123A  C*F-4            SR6600   SCP 3.1
F123A  D*                    SW  1     LS  1     TYPE 1.1
F123A  E*SOURCE CARDS         7    BCD    OBJECT CARDS    7    BIN
F123A  F**MATRIX*TRANSPOSE*MULTIPLY
F123A  G*DISK         F4  COMPAT   WU 04/03/73REV.1 DECK 04/03/73REV.1
F123A  1*FORM:  CALL MTMPY (M,N,L,A,IA,B,IB,C,IC)
F123A  2*PURPOSE:  MULTIPLY THE TRANSPOSE OF MXN MATRIX A BY
F123A  3*      MXL MATRIX B TO FORM NXL MATRIX C.  IA, IB, IC ARE THE
F123A  4*      COLUMN LENGTHS AS SPECIFIED IN THE DIMENSION
F123A  5*      STATEMENT. I.E. DIMENSION A(IA,KA), B(IB,KB),
F123A  6*      C(IC,KC).  THE ELEMENTS OF THE PRODUCT ARE COMPUTED
F123A  7*      WITH DOUBLE PRECISION ACCUMULATION.
F123A  8*ROUTINE NAME:  MTMPY
F123A  9*ENTRY NAME:  MTMPY
F123A 10*  STORAGE 64 OCTAL WORDS
F123A 11*ROUTINES CALLED:  DOTPRO (F124A)
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```
F123B  A*           B BUZBEE          C-4          B BUZBEE          73
F123B  B*MATRIX TRANSPOSE MULTIPLY ROUTINE
F123B  C*F-4              SR7600   CROS
F123B  D*                      SW  1     LS  1     TYPE 1.1
F123B  E*SOURCE CARDS          7    BCD    OBJECT CARDS    7    BIN
F123B  F**MATRIX*TRANSPOSE*MULTIPLY
F123B  G*DISK          F4  COMPAT   WU 04/03/73       DECK 04/03/73
F123B  1*FORM:  CALL MTMPY (M,N,L,A,IA,B,IB,C,IC)
F123B  2*PURPOSE:  MULTIPLY THE TRANSPOSE OF MXN MATRIX A BY
F123B  3*      MXL MATRIX B TO FORM NXL MATRIX C.  IA, IB, IC ARE THE
F123B  4*      COLUMN LENGTHS AS SPECIFIED IN THE DIMENSION
F123B  5*      STATEMENT. I.E. DIMENSION A(IA,KA), B(IB,KB),
F123B  6*      C(IC,KC).  THE ELEMENTS OF THE PRODUCT ARE COMPUTED
F123B  7*      WITH DOUBLE PRECISION ACCUMULATION.
F123B  8*ROUTINE NAME:  MTMPY
F123B  9*ENTRY NAME:  MTMPY
F123B 10*  STORAGE 70 OCTAL WORDS
F123B 11*ROUTINES CALLED:  DOTPRO (F124B)
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F124A  A*           B. L. BUZBEE      C-4          R. M. FRANK       67
F124A  B*INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)
F124A  C*COMPASS          SR6600   SCP 3.1
F124A  D*                      SW  1     LS  3     TYPE  1
F124A  E*CMP SOURCE CARDS    107  BCD    OBJECT CARDS     5   BIN
F124A  F**VECTOR*PRODUCT
F124A  G*ON DISK       F4  COMPAT   WU 10/02/72REV 4 DECK 10/02/72REV 4
F124A  1*FORM:  Z=DOTPRO(N,X,IX,Y,IY)
F124A  2*PURPOSE:  PRODUCES INNER PRODUCT OF TWO VECTORS WHERE X AND Y
F124A  3*    ARE REAL VECTORS EACH CONTAINING N ELEMENTS.  IX AND IY
F124A  4*    ARE THE SPACINGS BETWEEN ELEMENTS OF X AND Y RESPECTIVELY.
F124A  5*    THE RESULT IS THE INNER PRODUCT (X,Y) OF THE VECTORS
F124A  6*    X AND Y, I.E., THE SUM OF X(I)*Y(I) FROM I = 1 TO N.
F124A  7*    THE RESULT IS ZERO IF N = 0, INFINITE IF N.LT.0.
F124A  8*    RESULT IS DOUBLE PRECISION BUT MAY BE USED AS SINGLE
F124A  9*    DEPENDING ON CALLING PROGRAM DEFINITION OF DOTPRO.
F124A 10*ROUTINE NAME:  DOTPRO
F124A 11*ENTRY NAME:  DOTPRO
F124A 12*STORAGE:  26 OCTAL WORDS.
F124A 13*SELF CONTAINED.
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F124B  A*          B. L. BUZBEE     C-4          R. M. FRANK      72
F124B  B*INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)
F124B  C*COMPASS       SR7600   CROS
F124B  D*                    SW  1     LS  3     TYPE  1
F124B  E*CMP SOURCE CARDS   107  BCD    OBJECT CARDS     5  BIN
F124B  F**VECTOR*PRODUCT
F124B  G*ON DISK     F4  COMPAT   WU 10/02/72      DECK 10/02/72
F124B  1*FORM:  Z=DOTPRO(N,X,IX,Y,IY)
F124B  2*PURPOSE:  PRODUCES INNER PRODUCT OF TWO VECTORS WHERE X AND Y
F124B  3*   ARE REAL VECTORS EACH CONTAINING N ELEMENTS.  IX AND IY
F124B  4*   ARE THE SPACINGS BETWEEN ELEMENTS OF X AND Y RESPECTIVELY.
F124B  5*   THE RESULT IS THE INNER PRODUCT (X,Y) OF THE VECTORS
F124B  6*   X AND Y, I.E., THE SUM OF X(I)*Y(I) FROM I = 1 TO N.
F124B  7*   THE RESULT IS ZERO IF N = 0, INFINITE IF N.LT.0.
F124B  8*   RESULT IS DOUBLE PRECISION BUT MAY BE USED AS SINGLE
F124B  9*   DEPENDING ON CALLING PROGRAM DEFINITION OF DOTPRO.
F124B 10*ROUTINE NAME:  DOTPRO
F124B 11*ENTRY NAME:  DOTPRO
F124B 12*STORAGE:  26 OCTAL WORDS.
F124B 13*SELF CONTAINED.
```

```
F125A  A*          PAUL HARPER      CDO                          67
F125A  0*CORRECTION OF AN APPROXIMATE INVERSE MATRIX
F125A  B*MATRIX THEORY  F1            F4              6600   SCOPE
F125A  C*                          SW  2     LS  1
F125A  D*F4 SOURCE CARDS       488CDREL BIN              16BIN
F125A  S**MATRIX*INVERSE*CORRECTOR
F125A 10*ON DISK     F4  COMPAT   WU 08/18/67      DECK 08/18/67
F125A 11*CALL CORINV(A,B,N,IA,D)  CORRECTS AN APPROXIMATE INVERSE
F125A 12*MATRIX B OF THE MATRIX A.  A IS THE NAME OF THE MATRIX FOR
F125A 13*WHICH B IS THE APPROXIMATE INVERSE.  N IS THE NUMBER OF ROWS
F125A 14*IN A, IA IS THE FIRST DIMENSION OF A(IA,N) AND B(IA,N) AS
F125A 15*SPECIFIED IN THE DIMENSION STATEMENT OF CALLING PROGRAM. AND
F125A 16*D IS THE NAME OF N(N+1) WORDS OF SINGLE DIMENSIONED TEMPORARY
F125A 17*STORAGE.
F125A 18*USES LABRT(N103A).  STORAGE 189 WORDS
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```
F128A  A*           B.L.BUZBEE       C-4                                  68
F128A  B*MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION
F128A  C*F4              SR6600   SCP 3.1
F128A  D*                     SW  3     LS  2     TYPE  1.1
F128A  E*F4 SOURCE CARDS     70   BCD    OBJECT CARDS    19   BIN
F128A  F*MODIFIED*GRAM-SCHMIDT*ORTHOGONALIZATION
F128A  G*ON DISK     F4  COMPAT   WU 03/22/73REV 3 DECK 03/22/73REV 2
F128A  1*FORM:  CALL MGS(M,N,A,IA,NR)
F128A  2*PURPOSE:  ORTHOGONALIZES THE COLUMNS OF THE M BY N MATRIX
F128A  3*   STORED IN ARRAY A. THE COLUMN LENGTH OF A IS IA, AND
F128A  4*   THE RANK OF THE MATRIX IS RETURNED IN NR.
F128A  5*ROUTINE NAME:  MGS
F128A  6*ENTRY NAME:  MGS
F128A  7*STORAGE:  333 OCTAL WORDS
F128A  8*ROUTINES CALLED:  SQRT(B408A),DOTPRO(F124A).
```

```
F128B  A*           B.L.BUZBEE       C-4
F128B  B*MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION
F128B  C*F4              SR7600   CROS
F128B  D*                     SW  3     LS  2     TYPE  1.1
F128B  E*F4 SOURCE CARDS     70   BCD    OBJECT CARDS    19   BIN
F128B  F*MODIFIED*GRAM-SCHMIDT*ORTHOGONALIZATION
F128B  G*ON DISK     F4  COMPAT   WU 03/22/73      DECK 03/22/73
F128B  1*FORM:  CALL MGS(M,N,A,IA,NR)
F128B  2*PURPOSE:  ORTHOGONALIZES THE COLUMNS OF THE M BY N MATRIX
F128B  3*   STORED IN ARRAY A, THE COLUMN LENGTH OF A IS IA, AND
F128B  4*   THE RANK OF THE MATRIX IS RETURNED IN NR.
F128B  5*ROUTINE NAME:  MGS
F128B  6*ENTRY NAME:  MGS
F128B  7*7600 TIMING:  N=10, M=100, .035 SEC.
F128B  8*STORAGE:  336 OCTAL WORDS
F128B  9*ROUTINES CALLED:  SQRT(B408), DOTPRO(F124).
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F129A  *(GNSM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AA.
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F130A  *(GSM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AB.
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```
F131A  *(GHM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AC.
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```
F132A  A*          B. L. BUZBEE      C-4          B L BUZBEE       67
F132A  B*MATRIX INVERSE
F132A  C*                SR6600   SCP 3.1
F132A  D*                     SW  2     LS  3     TYPE  1.1
F132A  E*SOURCE CARDS         99  BCD     OBJECT CARDS      35   BIN
F132A  F**MATRIX*INVERSE
F132A  G*ON DISK      F4  COMPAT   WU 04/06/73REV 5 DECK 04/06/73REV 4
F132A  1*FORM: CALL MATINV(A,IA,N,R,DET)
F132A  2*PURPOSE:  FIND THE INVERSE OF A MATRIX A.
F132A  3*TIMING:  87 MILLISECONDS FOR N = 20.
F132A  4*ROUTINE NAME:  MATINV
F132A  5*ENTRY NAME:  MATINV
F132A  6*STORAGE= 655 (OCTAL) WORDS.
F132A  7*ROUTINES CALLED:  LABRT (N103A). DOTPRO (F124A).
```

```
F132B  A*          B. L. BUZBEE      C-4          B L BUZBEE       73
F132B  B*MATRIX INVERSE
F132B  C*                SR7600   CROS
F132B  D*                     SW  2     LS  3     TYPE  1.1
F132B  E*SOURCE CARDS         99  BCD     OBJECT CARDS      35   BIN
F132B  F**MATRIX*INVERSE
F132B  G*ON DISK      F4  COMPAT   WU 04/06/73      DECK 04/06/73
F132B  1*FORM: CALL MATINV(A,IA,N,R,DET)
F132B  2*PURPOSE:  FIND THE INVERSE OF A MATRIX A.
F132B  3*TIMING: 14 MILLISECONDS FOR N = 20
F132B  4*ROUTINE NAME:  MATINV
F132B  5*ENTRY NAME:  MATINV
F132B  6*STORAGE= 665 (OCTAL) WORDS.
F132B  7*ROUTINES CALLED:  LABRT (N103B), DOTPRO (F124B).
```

```
F133A  A*          B L BUZBEE        C-4          B.L.BUZBEE       69
F133A  B*VECTOR ADDITION
F133A  C*COMPASS         SR6600   SCP 3.1
F133A  D*                     SW  3     LS  3     TYPE 1.1
F133A  E*                SOURCE   91 CARDS          OBJECT    6 CARDS
F133A  F**VECTOR*ADDITION*SUM*PRODUCT
F133A  G*DISK       F4 COMPAT  WU 05/01/73 REV.3 DECK 05/01/73 REV.3
F133A  1*FORM:  CALL ADDVEC (N,A,X,Nx,Y,NY,Z,NZ)
F133A  2*        CALL VECSUM (Y,X,A,Z,N)
F133A  3*        CALL VECPROD (B,X,A,Z,N)
F133A  4*PURPOSE:  COMPUTE Z = A*X + Y WHERE A IS SCALAR AND
F133A  5*          X, Y, AND Z ARE N-DIMENSIONAL VECTORS.
F133A  6*ROUTINE NAME:  ADDVEC
F133A  7*ENTRY NAMES:  ADDVEC, VECSUM, VECPROD
F133A  8*STORAGE:  44 OCTAL WORDS
F133A  9*ROUTINES CALLED:  SELF CONTAINED
```

```
F133B  A*          B L BUZBEE        C-4          B.L.BUZBEE        73
F133B  B*VECTOR ADDITION
F133B  C*COMPASS        SR7600   CROS
F133B  D*                    SW  3     LS  3     TYPE 1.1
F133B  E*                SOURCE   91 CARDS          OBJECT     6 CARDS
F133B  F**VECTOR*ADDITION*SUM*PRODUCT
F133B  G*DISK       F4 COMPAT  WU 05/01/73        DECK 05/01/73
F133B  1*FORM:  CALL ADDVEC (N,A,X,NX,Y,NY,Z,NZ)
F133B  2*       CALL VECSUM (Y,X,A,Z,N)
F133B  3*       CALL VECPROD (B,X,A,Z,N)
F133B  4*PURPOSE:  COMPUTE Z = A*X + Y WHERE A IS SCALAR AND
F133B  5*          X, Y, AND Z ARE N-DIMENSIONAL VECTORS.
F133B  6*TIMEING:  ON CDC 7600, AS N INCREASES AVERAGE TIME/ELEMENT
F133B  7*          GOES FROM 3.8 TO 0.4 MILLISEC.
F133B  8*ROUTINE NAME:  ADDVEC
F133B  9*ENTRY NAMES:  ADDVEC, VECSUM, VECPROD
F133B 10*STORAGE:  44 OCTAL WORDS
F133B 11*ROUTINES CALLED:  SELF CONTAINED
```

```
F134A  A*          B. L. BUZBEE      C-4                          70
F134A  B*ECS MATRIX MULTIPLY
F134A  C*F4             SR6600   SCP 3.1
F134A  D*                    SW  3     LS  2     TYPE  1
F134A  E*SOURCE CARDS        40   BCD    OBJECT CARDS    13   BIN
F134A  F**MATRIX*MULTIPLY*ECS
F134A  G*CARDS       F4  COMPAT   WU 09/08/71REV1  DECK 09/08/71REV1
F134A  1*FORM:  CALL ECMATPY(NN,MM,LL,KA,LA,MA,KB,LB,MB,KC,LC,MC,T)
F134A  2*PURPOSE:  TO FORM THE PRODUCT IN ECS OF TWO MATRICES STORED
F134A  3*     IN ECS.
F134A  4*ROUTINE NAME: ECMATPY
F134A  5*ENTRY NAME : ECMATPY
F134A  6*STORAGE:  222 (OCTAL) WORDS.
F134A  7*TIMING:  4.34 SEC. FOR NN=MM=LL=100.
F134A  8*ROUTINES CALLED:  DOTPRO(F124A), ECR(K203A), ECW(K204A).
```

```
F134B  A*          B. L. BUZBEE     C-4                                  72
F134B  B*ECS MATRIX MULTIPLY
F134B  C*F4              SR7600   CROS
F134B  D*                   SW  1     LS  2     TYPE  1
F134B  E*SOURCE CARDS        40   BCD    OBJECT CARDS    13   BIN
F134B  F**MATRIX*MULTIPLY*ECS
F134B  G*ON DISK     F4  COMPAT   WU 03/16/72      DECK 03/16/72
F134B  1*FORM:  CALL ECMATPY(NN,MM,LL,KA,LA,MA,KB,LB,MB,KC,LC,MC,T)
F134B  2*PURPOSE:  FORM THE PRODUCT IN ECS OF TWO MATRICES STORED
F134B  3*     IN ECS. SEE ECMATPY(F134A) FOR FURTHER DETAILS.
F134B  4*ROUTINE NAME: ECMATPY
F134B  5*ENTRY NAME : ECMATPY
F134B  6*STORAGE:  226 (OCTAL) WORDS.
F134B  7*TIMING:  .696 SEC. FOR NN=MM=LL=100.
F134B  8*ROUTINES CALLED:  DOTPRO(F124B), ECR(K203B), ECW(K204B).
```

```
F135A  A*          B. L. BUZBEE     C-4                                  70
F135A  B*ECS MATRIX TRANSPOSE MULTIPLY
F135A  C*F4              SR6600 SCP 3.1
F135A  D*                   SW  3     LS  2     TYPE  1
F135A  E*SOURCE CARDS        40  BCD     OBJECT CARDS    12  BIN
F135A  F**MATRIX*TRANSPOSE*MULTIPLY*ECS
F135A  G*CARDS       F4  COMPAT   WU 09/08/71REV.1 DECK 09/08/71REV.1
F135A  1*FORM:  CALL ECMTRPY(MM,NN,LL,KA,LA,MA,KB,LB,MB,KC,LC,MC,T)
F135A  2*PURPOSE:  TO FORM THE PRODUCT IN ECS OF THE TRANSPOSE OF A
F135A  3*     MATRIX IN ECS WITH A MATRIX IN ECS.
F135A  4*ROUTINE NAME:  ECMTRPY
F135A  5*ENTRY NAME:  ECMTRPY
F135A  6*STORAGE:  214 (OCTAL) WORDS.
F135A  7*ROUTINES CALLED:  DOTPRO(F124A), ECR(K203A), ECW(K204A).
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```
F135B  A*          B. L. BUZBEE     C-4                                  72
F135B  B*ECS MATRIX TRANSPOSE MULTIPLY
F135B  C*F4              SR7600 CROS
F135B  D*                   SW  3     LS  2     TYPE  1
F135B  E*SOURCE CARDS        40  BCD     OBJECT CARDS    12  BIN
F135B  F**MATRIX*TRANSPOSE*MULTIPLY*ECS
F135B  G*ON DISK     F4  COMPAT   WU 03/16/72      DECK 03/16/72
F135B  1*FORM:  CALL ECMTRPY(MM,NN,LL,KA,LA,MA,KB,LB,MB,KC,LC,MC,T)
F135B  2*PURPOSE:  TO FORM THE PRODUCT IN ECS OF THE TRANSPOSE OF A
F135B  3*     MATRIX IN ECS WITH A MATRIX IN ECS.
F135B  4*ROUTINE NAME:  ECMTRPY
F135B  5*ENTRY NAME:  ECMTRPY
F135B  6*STORAGE:  220 (OCTAL) WORDS.
F135B  7*ROUTINES CALLED:  DOTPRO(F124A), ECR(K203A), ECW(K204A).
```

```
F136A  A*           B L BUZBEE        C-4                              70
F136A  B*INNER PRODUCT OF TWO COMPLEX VECTORS
F136A  C*F4              SR6600   SCP 3.1
F136A  D*                     SW  1      LS  1      TYPE  1
F136A  E*SOURCE CARDS         14    BCD     OBJECT CARDS      9    BIN
F136A  F**INNER*PRODUCT*VECTOR
F136A  G*CARDS         F4  COMPAT    WU 04/26/73REV.1 DECK 11/11/70
F136A  1*USE:  Z=COTPRO(N,X,IX,Y,IY)
F136A  2*      Z=CDOTPRO(N,X,IX,Y,IY)
F136A  3*PURPOSE:  Z=COTPRO(N,X,IX,Y,IY) COMPUTES THE
F136A  4*COMPLEX SUM  Z=X(1)*Y(1)+X(1+IX)*Y(1+IY)+...
F136A  5*+X(1+(N-1)*IX)*Y(1+(N-1)*IY) WHERE X AND Y ARE
F136A  6*COMPLEX VECTORS OF LENGTH N.
F136A  7*Z=CDOTPRO(N,X,IX,Y,IY) IS THE SAME AS COTPRO
F136A  8*EXCEPT ALL X(I)*S ARE CONJUGATED.
F136A  9*TIMING:  N=100. .0015 SEC.
F136A 10*STORAGE:  133 (OCTAL WORDS).
F136A 11*ROUTINE NAME :  COTPRO
F136A 12*ENTRY NAMES:  COTPRO, CDOTPRO
F136A 13*ROUTINES CALLED:  F124A(DOTPRO).
```

```
F136B  A*           B.L.BUZBEE        C-4          B.L.BUZBEE       73
F136B  B*INNER PRODUCT OF TWO COMPLEX VECTORS
F136B  C*F4              SR7600   CROS
F136B  D*                     SW 1       LS 1       TYPE 1
F136B  E*SOURCE CARDS         14    BCD     OBJECT CARDS     10   BIN
F136B  F**INNER*PRODUCT*VECTOR
F136B  G*ON DISK       F4  COMPAT    WU 04/26/73REV.1 DECK 03/02/73
F136B  1*FORM:  Z=COTPRO(N,X,IX,Y,IY)
F136B  2*       Z=CDOTPRO(N,X,IX,Y,IY)
F136B  3*PURPOSE:  Z=COTPRO(N,X,IX,Y,IY)) COMPUTES THE COMPLEX SUM,
F136B  4* Z=X(1)*Y(1)+X(1+IX)*Y(1+IY)+...+X(1+(N-1)*IX)*Y(1+(N-1)*IY)
F136B  5* WHERE X AND Y ARE COMPLEX VECTORS OF LENGTH N.
F136B  6*           Z=CDOTPRO(N,X,IX,Y,IY) IS THE SAME AS COTPRO
F136B  7* EXCEPT ALL X(I) S ARE CONJUGATED.
F136B  8*ROUTINE NAME:  COTPRO
F136B  9*ENTRY NAME:  COTPRO, CDOTPRO
F136B 10*STORAGE:  153 (OCTAL ) WORDS
F136B 11*ROUTINES CALLED:  DOTPRO(F124B).
```

```
F137A  A*          B L BUZBEE       C-4                              70
F137A  B*COMPLEX MATRIX INVERSION
F137A  C*F4              SR6600   SCP 3.1
F137A  D*                     SW  1     LS  3     TYPE  1.1
F137A  E*SOURCE CARDS         98   BCD    OBJECT CARDS    41   BIN
F137A  F**COMPLEX*MATRIX*INVERSION
F137A  G*CARDS        F4  COMPAT   WU 11/04/70      DECK 11/04/70
F137A  1*USE:  CALL CATINV(A,IA.IN,R,DET) WHERE THE ARGUMENTS ARE
F137A  2*IDENTICAL TO F132A EXCEPT ALL FLOATING POINT ARGUMENTS
F137A  3*A,R, AND DET MUST BE COMPLEX.
F137A  4*PURPOSE:  TO INVERT A COMPLEX MATRIX USING ORDER N**2
F137A  5*STORAGE LOCATIONS.
F137A  6*STORAGE:  777 OCTAL WORDS
F137A  7*ROUTINES CALLED:  COTPRO(F136A), LABRT(N103A).
```

```
F137B  A*          B.L.BUZBEE       C-4                              73
F137B  B*COMPLEX MATRIX INVERSION
F137B  C*F4              SR7600   CROS
F137B  D*                     SW  1     LS  3     TYPE  1.1
F137B  E*F4 SOURCE CARDS      98   BCD    OBJECT CARDS    41   BIN
F137B  F**COMPLEX*MATRIX*INVERSION
F137B  G*ON DISK      F4  COMPAT   WU 03/02/73      DECK 03/02/73
F137B  1*FORM:  CALL CATINV(A,IA,IN,R,DET)
F137B  2*PURPOSE:  TO INVERT A COMPLEX MATRIX USING ORDER N**2. THE
F137B  3*   THE ARGUMENTS ARE IDENTINAL TO MATINV(F132B) EXCEPT
F137B  4*   ALL FLOATING POINT ARGUMENTS A,R, AND DET MUST BE COMPLEX.
F137B  5*ROUTINE NAME:  CATINV
F137B  6*ENTRY NAME:  CATINV
F137B  7*7600 TIMING:  .009 SEC. FOR N=10.
F137B  8*STORAGE:  1005 OCTAL WORDS.
F137B  9*ROUTINES CALLED:  COTPRO(F136B), LABRT(ON THE SYSTEM).
```

```
F138A  A*           PAUL IWANCHUK    C-4
F138A  B*SUMVEC ... A FAST SUMMATION OF VECTOR ELEMENTS
F138A  C*COMPASS        SR6600   SCP 3.1
F138A  D*                    SW   1    LS   2    TYPE 1
F138A  E*SOURCE CARDS        74   BCD    OBJECT CARDS   4     BIN
F138A  F**SUMVEC*VECTOR ELEMENTS
F138A  G*CARDS        F4 COMPAT    WU 05/10/72      DECK 05/10/72
F138A  1*FORM:  SUM = SUMVEC(N,X,INCX)
F138A  2*      WHERE:    X = REAL VECTOR
F138A  3*                N = NUMBER OF ELEMENTS TO BE SUMMED
F138A  4*              INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138A  5*PURPOSE:  PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138A  6*      N ELEMENTS FASTER THAN THE EQUIVALENT FORTRAN CODE.
F138A  7*         SUM = 0.0
F138A  8*         LENX = N*INCX
F138A  9*         DO 1  I = 1,LENX,INCX
F138A 10*       1 SUM = SUM+X(I)
F138A 11*      SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138A 12*      IF N IS LESS THAN 0.
F138A 13*STORAGE:  25 (OCTAL) WORDS
F138A 14*ROUTINES CALLED:  SELF CONTAINED
```

```
F138B  A*           PAUL IWANCHUK    C-4          B.L.BUZBEE       72
F138B  B*SUMVEC...A FAST SUMMATION OF VECTOR ELEMENTS
F138B  C*COMPASS        SR7600   CROS
F138B  D*                    SW  1     LS  3     TYPE  1
F138B  E*CMP SOURCE CARDS    83   BCD    OBJECT CARDS      5  BIN
F138B  F**SUMVEC*VECTOR ELEMENTS
F138B  G*ON DISK      F4  COMPAT    WU 10/12/72REV 1 DECK 10/12/72REV 1
F138B  1*FORM:  SUM = SUMVEC(N,X,INCX)
F138B  2*      WHERE:    X = REAL VECTOR
F138B  3*                N = NUMBER OF ELEMENTS TO BE SUMMED
F138B  4*              INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138B  5*PURPOSE:  PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138B  6*      N ELEMENTS FASTER THAN THE FORTRAN EQUIVALENT CODE.
F138B  7*         SUM = 0.0
F138B  8*         LENX = N*INCX
F138B  9*         DO 1  I = 1,LENX,INCX
F138B 10*       1 SUM = SUM+X(I)
F138B 11*      SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138B 12*      IF N IS LESS THAN 0.
F138B 13*ROUTINE NAME:  SUMVEC
F138B 14*ENTRY NAME:  SUMVEC
F138B 15*TIMING ON 7600 MACHINE:
F138B 16*          N = 10   N*.72 MICROSEC: EQUIVALENT TO FORTRAN
F138B 17*          N = 100  N*.21 MICROSEC:2.5 TIMES FASTER THAN FORTRAN
F138B 18*          N= 1000 N*.15 MICROSEC:3.5 TIMES FASTER THAN FORTRAN
F138B 19*STORAGE:  50 OCTAL WORDS.
F138B 20*ROUTINES CALLED:  LIBMSG(SYSTEM).
```

```
F1AA   A*          B.L. BUZBEE      C-4                                72
F1AA   B*GENERATE NONSYMMETRIC MATRIX
F1AA   C*F4              SR6600   SCP 3.1
F1AA   D*                    SW  3     LS  1     TYPE  2
F1AA   E*F4 SOURCE CARDS     23   BCD    OBJECT CARDS      9   BIN
F1AA   F*GENERATE*NONSYMMETRIC*MATRIX
F1AA   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F1AA   1*FORM:  CALL GNSM(N,M,A)
F1AA   2*PURPOSE:  GENERATE A REAL NONSYMMETRIC MATRIX WITH
F1AA   3*   KNOWN REAL AND/OR COMPLEX EIGENVALUES.
F1AA   4*ROUTINE NAME:  GNSM
F1AA   5*ENTRY NAME:  GNSM
F1AA   6*STORAGE:  82 OCTAL WORDS.
F1AA   7*SELF CONTAINED.


F1AB   A*          B.L. BUZBEE      C-4                                72
F1AB   B*GENERATE SYMMETRIC MATRIX
F1AB   C*F4              SR6600   SCP 3.1
F1AB   D*                    SW  2     LS  1     TYPE  2
F1AB   E*F4 SOURCE CARDS     14   BCD    OBJECT CARDS      7   BIN
F1AB   F*GENERATE*SYMMETRIC*MATRIX
F1AB   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F1AB   1*FORM:  CALL GSM(N,M,A,B)
F1AB   2*PURPOSE:  GENERATE A REAL SYMMETRIC MATRIX WITH KNOWN
F1AB   3*   EIGENVALUES.
F1AB   4*ROUTINE NAME:  GSM
F1AB   5*ENTRY NAME:  GSM
F1AB   6*STORAGE:  60 OCTAL WORDS.
F1AB   7*SELF CONTAINED.


F1AC   A*          B.L. BUZBEE      C-4                                72
F1AC   B*GENERATE HERMITIAN MATRIX
F1AC   C*F4              SR6600   SCP 3.1
F1AC   D*                    SW  2     LS  1     TYPE  2
F1AC   E*F4 SOURCE CARDS     25   BCD    OBJECT CARDS      14   BIN
F1AC   F*GENERATE*HERMITIAN*MATRIX
F1AC   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F1AC   1*FORM:  CALL GHM(N,M,A,B)
F1AC   2*PURPOSE: GENERATE A HERMITIAN MATRIX WITH KNOWN EIGENVALUES.
F1AC   3*ROUTINE NAME;  GHM
F1AC   4*ENTRY NAME:  GHM
F1AC   5*STORAGE:  173 OCTAL WORDS.
F1AC   6*SELF CONTAINED.
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```
F1AD   A*           BRENDAN GODFREY  T-6          B BUZBEE          73
F1AD   B*TRANS
F1AD   C*F4      CMP     MP7600   CROS   ALL OF LCM
F1AD   D*                        SW  3     LS  5     TYPE 2
F1AD   D*F4 SOURCE CARDS      133  BCD    OBJECT CARDS     40   BIN
F1AD   F**MATRIX*COMPLEX MATRIX*MATRIX TRANSPOSE
F1AD   G*CARDS         F4  COMPAT   WU 03/23/73       DECK 03/23/73
F1AD   1*FORM:  PROGRAM TRANS (FSET4,FSET6)
F1AD   2*PURPOSE:  TRANSPOSE A VERY LARGE COMPLEX MATRIX
F1AD   3*      STORED BY ROWS ON FSET4.
F1AD   4*ROUTINE NAME:  TRANS
F1AD   5*ENTRY NAME:  TRANS
F1AD   6*STORAGE:  ALL OF SCM AND LCM
F1AD   7*TIMING:  SEE FULL WRITEUP
F1AD   8*ROUTINES CALLED:  BUFFEI, ECSRW, ENDFIL, IOCHEK, LOCF,
F1AD   9*      SYSTEM, LSHIFT, BS4020,GETRA, IOUTIL,
F1AD  10*      SYSFS (ALL SYSTEM)
F1AD  11*      REWINM(W3018), SETQ(Q4148), MEMORY(Q3058),
F1AD  12*      SKIPR(W3048), BOI(W2018), OPEN(W1158),
```

F2 EIGENVALUES AND EIGENVECTORS

MATRIX DECOMPOSITIONS.

REVIEWER: B. BUZBEE, C-4

```
F206A  A*          B L BUZBEE       T-1          D. WILLIAMS      67
F206A  O*GENERAL REAL MATRIX EIGENVALUE-EIGENVECTOR ROUTINE
F206A  B*MATH            F2              F4             SR6600   SCOPE
F206A  C*                                SW  4     LS  1
F206A  D*F4 SOURCE CARDS        198CDF4 OBJECT CARDS        108IN
F206A  S*GENERAL REAL*MATRIX*EIGENVALUE*EIGENVECTOR ROUTINE
F206A 10*ON DISK     F4  COMPAT     WU 09/18/67 REV DECK 01/09/67
F206A 11*CALL REVEV(N,M,A,E,V,T,K) FINDS THE SINGLE PRECISION EIGEN-
F206A 12*VALUES AND EIGENVECTORS OF AN ARBITRARY REAL SINGLE PRECISION
F206A 13*MATRIX.  STORAGE=100 WORDS.  TIMING, N=20, 6 SEC.
F206A 14*USES- F207,LABRT(N103A),AND DSQRT(B410A).
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```
F207A  A*          B L BUZBEE       T-1                          67
F207A  O*GENERAL REAL MATRIX EIGENVALUE EIGENVECTOR ROUTINE
F207A  B*MATH            F2              F4             SR6600   SCOPE
F207A  C*                                SW  1     LS  8
F207A  D*F4 SOURCE CARDS       475BCDF4 OBJECT CARDS       223BIN
F207A  S*GENERAL REAL*MATRIX*EIGENVALUE*EIGENVECTOR ROUTINE
F207A 10*ON DISK     F4  COMPAT    WU 04/27/67      DECK 04/27/67
F207A 11*F207A IS CALLED BY F206A AND IT IS TO BE USED ONLY IN
F207A 12*CONJUNCTION WITH IT.  SEE F206A WRITEUP FOR DETAILS.
F207A 13*STORAGE=2998 WORDS.
F207A 14*USES=DSQRT.
```

```
F208A  A*          B L BUZBEE       T-1                          67
F208A  O*GENERAL REAL MATRIX EIGENVALUE ROUTINE
F208A  B*MATH            F2              F4             SR6600   SCOPE
F208A  C*                                SW  3     LS  1
F208A  D*F4 SOURCE CARDS        288CDF4 OBJECT CARDS        148IN
F208A  S*GENERAL REAL*MATRIX*EIGENVALUE ROUTINE
F208A 10*ON DISK     F4  COMPAT    WU 01/19/67      DECK 01/19/67
F208A 11*CALL REVAL(N,M,A,E,V,K) FINDS THE SINGLE PRECISION EIGEN-
F208A 12*VALUES OF AN ARBITRARY REAL SINGLE PRECISION MATRIX.
F208A 13*TIMING, N=20, 4 SEC. STORAGE=145 WORDS.
F208A 14*USES F209A AND LABRT.
```

```
F209A  A*          B L BUZBEE       T-1                              67
F209A  O*GENERAL REAL MATRIX EIGENVALUE ROUTINE
F209A  B*MATH            F2              F4            SR6600   SCOPE
F209A  C*                              SW  1     LS  6
F209A  D*F4 SOURCE CARDS       349BCDF4 OBJECT CARDS       147BIN
F209A  S*GENERAL REAL*MATRIX*EIGENVALUE ROUTINE
F209A 10*ON DISK     F4  COMPAT   WU 04/27/67      DECK 04/27/67
F209A 11*CALLED BY F208A AND F214A. THIS ROUTINE SHOULD ONLY BE USED
F209A 12*IN CONJUNCTION WITH THOSE ROUTINES.
F209A 13*STORAGE=1981 WORDS.
F209A 14*USES-DSQRT(B410A).
```

F210A *(RSEVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AA.

F211A *(RSEVEV) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AB.

F212A *(HEVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AC.

F213A *(HEVEV) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AD.

F214A *(DREVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AE.

F215A *(DRSVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AF.

F216A *(TREVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AG.

F217A *(TRSEVV) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AH.

F218A *(DTRVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AJ.

F219A *(THEVAL) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AK.

F220A *(THEVEV) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F2AL.

```
F221A  A*          B L BUZBEE        C-4          G. WILLBANKS     67
F221A  B*EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX
F221A  C*FIV             SR6600   SCP 3.1
F221A  D*                     SW  3     LS  7     TYPE  1
F221A  E*F4 SOURCE CARDS     367 BCD    OBJECT CARDS      89  BIN
F221A  F**EIGENVALUES AND*EIGENVECTORS OF A COMPLEX MATRIX
F221A  G*CARDS       F4  COMPAT   WU 04/01/70REV 2 DECK 04/01/70REV 2
F221A  1*CALL MATVEC(N,IVEC,A,E,V,IM,AL,TRAC,SUM,DET,PROD,IE) FINDS
F221A  2*THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX.
F221A  3*TIMING= .57 SEC. FOR N=10. STORAGE= 2203(OCTAL) WORDS.
F221A  4*USES SQRT(B408A).
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```
F222A  A*          B. L. BUZBEE     C-4                          69
F222A  B*EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX
F222A  C*F4              SR6600   SCP 3.1
F222A  D*                     SW  3     LS  3     TYPE  1
F222A  E*SOURCE CARDS        123  BCD    OBJECT CARDS    32   BIN
F222A  F**EIGENVALUE*MATRIX*SYMMETRIC*SMEVAL*STEVAL
F222A  G*ON DISK     F4  COMPAT   WU 08/02/71REV 3 DECK08/02/710REV 2
F222A  1*FORM:  CALL SMEVAL(NN,T,R,S,EPL,KE,M)
F222A  2*       CALL STEVAL(NN,B,R,S,EPL,KE)
F222A  3*       CALL S3DVAL(NN,T,R,S,EPL,KE,M)
F222A  4*PURPOSE: TO COMPUTE THE EIGENVALUES OF A REAL SYMMETRIC
F222A  5*       MATRIX OR OF A SYMMETRIC TRIDIAGONAL MATRIX.
F222A  6*ROUTINE NAME:  SMEVAL
F222A  7*ENTRY NAMES:  SMEVAL, STEVAL, S3DVAL
F222A  8*STORAGE:  646 (OCTAL) WORDS
F222A  9*ROUTINES CALLED: SMHHTR(F223A),DOTPRO(F124A),SQRT(B408A),
F222A 10*       LABRT(N103A).
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F222B  A*          B.L.BUZBEE       C-4                              72
F222B  B*EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX
F222B  C*F4              SR7600   CROS
F222B  D*                    SW  1     LS  4     TYPE  1
F222B  E*SOURCE CARDS        138  BCD    OBJECT CARDS    36   BIN
F222B  F**EIGENVALUE*MATRIX*SYMMETRIC*SMEVAL*STEVAL
F222B  G*ON DISK     F4  COMPAT   WU 05/12/72      DECK 05/12/72
F222B  1*FORM:  CALL SMEVAL(NN,T,R,S,EPL,KE,M)
F222B  2*       CALL STEVAL(NN,B,R,S,EPL,KE)
F222B  3*       CALL S3DVAL(NN,T,R,S,EPL,KE,M)
F222B  4*PURPOSE:  COMPUTE THE EIGENVALUES OF A REAL SYMMETRIC MATRIX
F222B  5*         OR OF A SYMMETRIC TRIDIAGONAL MATRIX.  SEE WRITEUP
F222B  6*         FOR SMEVAL(F222A) FOR FURTHER DETAILS.
F222B  7*ROUTINE NAME:  SMEVAL
F222B  8*ENTRY NAMES:  SMEVAL, STEVAL, S3DVAL
F222B  9*STORAGE:  732 (OCTAL) WORDS
F222B 10*TIMING:  TIME FOR N = 40 IS .1 SEC.
F222B 11*ROUTINES CALLED: SMHHTR(F223B),DOTPRO(F124B),SQRT(B408B).
F222B 12*       LABRT(N103B),LIBMSG(SYSTEM).
```

```
F223A  A*          B. L. BUZBEE     C-4                              69
F223A  B*TRIDIAGONALIZE REAL SYMMETRIC MATRIX
F223A  C*F4              SR6600   SCP 3.1
F223A  D*                    SW  3     LS  3     TYPE  1
F223A  E*F4SOURCE CARDS      103     BCD    OBJECT CARDS  28     BIN
F223A  F**MATRIX*SYMMETRIC*TRIDIAGONAL*SMHHTR*STHHTR
F223A  G*ON DISK     F4  COMPAT   WU 05/12/72REV.3 DECK 05/12/72REV.2
F223A  1*FORM:  CALL SMHHTR(IN,A,T,KE,IA)
F223A  2*       CALL STHHTR(IN,B,T,KE)
F223A  3*PURPOSE:  TRANSFORM A FULL SYMMETRIC MATRIX INTO A
F223A  4*       TRIDIAGONAL SYMMETRIC MATRIX.
F223A  5*ROUTINE NAME:  SMHHTR
F223A  6*ENTRY NAMES:  SMHHTR, STHHTR
F223A  7*STORAGE:  546 (OCTAL) WORDS.
F223A  8*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A), SQRT(B408A).
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```
F223B  A*          B. L. BUZBEE     C-4                                  72
F223B  B*TRIDIAGONALIZE REAL SYMMETRIC MATRIX
F223B  C*F4              SR7600   CROS
F223B  D*                    SW  1     LS  3     TYPE  1
F223B  E*F4SOURCE CARDS      103     BCD    OBJECT CARDS  29     BIN
F223B  F**MATRIX*SYMMETRIC*TRIDIAGONAL*SMHHTR*STHHTR
F223B  G*ON DISK      F4  COMPAT   WU 05/12/72      DECK 5/12/72
F223B  1*FORM:  CALL SMHHTR(IN,A,T,KE,IA)
F223B  2*       CALL STHHTR(IN,B,T,KE)
F223B  3*PURPOSE:  TRANSFORM A FULL SYMMETRIC MATRIX INTO A
F223B  4*       TRIDIAGONAL SYMMETRIC MATRIX.
F223B  5*       SEE SMHHTR(F223A) FOR FURTHER DETAILS.
F223B  6*ROUTINE NAME:  SMHHTR
F223B  7*ENTRY NAMES:  SMHHTR, STHHTR
F223B  8*STORAGE:  565 (OCTAL) WORDS.
F223B  9*TIMING:  TIME FOR N = 40 IS .1 SEC.
F223B 10*ROUTINES CALLED:  DOTPRO(F124B), LABRT(N103B), SQRT(B408B).
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```
F224A  A*          B. L. BUZBEE     C-4                                  69
F224A  B*EIGENVALUE-EIGENVECTOR ROUTINE FOR REAL SYMMETRIC MATRIX
F224A  C*F4              SR6600   SCP 3.1
F224A  D*                    SW  4     LS  3     TYPE  1
F224A  E*SOURCE CARDS        134  BCD    OBJECT CARDS    38   BIN
F224A  F**MATRIX*EIGENVALUE*EIGENVECTOR*SYMMETRIC*SMEVEV*STEVEV
F224A  G*CARDS        F4  COMPAT   WU 12/15/71REV 4 DECK 12/14/71REV 3
F224A  1*FORM:  CALL SMEVEV(NN,T,R,V,S,EPL,KE,M)
F224A  2*       CALL STEVEV(NN,B,R,V,S,EPL,KE,M)
F224A  3*       CALL S3DVEV(NN,T,R,V,S,EPL,KE,M)
F224A  4*PURPOSE: TO FIND THE EIGENVALUES AND EIGENVECTORS OF A REAL
F224A  5*       SYMMETRIC MATRIX.
F224A  6*ROUTINE NAME:  SMEVEV.
F224A  7*ENTRY NAMES:  SMEVEV, STEVEV, S3DVEV
F224A  8*TIMING:  N = 25, .36 SEC.
F224A  9*STORAGE:  757 OCTAL WORDS.
F224A 10*ROUTINES CALLED: SMHHTR(F223A),PRODHH(F225A),DOTPRO(F124A),
F224A 11*       SQRT(B408A),LABRT(N103A).
```

```
F224B  A*          B. L. BUZBEE     C-4                                72
F224B  B*EIGENVALUE-EIGENVECTOR ROUTINE FOR REAL SYMMETRIC MATRIX
F224B  C*F4              SR7600   CROS
F224B  D*                    SW  1     LS  4     TYPE  1
F224B  E*F4 SOURCE CARDS     134  BCD    OBJECT CARDS    40   BIN
F224B  F**MATRIX*EIGENVALUE*EIGENVECTOR*SYMMETRIC*SMEVEV*STEVEV
F224B  G*ON DISK      F4  COMPAT   WU 05/12/72      DECK 05/12/72
F224B  1*FORM:  CALL SMEVEV(NN,T,R,V,S,EPL,KE,M)
F224B  2*       CALL STEVEV(NN,B,R,V,S,EBL,KE,M)
F224B  3*       CALL S3DVEV(NN,T,R,V,S,EPL,KE,M)
F224B  4*PURPOSE:  TO FIND THE EIGENVALUES AND EIGENVECTORS OF A REAL
F224B  5*       SYMMETRIC MATRIX.
F224B  6*FOR MORE DETAILS SEE SMEVEV(F224A) WRITEUP.
F224B  7*ROUTINE NAME:  SMEVEV
F224B  8*ENTRY NAMES:  SMEVEV, STEVEV, S3DVEV
F224B  9*TIMING:  7600 TIME FOR N = 40 IS .26 SEC.
F224B 10*STORAGE:  1020 OCTAL WORDS.
F224B 11*ROUTINES CALLED: SMHHTR(F223B),PRODHH(F225B),DOTPRO(F124B),
F224B 12*       SQRT(B4088),LABRT(N103B).
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```
F225A  A*          B. L. BUZBEE     C-4                                69
F225A  B*COMPUTE TRANSFORM WHICH TRIDIAGONALIZES A SYMMETRIC MATRIX
F225A  C*F4              SR6600   SCP 3.1
F225A  D*                    SW  2     LS  2     TYPE  1
F225A  E*SOURCE CARDS        41   BCD    OBJECT CARDS    17   BIN
F225A  F**PRODHH*TRANSFORM*TRIDIAGONAL*SYMMETRIC*MATRIX
F225A  G*CARDS        F4  COMPAT   WU 09/20/71REV.1 DECK 09/20/71REV.1
F225A  1*FORM:  CALL PRODHH(IN,A,T,KE,V,IV)
F225A  2*PURPOSE:  COMPUTES THE SIMILARITY TRANSFORMATION USED BY
F225A  3*    SMHHTR(F223A) TO TRIDIAGONALIZE A SYMMETRIC MATRIX.
F225A  4*ROUTINE NAME:  PRODHH
F225A  5*ENTRY NAME:  PRODHH
F225A  6*STORAGE:  303 OCTAL WORDS
F225A  7*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A).
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```
F225B  A*          B. L. BUZBEE     C-4                              72
F225B  B*COMPUTE TRANSFORM WHICH TRIDIAGONALIZES A SYMMETRIC MATRIX
F225B  C*F4              SR7600   CROS
F225B  D*                    SW  1     LS  2     TYPE  1
F225B  E*F4 SOURCE CARDS     41   BCD    OBJECT CARDS    17   BIN
F225B  F**PRODHH*TRANSFORM*TRIDIAGONAL*SYMMETRIC*MATRIX
F225B  G*ON DISK      F4  COMPAT   WU 05/12/72      DECK 05/12/72
F225B  1*FORM:  CALL PRODHH(IN,A,T,KE,V,IV)
F225B  2*PURPOSE:  COMPUTES THE SIMILARITY TRANSFORMATION USED BY
F225B  3*    SMHHTR(F223B) TO TRIDIAGONALIZE A SYMMETRIC MATRIX.
F225B  4*FOR MORE DETAILS SEE PRODHH(F225A) WRITEUP
F225B  5*ROUTINE NAME:  PRODHH
F225B  6*ENTRY NAME:  PRODHH
F225B  7*STORAGE:  306 OCTAL WORDS.
F225B  8*ROUTINES CALLED:  DOTPRO(F124B), LABRT(N103B).
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```
F226A  A*          B L BUZBEE       C-4                              71
F226A  B*EIGENVALUE ROUTINE-COMPLEX HERMITIAN MATRIX
F226A  C*F4              SR6600   SCP 3.1
F226A  D*                    SW  1     LS  4     TYPE 1.1
F226A  E*F4 SOURCE CARDS     150  BCD    OBJECT CARDS    39   BIN
F226A  F*EIGENVALUE*MATRIX*HERMITIAN
F226A  G*CARDS         F4  COMPAT   WU 09/16/71      DECK 09/16/71
F226A  1*FORM:  CALL HMEVAL(NN,T,R,A,EPL,KE,M),
F226A  2*       CALL HTEVAL(NN,B,R,A,EPL,KE)
F226A  3*       CALL H3DVAL(NN,T,R,A,EPL,KE,M)
F226A  4*PURPOSE:  COMPUTE EIGENVALUES OF A COMPLEX HERMITIAN
F226A  5*       MATRIX.  ARGUMENTS ARE IDENTICAL TO SMEVAL(F222A)
F226A  6*       EXCEPT T,B,R, AND A MUST BE COMPLEX.
F226A  7*ROUTINE NAME: HMEVAL
F226A  8*ENTRY NAMES: HMEVAL, HTEVAL, H3DVAL.
F226A  9*STORAGE: 1002 OCTAL WORDS
F226A 10*ROUTINES CALLED: HMHHTR(F227A), SQRT(B408A), CABS(A203A)
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```
F226B  A*          B.L.BUZBEE       C-4                                  73
F226B  B*EIGENVALUE ROUTINE-COMPLEX HERMITIAN MATRIX
F226B  C*F4              SR7600   CROS
F226B  D*                     SW  1     LS  4     TYPE  1.1
F226B  E*F4 SOURCE CARDS     150  BCD    OBJECT CARDS    41   BIN
F226B  F**EIGENVALUE*MATRIX*HERMITIAN
F226B  G*ON DISK      F4  COMPAT   WU 03/02/73      DECK 03/02/73
F226B  1*FORM:  CALL HMEVAL (NN,T,R,A,EPL,KE,M)
F226B  2*       CALL HTEVAL(NN,B,R,A,EPL,KE)
F226B  3*       CALL H3DVAL (NN,T,R,A,EPL,KE,M)
F226B  4*PURPOSE:  COMPUTE EIGENVALUES OF A COMPLEX HERMITIAN
F226B  5*     MATRIX.  ARGUMENTS ARE IDENTICAL TO SMEVAL(F222B)
F226B  6*     EXCEPT T,B,R, AND A MUST BE COMPLEX.
F226B  7*ROUTINE NAME:  HMEVAL
F226B  8*ENTRY NAMES:  HMEVAL, HTEVAL, H3DVAL.
F226B  9*7600 TIMING:  .4 SEC. FOR N=50.
F226B 10*STORAGE:  1040 OCTAL WORDS
F226B 11*ROUTINES CALLED:  HMHHTR(F227B), SQRT,CABS(ON THE SYSTEM).
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F227A  A*          B L BUZBEE       C-4                                  71
F227A  B*TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX
F227A  C*F4              SR6600   SCP 3.1
F227A  D*                     SW  1     LS  3     TYPE 1
F227A  E*F4 SOURCE CARDS     118  BCD    OBJECT CARDS    37   BIN
F227A  F*MATRIX*HERMITIAN*TRIDIAGONAL
F227A  G*CARDS        F4  COMPAT   WU 09/16/71      DECK 09/16/71
F227A  1*FORM:  CALL HMHHTR(IN,A,T,KE,IA)
F227A  2*       CALL HTHHTR(IN,B,T,KE)
F227A  3*PURPOSE:  TRANSFORM A COMPLEX HERMITIAN MATRIX INTO A
F227A  4*       TRIDIAGONAL MATRIX.  ARGUMENTS ARE IDENTICAL TO
F227A  5*       SMHHTR,STHHTR(F223A) EXCEPT A,B, AND T MUST BE
F227A  6*       COMPLEX.
F227A  7*ROUTINE NAME:  HMHHTR
F227A  8*ENTRY NAMES:  HMHHTR, HTHHTR
F227A  9*STORAGE: 732 OCTAL WORDS
F227A 10*ROUTINES CALLED:  COTPRO (F136A), LABRT(N103A)
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F227B  A*          B.L.BUZBEE       C-4                                  73
F227B  B*TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX
F227B  C*F4              SR7600   CROS
F227B  D*                    SW  1     LS  3     TYPE  1.1
F227B  E*F4 SOURCE CARDS     118  BCD    OBJECT CARDS    38   BIN
F227B  F**MATRIX*HERMITIAN*TRIDIAGONAL
F227B  G*ON DISK      F4  COMPAT   WU 03/02/73      DECK 03/02/73
F227B  1*FORM:  CALL HMHHTR(IN,A,T,KE,IA)
F227B  2*       CALL HTHHTR(IN,B,T,KE)
F227B  3*PURPOSE:  TRANSFORM A COMPLEX HERMITIAN MATRIX INTO A
F227B  4*       TRIDIAGONAL MATRIX.  ARGUMENTS ARE IDENTICAL TO
F227B  5*       SMHHTR,STHHTR(F223B) EXCEPT A,B, AND T MUST BE
F227B  6*       COMPLEX.
F227B  7*ROUTINE NAME:  HMHHTR
F227B  8*ENTRY NAMES:  HMHHTR, HTHHTR
F227B  9*STORAGE:  751 OCTAL WORDS
F227B 10*ROUTINES CALLED:  COTPRO(F136B), LABRT(ON THE SYSTEM).
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F228A  A*          B L BUZBEE       C-4                                  71
F228A  B*EIGENVALUE-EIGENVECTOR ROUTINE FOR HERMITIAN MATRIX
F228A  C*F4              SR6600   SCP 3.1
F228A  D*                    SW  1     LS  4     TYPE 1
F228A  E*F4 SOURCE CARDS     163  BCD    OBJECT CARDS    48   BIN
F228A  F*MATRIX*EIGENVALUE*EIGENVECTOR*HERMITIAN
F228A  G*CARDS        F4  COMPAT   WU 09/16/71      DECK 09/16/71
F228A  1*FORM:  CALL HMEVEV(NN,T,R,V,A,EPL,KE,M)
F228A  2*       CALL HTEVEV(NN,B,R,V,A,EPL,KE,M)
F228A  3*       CALL H3DVEV(NN,T,B,V,A,EPL,KE,M)
F228A  4*PURPOSE:  FIND THE EIGENVALUES AND EIGENVECTORS OF A
F228A  5*     HERMITIAN MATRIX.  THE ARGUMENTS ARE IDENTICAL TO
F228A  6*     THOSE OF STEVEV(F224A), EXCEPT THAT T,B,R,V, AND A
F228A  7*     MUST BE COMPLEX.  SEE STEVEV(F224A) WRITEUP FOR
F228A  8*     DETAILS.  HTEVEV INPUT IS THE LOWER TRIANGLE.
F228A  9*     H3DVEV INPUT IS THE DIAGONAL AND SUPERDIAGONAL.
F228A 10*TIMING:  N=20, .62 SEC.
F228A 11*ROUTINE NAME:  HMEVEV
F228A 12*ENTRY NAMES:  HMEVEV, HTEVEV, H3DVEV
F228A 13*STORAGE:  1176 OCTAL WORDS
F228A 14*ROUTINES CALLED:  HMHHTR(F227A), PROHHH(F229A), COTPRO(F136A),
F228A 15*                  DOTPRO(F124A), CABS(A203A), SQRT(B408A).
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```
F228B  A*          B L BUZBEE       C-4                                  72
F228B  B*EIGENVALUE-EIGENVECTOR ROUTINE FOR HERMITIAN MATRIX
F228B  C*F4              SR7600   CROS
F228B  D*                     SW  1     LS  4     TYPE 1
F228B  E*F4 SOURCE CARDS     163  BCD    OBJECT CARDS    50   BIN
F228B  F**MATRIX*EIGENVALUE*EIGENVECTOR*HERMITIAN
F228B  G*ON DISK      F4  COMPAT   WU 04/12/72      DECK 04/12/72
F228B  1*FORM:  CALL HMEVEV(NN,T,R,V,A,EPL,KE,M)
F228B  2*       CALL HTEVEV(NN,B,R,V,A,EPL,KE,M)
F228B  3*       CALL H3DVEV(NN,T,B,V,A,EPL,KE,M)
F228B  4*PURPOSE:  FIND THE EIGENVALUES AND EIGENVECTORS OF A
F228B  5*      HERMITIAN MATRIX.  THE ARGUMENTS ARE IDENTICAL TO
F228B  6*      THOSE OF STEVEV(F224A), EXCEPT THAT T,B,R,V, AND A
F228B  7*      MUST BE COMPLEX.  SEE STEVEV(F224A) WRITEUP FOR
F228B  8*      DETAILS.  HTEVEV INPUT IS THE LOWER TRIANGLE.
F228B  9*      H3DVEV INPUT IS THE DIAGONAL AND SUPERDIAGONAL.
F228B 10*TIMING:  N=20, .12 SEC.
F228B 11*ROUTINE NAME:  HMEVEV
F228B 12*ENTRY NAMES:  HMEVEV, HTEVEV, H3DVEV
F228B 13*STORAGE:  1234 OCTAL WORDS
F228B 14*ROUTINES CALLED:  HMHHTR(F227B), PROHHH(F229B), COTPRO(F136B),
F228B 15*                  DOTPRO(F124B), CABS(A203B), SQRT(B408B).
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```
F229A  A*          B L BUZBEE       C-4                                  71
F229A  B*COMPUTE TRANSFORM TO TRIDIAGONALIZE HERMITIAN MATRIX
F229A  C*F4              SR6600   SCP 3.1
F229A  D*                     SW  1     LS  2     TYPE 1
F229A  E*F4 SOURCE CARDS      49  BCD    OBJECT CARDS    20   BIN
F229A  F*TRANSFORM*TRIDIAGONAL*HERMITIAN*MATRIX
F229A  G*CARDS        F4  COMPAT   WU 07/13/72REV.1 DECK 09/16/71
F229A  1*FORM:  CALL PROHHH(IN,A,T,KE,V,IV)
F229A  2*PURPOSE:  COMPUTE THE SIMILARITY TRANSFORMATION USED BY
F229A  3*      HMHHTR(F227A) AND HTHHTR(F227A) TO TRIDIAGONALIZE A
F229A  4*      HERMITIAN MATRIX.  THE ARGUMENTS ARE IDENTICAL TO
F229A  5*      THOSE OF PRODHH(F225A) EXCEPT THAT A,T,AND V
F229A  6*      MUST BE COMPLEX.  SEE PRODHH(F225A) WRITEUP FOR DETAILS.
F229A  7*ROUTINE NAME: PROHHH
F229A  8*ENTRY NAME:  PROHHH
F229A  9*STORAGE: 354 OCTAL WORDS.
F229A 10*ROUTINES CALLED: COTPRO(F136A), LABRT(N103A)
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F229B  A*          B L BUZBEE       C-4                              72
F229B  B*COMPUTE TRANSFORM TO TRIDIAGONALIZE HERMITIAN MATRIX
F229B  C*F4              SR7600   CROS
F229B  D*                     SW  1     LS  2     TYPE 1
F229B  E*F4 SOURCE CARDS     49   BCD    OBJECT CARDS    20   BIN
F229B  F*TRANSFORM*TRIDIAGONAL*HERMITIAN*MATRIX
F229B  G* ON DISK    F4  COMPAT   WU 07/13/72REV.1 DECK 04/12/72
F229B  1*FORM:  CALL PROHHH(IN,A,T,KE,V,IV)
F229B  2*PURPOSE:  COMPUTE THE SIMILARITY TRANSFORMATION USED BY
F229B  3*     HMHHTR(F227A) AND HTHHTR(F227A) TO TRIDIAGONALIZE A
F229B  4*     HERMITIAN MATRIX.  THE ARGUMENTS ARE IDENTICAL TO
F229B  5*     THOSE OF PRODHH(F225A) EXCEPT THAT A,T,AND V
F229B  6*     MUST BE COMPLEX.  SEE PRODHH(F225A) WRITEUP FOR DETAILS.
F229B  7*ROUTINE NAME:  PROHHH
F229B  8*ENTRY NAME:  PROHHH
F229B  9*STORAGE:  360 OCTAL WORDS.
F229B 10*ROUTINES CALLED:  COTPRO(F136B), LABRT(N103B)
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```
F230A  A*          B. L. BUZBEE     C-4                              71
F230A  B*COMPUTE SUBSET OF EIGENVALUES OF TRIDIAGONAL MATRIX
F230A  C*F4              SR6600   SCP 3.1
F230A  D*                     SW  4     LS  2     TYPE  1
F230A  E*F4 SOURCE CARDS     88   BCD    OBJECT CARDS    28   BIN
F230A  F**EIGENVALUES*TRIDIAGONAL*BISECTION
F230A  G*CARDS        F4  COMPAT   WU 06/29/71      DECK 06/29/71
F230A  1*FORM:  CALL BISECT (N,A,IA,E,EP,T)
F230A  2*PURPOSE:  COMPUTE SPECIFIED SUBSET OF EIGENVALUES OF A
F230A  3*    QUASI-SYMMETRIC, TRIDIAGONAL MATRIX.
F230A  4*ROUTINE NAME:  BISECT
F230A  5*ENTRY NAME:  BISECT
F230A  6*STORAGE:  547 (OCTAL) WORDS.
F230A  7*ROUTINES USED:  SQRT(B408A), OUTPTC(ON THE SYSTEM).
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```
F2AA   A*          B.L. BUZBEE      C-4
F2AA   B*REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AA   C*F4              SR6600   SCP 3.1
F2AA   D*                     SW  3     LS  1     TYPE  2
F2AA   E*F4 SOURCE CARDS     21   OBJECT CARDS     10   BIN
F2AA   F*REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AA   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AA   1*FORM:  CALL RSEVAL(N,M,A,E,T,K)
F2AA   2*PURPOSE:  COMPUTE THE SINGLE PRECISION EIGENVALUES OF A
F2AA   3*   REAL SYMMETRIC MATRIX WITH SINGLE PRECISION ELEMENTS.
F2AA   4*ROUTINE NAME:  RSEVAL
F2AA   5*ENTRY NAME:  RSEVAL
F2AA   6*TIMING:  N=40, 2 SEC.
F2AA   7*STORAGE:  94 OCTAL WORDS.
F2AA   8*USES DTRVAL(F2AJ) AND LABRT(N103A).
```

```
F2AB   A*          B. L. BUZBEE      C-4                                  72
F2AB   B*SYMMETRIC MATRIX EIGENVALUE EIGENVECTOR ROUTINE
F2AB   C*F4              SR6600   SCP 3.1
F2AB   D*                     SW  3     LS  1     TYPE  2
F2AB   E*F4 SOURCE CARDS      15   BCD   OBJECT CARDS     7   BIN
F2AB   F**REAL*SYMMETRIC MATRIX*EIGENVALUE*EIGENVECTOR ROUTINE
F2AB   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AB   1*FORM:  CALL RSEVEV(N,M,A,E,V,T,K)
F2AB   2*PURPOSE:  COMPUTE THE SINGLE PRECISION EIGENVALUES AND
F2AB   3*   EIGENVECTORS OF A REAL SYMMETRIC MATRIX.
F2AB   4*ROUTINE NAME:  RSEVEV
F2AB   5*ENTRY NAME:  RSEVEV
F2AB   6*TIMING:  N=20, 5 SEC.
F2AB   7*STORAGE:  49 OCTAL WORDS.
F2AB   8*USES:  TRSEVV(F2AH).
```

```
F2AC   A*          B.L. BUZBEE       C-4                                  72
F2AC   B*EIGENVALUES OF A HERMITIAN MATRIX
F2AC   C*F4              SR6600   SCP 3.1
F2AC   D*                     SW  2     LS  1     TYPE  2
F2AC   E*F4 SOURCE CARDS      18   BCD    OBJECT CARDS     9   BIN
F2AC   F**EIGENVALUES OF A*HERMITIAN MATRIX
F2AC   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AC   1*FORM:  CALL HEVAL(N,M,A,E,T,K)
F2AC   2*PURPOSE:  FIND THE EIGENVALUES OF A NTH ORDER HERMITIAN
F2AC   3*   MATRIX.
F2AC   4*ROUTINE NAME:  HEVAL
F2AC   5*ENTRY NAME:  HEVAL
F2AC   6*TIMING:  N=30, 5 SEC.
F2AC   7*STORAGE:  69 OCTAL WORDS.
F2AC   8*USES:  LABRT(N103A) AND THEVAL(F2AK).
```

```
F2AD   A*          B.L. BUZBEE       C-4                                  72
F2AD   B*EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX
F2AD   C*F4              SR6600   SCP 3.1
F2AD   D*                     SW  3     LS  1     TYPE  2
F2AD   E*F4 SOURCE CARDS      15   BCD    OBJECT CARDS     7   BIN
F2AD   F**EIGENVALUES AND*EIGENVECTORS OF A*HERMITIAN MATRIX
F2AD   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AD   1*FORM:  CALL HEVEV(N,M,A,E,V,T,K)
F2AD   2*PURPOSE:  FIND THE EIGENVALUES AND ASSOCIATED EIGENVECTORS
F2AD   3*   OF A HERMITIAN MATRIX.
F2AD   4*ROUTINE NAME:  HEVEV
F2AD   5*ENTRY NAME:  HEVEV
F2AD   6*TIMING:  N=20, 4 SEC.
F2AD   7*STORAGE:  57 OCTAL WORDS.
F2AD   8*USES:  THEVEV(F2AL).
```

```
F2AE   A*          B.L. BUZBEE      C-4                              72
F2AE   B*DOUBLE PRECISION REAL MATRIX EIGENVALUE ROUTINE
F2AE   C*F4           SR6600   SCP 3.1
F2AE   D*                     SW  3     LS  1     TYPE  2
F2AE   E*F4 SOURCE CARDS     26   BCD    OBJECT CARDS    12   BIN
F2AE   F**DOUBLE*PRECISION REAL*MATRIX*EIGENVALUE
F2AE   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AE   1*FORM:  CALL DREVAL(N,M,V,E,K)
F2AE   2*PURPOSE:  FIND THE DOUBLE PRECISION EIGENVALUES OF A
F2AE   3*   REAL N BY N MATRIX WITH DOUBLE PRECISION ELEMENTS.
F2AE   4*ROUTINE NAME:  DREVAL
F2AE   5*ENTRY NAME:  DREVAL
F2AE   6*TIMING:  N=8, 2 SEC.
F2AE   7*STORAGE:  106 OCTAL WORDS.
F2AE   8*USES:  F209A AND LABRT(N103A).


F2AF   A*          B. L. BUZBEE     C-4                              72
F2AF   B*DOUBLE PRECISION REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AF   C*F4           SR6600   SCP 3.1
F2AF   D*                     SW  3     LS  1     TYPE  2
F2AF   E*F4 SOURCE CARDS     19   BCD    OBJECT CARDS     8   BIN
F2AF   F**DOUBLE*PRECISION REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AF   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AF   1*FORM:  CALL DRSVAL(N,M,DA,DE,T,K)
F2AF   2*PURPOSE:  COMPUTE DOUBLE PRECISION EIGENVALUES OF A REAL
F2AF   3*   SYMMETRIC MATRIX WITH DOUBLE PRECISION ELEMENTS.
F2AF   4*ROUTINE NAME:  DRSVAL
F2AF   5*ENTRY NAME:  DRSVAL
F2AF   6*TIMING:  N=30, 6 SEC.
F2AF   7*STORAGE:  58 OCTAL WORDS.
F2AF   8*USES:  DTRVAL(F2AJ) AND LABRT(N103A).


F2AG   A*          B.L. BUZBEE      C-4                              72
F2AG   B*REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AG   C*F4           SR6600   SCP 3.1
F2AG   D*                     SW  3     LS  1     TYPE  2
F2AG   E*F4 SOURCE CARDS     20   BCD    OBJECT CARDS     9   BIN
F2AG   F**REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AG   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AG   1*FORM:  CALL TREVAL(N,TR,E,T,K)
F2AG   2*PURPOSE:  COMPUTE THE SINGLE PRECISION EIGENVALUES OF A
F2AG   3*   SINGLE PRECISION, REAL SYMMETRIC MATRIX USING ONLY THE
F2AG   4*   UPPER OR LOWER TRIANGLE OF THE MATRIX.
F2AG   5*ROUTINE NAME:  TREVAL
F2AG   6*ENTRY NAME:  TREVAL
F2AG   7*TIMING:  N=40, 2 SEC.
F2AG   8*STORAGE:  81 OCTAL WORDS.
F2AG   9*USES:  DTRVAL(F2AJ) AND LABRT(N103A).
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```
F2AH   A*          B.L. BUZBEE      C-4                                  72
F2AH   B*REAL SYMMETRIC MATRIX EIGENVALUE-EIGENVECTOR ROUTINE
F2AH   C*F4          SR6600   SCP 3.1
F2AH   D*                    SW  4     LS  9     TYPE  2
F2AH   E*F4 SOURCE CARDS     413  BCD    OBJECT CARDS   158   BIN
F2AH   F*REAL*SYMMETRIC MATRIX*EIGENVALUE*EIGENVECTOR
F2AH   G*CARDS       F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AH   1*FORM:  CALL TRSEVV(N,M,B,E,V,T,K)
F2AH   2*PURPOSE:  COMPUTE SINGLE PRECISION EIGENVALUES AND
F2AH   3*   EIGENVECTORS OF A SINGLE PRECISION REAL SYMMETRIC
F2AH   4*   MATRIX USING ONLY THE UPPER OR LOWER TRIANGLE OF THE
F2AH   5*   MATRIX.
F2AH   6*ROUTINE NAME:  TRSEVV
F2AH   7*ENTRY NAME:  TRSEVV
F2AH   8*TIMING:  N=20, 5 SEC.
F2AH   9*STORAGE:  2081 OCTAL WORDS.
F2AH  10*USES:  DSQRT(B410A) AND LABRT(N103A).
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F2AJ   A*          B.L. BUZBEE      C-4                                  72
F2AJ   B*DOUBLE PRECISION REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AJ   C*F4          SR6600   SCP 3.1
F2AJ   D*                    SW  3     LS  6     TYPE  2
F2AJ   E*F4 SOURCE CARDS     280   BCD    OBJECT CARDS    95   BIN
F2AJ   F*DOUBLE PRECISION REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AJ   G*CARDS       F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AJ   1*FORM:  CALL DTRVAL(N,DTR,DE,T,K)
F2AJ   2*PURPOSE:  COMPUTE DOUBLE PRECISION EIGENVALUES OF A DOUBLE
F2AJ   3*   PRECISION, REAL SYMMETRIC MATRIX USING ONLY THE UPPER
F2AJ   4*   OR LOWER TRIANGLE OF THE MATRIX.
F2AJ   5*ROUTINE NAME:  DTRVAL
F2AJ   6*ENTRY NAME:  DTRVAL
F2AJ   7*STORAGE:  1266 OCTAL WORDS.
F2AJ   8*SELF CONTAINED.
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F2AK   A*          B.L. BUZBEE      C-4                                72
F2AK   B*EIGENVALUES OF A HERMITIAN MATRIX
F2AK   C*F4           SR6600   SCP 3.1
F2AK   D*                    SW  3     LS  7     TYPE  2
F2AK   E*F4 SOURCE CARDS     332   BCD    OBJECT CARDS   141  BIN
F2AK   F**EIGENVALUES OF A*HERMITIAN MATRIX
F2AK   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AK   1*FORM:  CALL THEVAL(N,B,E,T,K)
F2AK   2*PURPOSE:  FIND THE EIGENVALUES OF A HERMITIAN MATRIX USING
F2AK   3*   ONLY THE UPPER OR LOWER TRIANGLE OF THE MATRIX.
F2AK   4*ROUTINE NAME:  THEVAL
F2AK   5*ENTRY NAME:  THEVAL
F2AK   6*TIMING:  N=20, 2 SEC.
F2AK   7*STORAGE:  3561 OCTAL WORDS.
F2AK   8*USES:  DSQRT(B410A) AND LABRT(N103A).
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F2AL   A*          B.L. BUZBEE      C-4                                72
F2AL   B*EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX
F2AL   C*F4           SR6600   SCP 3.1
F2AL   D*                    SW  4     LS  10    TYPE  2
F2AL   E*F4 SOURCE CARDS     498   BCD    OBJECT CARDS     231   BIN
F2AL   F**EIGENVALUES AND*EIGENVECTORS OF A HERMITIAN MATRIX
F2AL   G*CARDS        F4  COMPAT   WU 05/18/72      DECK 05/18/72
F2AL   1*FORM:  CALL THEVEV(N,M,B,E,V,T,K)
F2AL   2*PURPOSE:  FIND THE EIGENVALUES AND ASSOCIATED EIGEN-
F2AL   3*   VECTORS OF A HERMITIAN MATRIX USING ONLY THE LOWER
F2AL   4*   TRIANGLE OF THE MATRIX.
F2AL   5*ROUTINE NAME:  THEVEV
F2AL   6*ENTRY NAME:  THEVEV
F2AL   7*TIMING:  N=30, 6 SEC.
F2AL   8*STORAGE:  6033 OCTAL WORDS.
F2AL   9*USES:  LABRT(N103A) AND DSQRT(B410A).
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F4 SIMULTANEOUS LINEAR EQUATIONS AND LINEAR LEAST SQUARES

REVIEWER: B. BUZBEE, C-4

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F404A  A*          B L BUZBEE        C-4          R. M. FRANK       68
F404A  B*LINEAR SYSTEM SOLVER
F404A  C*F4              SR6600   SCP 3.1
F404A  D*                    SW  3     LS  2     TYPE  1
F404A  E*F4 SOURCE CARDS     76   BCD    OBJECT CARDS    28   BIN
F404A  F**MATRIX*EQUATION*SOLVER*DETERMINANT*EVALUATION
F404A  G*ON DISK     F4  COMPAT   WU 07/13/73REV.3 DECK 06/14/71REV 2
F404A  1*FORM:  CALL LSS(N,M,I,A,B,D,DET)
F404A  2*PURPOSE:  TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
F404A  3*ROUTINE NAME:  LSS
F404A  4*ENTRY NAME:  LSS
F404A  5*STORAGE:  522 (OCTAL) WORDS.
F404A  6*TIMING:  .025 SEC. FOR N=M=10.
F404A  7*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A).
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F404B  A*          B. L. BUZBEE        C-4       R M FRANK        72
F404B  B*LINEAR SYSTEM SOLVER
F404B  C*F4              SR7600   CROS
F404B  D*                    SW  3     LS  3     TYPE  1
F404B  E*F4 SOURCE CARDS     81   BCD    OBJECT CARDS    29   BIN
F404B  F**MATRIX*EQUATION*SOLVER*DETERMINANT*EVALUATION
F404B  G*ON DISK     F4  COMPAT   WU 07/13/73REV.1 DECK 03/17/72
F404B  1*FORM:  CALL LSS(N,M,I,A,B,D,DET)
F404B  2*PURPOSE:  TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
F404B  3*ROUTINE NAME:  LSS
F404B  4*ENTRY NAME:  LSS
F404B  5*STORAGE:  534 OCTAL WORDS
F404B  6*ROUTINES CALLED:  DOTPRO(F124B), LABRT(N103B), LIBMSG(SYSTEM)
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F405A  A*          B.L.BUZBEE        C-4          R.M.FRANK         67
F405A  B*GENERAL LINEAR SYSTEM SOLVER
F405A  C*F4              SR6600   SCP,3.1
F405A  D*                              SW  5     LS  2
F405A  E*SOURCE CARDS  80        BCD  OBJECT DECK          31   BIN
F405A  F*GENERAL*LINEAR*SYSTEM SOLVER
F405A  G*ON DISK      F4  COMPAT   WU 02/07/69 REV 5DECK 11/12/68 REV 1
F405A  1*CALL GLSS(M,N,K,L,NR,AA,IA,YA,IY,BA,IB,XA,IX) SOLVES THE
F405A  2*LINEAR SYSTEM AX=Y WHERE A IS AN M BY N MATRIX, M GREATER
F405A  3*THAN, EQUAL TO, OR LESS THAN N, AND WHERE A MAY BE SINGULAR
F405A  4*OR NONSINGULAR IF M=N.
F405A  5*TIMING, M=10, N=8, 2 SEC.
F405A  6*STORAGE=602 OCTAL WORDS
F405A  7*USES!  LABRT(N103A) DOTPRO(F124A) VECSUM(F133A)


F405B  A*          A.SOLEM, B.BUZBEE C-4        R.M.FRANK         72
F405B  B*GENERAL LINEAR SYSTEM SOLVER
F405B  C*F4              SR7600   CROS
F405B  D*                      SW 1      LS 3      TYPE 1
F405B  E*SOURCE CARDS  85        BCD  OBJECT CARDS          33   BIN
F405B  F**GENERAL*LINEAR*SYSTEM SOLVER
F405B  G*ON DISK      F4  COMPAT   WU 03/17/72      DECK 03/17/72
F405B  1*FORM!  CALL GLSS(M,N,K,L,NR,AA,IA,YA,IY,BA,IB,XA,IX)
F405B  2*PURPOSE!  SOLVE THE LINEAR SYSTEM AX=Y WHERE A IS AN M BY N
F405B  3*      MATRIX, M GREATER THAN, EQUAL TO, OR LESS THAN N, AND
F405B  4*      WHERE A MAY BE SINGULAR OR NONSINGULAR IF M=N.  SEE
F405B  5*      WRITEUP FOR GLSS (F405A) FOR FURTHER DETAILS.
F405B  6*ROUTINE NAME!  GLSS
F405B  7*ENTRY NAME!  GLSS
F405B  8*STORAGE!  617 (OCTAL) WORDS
F405B  9*ROUTINES USED!  LABRT(N103B),DOTPRO(F124B),VECSUM(F133B),
F405B 10*      LIBMSG(SYSTEM)


F406A  A*          B L BUZBEE        C-4                          67
F406A  0*DBLE PRECISION GENERAL LINEAR SYSTEM  SOLVER
F406A  B*MATHEMATICS    F4              F4            SR6600   SCP 3.1
F406A  C*                              SW  1     LS  2
F406A  D*F4 SOURCE CARDS         95BCDF4 OBJECT CARDS        46BIN
F406A  S*DBLE PRECISION GENERAL*LINEAR*SYSTEM SOLVER
F406A 10*CARDS        F4  COMPAT   WU 11/18/68REV 0 DECK 11/18/68REV 2
F406A 11*CALL DGLSS(M,N,K,L,NR,A,IA,Y,IY,B,IB,X,IX) IS THE DOUBLE
F406A 12*PRECISION VERSION OF F405A. USAGE IS IDENTICAL TO F405A
F406A 13*EXCEPT THAT ALL FLOATING POINT ARGUMENTS MUST BE DOUBLE
F406A 14*PRECISION.
F406A 15*STORAGE=570 WORDS.
F406A 16*USES LABRT(N103A) AND DSQRT(B410A).
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F407A  A*           R. M. FRANK      C-4          IVAN CHERRY      67
F407A  0*LINEAR SYMMETRIC SYSTEM SOLVER
F407A  B*MATH            F4              F4            SR6600   SCOPE
F407A  C*                              SW  3     LS  2
F407A  D*F4 SOURCE CARDS       119BCDF4 OBJECT CARDS        31BIN
F407A  S**LINEAR SYMMETRIC*SYSTEM SOLVER
F407A 10*ON DISK     F4  COMPAT   WU 11/29/67 REV  DECK 11/29/67 REV
F407A 11*CALL LSSS(N,NS,A,B,IB,IC) SOLVES THE SYMMETRIC
F407A 12*LINEAR SYSTEM AX=B, WHERE A IS SYMMETRIC AND ONLY
F407A 13*A TRIANGLE OF IT IS INPUT.
F407A 14*TIMING=.01 SEC FOR N=12.
F407A 15*STORAGE=372(DECIMAL) WORDS.
F407A 16*USES LABRT(N103A).
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F408A  A*           R. M. FRANK      C-4          IVAN CHERRY      67
F408A  0*COMRLEX LINEAR SYSTEM SOLVER
F408A  B*MATRIX THEORY  F4              F4            SR6600   SCOPE
F408A  C*                              SW  3     LS  1
F408A  D*F4 SOURCE CARDS        63BCDF4 OBJECT CARDS        30BIN
F408A  S**COMPLEX*EQUATION*SOLVER
F408A 10*ON DISK     F4  COMPAT   WU 11/02/67      DECK 11/02/67
F408A 11*PURPOSE - TO SOLVE THE MATRIX EQUATION AX=B, WHERE A AND B
F408A 12*HAVE COMPLEX ELEMENTS.
F408A 13*CALL CLSS(N,M,A,IA,B,IB)
F408A 14*  N - ORDER OF THE SYSTEM     M - NUMBER OF COLUMNS IN B
F408A 15*  A - ORIGIN OF NXN MATRIX A   B - ORIGIN OF NXM MATRIX B
F408A 16*  IA - FIRST DIMENSION OF A AS SPECIFIED IN CALLING PROGRAM.
F408A 17*  IB - FIRST DIMENSION OF B AS SPECIFIED IN CALLING PROGRAM.
F408A 18*STORAGE- 362(DECIMAL) WORDS.
F408A 19*USES LABRT(N103A).
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F408B  A*           IVAN CHERRY      C-4          B.L.BUZBEE       72
F408B  B*COMPLEX LINEAR SYSTEM SOLVER
F408B  C*F4              SR7600   CROS
F408B  D*                    SW  3     LS  2     TYPE  1
F408B  E*F4 SOURCE CARDS     68   BCD    OBJECT CARDS     34   BIN
F408B  F**COMPLEX*EQUATION*SOLVER
F408B  G*ON DISK      F4  COMPAT   WU 10/12/72       DECK 10/12/72
F408B  1*FORM:  CALL CLSS(N,M,A,IA,B,IB)
F408B  2*PURPOSE:  SOLVE THE MATRIX EQUATION AX=B, WHERE A AND B
F408B  3*       HAVE COMPLEX ELEMENTS.
F408B  4*    N - ORDER OF THE SYSTEM
F408B  5*    M - NUMBER OF COLUMNS IN B
F408B  6*    A - ORIGIN OF NXN MATRIX A
F408B  7*    B - ORIGIN OF NXM MATRIX B
F408B  8*    IA - FIRST DIMENSION OF A AS SPECIFIED IN CALLING PROGRAM.
F408B  9*    IB - FIRST DIMENSION OF B AS SPECIFIED IN CALLING PROGRAM.
F408B 10*ROUTINE NAME:  CLSS
F408B 11*ENTRY NAME:  CLSS
F408B 12*STORAGE:  632 OCTAL WORDS.
F408B 13*ROUTINES CALLED:  LABRT(N103B),LIBMSG(SYSTEM).
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F409A  A*           B. L. BUZBEE     C-4                          69
F409A  B*LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION(LU)
F409A  C*F4              SR6600   SCP 3.1
F409A  D*                    SW  4     LS  3     TYPE  1
F409A  E*SOURCE CARDS        95   BCD  OBJECT CARDS        33   BIN
F409A  F**LINEAR*SYSTEM SOLVER AND*MATRIX*FACTORIZATION
F409A  G*CARDS        F4  COMPAT  WU 09/23/70REV 2  DECK 09/23/70REV 2
F409A  1*USE:  CALL MATFAC(N, M, IT, A, IA, Y, IY, R, DET)
F409A  2*PURPOSE:  SOLVES LINEAR SYSTEM AX=Y BY MATRIX
F409A  3*FACTORIZATION.  IF IT=0, INPUT MATRIX IS FACTORED.
F409A  4* IF IT .NE. 0, ROUTINE USES INPUT FACTORS.
F409A  5* SEE WRITEUP FOR DETAILS.
F409A  6*STORAGE:  610 (OCTAL) WORDS.
F409A  7*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A).
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F409B  A*          B.L.BUZBEE       C-4                                72
F409B  B*LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION(LU)
F409B  C*F4              SR7600   CROS
F409B  D*                    SW  4     LS  3     TYPE  1
F409B  E*F4 SOURCE CARDS     95   BCD    OBJECT CARDS    33   BIN
F409B  F**LINEAR*SYSTEM SOLVER AND*MATRIX*FACTORIZATION
F409B  G*ON DISK      F4  COMPAT   WU 08/09/72       DECK 08/09/72
F409B  1*FORM:  CALL MATFAC(N,M,IT,A,IA,Y,IY,R,DET)
F409B  2*PURPOSE:  SOLVES LINEAR SYSTEM AX=Y BY MATRIX
F409B  3*  FACTORIZATION.  IF IT=0, INPUT MATRIX IS FACTORED.
F409B  4*   IF IT .NE. 0, ROUTINE USES INPUT FACTORS.
F409B  5*ROUTINE NAME:  MATFAC
F409B  6*ENTRY NAME:  MATFAC
F409B  7*STORAGE:  624 OCTAL WORDS.
F409B  8*ROUTINES CALLED:  DOTPRO(F124B), LABRT(N103B).


F410A  A*          B L BUZBEE       C-4                                68
F410A  0*ITERATIVE SOLUTION OF LINEAR SYSTEMS
F410A  B*MATRIX THEORY   F4             F4            SR6600   SCP3.1
F410A  C*                             SW  3     LS  1
F410A  D*F4 SOURCE CARDS         48BCDBINARY DECK            20BIN
F410A  S**LINEAR*SYSTEM SOLVER
F410A 10*CARDS       F4  COMPAT   WU 11/04/68       DECK 11/04/68
F410A 11*  CALL LSSIT(N, M, A, B, IA, X, Y, R, IX, T, D)
F410A 12*  SOLVES SYSTEM AX=Y USING ITERATIVE REFINEMENT WITH
F410A 13*  DOUBLE PRECISION ACCUMULATION.
F410A 14*  SEE WRITEUP FOR DETAILS.
F410A 15*  STORAGE 350 OCTAL WORDS.
F410A 16*  USES MATFAC(F409A),DOTPRO(F124A), LABRT(N103A), UNPAK(A101A).


F411A  A*          B L BUZBEE       C-4                                69
F411A  B*BAND MATRIX FACTORIZATION AND LINEAR SYSTEM SOLVER
F411A  C*F4              SR6600   SCP 3.1
F411A  D*                    SW  4     LS  3     TYPE  1
F411A  E*F4 SOURCE CARDS    105   BCD    OBJECT CARDS    34   BIN
F411A  F**MATRIX*BAND*BANMAT*SYSTEM
F411A  G*CARDS       F4  COMPAT   WU 04/06/72REV 2 DECK 12/15/70REV 1
F411A  1*FORM:  CALL BANMAT(N,L1,L2,NT,IM,A,IA,Y,IY,DE,T)
F411A  2*PURPOSE:  SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE
F411A  3*THE MATRIX HAS BAND STRUCTURE AND ONLY THE BAND IS STORED.
F411A  4*THE FIRST CALL TO THE ROUTINE FACTORS THE MATRIX INTO A
F411A  5*PRODUCT OF TRIANGULAR MATRICES, AND SUBSEQUENT CALLS USE
F411A  6*THESE FACTORS.
F411A  7*TIMING:  N=81, L1=L2=9, .118 SEC WITH NT=1, AND .032 SEC
F411A  8*WITH NT .NE. 1.
F411A  9*STORAGE:  666 (OCTAL) WORDS.
F411A 10*ROUTINES CALLED:  DOTPRO(F124A), ADDVEC(F133A)
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F4118  A*          B L BUZBEE       C-4                                72
F4118  B*BAND MATRIX FACTORIZATION AND LINEAR SYSTEM SOLVER
F4118  C*F4              SR7600   CROS
F4118  D*                    SW  4     LS  3     TYPE  1
F4118  E*F4 SOURCE CARDS     105   BCD    OBJECT CARDS    34   BIN
F4118  F**MATRIX*BAND*BANMAT*SYSTEM
F4118  G*ON DISK     F4  COMPAT   WU 03/03/72      DECK 03/03/72
F4118  1*FORM:  CALL BANMAT(N,L1,L2,NT,IM,A,IA,Y,IY,DE,T)
F4118  2*PURROSE:  SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE
F4118  3*  THE MATRIX HAS BAND STRUCTURE AND ONLY THE BAND IS STORED.
F4118  4*  THE FIRST CALL TO THE ROUTINE FACTORS THE MATRIX INTO A
F4118  5*  PRODUCT OF TRIANGULAR MATRICES, AND SUBSEQUENT CALLS USE
F4118  6*  THESE FACTORS.
F4118  7*TIMING:  N=81, L1=L2=9, .022 SEC WITH NT=1, AND .0036 SEC
F4118  8*  WITH NT .NE. 1.
F4118  9*ROUTINE NAME:  BANMAT
F4118 10*ENTRY NAME:  BANMAT
F4118 11*STORAGE:  666(OCTAL) WORDS
F4118 12*ROUTINES CALLED:  DOTPRO(F124B), ADDVEC(F133B)
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F412A  A*          B L BUZBEE       C-4                                69
F412A  B*TRIDIAGONAL LINEAR SYSTEM SOLVER
F412A  C*F4              SR6600   SCP 3.1
F412A  D*                    SW  4     LS  3     TYPE  1
F412A  E*SOURCE CARDS        135  BCD    OBJECT CARDS    30   BIN
F412A  F**TRIDIAGONAL*LINEAR*SYSTEM*MATRIX*LSS
F412A  G*CARDS       F4  COMPAT   WU 07/29/70REV.1 DECK 07/29/70REV.1
F412A  1*USE:  CALL TLSS(N,AA,IA,M,B,IB,UK,DE,NT)
F412A  2*PURPOSE: SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE
F412A  3*THE MATRIX IS TRIDIAGONAL AND ONLY THE THREE DIAGONALS ARE
F412A  4*STORED.  THE FIRST CALL TO THE ROUTINE FACTORS THE MATRIX
F412A  5*INTO A PRODUCT AND SUBSEQUENT CALLS MAY USE THESE FACTORS.
F412A  6*STORAGE:  601 (OCTAL) WORDS
F412A  7*SELF CONTAINED
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F412B  A*          B.L.BUZBEE       C-4                              72
F412B  B*TRIDIAGONAL LINEAR SYSTEM SOLVER
F412B  C*F4              SR7600   CROS
F412B  D*                    SW  4     LS  3     TYPE  1
F412B  E*F4 SOURCE CARDS     135  BCD    OBJECT CARDS    30   BIN
F412B  F**TRIDIAGONAL*LINEAR*SYSTEM*MATRIX*LSS
F412B  G*ON DISK     F4  COMPAT   WU 08/09/72      DECK 08/09/72
F412B  1*FORM:  CALL TLSS(N,AA,IA,M,B,IB,JK,DE,NT)
F412B  2*PURPOSE:  SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS
F412B  3*   WHERE THE MATRIX IS TRIDIAGONAL AND ONLY THE THREE
F412B  4*   DIAGONALS ARE STORED.  THE FIRST CALL TO THE ROUTINE
F412B  5*   FACTORS THE MATRIX INTO A PRODUCT AND SUBSEQUENT CALLS
F412B  6*   MAY USE THESE FACTORS.
F412B  7*ROUTINE NAME:  TLSS
F412B  8*ENTRY NAME:  TLSS
F412B  9*STORAGE:  605 OCTAL WORDS.
F412B 10*SELF CONTAINED.
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F413A  A*          B. L. BUZBEE       C-4                            70
F413A  B*SYMMETRIC CONSTANT TRIDIAGONAL LINEAR SYSTEM SOLVER
F413A  C*COMPASS         SR6600   SCP 3.1
F413A  D*                    SW  3     LS  3     TYPE  1
F413A  E*SOURCE CARDS        116  BCD   OBJECT CARDS      6    BIN
F413A  F**TRIDIAGONAL*MATRIX*LINEAR SYSTEM
F413A  G*CARDS         F4  COMPAT  WU 09/28/70REV 1  DECK 09/28/70REV 1
F413A  1*USE:  CALL ABTDSS(N,A,B,C,M,LC,LR,Y,T,NE)
F413A  2*PURPOSE:  SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH CONSTANT
F413A  3*DIAGONALS.
F413A  4*TIMING:  .001 SEC FOR N=100
F413A  5*STORAGE:  57 (OCTAL) WORDS
F413A  6*SELF CONTAINED
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F414A  A*          B. L. BUZBEE       C-4                            70
F414A  B*SYMMETRIC PERIODIC LINEAR SYSTEM SOLVER
F414A  C*F4              SR6600   SCP. 3.1
F414A  D*                    SW  3     LS  2     TYPE  1
F414A  E*SOURCE CARDS        87   BCD  OBJECT CARDS       34   BIN
F414A  F**SPERLSS*MATRIX*PERIODIC*LINEAR SYSTEM
F414A  G*CARDS         F4  COMPAT  WU 05/01/70       DECK 05/01/70
F414A  1*USE:  CALL SPERLSS(N,M,A,IA,B,IB,DD,NT)
F414A  2*PURPOSE:  TO SOLVE A SYMMETRIC, PERIODIC LINEAR SYSTEM
F414A  3*TIMING:  .009 SEC FOR N=100
F414A  4*STORAGE:  703 (OCTAL) WORDS
F414A  5*SELF CONTAINED
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F415A  A*          MORRIS KLEIN     C-6          B. L. BUZBEE     70
F415A  B*ECS GENERAL LINEAR SYSTEM SOLVER
F415A  C*F4              SR6600   SCP 3.1
F415A  D*                   SW  5     LS  3     TYPE  1
F415A  E*SOURCE CARDS        122 BCD     OBJECT CARDS    39  BIN
F415A  F**ECS*GENERAL*LINEAR*SYSTEM*SOLVER
F415A  G*CARDS        F4  COMPAT   WU 09/23/70      DECK 09/23/70
F415A  1*USE:  CALL ECSGLSS(IM,IN,IK,IL,NR,A,D,IR,IY,B,IB,X,JX,EPS)
F415A  2*PURPOSE:  TO SOLVE IN THE LEAST SQUARES SENSE THE GENERAL
F415A  3*LINEAR SYSTEM   CX=Y WHEN C AND Y ARE STORED COLUMN-WISE IN
F415A  4*ECS.
F415A  5*STORAGE:  717 (OCTAL) WORDS.  AT LEAST IM*IN+IM*IK WORDS
F415A  6*RESERVED IN ECS.
F415A  7*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A), SQRT(B408A),
F415A  8*VECPROD,VECSUM(F133A), ECRD,ECWR,EXIT(SYSTEM).
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F416A  A*          B L BUZBEE       C-4                          70
F416A  B*COMPLEX LINEAR SYSTEM SOLVER
F416A  C*F4              SR6600   SCP 3.1
F416A  D*                   SW  1     LS  3     TYPE  1.1
F416A  E*SOURCE CARDS        96   BCD    OBJECT CARDS    39   BIN
F416A  F**COMPLEX*LINEAR*SYSTEM*SOLVER
F416A  G*CARDS        F4  COMPAT   WU 11/03/70      DECK 11/03/70
F416A  1*USE:  CALL CATFAC(N,M,IT,A,IA,Y,IY,R,DET)
F416A  2*WHERE THE ARGUMENTS ARE IDENTICAL TO F409A EXCEPT ALL
F416A  3*FLOATING POINT ARGUMENTS A,Y,R, AND DET MUST BE COMPLEX.
F416A  4*PURPOSE:  TO SOLVE A COMPLEX LINEAR SYSTEM, AX=Y.
F416A  5*STORAGE:  733 OCTAL WORDS
F416A  6*ROUTINES CALLED:  COTPRO(F136A), LABRT(N103A).
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F416B  A*          B.L.BUZBEE       C-4                          73
F416B  B*COMPLEX LINEAR SYSTEM SOLVER
F416B  C*F4              SR7600   CROS
F416B  D*                   SW  1     LS  3     TYPE  1.1
F416B  E*F4 SOURCE CARDS     96   BCD    OBJECT CARDS    39   BIN
F416B  F**COMPLEX*LINEAR*SYSTEM*SOLVER
F416B  G*ON DISK      F4  COMPAT   WU 03/02/73      DECK 03/02/73
F416B  1*FORM:  CALL CATFAC(N,M,IT,A,IA,Y,IY,R,DET)
F416B  2*PURPOSE:  TO SOLVE A COMPLEX LINEAR SYSTEM, AX=Y.  THE
F416B  3*   ARGUMENTS ARE IDENTICAL TO F409 EXCEPT ALL FLOATING
F416B  4*   POINT ARGUMENTS A,Y,R, AND DET MUST BE COMPLEX.
F416B  5*ROUTINE NAME:  CATFAC
F416B  6*ENTRY NAME:  CATFAC
F416B  7*7600 TIMING:  .006 SEC. FOR N=10 AND IT=0
F416B  8*              .002 SEC. FOR N=10 AND IT=1
F416B  9*STORAGE:  745 OCTAL WORDS.
F416B 10*ROUTINES CALLED:  COTPRO(F136B), LABRT(ON THE SYSTEM).
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F417A  A*          B.L. BUZBEE      C-4                              70
F417A  B*SOLUTION OF COMPLEX LINEAR SYSTEMS BY ITERATIVE REFINEMENT
F417A  C*F4              SR6600   SCP 3.1
F417A  D*                     SW  1     LS  2     TYPE  1.1
F417A  E*F4 SOURCE CARDS     46   BCD    OBJECT CARDS    23   BIN
F417A  F**COMPLEX*LINEAR SYSTEMS*ITERATIVE*REFINEMENT
F417A  G*CARDS        F4  COMPAT   WU 11/04/70      DECK 11/04/70
F417A  1*USE:  CALL CLSIT(N,M,A,B,IA,X,Y,R,IX,T,D)
F417A  2*WHERE ALL ARGUMENTS ARE IDENTICAL TO F410A EXCEPT FLOATING
F417A  3*POINT ARGUMENTS A,B,X,Y,R,T, AND D MUST BE COMPLEX.
F417A  4*SEE F410A FOR FURTHER INFORMATION.
F417A  5*STORAGE:  377 OCTAL WORDS.
F417A  6*ROUTINES CALLED:  UNPAK(A101A), CABS(A203A), DOTPRO(F124A),
F417A  7*CDOTPRO,COTPRO(F136A), CATFAC(F416A); LABRT(N103A).
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F417B  A*          B.L.BUZBEE       C-4                              73
F417B  B*SOLUTION OF COMPLEX LINEAR SYSTEM BY ITERATIVE REFINEMENT
F417B  C*F4              SR7600   CROS
F417B  D*                     SW  1     LS  2     TYPE  1.1
F417B  E*F4 SOURCE CARDS     46   BCD    OBJECT CARDS    23   BIN
F417B  F**COMPLEX*LINEAR SYSTEMS*ITERATIVE*REFINEMENT
F417B  G*ON DISK      F4  COMPAT   WU 03/02/73      DECK 03/02/73
F417B  1*FORM:  CALL CLSIT(N,M,A,B,IA,X,Y,R,IX,T,D)
F417B  2*PURPOSE:  ALL ARGUMENTS ARE IDENTICAL TO LSSIT(F410B)
F417B  3*    EXCEPT FLOATING POINT ARGUMENTS A,B,X,Y,R,T, AND D MUST
F417B  4*    BE COMPLEX.
F417B  5*ROUTINE NAME:  CLSIT
F417B  6*ENTRY NAME:  CLSIT
F417B  7*7600 TIMING:  .029 SEC. FOR N=20 AND M=1.
F417B  8*STORAGE:  406 OCTAL WORDS.
F417B  9*ROUTINES CALLED:  DOTPRO(F124B),CDOTPRO,COTPRO(F136B),
F417B 10*    CATFAC(F416B), UNPAK,CABS,LABRT(ALL ON THE SYSTEM).
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F418A  A*          B L BUZBEE       C-4          B L BUZBEE       71
F418A  B*LU DECOMPOSITION OF DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418A  C*COMPASS         SR6600   SCP 3.1
F418A  D*                     SW 5      LS 3      TYPE 1
F418A  E*SOURCE CARDS         115  BCD    OBJECT CARDS    5    BIN
F418A  F**LU DECOMPOSITION*DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418A  G*CARDS        F4  COMPAT   WU 08/29/72REV 1 DECK 08/29/72REV 1
F418A  1*FORM:  CALL FACTTD(N,B,LB,EP,NE)
F418A  2*PURPOSE:  DECOMPOSE A DIAGONALLY DOMINANT TRIDIAGONAL
F418A  3*      MATRIX A INTO A PRODUCT LU.
F418A  4*ROUTINE NAME:  FACTTD
F418A  5*ENTRY NAMES:  FACTTD
F418A  6*STORAGE:  34 OCTAL WORDS
F418A  7*ROUTINES CALLED:  SELF CONTAINED
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F418B  A*          B L BUZBEE       C-4          B L BUZBEE       72
F418B  B*LU DECOMPOSITION OF DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418B  C*COMPASS        SR7600   CROS
F418B  D*                    SW 5      LS 3      TYPE 1
F418B  E*SOURCE CARDS         115  BCD    OBJECT CARDS    5    BIN
F418B  F**LU DECOMPOSITION*DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418B  G*ON DISK     F4  COMPAT   WU 08/29/72REV 1 DECK 08/29/72REV 1
F418B  1*FORM:  CALL FACTTD(N,B,LB,EP,NE)
F418B  2*PURPOSE:  DECOMPOSE A DIAGONALLY DOMINANT TRIDIAGONAL
F418B  3*     MATRIX A INTO A PRODUCT LU.
F418B  4*ROUTINE NAME:  FACTTD
F418B  5*ENTRY NAMES:  FACTTD
F418B  6*STORAGE:  34 OCTAL WORDS
F418B  7*ROUTINES CALLED:  SELF CONTAINED
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F419A  A*          B L BUZBEE       C-4          B L BUZBEE       72
F419A  B*SOLVE DIAGONALLY DOMINANT TRIDIAGONAL LINEAR SYSTEM
F419A  C*COMPASS        SR6600   SCP 3.1
F419A  D*                    SW 3      LS 4      TYPE 1
F419A  E*SOURCE CARDS         193  BCD    OBJECT CARDS    7    BIN
F419A  F**DIAGONALLY DOMINANT*TRIDIAGONAL LINEAR SYSTEM
F419A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
F419A  1*FORM:  CALL SOLTD1(N,B,LB,Y,LY,SN)
F419A  2*       CALL SOLTDM(N,B,LB,Y,LY,KY,M,SN)
F419A  3*PURPOSE:  SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY
F419A  4*     DOMINANT MATRIX, USING THE DECOMPOSITION FROM
F419A  5*     FACTTD(F418).
F419A  6*ROUTINE NAME:  SOLTDM
F419A  7*ENTRY NAMES:  SOLTDM, SOLTD1
F419A  8*STORAGE:  64 OCTAL WORDS
F419A  9*ROUTINES CALLED:  FACTTD(F418A)
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F419B  A*          B L BUZBEE        C-4          B L BUZBEE        72
F419B  B*SOLVE DIAGONALLY DOMINANT TRIDIAGONAL LINEAR SYSTEM
F419B  C*COMPASS        SR7600   CROS
F419B  D*                    SW 3      LS 4      TYPE 1
F419B  E*SOURCE CARDS        193  BCD    OBJECT CARDS    7    BIN
F419B  F**DIAGONALLY DOMINANT*TRIDIAGONAL LINEAR SYSTEM
F419B  G*ON DISK      F4  COMPAT   WU 08/29/72      DECK 08/29/72
F419B  1*FORM:  CALL SOLTD1(N,B,LB,Y,LY,SN)
F419B  2*       CALL SOLTDM(N,B,LB,Y,LY,KY,M,SN)
F419B  3*PURPOSE:  SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY
F419B  4*     DOMINANT MATRIX, USING THE DECOMPOSITION FROM
F419B  5*     FACTTD(F418).
F419B  6*ROUTINE NAME:  SOLTDM
F419B  7*ENTRY NAMES:  SOLTDM, SOLTD1
F419B  8*STORAGE:  64 OCTAL WORDS
F419B  9*TIMING:  .1 MS FOR N=100 AND M=1
F419B 10*ROUTINES CALLED:  FACTTD(F418B)
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F420A  A*          B.L.BUZBEE        C-4          B.L.BUZBEE        73
F420A  B*LU DECOMPOSITION OF PERIODIC-TRIDIAGONAL MATRIX
F420A  C*F-4            SR6600   SCP 3.1
F420A  D*                    SW 5      LS  2     TYPE 1.1
F420A  E*                SOURCE   56 CARD          OBJECT   12 CARD
F420A  F**LU DECOMPOSITION*PERIODIC TRIDIAGONAL MATRIX*MATRIX
F420A  G*CARDS       F4 COMPAT WU 04/30/73       DECK 04/30/73
F420A  1*FORM:  CALL DECPTD (N,A,B,C,EP,NE)
F420A  2*PURPOSE:  COMPUTE LU DECOMPOSITION OF A DIAGONALLY
F420A  3*       DOMINANT PERIODIC-TRIDIAGONAL MATRIX
F420A  4*ROUTINE NAME:  DECPTD
F420A  5*ENTRY NAMES:  DECPTD
F420A  6*STORAGE:  204 OCTAL WORDS
F420A  7*ROUTINES CALLED:  SELF CONTAINED
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F420B  A*          B.L.BUZBEE       C-4          B.L.BUZBEE       73
F420B  B*LU DECOMPOSITION OF PERIODIC-TRIDIAGONAL MATRIX
F420B  C*F-4            SR7600   CROS
F420B  D*                    SW 5      LS  2     TYPE 1.1
F420B  E*               SOURCE   56 CARD          OBJECT   12 CARD
F420B  F**LU DECOMPOSITION*PERIODIC TRIDIAGONAL MATRIX*MATRIX
F420B  G*DISK       F4 COMPAT WU 04/30/73       DECK 04/30/73
F420B  1*FORM:  CALL DECPTD (N,A,B,C,EP,NE)
F420B  2*PURPOSE:  COMPUTE LU DECOMPOSITION OF A DIAGONALLY
F420B  3*       DOMINANT PERIODIC-TRIDIAGONAL MATRIX
F420B  4*TIMING:  N = 25,  .11 MILLISEC.
F420B  5*         N = 50,  .21 MILLISEC.
F420B  6*ROUTINE NAME:  DECPTD
F420B  7*ENTRY NAMES:  DECPTD
F420B  8*STORAGE:  207 OCTAL WORDS
F420B  9*ROUTINES CALLED:  SELF CONTAINED
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F421A  A*          B.L.BUZBEE       C-4          B.L.BUZBEE       73
F421A  B*SOLUTION OF PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS
F421A  C*F-4            SR6600   SCP 3.1
F421A  D*                    SW  2     LS  2     TYPE 1.1
F421A  E*               SOURCE  62 CARDS          OBJECT   13 CARDS
F421A  F**PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS
F421A  G*CARDS      F4 COMPAT WU 04/30/73       DECK 04/30/73
F421A  1*FORM:  CALL SOLPTD(N,M,Y,LR,LC,XN)
F421A  2*PURPOSE:  SOLVE A PERIODIC-TRIDIAGONAL SYSTEM OF
F421A  3*       EQUATIONS.
F421A  4*ROUTINE NAME:  SOLPTD
F421A  5*ENTRY NAMES:  SOLPTD
F421A  6*STORAGE:  232 OCTAL WORDS
F421A  7*ROUTINES CALLED:  SELF CONTAINED
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F421B  A*          B.L.BUZBEE       C-4          B.L.B
F421B  B*SOLUTION OF PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS
F421B  C*F-4            SR7600   CROS
F421B  D*                    SW  2     LS  2     TYPE 1.1
F421B  E*               SOURCE  62 CARDS          OBJECT   13 CARDS
F421B  F**PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS
F421B  G*DISK       F4 COMPAT WU 04/30/73       DECK 04/30/73
F421B  1*FORM:  CALL SOLPTD(N,M,Y,LR,LC,XN)
F421B  2*PURPOSE:  SOLVE A PERIODIC-TRIDIAGONAL SYSTEM OF
F421B  3*       EQUATIONS.
F421B  4*TIMING:           N = 25, M = 2,  29 MILLISEC
F421B  5*                  N = 50, M = 2,  58 MILLISEC
F421B  6*ROUTINE NAME:  SOLPTD
F421B  7*ENTRY NAMES:  SOLPTD
F421B  8*STORAGE:  236 OCTAL WORDS
F421B  9*ROUTINES CALLED:  SELF CONTAINED
```

F5 FAST TRANSFORMS

E.G., FOURIER.

REVIEWER: R. HUNT, C-5

```
F501A  A*           B.R.HUNT          C-5                              72
F501A  B*RFFT - FAST FOURIER TRANSFORM OF REAL DATA
F501A  C*CMP             SR6600   SCP 3.1
F501A  D*                     SW  2     LS  4     TYPE  1
F501A  E*CMP SOURCE CARDS    126  BCD    OBJECT CARDS     8   BIN
F501A  F**FAST*FOURIER*TRANSFORM*REAL
F501A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
F501A  1*FORM:  CALL RFFT(A,N)
F501A  2*PURPOSE:  PERFORM THE FAST FOURIER TRANSFORM OF
F501A  3*     REAL-VALUED DATA.
F501A  4*ROUTINE NAME: RFFT
F501A  5*ENTRY NAME:  RFFT
F501A  6*STORAGE:  64 (OCTAL) WORDS
F501A  7*TIMING:  ABOUT 3.1E-6*N*LOG2(N) SECONDS FOR CDC 6600,
F501A  8*  WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME
F501A  9*  N IN THE CALL STATEMENT.
F501A 10*ROUTINES CALLED:  FFT2(F502A), SIN(B106A), COS(B106A).
```

```
F501B  A*           B.R.HUNT          C-5                              72
F501B  B*RFFT - FAST FOURIER TRANSFORM OF REAL DATA
F501B  C*CMP             SR7600   CROS
F501B  D*                     SW  2     LS  4     TYPE  1
F501B  E*CMP SOURCE CARDS    126  BCD    OBJECT CARDS     8   BIN
F501B  F**FAST*FOURIER*TRANSFORM*REAL
F501B  G*ON DISK      F4  COMPAT   WU 08/29/72      DECK 08/29/72
F501B  1*FORM:  CALL RFFT(A,N)
F501B  2*PURPOSE:  PERFORM THE FAST FOURIER TRANSFORM OF
F501B  3*  REAL-VALUED DATA.
F501B  4*ROUTINE NAME:  RFFT
F501B  5*ENTRY NAME:  RFFT
F501B  6*STORAGE:  64 OCTAL WORDS
F501B  7*TIMING:  ABOUT 5.4E-7*N*LOG2(N) SECONDS FOR CDC 7600,
F501B  8*  WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME
F501B  9*  N IN THE CALL STATEMENT.
F501B 10*ROUTINES CALLED:  FFT2(F502B), SIN(B106B), COS(B106B).
```

```
F502A  A*          B.R.HUNT          C-5                                  72
F502A  B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
F502A  C*CMP            SR6600   SCP 3.1
F502A  D*                     SW  3     LS  5     TYPE  1
F502A  E*CMP SOURCE CARDS    160  BCD    OBJECT CARDS     8   BIN
F502A  F**FAST*FOURIER*TRANSFORM*COMPLEX
F502A  G*CARDS        F4  COMPAT   WU 09/13/72      DECK 09/13/72
F502A  1*FORM:  CALL FFT2(A,B,N,INC)
F502A  2*PURPOSE:  PERFORM THE FAST FOURIER TRANSFORM OF
F502A  3*  COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
F502A  4*ROUTINE NAME:  FFT2
F502A  5*ENTRY NAME:  FFT2
F502A  6*TIMING:  ABOUT 4.7E-6*N*LOG2(N) SECONDS FOR CDC 6600.
F502A  7*  WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
F502A  8*  CALL STATEMENT.
F502A  9*STORAGE:  73 OCTAL WORDS.
F502A 10*SELF CONTAINED.
```

```
F502B  A*          B.R.HUNT          C-5                                  72
F502B  B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
F502B  C*CMP            SR7600   CROS
F502B  D*                     SW  3     LS  5     TYPE  1
F502B  E*CMP SOURCE CARDS    160  BCD    OBJECT CARDS     8   BIN
F502B  F**FAST*FOURIER*TRANSFORM*COMPLEX
F502B  G*ON DISK      F4  COMPAT   WU 09/13/72      DECK 09/13/72
F502B  1*FORM:  CALL FFT2(A,B,N,INC)
F502B  2*PURPOSE:  PERFORM THE FAST FOURIER TRANSFORM OF
F502B  3*  COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
F502B  4*ROUTINE NAME:  FFT2
F502B  5*ENTRY NAME:  FFT2
F502B  6*TIMING:  ABOUT 8.1E-7*N*LOG2(N) SECONDS FOR CDC 7600.
F502B  7*  WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
F502B  8*  CALL STATEMENT.
F502B  9*STORAGE:  73 OCTAL WORDS.
F502B 10*SELF CONTAINED.
```

```
F503A  A*          B.R.HUNT          C-5                                  72
F503A  B*RFTI - INVERSE FAST FOURIER TRANSFORM OF REAL DATA
F503A  C*CMP             SR6600   SCP 3.1
F503A  D*                     SW  2     LS  4     TYPE  1
F503A  E*CMP SOURCE CARDS    147  BCD    OBJECT CARDS     8   BIN
F503A  F**INVERSE*FAST*FOURIER*TRANSFORM*REAL
F503A  G*CARDS        F4  COMPAT   WU 09/13/72      DECK 09/13/72
F503A  1*FORM:  CALL RFTI(A,N)
F503A  2*PURPOSE:  PERFORM THE INVERSE FAST FOURIER TRANSFORM
F503A  3*  FOR REAL-VALUED DATA.
F503A  4*ROUTINE NAME:  RFTI
F503A  5*ENTRY NAME:  RFTI
F503A  6*TIMING:  ABOUT 2.9E-6*N*LOG2(N) SECONDS FOR CDC 6600, WHERE
F503A  7*  N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE CALL
F503A  8*  STATEMENT.
F503A  9*STORAGE:  74 OCTAL WORDS
F503A 10*EXTERNALS:  FFT2(F502A), SIN(B106B), COS(B106B).
```

```
F503B  A*          B.R.HUNT          C-5                                  72
F503B  B*RFTI - INVERSE FAST FOURIER TRANSFORM OF REAL DATA
F503B  C*CMP             SR7600   CROS
F503B  D*                     SW  2     LS  5     TYPE  1
F503B  E*CMP SOURCE CARDS    147  BCD    OBJECT CARDS     8   BIN
F503B  F**INVERSE*FAST*FOURIER*TRANSFORM*REAL
F503B  G*ON DISK      F4  COMPAT   WU 09/13/72      DECK 09/13/72
F503B  1*FORM:  CALL RFTI(A,N)
F503B  2*PURPOSE:  PERFORM THE INVERSE FAST FOURIER TRANSFORM
F503B  3*  FOR REAL-VALUED DATA.
F503B  4*ROUTINE NAME:  RFTI
F503B  5*ENTRY NAME:  RFTI
F503B  6*TIMING:  ABOUT 5.4E-7*N*LOG2(N) SECONDS FOR CDC 7600, WHERE
F503B  7*  N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE CALL
F503B  8*  STATEMENT.
F503B  9*STORAGE:  74 OCTAL WORDS
F503B 10*EXTERNALS:  FFT2(F502B), SIN(B106B), COS(B106B).
```

```
F5AA   A*           B. HUNT          C-5                                72
F5AA   B*FFT FAST FOURIER TRANSFORM FOR COMPLEX 3 DIMENSIONAL DATA.
F5AA   C*F4             SR6600   SCP 3.1
F5AA   D*                     SW  4     LS  7     TYPE  2
F5AA   E*F4 SOURCE CARDS     319  BCD    OBJECT CARDS    60   BIN
F5AA   F**FAST*FOURIER*TRANSFORM*COMPLEX*3 DIMENEIONAL
F5AA   G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
F5AA   1*FORM:  CALL FFT(A,M,INV,S,IFSET,IFERR)
F5AA   2*PURPOSE:  COMPUTE THE FOURIER TRANSFORM OF COMPLEX
F5AA   3*      THREE-DIMENSIONAL DATA.
F5AA   4*NOTE:  C DIVISION RECOMMENDS THE USE OF FFT2(F502A)
F5AA   5*      IN PLACE OF THIS ROUTINE.
F5AA   6*ROUTINE NAME:  FFT
F5AA   7*ENTRY NAME:  FFT
F5AA   8*TIMING:  APPROXIMATELY 2.3*10**-5*N*LOG2(N) SECONDS, WHERE
F5AA   9*      N REPRESENTS THE TOTAL NUMBER OF COMPLEX ELEMENTS IN A.
F5AA  10*STORAGE:  1541 OCTAL WORDS
F5AA  11*ROUTINES USED:  SQRT(B408A), SIN(B106A), COS(B106A).
```

```
F5AB   A*           B.R.HUNT         C-5                                72
F5AB   B*RFSN FAST INVERSE FOURIER TRANSFORM
F5AB   C*F4             SR6600   SCP 3.1
F5AB   D*                     SW  3     LS  2     TYPE  2
F5AB   E*F4 SOURCE CARDS      65  BCD    OBJECT CARDS    18   BIN
F5AB   F**FAST*INVERSE*FOURIER*TRANSFORM
F5AB   G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
F5AB   1*FORM:  CALL RFSN(A,M,INV,S,IFERR)
F5AB   2*PURPOSE:  COMPUTE THE REAL INVERSE FOURIER TRANSFORM
F5AB   3*NOTE:  C DIVISION RECOMMENDS USE OF RFTI(F503A)
F5AB   4*      IN PLACE OF THIS ROUTINE.
F5AB   5*ROUTINE NAME:  RFSN
F5AB   6*ENTRY NAME:  RFSN
F5AB   7*STORAGE:  347 OCTAL WORDS
F5AB   8*TIMING:  1.2*10-5N*LOG2(N) SECONDS.
F5AB   9*ROUTINES CALLED:  FFT(F5AA), SIN(B106A), COS(B106A).
```

G STATISTICAL ANALYSIS AND PROBABILITY

G1 DESCRIPTIVE STATISTICS

REVIEWER: R. LOHRDING, C-5

```
G101A  A*           B HUNT            C-5                                  68
G101A  B*MODERN POWER SPECTRAL ESTIMATION
G101A  C*F4              SR6600   SCP 3.1
G101A  D*                                SW  4     LS  5      TYPE 1
G101A  E*SOURCE CARDS         200  BCD    OBJECT CARDS    52   BIN
G101A  F**MODERN*POWER*SPECTRAL*ESTIMATION
G101A 1G*CARDS        F4  COMPAT   WU 07/13/72REV.1 DECK 08/12/68
G101A  1*FORM:  CALL SPAL(T,N,P,DUM,NA,IDT,SR,FF)
G101A  2*PURPOSE:  PROVIDE POWER SPECTRAL ESTIMATES FOR A
G101A  3*     ONE-DIMENTIONAL STATIONARY TIME SERIES.
G101A  4*TIMING:  1.8*10**-5*N*LOG2(N)SECONDS.
G101A  5*ROUTINE NAME:  SPAL
G101A  6*ENTRY NAME:  SPAL
G101A  7*STORAGE: 672 DECIMAL LOCATIONS
G101A  8*ROUTINES CALLED:  FFT(F5AA),RFFT(F501A),SIN(B106A),
G101A  9*     COS(B106A),ALOG(B305A),SQRT(B408A).
```

G4 DISTRIBUTION FUNCTIONS AND THEIR INVERSE

REVIEWER: R. LOHRDING, C-5

```
G403A  A*           LARA BAKER        ENG-DO       KEN LYONS          69
G403A  B*FISHE EVALUATION OF FISHER*S F VALUE.
G403A  C*FORTRAN IV       SR6600   SCP 3.1
G403A  D*                    SW  2     LS  1     TYPE  1
G403A  E*SOURCE CARDS         51   BCD    OBJECT CARDS      13  BIN
G403A  F**STATISTICS*FISHER*FTEST
G403A  G*CARDS        F4  COMPAT   WU 08/01/69       DECK 08/01/69
G403A  1*USAGE:  P=FISHE (NUMDEG,IDENDG,FVAL)
G403A  2*PURPOSE:  TO CALCULATE THE PROBABILITY LEVEL OF A FISHER*S
G403A  3*F VALUE GIVEN THE NUMERATOR AND DENOMINATOR DEGREES OF
G403A  4*FREEDOM.
G403A  5*STORAGE:  230 (OCTAL) WORDS
G403A  6*SELF CONTAINED.
```

G6 TIME SERIES ANALYSIS AND PROCESSING

REVIEWER: R. HUNT, C-5

```
G601A  A*           B.R.HUNT          C-5          B.R.HUNT          72
G601A  B*SPECTRAL ANALYSIS OF TIME SERIES
G601A  C*F4              SR6600   SCP 3.1
G601A  D*                    SW 4      LS 2      TYPE 1
G601A  E*SOURCE CARDS         44   BCD    OBJECT CARDS    27   BIN
G601A  F**SPECTRAL ANALYSIS*TIME SERIES
G601A  G*CARDS        F4  COMPAT   WU 10/04/72       DECK 10/04/72
G601A  1*FORM:  CALL SPCTRL(X,ACX,PSX,T,NX,NM,NF,DELTA,TITLE,
G601A  2*                   IA,IWIN,IDF,IP)
G601A  3*PURROSE:  COMPUTE THE AUTOCOVARIANCE FUNCTION AND POWER
G601A  4*      SPECTRUM OF A TIME SERIES.
G601A  5*ROUTINE NAME:  SPCTRL
G601A  6*ENTRY NAME:  SPCTRL
G601A  7*STORAGE:  471 (OCTAL) WORDS PLUS NX+NM+NF+MAX(NM,NF) WORDS
G601A  8*      RESERVED IN THE CALLING PROGRAM FOR ARRAYS
G601A  9*      X,ACX,PSX,AND T.
G601A 10*ROUTINES CALLED:  ACFCN(G602A), WINDOW(G603A),
G601A 11*      PWRSPCT(G604A), PLOJB(J562A).
```

```
G601B  A*           B.R.HUNT          C-5          B.R.HUNT          72
G601B  B*SPECTRAL ANALYSIS OF TIME SERIES
G601B  C*F4              SR7600   CROS
G601B  D*                    SW 4      LS 2      TYPE 1
G601B  E*SOURCE CARDS         44   BCD    OBJECT CARDS    27   BIN
G601B  F**SPECTRAL ANALYSIS*TIME SERIES
G601B  G*ON DISK      F4  COMPAT   WU 10/04/72       DECK 10/04/72
G601B  1*FORM:  CALL SPCTRL(X,ACX,PSX,T,NX,NM,NF,DELTA,TITLE,
G601B  2*                   IA,IWIN,IDF,IP)
G601B  3*PURPOSE:  COMPUTE THE AUTOCOVARIANCE FUNCTION AND POWER
G601B  4*      SPECTRUM OF A TIME SERIES.
G601B  5*ROUTINE NAME:  SPCTRL
G601B  6*ENTRY NAME:  SPCTRL
G601B  7*STORAGE:  501 (OCTAL) WORDS PLUS NX+NM+NF+MAX(NM,NF) WORDS
G601B  8*      RESERVED IN THE CALLING PROGRAM FOR ARRAYS
G601B  9*      X,ACX,PSX,AND T.
G601B 10*ROUTINES CALLED:  ACFCN(G602B), WINDOW(G603B),
G601B 11*      PWRSPCT(G604B), PLOJB(J562B).
```

```
G602A  A*           B.R.HUNT          C-5          B.R.HUNT          72
G602A  B*AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602A  C*F4              SR6600   SCP 3.1
G602A  D*                     SW 3      LS 1      TYPE 1
G602A  E*SOURCE CARDS         32   BCD    OBJECT CARDS    12   BIN
G602A  F**AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602A  G*CARDS       F4  COMPAT    WU 10/04/72      DECK 10/04/72
G602A  1*FORM:  CALL ACFCN(X,ACX,N,M,IOPT,XM,XVAR)
G602A  2*PURPOSE:  COMPUTE THE AUTOCOVARIANCE FUNCTION OF A
G602A  3*      TIME SERIES.
G602A  4*ROUTINE NAME:  ACFCN
G602A  5*ENTRY NAME:  ACFCN
G602A  6*STORAGE:  202 (OCTAL) WORDS PLUS N*M WORDS RESERVED
G602A  7*      IN THE CALLING PROGRAM FOR ARRAYS X AND ACX.
G602A  8*ROUTINES CALLED:  SELF CONTAINED.
```

```
G602B  A*           B.R.HUNT          C-5          B.R.HUNT          72
G602B  B*AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602B  C*F4              SR7600   CROS
G602B  D*                     SW 3      LS 1      TYPE 1
G602B  E*SOURCE CARDS         32   BCD    OBJECT CARDS    12   BIN
G602B  F**AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602B  G*ON DISK     F4  COMPAT    WU 10/04/72      DECK 10/04/72
G602B  1*FORM:  CALL ACFCN(X,ACX,N,M,IOPT,XM,XVAR)
G602B  2*PURPOSE:  COMPUTE THE AUTOCOVARIANCE FUNCTION OF A
G602B  3*      TIME SERIES.
G602B  4*ROUTINE NAME:  ACFCN
G602B  5*ENTRY NAME:  ACFCN
G602B  6*STORAGE:  206 (OCTAL) WORDS PLUS N*M WORDS RESERVED
G602B  7*      IN THE CALLING PROGRAM FOR ARRAYS X AND ACX.
G602B  8*ROUTINES CALLED:  SELF CONTAINED.
```

```
G603A  A*           B.R.HUNT          C-5          B.R.HUNT          72
G603A  B*LAG-WINDOW GENERATOR
G603A  C*F4              SR6600   SCP 3.1
G603A  D*F4                   SW 2      LS 2      TYPE 1
G603A  E*SOURCE CARDS         39   BCD    OBJECT CARDS    18   BIN
G603A  F**LAG-WINDOW GENERATOR
G603A  G*CARDS       F4  COMPAT    WU 10/04/72      DECK 10/04/72
G603A  1*FORM:  CALL WINDOW(ACX,N,IOPT,M,IDF)
G603A  2*PURPOSE:  MODIFY A RAW AUTOCOVARIANCE/AUTOCORRELATION
G603A  3*      FUNCTION BY MULTIPLYING IT BY A SPECIFIED
G603A  4*      LAG-WINDOW.
G603A  5*ROUTINE NAME:  WINDOW
G603A  6*ENTRY NAME:  WINDOW
G603A  7*STORAGE:  317 (OCTAL) WORDS PLUS M WORDS RESERVED IN THE
G603A  8*      CALLING PROGRAM FOR ARRAY ACX.
G603A  9*ROUTINES CALLED:  COS(B106A)
```

```
G603B  A*           B.R.HUNT          C-5          B.R.HUNT          72
G603B  B*LAG-WINDOW GENERATOR
G603B  C*F4              SR7600   CROS
G603B  D*F4                   SW 2      LS 2      TYPE 1
G603B  E*SOURCE CARDS         39   BCD    OBJECT CARDS    18   BIN
G603B  F**LAG-WINDOW GENERATOR
G603B  G*ON DISK      F4  COMPAT   WU 10/04/72      DECK 10/04/72
G603B  1*FORM:  CALL WINDOW(ACX,N,IOPT,M,IUF)
G603B  2*PURPOSE:  MODIFY A RAW AUTOCOVARIANCE/AUTOCORRELATION
G603B  3*      FUNCTION BY MULTIPLYING IT BY A SPECIFIED
G603B  4*      LAG-WINDOW.
G603B  5*ROUTINE NAME:  WINDOW
G603B  6*ENTRY NAME:  WINDOW
G603B  7*STORAGE:  323 (OCTAL) WORDS PLUS M WORDS RESERVED IN THE
G603B  8*      CALLING PROGRAM FOR ARRAY ACX.
G603B  9*ROUTINES CALLED:  COS(B106B)
```

```
G604A  A*           B.R.HUNT          C-5          B.R.HUNT          72
G604A  B*POWER SPECTRUM COMPUTATION
G604A  C*F4              SR6600   SCP 3.1
G604A  D*                     SW 2      LS 1      TYPE 1
G604A  E*SOURCE CARDS         10   BCD    OBJECT CARDS    7    BIN
G604A  F**POWER*POWER SPECTRUM COMPUTATION
G604A  G*CARDS         F4  COMPAT   WU 10/04/72      DECK 10/04/72
G604A  1*FORM:  CALL PWRSPCT(ACX,M,PSX,NF,DELTA)
G604A  2*PURPOSE:  COMPUTE THE POWER SPECTRUM OF A TIME SERIES
G604A  3*      FROM AN AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G604A  4*      OF THE SERIES.
G604A  5*ROUTINE NAME:  PWRSPCT
G604A  6*ENTRY NAME:  PWRSPCT
G604A  7*STORAGE:  73 (OCTAL) WORDS PLUS M*NF WORDS RESERVED
G604A  8*      IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.
G604A  9*ROUTINES CALLED:  COS(B106A)
```

```
G6048  A*          B.R.HUNT          C-5          B.R.HUNT          72
G6048  B*POWER SPECTRUM COMPUTATION
G6048  C*F4              SR7600   CROS
G6048  D*                     SW 2      LS 1      TYPE 1
G6048  E*SOURCE CARDS         10   BCD    OBJECT CARDS    7    BIN
G6048  F**POWER*POWER SPECTRUM COMPUTATION
G6048  G*ON DISK      F4  COMPAT   WU 10/04/72      DECK 10/04/72
G6048  1*FORM:  CALL PWRSPCT(ACX,M,PSX,NF,DELTA)
G6048  2*PURPOSE:  COMPUTE THE POWER SPECTRUM OF A TIME SERIES
G6048  3*      FROM AN AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G6048  4*      OF THE SERIES.
G6048  5*ROUTINE NAME:  PWRSPCT
G6048  6*ENTRY NAME:  PWRSPCT
G6048  7*STORAGE:  76 (OCTAL) WORDS PLUS M*NF WORDS RESERVED
G6048  8*      IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.
G6048  9*ROUTINES CALLED:  COS(B106B)
```

```
G6AA   A*          E. K. HODSON      J-14                          71
G6AA   B*AIDS - AUTO NUMERICAL FILTERING WITH CONVERGENCE TESTS
G6AA   C*F4              SR6600   SCP 3.1
G6AA   D*                     SW 51     LS 9      TYPE 2
G6AA   E*F4 SOURCE CARDS      448  BCD    OBJECT CARDS    99   BIN
G6AA   F**AIDS*AUTO-NUMERICAL*FILTERING
G6AA   G*CARDS        F4  COMPAT   WU 10/04/71      DECK 10/04/71
G6AA   1*FORM:  CALL AIDS(Y,YS,N,FRE,FRAT,NPAS,IHSF,R1,R2,DT,IPRI)
G6AA   2*PURPOSE:  SMOOTH RANDOM NOISE OUT OF SET OF POINTS.
G6AA   3*ROUTINE NAME:  AIDS
G6AA   4*ENTRY NAME:  AIDS
G6AA   5*STORAGE:  2631 OCTAL WORDS
G6AA   6*ROUTINES CALLED:  SQRT(B408A),ALOG(B305A),EXP(B306A)
```

G8 RANDOM VARIABLE GENERATORS

REVIEWER: R. LOHRDING, C-5

```
G801A  A*           R.M.FRANK          C-4          R.LOHRDING        72
G801A  B*RANDOM NUMBER GENERATOR
G801A  C*CMP             SR6600   SCP 3.1
G801A  D*                     SW  2     LS  1     TYPE  1
G801A  E*CMP SOURCE CARDS    41   BCD    OBJECT CARDS     5   BIN
G801A  F**RANDOM*NUMBER*GENERATOR
G801A  G*ON DISK      F4  COMPAT   WU 08/29/72       DECK 08/29/72
G801A  1*FORM:  Y = RANDOM(DUMMY)
G801A  2*       CALL RANDST(R)
G801A  3*       CALL RANDSV(R)
G801A  4*       CALL RANVECT(X,N)
G801A  5*PURPOSE:  GENERATES A RANDOM SEQUENCE OF FLOATING POINT
G801A  6*   NUMBERS ON THE OPEN INTERVAL (0,1).  RANDOM PRODUCES
G801A  7*   A SINGLE RANDOM NUMBER.  RANVECT RETURNS N RANDOM
G801A  8*   NUMBERS INTO X ARRAY.  PROVISION IS MADE FOR SAVING THE
G801A  9*   GENERATING NUMBER AND FOR RESTARTING.
G801A 10*ROUTINE NAME:  RANDOM
G801A 11*ENTRY NAMES:  RANDOM,RANDST,RANDSV,RANVECT
G801A 12*STORAGE:  23 OCTAL WORDS
G801A 13*SELF CONTAINED.
```

```
G801B  A*           R.M.FRANK          C-4          R.LOHRDING        73
G801B  B*RANDOM NUMBER GENERATOR
G801B  C*CMP             SR7600   CROS
G801B  D*                     SW  2     LS  3     TYPE  1.1
G801B  E*CMP SOURCE CARDS    77   BCD    OBJECT CARDS    6    BIN
G801B  F**RANDOM*NUMBER*GENERATOR
G801B  G*ON DISK      F4  COMPAT   WU 04/12/73       DECK 04/12/73
G801B  1*FORM:  Y = RANDOM(DUMMY)
G801B  2*       CALL RANDST(R)
G801B  3*       CALL RANDSV(R)
G801B  4*       CALL RANVECT(X,N)
G801B  5*PURPOSE:  GENERATES A RANDOM SEQUENCE OF FLOATING POINT
G801B  6*   NUMBERS ON THE OPEN INTERVAL (0,1).  RANDOM PRODUCES
G801B  7*   A SINGLE RANDOM NUMBER.  RANVECT RETURNS N RANDOM
G801B  8*   NUMBERS INTO X ARRAY.  PROVISION IS MADE FOR SAVING THE
G801B  9*   GENERATING NUMBER AND FOR RESTARTING.
G801B 10*ROUTINE NAME:  RANDOM
G801B 11*ENTRY NAMES:  RANDOM,RANDST,RANDSV,RANVECT
G801B 12*STORAGE:  44 OCTAL WORDS
G801B 13*ROUTINES CALLED:  LIBMSG(SYSTEM).
```

```
G802A  A*          B.L.BUZBEE        C-4          R.LOHRDING        72
G802A  B*RANDOM NUMBER GENERATOR
G802A  C*CMP             SR6600   SCP 3.1
G802A  D*                     SW  1     LS  3     TYPE  1
G802A  E*CMP SOURCE CARDS    65   BCD    OBJECT CARDS     4   BIN
G802A  F**RANDOM*NUMBER
G802A  G*ON DISK      F4  COMPAT   WU 08/29/72      DECK 08/29/72
G802A  1*FORM:  Y = RANF(X)
G802A  2*PURPOSE:  GENERATES A SEQUENCE OF RANDOM NUMBERS.
G802A  3*    IF X.EQ.0. THE NEXT NUMBER IN THE SEQUENCE IS RETURNED.
G802A  4*    IF X.LT.0. THE LAST PREVIOUSLY GENERATED RANDOM
G802A  5*    NUMBER (OR THE SEED IF NO RANDOM NUMBER HAS BEEN
G802A  6*    GENERATED) IS RETURNED.
G802A  7*    IF X.GT.0. X IS STORED (WITH EXPONENT 1717 (OCTAL))
G802A  8*    TO BE USED AS THE SEED OF A NEW SEQUENCE.  NOTE X.GT.0
G802A  9*    OPTION DIFFERS FROM THAT IN APPENDIX C OF FORTRAN REF.
G802A 10*    MANUAL.
G802A 11*ROUTINE NAME:  RANF
G802A 12*ENTRY NAME:  RANF
G802A 13*STORAGE:  14 OCTAL WORDS.
G802A 14*SELF CONTAINED.
```

```
G803A  A*          B.L.BUZBEE        C-4          R.LOHRDING        72
G803A  B*GENERATE M-ELEMENT SUBSETS OF N POSITIVE INTEGERS
G803A  C*F4              SR6600   SCP 3.1
G803A  D*                     SW  2     LS  2     TYPE  1
G803A  E*F4 SOURCE CARDS    32   BCD    OBJECT CARDS    13   BIN
G803A  F**SUBSETS
G803A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
G803A  1*FORM:  CALL MESSNI(N,M,NOM,LX,LD)
G803A  2*PURPOSE:  GENERATE M-ELEMENT SUBSETS OF N POSITIVE
G803A  3*    INTEGERS.
G803A  4*ROUTINE NAME:  MESSNI
G803A  5*ENTRY NAME:  MESSNI
G803A  6*STORAGE:  220 OCTAL WORDS
G803A  7*SELF CONTAINED.
```

H OPERATIONS RESEARCH TECHNIQUES, SIMULATION AND MANAGEMENT SCIENCE

H3 CRITICAL PATH PROGRAMS

REVIEWER: J. NEERGAARD, C-7

(THIS CATEGORY WILL NOT BE USED FOR FUTURE PROGRAMS)

```
H3AA  A*           R. A. WILEY      C-4          SYSTONETICS, INC.72
H3AA  B*EZPERT - PERT NETWORK PLOTTING PACKAGE
H3AA  C*F4     CMP     MP6600   SCP 3.1
H3AA  D*                      SW 15     LS  0      TYPE 2
H3AA  E*SOURCE CARDS          0            OBJECT CARDS 0
H3AA  F**EZPERT*PERT*NETWORK*PLOTTING PACKAGE
H3AA  G*ON TAPE                      WU 04/04/72
H3AA  1*FORM:  MAIN PROGRAM
H3AA  2*PURPOSE:  PLOT PERT NETWORKS
H3AA  3*STORAGE 112000 (OCTAL) WORDS
H3AA  4*TIMING:  NORMALLY UNDER 2 MINUTES, DEPENDS ON NETWORK SIZE
H3AA  5*      AND NUMBER OF PLOTS REQUESTED.
H3AA  6*ROUTINE NAME:  EZPERT
H3AA  7*ROUTINES CALLED:  SELF CONTAINED
```

I INPUT/OUTPUT WITH CONVERSION OR INTERPRETATION

I4 FREE FORM AND NAMELIST I/O

REVIEWER: J. MOORE, C-2

```
I401A  A*          J.D. KERSHNER    T-6          WALKER          67
I401A  B*LOAD FORTRAN IV    FORMAT FREE INPUT
I401A  C*FIV                   SR6600   SCP 3.1
I401A  D*                   SW  5     LS  3     TYPE  1
I401A  E*F4 SOURCE CARDS     172   BCD    OBJECT CARDS    61   BIN
I401A  F**LOAD*INPUT
I401A  G*CARDS        F4  COMPAT   WU 04/08/70REV 1 DECK 04/08/70REV j
I401A  1*CALL LOAD(LIST,N,ERROR) WHERE LIST IS ORIGIN OF TABLE OF
I401A  2*ABSOLUTE LOCATIONS,N IS THE NUMBER OF LOCATIONS,ERROR
I401A  3*IS A LOGICAL VARIABLE .TRUE. INDICATES AN ERROR DURING
I401A  4*INPUT .FALSE. INDICATES A VALID LOAD.
I401A  5*PROVIDES 6600 FORTRAN IV WITH DATA INPUT UNRESTRICTED
I401A  6*BY FORMAT CONTROL. LOADS REAL,INTEGER,HOLLRITH AND
I401A  7*LOGICAL CONSTANTS PROVIDES INPUT ARITHMETIC,ARRAY LOADING,
I401A  8*AND ERROR COMMENTS.
I401A  9*STORAGE-834 WORDS.
I401A 10*USES SHIFT(M401A),LOCF,MINO,AND MOD.
```

J INPUT/OUTPUT WITH CONVERSION OR INTERPRETATION

J1

REVIEWER: R.M. FRANK, C-4

```
J1AA  A*          P. SEEGER        P-11                              71
J1AA  B*BASIC ZETA PLOTTER PACKAGE
J1AA  C*F4              SR6600   SCP 3.1  ZETA PLOTTER
J1AA  D*                      SW  5     LS  4     TYPE 2
J1AA  E*SOURCE CARDS         133  BCD    PERMFILE W8ZETA  117 BIN
J1AA  F**CONVERSION OF*4020 PACKAGE TO*ZETA*PLOTTER
J1AA  G*CARDS  F4  COMPAT         WU 02/10/73REV 1 DECK 02/10/73REV 1
J1AA  1*FORM: CALL ADV,COLOR,CONVRT,DGA,DLCH,DLCV,DLGLG,DLGLN,DLNLG,
J1AA  2* DLNLN,DRV,EMPTY,EXH,EXL,EXPIM,FRAME,GXA,GYA,LINCNT,NORIM,
J1AA  3* PLOT,PLT,SBLIN,SBLOG,SETPLT,SLLIN,SLLOG,SRLIN,SRLOG,STB,
J1AA  4* STLIN,STLOG,SWEEP,TCP,TCR,TSP,TSPV,WLCH,WLCV,ZETABAS.
J1AA  5*PURPOSE: A VERSION OF BASIC, GENERAL, AND LARGE-CHARACTER
J1AA  6* PLOT ROUTINES (SEE J506A) WHICH CALLS ZETA PLOTTER ROUTINES
J1AA  7* INSTEAD OF GENERATING 4020 COMMANDS.  INCLUSION WITH ANY
J1AA  8* FILM-PLOT PRODUCING PROGRAM CAUSES ZETA PLOTTER OUTPUT WITH
J1AA  9* NO CHANGES IN PROGRAM.  SEE WRITEUP FOR RESTRICTIONS.
J1AA 10*STORAGE: 2563 (OCTAL) WORDS. (10611 WITH W8ZETA.)
J1AA 11*EXTERNALS: CALLOG,CJE07,ZETAF(COMMON),ENDFIL,JOBNAME,OUTPTC
J1AA 12* (SYSTEM),AXIS,LINE,BLKDATA,BPLOT,OUTBUF,PLTZ,SYMBOL,ZPLOTS,
J1AA 13* ZWHERE(PERMFILE W8ZETA, OR PERMFILE ZETABIN)
```

J4 FORMATTED I/O

J4 REVIEWER: J. MOORE, C-2

```
J401A  A*           BARBARA BACON    C-2          J MOORE          72
J401A  B*CHANGE FORTRAN P SCALE FACTORS ON OUTPUT FORMATS
J401A  C*CMP             SR6600   SCP 3.1
J401A  D*                    SW  2     LS  0     TYPE  1
J401A  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
J401A  F**CHANGE FORTRAN*P SCALE FACTORS ON*OUTPUT FORMATS
J401A  G*ON DISK      F4  COMPAT   WU 07/03/72      DECK    NONE
J401A  1*FORM:  CALL PSCALE(I)
J401A  2*PURPOSE:  IF I.NE.0, INCREASE P SCALE FACTOR ON E AND D
J401A  3*   FORMATS BY ONE.  IF I.EQ.0, PRINT E AND D FORMATS AS IS.
J401A  4*ROUTINE NAME:  PSCALE
J401A  5*ENTRY NAMES:  PSCALE, PFACTOR
J401A  6*STORAGE:  5 OCTAL WORDS
J401A  7*SELF CONTAINED.
```

```
J401B  A*           BARBARA BACON    C-2          J MOORE          72
J401B  B*CHANGE FORTRAN P SCALE FACTORS ON OUTPUT FORMATS
J401B  C*CMP             SR7600   CROS
J401B  D*                    SW  1     LS  0     TYPE  1
J401B  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
J401B  F**CHANGE FORTRAN*P SCALE FACTORS ON*OUTPUT FORMATS
J401B  G*ON DISK      F4  COMPAT   WU 07/03/72      DECK    NONE
J401B  1*FORM:  CALL PSCALE(I)
J401B  2*PURPOSE:  IF I.NE.0, INCREASE P SCALE FACTOR ON E AND D
J401B  3*   FORMATS BY ONE.  IF I.EQ.0, PRINT E AND D FORMATS AS IS.
J401B  4*ROUTINE NAME:  PSCALE
J401B  5*ENTRY NAMES:  PSCALE, PFACTOR
J401B  6*STORAGE:  5 OCTAL WORDS
J401B  7*SELF CONTAINED.
```

J5 GRAPHICS

REVIEWER: R. FRANK, C-4

```
J506A  A*          GENE WILLBANKS   C-2          R. M. FRANK     67
J506A  B*ADVANCE FILM
J506A  C*COMPASS        SR6600   SCP 3.1
J506A  D*                    SW  19    LS  1     TYPE  1
J506A  E*SOURCE CARDS        40   BCD  OBJECT CARDS       5    BIN
J506A  F**FILM*ADV*LINCNT*EMPTY*SETPLT*SC4020*PLOT*CDC 284
J506A  G*ON DISK     F4  COMPAT  WU 02/16/70 REV 6 DECK 06/26/69 REV 3
J506A  1*CALL NAME: ADV,EMPTY,LINCNT,SETPLT
J506A  2*PURPOSE: TO MANIPULATE FILM ON THE CDC 284 AND THE SC 4020
J506A  3*STORAGE:  26 OCTAL
J506A  4*ROUTINES CALLED:  BS4020
```

```
J506B  A*          JERRY MELENDEZ   C-4          E WILLBANKS     71
J506B  B*ADVANCE FRAME, SET LINECOUNT, SET PLOT, EMPTY FILM BUFFER
J506B  C*CMP            SR7600   CROS
J506B  D*                    SW  5     LS  0     TYPE 1
J506B  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
J506B  F**ADVANCE*FRAME*SET*PLOT*SET*LINECOUNT*EMPTY*FILM*BUFFER
J506B  G*ON DISK     F4  COMPAT   WU 08/04/71      DECK     NONE
J506B  1*FORM:  CALL ADV(N)
J506B  2*       CALL LINCNT(N)
J506B  3*       CALL GLINCNT(N,NAME)
J506B  4*       CALL SLINCNT(N,NAME)
J506B  5*       CALL SETPLT(NAME)
J506B  6*       CALL EMPTY
J506B  7*PURPOSE:  UTILITY FILM SUBROUTINES, USED TO SET UP THE FILM
J506B  8*   ENVIRONMENT, ADVANCE FRAMES, AND TO EMPTY THE SMALL CORE
J506B  9*   FILM BUFFER
J506B 10*ROUTINE NAME:  ADV
J506B 11*ENTRY NAMES:  ADV, LINCNT, GLINCNT, SLINCNT, SETPLT, EMPTY
J506B 12*STORAGE:  66 OCTAL WORDS OF SCM
J506B 13*SCM EXTERNALS:  RQTA,  (ON THE SYSTEM)
J506B 14*ROUTINES CALLED:  BS4020, GETBA, SYSTEM,
J506B 15*   ABNORML (ALL ON THE SYSTEM).
```

```
J507A  A*           R. M. FRANK       C-4          GENE WILLBANKS   67
J507A  B*SET EXPOSURE LIGHT OR HEAVY
J507A  C*COMPASS        SR6600   SCP. 3.1
J507A  D*                              SW  1     LS  1
J507A  E*SOURCE CARDS  19          BCD OBJECT CARDS          4     BIN
J507A  F**SET*EXPOSURE*LIGHT OR*HEAVY
J507A  G*ON DISK      F4  COMPAT    WU 01/17/69REV2  DECK 01/17/69REV2
J507A  1*CALL EXH. RETURN 4020 TO NORMAL EXPOSURE CONDITION.
J507A  2*CALL EXL. REDUCES EXPOSURE ON 4020 TO PROVIDE LIGHTER THAN
J507A  3*NORMAL IMAGE. SEE J506A WRITEUP FOR FULL DETAILS.
J507A  4*STORAGE - 12 WORDS
J507A  5*SELF CONTAINED.
```

```
J508A  A*           V. GARDINER       C-4          G. WILLBANKS     67
J508A  B*STANDARDIZED PLOT
J508A  C*F4             SR6600   SCP 3.1
J508A  D*                    SW  1     LS  2     TYPE  1
J508A  E*SOURCE CARDS         43  BCD OBJECT CARDS          17    BIN
J508A  F**STANDARDIZED*PLOT*ROUTINE
J508A  G*ON DISK      F4  COMPAT    WU 04/26/72REV.3 DECK 04/26/72REV 2
J508A  1*FORM:  CALL SPLOT(IOP,N,X,Y,ICHAR,ICON)
J508A  2*PURPOSE:  CREATE A BOX WITH A GRID AND PROVIDE A
J508A  3*      STANDARDIZED PLOT
J508A  4*      IOP DEFINES TYPE OF GRID.
J508A  5*      N POINTS ARE PLOTTED USING DATA FROM TABLES OF X AND Y
J508A  6*      ICHAR DEFINES THE PLOTTING CHARACTER TO BE USED.
J508A  7*      IF ICON NOT ZERO CONSECUTIVE POINTS WILL BE CONNECTED
J508A  8*      BY VECTORS.  SEE ADV(J506A) FOR COMPREHENSIVE DESCRIPTION.
J508A  9*STORAGE:  256 OCTAL WORDS
J508A 10*ROUTINE NAME:  SPLOT
J508A 11*ENTRY NAME:  SPLOT
J508A 12*ROUTINES CALLED:  MAXV(F115A),MINV(F115A),ASCL((J510A),
J508A 13*      ADV(J506A),DLNLN(J529A)DLNLG(J530A),DLGLG(J530A),
J508A 14*      DLGLN(J530A),SLLIN(J533A),SLLOG(J540A),SBLIN(J535A),
J508A 15*      SBLOG(J540A),PLOT(J541A),DGA(J528A).
```

```
J5088  A*          V. GARDINER      C-4          G. WILLBANKS     72
J5088  B*STANDARDIZED PLOT
J5088  C*F4              SR7600   CROS
J5088  D*                    SW  1     LS  2     TYPE  1
J5088  E*SOURCE CARDS        43  BCD OBJECT CARDS        17    BIN
J5088  F**STANDARDIZED*PLOT*ROUTINE
J5088  G*ON DISK      F4  COMPAT   WU 04/26/72      DECK 04/26/72
J5088  1*FORM:  CALL SPLOT(IOP,N,X,Y,ICHAR,ICON)
J5088  2*PURPOSE:  CREATE A BOX WITH A GRID AND PROVIDE A
J5088  3*      STANDARDIZED PLOT
J5088  4*      IOP DEFINES TYPE OF GRID.
J5088  5*      N POINTS ARE PLOTTED USING DATA FROM TABLES OF X AND Y
J5088  6*      ICHAR DEFINES THE PLOTTING CHARACTER TO BE USED.
J5088  7*      IF ICON NOT ZERO CONSECUTIVE POINTS WILL BE CONNECTED
J5088  8*      BY VECTORS.  SEE ADV(J506A) FOR COMPREHENSIVE DESCRIPTION.
J5088  9*STORAGE:  266 OCTAL WORDS
J5088 10*ROUTINE NAME:  SPLOT
J5088 11*ENTRY NAME:  SPLOT
J5088 12*ROUTINES CALLED:  MAXV(F115B),MINV(F115B),ASCL((J510B),
J5088 13*      ADV(J506B),DLNLN(J529B)DLNLG(J530B),DLGLG(J530B),
J5088 14*      DLGLN(J530B),SLLIN(J533B),SLLOG(J540B),SBLIN(J535B),
J5088 15*      SBLOG(J540B),PLOT(J541B),DGA(J528B).
```

```
J510A  A*          VERNA GARDINER   C-4                          67
J510A  B*AUTOMATIC GRAPH SCALING
J510A  C*F4              SR6600   SCP 3.1
J510A  D*                    SW  4     LS  3     TYPE  1
J510A  E*F4 SOURCE CARDS     102  BCD    OBJECT CARDS     18  BIN
J510A  F**AUTOMATIC*GRAPH*SCALING
J510A  G*ON DISK      F4  COMPAT   WU 03/24/72REV 2 DECK 03/24/72REV 2
J510A  1*FORM:  CALL ASCL(M,ZMIN,ZMAX,MAJOR,MINOR,K)
J510A  2*PURPOSE:  DETERMINES VALUES TO ASSIGN TO GRAPH BOUNDARIES,
J510A  3*   THE NUMBER OF MAJOR AND MINOR INTERVALS TO DRAW, AND THE
J510A  4*   FORMAT TO USE IN PLACING A NUMERICAL SCALE ALONG A
J510A  5*   BOUNDARY USING SC4020 SCALING ROUTINES.
J510A  6*ROUTINE NAME:  ASCL
J510A  7*ENTRY NAME:  ASCL
J510A  8*STORAGE:  326 (OCTAL) WORDS.
J510A  9*SELF CONTAINED.
```

```
J510B  A*           VERNA GARDINER   C-4                              72
J510B  B*AUTOMATIC GRAPH SCALING
J510B  C*F4              SR7600   CROS
J510B  D*                    SW  1      LS  3      TYPE  1
J510B  E*F4 SOURCE CARDS      102  BCD     OBJECT CARDS      18  BIN
J510B  F**AUTOMATIC*GRAPH*SCALING
J510B  G*ON DISK      F4  COMPAT   WU 03/24/72       DECK 03/24/72
J510B  1*FORM:  CALL ASCL(M,ZMIN,ZMAX,MAJOR,MINOR,K)
J510B  2*PURPOSE:  DETERMINES VALUES TO ASSIGN TO GRAPH BOUNDARIES,
J510B  3*    THE NUMBER OF MAJOR AND MINOR INTERVALS TO DRAW, AND THE
J510B  4*    FORMAT TO USE IN PLACING A NUMERICAL SCALE ALONG A
J510B  5*    BOUNDARY USING SC4020 SCALING ROUTINES.  SEE ASCL(J510A)
J510B  6*    FOR FURTHER DETAILS.
J510B  7*ROUTINE NAME:  ASCL
J510B  8*ENTRY NAME:  ASCL
J510B  9*STORAGE:  332 (OCTAL) WORDS.
J510B 10*SELF CONTAINED.
```

```
J511A  A*           GENE WILLBANKS   C-4                              67
J511A  B*AUTOMATIC GRAPHING OF A SET OF POINTS
J511A  C*FIV             SR6600   SCP 3.1
J511A  D*                    SW  5      LS  2      TYPE  1
J511A  E*SOURCE CARDS         106  BCD  OBJECT CARDS       34    BIN
J511A  F**AUTOMATIC*GRAPHING OF A SET OF*POINTS
J511A  G*ON DISK      F4  COMPAT   WU 02/24/69 REV1 DECK 05/26/67
J511A  1*CALL GRAPH(IOP,N,X,MX,Y,MY,ICHAR,ICON,IXY,XY). DRAWS A GRAPH
J511A  2*USING THE SC4020.
J511A  3*STORAGE - 355 WORDS
J511A  4*USES-ASCL(J510A),DGA(J528A),DLNLN(J529A),SLLIN(J533A),
J511A  5*SBLIN(J535A),PLOT(J541A),DLNLG(J530A),SLLOG(J540A),
J511A  6*SBLOG(J540A),DLGLN(J530A),DLGLG(J530A).
```

```
J512A  A*           V. GARDINER      C-4          R. FRANK          67
J512A  B*POLAR COORDINATE GRAPH USING THE 4020
J512A  C*F-4             SR6600   SCP 3.1  4020
J512A  D*                    SW  4      LS  4      TYPE 1.1
J512A  E*SOURCE CARDS         147  BCD     OBJECT CARDS      40   BIN
J512A  F**POLAR*COORDINATE*GRAPH*4020
J512A  G*ON DISK      F4  COMPAT   WU 03/29/73REV.1 DECK 03/29/73REV.1
J512A  1*FORM:  CALL POLAR(N,R,THETA,ICHAR,ICON,IGRID,IXC,IYC,IR)
J512A  2*PURPOSE:  DRAW A POLAR COORDINATE GRAPH OF A SET OF POINTS
J512A  3*      USING THE 4020.  MORE THAN ONE SET OF POINTS
J512A  4*      CAN BE PLOTTED ON THE SAME POLAR GRID.
J512A  5*ROUTINE NAME:  POLAR
J512A  6*ENTRY NAME:  POLAR
J512A  7*STORAGE:  1000 OCTAL WORDS
J512A  8*ROUTINES CALLED:  THIS PROGRAM USES BASIC SET OF 4020
J512A  9*    SUBROUTINES.  SEE J506A WRITEUP .
```

```
J512B  A*          V. GARDINER      C-4          R. FRANK          73
J512B  B*POLAR COORDINATE GRAPH USING THE 4020
J512B  C*F-4             SR7600   CROS     4020
J512B  D*                    SW  4     LS  4     TYPE 1.1
J512B  E*SOURCE CARDS         147  BCD     OBJECT CARDS    41   BIN
J512B  F**POLAR*COORDINATE*GRAPH*4020
J512B  G*ON DISK      F4  COMPAT   WU 03/29/73      DECK 03/29/73
J512B  1*FORM:  CALL POLAR(N,R,THETA,ICHAR,ICON,IGRID,IXC,IYC,IR)
J512B  2*PURPOSE:  DRAW A POLAR COORDINATE GRAPH OF A SET OF POINTS
J512B  3*      USING THE 4020.  MORE THAN ONE SET OF POINTS
J512B  4*      CAN BE PLOTTED ON THE SAME POLAR GRID.
J512B  5*ROUTINE NAME:  POLAR
J512B  6*ENTRY NAME:  POLAR
J512B  7*STORAGE:  1005 OCTAL WORDS
J512B  8*ROUTINES CALLED:  THIS PROGRAM USES BASIC SET OF 4020
J512B  9*    SUBROUTINES.  SEE J506B WRITEUP .
```

```
J513A  A*          R.M.FRANK        C-4          V.GARDINER        67
J513A  B*STEREOSCOPIC PROJECTION WITH THE SC4020 FILM PLOTTER.
J513A  C*F4              SR6600   SCP 3.1
J513A  D*                    SW 10     LS 4        TYPE 1
J513A  E*F4 SOURCE CARDS       193BCD   OBJECT CARDS        40BIN
J513A  F**STEREOSCOPIC*PROJECTION*SC4020
J513A  G*ON DISK      F4  COMPAT   WU 04/05/72REV.1 DECK 05/26/67
J513A  1*FORM:  CALL STEREO(IEYE,IXY,DV,A,SF,FWF,N,X,MX,
J513A  2*                    Y,MY,Z,MZ,ICHAR,ICON)
J513A  3*PURPOSE:  PRODUCE STEREOSCOPIC PROJECTIONS OF A SET OF
J513A  4*      POINTS IN SPACE OR CAN BE USED ALSO FOR SINGLE
J513A  5*      (MONOCULAR) PROJECTIONS.
J513A  6*      OUTPUT IS ON SC4020 FILM.
J513A  7*ROUTINE NAME:  STEREO
J513A  8*ENTRY NAME:  STEREO
J513A  9*STORAGE:  562 OCTAL WORDS
J513A 10*ROUTINES CALLED:  BASIC 4020 ROUTINES.  SEE ADV(J506A) WRITEUP.
```

```
J514A  A*          R. M. FRANK      C-4          GENE WILLBANKS    67
J514A  B*EXPAND OR RETURN IMAGE SIZE TO NORMAL
J514A  C*COMPASS         SR6600   SCP. 3.1
J514A  D*                    SW  1     LS  1     TYPE  1
J514A  E*SOURCE CARDS  22          BCD OBJECT CARDS        4     BIN
J514A  F**EXPAND OR*RETURN*IMAGE*SIZE TO*NORMAL
J514A  G*ON DISK      F4  COMPAT   WU 08/19/70REV 3 DECK 01/17/69REV2
J514A  1*USE:  CALL EXPIM PROVIDES FOR LARGER IMAGE AND THUS BUTTED
J514A  2*FRAMES, ON THE SC 4020.  NO EFFECT ON CDC 284.
J514A  3*USE:  CALL NORIM RETURNS IMAGE SIZE TO NORMAL, ALLOWING A GAP
J514A  4*BETWEEN FRAMES.
J514A  5*STORAGE:  15 (OCTAL) WORDS.
J514A  6*SELF CONTAINED.
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J516A  A*          GENE WILLBANKS    C-4                              67
J516A  0*PLOT A POINT
J516A  B*PLOTTING        J5              COMPASS        SR6600   SCOPE
J516A  C*                                SW  1      LS  1
J516A  D*COMPASS SOURCE DECK     15BCD3.1 OBJECT DECK          4BIN
J516A  S**PLOT*A*POINT
J516A 10*ON DISK      F4  COMPAT    WU 04/15/68 REV  DECK 04/15/68 REV
J516A 11*CALL PLT(IX.IY.ICHAR). THE CHARACTER SPECIFIED BY ICHAR IS
J516A 12*PLOTTED AT POINT (IX,IY). SEE J506A WRITEUP FOR DETAILS.
J516A 13*STORAGE - 6 WORDS
J516A 14*SELF CONTAINED.
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J517A  A*          GENE WILLBANKS    C-4                              67
J517A  0*DRAW VECTOR
J517A  B*PLOTTING        J5              COMPASS        SR6600   SCP 3.1
J517A  C*                                SW  1      LS  2
J517A  D*COMPASS SOURCE DECK     84BCD3.1 OBJECT DECK          5BIN
J517A  S**DRAW*VECTOR
J517A 10*ON DISK      F4  COMPAT    WU 11/14/68REV 2 DECK 11/14/68REV 2
J517A 11*CALL DRV(IX1,IY1,IX2,IY2). A STRAIGHT LINE VECTOR WILL BE
J517A 12*DRAWN FROM POSITION (IX1,IY1) TO (IX2,IY2). FOR FULL
J517A 13*DESCRIPTION SEE J506A WRITEUP.
J517A 14*STORAGE - 36 WORDS
J517A 15*SELF CONTAINED.
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J518A  A*          R. M. FRANK       C-4          GENE WILLBANKS   67
J518A  B*GENERATE X OR Y AXIS
J518A  C*COMPASS        SR6600   SCP, 3.1
J518A  D*                                SW  1      LS  1
J518A  E*SOURCE CARDS  42         BCD OBJECT CARDS        5    BIN
J518A  F**GENERATE*X OR*Y*AXIS
J518A  G*ON DISK      F4  COMPAT    WU 01/17/69REV2  DECK 01/17/69REV2
J518A  1*CALL GXA(IX1,IX2,IY). DRAWS X AXIS FROM (IX1,IY) TO (IX2,IY).
J518A  2*CALL GYA(IY1,IY2,IX). DRAWS Y AXIS FROM (IY1,IX) TO (IY2,IX).
J518A  3*FOR ADDITIONAL INFORMATION SEE J506A WRITEUP.
J518A  4*STORAGE - 21 WORDS
J518A  5*SELF CONTAINED.
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J520A  A*          GENE WILLBANKS   T-1                              67
J520A  O*TYPE SPECIFIC POINT
J520A  B*PLOTTING       J5              COMPASS       SR6600   SCOPE
J520A  C*                              SW  1     LS  2
J520A  D*COMPASS SOURCE DECK    38BCD3.1 OBJECT DECK          5BIN
J520A  S**TYPE*SPECIFIED*POINT
J520A 10*ON DISK     F4  COMPAT   WU 04/15/68 REV  DECK 04/15/68 RE
J520A 11*CALL TSP(IX,IY,NC,BCD). THE NC CHARACTERS LOCATED STARTING
J520A 12*AT BCD ARE TYPED ON FILM STARTING AT LOC (IX,IY). FOR
J520A 13*ADDITIONAL DETAILS SEE J506A WRITEUP.
J520A 14*STORAGE - 20 WORDS
J520A 15*USES TCP(J521A).
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J521A  A*          GENE WILLBANKS   C-4                              67
J521A  O*TYPE CURRENT POINT
J521A  B*PLOTTING       J5              COMPASS       SR6600   SCOPE
J521A  C*                              SW  1     LS  7
J521A  D*COMPASS SOURCE DECK   387BCD3.1 OBJECT DECK          20BIN
J521A  S**TYPE*CURRENT*POINT
J521A 10*ON DISK     F4  COMPAT   WU 07/12/68 REV  DECK 07/12/68 RE
J521A 11*CALL  TCP(NC,BCD). THE NC CHARACTERS LOCATED STARTING AT
J521A 12*LOCATION BCD ARE TYPED ON FILM STARTING AT THE LAST USED
J521A 13*POSITION. SEE J506A WRITEUP FOR COMPLETE DETAILS.
J521A 14*STORAGE - 238 WORDS
J521A 15*SELF CONTAINED.
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J522A  A*          GENE WILLBANKS   T-1                              67
J522A  O*TYPE SPECIFIED POINT VERTICALLY
J522A  B*PLOTTING       J5              COMPASS       SR6600   SCOPE
J522A  C*                              SW  1     LS  2
J522A  D*COMPASS SOURCE DECK    73BCD3.1 OBJECT DECK          5BIN
J522A  S**TYPE SPECIFIED POINT*VERTICALLY
J522A 10*ON DISK     F4  COMPAT   WU 04/15/68 REV  DECK 04/15/68 REV
J522A 11*CALL TSPV(IX,IY,NC,BCD). THE NC CHARACTERS FROM STORAGE BCD
J522A 12*ARE TYPED VERTICALLY FROM TOP TO BOTTOM STARTING AT (IX,IY).
J522A 13*SEE J506A WRITEUP FOR MORE DETAILS.
J522A 14*STORAGE - 37 WORDS
J522A 15*USES TSP(J520A).
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J523A  A*          R.M.FRANK          C-4        GENE WILLBANKS   67
J523A  B*DRAW FRAME
J523A  C*COMPASS        SR6600    SCP.3.1
J523A  D*                              SW  1     LS  1
J523A  E*SOURCE CARDS  36         BCD OBJECT DECK          4     BIN
J523A  F**DRAW FRAME
J523A  G*ON DISK      F4 COMPAT     WU 01/17/69 REV.2 DECK 04/15/68 REV.1
J523A  1*CALL FRAME(IXL.IXR,IYT,IYB). A BORDER IS DRAWN CONNECTING
J523A  2*THE BOUNDARIES SPECIFIED. SEE J506A WRITEUP FOR MORE DETAIL.
J523A  3*STORAGE - 18 WORDS.
J523A  4*USES GXA.GYA(J518A).
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J524A  A*            GENE WILLBANKS    T-1                          67
J524A  0*STORE WORD IN BUFFER
J524A  B*PLOTTING        J5              COMPASS        SR6600    SCOPE
J524A  C*                               SW  1     LS  1
J524A  D*COMPASS SOURCE DECK     9BCD3.1 OBJECT DECK          3BIN
J524A  S**STORE WORD*IN*BUFFER
J524A 10*ON DISK      F4  COMPAT    WU 04/15/68 REV  DECK 04/15/68 REV
J524A 11*CALL STB(WORD). THE WORD AT LOCATION ≠WORD≠ IS STORED
J524A 12*IN THE BUFFER. SEE J506A WRITEUP FOR DETAILS.
J524A 13*STORAGE - 4 WORDS
J524A 14*SELF CONTAINED.
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J526A  A*            G. WILLBANKS      T-1                          67
J526A  0*CONVERT TO 4020 COORDINATE
J526A  B*PLOTTING        J5                F4             SR6600    SCOPE
J526A  C*                               SW  1     LS  1
J526A  D*F4 SOURCE CARDS         11BCDF4 OBJECT DECK          7BIN
J526A  S**CONVERT TO*4020*COORDINATE
J526A 10*ON DISK      F4  COMPAT    WU 11/29/67 REV  DECK 11/29/67 REV
J526A 11*CALL CONVRT(Z,IZ,Z1,Z2,IZ1,IZ2) WHERE Z = A FLOATING POINT
J526A 12*NUMBER, Z1 AND Z2 ARE FLOATING POINT VALUES ASSIGNED TO THE
J526A 13*BOUNDARIES IZ1 AND IZ2 RESPECTIVELY AND THE RESULT IS IN IZ.
J526A 14*FOR ADDITIONAL DETAILS SEE J506A WRITEUP.
J526A 15* STORA3E - 63 WORDS
J526A 16*USES LABRT(N103A).
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J527A  A*          GENE WILLBANKS    T-1                          67
J527A  0*TEST COORDINATE FOR RANGE
J527A  B*PLOTTING       J5              F4            SR6600   SCOPE
J527A  C*                              SW  1     LS  1
J527A  D*F4 SOURCE CARDS          58CDF4 OBJECT CARDS          4BIN
J527A  S*TEST*COORDINATE FOR*RANGE
J527A 10*ON DISK     F4  COMPAT    WU 05/12/67      DECK 04/20/67
J527A 11*CALL TCR(IZ). COORDINATE IZ IS TESTED TO INSURE IT LIES
J527A 12*INSIDE 4020 LIMITS. SEE J506A FOR ADDITIONAL DETAILS.
J527A 13*STORAGE - 18 WORDS.
J527A 14*SELF CONTAINED.
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J528A  A*          GENE WILLBANKS    T-1                          67
J528A  0*DEFINE GRAPH AREA
J528A  B*PLOTTING       J5              COMPASS       SR6600   SCOPE
J528A  C*                              SW  1     LS  2
J528A  D*COMPASS SOURCE DECK    51BCD3.1 OBJECT CARDS          6BIN
J528A  S**DEFINE*GRAPH*AREA
J528A 10*ON DISK     F4  COMPAT    WU 04/15/68 REV  DECK 04/15/68 REV
J528A 11*CALL DGA(IXL,IXR,IYT,IYB,XL,XR,YT,YB). IXL,IXR,IYT,IYB ARE
J528A 12*THE 4020 COORDINATES FOR LEFT, RIGHT, TOP, AND BOTTOM
J528A 13*BOUNDARIES RESPECTIVELY. XL, XR, YT, AND YB ARE FLOATING PT
J528A 14*VALUES ASSIGNED TO RESPECTIVE BOUNDARIES. SEE J506A WRITEUP
J528A 15*FOR ADDITIONAL DETAILS.
J528A 16*STORAGE-22 WORDS
J528A 17*USES TCR(J527A), NAME COMMON CJE07(8 WORDS).
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J529A  A*          R.M.FRANK         C-4          GENE WILLBANKS   67
J529A  B*DRAW LINEAR-LINEAR GRID
J529A  C*F4            SR6600   SCP.3.1
J529A  D*                              SW  1     LS  1
J529A  E*SOURCE CARDS  18         BCD OBJECT CARDS         9    BIN
J529A  F**DRAW*LINEAR-LINEAR*GRID
J529A  G*ON DISK     F4 COMPAT     WU 01/17/69REV1  DECK 04/20/67
J529A  1*CALL DLNLN(NX,NY). A LINEAR GRID IS DRAWN IN BOTH X AND Y
J529A  2*USING INTERVALS SPECIFIED BY NX AND NY. FOR MORE DETAIL SEE
J529A  3*J506A WRITEUP.
J529A  4*STORAGE - 72 WORDS
J529A  5*USES GXA(J518A), GYA(J518A), NAME COMMON CJE07(8 WORDS).
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J530A  A*          R. M. FRANK      C-4          VERNA GARDINER   67
J530A  B*DRAW COMBINATION OF LINEAR AND LOG GRIDS
J530A  C*F4              SR6600   SCP. 3.1
J530A  D*                    SW  1     LS  2     TYPE  1
J530A  E*SOURCE CARDS      79     BCD    OBJECT CARDS      25   BIN
J530A  F**DRAW*COMBINATION OF*LINEAR AND*LOG*GRIDS
J530A  G*ON DISK     F4  COMPAT   WU 06/04/71REV 6 DECK 06/04/71REV 6
J530A  1*    CALL DLNLG(NX) DRAWS A GRID LINEAR IN X AT NX INTERVALS
J530A  2*      AND LOG IN Y.  Y MUST BE THE RESULT OF ALOG10. OVER 25
J530A  3*      DECADES CAUSES ERROR MESSAGE AND EXIT.
J530A  4*    CALL DLGLG. A GRID OF UP TO 25 DECADES EACH IS DRAWN
J530A  5*      IN X AND Y.
J530A  6*    CALL DLGLN(NY).  A GRID IS DRAWN, LOG IN X AND LINEAR
J530A  7*      IN Y AT NY INTERVALS.  X IS LIMITED TO 25 DECADES.
J530A  8*SEE J506A WRITEUP FOR FURTHER INFORMATION.
J530A  9*STORAGE - 441 (OCTAL) WORDS.
J530A 10*USES GXA(J518A), GYA(J518A), DLNLN(J529A),
J530A 11*NAME COMMON CJE07(8 WORDS).
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J530B  A*          R.M.FRANK        C-4          VERNA GARDINER   72
J530B  B*DRAW COMBINATION OF LINEAR AND LOG GRIDS
J530B  C*F4              SR7600   CROS
J530B  D*                    SW  1     LS  3     TYPE  1
J530B  E*F4 SOURCE CARDS     79   BCD    OBJECT CARDS     25   BIN
J530B  F**DRAW*COMBINATION OF*LINEAR AND*LOG*GRIDS
J530B  G*ON DISK     F4  COMPAT   WU 08/09/72      DECK 08/09/72
J530B  1*FORM:  CALL DLNLG(NX) DRAWS A GRID LINEAR IN X AT NX
J530B  2*         INTERVALS AND LOG IN Y.  Y MUST BE THE RESULT OF
J530B  3*         ALOG10.  OVER 25 DECADES CAUSES ERROR MESSAGE AND
J530B  4*         EXIT.
J530B  5*       CALL DLGLG.  A GRID OF UP TO 25 DECADES EACH IS
J530B  6*         DRAWN IN X AND Y.
J530B  7*       CALL DLGLN(NY).  A GRID IS DRAWN, LOG IN X AND
J530B  8*         LINEAR IN Y AT NY INTERVALS.  X IS LIMITED TO
J530B  9*         25 DECADES.  SEE J506B WRITEUP FOR FURTHER
J530B 10*         INFORMATION.
J530B 11*ROUTINE NAME:  DLNLG
J530B 12*ENTRY NAMES:  DLNLG. DLGLG, DLGLN
J530B 13*STORAGE:  447 OCTAL WORDS.
J530B 14*ROUTINES USED:  GXA(J518B). GYA(J518B). DLNLN(J529B).
J530B 15*   NAME COMMON CJE07(8 WORDS).
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J533A  A*           VERNA GARDINER   C-4                                67
J533A  B*SCALE LEFT SIDE LINEARLY
J533A  C*F4           SR6600   SCP 3.1
J533A  D*                    SW  1     LS  1     TYPE  1
J533A  E*F4 SOURCE CARDS     30   BCD    OBJECT CARDS    15   BIN
J533A  F**SCALE*LEFT SIDE*LINEARLY
J533A  G*ON DISK      F4  COMPAT   WU 08/02/71REV 1 DECK 08/02/71REV
J533A  1*FORM:  CALL SLLIN(NY,K)
J533A  2*THE LEFT SIDE OF A GRID IS SCALED AT NY INTERVALS ACCORD-
J533A  3*   ING TO A FORMAT SPECIFIED BY K.  SEE J506A WRITEUP FOR
J533A  4*   MORE DETAILS.
J533A  5*ROUTINE NAME:  SLLIN
J533A  6*ENTRY NAME:  SLLIN
J533A  7*STORAGE:  205 (OCTAL) WORDS.
J533A  8*ROUTINES USED:  TSP(J520A). NAME COMMON CJE07(8 WORDS).
J533A  9*  (ON THE SYSTEM).
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J533B  A*           VERNA GARDINER   C-4                                72
J533B  B*SCALE LEFT SIDE LINEARLY
J533B  C*F4           SR7600   CROS
J533B  D*                    SW  1     LS  2     TYPE  1
J533B  E*F4 SOURCE CARDS     30   BCD    OBJECT CARDS    14   BIN
J533B  F**SCALE*LEFT SIDE*LINEARLY
J533B  G*ON DISK      F4  COMPAT   WU 07/27/72      DECK 07/27/72
J533B  1*FORM:  CALL SLLIN(NY,K)
J533B  2*PURPOSE:  THE LEFT SIDE OF A GRID IS SCALED AT NY
J533B  3*     INTERVALS ACCORDING TO A FORMAT SPECIFIED BY K.
J533B  4*ROUTINE NAME:  SLLIN
J533B  5*ENTRY NAME:  SLLIN
J533B  6*STORAGE:  205 (OCTAL) WORDS.
J533B  7*ROUTINES USED:  TSP(J520B). NAME COMMON CJE07(8 WORDS).
J533B  8*  (ON THE SYSTEM).
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J534A  A*           GENE WILLBANKS   T-1                                68
J534A  0*SCALE RIGHT SIDE OF GRAPH LINEARLY
J534A  8*PLOTTING       J5              F4            SR6600   SCOPE
J534A  C*                              SW  1     LS  1
J534A  D*F4 SOURCE DECK          33BCDF4 OBJECT CARDS        16BIN
J534A  S**SCALE*RIGHT*LINEARLY
J534A 10*ON DISK      F4  COMPAT   WU 02/27/68 REV  DECK 02/27/68 REV
J534A 11*CALL SRLIN(NY,K). THE RIGHT SIDE OF A GRID IS SCALED AT NY
J534A 12*INTERVALS ACCORDING TO A FORMAT SPECIFIED BY K. FOR MORE
J534A 13*DETAILS SEE J506A WRITEUP.
J534A 14*STORAGE - 170 WORDS
J534A 15*USES TSP(J520A),TCP(J521A),NAME COMMON CJE07(8 WORDS).
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J535A  A*           R. M. FRANK      C-4          GENE WILLBANKS   67
J535A  B*SCALE TOP OR BOTTOM OF GRAPH LINEARLY
J535A  C*F4              SR6600   SCP. 3.1
J535A  D*                                SW  1     LS  1
J535A  E*SOURCE CARDS  42          BCD OBJECT CARDS          18   BIN
J535A  F**SCALE*TOP OR*BOTTOM OF*GRAPH*LINEARLY
J535A  G*ON DISK      F4  COMPAT   WU 02/12/69REV 3 DECK 02/12/69REV 3
J535A  1*CALL SBLIN(NX,K). A GRID IS SCALED ALONG THE BOTTOM AT NX
J535A  2*INTERVALS ACCORDING TO A FORMAT K.
J535A  3*CALL STLIN(NX,K). A NUMERIC SCALE IS TYPED ALONG THE TOP OF
J535A  4*THE GRID AT NX INTERVALS ACCORDING TO FORMAT K.  FOR MORE
J535A  5*DETAILED EXPLANATION SEE J506A WRITEUP.
J535A  6*STORAGE - 314 (OCTAL) WORDS.
J535A  7*USES TSP(J520A), NAME COMMON CJE07(8 WORDS).
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J540A  A*           V. GARDINER      C-4          R.M.FRANK        67
J540A  B*SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY
J540A  C*F4              SR6600   SCP. 3.1
J540A  D*                    SW  1     LS  2     TYPE  1
J540A  E*SOURCE CARDS     72     BCD    OBJECT CARDS     20   BIN
J540A  F**LOGARITHMIC SCALE*GRAPH BOUNDARY
J540A  G*ON DISK      F4  COMPAT   WU 02/21/73REV.3 DECK 02/21/73REV.3
J540A  1*CALL SBLOG.  A LOG SCALE IS TYPED ALONG THE BOTTOM BOUNDARY.
J540A  2*CALL SLLOG.  A LOG SCALE IS TYPED ON THE LEFT BOUNDARY.
J540A  3*CALL SRLOG.  A LOG SCALE IS TYPED IN ALONG THE RIGHT BOUNDARY.
J540A  4*CALL STLOG.  A LOG SCALE IS TYPED ALONG THE TOP BOUNDARY.
J540A  5*FOR MORE DETAIL SEE J506A WRITEUP.
J540A  6*STORAGE - 375 OCTAL WORDS
J540A  7*ROUTINE NAME:  SBLOG
J540A  8*ENTRY NAMES:  SBLOG, SLLOG, SRLOG, STLOG
J540A  9*ROUTINES CALLED:  TSP(J520A),
J540A 10*     NAME COMMON CJE07(10 OCTAL WORDS)
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J540B  A*          V. GARDINER      C-4          R.M.FRANK        73
J540B  B*SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY
J540B  C*F4              SR7600   CROS
J540B  D*                    SW  1     LS  2     TYPE  1
J540B  E*SOURCE CARDS     72     BCD    OBJECT CARDS     19   BIN
J540B  F**LOGARITHMIC SCALE*GRAPH BOUNDARY
J540B  G*ON DISK     F4  COMPAT   WU 02/21/73      DECK 02/21/73
J540B  1*CALL SBLOG.  A LOG SCALE IS TYPED ALONG THE BOTTOM BOUNDARY.
J540B  2*CALL SLLOG.  A LOG SCALE IS TYPED ON THE LEFT BOUNDARY.
J540B  3*CALL SRLOG.  A LOG SCALE IS TYPED IN ALONG THE RIGHT BOUNDARY.
J540B  4*CALL STLOG.  A LOG SCALE IS TYPED ALONG THE TOP BOUNDARY.
J540B  5*FOR MORE DETAIL SEE J506B WRITEUP.
J540B  6*STORAGE - 374 OCTAL WORDS
J540B  7*ROUTINE NAME:  SBLOG
J540B  8*ENTRY NAMES:  SBLOG. SLLOG. SRLOG. STLOG
J540B  9*ROUTINES CALLED:  TSP(J520B).
J540B 10*     NAME COMMON CJE07(10 OCTAL WORDS)
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J541A  A*          GENE WILLBANKS   C-4                          67
J541A  B*PLOT N POINTS
J541A  C*FORTRAN IV    SR6600   SCP3.1
J541A  D*                    SW  1     LS  1     TYPE  1
J541A  E*F4 SOURCE CARDS     26  BCD       OBJECT CARDS  13   BIN
J541A  F**PLOT*N*POINTS
J541A  G*ON DISK     F4  COMPAT   WU 06/24/69REV 1 DECK 06/24/69REV 1
J541A  1*CALL PLOT(N,X,MX,Y,MY,ICHAR,ICON). THE CHARACTER DESIGNATED
J541A  2*BY ICHAR IS PLOTTED N TIMES AT POINTS DERIVED FROM TABLES OF
J541A  3*X AND Y STORED AT INTERVALS OF MX AND MY. IF ICON IS NOT ZERO
J541A  4*SUCCESSIVE POINTS ARE CONNECTED BY VECTORS. SEE J506A FOR
J541A  5*MORE DETAILED WRITEUP.
J541A  6*STORAGE - 119 WORDS
J541A  7*USES CONVRT(J526A), TCP(J527A), PLT(J516A), DRV(J517A). NAME
J541A  8*COMMON CJE07(8 WORDS).
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J542A  A*           K. J. MELENDEZ   C-4          R. M. FRANK      67
J542A  B*WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
J542A  C*COMPASS     SR6600     SCP. 3.1
J542A  D*                  SW  1     LS  9     TYPE  1
J542A  E*SOURCE CARDS     312    BCD OBJECT CARDS        20   BIN
J542A  F**WRITE*LARGE*CHARACTERS*HORIZONTALLY OR*VERTICALLY
J542A  G*ON DISK     F4  COMPAT   WU 01/28/71REV 3 DECK 01/28/71REV 3
J542A  1*CALL WLCH(IX,IY,NC,BCD,ISIZE). THE NC CHARACTERS LOCATED AT
J542A  2*BCD ARE PRINTED STARTING AT (IX,IY). THE SIZE OF THE
J542A  3*CHARACTERS IS CONTROLLED BY ISIZE FROM 1 TO 6.
J542A  4*CALL WLCV(IX,IY,NC,BCD,ISIZE). THE NC CHARACTERS LOCATED AT
J542A  5*BCD ARE PRINTED OVERSIZE STARTING AT (IX,IY). THE SIZE IS
J542A  6*CONTROLLED BY ISIZE. SEE J506A WRITEUP FOR FULL DETAILS.
J542A  7*STORAGE - 222 WORDS
J542A  8*SELF CONTAINED.
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J542B  A*           K.J.MELENDEZ     C-4          R.M.FRANK        72
J542B  B*WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
J542B  C*CMP           SR7600   CROS
J542B  D*                  SW  1     LS  10    TYPE  1
J542B  E*CMP SOURCE CARDS    312  BCD    OBJECT CARDS    20   BIN
J542B  F**WRITE*LARGE*CHARACTERS*HORIZONATLLY OR*VERTICALLY
J542B  G*ON DISK     F4  COMPAT   WU 08/09/72      DECK 08/09/72
J542B  1*FORM:  CALL WLCH(IX.IY,NC.BCD,ISIZE).
J542B  2*PURPOSE:  THE NC CHARACTERS LOCATED AT BCD ARE PRINTED
J542B  3*   STARTING AT (IX,IY).  THE SIZE OF THE CHARACTERS
J542B  4*   IS CONTROLLED BY ISIZE FROM 1 TO 6.
J542B  5*       CALL WLCV(IX,IY.NC.BCD,ISIZE).
J542B  6*PURPOSE:  THE NC CHARACTERS LOCATED AT BCD ARE PRINTED
J542B  7*   OVERSIZE STARTING AT (IX,IY).  THE SIZE IS CONTROLLED
J542B  8*   BY ISIZE.
J542B  9*ROUTINE NAME:  WLCH
J542B 10*ENTRY NAMES:  WLCH, WLCV
J542B 11*STORAGE:  336 OCTAL WORDS.
J542B 12*SELF CONTAINED.
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J544A  A*          V.GARDINER       C-4          R FRANK C-4       68
J544A  B*CALCOMP STANDARDIZED PLOT
J544A  C*F4              SR6600   SCP 3.1
J544A  D*                    SW 27     LS 2       TYPE 1
J544A  E*SOURCE CARDS         70   BCD    OBJECT CARDS    20   BIN
J544A  F**CALCOMP*PLOT
J544A  G*CARDS        F4  COMPAT   WU 01/03/73REV.2 DECK 01/06/69 REV1
J544A  1*FORM:  CALL PLOTZ(X,Y.N,I.LIN.ISYM,B,XA,YA.ITITLE,
J544A  2*      NTITLE.LABELX,NLBLX,LABELY,NLBLY)
J544A  3*PURPOSE:  CREATE A BOX WITH TIC MARKS ON ALL SIDES.
J544A  4*      LEFT AND BOTTOM AXES ARE LABELLED.  TITLE IS
J544A  5*      WRITTEN AT TOP OF GRAPH.  VALUES OF X AND Y ARE
J544A  6*      PLOTTED.
J544A  7*NOTE:  THE J544 WRITEUP ALSO DESCRIBES MANY OF THE
J544A  8*      CALCOMP ROUTINES.
J544A  9*ROUTINE NAME:  PLOTZ
J544A 10*ENTRY NAME:  PLOTZ
J544A 11*STORAGE:  321 OCTAL WORDS
J544A 12*ROUTINES CALLED:  SCALE(J546A),AXIS(J547A),LINE(J548A),
J544A 13*      PLTZ(J549A).SYMBOL(J559A).
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J545A  A*          R. M. FRANK      C-4                          68
J545A  0*CALCOMP NUMBER LABELING
J545A  B*PLOTTING        J5              F4            SR6600   SCOPE
J545A  C*                               SW  1      LS  1
J545A  D*F4 SOURCE CARDS          43BCDF4 OBJECT CARDS         14BIN
J545A  S**CALCOMP*LABEL
J545A 10*CARDS        F4  COMPAT   WU 09/12/68       DECK 09/12/68
J545A 11*CALL NUMBER ( X, Y, HT. BCD, TH, NS )
J545A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J545A 13*USES SYMBOL(J559A) AND ALOG10(B305A)
J545A 14*STORAGE 250(8) WORDS
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J546A  A*          ROBERT M FRANK   C-4                          68
J546A  0*GENERATE SCALE FOR AXIS
J546A  B*PLOTTING        J5              F4            SR6600   SCOPE
J546A  C*                               SW  1      LS  2
J546A  D*F4 SOURCE CARDS          96BCDF4 OBJECT CARDS         22BIN
J546A  S*CALCOMP*SCALE
J546A 10*CARDS        F4  COMPAT   WU 08/19/68       08/19/68
J546A 11*CALL SCALE ( X, F, D, A, N, I )
J546A 12*SEE WRITE UP FOR J544A FOR FULL DETAILS.
J546A 13*USES-ALOG10(B305A)
J546A 14*STORAGE 371(8) WORDS.
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J547A  A*           V.GARDINER        C-4          R.M.FRANK         68
J547A  B*GENERATE AND LABEL AXIS ON CALCOMP
J547A  C*F4              SR6600   SCP 3.1
J547A  D*                      SW  1     LS  4     TYPE  1
J547A  E*F4 SOURCE CARDS     144  BCD    OBJECT CARDS      42  BIN
J547A  F**CALCOMP*AXIS
J547A  G*CARDS        F4  COMPAT   WU 01/03/73REV 2 DECK 01/03/73REV 1
J547A  1*FORM:  CALL AXIS (X,Y,ITITLE,N,A,DEG,F,D,LOG)
J547A  2*PURPOSE:  GENERATE AND LABEL AXIS ON CALCOMP
J547A  3*SEE PLOTZ(J544A) WRITEUP FOR FULL DETAILS.
J547A  4*ROUTINE NAME:  AXIS
J547A  5*ENTRY NAME:  AXIS
J547A  6*STORAGE:  1040 OCTAL WORDS
J547A  7*ROUTINES CALLED:  NUMBER(J544A),PLTZ(J545A),SINCOS(B106A),
J547A  8*   AND SYMBOL(J559A).
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J547B  A*           V.GARDINER        C-4          R.M.FRANK         73
J547B  B*GENERATE AND LABEL AXIS ON CALCOMP
J547B  C*F4              SR7600   CROS
J547B  D*                      SW  1     LS  4     TYPE  1
J547B  E*F4 SOURCE CARDS     144  BCD    OBJECT CARDS      42 BIN
J547B  F**CALCOMP*AXIS
J547B  G*ON DISK     F4  COMPAT   WU 01/03/73      DECK 01/03/73
J547B  1*FORM:  CALL AXIS (X.Y.ITITLE.N,A,DEG.F.D.LOG)
J547B  2*PURPOSE:  GENERATE AND LABEL AXIS ON CALCOMP
J547B  3*SEE PLOTZ(J544) WRITEUP FOR FULL DETAILS.
J547B  4*ROUTINE NAME:  AXIS
J547B  5*ENTRY NAME:  AXIS
J547B  6*STORAGE:  1045 OCTAL WORDS.
J547B  7*ROUTINES CALLED:  NUMBER(J544), PLTZ(J545), SINCOS(B106),
J547B  8*   AND SYMBOL(J559).
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J548A  A*           ROBERT M FRANK   C-4                          68
J548A  0*PLOT SYMBOL AND DRAW LINE THROUGH SUCCESSIVE DATA POINTS
J548A  8*PLOTTING       J5              F4              SR6600   SCOPE
J548A  C*                              SW  1     LS  1
J548A  D*F4 SOURCE CARDS        52BCDF4 OBJECT CARDS        15BIN
J548A  S**CALCOMP*GRAPH
J548A 10*CARDS        F4  COMPAT   WU 08/19/68      DECK 08/19/68
J548A 11*CALL LINE (X,FX,DX.Y,FY,DY.N.I,LIN.ISYM,B)
J548A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J548A 13*USES PLTZ(J549A), WHERE(J554A), SYMBOL(J559A). ALOG10(B305A),
J548A 14*SQRT(B408A).
J548A 15*STORAGE  1340(8) WORDS.
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J549A  A*          ROBERT M FRANK   C-4                              68
J549A  0*GENERATE TAPE TO CONTROL PEN MOTION
J549A  B*PLOTTING       J5              F4             SR6600   SCOPE
J549A  C*                              SW  1     LS  3
J549A  D*F4 SOURCE CARDS        124BCDF4 OBJECT CARDS         178IN
J549A  S**CALCOMP*TAPE*PEN
J549A 10*CARDS       F4  COMPAT   WU 08/19/68      DECK 08/19/68
J549A 11*CALL PLTZ( X, Y, IC )
J549A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J549A 13*USES BLOCK(J551A), TAPWRI(J552A), STORE(J553A)
J549A 14*STORAGE  306(8) WORDS.
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J550A  A*          ROBERT M FRANK   C-4                    68
J550A  0*INITALIZE CALCOMP ROUTINES AND ASSIGN TAPE
J550A  B*PLOTTING       J5              F4  COMPAT    SR6600   SCOPE
J550A  C*                              SW  1     LS  1
J550A  D*F4 SOURCE CARDS        218CDF4 OBJECT CARDS         108IN
J550A  S**CALCOMP*TAPE
J550A 10*CARDS       F4  COMPAT   WU 08/19/68      DECK 08/19/68
J550A 11*CALL PLOTS ( LT )
J550A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J550A 13*USES BLOCK (J551A)
J550A 14*STORAGE  22(8) WORDS.
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J551A  A*          R. M. FRANK      C-4                             68
J551A  0*WRITE BLOCK NUMBER ON TAPE
J551A  B*PLOTTING       J5              F4             SR6600   SCOPE
J551A  C*                              SW  1     LS  1
J551A  D*F4 SOURCE CARDS        398CDF4 OBJECT CARDS         148IN
J551A  S**CALCOMP*BLOCK
J551A 10*CARDS       F4  COMPAT   WU 08/19/68      DECK 08/19/68
J551A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J551A 12*USES TAPWRI(J552A) AND STORE(J553A).
J551A 13*STORAGE 173(8) WORDS.
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J552A  A*          R. M. FRANK      C-4                             68
J552A  0*WRITE ON TAPE
J552A  B*PLOTTING       J5              F4             SR6600   SCOPE
J552A  C*                              SW  1     LS  1
J552A  D*F4 SOURCE CARDS        218CDF4 OBJECT CARDS         118IN
J552A  S**CALCOMP*TAPE*WRITE
J552A 10*CARDS       F4  COMPAT   WU 09/12/68      DECK 09/12/68
J552A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J552A 12*STORAGE 114(8) WORDS
J552A 13*CALLS UNLODE. GETEQN
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J5528  A*          R.M.FRANK        C-4          R M FRANK          72
J5528  B*WRITE ON TAPE
J5528  C*F4              SR7600   CROS
J5528  D*                     SW 1      LS 1      TYPE 1
J5528  E*SOURCE CARDS         9    RCD    OBJECT CARDS    5    BIN
J5528  F**CALCOMP*TAPE*WRITE*PLOTTING
J5528  G*ON DISK      F4  COMPAT   WU 11/15/72       DECK 11/15/72
J5528  1*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J5528  2*ROUTINE NAME:  TAPWRI
J5528  3*STORAGE 32 OCTAL WORDS
J5528  4*ROUTINES CALLED:  SELF CONTAINED
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J553A  A*          R. M. FRANK      C-4                            68
J553A  0*PACK COMMANDS FOR TAPE
J553A  B*PLOTTING        J5              F4             SR6600   SCOPE
J553A  C*                              SW  1      LS  1
J553A  D*F4 SOURCE CARDS          20BCDF4 OBJECT CARDS          6BIN
J553A  S**CALCOMP*TAPE
J553A 10*CARDS        F4  COMPAT   WU 08/19/68      DECK 08/19/68
J553A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J553A 12*USES TAPWRI(J552A) AND ENCODE(J558A).
J553A 13*STORAGE 41 (8) WORDS
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J554A  A*          R. M. FRANK      C-4                            68
J554A  0*CURRENT PLOTTER POSITION
J554A  B*PLOTTING        J5              F4             SR6600   SCOPE
J554A  C*                              SW  1      LS  1
J554A  D*F4 SOURCE CARDS          8BCDF4 OBJECT CARDS          4BIN
J554A  S**CALCOMP*PEN*POSITION
J554A 10*CARDS        F4  COMPAT   WU 08/19/68      08/19/68
J554A 11*CALL WHERE ( XWHERE . YWHERE, FACT)
J554A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J554A 13*STORAGE 23(8) WORDS.
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J555A  A*          R. M. FRANK      C-4                  68
J555A  0*SCALING FACTOR FOR SUBSEQUENT PLOTTING
J555A  B*PLOTTING        J5              F4             SR6600   SCOPE
J555A  C*                              SW  1      LS  1
J555A  D*F4 SOURCE CARDS          7BCDF4 OBJECT CARDS          3BIN
J555A  S**CALCOMP*MOVEMENT*SCALE
J555A 10*CARDS        F4  COMPAT   WU 08/19/68      DECK 08/19/68
J555A 11*CALL FACTOR (FACT)
J555A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J555A 13*STORAGE  13(8) WORDS.
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J556A  A*          R. M. FRANK       C-4                              68
J556A  0*CHANGE OF ORIGIN
J556A  B*PLOTTING        J5              F4              SR6600   SCOPE
J556A  C*                               SW  1     LS  1
J556A  D*F4 SOURCE CARDS          98CDF4 OBJECT CARDS          4BIN
J556A  S**CALCOMP*ORIGIN*CHANGE
J556A 10*CARDS        F4  COMPAT   WU 08/19/68       DECK 08/19/68
J556A 11*CALL OFFSET (XMIN, DX, YMIN, DY )
J556A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J556A 13*STORAGE  17(8) WORDS.
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J558A  A*          R. M. FRANK       C-4                              68
J558A  0*TAPE PACKING ROUTINE
J558A  B*PLOTTING        J5              COMPASS         SR6600   SCOPE
J558A  C*                               SW  1     LS  1
J558A  D*COMPASS SOURCE CARDS   22BCDOBJECT CARDS             3BIN
J558A  S**CALCOMP*TAPE*PACKING
J558A 10*CARDS        F4  COMPAT   WU 09/12/68       DECK 09/12/68
J558A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J558A 12*STORAGE 13(8) WORDS.
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J559A  A*          R. M. FRANK       C-4                              68
J559A  0*CALCOMP SYMBOL LABELING
J559A  B*PLOTTING        J5              COMPASS         SR6600   SCOPE
J559A  C*                               SW  1     LS  8
J559A  D*COMPASS SOURCE CARDS  389BCD OBJECT CARDS           23BIN
J559A  S**CALCOMP*LABEL
J559A 10*CARDS        F4  COMPAT   WU 09/12/68       DECK 09/12/68
J559A 11*CALL SYMBOL (X, Y, HT, IBCD, TH, NS)
J559A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS
J559A 13*USES PLTZ(J549A),COS(B106A),SIN(B106A)
J559A 14*STORAGE 415(8) WORDS.
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J560A  A*          R. M. FRANK      C-4                                  68
J560A  B*CONTOUR PLOTTING FOR CALCOMP PLOTTER
J560A  C*F4              SR6600   SCP 3.1
J560A  D*                    SW  3     LS  3     TYPE  1
J560A  E*F4 SOURCE CARDS     123 BCD OBJECT CARDS        46   BIN
J560A  F**CONTOUR*PLOTTING*CALCOMP
J560A  G*CARDS       F4  COMPAT   WU 03/13/69REV 1 DECK 03/13/69REV 1
J560A  1*CALL CONTOUR(X,NNX,Y,NNY,Z,NZX,NZY,NC,ZMN,ZMX,DLZ,ZC,DMPX,
J560A  2*DMPY,IGRD,ITITLE,NTITLE,XLABEL,NXLBL,YLABEL,NYLBL)
J560A  3*MAKES TAPE FOR PLOTTING CONTOURS ON CALCOMP PLOTTER.  SEE
J560A  4*WRITE-UP FOR DETAILS.
J560A  5*USES TRICON(J561A) AND PLOTZ(J544A).
J560A  6*STORAGE  1114  WORDS.


J561A  A*          R. M. FRANK      C-4                                  68
J561A  0*PRIVATE SUBROUTINE FOR CONTOUR
J561A  B*PLOTTING       J5             F4            SR6600   SCOPE
J561A  C*            PLOTZ           SW  1     LS  2
J561A  D*F4 SOURCE              61BCDBINARY                  24BIN
J561A  S**CONTOUR*PLOTTING*CALCOMP
J561A 10*CARDS       F4  COMPAT   WU 09/12/68      DECK 09/12/68
J561A 11*CALL TRICON(X,Y,DX,DY,NOC,ZPLAN,ZX,ZV,ZY)
J561A 12*PRIVATE SUBROUTINE FOR CONTOUR
J561A 13*CALLS PLOTZ(J544A).
J561A 14*STORAGE 496 WORDS.


J562A  A*          V. GARDINER      C-4          R FRANK             68
J562A  B*STANDARDIZED PLOT ON FILM
J562A  C*F4              SR6600   SCP.3.1
J562A  D*                    SW  10    LS  3     TYPE  1
J562A  E*SOURCE CARDS        118  BCD   OBJECT CARDS      43   BIN
J562A  F**FILM*PLOT
J562A  G*ON DISK     F4 COMPAT    WU 02/14/73REV.9 DECK 04/24/72REV.7
J562A  1*FORM:  CALL PLOJB(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
J562A  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J562A  3*PURPOSE:  PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
J562A  4*  OF AXES AND TITLE.
J562A  5*ROUTINE NAME:  PLOJB
J562A  6*ENTRY NAME:  PLOJB
J562A  7*STORAGE 1021 (OCTAL) WORDS
J562A  8*ROUTINES CALLED:  MAXV(F115A), MINV(F115A), ADV(J506A),
J562A  9*  ASCL(J510A), PLT(J516A), DRV(J517A), TSP(J520A),
J562A 10*  TSPV(J522A), FRAME(J523A), CONVRT(J526A), DLNLN(J529A),
J562A 11*  DLGLG(J530A), DLGLN(J530A), DLNLG(J530A), SLLIN(J533A),
J562A 12*  SBLIN(J535A), SBLOG(J540A), SLLOG(J540A), DLCH(J567A),
J562A 13*  DGA(J528A).  ALL ON DISK.
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J562B  A*           V. GARDINER      C-4          R FRANK          72
J562B  B*STANDARDIZED PLOT ON FILM
J562B  C*F4              SR7600   CROS
J562B  D*                    SW  10    LS  3     TYPE  1
J562B  E*SOURCE CARDS        118  BCD   OBJECT CARDS      44   BIN
J562B  F**FILM*PLOT
J562B  G*ON DISK     F4 COMPAT    WU 02/14/73REV.1 DECK 04/24/72
J562B  1*FORM:  CALL PLOJB(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
J562B  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J562B  3*PURPOSE;  PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
J562B  4*  OF AXES AND TITLE.
J562B  5*ROUTINE NAME:  PLOJB
J562B  6*ENTRY NAME:  PLOJB
J562B  7*STORAGE 1030 (OCTAL) WORDS
J562B  8*ROUTINES CALLED:  MAXV(F115B), MINV(F115B). ADV(J506B),
J562B  9*  ASCL(J510B), PLT(J516B). DRV(J517B), TSP(J520B),
J562B 10*  TSPV(J522B), FRAME(J523B). CONVRT(J526B), DLNLN(J529B),
J562B 11*  DLGLG(J530B), DLGLN(J530B), DLNLG(J530B), SLLIN(J533B),
J562B 12*  SBLIN(J535B), SBLOG(J540B), SLLOG(J540B), DLCH(J567B),
J562B 13*  DGA(J528B).  ALL ON DISK.
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J563A  A*           R. M. FRANK      C-4          J. BORING        68
J563A  B*CONTOUR PLOTTING WITH FILM OUTPUT
J563A  C*F4              SR6600   SCP.3.1
J563A  D*                    SW  6     LS  3     TYPE 1
J563A  E*SOURCE CARDS        91   BCD   OBJECT CARDS      39   BIN
J563A  F**CONTOUR*PLOTTING*FILM
J563A  G*ON DISK     F4 COMPAT    WU 07/22/70REV 4 DECK 07/22/70REV 3
J563A  1*USE:  CALL CONTRJB(X,NNX,Y,NNY,Z,NZX,NZY,NC,ZMN,ZMX,DLZ,ZC,
J563A  2*DMPX,DMPY,IGRD,ITITLE,NTITLE,XLABEL,NXLBL,YLABEL,NYLBL)
J563A  3*PURPOSE: PRODUCES A CONTOUR PLOT WITH LABELS ON FILM.
J563A  4*STORAGE 754 (OCTAL) WORDS.
J563A  5*USES TRICJB(J564A),PLOJB(J562A),ADV(J506A),DLCH(J567A),
J563A  6*DRV(J517A),PLT(J516A),TCP(J521A)
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J563B  A*           R. M. FRANK       C-4          R.M.FRANK          72
J563B  B*CONTOUR PLOTTING WITH FILM OUTPUT
J563B  C*F4              SR7600    CROS
J563B  D*                    SW  6      LS      3  TYPE 1
J563B  E*SOURCE CARDS       91     BCD     OBJECT CARDS    40      BIN
J563B  F**CONTOUR*PLOTTING*FILM
J563B  G*ON DISK      F4 COMPAT     WU 08/09/72       DECK 08/09/72
J563B  1*FORM:  CALL CONTRJB(X,NNX,Y,NNY,Z,NZX,NZY,NC,ZMN,ZMX,DLZ,ZC,
J563B  2*      DMPX,DMPY,IGRD,ITITLE,NTITLE,XLABEL,NXLBL,YLABEL,NYLBL)
J563B  3*PURPOSE: PRODUCE A CONTOUR PLOT WITH LABELS ON FILM.
J563B  4*ROUTINE NAME:  CONTRJB
J563B  5*ENTRY NAME:  CONTRJB
J563B  6*STORAGE 764 (OCTAL) WORDS.
J563B  7*ROUTINES CALLED:  TRICJB(J564B),PLOJB(J562B)ADV(J506B),
J563B  8*      DLCH(J567B),DRV(J517),PLT(J516B),TCP(J521B)


J564A  A*           R. M. FRANK       C-4          J. BORING          68
J564A  B*PRIVATE SUBROUTINE FOR CONTRJB(J563A)
J564A  C*F4              SR6600    SCP,3.1
J564A  D*                    SW  1      LS  1      TYPE  1
J564A  E*SOURCE CARDS        57    BCD    OBJECT CARDS       21    BIN
J564A  F**CONTOUR*PLOTTING*FILM
J564A  G*ON DISK      F4 COMPAT     WU 09/19/69REV 2 DECK 09/19/69REV 1
J564A  1*CALL TRICJB(X,Y,DX,DY,NOC,ZPLAN,ZX,ZV,ZY)
J564A  2*PRIVATE SUBROUTINE FOR CONTRJB
J564A  3*STORAGE  454 WORDS
J564A  4*CALLS PLOJB(J562A),TCP(J521A)


J565A  A*           K J MELENDEZ      C-4                            69
J565A  B*DOUBLE BUFFER FILM OUTPUT
J565A  C*COMPASS         SR6600    SCP 3.1
J565A  D*                    WU  2      LS  5      TYPE  1
J565A  E*SOURCE CARDS         269  BCD  OBJECT CARDS       14    BIN
J565A  F**DOUBLE BUFFER*BS4020*4020*SC4020*FILM*PLOT
J565A  G*CARDS         CMP           WU 10/06/69REV 2 DECK 10/06/69REV 2
J565A  1*J565A IS A VERSION OF BS4020 WHICH USES A DOUBLE BUFFER
J565A  2*SCHEME TO DECREASE RUNNING TIME WHEN HAVING LARGE AMOUNTS OF
J565A  3*FILM OUTPUT.  ALTHOUGH BS4020 IS NOT CALLED DIRECTLY BY THE
J565A  4*USER, HE MUST SUBMIT THE DECK FOR J565A AS PART OF HIS JOB
J565A  5*IF HE DESIRES TO USE THIS FASTER VERSION.  WHEN THIS ROUTINE
J565A  6*IS USED, ONE MUST CALL EMTY BEFORE TERMINATING EXECUTION.
J565A  7*J565A USES 143(DECIMAL) WORDS OF STORAGE.
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J566A  A*          GENE WILLBANKS   C-4          KAY LATHROP       69
J566A  B*PLOT 3-DIMENSIONS ON 4020
J566A  C*FORTRAN IV     SR6600   SCP 3.1
J566A  D*                   SW  4     LS  2     TYPE 1
J566A  E*SOURCE CARDS        92   BCD                      35   BIN
J566A  F**PLOT*3-DIMENSIONS ON*4020
J566A  G*CARDS        F4  COMPAT   WU 03/07/69      DECK 03/06/69
J566A  1*CALL PLT3D(F,X,Y,IM,JM,FL,WR)
J566A  2*STORAGE 1241 WORDS
J566A  3*USES-J523A(FRAME), J520A(TSP), J528A(DGA), J541A(PLOT),
J566A  4*AND J506A(ADV).
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J567A  A*          R. M. FRANK      C-4                          69
J567A  B*DRAW LARGE CHARACTERS
J567A  C*F4             SR6600   SCP 3.1
J567A  D*                   SW  5     LS  3     TYPE  1
J567A  E*SOURCE CARDS        151 BCD   OBJECT CARDS      71   BIN
J567A  F**WRITE*LARGE*CHARACTERS HORIZONTALLY OR VERTICALLY
J567A  G*ON DISK      F4  COMPAT   WU 04/28/70 REV. 2 DECK 06/13/69
J567A  1*CALL NAME: DLCH(IX,IY,NC,BCD,ISIZE) DLCV(IX,IY,NC,BCD,ISIZE)
J567A  2*PURPOSE: TO DRAW LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
J567A  3*STORAGE:  272 OCTAL
J567A  4*ROUTINES CALLED:  EMPTY(J506A), STB(J524A) ,
J567A  5*BS4020(ON THE SYSTEM).
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J568A   *(FLASH) DELETED FROM THE LIBRARY-SEE CCF:PIM-2:003
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J569A  A*          JERRY MELENDEZ  C-4          R FRANK           69
J569A  B*COLOR
J569A  C*F4             SR6600   SCP 3.1
J569A  D*                   SW 6      LS 2      TYPE 1
J569A  E*SOURCE CARDS        47   BCD    OBJECT CARDS    9    BIN
J569A  F**COLOR*FILM*MICROFILM*COLOR MICROFILM
J569A  G*ON DISK      F4  COMPAT   WU 09/26/72REV 1 DECK 09/26/72REV 1
J569A  1*FORM:  CALL COLOR(C)
J569A  2*       CALL COLOR(IC)
J569A  3*PURPOSE:  SELECT COLOR FILTERS TO GENERATE COLOR MICROFILM
J569A  4*ROUTINE NAME:  COLOR
J569A  5*ENTRY NAME:  COLOR
J569A  6*STORAGE:  102 OCTAL WORDS
J569A  7*ROUTINES CALLED:  STB(J524A)
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J5698  A*          JERRY MELENDEZ  C-4          R FRANK          72
J5698  B*COLOR
J5698  C*F4              SR7600   CROS
J5698  D*                    SW 6     LS 2      TYPE 1
J5698  E*SOURCE CARDS         47   BCD    OBJECT CARDS    8    BIN
J5698  F**COLOR*FILM*MICROFILM*COLOR MICROFILM
J5698  G*ON DISK      F4  COMPAT   WU 09/26/72      DECK 09/26/72
J5698  1*FORM:  CALL COLOR(C)
J5698  2*       CALL COLOR(IC)
J5698  3*PURPOSE:  SELECT COLOR FILTERS TO GENERATE COLOR MICROFILM
J5698  4*ROUTINE NAME:  COLOR
J5698  5*ENTRY NAME:  COLOR
J5698  6*STORAGE:  101 OCTAL WORDS
J5698  7*ROUTINES CALLED:  STB(J524B)


J570A  A*          DON DICKMAN      C-4          R FRANK          69
J570A  B*SWEEP - BACKGROUND COLOR ON MICROFILM
J570A  C*F4              SR6600   SCP3.1 FILM
J570A  D*                    SW  3     LS  1     TYPE  1
J570A  E*SOURCE CARDS         21  BCD   OBJECT CARDS       7   BIN
J570A  F**SWEEPS*RECTANGULAR *BACKGROUND ON *COLOR *FILM
J570A  G*CARDS        F4  COMPAT   WU 09/07/72REV 1 DECK 09/07/72REV 1
J570A  1*FORM:  CALL SWEEP(IX1,IY1,IX2,IY2)
J570A  2*PURPOSE:  EXPOSE RECTANGULAR AREA AS A BACKGROUND
J570A  3*     ON A FRAME OF COLOR FILM.
J570A  4*ROUTINE NAME:  SWEEP
J570A  5*ENTRY NAME:  SWEEP
J570A  6*STORAGE:  65 OCTAL WORDS
J570A  7*ROUTINES CALLED:  GXA,GYA(J518A)


J570B  A*          DON DICKMAN      C-4          R FRANK          72
J570B  B*SWEEP - BACKGROUND COLOR ON MICROFILM
J570B  C*F4              SR7600   CROS   FILM
J570B  D*                    SW  3     LS  1     TYPE  1
J570B  E*SOURCE CARDS         21  BCD   OBJECT CARDS       7   BIN
J570B  F**SWEEPS*RECTANGULAR *BACKGROUND ON *COLOR *FILM
J570B  G*CARDS        F4  COMPAT   WU 09/07/72      DECK 09/07/72
J570B  1*FORM:  CALL SWEEP(IX1,IY1,IX2,IY2)
J570B  2*PURPOSE:  EXPOSE RECTANGULAR AREA AS A BACKGROUND
J570B  3*     ON A FRAME OF COLOR FILM.
J570B  4*ROUTINE NAME:  SWEEP
J570B  5*ENTRY NAME:  SWEEP
J570B  6*STORAGE:  67 OCTAL WORDS
J570B  7*ROUTINES CALLED:  GXA,GYA(J518B)
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J571A  A*          V. GARDINER      C-4          R.M. FRANK       69
J571A  B*PLOT ROUTINE FOR LINE PRINTER
J571A  C*F4              SR6600        SCP 3.1
J571A  D*                    SW  13     LS  8     TYPE  1
J571A  E*F4 SOURCE CARDS     339  BCD    OBJECT CARDS    104  BIN
J571A  F**PLOSB*PLOT*GRAPH
J571A  G*CARDS        F4  COMPAT   WU 09/01/72REV.3 DECK 09/01/72REV.3
J571A  1*FORM:  CALL PLOSB(X,Y,NPTS,INC,LNN,NSYM,C,XAA,YAA,
J571A  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J571A  3*PURPOSE:  PLOT VALUES OF AN X,Y TABLE ON THE LINE
J571A  4*    PRINTER WITH LABELLING OF AXES AND TITLE
J571A  5*ROUTINE NAME:  PLOSB
J571A  6*ENTRY NAME:  PLOSB
J571A  7*STORAGE: 12217 OCTAL WORDS.
J571A  8*ROUTINES CALLED:  MAXV(F115A), MINV(F115A), ASCL(J510A),
J571A  9*   PUT(M403A), FETCH(M403A).
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J571B  A*          V. GARDINER      C-4          R.M. FRANK       72
J571B  B*PLOT ROUTINE FOR LINE PRINTER
J571B  C*F4              SR7600   CROS
J571B  D*                    SW  13     LS  8     TYPE  1
J571B  E*F4 SOURCE CARDS     344  BCD    OBJECT CARDS    105  BIN
J571B  F**PLOSB*PLOT*GRAPH
J571B  G*ON DISK      F4  COMPAT   WU 09/01/72REV.1 DECK 09/01/72REV.1
J571B  1*FORM:  CALL PLOSB(X,Y,NPTS,INC,LNN,NSYM,C,XAA,YAA,
J571B  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J571B  3*PURPOSE:  PLOT VALUES OF AN X,Y TABLE ON THE LINE
J571B  4*    PRINTER WITH LABELLING OF AXES AND TITLE
J571B  5*ROUTINE NAME:  PLOSB
J571B  6*ENTRY NAME:  PLOSB
J571B  7*STORAGE: 12236 OCTAL WORDS.
J571B  8*ROUTINES CALLED:  MAXV(F115B), MINV(F115B), ASCL(J510B),
J571B  9*   PUT(M403B), FETCH(M403B), LIBMSG(SYSTEM).
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J572A  A*          R. M. FRANK      C-4                          69
J572A  B*POLAR3D (CALCOMP)
J572A  C*F4              SR6600   SCP 3.1
J572A  D*                    SW  4      LS  2     TYPE  1
J572A  E*SOURCE CARDS        112   BCD    OBJECT CARDS    48   BIN
J572A  F**PLOTTING*3-DIMENSIONAL*POLAR-COORDINATES*CALCOMP
J572A  G*CARDS        F4  COMPAT   WU 10/10/69REV 1 DECK 10/10/69REV 1
J572A  1*CALL POLAR3D(THETA,R,NTH,NR,F,NTHF,THX,THY,X,Y,TITLE,NTITLE)
J572A  2*PURPOSE: PLOTS THE MATRIX F IN 3-DIMENSIONS VS. R AND THETA.
J572A  3*STORAGE: 1113 (OCTAL) WORDS.
J572A  4*ROUTINES CALLED: SIN(B106A).MAXV(F115A),MAXM(F116A),
J572A  5*ADV(J506A),EXH(J507A),TSP(J520A),CONVRT(J526A),PLOJB(J562A),
J572A  6*DLCH(J567A).
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J573A  A*           WILLARD DRAISIN  C-4          TOM GODFREY       69
J573A  B*PRNSRD-PRINT *SECRET IN LARGE LETTERS ON MICROFILM
J573A  C*F4      CMP     SR6600   SCP 3.1      SC-4020
J573A  D*                     SW  1      LS  1      TYPE  1
J573A  E*SOURCE CARDS         20   BCD     OBJECT CARDS     13   BIN
J573A  F**PRNSRD*FILM
J573A  G*CARDS        F4  COMPAT   WU 08/25/69       DECK 08/25/69
J573A  1*CALL=PRNSRD (THERE ARE NO ARGUMENTS)
J573A  2*PURPOSE: TO WRITE *SECRET RD* IN LARGE LETTERS ON MICRO-
J573A  3*FILM (SC-4020).
J573A  4*PRNSRD IS NORMALLY USED TO IDENTIFY THE BEGINNING AND END
J573A  5*OF SECRET INFORMATION OUTPUT ON THE SC-4020.  THE SUBROUTINE
J573A  6*ADVANCES THE FILM BEFORE PRINTING.  IT DOES NOT ADVANCE THE
J573A  7*FILM AFTER PRINTING.  TAPE12 = FILM IS REQUIRED AS AN
J573A  8*ARGUMENT ON THE PROGRAM CARD.
J573A  9*TIMING IS UNDER TWO SECONDS OF CP TIME.
J573A 10*STORAGE: 163 OCTAL WORDS.
J573A 11*USES: LSHIFT(M407A).
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J574A  A*           V. GARDINER      C-4          R. FRANK          69
J574A  B*FILM ERROR BAR PLOTTER
J574A  C*F4              SR6600   SCP 3.1      SC-4020
J574A  D*                     SW  8      LS  4      TYPE  1
J574A  E*SOURCE CARDS         131  BCD     OBJECT CARDS     49   BIN
J574A  F**FILM*ERROR*BAR*PLOTTER
J574A  G*CARDS        F4  COMPAT   WU 08/11/72REV 3 DECK 08/11/72REV 3
J574A  1*USE:  CALL ERRBAR(X,Y,NPTS,INC,YPOS,YMIN,INCERR,LIN,NSYM,C,
J574A  2*XAA,YAA,LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J574A  3*PURPOSE: TO PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN
J574A  4*X,Y TABLE, INCLUDING LABELING OF AXES AND TITLE, ON THE FILM
J574A  5*PLOTTER.
J574A  6*STORAGE: 1131 OCTAL WORDS
J574A  7*ROUTINES CALLED:
J574A  8* MAXV(F115A).  MINV(F115A).   ADV(J506A).    EXH(J507A).
J574A  9*  EXL(J507A).  ASCL(J510A).   PLT(J516A).    DRV(J517A).
J574A 10*  TSP(J520A).  TSPV(J522A). FRAME(J523A). CONVRT(J526A).
J574A 11*  DGA(J528A). DLNLN(J529A). DLGLG(J530A).  DLGLN(J530A).
J574A 12*DLNLG(J530A). SLLIN(J533A). SBLIN(J535A).  SBLOG(J540A).
J574A 13*SLLOG(J540A).  DLCH(J567A).
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J5748  A*           V. GARDINER      C-4          R. FRANK          72
J5748  B*ERRBAR - FILM ERROR BAR PLOTTER
J5748  C*F4              SR7600   CROS   SC-4020
J5748  D*                    SW  8     LS  4     TYPE  1
J5748  E*F4 SOURCE CARDS     131  BCD    OBJECT CARDS    49   BIN
J5748  F**FILM*ERROR*BAR*PLOTTER
J5748  G*ON DISK      F4  COMPAT   WU 08/11/72REV 1      08/11/72REV 1
J5748  1*FORM:  CALL ERRBAR(X,Y,NPTS,INC,YPOS,YMIN,INCERR,LIN,NSYM,C,
J5748  2*                   XAA,YAA,LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J5748  3*PURPOSE:  PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN
J5748  4*  X,Y TABLE. INCLUDING LABELING OF AXES AND TITLE, ON THE
J5748  5*  FILM PLOTTER.
J5748  6*ROUTINE NAME:  ERRBAR
J5748  7*ENTRY NAME:  ERRBAR
J5748  8*STORAGE: 1140 OCTAL WORDS
J5748  9*ROUTINES CALLED:  MAXV(F115B), MINV(F115B). ADV(J506B),
J5748 10*  EXH(J507B), EXL(J507B), ASCL(J510B, PLT(J516B),
J5748 11*  DRV(J517B). TSP(J520B), TSPV(J522B), FRAME(J523B),
J5748 12*  CONVRT(J526B), DGA(J528B). DLNLN(J529B), DLGLG(J530B),
J5748 13*  DLGLN(J530B), DLNLG(J530B), SLLIN(J533B), SBLIN(J535B),
J5748 14*  SBLOG(J540B), SLLOG(J540B), DLCH(J567B).
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J575A  A*           R.M. FRANK       C-4        J.BORING/S.BLIVICE 69
J575A  B*CALCOMP ERROR BAR PLOTTER
J575A  C*F4              SR6600   SCP 3.1     CALCOMP
J575A  D*                    SW  8     LS  3     TYPE  1
J575A  E*SOURCE CARDS        132  BCD    OBJECT CARDS    35   BIN
J575A  F**CALCOMP*ERROR*BAR*PLOTTER
J575A  G*CARDS        F4  COMPAT   WU 03/23/71REV 1 DECK 03/23/71REV 1
J575A  1*CALL NAME: EROBAR
J575A  2*PURPOSE: TO PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN
J575A  3*X,Y TABLE, INCLUDING LABELING OF AXES AND TITLE. ON THE
J575A  4*CALCOMP PLOTTER.
J575A  5*STORAGE: 706 (OCTAL) WORDS.
J575A  6*ROUTINES CALLED: SCALE(J546A), AXIS(J547A), LINE(J548A),
J575A  7*PLTZ(J549A), SYMBOL(J559A).
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J575B  A*           R.M. FRANK        C-4                                72
J575B  B*CALCOMP ERROR BAR PLOTTER
J575B  C*F4              SR7600   CROS          CALCOMP
J575B  D*                     SW 1      LS 4        TYPE 1
J575B  E*SOURCE CARDS          132  BCD     OBJECT CARDS     36   BIN
J575B  F**CALCOMP*ERROR*BAR*PLOTTER
J575B  G*ON DISK      F4  COMPAT   WU 06/28/72       DECK 06/28/72
J575B  1*FORM:  CALL EROBAR(X,Y,NPTS,INC,YPOS,YMIN,INCERR,J,NSYM,B,
J575B  2*                   XXA,YYA,LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J575B  3*PURPOSE:  PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN X,Y
J575B  4*      TABLE, INCLUDING LABELING OF AXES AND TITLE ON THE
J575B  5*      CALCOMP PLOTTER.  SEE EROBAR(J575A) FOR FURTHER DETAILS.
J575B  6*ROUTINE NAME:  EROBAR
J575B  7*ENTRY NAME:  EROBAR
J575B  8*STORAGE:  716 OCTAL WORDS
J575B  9*ROUTINES CALLED: SCALE(J546B), AXIS(J547B), LINE(J548B),
J575B 10*PLTZ(J549B), SYMBOL(J559B).


J576A  A*           R. M. FRANK       C-4                                69
J576A  B*PLOTS MATRIX IN 3-DIMENSION VS R AND THETA FOR CALCOMP
J576A  C*F4              SR6600   SCP 3.1      CALCOMP
J576A  D*                     SW  3      LS  2      TYPE  1
J576A  E*SOURCE CARDS          110  BCD     OBJECT CARDS     48   BIN
J576A  F**PLOT*CALCOMP*3-D
J576A  G*CARDS        F4  COMPAT   WU 09/30/69       OECK 09/30/69
J576A  1*CALL NAME: POL3DCC(THETA,R,NTH,NR,F,NTHF,THX,THY,X,Y,TITLE,
J576A  2*NTITLE).
J576A  3*PURPOSE: PLOTS THE MATRIX F IN 3-DIMENSION VS. R AND THETA,
J576A  4*FOR THE CALCOMP.
J576A  5*STORAGE: 1,164 (OCTAL) WORDS.
J576A  6*ROUTINES CALLED: ATAN(B104A),SIN(B106A),MAXV(F115A),
J576A  7*MAXM(F116A),LINE(J548A),PLTZ(J549A),SYMBOL(J559A),
J576A  8*SCALED(J577A).


J577A  A*           R. M. FRANK       C-4                                69
J577A  B*THIS IS A PRIVATE SUBROUTINE TO BE USED WITH POL3DCC
J577A  C*F4              SR6600   SCP 3 .1      CALCOMP
J577A  D*                     SW  2      LS  1      TYPE  1
J577A  E*SOURCE CARDS          49   BCD     OBJECT CARDS     13   BIN
J577A  F**CALCOMP
J577A  G*CARDS        F4  COMPAT   WU 09/30/69       DECK 09/30/69
J577A  1*CALL NAME: CALL SCALED(ARRAY,FIRSTV,DELTAV,AXLE,NPTS,INC,
J577A  2*AMN,AMX)
J577A  3*PURPOSE: TO ESTABLISH FIRST VALUE AND INCREMENT FOR LINE
J577A  4*ROUTINE WHEN USING POL3DCC.
J577A  5*STORAGE: 207 (OCTAL) WORDS.
J577A  6*ROUTINES CALLED: ATAN2(B104A),ALOG(B305A),ALOG10(B305A).
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J578A  A*          R. M. FRANK      C-4                                  69
J578A  B*CONTOUR PLOTTING IN POLAR COORDINATES WITH FILM OUTPUT
J578A  C*F4              SR6600   SCP 3.1
J578A  D*                    SW  4     LS  2     TYPE  1
J578A  E*SOURCE CARDS        111  BCD      OBJECT CAROS   50  BIN
J578A  F**CONTOUR*PLOTTING*POLAR*COORDINATES*FILM
J578A  G*CARDS        F4  COMPAT   WU 10/14/69REV 1 DECK 10/14/69REV 1
J578A  1*CALL NAME: POLCON(X,NNX,Y,NNY,Z,NZX,NC,ZMN,ZMX,DLZ,ZC,IGRD,
J578A  2*ITITLE,NTITLE).
J578A  3*PURPOSE: TO PRODUCE A CONTOUR PLOT OF A VARIABLE Z(X,Y).
J578A  4*STORAGE: 1165 (OCTAL) WORDS.
J578A  5*ROUTINES CALLED: CDG(B106A).COS(B106A),SDG(B106A),
J578A  6*SIN(B106A),MAXAV(F115A),MINAV(F115A),MAXV(F115A),MINM(F116A),
J578A  7*MAXM(F116A).ADV(J506A).EXH(J507A).EXL(J507A),DRV(J517A).
J578A  8*PLOJB(J562A).DLCH(J567A),TRIPOL(J579A),CIRCA(J580A).


J579A  A*          R. M. FRANK      C-4                                  69
J579A  B*PRIVATE SUBROUTINE FOR POLCON(J578A)
J579A  C*F4              SR6600   SCP 3.1
J579A  D*                    SW  1     LS  1     TYPE  1
J579A  E*SOURCE CARDS         61  BCD    OBJECT CARDS      23  BIN
J579A  F**CONTOUR*PLOTTING*FILM
J579A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J579A  1*CALL TRIPOL(X,Y.DX,DY,NOC,ZPLAN,ZX.ZV,ZY)
J579A  2*PRIVATE SUBROUTINE FOR POLCON
J579A  3*STORAGE 744(OCTAL) WORDS.
J579A  4*USES CDG(B106A),SDG(B106A),PLOJB(J562A).


J580A  A*          R. M. FRANK      C-4                                  69
J580A  B*ROUTINE TO DRAW CIRCLES ON SC4020
J580A  C*F4              SR6600   SCP 3.1
J580A  D*                    SW  1     LS  1     TYPE  1
J580A  E*SOURCE CARDS         41   BCD    OBJECT CARDS      12   BIN
J580A  F**DRAW*CIRCLES ON *SC4020
J580A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J580A  1*CALL CIRCA(IXC.IYC,IR)
J580A  2*DRAWS A CIRCLE CENTERED AT IXC,IYC WITH RADIUS IR.
J580A  3*IXC,IYC,IR ARE IN PLOTTER COORDINATES WHERE (0,0) IS THE
J580A  4*LEFT EDGE OF THE FRAME AND (1023,1023) IS THE LOWER RIGHT
J580A  5*EDGE.
J580A  6*STORAGE-251(OCTAL) WORDS
J580A  7*USES-COS(B106A), SIN(B106A), DRV(J517A).
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J581A  A*           R. M. FRANK      C-4                              69
J581A  B*DRAWS A CIRCLE, ARC, OR SPIRAL ON THE CALCOMP
J581A  C*F4              SR6600   SCP 3.1     CALCOMP
J581A  D*                    SW  2     LS  1     TYPE  1
J581A  E*SOURCE CARDS         52   BCD    OBJECT CARDS    14   BIN
J581A  F**PLOT*CALCOMP
J581A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J581A  1*CALL NAME: CALL CIRCL(XPAGE,YPAGE,THO,THF,RO,RF,DI)
J581A  2*PURPOSE: TO DRAW, STARTING AT A GIVEN POINT, AN ARCH WHICH
J581A  3*MAY BE EXTENDED TO FORM A CIRCLE OR SPIRAL.
J581A  4*STORAGE: 232 (OCTAL) WORDS.
J581A  5*ROUTINES CALLED: COS(B106A), SIN(B106A), PLTZ(J549A),
J581A  6*WHERE(J554A).
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J582A  A*           R. M. FRANK      C-4                              69
J582A  B*DRAWS DASHED LINES CONNECTING DATA POINTS ON THE CALCOMP
J582A  C*F4              SR6600   SCP 3.1     CALCOMP
J582A  D*                    SW  2     LS  2     TYPE  1
J582A  E*SOURCE CARDS         76   BCD    OBJECT CARDS    15   BIN
J582A  F**PLOT*CALCOMP
J582A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J582A  1*CALL NAME: DASHL(XARRAY,YARRAY,NPTS,INC)
J582A  2*PURPOSE; TO DRAW DASHED LINES CONNECTING A SERIES OF DATA
J582A  3*POINTS.
J582A  4*STORAGE: 310 (OCTAL) WORDS.
J582A  5*ROUTINES CALLED: SQRT(B408A),PLTZ(J549A),WHERE(J554A).
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```
J583A  A*           R. M. FRANK      C-4                              69
J583A  B*DRAWS A DASHED LINE TO A SPECIFIED POINT ON THE CALCOMP
J583A  C*F4              SR6600   SCP 3.1     CALCOMP
J583A  D*                    SW  2     LS  1     TYPE  1
J583A  E*SOURCE CARDS         53   BCD    OBJECT CARDS     9   BIN
J583A  F**PLOT*CALCOMP
J583A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J583A  1*CALL NAME: DASHP(XPAGE,YPAGE,DASH)
J583A  2*PURPOSE: TO DRAW A DASHED LINE FROM THE PEN'S PRESENT
J583A  3*POSITION TO A SPECIFIED POINT
J583A  4*STORAGE: 124 (OCTAL) WORDS
J583A  5*ROUTINES CALLED: SQRT(B408A),PLTZ(J549A),WHERE(J554A).
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J584A  A*          F. M. FRANK      C-4                              69
J584A  B*DRAWS AN ELLIPSE OR ELLIPTICAL ARC ON THE CALCOMP
J584A  C*F4              SR6600   SCP 3.1      CALCOMP
J584A  D*                    SW  2     LS  1      TYPE  1
J584A  E*SOURCE CARDS         39   BCD    OBJECT CARDS    16   BIN
J584A  F**PLOT*CALCOMP
J584A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J584A  1*CALL NAME: ELIPS(XPAGE,YPAGE,RMAJ,RMIN,ANGLE,THO,THF,IPEN)
J584A  2*PURPOSE: TO DRAW AN ELLIPSE OR ELLIPTICAL ARC.
J584A  3*STORAGE: 303 (OCTAL) WORDS.
J584A  4*ROUTINES CALLED: COS(B106A),SIN(B106A),SQRT(B408A),
J584A  5*PLTZ(J549A).WHERE(J554A).
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```
J585A  A*          R. M. FRANK      C-4                              69
J585A  B*DRAWS A CURVE THROUGH THREE POINTS ON THE CALCOMP
J585A  C*F4              SR6600   SCP 3.1      CALCOMP
J585A  D*                    SW  2     LS  2      TYPE  1
J585A  E*SOURCE CARDS         61   BCD    OBJECT CARDS    17   BIN
J585A  F**PLOT*CALCOMP
J585A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J585A  1*CALL NAME: CALL FIT(XPAGE1,YPAGE1,XPAGE2,YPAGE2,XPAGE3,
J585A  2*YPAGE3).
J585A  3*PURPOSE: TO DRAW A SEMI-HYPERBOLIC CURVE THROUGH THREE
J585A  4*POINTS.
J585A  5*STORAGE: 421 (OCTAL) WORDS
J585A  6*ROUTINES CALLED: ATAN(B104A), COS(B106A), SQRT(B408A),
J585A  7*PLTZ(J549A), WHERE(J554A), SOLUT(J589A).
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```
J586A  A*          R. M. FRANK      C-4                              69
J586A  B*DRAWS A LINEAR GRID ON THE CALCOMP
J586A  C*F4              SR6600   SCP 3.1      CALCOMP
J586A  D*                    SW  2     LS  1      TYPE  1
J586A  E*SOURCE CARDS         36   BCD    OBJECT CARDS     9   BIN
J586A  F**PLOT*CALCOMP
J586A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J586A  1*CALL NAME: CALL GRID(XPAGE,YPAGE,DELTAX,DELTAY,NXSP,NYSP)
J586A  2*PURPOSE: TO DRAW A LINEAR GRID.
J586A  3*STORAGE: 114 (OCTAL) WORDS.
J586A  4*ROUTINES CALLED: PLTZ(J549A).
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J587A  A*           R. M. FRANK      C-4                              69
J587A  B*DRAWS AN EQUILATERAL POLYGON ON THE CALCOMP
J587A  C*F4              SR6600   SCP 3.1     CALCOMP
J587A  D*                     SW  2     LS  1     TYPE  1
J587A  E*SOURCE CARDS         31   BCD    OBJECT CARDS    11   BIN
J587A  F**PLOT*CALCOMP
J587A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J587A  1*CALL NAME: POLY(XPAGE,YPAGE,SLEN,SN,ANGLE)
J587A  2*PURPOSE: TO DRAW EQUILATERAL POLYGONS.
J587A  3*STORAGE: 171 (OCTAL) WORDS.
J587A  4*ROUTINES CALLED: COS(B106A), SIN(B106A), PLTZ(J549A).


J588A  A*           R. M. FRANK      C-4                              69
J588A  B*DRAWS RECTANGLES ON THE CALCOMP
J588A  C*F4              SR6600   SCP 3.1     CALCOMP
J588A  D*                     SW  2     LS  1     TYPE  1
J588A  E*SOURCE CARDS         20   BCD    OBJECT CARDS     9   BIN
J588A  F**PLOT*CALCOMP
J588A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
J588A  1*CALL NAME: CALL RECT(XPAGE,YPAGE,HEIGHT,WIDTH,ANGLE,IPEN)
J588A  2*PURPOSE: TO DRAW RECTANGLES.
J588A  3*STORAGE: 113 (OCTAL) WORDS.
J588A  4*ROUTINES CALLED: COS(B106A), SIN(B106A). PLTZ(J549A).


J589A  A*           R. M. FRANK      C-4                              69
J589A  B*THIS IS A PRIVATE SUBROUTINE FOR FIT(J585A).
J589A  C*F4              SR6600   SCP 3.1     CALCOMP
J589A  D*                     SW  1     LS  1     TYPE  1
J589A  E*SOURCE CARDS         38   BCD    OBJECT CARDS    12   BIN
J589A  F**CALCOMP*PLOT
J589A  G*CARDS        F4  COMPAT   WU 09/26/69      DECK 09/26/69
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J590A  A*           R M FRANK          C-4                              70
J590A  B*THREE-D PLOT PROGRAM FOR 4020
J590A  C*F4              SR6600   SCP 3.1
J590A  D*                     SW  3     LS  3     TYPE  1
J590A  E*SOURCE CARDS          128  BCD     OBJECT CARDS     65   BIN
J590A  F**THREE-D*PLOT*4020
J590A  G*CARDS         F4  COMPAT   WU 01/20/70       DECK 01/20/70
J590A  1*CALL NAME:  CART3D(X,Y,NX,NY,F,NF,FO,THX,THY,SO,U,V,TITLE,
J590A  2*NTITLE)
J590A  3*PURPOSE:  MAKE AN ISOMETRIC 3-DIMENSIONAL PLOT OF F VS X,Y
J590A  4*ON THE 4020
J590A  5*STORAGE:  1.514 (OCTAL) WORDS.
J590A  6*ROUTINES CALLED:  ATAN2(B104A), CDG(B106A). SDG(B106A),
J590A  7*MAXV(F115A).MINV(F115A),MAXM(F116A),MINM(F116A),ADV(J506A),
J590A  8*EXH(J507A).EXL(J507A).CONVRT(J526A).PLOJB(J562A),DLCH(J567A),
J590A  9*DLCV(J567A).
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J591A  A*           K. J. MELENDEZ   C-4                              70
J591A  B*FILM EDIT
J591A  C*F4              SR6600   SCP 3.1
J591A  D*                     SW  3     LS  3     TYPE  1
J591A  E*SOURCE CARDS          112  BCD     OBJECT CARDS     33  BIN
J591A  F**FILM*EDIT
J591A  G*CARDS         F4  COMPAT   WU 06/23/70       DECK 06/23/70
J591A  1*USE:  CALL EDITFF(IFLG.JMAX,IN.OUT,NFRM).
J591A  2*PURPOSE:  TO EDIT A FILM FILE IN TERMS OF FRAMES.
J591A  3*STORAGE:  3323 (OCTAL) WORDS.
J591A  4*ROUTINES CALLED:  SHIFN(M401A).
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J592A  A*          MELVIN L. PRUEITT  TD-4      R. FRANK          71
J592A  B*PICTURE-PERSPECTIVE PLOTS. HIDDEN LINES REMOVED. COLOR
J592A  C*F4     CMP    SR6600   SCP 3.1     FILM
J592A  D*         SW  8     LS 19     TYPE  1
J592A  E*F4 SOURCE CARDS     912  BCD    OBJECT CARDS    212  BIN
J592A  F**PICTURE*PERSPECTIVE*PLOTS*3D PLOTS*HIDDEN*LINE*REMOVAL*COLOR
J592A  G*CARDS       F4  COMPAT   WU 02/16/73REV.1 DECK 02/16/73REV.1
J592A  1*FORM:  CALL PICTURE (F,X,Y,NX,NY,NXD,XW,YW,XVIEW,YVIEW,
J592A  2*      ZVIEW,BA,RF,SC,LHIDE,LBOX,LINE,COLR)
J592A  3*PURPOSE:  PRODUCE 3-D PLOTS IN PERSPECTIVE WITH HIDDEN
J592A  4*      LINES OPTIONALLY REMOVED AND WITH THE OPTION TO
J592A  5*      PRODUCE COLOR PLOTS.
J592A  6*ROUTINE NAME:  PICTURE
J592A  7*ENTRY NAMES:  PICTURE
J592A  8*STORAGE:  5516 OCTAL WORDS
J592A  9*ROUTINES CALLED:  ATAN2(B104A), COS(B106A), SIN(B106A),
J592A 10*      ADV(J506A), TSP(J520A), CONVRT(J526A), DGA(J528A),
J592A 11*      PLOT(J541A), WLCH(J542A), COLOR(J569A), ACGOER(SYSTEM),
J592A 12*      OUTPTS(SYSTEM).
J592A 13*OTHER EXTERNALS:  INSECT
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J592B  A*          MELVIN L. PRUEITT  TD-4      R. FRANK          73
J592B  B*PICTURE-PERSPECTIVE PLOTS, HIDDEN LINES REMOVED, COLOR
J592B  C*F4     CMP    SR7600   CROS        FILM
J592B  D*         SW  8     LS 19     TYPE  1
J592B  E*F4 SOURCE CARDS     912  BCD    OBJECT CARDS    213  BIN
J592B  F**PICTURE*PERSPECTIVE*PLOTS*3D PLOTS*HIDDEN*LINE*REMOVAL*COLOR
J592B  G*ON DISK     F4  COMPAT   WU 02/16/73      DECK 02/16/73
J592B  1*FORM:  CALL PICTURE (F,X,Y,NX,NY,NXD,XW,YW,XVIEW,YVIEW,
J592B  2*      ZVIEW,BA,RF,SC,LHIDE,LBOX,LINE,COLR)
J592B  3*PURPOSE:  PRODUCE 3-D PLOTS IN PERSPECTIVE WITH HIDDEN
J592B  4*      LINES OPTIONALLY REMOVED AND WITH THE OPTION TO
J592B  5*      PRODUCE COLOR PLOTS.
J592B  6*ROUTINE NAME:  PICTURE
J592B  7*ENTRY NAMES:  PICTURE
J592B  8*STORAGE:  5551 OCTAL WORDS
J592B  9*ROUTINES CALLED:  ATAN2(B104B), COS(B106B), SIN(B106B),
J592B 10*      ADV(J506B), TSP(J520B), CONVRT(J526B), DGA(J528B),
J592B 11*      PLOT(J541B), WLCH(J542B), COLOR(J569B), ACGOER(SYSTEM),
J592B 12*      OUTPTS(SYSTEM).
J592B 13*OTHER EXTERNALS:  INSECT
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J593A  A*          JERRY MELENDEZ   C-4                              71
J593A  B*WRITE FILM HEADER
J593A  C*CMP            SR6600   SCP 3.1
J593A  D*                   SW  2     LS  6     TYPE  1
J593A  E*CMP SOURCE CARDS    272  BCD    OBJECT CARDS    18   BIN
J593A  F**WRITE*FILM*HEADER
J593A  G*CARDS       F4  COMPAT   WU 06/17/71      DECK 06/17/71
J593A  1*FORM:  CALL WFH(N,STRING)
J593A  2*ARGUMENTS:  N = NUMBER OF WORDS IN THE ARRAY STRING
J593A  3*  STRING= ARRAY CONTAINING N WORDS OF DISPLAY CODE CHARS.
J593A  4*PURPOSE:  THE N WORDS OF DISPLAY CODE CHARACTERS IN STRING
J593A  5*          ARE WRITTEN AS N FRAMES ON FILM USING $ SIGNS
J593A  6*STORAGE:  300 OCTAL WORDS.
J593A  7*  TIMING: 21 MS PER WORD.
J593A  8*EXTERNALS:  BS4020(SYSTEM).
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J594A  A*          JOHN SAVAGE      ENG-6                            71
J594A  B*XHATCH TO HATCH RECTANGULAR AREAS ON FILM.
J594A  C*F4             SR6600   SCP 3.1SC-4020
J594A  D*                   SW  2     LS  2     TYPE 1
J594A  E*F4 SOURCE CARDS     45   BCD    OBJECT CARDS    15   BIN
J594A  F**XHATCH*VECTOR*GENERATOR FOR*HATCHING*FILM
J594A  G*CARDS       F4  COMPAT   WU 06/08/71      DECK 06/08/71
J594A  1*FORM:  CALL XHATCH(IX1,IY1,IX2,IY2,INC)
J594A  2*PURPOSE:  FILL A SPECIFIED RECTANGULAR AREA ON A FILM PLOT
J594A  3*          WITH SLOPING PARALLEL VECTORS.  VECTOR SLOPE AND
J594A  4*          SPACING CAN BE SPECIFIED.
J594A  5*TIMING:  CP TIME USED BY DEMONSTRATION PROGRAM CALLING THIS
J594A  6*          SUBROUTINE TO CROSSHATCH 30 RECTANGLES WITH VARIOUS
J594A  7*          PATTERNS:  2.384 SECONDS ON 6600, 2.750 SECONDS ON
J594A  8*          7600.
J594A  9*ROUTINE NAME:  XHATCH
J594A 10*ENTRY NAME:  XHATCH
J594A 11*STORAGE:  236 (OCTAL) WORDS.
J594A 12*ROUTINES CALLED:  DRV(J517A).
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J5948  A*           JOHN SAVAGE      ENG-6                              71
J5948  B*XHATCH TO HATCH RECTANGULAR AREAS ON FILM.
J5948  C*F4              SR7600   CROS   SC-4020
J5948  D*                     SW  2     LS  2     TYPE 1
J5948  E*F4 SOURCE CARDS     45   BCD    OBJECT CARDS    15   BIN
J5948  F**XHATCH*VECTOR*GENERATOR FOR*HATCHING*FILM
J5948  G*ON DISK      F4  COMPAT   WU 06/08/71      DECK 06/08/71
J5948  1*FORM:  CALL XHATCH(IX1,IY1,IX2,IY2,INC)
J5948  2*PURPOSE:  FILL A SPECIFIED RECTANGULAR AREA ON A FILM PLOT
J5948  3*       WITH SLOPING PARALLEL VECTORS.  VECTOR SLOPE AND
J5948  4*       SPACING CAN BE SPECIFIED.
J5948  5*TIMING:  CP TIME USED BY DEMONSTRATION PROGRAM CALLING THIS
J5948  6*       SUBROUTINE TO CROSSHATCH 30 RECTANGLES WITH VARIOUS
J5948  7*       PATTERNS:  2.384 SECONDS ON 6600, 2.750 SECONDS ON
J5948  8*       7600.
J5948  9*ROUTINE NAME:  XHATCH
J5948 10*ENTRY NAME:  XHATCH
J5948 11*STORAGE:  241 OCTAL WORDS
J5948 12*ROUTINES CALLED:  DRV(J517A).
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J5958  A*           JERRY MELENDEZ   C-4                                71
J5958  B*CHECK NUMBER OF WORDS IN THE PLOT FILESET
J5958  C*CMP             SR7600   CROS
J5958  D*                     SW  2     LS  0     TYPE 1
J5958  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
J5958  F**CHECK*NUMBER OF WORDS IN*PLOT*FILESET
J5958  G*ON DISK      F4  COMPAT   WU 08/04/71      DECK     NONE
J5958  1*FORM:  CALL FILMCK(N)
J5958  2*PURPOSE:  CHECK THE NUMBER OF WORDS WRITTEN ON THE PLOT
J5958  3*       FILESET AND RELEASE THE DATA IF THE PLOT FILESET
J5958  4*       CONTAINS MORE THAN N WORDS OF DATA.
J5958  5*ROUTINE NAME:  FILMCK
J5958  6*ENTRY NAME:  FILMCK
J5958  7*STORAGE:  34 OCTAL WORDS OF SCM
J5958  8*ROUTINES CALLED:  DATAREL(W1058), RQTA (BS4020), BS4020
J5958  9*       (ALL ON THE SYSTEM).
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J596A  A*           V. GARDINER      C-4                                  72
J596A  B*FILM PLOT ON NORMAL PROBABILITY PAPER
J596A  C*F4              SR6600   SCP 3.1
J596A  D*                      SW  6     LS  5     TYPE  1
J596A  E*F4 SOURCE CARDS      178  BCD    OBJECT CARDS      56  BIN
J596A  F**FILM*PLOT*NORMAL PROBABILITY PAPER
J596A  G*CARDS        F4  COMPAT   WU 06/01/72       DECK 06/01/72
J596A  1*FORM:  CALL PLOPR(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
J596A  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J596A  3*PURPOSE:  PLOTS VALUES OF X,Y TABLES ON FILM USING THE
J596A  4*   FORMAT OF NORMAL PROBABILITY PAPER WITH LABELLING OF
J596A  5*   AXES AND TITLE.
J596A  6*ROUTINE NAME:  PLOPR
J596A  7*ENTRY NAME:  PLOPR
J596A  8*STORAGE:  1216 OCTAL WORDS.
J596A  9*ROUTINES CALLED:  ADV(J506A), ALOG10(B305A), ASCL(J510A),
J596A 10*   CONVRT(J526A), DGA(J528A), DLCH(J567A), DLCV(J567A),
J596A 11*   DLGLG(J530A), DLGLN(J530A), DLNLG(J530A), DLNLN(J529A),
J596A 12*   DRV(J517A), EXH(J507A), EXL(J507A), FRAME(J523A),
J596A 13*   GXA(J518A), GYA(J518A), MAXV(F115A), MINV(F115A),
J596A 14*   PLT(J516A), SBLIN(J535A), SBLOG(J540A), SLLIN(J533A),
J596A 15*   SLLOG(J540A), TSP(J520A). ALL ON DISK.
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J596B  A*           V. GARDINER      C-4                                  72
J596B  B*FILM PLOT ON NORMAL PROBABILITY PAPER
J596B  C*F4              SR7600   CROS
J596B  D*                      SW  1     LS  5     TYPE  1
J596B  E*F4 SOURCE CARDS      178  BCD    OBJECT CARDS      56   BIN
J596B  F**FILM*PLOT*NORMAL PROBABILITY PAPER
J596B  G*ON DISK      F4  COMPAT   WU 06/01/72       DECK 06/01/72
J596B  1*FORM:  CALL PLOPR(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,LABELZ,
J596B  2*                  NZL,LABELX,NXL,LABELY,NYL)
J596B  3*PURPOSE:  PLOTS VALUES OF X,Y TABLES ON FILM USING THE
J596B  4*   FORMAT OF NORMAL PROBABILITY PAPER WITH LABELLING OF
J596B  5*   AXES AND TITLE.  FOR FURTHER DETAILS SEE WRITEUP FOR
J596B  6*   PLOPR(J596A).
J596B  7*ROUTINE NAME:  PLOPR
J596B  8*ENTRY NAME:  PLOPR
J596B  9*STORAGE:  1227 OCTAL WORDS
J596B 10*ROUTINES CALLED:  ADV(J506B), ALOG10(B305B), ASCL(J510B),
J596B 11*   CONVRT(J526B), DGA(J528B), DLCH(J567B), DLCV(J567B),
J596B 12*   DLGLG(J530B), DLGLN(J530B), DLNLG(J530B), DLNLN(J529B),
J596B 13*   DRV(J517B), EXH(J507B), EXL(J507B), FRAME(J523B),
J596B 14*   GXA(J518B), GYA(J518B), MAXV(F115B), MINV(F115B),
J596B 15*   PLT(J516B), SBLIN(J535B), SBLOG(J540B), SLLIN(J533B),
J596B 16*   SLLOG(J540B), TSP(J520B). ALL ON DISK.
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```
J597A  A*           ALAN MARSHALL     C-4                                  72
J597A  B*CONTOUR PLOTTING OF ARBITRARILY SPACED DATA POINTS
J597A  C*F4              SR6600   SCP 3.1
J597A  D*                     SW  4     LS  12      TYPE  1
J597A  E*F4 SOURCE CARDS      376  BCD     OBJECT CARDS    123  BIN
J597A  F**CONTOUR*PLOTTING OF ARBITRARILY SPACED*DATA*POINTS
J597A  G*CARDS         F4  COMPAT    WU 04/12/72       DECK 04/12/72
J597A  1*FORM:  CALL RXPLOT(X,Y,Z,N,NC,CONVAL,DMPX,DMPY,C,ITITLE,
J597A  2*    NTITLE,XLABEL,NXLABEL,YLABEL,NYLABEL,M)
J597A  3*PURPOSE:    PRODUCE CONTOUR PLOTS ON FILM OF THE FUNCTION
J597A  4*    Z = F(X,Y), WHERE THE (X,Y) PAIRS ARE PERMITTED
J597A  5*    TO BE IRREGULARLY SPACED.
J597A  6*RESTRICTION:  IN THE PRESENT VERSION OF THE CODE THE USER
J597A  7*    IS REQUIRED TO SCALE THE X,Y VALUES TO THE SAME ORDER
J597A  8*    OF MAGNITUDE.
J597A  9*ROUTINE NAME:  RXPLOT
J597A 10*ENTRY NAMES:  RXPLOT,NGONS,IFNGH,PBISEQ,LSTUP
J597A 11*LABELLED COMMON:  PBLK01, TRBLK
J597A 12*STORAGE:  3775 OCTAL WORDS (EXCLUSIVE OF STORAGE WHICH MUST
J597A 13*    BE ASSIGNED BY USER)
J597A 14*ROUTINES CALLED:  MINV(F115A), MAXV(F115A), PLOJB(J562A),
J597A 15*    ATAN(B104A), SQRT(B408A).
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J597B  A*           ALAN MARSHALL     C-4                                  72
J597B  B*CONTOUR PLOTTING OF ARBITRARILY SPACED DATA POINTS
J597B  C*F4              SR7600   CROS
J597B  D*                     SW  1     LS  12     TYPE  1
J597B  E*F4 SOURCE CARDS      376   BCD     OBJECT CARDS   125    BIN
J597B  F**CONTOUR*PLOTTING OF ARBITRARILY SPACED*DATA*POINTS
J597B  G*ON DISK       F4  COMPAT    WU 04/12/72      DECK 04/12/72
J597B  1*FORM:  CALL RXPLOT(X,Y,Z,N,NC,CONVAL,DMPX,DMPY,C,ITITLE,
J597B  2*    NTITLE,XLABEL,NXLABEL,YLABEL,NYLABEL,M)
J597B  3*PURPOSE:  PRODUCE CONTOUR PLOTS ON FILM OF THE FUNCTION
J597B  4*    Z = F(X,Y), WHERE THE (X,Y) PAIRS ARE PERMITTED
J597B  5*    TO BE IRREGULARLY SPACED.
J597B  6*FOR FURTHER DETAILS SEE WRITEUP FOR RXPLOT(J597A).
J597B  7*STORAGE:  3775 OCTAL WORDS (EXCLUSIVE OF STORAGE WHICH MUST
J597B  8*    BE ASSIGNED BY USER)
J597B  9*ROUTINES CALLED:  MINV(F115B), MAXV(F115B), PLOJB(J562B),
J597B 10*    ATAN(B104B), SQRT(B408B).
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J598A  A*           V GARDINER        C-4          R MITCHELL T-6    73
J598A  B*PHISTF, HISTOGRAM PLOT ROUTINE
J598A  C*F4              SR6600   SCP 3.1    MICROFILM
J598A  D*                    SW 7       LS 2       TYPE 1
J598A  E*SOURCE CARDS         69   BCD    OBJECT CARDS 27       BIN
J598A  F**HISTOGRAM*PLOT ROUTINE
J598A  G*CARDS        F4  COMPAT   WU 02/08/73      DECK 02/08/73
J598A  1*FORM:  CALL PHISTF(X,Y,NPTS,INC,YB,YT,NYSM,XINC,XAA,YAA,
J598A  2*                   LBLZ,NZ,LBLX,NX,LBLY,NY)
J598A  3*PURPOSE:  PLOT VERTICAL HISTOGRAMS ON FILM.
J598A  4*ROUTINE NAME:  PHISTF
J598A  5*ENTRY NAME:  PHISTF
J598A  6*STORAGE:   514 OCTAL WORDS
J598A  7*ROUTINES CALLED:  PLOTM(J599A)
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J598B  A*           V GARDINER        C-4          R MITCHELL T-6    73
J598B  B*PHISTF, HISTOGRAM PLOT ROUTINE
J598B  C*F4              SR7600   CROS       MICROFILM
J598B  D*                    SW 7       LS 2       TYPE 1
J598B  E*SOURCE CARDS         69   BCD    OBJECT CARDS 28       BIN
J598B  F**HISTOGRAM*PLOT ROUTINE
J598B  G*ON DISK      F4  COMPAT   WU 02/08/73      DECK 02/08/73
J598B  1*FORM:  CALL PHISTF(X,Y,NPTS,INC,YB,YT,NYSM,XINC,XAA,YAA,
J598B  2*                   LBLZ,NZ,LBLX,NX,LBLY,NY)
J598B  3*PURPOSE:  PLOT VERTICAL HISTOGRAMS ON FILM.
J598B  4*ROUTINE NAME:  PHISTF
J598B  5*ENTRY NAME:  PHISTF
J598B  6*STORAGE:   524 OCTAL WORDS
J598B  7*ROUTINES CALLED:  PLOTM(J599B)
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J599A  A*           V.GARDINER       C-4          R FRANK          73
J599A  B*STANDARDIZED PLOT ON FILM WITH TIC MARKS
J599A  C*F4              SR6600   SCP 3.1
J599A  D*                    SW  6     LS 3      TYPE 1
J599A  E*SOURCE CARDS         118  BCD    OBJECT CARDS    43   BIN
J599A  F**FILM*PLOT
J599A  G*CARDS        F4  COMPAT   WU 02/08/73      DECK 02/08/73
J599A  1*FORM:  CALL PLOTM(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
J599A  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J599A  3*PURPOSE:  PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
J599A  4*   OF AXES AND TITLE AND WITH TIC MARKS.
J599A  5*ROUTINE NAME:  PLOTM
J599A  6*ENTRY NAME:  PLOTM
J599A  7*STORAGE:  1021 (OCTAL) WORDS
J599A  8*ROUTINES CALLED:  MAXV(F115A), MINV(F115A), ADV(J506A),
J599A  9*   ASCL(J510A), PLT(J516A), DRV(J517A), TSP(J520A),
J599A 10*   TSPV(J522A), FRAME(J523A), CONVRT(J526A),
J599A 11*   SLLIN(J533A), SBLIN(J535A), SBLOG(J540A), SLLOG(J540A),
J599A 12*   DLCH(J567A), DGA(J528A).  ALL ON DISK.
J599A 13*   DLGLGTM(J602A), DLGLNTM(J602A), DLNLGTM(J602A),
J599A 14*   DLNLNTM(J601A).  ALL ON CARDS
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J599B  A*           V.GARDINER       C-4          R FRANK          73
J599B  B*STANDARDIZED PLOT ON FILM WITH TIC MARKS
J599B  C*F4              SR7600   CROS
J599B  D*                    SW  6     LS 3      TYPE 1
J599B  E*SOURCE CARDS         118  BCD    OBJECT CARDS    43   BIN
J599B  F**FILM*PLOT
J599B  G*ON DISK      F4  COMPAT   WU 02/08/73      DECK 02/08/73
J599B  1*FORM:  CALL PLOTM(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
J599B  2*                  LABELZ,NZL,LABELX,NXL,LABELY,NYL)
J599B  3*PURPOSE:  PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
J599B  4*   OF AXES AND TITLE AND WITH TIC MARKS.
J599B  5*ROUTINE NAME:  PLOTM
J599B  6*ENTRY NAME:  PLOTM
J599B  7*STORAGE:  1030 (OCTAL) WORDS
J599B  8*ROUTINES CALLED:  MAXV(F115B), MINV(F115B), ADV(J506B),
J599B  9*   ASCL(J510B), PLT(J516B), DRV(J517B), TSP(J520B),
J599B 10*   TSPV(J522B), FRAME(J523B), CONVRT(J526B),
J599B 11*   SLLIN(J533B), SBLIN(J535B), SBLOG(J540B), SLLOG(J540B),
J599B 12*   DLCH(J567B), DGA(J528B), DLNLNTM(J601B),
J599B 13*   DLGLGTM(J602B), DLGLNTM(J602B), DLNLGTM(J602B),
J599B 14*   ALL ON DISK.
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J5AA   A*          R. L. ELLIOT     TD-5        R.FRANK          72
J5AA   B*M2C - THE MAGEE MOVIE CODE
J5AA   C*F4     CMP    MP7600   CROS   REQUIRES MICROFILM
J5AA   D*                  SW 48     LS 0      TYPE 2
J5AA   E*                   NO CARDS
J5AA   F**M2C*MAGEE*MOVIE
J5AA   G* PERMFILE                  WU 02/12/73REV.2 DECK NONE
J5AA   1*FORM: MAIN PROGRAM
J5AA   2*PURPOSE:  MAKE MOVIES FROM DATA GIVEN ON TAPE.  SEE PAGE 4
J5AA   3*     OF WRITEUP FOR OTHER USES.
```

```
J5AB   A*          R. M.  FRANK     C-4                          73
J5AB   B*CONVERT CALCOMP FILE TO MUX FREE FILE
J5AB   C*F4             MP6600   SCP 3.1
J5AB   D*                  SW  1     LS  4     TYPE  2
J5AB   E*               SOURCE  114 CARDS          OBJECT  34  CARDS
J5AB   F**CALCOMP*MUX
J5AB   G*CARDS     F4  COMPAT WU 07/05/73       DECK 07/05/73
J5AB   1*FORM:  MAIN PROGRAM
J5AB   2*PURPOSE:  READ CALTAPE FILE WHICH CONTAINS CALCOMP
J5AB   3* INSTRUCTIONS AND CREATE MUXTAPE FILE WHICH CONTAINS
J5AB   4* ON-LINE CALCOMP INSTRUCTIONS.
J5AB   5*       CALTAPE MUST BE REWOUND BEFORE ENTERING THIS
J5AB   6* PROGRAM.  CALTAPE AND MUXTAPE FILENAMES MAY BE CHANGED
J5AB   7* BY USING THE FILENAME REPLACEMENT FEATURE OF THE LOADER.
J5AB   8*       THE STORAGE AVAILABLE FOR CREATING BUFFER SPACE FOR
J5AB   9* MUXTAPE IS CALCULATED BY THE PROGRAM.  STORAGE MAY BE
J5AB  10* INCREASED BY INCREASING THE FIELD LENGTH ON THE JOB CARD
J5AB  11* AND USING SC=* TO PREVENT AUTOMATIC FIELD LENGTH
J5AB  12* REDUCTION BY THE SYSTEM.
J5AB  13*PROGRAM CARD:  PROGRAM CALCVT (CALTAPE=100,MUXTAPE=100,
J5AB  14* OUTPUT)
J5AB  15*ROUTINE NAME:  CALCVT
J5AB  16*ENTRY NAME:  CALCVT
J5AB  17*STORAGE:  AT LEAST 14300 OCTAL WORDS
J5AB  18*ROUTINES CALLED:  PUT/FETCH(M403),CPAREA(Q401),
J5AB  19*       LOCF(SYSTEM),LENGTH(SYSTEM)
```

J6 GRAPHICS(CONT≠D)

```
J601A  A*           V. GARDINER      C-4          R FRANK          73
J601A  B*DRAW LINEAR-LINEAR TIC MARKS ON FILM.
J601A  C*F4              SR6600   SCP 3.1
J601A  D*                   SW 1       LS 1      TYPE 1.1
J601A  E*SOURCE CARDS         29   BCD    OBJECT CARDS    12   BIN
J601A  F**FILM*TIC MARKS
J601A  G*CARDS    F4 COMPAT   WU 05/08/73 REV.1 DECK 05/08/73 REV.1
J601A  1*FORM:  CALL DLNLNTM (NX,NY)
J601A  2*PURPOSE:  DLNLNTM DRAWS A FRAME AROUND THE AREA SPECIFIED
J601A  3*      IN THE LAST CALL TO DGA(J528).  IT DRAWS A
J601A  4*      LINEAR-LINEAR GRID OF TIC MARKS, DIVIDING THE
J601A  5*      FRAME INTO A SPECIFIED NUMBER OF INTERVALS.
J601A  6*      NX = NUMBER OF INTERVALS IN WHICH THE X AXIS
J601A  7*           IS DIVIDED, NX.GT.0.
J601A  8*      NY = NUMBER OF INTERVALS IN WHICH THE Y AXIS
J601A  9*           IS DIVIDED, NY.GT.0.
J601A 10*ROUTINE NAME:  DLNLNTM
J601A 11*ENTRY NAME:  DLNLNTM
J601A 12*STORAGE:  152 OCTAL WORDS
J601A 13*ROUTINES CALLED:  GXA(J518A), GYA(J518A), DRV(J517A),
J601A 14*      NAME COMMON CJE07(10 OCTAL WORDS).
```

```
J601B  A*           V. GARDINER      C-4          R FRANK          73
J601B  B*DRAW LINEAR-LINEAR TIC MARKS ON FILM.
J601B  C*F4              SR7600    CROS
J601B  D*                   SW 1       LS 1      TYPE 1.1
J601B  E*SOURCE CARDS         29   BCD    OBJECT CARDS    11   BIN
J601B  F**FILM*TIC MARKS
J601B  G*DISK     F4 COMPAT   WU 05/08/73 REV.1 DECK 05/08/73 REV.1
J601B  1*FORM:  CALL DLNLNTM (NX,NY)
J601B  2*PURPOSE:  DLNLNTM DRAWS A FRAME AROUND THE AREA SPECIFIED
J601B  3*      IN THE LAST CALL TO DGA(J528).  IT DRAWS A
J601B  4*      LINEAR-LINEAR GRID OF TIC MARKS, DIVIDING THE
J601B  5*      FRAME INTO A SPECIFIED NUMBER OF INTERVALS.
J601B  6*      NX = NUMBER OF INTERVALS IN WHICH THE X AXIS
J601B  7*           IS DIVIDED, NX.GT.0.
J601B  8*      NY = NUMBER OF INTERVALS IN WHICH THE Y AXIS
J601B  9*           IS DIVIDED, NY.GT.0.
J601B 10*ROUTINE NAME:  DLNLNTM
J601B 11*ENTRY NAME:  DLNLNTM
J601B 12*STORAGE:  152 OCTAL WORDS
J601B 13*ROUTINES CALLED:  GXA(J518B), GYA(J518B), DRV(J517B),
J601B 14*      NAME COMMON CJE07(10 OCTAL WORDS).
```

```
J602A  A*          V. GARDINER      C-4          R FRANK          73
J602A  B*DRAW LINEAR AND LOG TIC MARKS ON FILM
J602A  C*F4              SR6600   SCP 3.1
J602A  D*                     SW 2      LS 3      TYPE 1.1
J602A  E*SOURCE CARDS          99          OBJECT CARDS    30   BIN
J602A  F**FILM*TIC MARKS
J602A  G*CARDS       F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1
J602A  1*FORM:  CALL DLNLGTM(NX)      LINEAR X, LOG Y
J602A  2*       CALL DLGLNTM(NY)      LOG X, LINEAR Y
J602A  3*       CALL DLGLGTM          LOG X, LOG Y
J602A  4*PURPOSE:  DRAW GRID OF TIC MARKS, AS DETERMINED BY
J602A  5*      DGA(J528).  A LOG AXIS IS LIMITED TO 25 DECADES.
J602A  6*      A LINEAR GRID DIVIDES THE AXIS INTO NX OR NY INTERVALS.
J602A  7*ROUTINE NAME:  DLNLGTM
J602A  8*ENTRY NAMES:  DLNLGTM, DLGLNTM, DLGLGTM
J602A  9*STORAGE:  524 (OCTAL) WORDS
J602A 10*ROUTINES CALLED:  GXA(J518A), GYA(J518A), DLNLNTM(J601A),
J602A 11*      DRV(J517A), NAME COMMON CJE07(10 OCTAL WORDS).
```

```
J602B  A*          V. GARDINER      C-4          R FRANK          73
J602B  B*DRAW LINEAR AND LOG TIC MARKS ON FILM
J602B  C*F4              SR7600   CROS
J602B  D*                     SW 2      LS 3      TYPE 1
J602B  E*SOURCE CARDS          99          OBJECT CARDS    30   BIN
J602B  F**FILM*TIC MARKS
J602B  G*DISK        F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1
J602B  1*FORM:  CALL DLNLGTM(NX)      LINEAR X, LOG Y
J602B  2*       CALL DLGLNTM(NY)      LOG X, LINEAR Y
J602B  3*       CALL DLGLGTM          LOG X, LOG Y
J602B  4*PURPOSE:  DRAW GRID OF TIC MARKS. AS DETERMINED BY
J602B  5*      DGA(J528).  A LOG AXIS IS LIMITED TO 25 DECADES.
J602B  6*      A LINEAR GRID DIVIDES THE AXIS INTO NX OR NY INTERVALS.
J602B  7*ROUTINE NAME:  DLNLGTM
J602B  8*ENTRY NAMES:  DLNLGTM, DLGLNTM, DLGLGTM
J602B  9*STORAGE:  531 (OCTAL) WORDS
J602B 10*ROUTINES CALLED:  GXA(J518B), GYA(J518B), DLNLNTM(J601B),
J602B 11*      DRV(J517B), NAME COMMON CJE07(10 OCTAL WORDS).
```

```
J603A  A*          V. GARDINER      C-4          R. FRANK          73
J603A  B*POLAR COORDINATE GRAPH FOR CALCOMP
J603A  C*F-4             SR6600   SCP3.1 CALCOMP
J603A  D*                   SW  4     LS 4      TYPE 1
J603A  E*SOURCE CARDS        124  BCD    OBJECT CARDS    42   BIN
J603A  F**POLAR COORDINATE*GRAPH*CALCOMP
J603A  G*CARDS        F4  COMPAT   WU 03/01/73      DECK 03/01/73
J603A  1*FORM:  CALL POLCC(N,R,THETA,ICHAR,ICON,
J603A  2*                  IGRID,XC,YC,XR,TITLE,NC)
J603A  3*PURPOSE:  DRAW A POLAR COORDINATE GRAPH OF A SET OF
J603A  4*     POINTS ON THE CALCOMP WITH A TITLE.
J603A  5*ROUTINE NAME:  POLCC
J603A  6*ENTRY NAME:  POLCC
J603A  7*STORAGE:  1032 OCTAL WORDS
J603A  8*ROUTINES CALLED:  PLTZ(J549A),NUMBER(J545A),CIRCL(J581A),
J603A  9*     SYMBOL(J559A),SCALE(J546A),LINE(J548A).
```

```
J603B  A*          V. GARDINER      C-4          R. FRANK          73
J603B  B*POLAR COORDINATE GRAPH FOR CALCOMP
J603B  C*F-4             SR7600   CROS   CALCOMP
J603B  D*                   SW  4     LS 3      TYPE 1
J603B  E*SOURCE CARDS        124  BCD    OBJECT CARDS    42   BIN
J603B  F**POLAR COORDINATE*GRAPH*CALCOMP
J603B  G*ON DISK      F4  COMPAT   WU 03/01/73      DECK 03/01/73
J603B  1*FORM:  CALL POLCC(N,R,THETA,ICHAR,ICON,
J603B  2*                  IGRID,XC,YC,XR,TITLE,NC)
J603B  3*PURPOSE:  DRAW A POLAR COORDINATE GRAPH OF A SET OF
J603B  4*     POINTS ON THE CALCOMP WITH A TITLE.
J603B  5*ROUTINE NAME:  POLCC
J603B  6*ENTRY NAME:  POLCC
J603B  7*STORAGE:  1036 OCTAL WO6DS
J603B  8*ROUTINES CALLED:  PLTZ(J549B),NUMBER(J545B),CIRCL(J581B),
J603B  9*     SYMBOL(J559B),SCALE(J546B),LINE(J548B).
```

```
J604A  A*           R.M.FRANK        C-4          R.M.FRANK        73
J604A  B*DRAW AND SHADE RECTANGLE ON FILM
J604A  C*F4              SR6600   SCP 3.1 MICROFILM
J604A  D*                   SW  4     LS  3     TYPE 1.1
J604A  E*                SOURCE   88 CARDS          OBJECT   25 CARDS
J604A  F**MICROFILM*RECTANGLE
J604A  G*CARDS       F4 COMPAT WU 06/11/73       DECK 06/11/73
J604A  1*FORM:  CALL BARPLOT (X1,X2,Y1,Y2,SPACING,ANGLE)
J604A  2*PURPOSE:  DRAW SCALED RECTANGLE AND SHADE IT.  SCALING
J604A  3*        IS ESTABLISHED BY PRIOR CALL TO PLOJB(J562) OR
J604A  4*        PLOTM(J599).
J604A  5*ROUTINE NAME:  BARPLOT
J604A  6*ENTRY NAMES:  BARPLOT
J604A  7*STORAGE:  467 OCTAL WORDS
J604A  8*ROUTINES CALLED:  PLOTM(J599)
```

```
J604B  A*           R.M.FRANK        C-4          R.M.FRANK        73
J604B  B*DRAW AND SHADE RECTANGLE ON FILM
J604B  C*F4              SR7600    CROS  MICROFILM
J604B  D*                   SW  4     LS  3     TYPE 1.1
J604B  E*                SOURCE   88 CARDS          OBJECT   25 CARDS
J604B  F**MICROFILM*RECTANGLE
J604B  G*DISK        F4 COMPAT WU 06/11/73       DECK 06/11/73
J604B  1*FORM:  CALL BARPLOT (X1,X2,Y1,Y2,SPACING,ANGLE)
J604B  2*PURPOSE:  DRAW SCALED RECTANGLE AND SHADE IT.  SCALING
J604B  3*        IS ESTABLISHED BY PRIOR CALL TO PLOJB(J562) OR
J604B  4*        PLOTM(J599).
J604B  5*ROUTINE NAME:  BARPLOT
J604B  6*ENTRY NAMES:  BARPLOT
J604B  7*STORAGE:  475 OCTAL WORDS
J604B  8*ROUTINES CALLED:  PLOTM(J599)
```

K INFORMATION TRANSFER WITH NO PARTICULAR CONVERSION OR INTERPRETATION OTHER THAN DEVICE-DEPENDENT REQUIREMENTS

K1 DIRECT ACCESS CORE/DISK I/O

REVIEWER: J. MOORE, C-2

```
K101B  A*          EMILY WILLBANKS  C-2          J. MOORE          71
K101B  B*RANR,RANW,RANRE,RANWE - DIRECT ACCESS I/O
K101B  C*CMP            SR7600   CROS
K101B  D*                    SW  2     LS  4     TYPE  1
K101B  E*CMP SOURCE CARDS    121  BCD    OBJECT CARDS     8   BIN
K101B  F**RANR*RANW*RANRE*RANWE*DIRECT ACCESS*RANDOM*IO
K101B  G*ON DISK     F4  COMPAT   WU 10/10/72REV 1 DECK 10/10/72REV 1
K101B  1*FORM:  CALL RANR(N,LCMV,NWORDS,NSECT,IWAIT)
K101B  2*       CALL RANW(N,LCMV,NWORDS,NSECT,IWAIT)
K101B  3*       CALL RANRE(N,NLCM,NWORDS,NSECT,IWAIT)
K101B  4*       CALL RANWE(N,NLCM,NWORDS,NSECT,IWAIT)
K101B  5*PURPOSE:  RANR/RANRE READS NWORDS FROM SECTOR NSECT OF FILE-
K101B  6*   SET N INTO LCM VARIABLE LCMV OR WORD NLCM.  RANW/RANWE
K101B  7*   WRITES NWORDS FROM LCMV OR WORD NLCM OF LCM INTO FILESET
K101B  8*   N AT SECTOR NSECT.  IWAIT IS A WAIT/NOWAIT OPTION.  THIS
K101B  9*   IS SLOWER THAN IRAN(K102B).
K101B 10*ROUTINE NAME:  RANRW
K101B 11*ENTRY NAMES:  RANR,RANW,RANRE,RANWE
K101B 12*STORAGE:  52 OCTAL WORDS.
K101B 13*ROUTINES CALLED:  GETBA(ON THE SYSTEM).
```

```
K102B  A*          EMILY WILLBANKS  C-2          J. MOORE          71
K102B  B*IRANR,IRANW,IRANRE,IRANWE - DIRECT ACCESS I/O
K102B  C*CMP            SR7600   CROS
K102B  D*                    SW  2     LS  4     TYPE  1
K102B  E*CMP SOURCE CARDS     99  BCD    OBJECT CARDS     7   BIN
K102B  F**IRANR*IRANW*IRANRE*IRANWE*DIRECT ACCESS*RANDOM*IO
K102B  G*ON DISK     F4  COMPAT   WU 10/10/72REV 1 DECK 10/10/72REV 1
K102B  1*FORM:  I = IRANR(RQT,LCMV,NWORDS,NSECT,FS)
K102B  2*       I = IRANW(RQT,LCMV,NWORDS,NSECT,FS)
K102B  3*       I = IRANRE(RQT,NLCM,NWORDS,NSECT,FS)
K102B  4*       I = IRANWE(RQT,NLCM,NWORDS,NSECT,FS)
K102B  5*PURPOSE:  IRANR/IRANRE READS NWORDS FROM SECTOR NSECT OF
K102B  6*   FILESET FS WITH RQT INTO LCM VARIABLE LCMV OR WORD NLCM.
K102B  7*   IRANW/IRANWE WRITES NWORDS FROM LCMV OR WORD NLCM OF LCM
K102B  8*   INTO FILESET FS AT SECTOR NSECT.  THIS IS FASTER THAN
K102B  9*   RANRW(K101B).
K102B 10*ROUTINE NAME:  IRAN
K102B 11*ENTRY NAMES:  IRANR,IRANW,IRANRE,IRANWE
K102B 12*STORAGE:  44 OCTAL WORDS
K102B 13*SELF CONTAINED.
```

K103B *(RANRWE) DELETED FROM LIBRARY-NOW COMBINED WITH K101B.

K104B *(IRANE) DELETED FROM LIBRARY-NOW COMBINED WITH K102B.

K2 ECS/CORE OR CORE/CORE

REVIEWER: J. MOORE, C-2

```
K201A  A*           LARA BAKER        ENG-DO                          69
K201A  B*MOVEMC MOVES AN ARRAY IN MAIN CORE THROUGH ECS
K201A  C*FORTRAN IV     SR6600    SCP 3.1
K201A  D*                      SW  3      LS  1      TYPE  1
K201A  E*SOURCE DECK            25   BCD     OBJECT CARDS      10  BIN
K201A  F**ECS*MOVEMC
K201A  G*CARDS         F4  COMPAT    WU 08/01/69       DECK 08/01/69
K201A  1*CALL MOVEMC(IFROM, ITO, NWDS, IECS$ NECS)
K201A  2*PURPOSE TO MOVE IN ARRAY FROM ONE LOCATION IN MAIN MEMORY
K201A  3*TO ANOTHER LOCATION IN MAIN MEMORY.
K201A  4*TIMING:  SEE ATTACHED GRAPH.
K201A  5*STORAGE: 143 (OCTAL) WORDS.
K201A  6*USES: ECRD, ECWR(ON THE SYSTEM)
```

```
K202A  A*           LARA BAKER        ENG-DO                          69
K202A  B*MOVEEC MOVES AN ARRAY IN ECS THROUGH MAIN CORE
K202A  C*FORTRAN IV     SR6600    SCP 3.1
K202A  D*                      SW  2      LS  1      TYPE  1
K202A  E*SOURCE CARDS           20   BCD     OBJECT CARDS      9   BIN
K202A  F**ECS*MOVEEC
K202A  G*CARDS         F4  COMPAT    WU 08/01/69       DECK 08/01/69
K202A  1*USAGE:  CALL MOVEEC (IFROM, ITO, NWDS, IMC, NMC)
K202A  2*PURPOSE:  TO MOVE AN ARRAY FROM ONE LOCATION IN EXTENDED
K202A  3*CORE STORAGE TO ANOTHER LOCATION ECS.
K202A  4*TIMING:  ABOUT THE SAME AS THAT EXPLAINED FOR MOVEMC,K201A.
K202A  5*STORAGE:  127(OCTAL) WORDS
K202A  6*USES ECRD, ECWR(ON THE SYSTEM)
```

```
K203A  A*           LARA BAKER        ENG-DO                          69
K203A  B*ECR READS ONE WORD FROM ECS
K203A  C*COMPASS        SR6600    SCP 3.1
K203A  D*                    SW  2      LS  1      TYPE  1
K203A  E*SOURCE CARDS         13    BCD     OBJECT CARDS      4    BIN
K203A  F**ECS*ECR*READ
K203A  G*CARDS         F4  COMPAT    WU 08/01/69       DECK 08/01/69
K203A  1*USAGE:  ANS = ECR (LOCE)
K203A  2*PURPOSE:  TO READ ONE WORD FROM EXTENDED CORE STORAGE AND
K203A  3*RETURN THE CONTENTS OF THAT WORD AS THE RESULT OF THE
K203A  4*FUNCTION CALL.
K203A  5*TIMING:  15.0 MICROSECONDS
K203A  6*STORAGE:  7 WORDS
K203A  7*SELF CONTAINED.
```

```
K203B  A*           LARA BAKER        TD-7         J.MOORE           72
K203B  B*ECR READS ONE WORD FROM ECS
K203B  C*COMPASS        SR7600    CROS
K203B  D*                    SW  2      LS  1      TYPE  1
K203B  E*CMP SOURCE CARDS     22    BCD     OBJECT CARDS      4  BIN
K203B  F**ECS*ECR*READ
K203B  G*ON DISK        F4  COMPAT    WU 10/12/72       DECK 10/12/72
K203B  1*FORM:  ANS = ECR (LOCE)
K203B  2*PURPOSE:  READ ONE WORD FROM EXTENDED CORE STORAGE AND
K203B  3*   RETURN THE CONTENTS OF THAT WORD AS THE RESULT OF THE
K203B  4*   FUNCTION CALL.
K203B  5*ROUTINE NAME:  ECR
K203B  6*ENTRY NAME:  ECR
K203B  7*STORAGE:  13 OCTAL WORDS.
K203B  8*ROUTINES CALLED:  LIBMSG(SYSTEM).
```

```
K204A  A*           LARA BAKER        ENG-DO                          69
K204A  B*ECW WRITES ONE WORD TO ECS
K204A  C*COMPASS        SR6600    SCP 3.1
K204A  D*                    SW  2      LS  1      TYPE  1
K204A  E*SOURCE CARDS         11    BCD     OBJECT CARDS      3    BIN
K204A  F**ECS*ECW*WRITE
K204A  G*CARDS         F4  COMPAT    WU 08/01/69       DECK 08/01/69
K204A  1*USAGE:  CALL ECW (MCAD,LOCE)
K204A  2*PURPOSE:  TO WRITE ONE WORD INTO EXTENDED CORE STORAGE
K204A  3*FROM MAIN CORE.
K204A  4*TIMING:  12.6 MICROSECONDS
K204A  5*STORAGE:  5 WORDS
K204A  6*SELF CONTAINED.
```

```
K204B  A*          LARA BAKER        TD-7          J. MOORE          72
K204B  B*ECW WRITES ONE WORD TO ECS
K204B  C*COMPASS        SR7600    CROS
K204B  D*                    SW  2      LS  1      TYPE  1
K204B  E*CMP SOURCE CARDS     19    BCD     OBJECT CARDS      4    BIN
K204B  F**ECS*ECW*WRITE
K204B  G*ON DISK      F4  COMPAT    WU 10/12/72       DECK 10/12/72
K204B  1*FORM:  CALL ECW(MCAD,LDCE)
K204B  2*PURPOSE:  WRITE ONE WORD INTO EXTENDED CORE STORAGE
K204B  3*    FROM MAIN CORE.
K204B  4*ROUTINE NAME:  ECW
K204B  5*ENTRY NAME:  ECW
K204B  6*STORAGE:  7 OCTAL WORDS.
K204B  7*ROUTINES CALLED:  LIBMSG(SYSTEM).
```

```
K2AA   A*          D. PLAISTED       C-4          J MOORE     C-2    72
K2AA   B*QUICK EXCHANGE OF TWO SCM ARRAYS
K2AA   C*COMPASS        SR7600    CROS
K2AA   D*                    SW   2     LS  2      TYPE 2
K2AA   E*SOURCE CARDS         85    BCD     OBJECT CARDS     5     BIN
K2AA   F**VECTOR*SCM VECTOR*VECTOR EXCHANGE*QEXCH
K2AA   G*CARDS        F4  COMPAT    WU 09/18/72       DECK 09/18/72
K2AA   1*FORM:  CALL QEXCH(A,B,N,M,K)
K2AA   2*PURPOSE:  QUICK EXCHANGE OF TWO SCM ARRAYS
K2AA   3*ROUTINE NAME:  QEXCH
K2AA   4*ENTRY NAME:  QEXCH
K2AA   5*STORAGE:  26 OCTAL WORDS
K2AA   6*ROUTINES CALLED:  SELF CONTAINED
```

```
K2AB   A*          D PLAISTED        C-4          J MOORE C-2       72
K2AB   B*QUICK MOVE OF AN ARRAY IN SCM
K2AB   C*COMPASS        SR7600    CROS
K2AB   D*                    SW   2     LS 2       TYPE 2
K2AB   E*SOURCE CARDS         87    BCD     OBJECT CARDS     5     BIN
K2AB   F**VECTOR
K2AB   G*CARDS        F4  COMPAT    WU 09/18/72       DECK 09/18/72
K2AB   1*FORM:  CALL QMOVE(A,B,N,M,K)
K2AB   2*FUNCTION:  QUICK MOVE OF AN ARRAY IN SCM
K2AB   3*ROUTINE NAME:  QMOVE
K2AB   4*ENTRY NAME:  QMOVE
K2AB   5*STORAGE: 27 OCTAL WORDS
K2AB   6*ROUTINES CALLED:  SELF CONTAINED
```

K3 SEQUENTIAL I/O

REVIEWER: J. NORRIS, C-2

```
K3018  A*          EMILY WILLBANKS  C-2                              71
K3018  B*COPY,COPYF,COPYR - COPY PORTIONS OF FILESETS
K3018  C*CMP            SR7600   CROS
K3018  D*                    SW  3     LS  0     TYPE  1
K3018  E*                      0   BCD                        0   BIN
K3018  F**COPY*COPYF*COPYR - COPY PORTIONS OF*FILESETS
K3018  G*ON DISK     F4  COMPAT   WU 07/12/71       DECK NONE
K3018  1*FORM:  CALL COPY(I,O)
K3018  2*       CALL COPYF(I,O,NF)
K3018  3*       CALL COPYR(I,O,NR)
K3018  4*PURPOSE:  COPY DATA FROM FILESET I TO FILESET O, STARTING
K3018  5*  AT CURRENT FILESET POSITIONS, COPY COPIES TO EOI.
K3018  6*  COPYF COPIES NF FILES OR TO EOI.  COPYR COPIES NR RECORDS
K3018  7*  OR TO EOI.
K3018  8*ROUTINE NAME:  COPY
K3018  9*ENTRY NAMES:  COPY, COPYF, COPYR
K3018 10*STORAGE:  1458 WORDS OF SCM.
K3018 11*ROUTINES CALLED:  GETBA, OPEN., WAITR, SYSTEM, ABNORML,
K3018 12*  (ALL ON SYSTEM).
K3018 13*OTHER SCM EXTERNALS:  IOGEN, BUFF.
```

```
K3038  A*          EMILY WILLBANKS  C-2                              71
K3038  B*COPYSF - COPY SHIFTED FILE FOR SINGLE SPACED LISTING
K3038  C*FIV            SR7600   CROS
K3038  D*                    SW  3     LS  0     TYPE  1
K3038  E*                      0   BCD                        0   BIN
K3038  F**COPYSF*COPY*SHIFTED FILE
K3038  G*ON DISK     F4  COMPAT   WU 06/22/71       DECK   NONE
K3038  1*FORM:  CALL COPYSF(I,O,N,PR)
K3038  2*PURPOSE:  COPY N FILES OF FILESET I (CONTAINING BCD CHAR-
K3038  3*  ACTERS) TO FILESET O, INSERTING A BLANK AS THE FIRST CHAR-
K3038  4*  ACTER OF EACH RECORD.  IF FILESET O HAS FILM OR SFILM ACTIVE
K3038  5*  DISPOSITION, IT WILL BE WRITTEN IN 4020 COMMAND FORMAT.
K3038  6*ENTRY NAMES:  COPYSF
K3038  7*ROUTINE NAME:  COPYSF
K3038  8*STORAGE:  2618 WORDS.
K3038  9*ROUTINES CALLED:  EOI, IFENDF, INPUTC, LENGTH, MARG, OUTPTC,
K3038 10*  (ALL ON SYSTEM).
```

```
K3048  A*           RON KRANTZ       C-2                              71
K3048  B*ULCR - USER LIBRARY CONTROL ROUTINE
K3048  C*CMP              SR7600   CROS
K3048  D*                    SW  3     LS  0     TYPE  1
K3048  E*                      0   BCD                          0   BIN
K3048  F**ULCR*USER*LIBRARY
K3048  G*ON DISK      F4  COMPAT   WU 06/22/71       DECK   NONE
K3048  1*FORM:  CALL ULCR(I,L)
K3048  2*PURPOSE:  CONVERT SET OF RELOCATABLE BINARY DECKS ON
K3048  3*  SEQUENTIAL FILESET I INTO RANDOM LIBRARY FILESET L,
K3048  4*  SUITABLE FOR LIBRARY L ON $LOAD OR $LDGO CONTROL CARDS.
K3048  5*ROUTINE NAME:  ULCR
K3048  6*ENTRY NAME:  ULCR
K3048  7*STORAGE:  6,400B WORDS OF SCM.  5,000B WORDS OF LCM.
K3048  8*ROUTINES CALLED:  GETBA(ON SYSTEM).
```

```
K3058  A*           EMILY WILLBANKS  C-2                              71
K3058  B*COPYFF - COPY FORTRAN FILE
K3058  C*FIV              SR7600   CROS
K3058  D*                    SW  3     LS  0     TYPE  1
K3058  E*                    0   BCD                          0   BIN
K3058  F**COPYFF*COPY FORTRAN FILE
K3058  G*ON DISK      F4  COMPAT   WU 06/22/71       DECK   NONE
K3058  1*FORM:  CALL COPYFF(I,O,N,NADV)
K3058  2*PURPOSE:  COPY N FILES OF FILESET I (CONTAINING BCD CHARAC-
K3058  3*  TERS) TO FILESET O.  NADV PAGE EJECTS ARE DONE BETWEEN EACH
K3058  4*  FILE.  129 CHARACTERS ARE READ AND WRITTEN PER RECORD.  IF
K3058  5*  FILESET O HAS FILM OR SFILM ACTIVE DISPOSITION, IT WILL BE
K3058  6*  WRITTEN IN 4020 COMMAND FORMAT.
K3058  7*ROUTINE NAME:  COPYFF
K3058  8*ENTRY NAMES:  COPYFF
K3058  9*STORAGE:  223B WORDS OF SCM.
K3058 10*ROUTINES CALLED:  EOI, IFENDF, INPUTC, LENGTH, NARG, OUTPTC,
K3058 11*    (ALL ON SYSTEM).
```

```
K306B  A*          FRED SCHILLING       C-2                          71
K306B  B*COPYL - UPDATE LIBRARY OF BINARY DECKS
K306B  C*F4 COMPASS    SR7600    CROS
K306B  D*                    SW  14    LS  0     TYPE  1
K306B  E*SOURCE CARDS        0   BCD    OBJECT CARDS     0    BIN
K306B  F**COPYL*UPDATE*LIBRARY OF*BINARY DECKS
K306B  G*ON DISK     F4  COMPAT   WU 05/10/72REV.1 DECK  NONE
K306B  1*FORM:  CALL COPYL(OLDBL,CHANGE,NEWBL,ORDER,OUT,CK)
K306B  2*PURPOSE:  MAINTAIN AND REARRANGE A LIBRARY OF BINARY DECKS.
K306B  3*TIMING:  LARGE LCM BUFFERS ARE NEEDED TO ACHIEVE SPEED.
K306B  4*ROUTINE NAME:  COPYL
K306B  5*ENTRY NAMES:  COPYL, REPLACE, BREAKUP, DFILE, SUM
K306B  6*STORAGE:  4206 OCTAL WORDS OF SCM, PLUS BLANK COMMON.
K306B  7*USES ONE WORD OF BLANK COMMON FOR EACH RECORD OF MERGE FILE,
K306B  8*  PLUS ONE WORD FOR EACH DECK NAME IN THE CONTROL CARD LIST
K306B  9*  PLUS TWO.
K306B 10*ROUTINES CALLED:  ABNORMAL, ACGOER, ADDRQT, COPYF, COPYR
K306B 11*  FETCH, IFENDF, MEMLEN, OPEN, OUTPTB, OUTPTC, PUTIT, RDBUF,
K306B 12*  REWIND, SHIFN, SKIPF, SKIPR (ON THE SYSTEM).
```

```
K307B  A*          J. NORRIS        C-2        J. NORRIS        72
K307B  B*CKSUM - ADD OR VERIFY CHECKSUMS.
K307B  C*F4            SR7600   CROS
K307B  D*                    SW   4    LS  0     TYPE 1,2
K307B  E*                SOURCE   0 C-2              OBJECT   0 C-2
K307B  F**CKSUM*CHECKSUM
K307B  G*ON DISK     F4  COMPAT   WU 06/15/73REV.1   DECK  NONE
K307B  1*FORM:  CALL CKSUM(IN,OUT,NF,TYPE)
K307B  2*PURPOSE:  CALCULATE AND VERIFY CHECKSUMS
K307B  3*ROUTINE NAME:  CKSUM
K307B  4*ENTRY NAME:  CKSUM
K307B  5*STORAGE:  1630 OCTAL WORDS SCM AND 10000 OCTAL WORDS OF LCM
K307B  6*ROUTINES CALLED:  RDBUF(Q417B), WTBUF(Q417B), SKIPR(W304B),
K307B  7*      CKSUM2(K310B), LCROLOT/LCROLIN(Q306B),
K307B  8*      MEMREQ/MEMREL/MEMLEN(Q305B), OPEN(W115B),
K307B  9*      MESSAGE(Q116B), SHIFN(M401B), SYSFS(W116B),
K307B 10*      GETQ(Q414B), ENDFIL, OUTPTB, ABNORML, ACGOER, LAFST
K307B 11*      (ALL ON SYSTEM).
```

```
K3088  A*           EMILY WILLBANKS  C-2          J. NORRIS          73
K3088  B*COPYSR-COPY ONE SEQUENTIAL RECORD TO RANDOM FILESET
K3088  C*COMPASS        SR7600   CROS
K3088  D*                    SW 3       LS 0       TYPE 1 .2
K3088  E*                SOURCE   0 C-2                OBJECT   0 C-2
K3088  F**CORY*RANDOM*SEQUENTIAL
K3088  G*ON DISK      F4  COMPAT   WU 06/13/73REV.1  DECK NONE
K3088  1*FORM:  CALL COPYSR(IS,OR,SL)
K3088  2*        CALL COPYSR(IS,OR)
K3088  3*PURPOSE:  COPY ONE RECORD FROM SEQUENTIAL FILESET(IS) TO
K3088  4*      RANDOM FILESET(OR).  IF SECTOR LIST(SL) IS NOT
K3088  5*      GIVEN, DATA WILL BE WRITTEN BEGINNING AT SECTOR
K3088  6*      ZERO.  SECTOR LIST ALLOWS SELECTED SECTORS TO BE
K3088  7*      WRITTEN.
K3088  8*ROUTINE NAME:  COPYSR
K3088  9*  ENTRY NAME:  COPYSR
K3088 10*STORAGE:  230 OCTAL WORDS OF SCM AND UP TO
K3088 11*      234000 OCTAL WORDS OF LCM.
K3088 12*ROUTINES CALLED:  GETBA, SYSTEM, ABNORML, (ALL ON SYSTEM)
K3088 13*      MEMREL(Q305B), MEMLEN(Q305B), MEMREQ(Q305B),
K3088 14*      LCROLIN(Q306B), COPYBFS(W404B).
K3088 15*OTHER SCM EXTERNALS:  IOGEN(SYSTEM)
K3088 16*LCM BLOCK NAMES:  MALCM, RANSEQ
```

```
K3098  A*           EMILY WILLBANKS  C-2          J NORRIS           73
K3098  B*COPYRS - COPY RANDOM FILESET TO ONE SEQUENTIAL RECORD
K3098  C*COMPASS        SR7600   CROS
K3098  D*                    SW 3       LS  0      TYPE 1,2
K3098  E*                SOURCE    0 C-2               OBJECT   0 C-2
K3098  F**COPY*RANDOM*SEQUENTIAL
K3098  G*ON DISK   F4  COMPAT WU 06/13/73 REV.1 DECK NONE
K3098  1*FORM:  CALL COPYRS(IR,OS,SL)
K3098  2*        CALL COPYRS(IR,OS)
K3098  3*PURPOSE:  COPY SECTORS FROM RANDOM FILESET(IR) TO
K3098  4*      ONE RECORD OF SEQUENTIAL FILESET(OS).  IF SECTOR
K3098  5*      LIST(SL) IS NOT GIVEN, ALL RANDOM FILESET WILL
K3098  6*      BE READ.  SECTOR LIST ALLOWS SELECTED SECTORS TO
K3098  7*      BE READ.
K3098  8*ROUTINE NAME:  COPYRS
K3098  9*ENTRY NAME:  COPYRS
K3098 10*STORAGE:  256 (OCTAL) WORDS OF SCM AND UP TO 234000
K3098 11*        (OCTAL) WORDS OF LCM.
K3098 12*ROUTINES CALLED:  GETBA, SYSTEM, ABNORML, (ALL ON SYSTEM)
K3098 13*      MEMREL(Q305B), MEMLEN(Q305B), MEMREQ(Q305B)
K3098 14*      LCROLIN(Q306B), COPYBSF(W404B).
K3098 15*OTHER EXTERNALS:  IOGEN (ON SYSTEM)
K3098 16*LCM BLOCK NAMES:  MALCM, RANSEQ
```

```
K310B  A*           J. NORRIS          C-2          J. NORRIS        73
K310B  B*CKSUM2 - CALCULATE CHECKSUM OF LCM AREA
K310B  C*CMP              SR7600   CROS
K310B  D*                      SW  3     LS  0     TYPE 1,2
K310B  E*C-2 OLDPL4    NO CARDS
K310B  F**CHECKSUM
K310B  G*DISK          F4 COMPAT     WU 06/12/73       DECK NONE
K310B  1*FORM:  CALL CKSUM2(BUFFER,LEN,IFLAG)
K310B  2*PURPOSE:  FORM CHECKSUM OF LCM AREA.
K310B  3*      BUFFER = LCM ARRAY OR INTEGER ADDRESS OF LCM AREA
K310B  4*      LEN = LENGTH OF BUFFER
K310B  5*      IFLAG = 0 FOR PARTIAL, = 1 FOR COMPLETE CHECKSUM
K310B  6*INITIALIZE WITH EITHER LEN = 0 OR IFLAG = 1
K310B  7*ROUTINE NAME:  CKSUM2
K310B  8*ENTRY NAMES:  CKSUM2
K310B  9*STORAGE:  24 OCTAL WORDS OF SCM
K310B 10*ROUTINES CALLED:  SELF CONTAINED
```

K4 CONVERT SEQUENTAL/RANDOM

REVIEWER: J. NORRIS, C-2

```
K402A  A*          MARGE ASPREY     C-4                                69
K402A  B*REORDR-PROGRAM FOR REORDERING ROUTINES ON TAPE FOR OVERLAY
K402A  C*F-4            MP6600 SCP 3.1
K402A  D*                    SW  2     LS  1     TYPE  1
K402A  E*SOURCE CARDS         55  BCD    OBJECT CARDS     17  BIN
K402A  F**REORDR FOR TAPE*OVERLAY*EDIT
K402A  G*CARDS        F4  COMPAT   WU 12/12/69      DECK 12/12/69
K402A  1*CALL NAME:  REORDR
K402A  2*PURPOSE:  REARRANGES ROUTINES ON CARD IMAGES FROM BCD TAPE66
K402A  3*AND REWRITES IN DESIRED ORDER ON BCD TAPE67.
K402A  4*STORAGE:  42000 (OCTAL) WORDS.
K402A  5*SELF CONTAINED
```

```
K403A  A*          MARGE ASPREY     C-4                                69
K403A  B*SUBLST-LISTS AND INDEXES ROUTINES FROM BCD TAPE
K403A  C*F4             MP6600 SCP 3.1
K403A  D*                    SW  2     LS  3     TYPE 1
K403A  E*SOURCE CARDS        143 BCD    OBJECT CARDS    43   BIN
K403A  F**SUBLST*LISTS*INDEXES FROM*CATALOG
K403A  G*CARDS        F4  COMPAT   WU 12/12/69      DECK 12/12/69
K403A  1*CALL NAME:  SUBLST
K403A  2*PURPOSE:  PREPARES A REFERENCE INDEX BY CARD AND PAGE NUMBER
K403A  3*OF PROGRAMS, SUBROUTINES, FUNCTIONS AND BLOCK DATA FROM BCD
K403A  4*TAPE66.
K403A  5*STORAGE:  45000 (OCTAL) WORDS
K403A  6*SELF CONTAINED
```

```
K404A  *(ATOFLO) HAS BEEN DELETED-SERVES NO PURPOSE WITHOUT IBM-7094
```

K5 MAGNETIC TAPE/TAPE, TAPE/CORE, ETC.

REVIEWER: J. NORRIS, C-2

```
K501A  A*          B. L. BUZBEE     C-4          JAN NORRIS        72
K501A  B*READ(WRITE) A 7094 BINARY TAPE
K501A  C*F4              SR6600   SCP 3.1
K501A  D*                    SW  1     LS  2     TYPE  1
K501A  E*F4 SOURCE CARDS      32  BCD  OBJECT CARDS        24   BIN
K501A  F**READ(WRITE) A 7094 BINARY*TAPE
K501A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
K501A  1*FORM:  CALL WRIT94(A,NW,NT)
K501A  2*       CALL READ94(A,NW,NT)
K501A  3*PURPOSE:  WRITES BITS 56 THRU 21 OFWORDS A(1) THRU (NW)
K501A  4*   ONTO LOGICAL UNIT NT.  READS A MAXIMUM OF NW 36 BIT WORDS
K501A  5*   FROM THE NEXT PHYSICAL RECORD ON UNIT NT.  ON RETURN
K501A  6*   IABS(NW) IS THE NUMBER OF 36 BIT WORDS IN THE RECORD
K501A  7*   AND THEY ARE STORED IN BITS 56-21 OF A(1) THRU A(NW).
K501A  8*   NW=0 SIGNALS EOF ENCOUNTERED, NW.LT.0 SIGNALS PARITY
K501A  9*   ERROR.
K501A 10*ROUTINE NAME:  WRIT94
K501A 11*ENTRY NAMES:  WRIT94, READ94
K501A 12*STORAGE:  246 OCTAL WORDS
K501A 13*ROUTINES CALLED:  SHIFN(M401A), LABRT(N103A).
```

```
K502A  A*          B. L. BUZBEE     C-4          JAN NORRIS        72
K502A  B*READ(WRITE) ONE 7094 F4 LOGICAL BINARY RECORD
K502A  C*F4              SR6600   SCP 3.1
K502A  D*                    SW  2     LS  1     TYPE  1
K502A  E*F4 SOURCE CARDS      18   BCD    OBJECT CARDS     12   BIN
K502A  F**READ(WRITE) ONE 7094 F4*LOGICAL BINARY RECORD
K502A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
K502A  1*FORM:  CALL WR94FBT(A,NW,NT,T)
K502A  2*       CALL RD94FBT(A,NW,NT,T)
K502A  3*PURPOSE:  WR94FBT WRITES BITS 56 THRU 21 OF A(1) THRU A(NW)
K502A  4*   ON UNIT NT AS ONE 7094 F4 LOGICAL BINARY RECORD.
K502A  5*   RD94FBT PERFORMS THE CONVERSE.  ON RETURN IABS(NW) IS
K502A  6*   THE NUMBER OF WORDS IN THE RECORD.  NW=0 SIGNALS EOF
K502A  7*   ENCOUNTERED, NW.LT.0 SIGNALS PARITY ERROR.
K502A  8*NOTE:  IN BOTH ENTRIES T MUST BE 256 WORDS (60 BITS) OF
K502A  9*   TEMPORARY STORAGE.
K502A 10*ROUTINE NAME:  WR94FBT
K502A 11*ENTRY NAMES:  WR94FBT, RD94FBT
K502A 12*STORAGE:  129 OCTAL WORDS
K502A 13*ROUTINES CALLED:  SHIFN(M401A)WRIT94FBT AND READ94(K501A).
```

```
K503A  A*           JAMES F. BEM      C-4          J. NORRIS          73
K503A  B*CROS76 - READ 7600-FORMAT TAPE ON 6600
K503A  C*F4-CMP          MP6600
K503A  D*                      SW  5    LS  0      TYPE  1.2
K503A  E*F4-CMP     SOURCE      0    BCD     OBJECT CARDS      0    BIN
K503A  F**MAGNETIC TAPE CONVERSION
K503A  G*PERMFILE     F4   COMPAT    WU 03/13/73       DECK      NONE
K503A  1*CONTROL CARD FORM:
K503A  2*       ASSIGN AB,CROS76.
K503A  3*       COPY(CROS76,CROS)
K503A  4*       RETURN(CROS76)
K503A  5*       ASSIGN MT,TAPEIN(PUL,XX.....,SMB)
K503A  6*       ASSIGN MT,TAPEOUT(...)
K503A  7*       CROS(BIN,TAPEIN,TAPEOUT.OUTPUT)
K503A  8*PURPOSE:  CONVERT 7600-FORMAT TAPE TO 6600-FORMAT TAPE
K503A  9*ROUTINE NAME:  CROS76
K503A 10*STORAGE:  16000 OCTAL WORDS FOR BCD OUTPUT. VARIABLE
K503A 11*      FOR BINARY.  SEE WRITEUP.
K503A 12*SELF CONTAINED
```

```
K5AA   A*           DUANE HARDER      C-4          J NORRIS           70
K5AA   B*TSUB
K5AA   C*COMPASS         MP7600    CROS
K5AA   D*                      SW 2       LS 3       TYPE 2
K5AA   E*SOURCE CARDS          75    BCD     OBJECT CARDS     9     BIN
K5AA   F**TSUB
K5AA   G*CARDS         CMP             WU 09/28/72       DECK 09/28/72
K5AA   1*FORM:  MAIN PROGRAM
K5AA   2*PURROSE:  TSUB IS A MAIN PROGRAM WHICH RUNS ON CROS.  TSUB
K5AA   3*      READS A FILESET CALLED TAPE1 WHICH CONTAINS BCD CODED
K5AA   4*      INFORMATION IN BINARY FORM, CONVERTS THIS TO CARD
K5AA   5*      IMAGES, AND WRITES THEM TO THE FILESET CALLED TAPE2.
K5AA   6*      THE FILESETS TAPE1 AND TAPE2 MUST BE OPENED PRIOR TO
K5AA   7*      EXECUTING TSUB.  ALL DATA ON TAPE1 IS CONVERTED.
K5AA   8*ROUTINE NAME:  TSUB
K5AA   9*ENTRY NAME:  TSUB
K5AA  10*STORAGE:  1157 OCTAL WORDS
K5AA  11*ROUTINES CALLED:  SELF CONTAINED
```

K6 PAPER TAPE

REVIEWER: J. NORRIS, C-2

```
K6AA  A*          LARA BAKER       TD-7        JAN NORRIS       72
K6AA  B*UT01 - GE PAPER TAPE TO RUN FORTRAN CARD CONVERTER
K6AA  C*F4          MP6600   SCP 3.1   RAPER TAPE I/O
K6AA  D*                   SW  7     LS  17   TYPE  2
K6AA  E*F4 SOURCE CARDS     650  BCD    OBJECT CARDS    84   BIN
K6AA  F**UT01*PAPER*TAPE*CARD*GE
K6AA  G*CARDS       F4  COMPAT   WU 08/29/72      DECK 08/29/72
K6AA  1*FORM:  MAIN PROGRAM
K6AA  2*PURPOSE:  CONVERTS A RUNNING GE FORTRAN PROGRAM ON PAPER
K6AA  3*   TAPE TO 6600 RUN FORTRAN FORMAT.  REQUIRES CONTROL
K6AA  4*     CARD:  REQUEST TAPE5,PR,UH.
K6AA  5*ROUTINE NAME:  UT01
K6AA  6*ENTRY NAMES:  UT01,FILL,WRITE,BUF,GETNXT,NEWLINE
K6AA  7*STORAGE:  42,300 OCTAL WORDS.
K6AA  8*SELF CONTAINED.
```

```
K6AB  A*          LARA BAKER       TD-7        JAN NORRIS       72
K6AB  B*UT02 - PUNCHED CARD TO GE PAPER TAPE CONVERTER
K6AB  C*F4            MP6600   SCP 3.1   PAPER TAPE I/O
K6AB  D*                   SW  4     LS  5    TYPE  2
K6AB  E*F4 SOURCE CARDS     223  BCD    OBJECT CARDS    36   BIN
K6AB  F**UT02*CARD*PAPER*TAPE*GE
K6AB  G*CARDS       F4  COMPAT   WU 08/29/72      DECK 08/29/72
K6AB  1*FORM:  MAIN PROGRAM
K6AB  2*PURPOSE:  THIS PROGRAM IS A PUNCHED CARD TO ASCII-II PAPER
K6AB  3*   TAPE CONVERTER.  ALL ALPHANUMERIC AND SOME SPECIAL
K6AB  4*   CHARACTERS ARE CONVERTED.
K6AB  5*   REQUIRES CONTROL CARD:  REQUEST TAPE,PP,UD.
K6AB  6*ROUTINE NAME:  UT02
K6AB  7*ENTRY NAME:  UT02
K6AB  8*STORAGE:  416000 (OCTAL) WORDS
K6AB  9*SELF CONTAINED.
```

```
K6AC   A*           LARA BAKER        TD-7         JAN NORRIS        72
K6AC   B*UT03 - RUN FORTRAN CARDS TO GE PAPER TAPE CONVERTER
K6AC   C*F4              MP6600   SCP 3.1   PAPER TAPE I/O
K6AC   D*                      SW  3     LS 26     TYPE  2
K6AC   E*F4 SOURCE CARDS     724  BCD    OBJECT CARDS    125  BIN
K6AC   F**UT03*CARDS*TAPE*GE
K6AC   G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
K6AC   1*FORM:  MAIN PROGRAM
K6AC   2*PURPOSE:  THIS PROGRAM CONVERTS A RUNNING 6600 FORTRAN
K6AC   3*   PROGRAM ON CARDS TO GE FORTRAN FORMAT ON PAPER TAPE.
K6AC   4*   LINE NUMBERS ARE ADDED AND TRAILING BLANKS ARE REMOVED.
K6AC   5*   REQUIRES THE CONTROL CARD:  REQUEST TAPE5,PP,UD.
K6AC   6*ROUTINE NAME:  UT03
K6AC   7*ENTRY NAME:  UT03
K6AC   8*STORAGE:  42,200 OCTAL WORDS.
K6AC   9*SELF CONTAINED.
```

L

PROGRAM MAINTENANCE

PROGRAMS WHICH MAKE IT EASIER TO MAINTAIN AND DOCUMENT PROGRAMS.

L2 DOCUMENT

E.G., INDEX.

REVIEWER: A. SOLEM, C-4

```
L202B  A*          L RUDSINSKI       C-4          A SOLEM          73
L202B  B*REGREF - EXAMINE REGISTER REFERENCES
L202B  C*CMP             MP7600    CROS
L202B  D*                     SW 6       LS 0       TYPE 1
L202B  E*NO CARDS
L202B  F**OPTIMIZE*COMPASS*CODE
L202B  G*ON DISK                        WU 01/03/73       DECK NONE
L202B  1*7600 CONTROL CARD FORM:  $REGREF(TYPE=COMPASS,
L202B  2*      SOURCE=SOURCE,DOC=BRIEF,EXP=YES,OUT=OUT)
L202B  3*PURPOSE:  EXAMINE REGISTER REFERENCES IN COMPASS
L202B  4*      CODE TO FACILITATE OPTIMIZATION OF COMPASS CODE.
L202B  5*ROUTINE NAME:  REGREF
```

L3 CLEAN

E.G., TIDY.

REVIEWER: A. SOLEM, C-4

```
L301A  A*          A SOLEM          C-4                                  72
L301A  B*TIDY - RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301A  C*F4             MP6600   SCP 3.1
L301A  D*                    SW 15     LS 44     TYPE 1
L301A  E*6600 SOURCE DECK = TAPE NO. LC650L00  OBJECT DECK 1583 BIN
L301A  F**TIDY*RENUMBER AND *EDIT*FORTRAN*SOURCE PROGRAMS
L301A  G*ON DISK     F4  COMPAT   WU 08/23/72     DECK 08/29/72
L301A  1*6600 CONTROL CARD FORM:
L301A  2*     TIDY(INPUT,PUNCH,OUTPUT,TAPE20,TAPE21)
L301A  3*PURPOSE:  RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301A  4*ROUTINE NAME:  TIDY
L301A  5*ENTRY NAME:  TIDY
L301A  6*STORAGE:  57000 OCTAL WORDS
L301A  7*ROUTINES CALLED:  SELF CONTAINED
```

```
L301B  A*          A. SOLEM         C-4                                  72
L301B  B*TIDY - RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS
L301B  C*F4             MP7600   CROS
L301B  D*                    SW 15     LS 44     TYPE 1
L301B  E*7600 SOURCE DECK = TAPE NO. LE242L00  OBJECT DECK  809 BIN
L301B  F**TIDY*RENUMBER AND *EDIT*FORTRAN*SOURCE PROGRAMS
L301B  G*ON DISK     F4  COMPAT   WU 08/29/72      DECK 08/29/72
L301B  1*7600 CONTROL CARD FORM:
L301B  2*     $TIDY(INP=INP,OUT=OUT,PUN=PUN,FSET20=FSET20,FSET21=FSET21)
L301B  3*PURPOSE:  RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301B  4*ROUTINE NAME:  TIDY
L301B  5*ENTRY NAME:  TIDY
L301B  6*STORAGE:   46000 OCTAL WORDS
L301B  7*ROUTINES CALLED:  IOCHECK(SYSTEM)
```

L4 UPDATE

E.G., UPDATE, COPYL.

REVIEWER: F. MCGIRT, C-4

L401A *(CREATE) DELETED FROM THE LIBRARY

L402A *(PREEDIT) DELETED FROM THE LIBRARY

L403A *(EDIT2) DELETED FROM THE LIBRARY

L404A *(VEREDIT) DELETED FROM THE LIBRARY

L405A *(AFWL) DELETED FROM THE LIBRARY

```
L407A  A*           ANN SOLEM         C-2                              70
L407A  B*UPDATE - MAINTAIN LIBRARY OF SYMBOLIC INFORMATION
L407A  C*COMPASS        MP6600   SCOPE
L407A  D*                     SW  27    LS  0     TYPE 1
L407A  E*SOURCE CARDS          0           OBJECT CARDS    0
L407A  F**UPDATE*MAINTAIN*LIBRARY OF*SYMBOLIC*INFORMATION
L407A  G*ON DISK                      WU 05/15/70      DECK   NONE
L407A  1*CALL NAME:  MAIN PROGRAM
L407A  2*PURPOSE:  UPDATE IS USED TO MAINTAIN A LIBRARY OF SOURCE
L407A  3*INFORMATION.  IT IS ON THE SYSTEM CALLABLE VIA CONTROL CARDS
L407A  4*STORAGE:  36000 TO 50000 (OCTAL) WORDS.
L407A  5*SELF CONTAINED
```

```
L4AA   A*           R. ELLIOTT        TD-5         F. MCGIRT
L4AA   B*MAINTAIN LIBRARY OF SYMBOLIC AND BINARY INFORMATION
L4AA   C*F-4      COMPASS MP7600 CROS
L4AA   D*                      SW 28      LS 0       TYPE 2
L4AA   E*NO CARDS
L4AA   F**MOLL*FIXUP*LIBRARY*SYMBOLIC INFORMATION*BINARY INFORMATION
L4AA   G*PERMFILE                        WU 02/01/73       DECK NONE
L4AA   1*FORM:  MAIN PROGRAM
L4AA   2*PURPOSE:  MOLL-FIXUP IS A SET OF TWO PROGRAMS USED TO
L4AA   3*      MAINTAIN A LIBRARY OF SYMBOLIC AND BINARY
L4AA   4*      INFORMATION.  MOLL IS USED TO UPDATE SOURCE CARDS.
L4AA   5*      FIXUP IS USED TO UPDATE BINARY FILES.
L4AA   6*ROUTINE NAMES:  MOLL, FIXUP
```

M DATA HANDLING

M1 SORTING

REVIEWER: P. IWANCHUK, C-4

```
M101A  A*          R. M. FRANK      C-4                              67
M101A  B*EXTENDED SORT ROUTINE - SORT1
M101A  C*FORTRAN 4     SR6600    SCP 3.1
M101A  D*                  SW  2     LS  2     TYPE  1
M101A  E*F4 SOURCE DECK      48  BCD     OBJECT CARDS    15   BIN
M101A  F**SORT1 EXTENDED *SORT
M101A  G*ON DISK     F4  COMPAT   WU 07/09/70REV 3 DECK 07/09/70REV 3
M101A  1*USE:  CALL SORT1(N,L,X,T,Y1,...,YL)
M101A  2*PURPOSE: TO SORT, ALGEBRAICALLY, A TABLE,(X), OF INTEGER
M101A  3*OR NORMALIZED FLOATING POINT NUMBERS AND TO ORDER UP TO 7
M101A  4*TABLES,(YI), OF DEPENDENT NUMBERS ON THE X SORT.
M101A  5*STORAGE:  275 (OCTAL) WORDS.  SORT TIME=58*N**1.29 MICROSEC.
M101A  6*ROUTINES CALLED:  LOCF (ON THE SYSTEM).
```

```
M115A  A*          STANLEY HALL     P-12                             70
M115A  B*SORTECS
M115A  C*F4            SR6600   SCP 3.1
M115A  D*                  SW  2     LS  2     TYPE  1
M115A  E*SOURCE CARDS       72   BCD    OBJECT CARDS    19   BIN
M115A  F**SORT*ECS
M115A  G*CARDS       F4  COMPAT   WU 08/13/70      DECK 08/13/70
M115A  1*USE:  CALL SORTECS(N,L,X,T,IMC,NMC)
M115A  2*PURPOSE:  TO SORT, IN INCREASING ORDER, A TABLE X OF N
M115A  3*INTEGERS OR NORMALIZED FLOATING POINT NUMBERS STORED IN ECS.
M115A  4*STORAGE:  346 (OCTAL) WORDS.
M115A  5*TIMING:  ABOUT TWICE AS LONG AS SORT1(M101A),
M115A  6* I.E., 2*58*N**1.29 MICROSECONDS.
M115A  7*ROUTINES CALLED:  ECRD, ECWR (ON THE SYSTEM).
```

```
M116A  A*          ROGER STUTZ      T-2                              71
M116A  B*ORDER1, ORDER2
M116A  C*F4            SR6600   SCP 3.1
M116A  D*                  SW  3     LS  2     TYPE  1
M116A  E*SOURCE CARDS       72   BCD    OBJECT CARDS    17   BIN
M116A  F**ORDER
M116A  G*CARDS       F4  COMPAT   WU 04/21/71      DECK 04/21/71
M116A  1*USE:  CALL ORDER1(IA,ISEARCH,NX,IC,JJ,NZ)
M116A  2*      CALL ORDER2(IA,ISEARCH,NX,IC,JJ,NZ)
M116A  3*PURPOSE:  RETURN A SORTED KEY OF AN ARRAY (IA).
M116A  4*STORAGE:  320 (OCTAL) WORDS.
M116A  5*ROUTINES CALLED:  PUT,FETCH(M403A).
```

```
M117A  A*           PAUL IWANCHUK     C-4          P. IWANCHUK        72
M117A  B*SORT2 - TWO LEVEL EXTENDED SORT ROUTINE
M117A  C*F4              SR6600    SCP 3.1
M117A  D*                     SW   3    LS  2     TYPE 1.1
M117A  E*F4 SOURCE CARDS      44   BCD    OBJECT CARDS    12   BIN
M117A  F**SORT2*SORTING*TWO LEVEL EXTENDED SORT
M117A  G*CARDS      F4  COMPAT WU 06/14/73 REV 2 DECK 06/14/73 REV 1
M117A  1*FORM:  CALL SORT2(N,IY1,INC1,IY2,INC2,IT,M)
M117A  2*PURPOSE:  OBTAIN THE SORTING ORDER FOR TWO TABLES IY1 AND IY2.
M117A  3*     IY2 IS USED TO DETERMINE THE ORDERING ONLY OF ELEMENTS
M117A  4*     OF IY1 WHICH ARE IDENTICAL.  OTHERWISE, THE ORDERING
M117A  5*     IS BASED ON THE ELEMENTS OF IY1.
M117A  6*ROUTINE NAME:  SORT2
M117A  7*ENTRY NAME:  SORT2
M117A  8*STORAGE:  204 (OCTAL) WORDS
M117A  9*SELF CONTAINED
```

```
M117B  A*           PAUL IWANCHUK     C-4          P. IWANCHUK        72
M117B  B*SORT2 - TWO LEVEL EXTENDED SORT ROUTINE
M117B  C*F4              SR7600    CROS
M117B  D*                     SW   3    LS  2     TYPE 1.1
M117B  E*F4 SOURCE CARDS      44   BCD    OBJECT CARDS    12   BIN
M117B  F**SORT2*SORTING*TWO LEVEL EXTENDED SORT
M117B  G*CARDS      F4  COMPAT WU 06/14/73 REV 2 DECK 06/14/73 REV 1
M117B  1*FORM:  CALL SORT2(N,IY1,INC1,IY2,INC2,IT,M)
M117B  2*PURPOSE:  OBTAIN THE SORTING ORDER FOR TWO TABLES IY1 AND IY2.
M117B  3*     IY2 IS USED TO DETERMINE THE ORDERING ONLY OF ELEMENTS
M117B  4*     OF IY1 WHICH ARE IDENTICAL.  OTHERWISE, THE ORDERING
M117B  5*     IS BASED ON THE ELEMENTS OF IY1.
M117B  6*ROUTINE NAME:  SORT2
M117B  7*ENTRY NAME:  SORT2
M117B  8*STORAGE:  207 (OCTAL) WORDS
M117B  9*SELF CONTAINED
```

```
M118A  A*           R.M. FRANK        C-4          P. IWANCHUK       72
M118A  B*RAPID SEARCH OF A FLOATING POINT TABLE
M118A  C*F4              SR6600   SCP 3.1
M118A  D*                     SW  3     LS  2     TYPE  1
M118A  E*F4 SOURCE CARDS     57   BCD    OBJECT CARDS    27   BIN
M118A  F**RAPID*SEARCH*TABLE*LOOK-UP
M118A  G*ON DISK      F4  COMPAT   WU 08/29/72      DECK 08/29/72
M118A  1*FORM:  CALL SEARCH (XBAR,X,N,I,MFLAG)
M118A  2*PURPOSE:  SEARCHES A TABLE OF N MONOTONIC INTEGER OR NORMAL-
M118A  3*   IZED FLOATING POINT NUMBERS, X, FOR XBAR. ON RETURN
M118A  4*   I CONTAINS THE INDEX OF THE TABLE ENTRY FOUND EQUAL
M118A  5*   TO XBAR AND MFLAG = 0, OR I IS SET SO THAT ABS(X(I)).
M118A  6*   .LT.XBAR.LT.ABS(X(I+1)) AND MFLAG = 1.  IF XBAR IS NOT
M118A  7*   WITHIN THE RANGE OF THE TABLE X RETURN IS WITH MFLAG = 2.
M118A  8*ROUTINE NAME:  SEARCH
M118A  9*ENTRY NAME:  SEARCH
M118A 10*STORAGE:  207 OCTAL WORDS.
M118A 11*ROUTINES CALLED:  LABRT(N103A).
```

```
M119A  A*           LARA BAKER        TD-7         P. IWANCHUK       72
M119A  B*ESEARCH - A BINARY SEARCH THROUGH EXTENDED CORE STORAGE
M119A  C*F4     CMP     SR6600   SCP 3.1
M119A  D*                     SW  2     LS  1     TYPE  1
M119A  E*SOURCE CARDS     27   BCD    OBJECT CARDS    10   BIN
M119A  F**ESEARCH*ECS
M119A  G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
M119A  1*FORM:  CALL ESEARCH(XBAR,XBAS,N,I,MFLAG,INC)
M119A  2*PURPOSE: TO RAPIDLY SEARCH AN ARRAY OF MONOTONICALLY INCREAS-
M119A  3*   ING INTEGERS OR NORMALIZED FLOATING POINT NUMBERS IN ECS.
M119A  4*ROUTINE NAME:  ESEARCH
M119A  5*ENTRY NAME:  ESEARCH
M119A  6*STORAGE:  154 OCTAL WORDS.
M119A  7*ROUTINES CALLED:  ECR(K203A).
```

```
M1AA  A *           R.F. THOMAS       T-5                              69
M1AA  B *ALPHABETIC SORT FILE
M1AA  C *FORTRAN IV     SR6600    SCP 3.1          ECS
M1AA  D *                         SW  4      LS 10      TYPE  2
M1AA  E *SOURCE CARDS       553    BCD        OBJECT CARDS    131  BIN
M1AA  F **ALPHABETIC*SORT*FILE
M1AA  G *CARDS         F4  COMPAT    WU 08/07/69       DECK 08/07/69
M1AA  1 *CALL SORT(INP,OUT,TMPSTO,LREC,LTMP,DB,NF,FC,NC,MXECS)
M1AA  2 *SORT READS FILE ≠INP≠ AND SORTS THE RECORDS ALPHABETICALLY,
M1AA  3 *WRITING THE SORTED RECORDS ON FILE ≠OUT≠.
M1AA  4 *OCCUPIES 3014 (OCTAL) WORDS.
M1AA  5 *THE PACKAGE INCLUDES 6 FORTRAN SUBROUTINES, WHICH IN ADDITION
M1AA  6 *TO ≠SORT≠HAVE THE NAMES ≠CORSET≠, ≠IERSRT≠, ≠MERGE≠, ≠LEN1≠,
M1AA  7 *AND ≠LEN2≠.  THE FOLLOWING STANDARD LIBRARY SUBROUTINES ARE
M1AA  8 *USED: CPAREA(Q401A), SHIFT(M401A), ECWR, ECRD, AND LENGTH.
```

M2 CONVERSION/SCALING

PERTAINS TO ANY CONVERSION OR SCALING ROUTINE (PACKED OR UNPACKED, SINGLE OR MULTIPLE PRECISION), SUCH AS CARD IMAGE TO BCD, BINARY TO BCD, FIXED TO FLOATING. THE PRIMARY FUNCTION MUST BE CONVERSION OR SCALING, NOT INPUT/OUTPUT.

REVIEWER: P. IWANCHUK, C-4

M2AA *(UT01) HAS BEEN REDESIGNATED K6AA.

M2AB *(UT02) HAS BEEN REDESIGNATED K6AB.

M2AC *(UT03) HAS BEEN REDESIGNATED K6AC.

```
M2AD   A*          B.L.BUZBEE        C-4          P.IWANCHUK        72
M2AD   B*CONVERT 6600(7094) FLOATING PT. TO 7094(6600) FL. PT.
M2AD   C*F4              SR6600   SCP 3.1
M2AD   D*                   SW  1     LS  1     TYPE  2
M2AD   E*F4 SOURCE CARDS      7   BCD    OBJECT CARDS     6   BIN
M2AD   F**CONVERT 6600(7094)FL. PT. TO 7094(6600) FL. PT.
M2AD   G*CARDS       F4  COMPAT   WU 09/22/72      DECK 09/22/72
M2AD   1*FORM: Y = F66F94(X)
M2AD   2*       X = F94F66(Y)
M2AD   3*PURPOSE:  F66F94 CONVERTS THE 60 BIT 6600 FL.PT. NUMBER
M2AD   4*      IN X INTO A 36 BIT 7094 FL.PT. NUMBER STORED IN
M2AD   5*      BITS 56 THRU 21 OF Y.
M2AD   6*           F94F66 IS THE CONVERSE OF THE ABOVE.
M2AD   7*ROUTINE NAME:  F66F94
M2AD   8*ENTRY NAMES:  F66F94, F94F66
M2AD   9*STORAGE:  53 OCTAL WORDS.
M2AD  10*SELF CONTAINED.
```

```
M2AE   A*           B.L.BUZBEE        C-4          P.IWANCHUK        72
M2AE   B*CONVERT 6600 DISPLAY CODE TO 7094INTERNAL BCD(AND CONVERSE)
M2AE   C*F4              SR6600   SCP 3.1
M2AE   D*                      SW  1     LS  1     TYPE  2
M2AE   E*F4 SOURCE CARDS     19   BCD    OBJECT CARDS    11   BIN
M2AE   F**CONVERT 6600 DC TO 7094 INTERNAL BCD (AND CONVERSE)
M2AE   G*CARDS        F4  COMPAT   WU 09/22/72      DECK 09/22/72
M2AE   1*FORM:  Y = DISI94(X)
M2AE   2*       X = I94DIS(Y)
M2AE   3*PURPOSE:  DISI94 CONVERTS THE 10 CHARACTERS OF DISPLAY
M2AE   4*      CODE IN X INTO THE ASSOCIATED 7094 INTERNAL BCD
M2AE   5*      REPRESENTATION
M2AE   6*           I94DIS PERFORMS THE CONVERSE
M2AE   7*ROUTINE NAME:  DISI94
M2AE   8*ENTRY NAMES:  DISI94,I94DIS
M2AE   9*STORAGE:  125 OCTAL WORDS
M2AE  10*ROUTINES CALLED:  SHIFN(M401A).
```

M4 BIT OR CHARACTER MANIPULATION

E.G., SHIFT, PUT, FETCH.

REVIEWER: P. IWANCHUK, C-4

```
M401A  A*          B.L. BUZBEE       C-4          J.D. KERSHNER     67
M401A  B*SHIFT
M401A  C*COMPASS        SR6600   SCP 3.1
M401A  D*                                SW  1     LS  1
M401A  E*COMPASS SOURCE CARDS  30 BCD                          4    BIN
M401A  F**SHIFT AND SHIFN
M401A  G*ON DISK      F4  COMPAT   WU 01/24/69REV 3 DECK 01/02/69REV 2
M401A  1*CALL SHIFT(IN,OUT,NBITS) WHERE IN IS THE WORD TO BE
M401A  2*SHIFTED, OUT IS THE SHIFTED RESULT NBITS IS THE NUMBER
M401A  3*OF BITS TO BE SHIFTED LEFT OR RIGHT,NBITS POSITIVE
M401A  4*INDICATES A RIGHT SHIFT,NEGATIVE A LEFT SHIFT
M401A  5*SIGN EXTENSION AND END AROUND ARE ZEROED OUT
M401A  6*CALL SHIFN(A,B,N) WHERE A IS THE WORD TO BE SHIFTED, B IS THE
M401A  7*RESULT, AND N IS THE NUMBER OF BITS TO SHIFT.  N POSITIVE
M401A  8*PRODUCES LEFT SHIFT(END AROUND). N NEGATIVE PRODUCES RIGHT
M401A  9*SHIFT(END-OFF WITH SIGN EXTENSION).
M401A 10*STORAGE 13 WORDS
M401A 11*THIS ROUTINE IS SELF CONTAINED
```

```
M403A  A*           R. FRANK          C-4          P. IWANCHUK      69
M403A  B*PUTS AND FETCHES CHARACTERS
M403A  C*COMRASS        SR6600   SCP 3.1
M403A  D*                      SW  1     LS  1     TYPE  1.1
M403A  E*SOURCE CARDS         43   BCD    OBJECT CARDS     6   BIN
M403A  F**PUT*FETCH*CHARACTER
M403A  G*DISK        F4 COMPAT WU 05/25/73 REV.3 DECK 05/12/70 REV.2
M403A  1*FORM:  CALL PUT (N,X,Y)
M403A  2*    WHERE  N= NTH CHARACTER OF ARRAY X.
M403A  3*           X= ARRAY INTO WHICH Y IS TO BE PUT.
M403A  4*           Y= CHARACTER TO BE PUT INTO ARRAY X.
M403A  5*        CALL FETCH(N,X,Y)
M403A  6*    WHERE  N= NTH CHARACTER OF ARRAY X.
M403A  7*           X= ARRAY FROM WHICH CHARACTER IS TO BE FETCHED.
M403A  8*           Y= WORD INTO WHICH NTH CHARACTER OF X IS TO BE STORED.
M403A  9*PURPOSE:  PUT A CHARACTER INTO NTH CHARACTER OF AN ARRAY
M403A 10*       OR FETCH THE NTH CHARACTER FROM AN ARRAY OF
M403A 11*          10 CHARACTER WORDS,
M403A 12*          AND STORE IT RIGHT ADJUSTED INTO A WORD.
M403A 13*ROUTINE NAME:  PUT
M403A 14*ENTRY NAMES:  PUT, FETCH
M403A 15*STORAGE: 42 (OCTAL) WORDS
M403A 16*SELF CONTAINED
```

```
M404A  A*          L. RUDSINSKI     C-4          R FRANK          72
M404A  B*MOVE STRING OF CHARACTERS FROM X TO Y
M404A  C*COMRASS       SR6600   SCP 3.1
M404A  D*                   SW  2     LS  6     TYPE 1
M404A  E*SOURCE CARDS        132  BCD    OBJECT CARDS      8  BIN
M404A  F**CHARACTER *STRING
M404A  G*CARDS       F4  COMPAT   WU 05/26/72REV.3 DECK 05/26/72REV.3
M404A  1*FORM:  CALL PUTIT(X,JCH1,JCH2,Y,K1)
M404A  2*PURPOSE:  MOVE CHARACTERS JCH1 THRU JCH2 FROM ARRAY X TO
M404A  3*     ARRAY Y AT POSITION K1.
M404A  4*ROUTINE NAME:  PUTIT
M404A  5*ENTRY NAME:  PUTIT
M404A  6*STORAGE:  102 OCTAL WORDS
M404A  7*ROUTINES CALLED:  PUT(M403A)
```

```
M404B  A*          L. RUDSINSKI     C-4          R. FRANK         72
M404B  B*MOVE STRING OF CHARACTERS FROM X TO Y
M404B  C*COMPASS       SR7600   CROS
M404B  D*                   SW  2     LS  6     TYPE 1
M404B  E*SOURCE CARDS        132  BCD    OBJECT CARDS      8  BIN
M404B  F**CHARACTER *STRING
M404B  G*ON DISK     F4  COMPAT   WU 05/26/72REV.1 DECK05/26/72REV.1
M404B  1*FORM:  CALL PUTIT(X,JCH1,JCH2,Y,K1)
M404B  2*PURPOSE:  MOVE CHARACTERS JCH1 THRU JCH2 FROM ARRAY X TO
M404B  3*     ARRAY Y AT POSITION K1.
M404B  4*ROUTINE NAME:  PUTIT
M404B  5*ENTRY NAME:  PUTIT
M404B  6*STORAGE:  102 (OCTAL) WORDS
M404B  7*ROUTINES CALLED:  PUT(M403A)
```

```
M405A  A*          JENNIE BORING    C-4                          69
M405A  B*GETIT
M405A  C*FORTRAN IV    SR6600   SCP 3.1
M405A  D*                   SW  2     LS  1     TYPE  1
M405A  E*SOURCE CARDS        18   BCD    OBJECT CARDS    7    BIN
M405A  F**GETIT
M405A  G*CARDS       F4  COMPAT   WU 08/14/69      DECK 08/14/69
M405A  1*USAGE:  CALL GETIT(X,JCH1,JCH2,Y) WHERE:  X= AN ARRAY.
M405A  2*PURPOSE:  TO STORE A STRING OF CHARACTERS (MAX. LENGTH 10)
M405A  3*OF AN ARRAY INTO A VARIABLE.
M405A  4*STORAGE:  76 (OCTAL) WORDS
M405A  5*USES:  ASHIFT(M406A), SHIFT(M401A).
```

```
M406A  A*          JENNIE BORING    C-4                          69
M406A  B*ASHIFT
M406A  C*FORTRAN IV    SR6600   SCP 3.1
M406A  D*                   SW  2     LS  1     TYPE  1
M406A  E*SOURCE CARDS        17   BCD    OBJECT CARDS     7   BIN
M406A  F**ASHIFT
M406A  G*CARDS       F4  COMPAT   WU 08/14/69      DECK 08/14/69
M406A  1*USAGE: CALL ASHIFT(X,JCH1,JCH2,Y) WHERE: X= AN ARRAY.
M406A  2*PURPOSE: TO STORE A STRING OF CHARACTERS OF A WORD OF AN
M406A  3*ARRAY INTO A VARIABLE.
M406A  4*STORAGE: 74 (OCTAL) WORDS
M406A  5*USES: SHIFT(M401A).
```

```
M407A  A*          WILLARD DRAISIN  C-4          TOM GODFREY      69
M407A  B*LSHIFT
M407A  C*CMP           IR6600   SCP 3.1
M407A  D*                   SW  1     LS  1     TYPE  1
M407A  E*SOURCE CARDS        9   BCD    OBJECT CARDS     3   BIN
M407A  F**LSHIFT
M407A  G*CARDS       F4  COMPAT   WU 08/25/69      DECK 08/25/69
M407A  1*CALL: LSHIFT
M407A  2*PURPOSE: LSHIFT IS A COMPASS FUNCTION.
M407A  3*THE STATEMENT B = LSHIFT (A,X) SHIFTS A LEFT X BITS
M407A  4*END AROUND AND STORES THE RESULT IN B.  A IS NOT CHANGED.
M407A  5*STORAGE: 3 LOCATIONS.
M407A  6*SELF-CONTAINED.
```

```
M411A  A*          VERNA GARDINER   C-4                          72
M411A  B*NONES AND IPARITY -RETURN NUMBER OF ONES OR PARITY
M411A  C*CMP           SR6600   SCP 3.1
M411A  D*                   SW  2     LS  1     TYPE  1
M411A  E*CMP SOURCE CARDS    20   BCD    OBJECT CARDS     4   BIN
M411A  F**NONES*IPARITY
M411A  G*CARDS  F4  COMPAT        WU 03/02/72      DECK 03/02/72
M411A  1*FORM:  N = NONES(WORD)
M411A  2*       I = IPARITY(WORD)
M411A  3*PURPOSE:  NONES RETURNS NUMBER OF ONES IN WORD.
M411A  4*   IPARITY RETURNS 1 IF NUMBER OF ONES IN WORD IS ODD OR
M411A  5*   0 IF NUMBER OF ONES IS EVEN.
M411A  6*ROUTINE NAME:  NONES
M411A  7*ENTRY POINTS:  NONES, IPARITY
M411A  8*STORAGE:  12(OCTAL) WORDS.
M411A  9*SELF CONTAINED.
```

```
M4118  A*           VERNA GARDINER   C-4                                72
M4118  B*NONES AND IPARITY -RETURN NUMBER OF ONES OR PARITY
M4118  C*CMP            SR7600   CROS
M4118  D*                    SW  2     LS  1     TYPE  1
M4118  E*CMP SOURCE CARDS    20   BCD    OBJECT CARDS     4   BIN
M4118  F**NONES*IPARITY
M4118  G*ON DISK     F4  COMPAT   WU 03/02/72      DECK 03/02/72
M4118  1*FORM:  N = NONES(WORD)
M4118  2*       I = IPARITY(WORD)
M4118  3*PURROSE:  NONES RETURNS NUMBER OF ONES IN WORD.  IPARITY
M4118  4*   RETURNS 1 IF NUMBER OF ONES IN WORD IS ODD OR 0 IF
M4118  5*   NUMBER OF ONES IS EVEN.
M4118  6*ROUTINE NAME:  NONES
M4118  7*ENTRY POINTS:  NONES, IPARITY
M4118  8*STORAGE:  12(OCTAL) WORDS.
M4118  9*SELF CONTAINED.
```

```
M412A  A*           B. BACON         C-2         P. IWANCHUK, C-4 70
M412A  B*LOGICAL DIFFERENCE (EXCLUSIVE OR) INLINE FUNCTION
M412A  C*CMP            OR6600   SCP 3.1RUN COMPILER
M412A  D*                    SW 1      LS  0     TYPE 1,2
M412A  E*                SOURCE   0  C-2             OBJECT    0 C-2
M412A  F**EXCLUSIVE OR*LOGICAL DIFFERENCE*INLINE FUNCTION
M412A  G*DISK        F4 COMPAT WU 04/20/73       DECK NONE
M412A  1*FORM:  OUT = EXOR (IN1,IN2)
M412A  2*PURPOSE:  RETURN THE LOGICAL DIFFERENCE (I.E., EXCLUSIVE
M412A  3*       OR) OF THE TWO ARGUMENTS IN1 AND IN2.  THIS
M412A  4*       FUNCTION IS INLINE (IN THE RUN COMPILER) AND IS
M412A  5*       MODELESS (I.E., THE RESULT WILL NEVER BE CONVERTED
M412A  6*       TO ANOTHER MODE).
M412A  7*ENTRY NAMES:  EXOR
```

```
M412B  A*           B. BACON         C-2         P. IWANCHUK, C-4 70
M412B  B*LOGICAL DIFFERENCE (EXCLUSIVE OR) INLINE FUNCTION
M412B  C*CMP            OR7600   CROS   RUN COMPILER
M412B  D*                    SW 1      LS  0     TYPE 1,2
M412B  E*                SOURCE   0  C-2             OBJECT    0 C-2
M412B  F**EXCLUSIVE OR*LOGICAL DIFFERENCE*INLINE FUNCTION
M412B  G*DISK        F4 COMPAT WU 04/20/73       DECK NONE
M412B  1*FORM:  OUT = EXOR (IN1,IN2)
M412B  2*PURPOSE:  RETURN THE LOGICAL DIFFERENCE (I.E., EXCLUSIVE
M412B  3*       OR) OF THE TWO ARGUMENTS IN1 AND IN2.  THIS
M412B  4*       FUNCTION IS INLINE (IN THE RUN COMPILER) AND IS
M412B  5*       MODELESS (I.E., THE RESULT WILL NEVER BE CONVERTED
M412B  6*       TO ANOTHER MODE).
M412B  7*ENTRY NAMES:  EXOR
```

```
M413A  A*           B. BACON          C-2          P. IWANCHUK, C-4 70
M413A  B*SHIFT - INLINE FUNCTION
M413A  C*CMP              OR6600   SCP 3.1RUN COMPILER
M413A  D*                    SW   1    LS  0     TYPE 1.2
M413A  E*                 SOURCE    0 C-2           OBJECT    0 C-2
M413A  F**SHIFT*INLINE FUNCTION
M413A  G*DISK        F4 COMPAT WU 04/20/73        DECK NONE
M413A  1*FORM:  OUT = SHIFT (IN,BITS)
M413A  2*PURPOSE:  SHIFT THE WORD IN BY IABS(NBITS) BITS AND RETURN
M413A  3*        THE RESULT.  IABS(NBITS).LT.64
M413A  4*        IF NBITS.GE.0, LEFT SHIFT CIRCULAR.
M413A  5*        IF NBITS.LT.0, RIGHT SHIFT WITH SIGN EXTENSION.
M413A  6*        THIS FUNCTION IS INLINE (IN THE RUN COMPILER) AND
M413A  7*        IS MODELESS (I.E., THE RESULT WILL NEVER BE
M413A  8*        CONVERTED TO ANOTHER MODE).  SHIFT(M413) BEHAVES
M413A  9*        THE SAME AS SHIFN(M401).
M413A 10*ENTRY NAMES:  SHIFT
```

```
M413B  A*           B. BACON          C-2          P. IWANCHUK, C-4 70
M413B  B*SHIFT - INLINE FUNCTION
M413B  C*CMP              OR7600   CROS RUN COMPILER
M413B  D*                    SW   1    LS  0     TYPE 1.2
M413B  E*                 SOURCE    0 C-2           OBJECT    0 C-2
M413B  F**SHIFT*INLINE FUNCTION
M413B  G*DISK        F4 COMPAT WU 04/20/73        DECK NONE
M413B  1*FORM:  OUT = SHIFT (IN,BITS)
M413B  2*PURROSE:  SHIFT THE WORD IN BY IABS(NBITS) BITS AND RETURN
M413B  3*        THE RESULT.  IABS(NBITS).LT.64
M413B  4*        IF NBITS.GE.0, LEFT SHIFT CIRCULAR.
M413B  5*        IF NBITS.LT.0, RIGHT SHIFT WITH SIGN EXTENSION.
M413B  6*        THIS FUNCTION IS INLINE (IN THE RUN COMPILER) AND
M413B  7*        IS MODELESS (I.E., THE RESULT WILL NEVER BE
M413B  8*        CONVERTED TO ANOTHER MODE).  SHIFT(M413) BEHAVES
M413B  9*        THE SAME AS SHIFN(M401).
M413B 10*ENTRY NAMES:  SHIFT
```

N DEBUGGING

N1 TRACING OR TRAPPING

E.G., LABRT. ALSO INCLUDES SOME INTERRUPT HANDLING (SEE Q2).

REVIEWER: A. SOLEM, C-4

```
N103A  A*           PAUL HARPER      T-1                              67
N103A  O*LOS ALAMOS ABORTER AND MESSAGE PRINTER
N103A  B*MATH SR ERRORS  N1            F4              SR6600   SCOPE
N103A  C*                             SW  2     LS  1
N103A  D*F4 SOURCE CARDS        218CDREL BIN                    8BIN
N103A  S**ERROR*TERMINATION*COMMENT
N103A 10*ON DISK      F4  COMPAT   WU 08/31/67      DECK 08/31/67
N103A 11*CALL LABRT(ISW,LHOL,INT)  WHERE ISW AND INT ARE NAMES OF
N103A 12*FORTRAN IV INTEGERS AND LHOL IS THE NAME OF 50 HOLLERITH
N103A 13*CHARACTERS.  PRINTS MESSAGES UNDER FORMAT(1H0,9X,5A10,3X,06),
N103A 14*SETS LINE COUNT, AND CAUSES JOB TERMINATION ACCORDING TO ISW
N103A 15*SETTINGS.  USED WITH MATH SUBROUTINES FOR ERROR MESSAGES
N103A 16*AND/OR JOB TERMINATION.
N103A 17*SELF-CONTAINED.  73 WORDS STORAGE.
```

```
N105A  A*           JAMES T. KOCH    C-2                              69
N105A  B*MODE ERRORS PROCESSED BY PROGRAMMER (MEPBP)
N105A  C*CMP            SR6600 SCP 3.1
N105A  D*                     SW  3    LS  1      TYPE  1
N105A  E*SOURCE CARDS          43  BCD    OBJECT CARDS     4    BIN
N105A  F**MODE*ERROR*MEPBP
N105A  G*ON DISK      F4  COMPAT   WU 10/30/69      DECK 10/30/69
N105A  1*CALL NAME:  MEPBP(IA)
N105A  2*PURPOSE:  ALLOWS THE OBJECT PROGRAM TO PROCESS MODE ERRORS.
N105A  3*STORAGE:  15 (OCTAL) WORDS.
N105A  4*ROUTINES CALLED:  PP ROUTINE (ON DISK).
```

```
N1068  A*           JERRY MELENDEZ   C-4                              71
N1068  B*ENTER AN INTERRUPT ADDRESS
N1068  C*CMP             SR7600   CROS
N1068  D*                     SW  4     LS  0     TYPE 1
N1068  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
N1068  F**ENTER*INTERRUPT ADDRESS
N1068  G*ON DISK     F4  COMPAT   WU 08/04/71      DECK     NONE
N1068  1*FORM:  CALL ENTRH (IADD)
N1068  2*       CALL ENTRS (IADD)
N1068  3*       CALL ENTRTM (IADD)
N1068  4*PURPOSE:  TO ENTER INTERRUPT ADDRESSES IN USER MONITOR.
N1068  5*ROUTINE NAME:  ENTR
N1068  6*ENTRY NAMES:  ENTRH, ENTRS, ENTRTM
N1068  7*STORAGE:  34 OCTAL WORDS OF SCM.
N1068  8*SELF CONTAINED.
```

```
N1078  A*           JERRY MELENDEZ   C-4                              71
N1078  B*RETURN FROM AN INTERRUPT STATE
N1078  C*CMP             SR7600   CROS
N1078  D*                     SW  2     LS  0     TYPE 1
N1078  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS     0   BIN
N1078  F**RETURN FROM AN *INTERRUPT STATE
N1078  G*ON DISK     F4  COMPAT   WU 08/04/71      DECK     NONE
N1078  1*FORM:  CALL RETNH
N1078  2*       CALL RETNS
N1078  3*       CALL RETNTM
N1078  4*       CALL RETND
N1078  5*PURPOSE:  RETURN THE JOB TO ITS PREVIOUS OPERATING STATE.
N1078  6*ROUTINE NAME:  RETN
N1078  7*ENTRY NAMES:  RETNH, RETNS, RETNTM, RETND.
N1078  8*STORAGE:  30 OCTAL WORDS OF SCM.
N1078  9*SELF CONTAINED.
```

```
N1088  A*          ANN SOLEM        C-4                                  71
N1088  B*XIT,XITFIX AND XITSAVE - HANDLE TASK ABORT
N1088  C*F4              SR7600   CROS
N1088  D*                    SW  4     LS  0     TYPE 1.2
N1088  E*F4 SOURCE CARDS      0   C-2    OBJECT CARDS    0    C-2
N1088  F**XIT*HANDLE*TASK*ABORT*SOFTWARE*INTERRUPT
N1088  G*ON DISK   F4  COMPAT     WU 03/14/73 REV 1 DECK  NONE
N1088  1*FORM:  CALL XIT(LOC)
N1088  2*       CALL XITFIX(KJST,IP,IPSD)
N1088  3*       CALL XITSAVE(LOC,LOOP)
N1088  4*       CALL XIT(LOC,LOOP)
N1088  5*PURPOSE:  XIT ALLOWS A TASK TO CONTINUE RUNNING AFTER A
N1088  6*      TASK ABORT HAS BEEN REQUESTED. TRANSFERRING
N1088  7*      CONTROL TO LOC.
N1088  8*           XITFIX RETURNS INFORMATION REGARDING THE LAST
N1088  9*      TASK ABORT AND TURNS OFF THE ERROR FLAG.
N1088 10*           XITSAVE AND XIT SAVE AND RESTORE AN EXIT, SO THAT
N1088 11*      A DIFFERENT EXIT CAN BE ESTABLISHED.
N1088 12*ROUTINE NAME:  XIT
N1088 13*ENTRY NAMES:  XIT, XITFIX,XITSAVE
N1088 14*STORAGE:  266 (OCTAL) WORDS OF SCM
N1088 15*ROUTINES CALLED:  ENTRS(N106), GETSPK(Q413), SETSPK(Q413),
N1088 16*      RETNS(N107), REMARK(Q116), ABORT(N203), OUTPTS(SYSTEM)
```

```
N1098  A*          JERRY MELENDEZ   C-4                                  71
N1098  B*END INTERRUPT REQUEST
N1098  C*CMP             SR7600   CROS
N1098  D*                    SW  2     LS  0     TYPE 1
N1098  E*CMP SOURCE CARDS     0   BCD                        0   BIN
N1098  F**END*INTERRUPT REQUEST
N1098  G*ON DISK     F4  COMPAT   WU 08/05/71       DECK      NONE
N1098  1*FORM:  CALL ENDH
N1098  2*       CALL ENDS
N1098  3*       CALL ENDTM
N1098  4*       CALL ENDD
N1098  5*PURPOSE:  TO END THE OUTSTANDING INTERRUPT REQUEST(S) OF A
N1098  6*       GIVEN TYPE.
N1098  7*ROUTINE NAME:  ENDS
N1098  8*ENTRY NAMES:  ENDH, ENDS, ENDTM, ENDD
N1098  9*STORAGE:  33 OCTAL WORDS OF SCM.
N1098 10*SELF CONTAINED
```

N2 DUMPING

CORE, TAPE, DISK, CONSOLE PRINTOUTS (ONLINE OR OFFLINE). E.G., ABORT, DUMP, DMPPK.

REVIEWER: A. SOLEM, C-4

```
N203A  A*           VERNA GARDINER   C-4                              71
N203A  B*ABORT JOB
N203A  C*F4, CMP        SR6600   SCP 3.1
N203A  D*                    SW  3     LS  3     TYPE  1
N203A  E*SOURCE CARDS         85  BCD    OBJECT CARDS       13  BIN
N203A  F**ABORT
N203A  G*ON DISK      F4  COMPAT   WU 01/16/73REV.6 DECK 05/12/72REV.4
N203A  1*FORM:  CALL ABORT
N203A  2*PURPOSE:  TO TERMINATE A JOB ABNORMALLY,
N203A  3*  GIVING ERROR 39 AND A TRACEBACK
N203A  4*ROUTINE NAME:  ABORT
N203A  5*ENTRY NAME:  ABORT
N203A  6*STORAGE:  170 (OCTAL) WORDS
N203A  7*OTHER EXTERNALS:  N203SR, N203RR
N203A  8*ROUTINES CALLED:  SYSTEMC, SYSTEMP(ON THE SYSTEM).
```

```
N203B  A*           VERNA GARDINER   C-4                              71
N203B  B*ABORT JOB
N203B  C*F4, CMP        SR7600   CROS
N203B  D*                    SW  3     LS  3     TYPE  1
N203B  E*F4 SOURCE CARDS      88   BCD    OBJECT CARDS       13  BIN
N203B  F**ABORT
N203B  G*ON DISK      F4  COMPAT   WU 01/16/73REV.3 DECK 01/16/73REV.2
N203B  1*FORM:  CALL ABORT
N203B  2*PURPOSE:  TO ABORT A TASK, GIVING ERROR 39 AND A TRACEBACK,
N203B  3*ROUTINE NAME:  ABORT
N203B  4*ENTRY NAME:  ABORT
N203B  5*STORAGE:  170 OCTAL WORDS
N203B  6*OTHER EXTERNALS:  N203SR, N203RR
N203B  7*ROUTINES CALLED:  SYSTEMC, SYSTEMP (ON THE SYSTEM).
```

```
N204A  A*           BARBARA BACON    C-2                              67
N204A  O*DUMP CENTRAL MEMORY LOCATIONS
N204A  B*DUMPING        N2              FORTRANCOMPASS SR6600   SCOPE
N204A  C*                              SW  2  LS  2
N204A  D*FORTRAN,COMPASS CARDS  73BCDBINARY CARDS         28BIN
N204A  S**DUMPING
N204A 10*ON DISK      F4  COMPAT  WU 05/09/68 REV  DECK 05/09/68 REV
N204A 11*CALL DUMPA (FWA,LWA,M)
N204A 12*DUMPS CENTRAL MEMORY FROM LOCATION RA+FWA TO
N204A 13*LOCATION RA+LWA IN FORMAT M.
N204A 14*STORAGE - 430 OCTAL WORDS
N204A 15*ROUTINES CALLED:  SYSTEM, OUTPTC. SIOS, C4020, BS4020, XRCL,
N204A 16*(ON THE SYSTEM)
```

```
N205A  A*           B L BUZBEE       C-4                              68
N205A  O*SELECTIVE DUMPING OF A CDC 6600 LOGICAL I/O UNIT
N205A  B*DEBUGGING      N2              F4              SR6600   SCOPE
N205A  C*                              SW  4     LS  1
N205A  D*F4 SOURCE CARDS         22BCDF4 OBJECT CARDS         20BIN
N205A  S*SELECTIVE*DUMPING OF A CDC 6600 LOGICAL I/O UNIT
N205A 10*CARDS        F4  COMPAT   WU 10/01/68      DECK 10/01/68
N205A 11*CALL TAPDMP(NT,MT,NF1,NR1,NF,N1,N2,MD,A,ML) DUMPS RECORDS N1
N205A 12*THRU N2 OF FILE NF ON UNIT NT.  STORAGE = 220 WORDS.  USES
N205A 13*PDUMP AND LENGTH(ON THE SYSTEM)
```

```
N207B  A*           EMILY WILLBANKS  C-2          A. SOLEM          71
N207B  B*DUMP BLOCK NAME
N207B  C*CMP             SR7600   CROS
N207B  D*                     SW   2    LS 0      TYPE 1
N207B  E*NO CARDS
N207B  F**DMPBN*DUMP BLOCK NAME
N207B  G*ON DISK      F4  COMPAT   WU 10/19/72      DECK NONE
N207B  1*FORM: CALL DMPBN(BN,FWA,LWA,FORMAT,TYPE,FSO)
N207B  2*       CALL DMPBN(BN,LWA)
N207B  3*PURPOSE: DUMP PORTION OF SCM OR LCM NAMED BLOCK
N207B  4*      ONTO A FILESET ACCORDING TO A FORMAT.
N207B  5*ROUTINE NAME: DMPBN
N207B  6*ENTRY NAMES: DMPBN
N207B  7*SCM-LCM BLOCK NAMES: MALCM OR MASCM AND
N207B  8*      BLOCK NAME GIVEN AS ARGUMENT(SCM OR LCM).
N207B  9*STORAGE: 146 OCTAL WORDS OF SCM
N207B 10*ROUTINES CALLED: MEMREQ, MEMLEN, MEMREL(ALL ON THE SYSTEM).
```

```
N2088  A*           EMILY WILLBANKS  C-2                              71
N2088  B*DMPPK, DMPXX, DMPXPG - DISPLAY EXCHANGE PACKAGE
N2088  C*F4              SR7600    CROS
N2088  D*                     SW  3     LS  0     TYPE  1
N2088  E*                       0   BCD                        0   BIN
N2088  F**DMPPK*DMPXX*DMPXPG*DISPLAY*EXCHANGE PACKAGE
N2088  G*ON DISK     F4  COMPAT    WU 07/09/71       DECK    NONE
N2088  1*FORM:  CALL DMPPK(FSO,PACK)
N2088  2*       CALL DMPXX(FSO,PACK,NTASK,NAME)
N2088  3*       CALL DMPXPG(FSO)
N2088  4*PURPOSE:  PRINT THE 16-WORD EXCHANGE PACKAGE IN PACK IN
N2088  5*  DMPX EXCHANGE PACKAGE FORMAT ON FILESET FSO.  LABEL IT
N2088  6*  WITH THE TASK NAME IN NAME AND NUMBER IN NTASK.  DMPXPG
N2088  7*  SKIPS TWO LINES ON FILESET FSO.
N2088  8*ROUTINE NAME:  DMPXX
N2088  9*ENTRY NAMES:  DMPPK, DMPXPG, DMPXX
N2088 10*STORAGE:  3278 WORDS OF SCM.
N2088 11*ROUTINES CALLED:  OUTPTC, SHIFT(ALL ON SYSTEM).
```

```
N2098  A*           EMILY WILLBANKS  C-2                              71
N2098  B*PDUMP AND DUMP - DUMP SCM AND LCM LOCATIONS
N2098  C*CMP             SR7600    CROS
N2098  D*                     SW  3     LS  0     TYPE  1
N2098  E*                       0   BCD                        0   BIN
N2098  F**DUMP*PDUMP
N2098  G*ON DISK    F4  COMPAT      WU 06/22/71       DECK    NONE
N2098  1*FORM:  CALL PDUMP(A1,B1,F1,...,AN,BN,FN)
N2098  2*                                          FOR N.LE.20
N2098  3*       CALL DUMP(A1,B1,F1,...,AN,BN,FN)
N2098  4*PURPOSE:  DUMP CONTENTS OF SCM OR LCM LOCATIONS IN AN
N2098  5*   INDICATED FORMAT ON FILESET OUT.
N2098  6*ROUTINE NAME:  DUMP
N2098  7*ENTRY NAMES:  DUMP,PDUMP↑,DUMP↑ ,PDUMP
N2098  8*STORAGE:  2048 WORDS OF SCM.
N2098  9*ROUTINES CALLED:  STOP, OUTPTC, GENDMP (ALL ON SYSTEM).
```

```
N2108  A*           EMILY WILLBANKS  C-2                                71
N2108  B*DUMPA,DUMPL - DUMP ABSOLUTE SCM OR LCM MEMORY LOCATIONS
N2108  C*CMP             SR7600   CROS
N2108  D*                     SW  2     LS  0     TYPE  1
N2108  E*                       0   BCD                        0   BIN
N2108  F**DUMPA*DUMPL*DUMP*SCM AND *LCM*MEMORY
N2108  G*ON DISK    F4  COMPAT      WU 06/28/71       DECK   NONE
N2108  1*FORM:  CALL DUMPA(FWA,LWA,M)
N2108  2*       CALL DUMPL(FWA,LWA,M)
N2108  3*PURPOSE:  DUMP SCM OR LCM MEMORY LOCATIONS RA+FWA THRU
N2108  4*   RA+LWA IN FORMAT M.
N2108  5*ROUTINE NAME:  DUMPA
N2108  6*ENTRY NAMES:  DUMPA, DUMPL
N2108  7*STORAGE:  228 WORDS OF SCM.
N2108  8*ROUTINES CALLED:  GENDMP (ON THE SYSTEM)
```

```
N2118  A*           LARRY RUDSINSKI  C-4                                71
N2118  B*DMPXI AND DMPX - PRINT THE EXCHANGE PACKAGE
N2118  C*CMP             SR7600   CROS
N2118  D*                     SW  2     LS  0     TYPE  1
N2118  E*CMP SOURCE CARDS       0   BCD    OBJECT CARDS       0   BIN
N2118  F**DUMP*EXCHANGE PACKAGE*DMPX
N2118  G*ON DISK      F4  COMPAT    WU 08/26/71       DECK   NONE
N2118  1*FORM:  CALL DMPXI(LOC)
N2118  2*       CALL DMPX
N2118  3*PURPOSE:  DMPX PRINTS THE EXCHANGE PACKAGE AT THE TIME
N2118  4*   OF THE CALL.  DMPXI INITIALIZES DMPX.
N2118  5*ROUTINE NAME:  DMPXI
N2118  6*ENTRY NAMES:  DMPXI,DMPX
N2118  7*STORAGE:  60 OCTAL WORDS OF SCM.
N2118  8*ROUTINES CALLED: ENTRH(N106B), GETHPK(Q413B), SETHPK(Q413B),
N2118  9*   DMPPK(N208B), RETNH(N107B), ENDH(N109B),
N2118 10*   (ALL ON THE SYSTEM).
```

```
N2128  A*          J. NORRIS        C-4          A. SOLEM          /3
N2128  B*DUMP MEMORY TO ANY FILESET WITH SPECIFIED RA AND FORMAT
N2128  C*CMP            SR/600   CROS
N2128  D*                    SW 4      LS  0     TYPE 1,2
N2128  E*               SOURCE OLDPL4 C-2           OBJECT      0 C-2
N2128  F**DUMP
N2128  G*DISK      F4  COMPAT WU 06/12/73        DECK NONE
N2128  1*FORM:  CALL DMP(FWA,LWA,FORMAT,TYPE,FSO,RA)
N2128  2*       CALL DMP(LWA)
N2128  3*PURPOSE:  DUMP CONTENTS OF SCM OR LCM IN AN INDICATED
N2128  4*  FORMAT ONTO A FILESET.  THE DUMP MAY BE RELATIVE TO AN
N2128  5*  ADDRESS OTHER THAN THE USERS RA.
N2128  6*ROUTINE NAME:  DMP
N2128  7*ENTRY NAMES:  DMP, DMP↑
N2128  8*STORAGE:  77 OCTAL WORDS OF SCM
N2128  9*ROUTINES CALLED:  GENDMP, OUTPTC(ON SYSTEM).
```

0 SIMULATION OF COMPUTERS AND DATA PROCESSORS - INTERPRETERS

04 PSEUDO-COMPUTERS

SIMULATION OF THEORETICAL OR PSEUDO-COMPUTERS.

REVIEWER: J. NEERGAARD, C-7

```
04AA  A *          GEORGE SWAIN     MP-3                              69
04AA  B *HACK- AN INTERPRETIVE SYSTEM WITH PRECISION AND UNITS
04AA  C *FORTRAN IV     MP6600    SCP 3.1
04AA  D *                    SW  5     LS  24     TYPE  2
04AA  E *SOURCE CARDS         1330 BCD     OBJECT CARDS     257 BIN
04AA  F **INTERPRETER*SYSTEM*PRECISION*UNITS*USER-DEFINED OPERATIONS
04AA  G *CARDS        F4  COMPAT   WU 06/02/6?       DECK 06/02/69
04AA  1 *THIS PROGRAM FORMS AN INTERPRETIVE SYSTEM WHICH ALLOWS THE
04AA  2 *USER TO ASSOCIATE PRECISION AND UNITS WITH VARIABLES AND
04AA  3 *WHICH OFFERS THE USER SEVERAL AIDS IN DEVELOPING HIS OWN
04AA  4 *PROBLEM-ORIENTED LANGUAGE FOR SHORT PROBLEMS.  LANGUAGE
04AA  5 *FEATURES INCLUDE USER-DEFINED OPERATIONS AND SUBROUTINES,
04AA  6 *LOOPING, CONDITIONAL BRANCHING, AND UNLIMITED NAME LENGTH.
04AA  7 *TIMING- VARIES WITH USE.  ROUGHLY 0.5 SEC/OUTPUT PAGE.
04AA  8 *COMPILER FIELD LENGTH 52K OCTAL.  OBJECT TIME FIELD LENGTH
04AA  9 *43400 OCTAL.
```

Q SERVICE

Q1 TIME, DAYFILE, OR PAUSE

E.G., SECOND, CLOCK, TIME, DATE, REMARK, PAUSE. (ALSO INCLUDES SOME FILE MANIPULATION (SEE W).)

REVIEWER: J. MELENDEZ, C-4

```
Q102A  A*           JIM CLARK        C-2                              67
Q102A  O*CLOCK ROUTINE
Q102A  B*TIMING          Q1             COMPASS        SR6600   SCOPE
Q102A  C*                              SW  2     LS  2
Q102A  D*COMPASS SOURCE CARDS   99BCDCOMPASS OBJECT CARDS    7BIN
Q102A  S**CLOCK*TIMING
Q102A 10*ON DISK     F4  COMPAT   WU 04/15/68 REV  04/15/68 REV
Q102A 11*CALL CLOCK(X)
Q102A 12*RESULTS IN X CONTAINING THE FLOATING POINT VALUE OF THE
Q102A 13*TIME CLOCK IN MINUTES PLUS HUNDRED OF MINUTES
Q102A 14*STORAGE 61 OCTAL WORDS.
Q102A 15*THIS ROUTINE USE THE PP ROUTINE DCL.
```

```
Q105A  A*           JIM CLARK        C-2                              67
Q105A  O*CLOCK ROUTINE
Q105A  B*SERVICE         Q1             COMPASS        SR6600   SCOPE
Q105A  C*                              SW  2     LS  1
Q105A  D*COMPASS SOURCE CARDS   35BCDCOMRASS OBJECT CARDS    5BIN
Q105A  S**CLOCK
Q105A 10*ON DISK     F4  COMPAT   WU 04/17/68 REV  DECK 04/17/68 REV
Q105A 11*CALL CLOCK1(Y)
Q105A 12*RESULTS IN Y CONTAINING THE TIME OF DAY(IN DISPLAY CODE),
Q105A 13*IN THE FORM HH.MM.SS, WHERE HH IS THE NUMBER OF HOURS,
Q105A 14*MM IS THE NUMBER OF MINUTES, AND SS IS THE NUMBER OF SECONDS
Q105A 15*STORAGE 30 OCTAL WORDS.
Q105A 16*USES PP ROUTINE DCL.
```

```
Q106A  A*           JIM CLARK        C-2                              67
Q106A  0*DATE ROUTINE
Q106A  B*SERVICE         Q1              COMPASS        SR6600   SCOPE
Q106A  C*                               SW  2     LS  1
Q106A  D*COMPASS SOURCE CARDS   288CDCOMPASS OBJECT CARDS    4BIN
Q106A  S**DATE
Q106A 10*ON DISK     F4  COMPAT   WU 04/17/68 REV  DECK 04/17/68 REV
Q106A 11*CALL DATE(Y)
Q106A 12*RESULTS IN Y CONTAINING THE DATE(IN DISPLAY CODE), IN THE
Q106A 13*FORM MMDDYY WHERE MM IS THE MONTH, DD IS THE DAY, AND YY IS
Q106A 14*THE YEAR
Q106A 15*STORAGE 24 OCTAL WORDS.
Q106A 16*USES PP ROUTINE DCL.
```

```
Q107A  A*           JIM CLARK        C-2                              67
Q107A  0*DATE ROUTINE
Q107A  B*SERVICE         Q1              COMPASS        SR6600   SCOPE
Q107A  C*                               SW  2     LS  1
Q107A  D*COMPASS SOURCE CARDS   358CDCOMPASS OBJECT CARDS    5BIN
Q107A  S**DATE
Q107A 10*ON DISK     F4  COMPAT   WU 04/17/68 REV  DECK 04/17/68 REV
Q107A 11*CALL DATE1(X)
Q107A 12*RESULTS IN X CONTAINING THE DATE(IN DISPLAY CODE), IN THE
Q107A 13*FORM MM/DD/YY WHERE MM IS THE MONTH, DD IS THE DAY, AND
Q107A 14*YY IS THE YEAR
Q107A 15*STORAGE 30 OCTAL WORDS.
Q107A 16*USE PP ROUTINE DCL.
```

```
Q110A  A*           ANN SOLEM        C-2          JIM CLARK        70
Q110A  B*SECOND - ELAPSED CP TIME FOR THIS JOB
Q110A  C*CMP            SR6600   SCP 3.1
Q110A  D*                    SW  2     LS  1     TYPE  1
Q110A  E*                     0    BCD    OBJECT CARDS    0    BIN
Q110A  F**SECOND*TIME*CP*TIMER
Q110A  G*ON DISK                    WU 03/12/70      DECK  NONE
Q110A  1*CALL NAME:  CALL SECOND(CP)
Q110A  2*PURPOSE:  TO OBTAIN THE ELAPSED CENTRAL PROCESSOR TIME FOR
Q110A  3*THIS JOB, IN SECONDS TO THE NEAREST THOUSANDTH OF A SECOND.
Q110A  4*STORAGE:  24 OCTAL WORDS
Q110A  5*SELF CONTAINED.
```

```
Q111A  A*           ANN SOLEM        C-2          JIM CLARK        70
Q111A  B*TIME - ENTER TIME OF DAY AND COMMENT IN DAYFILE
Q111A  C*CMP            SR6600   SCP 3.1
Q111A  D*                  SW  2     LS  1     TYPE  1
Q111A  E*                   0    BCD    OBJECT CARDS    0    BIN
Q111A  F**TIME*COMMENT*DAYFILE
Q111A  G*ON DISK                    WU 03/12/70      DECK  NONE
Q111A  1*CALL NAME:  CALL TIME(MESSAGE)
Q111A  2*PURPOSE:  TO ENTER A MESSAGE OF 34 CHARACTERS OR LESS IN THE
Q111A  3*DAYFILE PRECEDED BY THE CHARACTERS #TIME#.  STRING MUST BE
Q111A  4*TERMINATED BY A ZERO BYTE (12-BITS).
Q111A  5*STORAGE:  23 (OCTAL) WORDS.
Q111A  6*SELF CONTAINED
```

```
Q112A  A*           ANN SOLEM        C-2          BARBARA BACON    70
Q112A  B*REMARK - ENTER COMMENT IN DAYFILE
Q112A  C*CMP            SR6600   SCP 3.1
Q112A  D*                  SW  2     LS  1     TYPE  1
Q112A  E*                   0    BCD    OBJECT CARDS    0    BIN
Q112A  F**REMARK*COMMENT*DAYFILE
Q112A  G*ON DISK                    WU 03/12/70      DECK  NONE
Q112A  1*CALL NAME:  CALL REMARK(MESSAGE)
Q112A  2*PURPOSE:  TO ENTER A MESSAGE OF 40 CHARACTERS OR LESS IN THE
Q112A  3*DAYFILE.  THE CHARACTER STRING MUST BE TERMINATED BY A ZERO
Q112A  4*BYTE (12-BITS).
Q112A  5*STORAGE:  22 (OCTAL) WORDS.
Q112A  6*SELF CONTAINED
```

```
Q113A  A*           ANN SOLEM        C-2                          70
Q113A  B*DISPLA - DISPLAY CURRENT VALUE OF VARIABLE IN DAYFILE
Q113A  C*CMP            SR6600   SCP 3.1
Q113A  D*                  SW  3     LS  5     TYPE  1
Q113A  E*                   0    BCD    OBJECT CARDS    0    BIN
Q113A  F**DISPLAY CURRENT*VALUE OF*VARIABLE IN*DAYFILE
Q113A  G*ON DISK                    WU 03/12/70      DECK  NONE
Q113A  1*CALL NAME:  CALL DISPLA(MESSAGE,VALUE)
Q113A  2*PURPOSE:  TO DISPLAY IN THE DAYFILE A MESSAGE OF 10 CHAR-
Q113A  3*ACTERS OR LESS AND A VALUE.  THE VALUE WILL BE TREATED AS
Q113A  4*FLOATING POINT OR INTEGER.
Q113A  5*STORAGE:  247 (OCTAL) WORDS.
Q113A  6*SELF CONTAINED.
```

```
Q114A  A*           ANN SOLEM          C-2          DAVE SCHULTZ      70
Q114A  B*SWITCH - BUFFER POOLING, MULTIREEL TAPE SWITCHING
Q114A  C*CMP             SR6600    SCP 3.1
Q114A  D*                     SW  2      LS  1      TYPE  1
Q114A  E*                      0     BCD     OBJECT CARDS     0     BIN
Q114A  F**SWITCH*BUFFER*POOLING*MULTIREEL*TAPE*SWITCHING
Q114A  G*ON DISK                      WU 03/12/70       DECK  NONE
Q114A  1*CALL NAME:  CALL SWITCH(NAME1,NAME2)
Q114A  2*PURPOSE: TO CHANGE FILE REFERENCES DURING FORTRAN EXECUTION,
Q114A  3*IN ORDER TO POOL BUFFERS AND/OR SWITCH REELS FOR MULTIREEL
Q114A  4*FILES.
Q114A  5*STORAGE: 24 (OCTAL) WORDS.
Q114A  6*SELF CONTAINED.
```

```
Q115B  A*           EMILY WILLBANKS  C-2                              71
Q115B  B*CLOCK,DATE AND SECOND ROUTINE
Q115B  C*CMP             SR7600    CROS
Q115B  D*                     SW  3      LS  0      TYPE  1
Q115B  E*                      0    BCD                          0    BIN
Q115B  F**CLOCK*DATE AND*SECOND
Q115B  G*ON DISK    F4   COMPAT       WU 06/16/71       DECK    NONE
Q115B  1*FORM:    CALL CLOCK(C1)        CALL CLOCK1(C2)
Q115B  2*         CALL SECOND(S)
Q115B  3*         CALL DATE(D1)         CALL DATE1(D2)
Q115B  4*PURPOSE:  TO GIVE TIMES AND DATE TO USER.
Q115B  5*C1=TIME OF DAY IN MINUTES(FLOAT PT)
Q115B  6*C2=TIME OF DAY IN DISPLAY CODE 8HHR,MI,SE WHERE HR=HOURS,
Q115B  7*    MI=MINUTES, SE=SECONDS
Q115B  8* S=ELAPSED CP(REAL) TIME IN SECONDS(FLOAT PT)
Q115B  9*D1=DATE IN DISPLAY CODE 6HMMDDYY
Q115B 10*D2=DATE IN DISPLAY CODE 8HMM/DD/YY
Q115B 11*    WHERE MM=MONTH, DD=DAY, YY=YEAR
Q115B 12*ROUTINE NAME:  CLOCKF
Q115B 13*ENTRY NAMES:  CLOCK, CLOCK1, DATE, DATE1, SECOND
Q115B 14*STORAGE:  1038 WORDS.
Q115B 15*SELF CONTAINED.
```

```
Q116B  A*          N. NAGY          C-2          J MELENDEZ C-4    71
Q116B  B*REMARK, TIME - SEND REMARK TO DAYFILE
Q116B  C*CMP             SR7600   CROS
Q116B  D*                     SW  3     LS  0     TYPE  1
Q116B  E*                      0   BCD                          0   BIN
Q116B  F**REMARK*TIME*MESSAGE*DAYFILE
Q116B  G*ON DISK   F4  COMPAT     WU 11/21/72REV.1 DECK   NONE
Q116B  1*FORM:  CALL REMARK(MSG)
Q116B  2*       CALL TIME(MSG)
Q116B  3*       CALL MESSAGE(M,N)
Q116B  4*PURPOSE:  ENTER A COMMENT IN THE DAYFILE.
Q116B  5*ROUTINE NAME:  REMARK
Q116B  6*ENTRY NAMES:  REMARK, TIME, MESSAGE
Q116B  7*STORAGE:  33 OCTAL WORDS OF SCM
Q116B  8*ROUTINES CALLED:  ABNORML(SYSTEM)
```

```
Q117B  A*          N. NAGY          C-2          J.MELENDEZ C-4    72
Q117B  B*KILLDF - SUPPRESS THE WHOLE DAYFILE
Q117B  C*COMPASS         SR7600   CROS
Q117B  D*                     SW 2      LS 0      TYPE 1
Q117B  E*NO CARDS
Q117B  F**DAYFILE*SUPPRESS
Q117B  G*ON DISK      F4  COMPAT    WU 11/27/72       DECK NONE
Q117B  1*FORM:  CALL KILLDF
Q117B  2*PURPOSE:  SUPPRESS THE WHOLE DAYFILE. THIS SHOULD
Q117B  3*      BE USED WITH CAUTION.
Q117B  4*ROUTINE NAME:  KILLDF
Q117B  5*ENTRY NAME:  KILLDF
Q117B  6*STORAGE:  46 (OCTAL) WORDS
Q117B  7*ROUTINES CALLED:  GETBA, ADDRQT, DFNAME (ALL ON SYSTEM).
```

```
Q118B  A*          N. NAGY          C-2          J. MELENDEZ       73
Q118B  B*ROLLOUT JOB
Q118B  C*F4              SR7600   CROS
Q118B  D*                     SW 3      LS 0      TYPE 1
Q118B  E* NO CARDS
Q118B  F**ROLLOUT
Q118B  G*ON DISK      F4 COMPAT     WU 01/31/73       DECK NONE
Q118B  1*FORM:  CALL ROLLOUT(ITIME)
Q118B  2*PURPOSE:  ROLL A JOB OUT TO THE DISK FOR A PREDETERMINED
Q118B  3*      AMOUNT OF TIME
Q118B  4*ROUTINE NAME:  ROLLOUT
Q118B  5*ENTRY NAME:  ROLLOUT
Q118B  6*STORAGE:  475 (OCTAL) WORDS
Q118B  7*ROUTINES CALLED:  REMARK(Q116B), ENTRTM(N106B),
Q118B  8*      ABNORML(SYSTEM)
```

```
Q1198  A*           JAN NORRIS        C-4          J MELENDEZ        73
Q1198  B*COPY DAYFILE TO GIVEN FILESET
Q1198  C*F4              SR7600 CRUS
Q1198  D*                    SW  3      LS  0      TYPE 1,2
Q1198  E*                SOURCE OLDPL4  C-4           OBJECT     0  C-4
Q1198  F**DAYFILE
Q1198  G*DISK       F4  COMPAT WU 07/16/73         DECK  NONE
Q1198  1*FORM:  CALL COPYDF (FSNAME)
Q1198  2*PURPOSE:  COPY THE JOB DAYFILE TO THE FILESET - FSNAME-
Q1198  3*ROUTINE NAME:  COPYDF
Q1198  4*ENTRY NAMES:  COPYDF
Q1198  5*STORAGE:  224 OCTAL WORDS OF SCM
Q1198  6*ROUTINES CALLED:  CLOSER(114B),LENGTH(W204B),REMARK(Q116B),
Q1198  7*      SYSFS(W116B),ADDRQT,DFNAME,FLUSHDF,INPUTC,NARG,
Q1198  8*      OUTPIC  (ALL ON SYSTEM)
```

```
Q1AA   A*           LARA BAKER        TD-7         J. MELENDEZ       72
Q1AA   B*DATE INCREMENTATION ROUTINE
Q1AA   C*F4              SR6600   SCP 3.1
Q1AA   D*                    SW  1      LS  2      TYPE  2
Q1AA   E*F4 SOURCE CARDS      68   BCD    OBJECT CARDS    17   BIN
Q1AA   F**DATE*CHANGE*JULIAN
Q1AA   G*CARDS        F4  COMPAT   WU 08/29/72       DECK 08/29/72
Q1AA   1*FORM:  NEXT=NXTDAY(IODATE).
Q1AA   2*         I=JULIAN(IODATE)
Q1AA   3*PURPOSE:  IF IODATE CONTAINS THE DATE IN THE FORM
Q1AA   4*    YYMMDD(INTEGER), NEXT WILL CONTAIN THE DATE, IN THE SAME
Q1AA   5*    FORMAT, OF THE NEXT DAY.  NXTDAY WILL INCREMENT
Q1AA   6*    CORRECTLY FOR ANY DATE IN A GIVEN CENTURY.
Q1AA   7*    I WILL CONTAIN THE JULIAN DATE (DAY OF THE YEAR) FOR
Q1AA   8*    IODATE IN THE ABOVE FORMAT.  IODATE IS NOT ALTERED
Q1AA   9*    BY EITHER ENTRY.
Q1AA  10*NOTE:  THE FIRST VALUE OF IODATE WOULD PROBABLY BE READ INTO
Q1AA  11*  THE MACHINE UNDER AN -I- FORMAT.
Q1AA  12*ROUTINE NAME:  NXTDAY
Q1AA  13*ENTRY NAMES:  NXTDAY, JULIAN
Q1AA  14*STORAGE:  157 OCTAL WORDS
Q1AA  15*SELF CONTAINED.
```

Q3 DYNAMIC STORAGE ALLOCATION

REVIEWER: J. MELENDEZ, C-4

Q301A *(SKFILE) HAS BEEN REDESIGNATED W110A.

Q302A *(RELEASE) HAS BEEN REDESIGNATED W111A.

Q303A *(UNLODE) HAS BEEN REDESIGNATED W112A.

Q304A *(OPEN,CLOSE) HAS BEEN REDESIGNATED W113A.

```
Q305B  A*           EMILY WILLBANKS  C-2          J MELENDEZ        72
Q305B  B*MEMREQ,MEMREL,MEMLEN
Q305B  C*CMP              SR7600   CROS
Q305B  D*                    SW 3       LS 0       TYPE 1,2
Q305B  E*SOURCE CARDS          0   C-2     OBJECT CARDS     0   C-2
Q305B  F**MEMREQ*MEMREL*MEMLEN
Q305B  G* ON DISK     F4  COMPAT   WU 05/03/73REV 1 DECK  NONE
Q305B  1*FORM:  CALL MEMREQ(NWDS,TYPE,BN1,BN2,PR)
Q305B  2*       CALL MEMREL(NWDS,TYPE,BN1,BN2,PR)
Q305B  3*       CALL MEMLEN(L,TYPE,BN)
Q305B  4*PURPOSE: MEMREQ REQUESTS NWDS FOR NAMED BLOCK BN1 FROM
Q305B  5*      NAMED BLOCK BN2 AND MEMREL RELEASES NWDS FROM BN1
Q305B  6*      TO BN2 IN LCM OR SCM(TYPE).  PR SUPPRESSES DAYFILE
Q305B  7*      COMMENTS.  MEMLEN OBTAINS IN L THE LENGTH OF
Q305B  8*      BLOCK NAME BN IN LCM OR SCM.
Q305B  9*ROUTINE NAME:  MEMORY
Q305B 10*ENTRY NAMES:  MEMREQ,MEMREL,MEMLEN
Q305B 11*STORAGE:  161 (OCTAL) WORDS OF SCM
Q305B 12*ROUTINES CALLED:  SELF CONTAINED
```

```
Q306B  A*           EMILY WILLBANKS  C-2          J MELENDEZ        73
Q306B  B*LCROLOT LCROLIN - MALCM ROLL OUT OR IN
Q306B  C*COMRASS        SR7600   CROS
Q306B  D*                    SW 2      LS 0      TYPE 1,2
Q306B  E*                SOURCE     0 C-2            OBJECT     0 C-2
Q306B  F**ROLLOUT*ROLLIN*LCM
Q306B  G* ON DISK     F4  COMPAT   WU 06/13/73REV.1 DECK NONE
Q306B  1*FORM:  CALL LCROLOT(NWDS,LCADD)
Q306B  2*       CALL LCROLIN(NWDS,LCADD)
Q306B  3*PURPOSE:  ROLL OUT OR ROLL IN DATA BETWEEN MALCM AND
Q306B  4*      RANDOM FILESET RANLCM.  DEFAULT NWDS IS ALL OF
Q306B  5*      MALCM.  DEFAULT LCADD IS LOCATION ZERO.
Q306B  6*ROUTINE NAME:  LCROLOT
Q306B  7*ENTRY NAMES:  LCROLOT, LCROLIN
Q306B  8*STORAGE:  57 (OCTAL) WORDS SCM
Q306B  9*ROUTINES CALLED:  MEMLEN( Q305B) ON SYSTEM
Q306B 10*OTHER SCM EXTERNALS:  IOGEN(SYSTEM)
Q306B 11*LCM BLOCK NAME:  MALCM
```

```
Q3AA   A*           FRANK MCGIRT     C-4          J. MELENDEZ       72
Q3AA   B*ASAP-AUTOMATED STORAGE ALLOCATION PROGRAM
Q3AA   C*F4             SR6600   SCP 3.1
Q3AA   D*                    SW 24     LS 22     TYPE  2
Q3AA   E*F4 SOURCE CARDS      487  BCD    OBJECT CARDS    148  BIN
Q3AA   F**DYNAMIC*ALLOCATION
Q3AA   G*CARDS        F4  COMPAT   WU 08/29/72      DECK 08/29/72
Q3AA   1*FORM:  COMPLETE INSTRUCTIONS FOR USE ARE GIVEN IN K-1-4620,
Q3AA   2*   AN INTERNAL K-1 DOCUMENT WHICH IS ATTACHED TO THIS
Q3AA   3*   WRITEUP, INCLUDING A SAMPLE PROBLEM UTILIZING ALL THE
Q3AA   4*   ASAP FEATURES.
Q3AA   5*PURPOSE:  Q3AA IS A PACKAGE OF SUBROUTINES WHICH CAN BE
Q3AA   6*   USED TO ASSIGN STORAGE AND DEFINE INTEGER POINTERS FOR
Q3AA   7*   USE WITH DYNAMIC STORAGE ALLOCATION PROGRAMMING
Q3AA   8*   TECHNIQUES.
Q3AA   9*METHOD:  SEE K-1-4620 OR ALLEN S. KENNEDY, #POINTR, A
Q3AA  10*   DYNAMIC STORAGE ALLOCATION PROGRAM,# ARGONNE NATIONAL
Q3AA  11*   LABORATORY, AMD-28, FEBRUARY 28, 1967.
Q3AA  12*ROUTINE NAME:  ASAP
Q3AA  13*ENTRY NAME:  ASAP
Q3AA  14*STORAGE:  1420 OCTAL CELLS.
```

Q4 GET AND SET JOB-RELATED INFORMATION

E.G., CPAREA, FIELD LENGTH, SENSE SWITCHES, PACKAGE, GETQ, SETQ. (ALSO INCLUDES SOME PROGRAMMING AIDS (SEE X) AND I/O (SEE K).)

REVIEWER: J. MELENDEZ, C-4

```
Q401A  A*           C. BOGENHOLM      C-2          J. MELENDEZ       67
Q401A  B*CPAREA
Q401A  C*COMPASS        SR6600    SCP 3.1
Q401A  D*                   SW  4      LS  1      TYPE  1.1
Q401A  E*SOURCE CARDS          25  BCD    OBJECT CARDS      4     BIN
Q401A  F**CONTROL POINT
Q401A  G*ON DISK      F4  COMPAT    WU 04/17/73REV 6 DECK 04/01/70REV 2
Q401A  1*FORM:  CALL CPAREA(A)
Q401A  2*PURPOSE:  PROVIDE THE PROGRAMMER WITH THE
Q401A  3*        CONTENTS OF THE CONTROL POINT AREA.
Q401A  4*  WHERE:
Q401A  5*  A     = THE FIRST WORD OF AN AREA AT LEAST 200 OCTAL (128
Q401A  6*          DECIMAL) WORDS LONG.  THE CONTROL POINT AREA WILL
Q401A  7*          BE COPIED INTO THIS AREA BEGINNING WITH LOCATION
Q401A  8*          A.  THE LAST WORD GOES INTO LOCATION A+177 OCTAL
Q401A  9*STORAGE:  17 OCTAL WORDS
Q401A 10*TIMING:  CP.145 SEC.      PP 2.028 SEC.
Q401A 11*ROUTINES CALLED:  THIS PROGRAM USES PP ROUTINE CPA WHICH IS
Q401A 12         ON SYSTEM.
```

```
Q402A  A*           B. BACON          C-2          J. MELENDEZ  C-4 67
Q402A  B*OBTAIN JOB NAME
Q402A  C*CMP            SR6600    SCP 3.1
Q402A  D*                   SW   1    LS   0    TYPE 1.2
Q402A  D*E*             SOURCE   29 C-2             OBJECT   4  C-2
Q402A  F**JOB NAME
Q402A  G*DISK        F4 COMPAT WU 05/01/73 REV.2 DECK      NONE
Q402A  1*FORM:  CALL JOBNAME (NAME)
Q402A  2*PURPOSE:  RETURN JOBNAME IN NAME AS DISPLAY CODE
Q402A  3*              NAME = 7HNNNNSSS
Q402A  4*        WHERE NNNN IS FROM THE NAME PARAMETER OF THE JOB
Q402A  5*        CARD AND SSS IS THE SEQUENCE NUMBER.
Q402A  6*ROUTINE NAME:  JOBNAME
Q402A  7*ENTRY NAMES:  JOBNAME
Q402A  8*STORAGE:  20 OCTAL WORDS
Q402A  9*ROUTINES CALLED:  JBN(PP ROUTINE)
```

```
Q405A   *(TIDY) HAS BEEN REDESIGNATED L301A.


Q405B   *(TIDY) HAS BEEN REDESIGNATED L301B.


Q406A  A*           ROBERT FORREST   C-2          JIM MOORE         69
Q406A  B*GETEQN
Q406A  C*COMPASS        SR6600   SCP 3.1
Q406A  D*GETBA,XRCL           SW  2     LS  2     TYPE  1
Q406A  E*SOURCE CARDS          55   BCD    OBJECT CARDS    4    BIN
Q406A  F**GETEQN
Q406A  G*ON DISK      F4  COMPAT   WU 04/07/70REV 1 DECK 03/18/69
Q406A  1*CALL GETEQN(N,I) TO GET THE EQUIPMENT NUMBER ASSIGNED TO
Q406A  2*A FILE NAME.  TIMING IS LESS THAN 1/2 SECOND.
Q406A  3*STORAGE - 32 OCTAL CM.
Q406A  4*USES GETBA, XRCL (ON THE SYSTEM).


Q407A  A*           BILL HUNTEMAN    C-2                           69
Q407A  B*PROGRAM CYCLE CHECK
Q407A  C*COMPASS        SR6600   SCP 3.1
Q407A  D*                     SW  3     LS  1     TYPE  1
Q407A  E*SOURCE CARDS     45  BCD     OBJECT CARDS   5    BIN
Q407A  F**PROGRAM*CYCLE*CHECK
Q407A  G*ON DISK      F4  COMPAT   WU 05/19/69      DECK 05/19/69
Q407A  1*CALL NAME  CALL INTVL(ERROR RETURN, CONTROL WORD, INTERVAL)
Q407A  2*PURPOSE  ESTABLISHES A SECONDARY TIME LIMIT OR CYCLE CHECK
Q407A  3*FOR PORTIONS OF A PROGRAM EXECUTION.
Q407A  4*STORAGE  22 WORDS
Q407A  5*SELF CONTAINED.
```

```
Q408A  A*          JENNIE BORING    C-4          R.M. FRANK        70
Q408A  B*READ/WRITE A BINARY PRU(PHYSICAL RECORD)
Q408A  C*CMP             SR6600   SCP 3.1
Q408A  D*                   SW  3     LS  3     TYPE  1
Q408A  E*SOURCE CARDS        120  BCD    OBJECT CARDS     8   BIN
Q408A  F**PRU*READ*WRITE*BINARY
Q408A  G*CARDS       F4  COMPAT   WU 06/15/70      DECK 06/15/70
Q408A  1*USE:  CALL PRUSIZE(NOWDS,LFN) CALL RDPRU(A,LFN,LEN)
Q408A  2*CALL WRITPRU(A,LFN,LEN)
Q408A  3*PURPOSE:  ALLOWS USER TO READ OR WRITE A BINARY PHYSICAL
Q408A  4*RECORD IN CONTRAST TO THE LOGICAL RECORD FACILITY THAT
Q408A  5*FORTRAN PROVIDES.
Q408A  6*STORAGE:  71 (OCTAL) WORDS.
Q408A  7*ROUTINES CALLED:  OPEN,CLOSE(Q304A)
```

```
Q409A  A*          J. BORING        C-4                          70
Q409A  B*DATA TRANSFER FROM ECS TO FILE AND VICE VERSA
Q409A  C*F4              SR6600   SCP 3.1
Q409A  D*                   SW  2     LS  1     TYPE  1
Q409A  E*SOURCE CARDS        31  BCD     OBJECT CARDS    11   BIN
Q409A  F**ECS*READ*WRITE*FILE
Q409A  G*CARDS       F4  COMPAT   WU 07/27/70      DECK 07/27/70
Q409A  1*USE:  CALL ECSBUFO(FWA,LFN,NOWDS,SCRATCH)
Q409A  2*      CALL ECSBUFI(FWA,LFN,NOWDS,SCRATCH)
Q409A  3*PURPOSE:  ALLOWS THE USER TO DO I/O DIRECTLY TO OR FROM ECS
Q409A  4*WITHOUT BRINGING THE TOTAL LOGICAL RECORD INTO CORE.
Q409A  5*STORAGE:  153 (OCTAL) WORDS.
Q409A  6*ROUTINES CALLED:  OPEN(Q304A),PRUSIZE(Q408A),RDPRU(Q408A),
Q409A  7*WRITPRU(Q408A).
```

```
Q410A  A*          GEORGE V. MARTIN         CDC                    70
Q410A  B*CPWORD
Q410A  C*COMPASS         SR6600   SCP 3.1
Q410A  D*                   SW  2     LS  1     TYPE 1
Q410A  E*SOURCE CARDS        24   BCD    OBJECT CARDS    4    BIN
Q410A  F**CONTROL POINT*CPAREA
Q410A  G*DISK        F4  COMPAT   WU 08/11/70      DECK 08/11/70
Q410A  1*USE:  CALL CPWORD(A,B)
Q410A  2*PURPOSE:  TO PROVIDE THE FORTRAN PROGRAMMER WITH A SINGLE
Q410A  3*WORD FROM THE CONTROL POINT AREA.  A IS THE NAME OF THE
Q410A  4*DESIRED CONTROL POINT WORD AS SHOWN ON THE LEFT SIDE OF THE
Q410A  5*DIAGRAM.  E.G., 10HW.CPSTAT   OR 10HW.CPTIME  .
Q410A  6*B WILL CONTAIN THE DESIRED WORD.
Q410A  7*STORAGE:  16 (OCTAL) WORDS.
Q410A  8*SELF CONTAINED.
```

```
Q411A  A*           R. M. FRANK      C-4                              70
Q411A  B*READ/WRITE A BINARY BUFFERFULL
Q411A  C*CMP              SR6600 SCP 3.1
Q411A  D*                    SW  3     LS  4     TYPE  1
Q411A  E*SOURCE CARDS        167  BCD    OBJECT CARDS    9   BIN
Q411A  F**BUFFER*READ*WRITE*BINARY
Q411A  G*CARDS        F4  COMPAT   WU 09/22/70      DECK 09/22/70
Q411A  1*USE:  CALL BUFSIZE(NOWDS,LFN)
Q411A  2*      CALL RDBUF(A,LFN,LEN)
Q411A  3*      CALL WRITBUF(A,LFN,LEN)
Q411A  4*PURPOSE:  ALLOWS USER TO READ OR WRITE A BUFFER FULL (BINARY
Q411A  5*PARITY) IN CONTRAST TO THE LOGICAL RECORD FACILITY THAT
Q411A  6*FORTRAN PROVIDES.
Q411A  7*STORAGE:  106 (OCTAL) WORDS.
Q411A  8*ROUTINES CALLED:  OPEN,CLOSE(Q304A).
```

```
Q413B  A*           JERRY MELENDEZ   C-4                              71
Q413B  B*GET AND SET EXCHANGE PACKAGE
Q413B  C*CMP             SR7600   CROS
Q413B  D*                    SW  3     LS  0     TYPE 1
Q413B  E*CMP SOURCE CARDS      0   BCD    OBJECT CARDS      0   BIN
Q413B  F**GET*SET*INTERRUPT*EXCHANGE PACKAGE
Q413B  G*ON DISK      F4  COMPAT   WU 08/04/71      DECK      NONE
Q413B  1*FORM:  CALL GETNPK(IPAK)
Q413B  2*       CALL SETNPK(IPAK)
Q413B  3*       CALL GETDPK(IPAK)
Q413B  4*       CALL SETDPK(IPAK)
Q413B  5*       CALL GETTMPK(IPAK)
Q413B  6*       CALL SETTMPK(IPAK)
Q413B  7*       CALL GETSPK(IPAK)
Q413B  8*       CALL SETSPK(IPAK)
Q413B  9*       CALL GETHPK(IPAK)
Q413B 10*       CALL SETHPK(IPAK)
Q413B 11*            IPAK - ARRAY OF DIMENSION AT LEAST 16.
Q413B 12*PURPOSE:  GET OR SET THE EXCHANGE PACKAGES WHICH ARE KEPT BY
Q413B 13*       USER MONITOR FOR EACH OF THE OPERATING STATES.
Q413B 14*ROUTINE NAME:  PACKAGE
Q413B 15*ENTRY NAMES:  GETNPK GETDPK, GETTMPK, GETSPK, GETHPK,
Q413B 16*       GETEPK, SETNPK, SETDPK, SETTMPK, SETSPK, SETHPK
Q413B 17*STORAGE:  65 OCTAL WORDS OF SCM.
Q413B 18*SELF CONTAINED.
```

```
Q4148  A*           JERRY MELENDEZ   C-4          J. MELENDEZ       71
Q4148  B*SETQ, GETQ - SET AND GET JOB RELATED QUANTITIES
Q4148  C*CMP            SR7600   CROS
Q4148  D*                    SW  10    LS  0     TYPE 1,2
Q4148  E*CMP SOURCE CARDS     0   BCD    OBJECT CARDS      0   BIN
Q4148  F**SETQ*GETQ*SET AND*GET*JOB RELATED*QUANTITIES
Q4148  G*ON DISK      F4  COMPAT   WU 05/09/73 REV.2 DECK      NONE
Q4148  1*FORM:  CALL SETQ(KEY,Q,OP)
Q4148  2*       CALL GETQ(KEY,Q)
Q4148  3*PURPOSE:  SET OR GET JOB-RELATED QUANTITIES LOCATED IN
Q4148  4*       SPECIAL USER MONITOR CELLS.
Q4148  5*TIMING:  SETQ - 70 - 120 MS, GETQ - 65 MS
Q4148  6*ROUTINE NAME:  SETQ
Q4148  7*ENTRY NAMES:  SETQ, GETQ
Q4148  8*STORAGE:  236 OCTAL WORDS OF SCM.
Q4148  9*SELF CONTAINED.
```

```
Q4158  A*           EMILY WILLBANKS  C-2                          71
Q4158  B*SLITE,SLITET - SET AND TEST SENSE LIGHTS
Q4158  C*CMP            SR7600   CROS
Q4158  D*                    SW  3     LS  0     TYPE  1
Q4158  E*                      0   BCD                        0   BIN
Q4158  F**SLITE*SLITET - SET AND TEST*SENSE*LIGHTS
Q4158  G*ON DISK      F4  COMPAT   WU 07/19/71       DECK   NONE
Q4158  1*FORM:  CALL SLITE(I)
Q4158  2*       CALL SLITET(I,J)
Q4158  3*PURPOSE:  SLITE(I) TURNS ON SENSE LIGHT I WHERE 1.LE.I.LE.60.
Q4158  4*   SLITE(0) TURNS OFF ALL LIGHTS.
Q4158  5*   SLITET(I,J) TESTS AND TURNS OFF LIGHT I, SETTING J=1 IF
Q4158  6*   LIGHT WAS ON, J=2 IF OFF.
Q4158  7*ROUTINE NAME:  SLITE
Q4158  8*ENTRY NAMES:  SLITE, SLITET
Q4158  9*STORAGE:  418 WORDS OF SCM.
```

```
Q4168  A*           EMILY WILLBANKS  C-2                                  71
Q4168  B*ONSWCH, OFFSWCH, COMPSW, SSWTCH - SENSE SWITCH ACCESS
Q4168  C*CMP            SR7600   CROS
Q4168  D*                    SW  3     LS  0     TYPE  1
Q4168  E*                     0   BCD                          0   BIN
Q4168  F**SSWTCH*ONSWCH*OFFSWCH*COMPSW*SENSE*SWITCH ACCESS
Q4168  G*ON DISK      F4  COMPAT   WU 07/16/71      DECK   NONE
Q4168  1*FORM:  CALL ONSWCH(I)
Q4168  2*       CALL OFFSWCH(I)
Q4168  3*       CALL COMPSW(I)
Q4168  4*       CALL SSWTCH(I,J)
Q4168  5*PURPOSE:  ONSWCH TURNS ON SENSE SWITCH I, WHERE 1.LE.I.LE.60.
Q4168  6*          OFFSWCH TURNS OFF SWITCH I.
Q4168  7*          COMPSW SWITCHES SWITCH I.
Q4168  8*          SSWTCH TESTS AND TURNS OFF SWITCH I, SETTING J=1
Q4168  9*            IF SWITCH I WAS ON, J=2 IF OFF.
Q4168 10*ROUTINE NAME:  SSWTCH
Q4168 11*ENTRY NAMES:  SSWTCH, ONSWCH, OFFSWCH, COMPSW
Q4168 12*STORAGE:  668 WORDS OF SCM.
Q4168 13*ROUTINE CALLED:  SYSTEM (ON THE SYSTEM).
```

```
Q4178  A*           JAN NORRIS       C-2         J. MELENDEZ      71
Q4178  B*RDBUF - READ OR WRITE FIXED NUMBER WORDS FROM/TO FILESET
Q4178  C*CMP            SR7600   CROS
Q4178  D*                    SW  3     LS  0     TYPE  1,2
Q4178  E*               SOURCE NONE C-2              OBJECT NONE C-2
Q4178  F**RDBUF*READ OR*WRITE*FIXED*NUMBER WORDS FROM/TO*FILESET
Q4178  G*DISK        F4 COMPAT WU 06/06/73 REV.1 DECK NONE
Q4178  1*FORM:  CALL RDBUF(FSET,BUFFER,LENGTH,LENGTH2,LSTATUS,I)
Q4178  2*       CALL WTBUF(FSET,BUFFER,LENGTH,I)
Q4178  3*PURPOSE:  RDBUF IS USED TO READ A SPECIFIED NUMBER OF WORDS
Q4178  4*  FROM A DESIGNATED SEQUENTIAL FILESET.  WTBUF IS USED TO
Q4178  5*  WRITE A SPECIFIED NUMBER OF WORDS TO A DESIGNATED SEQUEN-
Q4178  6*  TIAL FILESET.  THESE ROUTINES READ BINARY INFORMATION
Q4178  7*  WITHOUT REGARD TO FORMAT CONSIDERATION.
Q4178  8*ROUTINE NAME:  RDBUF
Q4178  9*ENTRY NAMES:  RDBUF,WTBUF
Q4178 10*STORAGE:  131 (OCTAL) WORDS.
Q4178 11*ROUTINES CALLED:  ABNORML, GETBA, SYSTEM (ALL ON SYSTEM).
```

```
Q418A  A*           M. CARPENTER      C-2          J. MELENDEZ, C-4 72
Q418A  B*OBTAIN MACHINE NUMBER OF COMPUTER
Q418A  C*F4              SR6600   SCP 3.1
Q418A  D*                     SW 1      LS 0      TYPE 1,2
Q418A  E*                SOURCE    4 C-2            OBJECT    0 C-2
Q418A  F**MACHINE NUMBER
Q418A  G*DISK        F4 COMPAT WU 04/20/73        DECK NONE
Q418A  1*FORM:  CALL MACH (N)
Q418A  2*PURPOSE:  RETURN THE MACHINE NUMBER OF THE COMPUTER UPON
Q418A  3*        WHICH THIS JOB IS CURRENTLY RUNNING.
Q418A  4*        N WILL BE SET TO 0, 1, OR 2.
Q418A  5*ROUTINE NAME:  MACH
Q418A  6*ENTRY NAMES:  MACH
Q418A  7*STORAGE:  12 OCTAL WORDS
Q418A  8* SELF CONTAINED
```

```
Q4AA   A*           DUANE HARDER      C-2                              70
Q4AA   B*LINES
Q4AA   C*CMP             SR6600   SCP 3.1
Q4AA   D*                     SW  1     LS  0     TYPE  2
Q4AA   E*                      0    BCD    OBJECT CARDS    4    BIN
Q4AA   F**OUTPUT*LINE*LIMIT
Q4AA   G*CARDS        F4  COMPAT   WU 02/20/70      DECK 02/20/70
Q4AA   1*CALL NAME:  LINES
Q4AA   2*PURPOSE: LINES IS A FUNCTION SUBPROGRAM WHICH RETURNS THE
Q4AA   3*NUMBER OF LINES AVAILABLE ON THE OUTPUT (PRINT) FILE.
Q4AA   4*USAGE:  I = LINES(DUM.) DUM IS A DUMMY VARIABLE WHICH IS
Q4AA   5*USED ONLY TO INDICATE TO THE COMPILER THAT LINES IS A
Q4AA   6*FUNCTION.
Q4AA   7*STORAGE: 10 (OCTAL) WORDS.
Q4AA   8*ROUTINES CALLED: GETBA (SYSTEM ROUTINE).
```

T APPLICATIONS AND APPLICATION-ORIENTED PROGRAMS

REVIEWER: SEE SUBMITTER FOR PARTICULAR #T# ROUTINE

T1 PHYSICS (INCLUDING NUCLEAR)

```
T1AB   A*           CHARLES WILSON   C-7          FRED CORNWELL    69
T1AB   B*TACS1 TRANSPORT AND CHARGE STORAGE DEVICE ANALYSIS CODE
T1AB   C*F4                6600   SCP 3.1
T1AB   D*                    SW 37     LS 72     TYPE 2
T1AB   E*SOURCE CARDS          3421 BCD                      0    BIN
T1AB   F**TACS1*TRANSPORT AND*CHARGE*STORAGE*DEVICE*ANALYSIS CODE
T1AB   G*CARDS         F4  COMPAT   WU 12/08/69       DECK 12/08/69
T1AB   1*USES THE FOLLOWING SUBROUTINES:  ADV(J506A),CONVRT(J526A),
T1AB   2*ERF(C310A),GYA(J518A),PLOT(J541A),SORT1(M101A),
T1AB   3*SPLOT(J508A),TCP(J521A),TSP(J520A),WLCH(J542A),WLCV(J542A).
```

T4 ENGINEERING

```
T4AA   A*           LUKE NEY          J-7                                  71
T4AA   B*CBSIII - BEAM FRAME SYSTEM ANALYZER
T4AA   C*F4      CMP     MP6600    SCP 3.1SC4020
T4AA   D*                    SW  33     LS 0       TYPE 2
T4AA   E*F4,CMP SOURCE CARDS NONE          OBJECT CARDS     NONE
T4AA   F**CBSIII*BEAM*FRAME*SYSTEM*ANALYZER
T4AA   G*ON TAPE      F4  COMPAT   WU 07/28/71       DECK NONE
T4AA   1*FORM:  MAIN PROGRAM
T4AA   2*PURPOSE:  BEAM FRAME SYSTEM ANALYZER PROGRAM.
T4AA   3*      100 BRANCH * 101 BRANCH INTERSECTION POINT CAPACITY.
T4AA   4*TIMING:  MAXIMUM IS 5 MINUTES
T4AA   5*ROUTINE NAME:  CBSIII
T4AA   6*STORAGE:  156000 OCTAL WORDS CENTRAL MEMORY
T4AA   7*      AND 607000 OCTAL WORDS ECS
T4AA   8*ROUTINES CALLED:  ADV(J506A),SPLOT(J508A),PLOT(J541A),
T4AA   9*      WLCH AND WLCV(J542A),SIN AND COS(B106A),
T4AA  10*      ECWR,ECRD,LOCF (ALL ON SYSTEM).
T4AA  11*NOTE:  BINARY AVAILABLE ON MAGNETIC TAPES: LC996L00
T4AA  12*      OR LB797L00.
T4AA  13*      CBSIII HAS THE FOLLOWING PROGRAM CARD:
T4AA  14*      PROGRAM CBS3(INPUT,OUTPUT,FILM,TAPE7,TAPE8)
```

```
T4AB   A*           TOM DOYLE         C-6          TOM DOYLE          73
T4AB   B*LENS DESIGN
T4AB   C*F4              MP7600   CROS
T4AB   D*                    SW 14     LS  0      TYPE 2
T4AB   E*                SOURCE TAPE NO. LE441L00
T4AB   F**LENS DESIGN
T4AB   G*TAPE AND FILESET F4 COMPAT WU 04/27/73  DECK NONE
T4AB   1*FORM :  MAIN PROGRAM
T4AB   2*PURPOSE:  LENS DESIGN
T4AB   3*ROUTINE NAME:  LENSDES
T4AB   4*STORAGE:  100300 OCTAL WORDS OF SCM, ALL OF LCM
T4AB   5*ROUTINES CALLED:  OPTIMIZ(E4AA)
```

U LANGUAGES

U1 ASSEMBLY

E.G., COMPASS.

REVIEWER: J. MOORE, C-2

U101A *(FTN) HAS BEEN REDESIGNATED U2AA.

U102A *(LACENT) HAS BEEN REDESIGNATED U1AA.

```
U1AA  A*           GLEN CARTER      C-4          J. MOORE          72
U1AA  B*LACENT 6600 ASSEMBLY LANGUAGE
U1AA  C*LACENT         MP6600   SCP 3.1
U1AA  D*                     SW 55     LS  0     TYPE  2
U1AA  E*SOURCE CARDS  0                OBJECT CARDS  0
U1AA  F**LACENT*ASSEMBLER
U1AA  G*ON DISK                    WU 09/22/72      DECK  NONE
U1AA  1*FORM:  MAIN PROGRAM
U1AA  2*PURPOSE:  LACENT IS A 6600 ASSEMBLY LANGUAGE ON THE SYSTEM,
U1AA  3*   CALLABLE VIA CONTROL CARDS.
U1AA  4*ROUTINE NAME:  LACENT
U1AA  5*STORAGE:  40000 (OCTAL) WORDS
U1AA  6*SELF CONTAINED.
```

U2 COMPILING

E.G., RUN.

REVIEWER: J. MOORE, C-2

```
U2AA  A*          BARBARA BACON    C-2          J. MOORE          72
U2AA  B*FTN-FORTRAN EXTENDED LANGUAGE
U2AA  C*CMP             MP6600   SCP 3.1
U2AA  D*                    SW 24     LS  0     TYPE  2
U2AA  E*SOURCE CARDS  NONE                OBJECT CARDS  NONE
U2AA  F**FTN*FORTRAN*EXTENDED*COMPILER
U2AA  G*ON DISK     F4  COMPAT   WU 02/22/72      DECK  NONE
U2AA  1*FORM:  MAIN PROGRAM
U2AA  2*PURPOSE:  FTN, FORTRAN EXTENDED, IS A FORTRAN COMPILER ON
U2AA  3*   THE SYSTEM, CALLABLE VIA CONTROL CARDS.
U2AA  4*ROUTINE NAME:  FTN
U2AA  5*STORAGE:  50000 (OCTAL) WORDS
U2AA  6*SELF CONTAINED.
```

V (WILL NOT BE USED FOR FUTURE PROGRAMS)

V102A *(RANDOM) HAS BEEN REDESIGNATED G801A.

V103A *(RANF) HAS BEEN REDESIGNATED G802A.

V201A *(MESSNI) HAS BEEN REDESIGNATED 0803A.

W FILE MANIPULATION

W1 ACCESS

E.G.: OPEN, CLOSE, CREATE, RELEASE, MODIFY, UNLOAD, RENAME, SWITCH, GET RQT, DATAREL. (ALSO SEE Q1).

REVIEWER: J. NORRIS, C-2

```
W104B  A*          J. NORRIS        C-4          J. NORRIS          73
W104B  B*CHANGE NAME IN FILESET REQUEST TABLE
W104B  C*CMP            SR7600     CROS
W104B  D*                    SW  3     LS  0     TYPE 1,2
W104B  E*                SOURCE     0 OLDPL4  C-2     OBJECT     0 C-2
W104B  F**RENAME*RQT
W104B  G*DISK       F4  COMPAT WU 07/13/73        DECK NONE
W104B  1*FORM:  CALL RENAME (FS1,FS2)
W104B  2*PURPOSE:  CHANGE THE NAME IN A FILESET REQUEST TABLE
W104B  3*      FS1 = THE ORIGINAL NAME AS ON THE PROGRAM CARD
W104B  4       FS2 = THE NEW NAME
W104B  5*ROUTINE NAME:  RENAME
W104B  6*ENTRY NAMES:  RENAME
W104B  7*STORAGE:  115 OCTAL WORDS OF SCM
W104B  8*ROUTINES CALLED:  GETBA,SYSTEM,ABNORML,BS4020,RQTA.
W104B  9*      (ALL ON SYSTEM)
```

```
W105B  A*          JERRY MELENDEZ   C-4                              71
W105B  B*RELEASE DATA FROM A TEMPORARY SEQUENTIAL FILESET
W105B  C*CMP            SR7600    CROS
W105B  D*                    SW  2     LS  0     TYPE  1
W105B  E*CMP SOURCE CARDS      0   BCD     OBJECT CARDS      0   BIN
W105B  F**RELEASE*DATA FROM A*TEMPORARY*SEQUENTIAL*FILESET
W105B  G*ON DISK      F4  COMPAT   WU 08/04/71       DECK   NONE
W105B  1*FORM:  CALL DATAREL(NAME1,NAME2)
W105B  2*PURPOSE:  RELEASE DATA FROM A TEMPORARY SEQUENTIAL FILESET
W105B  3*  WITHOUT CHANGING ANY OTHER ATTRIBUTES OF THE FILESET.
W105B  4*ROUTINE NAME:  DATAREL
W105B  5*ENTRY NAME:  DATAREL
W105B  6*STORAGE:  150 OCTAL WORDS OF SCM.
W105B  7*ROUTINES USED:  AFSREL(W101B), GETBA, SYSTEM, ABNORML,
W105B  8*   (ALL ON SYSTEM).
```

```
W106B  A*           R. STUTZ          TD-3                              71
W106B  B*FORQTS - CREATE RQT FOR FILESET
W106B  C*CMP              SR7600   CROS
W106B  D*                      SW 2      LS  2     TYPE  1
W106B  E*CMP SOURCE CARDS    49   BCD    OBJECT CARDS     4   BIN
W106B  F**FORQTS*CREATE*RQT FOR*FILESET
W106B  G*ON DISK     F4  COMPAT   WU 05/15/72REV.1 DECK05/15/72REV.1
W106B  1*FORM:  CALL FORQTS(FS,ARRAY)
W106B  2*PURPOSE:  CREATE I/O REQUEST TABLE(RQT) IN 20-WORD ARRAY
W106B  3*   FOR FILESET FS.
W106B  4*ROUTINE NAME:  FORQTS
W106B  5*ENTRY NAME:  FORQTS
W106B  6*STORAGE:  12 (OCTAL) WORDS.
W106B  7*SELF CONTAINED.
```

```
W108B  A*           NICK NAGY         C-2          J. NORRIS         72
W108B  B*CREVER
W108B  C*F 4    CMP    SR7600   CROS
W108B  D*                      SW   3    LS  0     TYPE 1,2
W108B  E*NO CARDS
W108B  F**CREVER
W108B  G*ON DISK     F4  COMPAT   WU 05/03/73REV.1 DECK  NONE
W108B  1*FORM:  CALL GETQ(4LKCCF,ICCD)
W108B  2*       CALL SETQ(36,ICCD)
W108B  3*       CALL SETQ(37,PW)
W108B  4*       CALL CREVER(FS,CL,OAC,0,NF,MT,MTB,FSL)
W108B  5*PURPOSE:  STAGE TAPE AND RESTORE RESIDENT FILESETS
W108B  6*ROUTINE NAME:  CREVER
W108B  7*ENTRY NAME:  CREVER
W108B  8*STORAGE:  1005 OCTAL WORDS OF SEM.  (NOTE THAT CKSUM(K307B)
W108B  9*     REQUIRES 10000 OCTAL WORDS OF LCM FROM THE FREE POOL
W108B 10*     AND/OR MALCM.)
W108B 11*ROUTINES CALLED:  GETQ(Q414B), XIT(N108B), RDBUF(Q417B),
W108B 12*     SKIPF(W302B), SETQ(Q414B), CREATE(L401B), ABORT(N203B)
W108B 13*     REWIND((W301B), OPEN(Q304B), CKSUM(K307B),
W108B 14*     MEMLEN(Q305B), MESSAGE(Q116B) AFSREL, ADDRQT, RENAME,
W108B 15*     ENDFIL, CLOSER, (ALL ON SYSTEM).
```

```
W109B  A*          FRED SCHILLING   C-2          J. NORRIS        72
W109B  B*OPERM
W109B  C*F4     CMP     SR7600    CROS
W109B  D*                    SW  2     LS  0     TYPE 1
W109B  E*NO CARDS
W109B  F**OPERM
W109B  G*ON DISK      F4  COMPAT   WU 05/12/72       DECK NONE
W109B  1*FORM:  CALL OPERM(FS,OAC,PW,FSI,BUF)
W109B  2*PURPOSE:  TEST FILESET FOR EMPTY
W109B  3*ROUTINE NAME:  OPERM
W109B  4*ENTRY NAME:  OPERM
W109B  5*STORAGE:  367 OCTAL WORDS SCM
W109B  6*ROUTINES CALLED:  GETQ(Q414B), SETQ(Q414B), RDBUF(Q417B),
W109B  7*      REWIND(W310B),OPERM1, OPERM2, OPEN, ABNORML(ALL ON
W109B  8*      THE SYSTEM).
```

```
W110A  A*          D. HARDER        C-4          JAN NORRIS       72
W110A  B*SKPFIL OR SKFILE TO SKIP FILES
W110A  C*CMP            SR6600   SCP 3.1
W110A  D*                    SW  3     LS  4     TYPE  1
W110A  E*CMP SOURCE CARDS     137  BCD    OBJECT CARDS     9   BIN
W110A  F**TAPE*FILE
W110A  G*ON DISK      F4  COMPAT   WU 08/29/72       DECK 08/29/72
W110A  1*FORM:  CALL SKPFIL(ITPNO,NOFILS,IPAR)
W110A  2*       CALL SKFILE(LOGTPN,NOFILS,IPAR)
W110A  3*PURPOSE:  SKPFIL OR SKFILE MAY BE USED TO MOVE FORWARD OR
W110A  4*   BACKWARD TO ANY FILE MARK ON A TAPE OR DISK.
W110A  5*ROUTINE NAME:  SKFILE
W110A  6*ENTRY NAMES:  SKPFIL,SKFILE
W110A  7*STORAGE:  112 OCTAL WORDS.
W110A  8*ROUTINES CALLED:  CPC(ON THE SYSTEM).
```

```
W111A  A*           SCHULTZ, D.E.     C-2          JAN NORRIS        72
W111A  B*RELEASE MAGNETIC TAPE UNIT
W111A  C*CMP             SR6600   SCP 3.1
W111A  D*                    SW  1     LS  4     TYPE  1
W111A  E*CMP SOURCE CARDS    112  BCD    OBJECT CARDS      8   BIN
W111A  F**RELEASE*MAGNETIC*TAPE
W111A  G*ON DISK      F4  COMPAT   WU 08/29/72       DECK 08/29/72
W111A  1*FORM:  CALL RELEASE(N)
W111A  2*PURPOSE:  REWIND AND UNLOAD TAPE DURING EXECUTION, WHEN THE
W111A  3*   PROGRAM NO LONGER HAS ANY USE FOR THE TAPE.  N IS EITHER
W111A  4*   A LOGICAL TAPE NUMBER OR A LEFT ADJUSTED HOLLERITH
W111A  5*   LITERAL, I.E., 5LTAPE3
W111A  6*ROUTINE NAME:  RELEASE
W111A  7*ENTRY NAME:  RELEASE
W111A  8*TIMING:  NOT APPLICABLE
W111A  9*STORAGE:  50 OCTAL WORDS
W111A 10*ROUTINES CALLED:  ZFN(ON THE SYSTEM).
```

```
W112A  A*           BARBARA BACON     C-2          JAN NORRIS        72
W112A  B*REWIND AND UNLOAD A MAGNETIC TAPE
W112A  C*CMP             SR6600   SCP 3.1
W112A  D*                    SW  2     LS  3     TYPE  1
W112A  E*CMP SOURCE CARDS     87   BCD    OBJECT CARDS      6   BIN
W112A  F**UNLOAD*UNLODE*MAGNETIC*TAPE
W112A  G*ON DISK      F4  COMPAT   WU 08/29/72       DECK 08/29/72
W112A  1*FORM:  CALL UNLODE(N)
W112A  2*PURPOSE:  REWIND AND UNLOAD A TAPE DURING EXECUTION SO
W112A  3*   THAT A CONTINUATION TAPE CAN BE USED.  N IS EITHER A
W112A  4*   LOGICAL TAPE NUMBER OR A LEFT ADJUSTED HOLLERITH
W112A  5*   LITERAL, I.E., 5LTAPE3
W112A  6*ROUTINE NAME:  UNLODE
W112A  7*ENTRY NAME:  UNLODE
W112A  8*STORAGE:  52 OCTAL WORDS.
W112A  9*SELF CONTAINED.
```

```
W113A  A*           JENNIE BORING     C-DO          JAN NORRIS        72
W113A  B*OPEN AND CLOSE FILES
W113A  C*CMP              SR6600    SCP 3.1
W113A  D*                   SW  1      LS  3      TYPE  1
W113A  E*CMP SOURCE CARDS     76    BCD     OBJECT CARDS      7    BIN
W113A  F**OPEN*CLOSE*FILE
W113A  G*CARDS         F4  COMPAT    WU 08/29/72       DECK 08/29/72
W113A  1*FORM:  CALL OPEN(KODE,NAME)
W113A  2*       CALL CLOSE(KODE,NAME)
W113A  3*PURPOSE:  KODE IS A FUNCTION CODE FROM SCOPE 3.1 MANUAL.
W113A  4*   SUGGESTED VALUES FOR KODE ON OPEN ARE 1228 FOR BINARY
W113A  5*   AND 1208 FOR BCD.  SUGGESTED VALUES ON CLOSE ARE 1328
W113A  6*   FOR BINARY AND 1308 FOR BCD.  NAME EITHER A LOGICAL UNIT
W113A  7*   NUMBER OR A LEFT ADJUSTED HOLLERITH LITERAL. I.E.,
W113A  8*   6LTAPE10.
W113A  9*ROUTINE NAME:  OPEN
W113A 10*ENTRY NAMES:  OPEN, CLOSE
W113A 11*STORAGE:  51 OCTAL WORDS
W113A 12*SELF CONTAINED.
```

```
W114B  A*           N. NAGY           C-2           J.NORRIS          73
W114B  B*CLOSE AND REWIND FILESET
W114B  C*COMPASS          SR7600    CROS
W114B  D*                   SW 2       LS 0       TYPE 1
W114B  E*NO CARDS
W114B  F**CLOSE*FILESET*REWIND
W114B  G*ON DISK       F4  COMPAT    WU 02/01/73       DECK NONE
W114B  1*FORM:  CALL CLOSER (FSET)
W114B  2*PURPOSE:  CLOSE AND REWIND THE FILESET
W114B  3*ROUTINE NAME:  CLOSER
W114B  4*ENTRY NAME:  CLOSER
W114B  5*STORAGE:  71 (OCTAL) WORDS
W114B  6*ROUTINES CALLED:  GETBA, BS4020, RQTA.(ALL ON SYSTEM)
```

```
W1158  A*          JAN NORRIS       C-2          JAN NORRIS       73
W1158  B*OPEN A FILESET
W1158  C*CMP            SR7600   CROS
W1158  D*                    SW  6     LS 0      TYPE 1,2
W1158  E*NO CARDS
W1158  F**OPEN*SEQUENTIAL*FILESET*BUFFER
W1158  G*ON DISK     F4  COMPAT   WU 03/27/73      DECK NONE
W1158  1*FORM:  CALL OPEN(FS,TYPE,BUF,USE,OAC,PW,SCT,ADISP,DEV)
W1158  2*PURPOSE:  MAKE A FILESET AVAILABLE TO A JOB, SET
W1158  3*      FILESET PARAMETERS, AND ESTABLISH BUFFERS.
W1158  4*      FS=FILESET NAME(REQUIRED)
W1158  5*      TYPE=2LST,2LSR,2LRT, OR 2LRR
W1158  6*      BUF=LCM BUFFER LENGTH
W1158  7*      USE=1LR OR 2LRW
W1158  8*      OAC=OWNER ACCESS CODE
W1158  9*      PW=PASSWORD
W1158 10*      SCT=SECTOR LIMIT
W1158 11*      ADISP=3LPRT,4LPCHB,5LPCHD1,5LPCH80,4LTAPE,
W1158 12             4LFILM,5LSFILM,4LNONE,3LNOT - IN TABLE FORM.
W1158 13*      DEV=5LDISKA,5LDISKB, OR 5LDISKC
W1158 14*ROUTINE NAME:  OPEN
W1158 15*ENTRY NAME:  OPEN
W1158 16*STORAGE:  502 OCTAL WORDS OF SCM
W1158 17*ROUTINES CALLED:  GETBA,SYSFS (ON SYSTEM)
```

```
W116B  A*          JAN NORRIS       C-2          J NORRIS         73
W116B  B*SYSFS - CHECK FILESET NAME, AND FORMAT IF IT IS AN INTEGER
W116B  C*CMP            SR7600   CROS
W116B  D*                    SW  2     LS  0     TYPE 1,2
W116B  E*NO CARDS
W116B  F**FILESET*NAME
W116B  G*ON DISK     F4  COMPAT   WU 04/12/73      DECK NONE
W116B  1*FORM:  CALL SYSFS(INAME,ONAME)
W116B  2*PURPOSE:  CHECK INAME TO SEE IF IT IS A LEGAL FILESET
W116B  3*      NAME OR INTEGER 1-99.  IF IT IS AN INTEGER N, CONVERT
W116B  4*      IT TO FSETN.  THE PROPERLY FORMATTED NAME IS RETURNED
W116B  5*      IN ONAME.  IF INAME IS NOT A LEGAL FILESET NAME OR
W116B  6*      NUMBER, -1 IS RETURNED.
W116B  7*ROUTINE NAME:  SYSFS
W116B  8*ENTRY NAME:  SYSFS
W116B  8*STORAGE:  34 OCTAL WORDS OF SCM.
W116B 10*ROUTINES CALLED:  SELF CONTAINED
```

```
W117B  A*           JAN NORRIS      C-4           JAN NORRIS        73
W117B  B*ACTIVE FILESET RELEASE - RELEASE BUFFER, INITIATE OUTPUT
W117B  C*CMP            SR7600   CROS
W117B  D*                    SW  5     LS  0     TYPE 1,2
W117B  E*               SOURCE 0 ULUPL4 C-2          OBJECT   0 C-2
W117B  F**AFSREL*ACTIVE*FILESET*RELEASE*BUFFER*DISPOSITION
W117B  G*DISK       F4  COMPAT WU 07/06/73        DECK NONE
W117B  1*FORM:  CALL AFSREL(FS,ADISP,ITAPE,RENAME)
W117B  2*PURPOSE:  INITIATE OUTPUT PROCESSING OF AN ACTIVE
W117B  3*      FILESET BEFORE JOB COMPLETION AND RELEASE UNNEEDED
W117B  4*      LCM AND DISK SPACE.
W117B  5*    FS = NAME OF FILESET TO BE RELEASED (REQUIRED).
W117B  6*    ADISP = TABLE OF DISPOSITIONS.
W117B  7*    ITAPE = POSTSTAGE PARAMETERS (MODE,DENSITY,FILES,LABEL).
W117B  8*    RENAME = NEW FILESET NAME.
W117B  9*ROUTINE NAME:  AFSREL
W117B 10*ENTRY NAMES:  AFSREL
W117B 11*STORAGE:  665 OCTAL WORDS OF SCM
W117B 12*ROUTINES CALLED:  SYSFS(W116B),GETBA,BS4020 (ON SYSTEM)
W117B 13*OTHER EXTERNAL:  RQTA.
```

```
W1188  A*           JAN NORRIS       C-4          JAN NORRIS       73
W1188  B*CREATE A FILESET OR MODIFY RESIDENT FILESET PARAMETERS
W1188  C*CMP            SR7600   CROS
W1188  D*                    SW  11    LS  0     TYPE 1,2
W1188  E*             SOURCE OLDPL4  C-4            OBJECT  0   C-4
W1188  F**CREMOD*CREATE*MODIFY*RESIDENT*FILESET
W1188  G*DISK       F4  COMPAT WU 07/06/73        DECK  NONE
W1188  1*FORM:  CALL CREATE(FS,CL,TYPE,OPW,REL,RDISP,ITAPE,RWU,
W1188  2*             RU,SCT,DEV)
W1188  3*       CALL MODIFY(FS,OPW,REL,RDISP,DROP,RWU,RU,SCT,
W1188  4*             RENAME)
W1188  5*PURPOSE:  CREATE AND ACTIVATE FILESET. STAGE IN TAPE.
W1188  6*  FS=FILESET NAME.                        CL=CLASSIFICATION.
W1188  7*  TYPE=2LST,2LSR,2LRT,OR 2LRR.           OPW=OWNER PASSWORD.
W1188  8*  REL=RELEASE DATE.
W1188  9*  RDISP=TABLE OF DISPOSITIONS.
W1188 10*  ITAPE=PRESTAGE PARAMETERS(MODE,DENSITY,FILES,LABEL).
W1188 11*  RWU=TABLE OF READ/WRITE USERS AND PASSWORDS.
W1188 12*  RU=TABLE OF READ ONLY USERS AND PASSWORDS.
W1188 13*  SCT=SECTOR LIMIT.                       DEV=DEVICE.
W1188 14*  DROP=TABLE OF USERS TO BE DROPPED.
W1188 15*  RENAME=NEW FILESET NAME.
W1188 16*ROUTINE NAME:  CREMOD
W1188 17*ENTRY NAMES:  CREATE,MODIFY
W1188 18*STORAGE:  1754 OCTAL WORDS OF SCM.
W1188 19*ROUTINES CALLED:  SYSFS(W1168), GETBA(SYSTEM).
```

W2 GET INFORMATION ON STATUS OF I/O

E.G., IF(EOF), LENGTH, BOI, IOCHECK.

REVIEWER: J. NORRIS, C-2

```
W201B  A*          EMILY WILLBANKS  C-2                          71
W201B  B*BOI - BEGINNING OF INFORMATION TEST
W201B  C*CMP            SR7600   CROS
W201B  D*                    SW  3     LS  0     TYPE  1
W201B  E*                      0   BIN                      0   BCD
W201B  F**BOI*I/O STATUS
W201B  G*ON DISK   F4  COMPAT      WU 06/28/71       DECK  NONE
W201B  1*FORM:  Y=BOI(N)
W201B  2*PURPOSE:  FUNCTION TO DETERMINE STATUS (BOI) OF I/O ON
W201B  3*   UNIT N. RETURNS NON-ZERO IF FILESET POSITIONED AT BOI.
W201B  4*   =*0 IF FILESET NOT POSITIONED AT BOI.
W201B  5*ROUTINE NAME:  BOI
W201B  6*ENTRY NAME:  BOI
W201B  7*STORAGE:  44 OCTAL WORDS OF SCM.
W201B  8*ROUTINES CALLED:  GETBA, OPEN., WAITR, SYSTEM, ABNORML,
W201B  9*   (ALL ON SYSTEM).
```

```
W202B  A*          EMILY WILLBANKS  C-2                          71
W202B  B*EOI - END OF INFORMATION TEST
W202B  C*CMP            SR7600   CROS
W202B  D*                    SW  3     LS  0     TYPE  1
W202B  E*                      0   BIN                      0   BCD
W202B  F**EOI*I/O*STATUS
W202B  G*ON DISK   F4  COMPAT      WU 06/28/71       DECK   NONE
W202B  1*FORM:  Y=EOI(N)
W202B  2*PURPOSE:  FUNCTION TO DETERMINE STATUS (EOI) OF I/O ON
W202B  3*   UNIT N. RETURNS NON-ZERO IF EOI STATUS, =*0 IF
W202B  4*   NO EOI STATUS.
W202B  5*ROUTINE NAME:  EOI
W202B  6*ENTRY NAME:  EOI
W202B  7*STORAGE:  168 WORDS OF SCM.
W202B  8*ROUTINES CALLED:  GETBA, WAITR, SYSTEM, ABNORML, (ALL
W202B  9*   ON SYSTEM).
```

```
W2038  A*           ANN SOLEM          C-4                              71
W2038  B*IOCHECK - DETERMINE STATUS OF I/O REQUEST
W2038  C*FIV             SR7600   CROS
W2038  D*                     SW  4     LS  0     TYPE  1
W2038  E*                       0   BCD                        0   BIN
W2038  F**IOCHECK - DETERMINE*STATUS OF*I/O REQUEST
W2038  G*ON DISK      F4  COMPAT   WU 06/22/71       DECK   NONE
W2038  1*FORM:  J=IOCHECK(I,ITIME)
W2038  2*PURPOSE:  FUNCTION TO DETERMINE STATUS (EOF,EOI) OF I/O ON
W2038  3*    UNIT I.  ITIME MAY BE SET TO AMOUNT OF TIME WAITED IF
W2038  4*    ITIME.EQ.2
W2038  5*ROUTINE NAME:  IOCHECK
W2038  6*ENTRY NAME:  IOCHECK
W2038  7*STORAGE:  2408 WORDS OF SCM.
W2038  8*ROUTINES CALLED:  BOI, EOI, IOCHEK, LENGTH,
W2038  9*  OUTPTC (ALL ON SYSTEM).
```

```
W2048  A*           EMILY WILLBANKS  C-2                               71
W2048  B*LENGTH - AMOUNT OF DATA TRANSFERRED BY INPUT OPERATION
W2048  C*CMP             SR7600   CROS
W2048  D*                     SW  2     LS  0     TYPE  1
W2048  E*                       0   BCD                        0   BIN
W2048  F**LENGTH - AMOUNT OF DATA TRANSFERRED BY*INPUT OPERATION
W2048  G*ON DISK      F4  COMPAT   WU 07/19/71       DECK   NONE
W2048  1*FORM:  L=LENGTH(N)
W2048  2*PURPOSE:  INTEGER FUNCTION TO RETURN THE NUMBER OF WORDS
W2048  3*    TRANSFERRED INTO MEMORY BY THE PREVIOUS I/O OPERATION
W2048  4*    ON UNIT N.
W2048  5*ROUTINE NAME:  LENGTH
W2048  6*ENTRY NAME:  LENGTH
W2048  7*STORAGE:  208 WORDS OF SCM.
W2048  8*ROUTINES CALLED:  SYSTEM, ABNORML, GETBA, WAITR,
W2048  9*    (ALL ON SYSTEM).
```

```
W2058  A*           R. STUTZ           TD-3                             71
W2058  B*GETADD - GET ADDRESS OF RQT FOR A FILESET
W2058  C*CMP             SR7600   CROS
W2058  D*                     SW 2      LS  2     TYPE  1
W2058  E*CMP SOURCE CARDS     48   BCD    OBJECT CARDS      4   BIN
W2058  F**GETADD*ADDRESS*RQT
W2058  G*CARDS         F4  COMPAT   WU 10/14/71       DECK 10/14/71
W2058  1*FORM:  RQT = GETADD(N)
W2058  2*PURPOSE:  RETURN ADDRESS OF I/O REQUEST TABLE(RQT) FOR
W2058  3*    FILESET N.
W2058  4*ROUTINE NAME:  GETADD
W2058  5*ENTRY NAME:  GETADD
W2058  6*STORAGE:  13 (OCTAL) WORDS.
W2058  7*ROUTINES CALLED:  FORMF(W208B).
```

```
W2068  A*          EMILY WILLBANKS  C-2          J. NORRIS        71
W2068  B*IDONE,IDONEQ,ISTATUS
W2068  C*CMP            SR7600   CROS
W2068  D*                    SW  2     LS  3     TYPE  1
W2068  E*CMP SOURCE CARDS    94   BCD    OBJECT CARDS     5   BIN
W2068  F**IDONE*IDONEQ*ISTATUS*STATUS
W2068  G*ON DISK     F4  COMPAT   WU 10/10/72REV 1 DECK 10/10/72REV 1
W2068  1*FORM:  I = IDONE(N)
W2068  2*       I = IDONEQ(RQT)
W2068  3*       I = ISTATUS(RQT)
W2068  4*PURPOSE:  IDONE/IDONEQ FUNCTION RETURNS STATUS OF I/O FOR
W2068  5*   FILESET N OR FOR FILESET IN REQUEST TABLE RQT.=1 FOR
W2068  6*   I/O COMPLETE. =0 OTHERWISE.  ISTATUS FUNCTION RETURNS
W2068  7*   THE I/O STATUS AS IS OF THE INDICATED FS.  IDONE IS
W2068  8*   SLOWER THAN IDONEQ OR ISTATUS.
W2068  9*ROUTINE NAME:  IDONE
W2068 10*ENTRY NAMES:  IDONE, IDONEQ,ISTATUS
W2068 11*STORAGE:  13 OCTAL WORDS.
W2068 12*ROUTINES CALLED:  GETBA(ON THE SYSTEM).


W2078   *(STATUS) DELETED FROM LIBRARY-NOW COMBINED WITH W2068.


W2088  A*          R. STUTZ         TD-3                          71
W2088  B*FORMF - CONVERT UNIT NUMBER TO FILESET NAME
W2088  C*CMP            SR7600   CROS
W2088  D*                    SW 2      LS  3     TYPE  1
W2088  E*CMP SOURCE CARDS    57   BCD    OBJECT CARDS     4   BIN
W2088  F**FORMF*UNIT NUMBER*FILESET NAME
W2088  G*CARDS       F4  COMPAT   WU 10/14/71      DECK 10/14/71
W2088  1*FORM:  FS = FORMF(N)
W2088  2*PURPOSE:  GIVEN INTEGER UNIT NUMBER N, RETURN
W2088  3*   ALPHANUMERIC FILESET NAME SLFSETN.
W2088  4*ROUTINE NAME:  FORMF
W2088  5*ENTRY NAME:  FORMF
W2088  6*STORAGE:  16 (OCTAL) WORDS.
W2088  7*SELF CONTAINED.


W2098   *(IDONEQ) DELETED FROM LIBRARY-NOW COMBINED WITH W2068.
```

```
W2108  A*           N. NAGY          C-2          J. NORRIS        73
W2108  B*CHECK FOR UNRECOVERED PARITY ERRORS ON MAG TAPE INPUT
W2108  C*COMPASS       SR7600   CROS
W2108  D*                    SW 2      LS 0      TYPE 1
W2108  E*NO CARDS
W2108  F**PARITY*ERROR
W2108  G*ON DISK      F4  COMPAT   WU 01/30/73      DECK NONE
W2108  1*FORM:  CALL PARITY(FSNAME,N)
W2108  2*PURPOSE:  CHECK FOR EXISTENCE OF AN UNRECOVERED PARITY
W2108  3*      ERROR WHEN A FILESET WAS STAGED IN FROM MAGNETIC TAPE.
W2108  4*ROUTINE NAME:  PARITY
W2108  5*ENTRY NAME:  PARITY
W2108  6*STORAGE:  70 (OCTAL) WORDS
W2108  7*ROUTINES CALLED:  MESSAGE(Q116), SYSFS (ON SYSTEM)
```

W3 POSITIONING

E.G., SKIP FILE, BACKSPACE, END FILE, REWIND.

REVIEWER: J. NORRIS, C-2

```
W301B  A*           EMILY WILLBANKS  C-2                              71
W301B  B*REWIND
W301B  C*CMP              SR7600   CROS
W301B  D*                    SW  2     LS  0     TYPE  1
W301B  E*                    0   BCD                          0   BIN
W301B  F**REWIND*REWINM
W301B  G*ON DISK     F4  COMPAT   WU 06/22/71      DECK   NONE
W301B  1*FORM:  CALL REWIND(FS)
W301B  2*PURPOSE:  REWIND FILESET FS.
W301B  3*ROUTINE NAME:  REWINM
W301B  4*ENTRY NAMES:  REWINM, REWIND
W301B  5*STORAGE:  338 WORDS OF SCM.
W301B  6*ROUTINES CALLED:  GETBA, SYSTEM, ABNORMAL, OPEN.,
W301B  7*   WAITR (ALL ON SYSTEM).
W301B  8*OTHER SCM EXTERNALS:  IOGEN (ON SYSTEM)
```

```
W302B  A*           EMILY WILLBANKS  C-2                              71
W302B  B*SKIRF,SKPFIL,SKFILE - SKIP FILES FORWARD OR BACKWARD
W302B  C*CMP              SR7600   CROS
W302B  D*                    SW  2     LS  2     TYPE  1
W302B  E*SOURCE CARDS         47   BCD    OBJECT CARDS    5    BIN
W302B  F**SKIPF*SKPFIL*SKFILE
W302B  G*ON DISK     F4  COMPAT   WU 11/01/72REV.1 DECK 11/01/72
W302B  1*FORM:  CALL SKIPF(FS,N)
W302B  2*       CALL SKPFIL(FS,N)
W302B  3*       CALL SKFILE(FS,N)
W302B  4*PURPOSE:  SKIP N FILES FORWARD OR BACKWARD ON FILESET FS.
W302B  5*ROUTINE NAME:  SKIPF
W302B  6*ENTRY NAMES:  SKIPF, SKPFIL, SKFILE
W302B  7*STORAGE:  27 OCTAL WORDS OF SCM
W302B  8*ROUTINES CALLED:  SKIPX (ON SYSTEM).
```

```
W303B  A*           EMILY WILLBANKS  C-2                              71
W303B  B*SKIPI - SKIP TO END-OF-INFORMATION
W303B  C*CMP            SR7600   CROS
W303B  D*                    SW  2     LS  0     TYPE  1
W303B  E*                      0   BCD                        0   BIN
W303B  F**SKIPI*EOI
W303B  G*ON DISK      F4  COMPAT   WU 06/22/71       DECK   NONE
W303B  1*FORM:  CALL SKIPI(FS)
W303B  2*PURPOSE:  POSITION FILESET FS AT END-OF-INFORMATION
W303B  3*ROUTINE NAME:  SKIPI
W303B  4*ENTRY NAME:  SKIPI
W303B  5*STORAGE:  128 WORDS OF SCM.
W303B  6*OTHER SCM EXTERNALS:  IOGEN (ON SYSTEM)
W303B  7*ROUTINES CALLED:  SKIPX (ON SYSTEM)
```

```
W304B  A*           EMILY WILLBANKS  C-2                              71
W304B  B*SKIPR - SKIP RECORDS FORWARD OR BACKWARD
W304B  C*CMP            SR7600   CROS
W304B  D*                    SW  2     LS  0     TYPE  1
W304B  E*                      0   BCD                        0   BIN
W304B  F**SKIPR
W304B  G*ON DISK      F4  COMPAT   WU 06/22/71       DECK   NONE
W304B  1*FORM:  CALL SKIPR(FS,N)
W304B  2*PURPOSE:  SKIP N RECORDS FORWARD OR BACKWARD ON FILESET FS.
W304B  3*ROUTINE NAME:  SKIPR
W304B  4*ENTRY NAMES:  SKIPX,SKIPR
W304B  5*STORAGE:  518 WORDS OF SCM.
W304B  6*OTHER SCM EXTERNAL: IOGEN (ON SYSTEM)
W304B  7*ROUTINES CALLED:  SYSTEM, ABNORML, GFTBA, OPEN,
W304B  8*   WAITR(ALL ON SYSTEM).
```

```
W305B  A*           J. NORRIS        C-2          J. NORRIS        73
W305B  B*BACKSPACE ONE OR MORE RECORDS
W305B  C*CMP             SR7600   CROS
W305B  D*                     SW  1     LS  0     TYPE 1,2
W305B  E*                SOURCE OLDPL4 C-2     OBJECT    0  C-2
W305B  F**BACKSPACE
W305B  G* DISK      F4  COMPAT WU 07/09/73        DECK NONE
W305B  1*FORM:  CALL BKSP(FS,N)
W305B  2*       CALL BKSP(FS)
W305B  3*       BACKSPACE I
W305B  4*PURPOSE:  BACKSPACE A FILESET ONE OR MORE RECORDS
W305B  5*     FS = FILESET NAME(LEFT-JUSTIFY, ZERO-FILL)
W305B  6*          OR INTEGER M, 1-99, TO BE CONVERTED TO FSETM
W305B  7*     N = INTEGER NUMBER OF RECORDS TO BACKSPACE OVER
W305B  8*     I = INTEGER UNIT NUMBER OR INTEGER VARIABLE WHOSE
W305B  9*         VALUE IS FILESET NAME OR UNIT NUMBER.
W305B 10*ROUTINE NAME:  BACKSP
W305B 11*ENTRY NAMES:  BACKSP,BKSP
W305B 12*STORAGE:  27 OCTAL WORDS OF SCM
W305B 13*ROUTINES CALLED:  SKIPX(W304B)
```

W4 GET INFORMATION ON FILE

DUMP FILE, CATALOG, DIRL, CRSREF,

REVIEWER: J. NORRIS, C-2

```
W4028  A*          RON KRANTZ       C-2                              71
W4028  B*DIRL - LIST DIRECTORY OF RANDOM LIBRARY FILESET
W4028  C*CMP           SR7600    CROS
W4028  D*                    SW  2     LS  0     TYPE  1
W4028  E*                      0   BCD                        0   BIN
W4028  F**DIRL - LIST*DIRECTORY OF*RANDOM*LIBRARY*FILESET
W4028  G*ON DISK    F4  COMPAT      WU 06/22/71       DECK   NONE
W4028  1*FORM:  CALL DIRL(D,O)
W4028  2*PURROSE:  LIST DIRECTORY OF RANDOM LIBRARY FILESET D ONTO
W4028  3*   OUTPUT FILESET O.
W4028  4*ROUTINE NAME:  DIRL
W4028  5*ENTRY NAME:  DIRL
W4028  6*STORAGE:  5,300B WORDS OF SCM,  10,000B WORDS OF LCM.
W4028  7*ROUTINES CALLED:  GETBA(ON SYSTEM).
```

```
W403B  A*          EMILY WILLBANKS  C-2        J. NORRIS          71
W403B  B*DMPFS - DUMP CONTENTS OF FILESET
W403B  C*F4             SR7600   CROS
W403B  D*                    SW  3     LS  3     TYPE  1
W403B  E*SOURCE CARDS        110  BCD    OBJECT CARDS    37   BIN
W403B  F**DMPFS*DUMP CONTENTS OF*FILESET
W403B  G*ON DISK      F4  COMPAT   WU 11/01/72REV.1 DECK 11/01/72REV.1
W403B  1*FORM:  CALL DMPFS(FS,NWDS,NR,NF,FORMAT,IF,IR,FSO)
W403B  2*PURPOSE:  PRINT THE CONTENTS OF FILESET FS, STARTING AT
W403B  3*  ITS CURRENT POSITION, ON FILESET FSO IN THE SPECIFIED
W403B  4*  FORMAT(FORMAT,IF,IR).  NWDS WORDS PER RECORD AND NR
W403B  5*  RECORDS PER FILE ARE PRINTED FOR NF FILES.  IF NWDS=0,
W403B  6*  EACH RECORD OF NF FILES IS CATALOGED.  IF NWDS=0 AND
W403B  7*  NF.LT.0, EACH FILE OF THE FILESET IS CATALOGED.
W403B  8*ROUTINE NAME:  DMPFS
W403B  9*ENTRY NAME:  DMPFS
W403B 10*STORAGE:  714 (OCTAL) WORDS OF SCM
W403B 11*ROUTINES CALLED:  NARG, SKIPF, BOI, OUTPTC, DREADI,
W403B 12*  DREADR (ALL ON SYSTEM).
```

```
W4048  A*           EMILY WILLBANKS  C-2          J. NORRIS C-2    72
W4048  B*COPYBFS - DETERMINE OPTIMUM RANDOM AND SEQUENTIAL BUFFERS
W4048  C*F4              SR7600   CROS
W4048  D*                     SW 2      LS 0      TYPE 1,2
W4048  E*                SOURCE   0 C-2              OBJECT   0 C-2
W4048  F**COPYBFS
W4048  G*ON DISK      F4  COMPAT   WU 06/13/73REV.1 DECK NONE
W4048  1*FORM:  CALL COPYBFS(LCAV,IRANBL,ISEQ,MALCM,IROLL)
W4048  2*PURPOSE:  GIVEN AMOUNT OF FREE LCM AND SIZE OF MALCM,
W4048  3*      DETERMINE THE OPTIMUM SIZES FOR RANDOM AND
W4048  4*      SEQUENTIAL BUFFERS AND ROLL OUT MALCM TO PROVIDE
W4048  5*      ROOM.
W4048  6*ROUTINE NAME:  COPYBFS
W4048  7*ENTRY NAME:  COPYBFS
W4048  8*STORAGE:  66 OCTAL WORDS
W4048  9*ROUTINES CALLED:  LCROLOT(Q306B) ON SYSTEM
```

Z (NOT USED FOR NEW PROGRAMS)

```
Z102A  A*           LARRY RUDSINSKI  C-4          ALEX MARUSAK     67
Z102A  B*INDEX
Z102A  C*FORTRAN        MP6600           SCP 3.1              ECS
Z102A  D*                     SW  7     LS  0      TYPE  1
Z102A  E*F4 SOURCE CARDS  0                 OBJECT CARDS   0
Z102A  F**INDEX*CROSS-REFERENCE*DIRECTORY
Z102A  G*ON DISK      F4 COMPAT     WU 11/10/71REV 4 NO DECK
Z102A  1*6600 CONTROL CARD FORM:  INDEX(INPUT,OUTPUT)
Z102A  2*PURPOSE:  ANALYZE FORTRAN SOURCE DECKS AND PRODUCE A
Z102A  3*      DIRECTORY OF ALL STATEMENT NUMBERS AND VARIABLE
Z102A  4*      NAMES USED IN THE SOURCE.
Z102A  5*ROUTINE NAME:  INDEX
Z102A  6*ENTRY NAME:  INDEX
Z102A  7*STORAGE:  45000 OCTAL WORDS CENTRAL MEMORY AND
Z102A  8*          46000 TO 303000 OCTAL WORDS ECS.
```

```
Z102B  A*           LARRY RUDSINSKI  C-4          ALEX MARUSAK     71
Z102B  B*INDEX
Z102B  C*FORTRAN        MP7600    CROS    ECS
Z102B  D*                     SW  7     LS  0      TYPE  1
Z102B  E*F4 SOURCE CARDS      NONE          OBJECT CARDS     NONE
Z102B  F**INDEX*CROSS-REFERENCE*DIRECTORY
Z102B  G*ON DISK      F4  COMPAT    WU 11/10/71       NO DECK
Z102B  1*7600 CONTROL CARD FORM:  $INDEX(INP=INP,OUT=OUT,LC=200000B)
Z102B  2*PURPOSE:  ANALYZE FORTRAN SOURCE DECKS AND PRODUCE A
Z102B  3*      DIRECTORY OF ALL STATEMENT NUMBERS AND VARIABLE
Z102B  4*      NAMES USED IN THE SOURCE.
Z102B  5*ROUTINE NAME:  INDEX
Z102B  6*ENTRY NAME:  INDEX
Z102B  7*STORAGE:  45000 OCTAL WORDS SCM
Z102B  8*  AND 46000 TO 303000 OCTAL WORDS LCM
```

```
Z103A   *(NXTDAY) HAS BEEN REDESIGNATED Q1AA.
```

```
Z104A   *(F66F94) HAS BEEN REDESIGNATED M2AD.
```

```
Z105A   *(DISI94) HAS BEEN REDESIGNATED M2AE.
```

```
Z106A   *(WRIT94) HAS BEEN REDESIGNATED K501A.
```

Z107A *(WR94FBT) HAS BEEN REDESIGNATED K502A.

Z1AA *(ASAP) HAS BEEN REDESIGNATED Q3AA.

PART III

INDEXES

INDEX 1 - PROGRAMS BY NAME

Currently, this index contains all program names and entry points found in the 6600 and 7600 System Libraries and Local Libraries. "PROGRAM NAME" refers to these names. The "$" appended to the name means that the program is a 7600 control card. The "↑" appended to a name means that the program is an LEXT 7600 program (see the LCM FORTRAN Supplement to the CDC FORTRAN Reference Manual).

"PROGRAM NUMBER" refers to the program designation associated with that program. "NONE" indicates that there is no program designation because that program has not been submitted to the Program Library.

"7600 RESIDENCE" refers to where the 7600 program may be found. "6600 RESIDENCE" refers to where the 6600 program may be found. "DISK" indicates that the program is in the System Library of that computer; if the program was submitted to the Program Library, it is probably also available on cards or tape in the Program Library. "CARDS", "TAPE", or "PERMFILE" indicates that the program is not in the System Library, but it is available in the Program Library on cards or magnetic tape or in the computer on a permanent disk file, respectively. A name in parenthesis is a cross reference to a similar program which is available on that computer.

"ABSTRACT IN CATALOG SECTION" refers to the section of the "Catalog of Programs" published in this volume in which an abstract for this program will be found. "NONE" indicates that the Program Library does not have an abstract or writeup for this program. In many cases, the 6600 writeup will do for the 7600 program which has none.

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
ABNORML	NONE	DISK	DISK	NONE
ABORT	N203	DISK	DISK	N2
ABORTJ	NONE	DISK		NONE
ABTDSS	F413		CARDS	F4
ABWTLAG	D1AD		CARDS	D1
ABWTLEG	D1AE		CARDS	D1
ACFCN	G602	DISK	CARDS	G6
ACGOER	NONE	DISK	DISK	NONE
ACOS	B108	DISK	DISK	B1
ADDRQT	NONE	DISK		NONE
ADDVEC	F133	DISK	DISK	F1
ADV	J506	DISK	DISK	J5
AFSREL	W117	DISK		W1
AFSREL$	NONE	DISK		NONE
AFST	NONE	DISK		NONE
AIDS	G6AA		CARDS	G6
AKNINT	E106	DISK	DISK	E1
ALNLOG	B305	DISK	DISK	B3
ALNLOG↑	B305	DISK		B3
ALOG10	B305	DISK	DISK	B3
ALOG10↑	B305	DISK		B3
ALOG	B305	DISK	DISK	B3
ALOG↑	B305	DISK		B3
APT	NONE		DISK	NONE
ARCCOS	B108	DISK	DISK	B1
ARCOS	B108	DISK	DISK	B1
ARCSIN	B108	DISK	DISK	B1
ARLM2	NONE		DISK	NONE
ARSIN	B108	DISK	DISK	B1
ASAP	Q3AA		CARDS	Q3
ASCL	J510	DISK	DISK	J5
ASHIFT	M406		CARDS	M4
	NONE	DISK		NONE
ASIN	B108	DISK	DISK	B1
ATAN	B104		DISK	B1
	NONE	DISK		NONE
ATAN2	B104		DISK	B1
	NONE	DISK		NONE
AXIS	J547	DISK	CARDS	J5
BACK	NONE	DISK		NONE
BACKSP	NONE		DISK	NONE
	W305	DISK		W3
BACKUP	NONE	DISK		NONE
BANMAT	F411	DISK	CARDS	F4
BARPLOT	J604	DISK	CARDS	J6
BASF	C327	DISK	DISK	C3
BENDIX	NONE		DISK	NONE
BESJN	C301		DISK	C3
	NONE	DISK		NONE
BETAIC	C336	DISK		C3

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
BISECT	F230		CARDS	F2
BJYIK	C328	DISK	DISK	C3
BKSP	NONE		DISK	NONE
	W305	DISK		W3
BKSP$	NONE	DISK		NONE
BKSPRU.	NONE		DISK	NONE
BKSP$	NONE	DISK		NONE
BLOCK	J551		CARDS	J5
	NONE	DISK		NONE
BOI	W201	DISK		W2
BOUNDS	E4AA	TAPE		E4
BREAKUP	K306	DISK		K3
BS4020	J565		CARDS	J5
	NONE	DISK	DISK	NONE
BUF	K6AA		CARDS	K6
BUFFEI	NONE	DISK	DISK	NONE
BUFFEO	NONE	DISK	DISK	NONE
BUFF.	NONE	DISK		NONE
BUFSIZE	Q411		CARDS	Q4
BURG	NONE		DISK	NONE
C4020	NONE	DISK	DISK	NONE
CABS	A203		DISK	A2
	NONE	DISK		NONE
CABS↑	NONE	DISK		NONE
CALCVT	J5AB		CARDS	J5
CALLER	NONE	DISK		NONE
CALLUMT	NONE	DISK		NONE
CALSEC2	NONE		DISK	NONE
CALSEC3	NONE		DISK	NONE
CART3D	J590		CARDS	J5
CATALOG	NONE	(DMPFS$)	DISK	NONE
CATFAC	F416	DISK	CARDS	F4
CATFILE	NONE		DISK	NONE
CATINV	F137	DISK	CARDS	F1
CBAIEX	NONE	DISK	DISK	NONE
CBJYIK	C333	DISK	CARDS	C3
CBSF	C332	DISK	CARDS	C3
CBSHV	D111		DISK	D1
	NONE	DISK		NONE
CBSIII	T4AA		TAPE	T4
CCOS	B109		DISK	B1
	NONE	DISK		NONE
CCP$	NONE	DISK		NONE
CCP$1	NONE	DISK		NONE
CCP2	NONE	DISK		NONE
CCP3	NONE	DISK		NONE
CCPIO	NONE	DISK		NONE
CCPJOB1	NONE	DISK		NONE
CCPMSG	NONE	DISK		NONE
CCPREAD	NONE	DISK		NONE
CCPZZZZ	NONE	DISK		NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
CCT	NONE	DISK		NONE
CDG	B106		DISK	B1
	NONE	DISK		NONE
CDG↑	NONE	DISK		NONE
CDOTPRO	F136	DISK	CARDS	F1
CELLI	C304		CARDS	C3
	NONE	DISK		NONE
CEXP	B310		DISK	B3
	NONE	DISK		NONE
CFL	NONE		DISK	NONE
CIO1.	NONE		DISK	NONE
CIN261	NONE		DISK	NONE
CINMAT	NONE		DISK	NONE
CIRCA	J580		CARDS	J5
	NONE	DISK		NONE
CIRCL	J581		CARDS	J5
	NONE	DISK		NONE
CIRCLE	D1AA		CARDS	D1
CKO	NONE	DISK		NONE
CKSUM	K307	DISK		K3
CKSUM2	K310	DISK		K3
CKSUM$	NONE	DISK		NONE
CLEAR	NONE		DISK	NONE
CLEARA	NONE	DISK		NONE
CLOCK	Q102		DISK	Q1
	Q115	DISK		Q1
CLOCK1	Q105		DISK	Q1
	Q115	DISK		Q1
CLOCKF	Q115	DISK		Q1
CLOG	B307		DISK	B3
	NONE	DISK		NONE
CLOSE	W113	(CLOSER)	CARDS	W1
CLOSE2	NONE		DISK	NONE
CLOSE2A	NONE		DISK	NONE
CLOSE2$	NONE		DISK	NONE
CLOSER	W114	DISK	(CLOSE)	W1
CLOSER$	NONE	DISK		NONE
CLSIT	F417	DISK	CARDS	F4
CLSS	F408	DISK	DISK	F4
COBOL	NONE		DISK	NONE
COBOL10	NONE		DISK	NONE
COBOL11	NONE		DISK	NONE
COBOL12	NONE		DISK	NONE
COBOL13	NONE		DISK	NONE
COBOL14	NONE		DISK	NONE
COBOL15	NONE		DISK	NONE
COBOL16	NONE		DISK	NONE
COBOL20	NONE		DISK	NONE
COBOL21	NONE		DISK	NONE
COBOL22	NONE		DISK	NONE
COBOL23	NONE		DISK	NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
COLOR	J569	DISK	DISK	J5
COMBES	C323		CARDS	C3
	NONE	DISK		NONE
COMP1$	NONE	DISK	DISK	NONE
COMP2	NONE	DISK		NONE
COMP2$	NONE		DISK	NONE
COMP11$	NONE		DISK	NONE
COMP12$	NONE		DISK	NONE
COMPARE	NONE		DISK	NONE
COMPAS2	NONE		DISK	NONE
COMPASS	NONE	DISK		NONE
COMPASS	NONE		DISK	NONE
COMPSW	Q416	DISK		Q4
COMPSW$	NONE	DISK		NONE
COMPTR	NONE		DISK	NONE
CONTOUR	J560		CARDS	J5
	NONE	DISK		NONE
CONTRJB	J563	DISK	DISK	J5
CONVRT	J526		DISK	J5
	NONE	DISK		NONE
CONVT	NONE		DISK	NONE
COPY	NONE		DISK	NONE
	K301	DISK		K3
COPYBCD	NONE		DISK	NONE
COPYBF	NONE	(COPYF$)	DISK	NONE
COPYBFS	W404	DISK		W4
COPYBR	NONE	(COPYR$)	DISK	NONE
COPYCF	NONE	(COPYF$)	DISK	NONE
COPYCR	NONE	(COPYR$)	DISK	NONE
COPYDF	Q119	DISK		Q1
COPYDF$	NONE	DISK		NONE
COPYF	K301	DISK		K3
COPYFF	NONE		DISK	NONE
	K305	DISK		K3
COPYFF$	NONE	DISK		NONE
COPYF$	NONE	DISK		NONE
COPYL	NONE		DISK	NONE
	K306	DISK		K3
COPYL$	NONE	DISK		NONE
COPYN	NONE		DISK	NONE
COPYR	K301	DISK		K3
COPYRS	K309	DISK		K3
COPYR$	NONE	DISK	(COPYBR)	NONE
COPYSBF	NONE	(COPYSF$)	DISK	NONE
COPYSF	K303	DISK		K3
COPYSF$	NONE	DISK	(COPYSBF)	NONE
COPYSR	K308	DISK		K3
COPY$	NONE	DISK	(COPY)	NONE
CORINV	F125		DISK	F1
	NONE	DISK		NONE
COS	B106		DISK	B1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
COS	NONE	DISK		NONE
COSH	B203	DISK	DISK	B2
COS↑	NONE	DISK		NONE
COT	B107	DISK	DISK	B1
COTAN	B107	DISK	DISK	B1
COTPRO	F136	DISK	CARDS	F1
CPAREA	Q401	(GETQ)	DISK	Q4
CPC	NONE		DISK	NONE
CPC02	NONE		DISK	NONE
CPC03	NONE		DISK	NONE
CPC04	NONE		DISK	NONE
CPC99	NONE		DISK	NONE
CPWORD	Q410	(GETQ)	DISK	Q4
CREATE	W118	DISK		W1
CREATE$	NONE	DISK		NONE
CREMOD	W118	DISK		W1
CREVER	W108	DISK		W1
CREVER1	NONE	DISK		NONE
CREVER$	NONE	DISK		NONE
CROS76	K503		PERMFILE	K5
CROSTXT	NONE	DISK		NONE
CRSREF	NONE	DISK		NONE
CRSREF$	NONE	DISK		NONE
CSIN	B109		DISK	B1
	NONE	DISK		NONE
CSQRT	B409	DISK	DISK	B4
	B4AA		CAROS	B4
CTX	NONE	DISK		NONE
CUBRT	B407		CARDS	B4
	NONE	DISK		NONE
CVDEL	NONE		DISK	NONE
CVRT	NONE		DISK	NONE
DABS	A108	DISK	DISK	A1
DASHL	J582		CARDS	J5
	NONE	DISK		NONE
DASHP	J583		CARDS	J5
	NONE	DISK		NONE
DAT.	NONE	DISK	DISK	NONE
DATAN	NONE	DISK	DISK	NONE
DATAN2	NONE	DISK	DISK	NONE
DATAREL	W105	DISK		W1
DATE	Q106		DISK	Q1
	Q115	DISK		Q1
DATE1	Q107		DISK	Q1
	Q115	DISK		Q1
DBADEX	NONE	DISK	DISK	NONE
DBAIEX	B313	DISK	DISK	B3
DBAREX	NONE	DISK	DISK	NONE
D.BCDRD	NONE		DISK	NONE
D.BCDWR	NONE		DISK	NONE
DBLE	A105		DISK	A1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
DBLE	A105	DISK		A1
DBPRINT	NONE	DISK		NONE
DCABS	A202		DISK	A2
	NONE	DISK		NONE
DCOS	NONE	DISK	DISK	NONE
DCPOLE	C213		CARDS	C2
	NONE	DISK		NONE
DCPOLY	C2AD		CARDS	C2
	NONE	DISK		NONE
DCPTACO	C214		CARDS	C2
DECPTD	F420	DISK	CARDS	F4
DEXP	NONE	DISK	DISK	NONE
DFILE	K306	DISK		K3
DFNAME	NONE	DISK		NONE
DGA	J528		DISK	J5
	NONE	DISK		NONE
DGLSS	F406		CARDS	F4
	NONE	DISK		NONE
DIAG	NONE		DISK	NONE
DIARY	NONE	DISK		NONE
DIARY$	NONE	DISK		NONE
DIRL	W402	DISK		W4
DIRL$	NONE	DISK		NONE
DIS194	M2AE		CARDS	M2
DISPLA	Q113		DISK	Q1
DLCH	J567		DISK	J5
	NONE	DISK		NONE
DLCV	J567		DISK	J5
	NONE	DISK		NONE
DLGLG	J530	DISK	DISK	J5
DLGLGTM	J602	DISK	CARDS	J6
DLGLN	J530	DISK	DISK	J5
DLGLNTM	J602	DISK	CARDS	J6
DLNLG	J530	DISK	DISK	J5
DLNLGTM	J602	DISK	CARDS	J6
DLNLN	J529		DISK	J5
	NONE	DISK		NONE
DLNLNTM	J601	DISK	CARDS	J6
DLNLOG	NONE	DISK	DISK	NONE
DLOG	NONE	DISK	DISK	NONE
DLOG10	NONE	DISK	DISK	NONE
DMOD	NONE	DISK	DISK	NONE
DMP	N212	DISK		N2
DMPBN	N207	DISK		N2
DMPBN$	NONE	DISK		NONE
DMPEC	NONE		DISK	NONE
DMPFS	W403	DISK		W4
DMPFS$	NONE	DISK		NONE
DMPPK	N208	DISK		N2
DMPX	N211	DISK		N2
DMPXD	NONE	DISK		NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
DMPXI	N211	DISK		N2
DMPXPG	N208	DISK		N2
DMPXX	N208	DISK		N2
DMPX$	NONE	DISK		NONE
DMP$	NONE	DISK		NONE
DMP↑	N212	DISK		N2
DOCIX	NONE	DISK		NONE
DOCIX$	NONE	DISK		NONE
DOMPASS	NONE	DISK		NONE
DOTPRO	F124	DISK	DISK	F1
DREADI	NONE	DISK		NONE
DREADR	NONE	DISK		NONE
DREVAL	F2AE		CARDS	F2
	NONE	DISK		NONE
DRPOLE	C212		CARDS	C2
	NONE	DISK		NONE
DRPOLY	C2AC		CARDS	C2
	NONE	DISK		NONE
DRSVAL	F2AF		CARDS	F2
	NONE	DISK		NONE
DRV	J517		DISK	J5
	NONE	DISK		NONE
DSIGN	A109	DISK	DISK	A1
DSIN	NONE	DISK	DISK	NONE
DSINCOS	NONE	DISK	DISK	NONE
DSQRT	NONE	DISK	DISK	NONE
DTANH	B206		DISK	B2
	NONE	DISK		NONE
DTRVAL	F2AJ		CARDS	F2
	NONE	DISK		NONE
DUMP	NONE		DISK	NONE
	N209	DISK		N2
DUMP↑	N209	DISK		N2
DUMPA	N204		DISK	N2
	N210	DISK		N2
DUMPL	N210	DISK		N2
DVCHK	NONE		DISK	NONE
E1	C309		DISK	C3
	NONE	DISK		NONE
E205A	E205		CARDS	E2
ECD	NONE	DISK		NONE
ECDMPH	NONE		DISK	NONE
ECFL	NONE		DISK	NONE
ECMATPY	F134	DISK	CARDS	F1
ECMTRPY	F135	DISK	CARDS	F1
ECR	K203	DISK	CARDS	K2
ECRD	NONE	DISK	DISK	NONE
ECRFL	NONE		DISK	NONE
ECSBUFI	Q409		CARDS	Q4
ECSBUFO	Q409		CARDS	Q4
ECSGLSS	F415		CARDS	F4

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
ECSRW	NONE	DISK	DISK	NONE
ECW	K204	DISK	CARDS	K2
ECWR	NONE	DISK	DISK	NONE
EDITFF	J591		CARDS	J5
EDITLIB	NONE		DISK	NONE
EJT	NONE	DISK		NONE
ELIPS	J584		CARDS	J5
	NONE	DISK		NONE
ELLI	C304		CARDS	C3
	NONE	DISK		NONE
EMPTY	J506	DISK	DISK	J5
EMTY	J565		CARDS	J5
ENCODE	J558		CARDS	J5
	NONE	DISK		NONE
END	NONE	DISK	DISK	NONE
ENDD	N109	DISK		N1
ENDFIL	NONE	DISK	DISK	NONE
ENDH	N109	DISK		N1
ENDJ	NONE	DISK		NONE
ENDS	N109	DISK		N1
ENDTM	N109	DISK		N1
ENFIL	NONE		DISK	NONE
ENTR	N106	DISK		N1
ENTRH	N106	DISK		N1
ENTRS	N106	DISK		N1
ENTRTM	N106	DISK		N1
EOI	W202	DISK		W2
ERF	C310	DISK	DISK	C3
ERFC	C335	DISK	CARDS	C3
ERFI	C339	DISK	CARDS	C3
ERFINV	C3AD	DISK	CARDS	C3
EROBAR	J575	DISK	CARDS	J5
ERR	NONE		DISK	NONE
ERRBAR	J574	DISK	CARDS	J5
ESEARCH	M119		CARDS	M1
	NONE	DISK		NONE
ETASRCH	E4AA	TAPE		E4
ETX	NONE	DISK		NONE
EXH	J507		DISK	J5
	NONE	DISK		NONE
EXIT	NONE	DISK	DISK	NONE
EXL	J507		DISK	J5
	NONE	DISK		NONE
EXOR	M412	INLINE	INLINE	M4
EXP	B306	DISK	DISK	B3
EXP↑	B306	DISK		B3
EXPAD	A103		DISK	A1
	NONE	DISK		NONE
EXPIM	J514		DISK	J5
	NONE	DISK		NONE
EXPINT	C313		CARDS	C3

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
EXPINT	NONE	DISK		NONE
EZPERT	H3AA		CARDS	H3
F:06	F207		DISK	F2
	NONE	DISK		NONE
F009	F209		DISK	F2
	NONE	DISK		NONE
F66F94	M2AD		CARDS	M2
F94F66	M2AD		CARDS	M2
FACTOR	J555		CARDS	J5
	NONE	DISK		NONE
FACTTD	F418	DISK	CARDS	F4
FBUFF.	NONE	DISK		NONE
FETA.	NONE		DISK	NONE
FETCH	M403		DISK	M4
	NONE	DISK		NONE
FFT	F5AA		CARDS	F5
FFT2	F502	DISK	CARDS	F5
FI0	C342	DISK	CARDS	C3
FI1	C343	DISK	CARDS	C3
FILL	K6AA		CARDS	K6
FILMCK	J595	DISK		J5
FINDMAP	C3AA		CARDS	C3
FISHE	G403		CARDS	G4
	NONE	DISK		NONE
FIT	J585		CARDS	J5
	NONE	DISK		NONE
FIXUP	L4AA	PERMFILE		L4
FIZBAK.	NONE		DISK	NONE
FJ0	C340	DISK	CARDS	C3
FJ1	C341	DISK	CARDS	C3
FLUSHDF	NONE	DISK		NONE
FNMA.	NONE		DISK	NONE
FORMF	W208	CARDS		W2
FORQTS	W106	DISK		W1
FORWARD	NONE	DISK		NONE
FOUROT	B413	DISK	DISK	B4
FRAME	J523		DISK	J5
	NONE	DISK		NONE
FTN	U2AA		DISK	U2
FTNMSG$	NONE		DISK	NONE
FTNX	NONE		DISK	NONE
FUN	NONE		DISK	NONE
FUN1	NONE	DISK	DISK	NONE
FUN$	NONE	DISK		NONE
GAM1	C325		DISK	C3
	NONE	DISK		NONE
GAMMA	C302		DISK	C3
	NONE	DISK		NONE
GAUSS	D114		DISK	D1
	NONE	DISK		NONE
GAUSSQ	D126		CARDS	D1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
GAUSSQ	D126	DISK		D1
GECENT	NONE		DISK	NONE
GENDMP	NONE	DISK		NONE
GENGSQ	D123		CARDS	D1
	NONE	DISK		NONE
GENID	F117	DISK	DISK	F1
GENPDP	C107		CARDS	C1
	NONE	DISK		NONE
GENPOL	C106		CARDS	C1
	NONE	DISK		NONE
GETADD	W205	CARDS		W2
GETBA	NONE	DISK	DISK	NONE
GETDPK	Q413	DISK		Q4
GETEPK	Q413	DISK		Q4
GETEQN	Q406		DISK	Q4
GETFLD	NONE	DISK		NONE
GETHPK	Q413	DISK		Q4
GETIT	M405		CARDS	M4
	NONE	DISK		NONE
GETNPK	Q413	DISK		Q4
GETNXT	K6AA		CARDS	K6
GETPL	NONE	DISK		NONE
GETPLS	NONE	DISK		NONE
GETQ	NONE		(CPAREA)	NONE
	Q414	DISK		Q4
GETSPK	Q413	DISK		Q4
GETTMPK	Q413	DISK		Q4
GHM	F1AC		CARDS	F1
	NONE	DISK		NONE
GLINCNT	J506	DISK		J5
GLSS	E4AA(OPTIMIZ)	TAPE		E4
GLSS	F405	DISK	DISK	F4
GNCPX	C108		CARDS	C1
	NONE	DISK		NONE
GNSM	F1AA		CARDS	F1
	NONE	DISK		NONE
GOTO	NONE	DISK		NONE
GRAPH	J511		DISK	J5
	NONE	DISK		NONE
GRID	J586		CARDS	J5
	NONE	DISK		NONE
GSM	F1AB		CARDS	F1
	NONE	DISK		NONE
GXA	J518		DISK	J5
	NONE	DISK		NONE
GYA	J518		DISK	J5
	NONE	DISK		NONE
H3DVAL	F226	DISK	CARDS	F2
H3DVEV	F228	DISK	CARDS	F2
H4020	NONE	DISK		NONE
HACK	04AA		CARDS	04

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
HEVAL	F2AC		CARDS	F2
	NONE	DISK		NONE
HEVEV	F2AD		CARDS	F2
	NONE	DISK		NONE
HMEVAL	F226	DISK	CARDS	F2
HMEVEV	F228	DISK	CARDS	F2
HMHHTR	F227	DISK	CARDS	F2
HRMTE	D112		DISK	D1
	NONE	DISK		NONE
HSHLECS	E4AA	TAPE		E4
HTEVAL	F226	DISK	CARDS	F2
HTEVEV	F228	DISK	CARDS	F2
HTHHTR	F227	DISK	CARDS	F2
HUGGINS	NONE	DISK		NONE
I94DIS	M2AE		CARDS	M2
IBAIEX	NONE	DISK	DISK	NONE
ICHAR	NONE	DISK		NONE
IDINT	A106	DISK	DISK	A1
IDONE	W206	DISK		W2
IDONEQ	W206	DISK		W2
IDT	NONE	DISK		NONE
IF	NONE	DISK		NONE
IFENDF	NONE	DISK	DISK	NONE
IFNGH	J597	DISK	CARDS	J5
INDEX	Z102	DISK	DISK	Z1
INDEX$	NONE	DISK		NONE
INPUTB	NONE	DISK	DISK	NONE
INPUTC	NONE	DISK	DISK	NONE
INPUTM	NONE	DISK		NONE
INPUTN	NONE	DISK	DISK	NONE
INPUTS	NONE	DISK	DISK	NONE
INSECT	J592	DISK	CARDS	J5
INTVL	Q407		DISK	Q4
IO	NONE		DISK	NONE
IOCHEC	NONE		DISK	NONE
IOCHECK	W203	DISK		W2
IOCHEK	NONE	DISK	DISK	NONE
IOGEN	NONE	DISK		NONE
IOIO	NONE		DISK	NONE
IORANDM	NONE		DISK	NO
IOREAD	NONE		DISK	NONE
IORQTBL	NONE	DISK		NONE
IORQTND	NONE	DISK		NONE
IORR	NONE		DISK	NONE
IORW	NONE		DISK	NONE
IOSAV	NONE		DISK	NONE
IOUTIL	NONE	DISK		NONE
IOWRITE	NONE		DISK	NONE
IOZW	NONE		DISK	NONE
IOZZ	NONE		DISK	NONE
IPARITY	M411		CARDS	M4

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
IPARITY	M411	DISK		M4
IRAN	K102	DISK		K1
IRANR	K102	DISK		K1
IRANRE	K102	DISK		K1
IRANW	K102	DISK		K1
IRANWE	K102	DISK		K1
ISTATUS	W206	DISK		W2
IUNPK	A102		CARDS	A1
	NONE	DISK		NONE
JDF	NONE	DISK		NONE
JDF$	NONE	DISK		NONE
JOBNAME	Q402		DISK	Q4
	NONE	DISK		NONE
JULIAN	Q1AA		CARDS	Q1
KEY.	NONE		DISK	NONE
KILLDF	Q117	DISK		Q1
KILLDF$	NONE	DISK		NONE
KODER	NONE	DISK	DISK	NONE
KOMPAS$	NONE	DISK		NONE
KRAKER	NONE	DISK	DISK	NONE
LABRT	N103		DISK	N1
	NONE	DISK		NONE
LACENT	U1AA		DISK	U1
LAFST	NONE	DISK		NONE
LAGRE	D113		DISK	D1
	NONE	DISK		NONE
LASC1	NONE		DISK	NONE
LASC2	NONE		DISK	NONE
LCROLIN	Q306	DISK		Q3
LCROLOT	Q306	DISK		Q3
LEGVAR	NONE	DISK	DISK	NONE
LENGTH	NONE		DISK	NONE
	W204	DISK		W2
LENSDES	T4AB	TAPE		T4
LFL	NONE	DISK		NONE
LGNDR	D110		DISK	D1
	NONE	DISK		NONE
LIBMSG	NONE	DISK	DISK	NONE
LINCNT	J506	DISK	DISK	J5
LINE	J548		CARDS	J5
	NONE	DISK		NONE
LINE.	NONE		DISK	NONE
LINES	Q4AA		CARDS	Q4
LNGAM	C326		DISK	C3
	NONE	DISK		NONE
LOAD	I401		CARDS	I4
LOADER	NONE	DISK	DISK	NONE
LOADER$	NONE	DISK		NONE
LOADZZZ	NONE	DISK		NONE
LOCF	NONE	DISK	DISK	NONE
LOCF↑	NONE	DISK		NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
LODER	NONE	DISK		NONE
LODER1	NONE	DISK		NONE
LODER2	NONE	DISK		NONE
LSHIFT	M407		CARDS	M4
	NONE	DISK		NONE
LSS	F404	DISK	DISK	F4
LSSIT	F410		CARDS	F4
	NONE	DISK		NONE
LSSS	F407		DISK	F4
	NONE	DISK		NONE
LST	NONE	DISK		NONE
LSTPROA	NONE		DISK	NONE
LSTPROS	NONE		DISK	NONE
LSTUP	J597	DISK	CARDS	J5
M2C	J5AA	PERMFILE		J5
MACETXT	NONE		DISK	NONE
MACH	Q418		DISK	Q4
	NONE	DISK		NONE
MACHS	NONE	DISK		NONE
MACRO	NONE	DISK		NONE
MACROS	NONE	DISK		NONE
MACROA	NONE	DISK		NONE
MACROB	NONE	DISK		NONE
MACROC	NONE	DISK		NONE
MADOV	NONE		DISK	NONE
MATADD	NONE		DISK	NONE
MATFAC	F409	DISK	CARDS	F4
MATINV	F132	DISK	DISK	F1
MATMOV	F120	DISK	DISK	F1
MATMPY	F122		DISK	F1
	NONE	DISK		NONE
MATSUB	NONE		DISK	NONE
MATTRA	F121	DISK	DISK	F1
MATTRS	F119	DISK	DISK	F1
MATVEC	F221		CARDS	F2
	NONE	DISK		NONE
MAXAM	F116	DISK	DISK	F1
MAXAV	F115	DISK	DISK	F1
MAXM	F116	DISK	DISK	F1
MAXV	F115	DISK	DISK	F1
MEMLEN	Q305	DISK		Q3
MEMORY	Q305	DISK		Q3
MEMREL	Q305	DISK		Q3
MEMREQ	Q305	DISK		Q3
MEPBP	N105	(XIT)	DISK	N1
MESSAGE	Q116	DISK		Q1
MESSNI	G803		CARDS	G8
MGS	F128	DISK	DISK	F1
MINAM	F116	DISK	DISK	F1
MINAV	F115	DISK	DISK	F1
MINM	F116		DISK	F1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
MINM	F116	DISK		F1
MINV	F115	DISK	DISK	F1
MNEMDMP	NONE	DISK		NONE
MODIFY	W118	DISK		W1
MODIFYS	NONE	DISK		NONE
MOLL	L4AA	PERMFILE		L4
MOORE	NONE	DISK		NONE
MOVEEC	K202		CARDS	K2
MOVEMC	K201		CARDS	K2
MSG	NONE	DISK		NONE
MTMPY	F123	DISK	DISK	F1
MUXCP	NONE		DISK	NONE
MUXIDLE	NONE		DISK	NONE
N203RR	N203	DISK	DISK	N2
N203SR	N203	DISK	DISK	N2
NARG	NONE	DISK		NONE
NEWLINE	K6AA		CARDS	K6
NEWPOL	C216	DISK	CARDS	C2
NEWS	NONE	DISK		NONE
NGONS	J597	DISK	CARDS	J5
NONES	M411	DISK	CARDS	M4
NORIM	J514		DISK	J5
	NONE	DISK		NONE
NUMB.	NONE		DISK	NONE
NUMBER	J545		CARDS	J5
	NONE	DISK		NONE
NXTDAY	Q1AA		CARDS	Q1
OBF	NONE	DISK		NONE
OFFSET	J556		CARDS	J5
	NONE	DISK		NONE
OFFSWCH	Q416	DISK		Q4
OFFSWCS	NONE	DISK		NONE
ONSWCH	Q416	DISK		Q4
ONSWCHS	NONE	DISK		NONE
OPEN	W113		CARDS	W1
	W115	DISK		W1
OPENS	NONE	DISK		NONE
OPEN.	NONE	DISK	DISK	NONE
OPERM	W109	DISK		W1
OPERM1	NONE	DISK		NONE
OPERM2	NONE	DISK		NONE
OPERMS	NONE	DISK		NONE
OPTIMIZ	E4AA	TAPE		E4
ORDER1	M116		CARDS	M1
ORDER2	M116		CARDS	M1
OUTPTB	NONE	DISK	DISK	NONE
OUTPTC	NONE	DISK	DISK	NONE
OUTPTM	NONE	DISK		NONE
OUTPTN	NONE	DISK	DISK	NONE
OUTPTS	NONE	DISK	DISK	NONE
OVER11	NONE		DISK	NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
OVER12	NONE		DISK	NONE
OVER13	NONE		DISK	NONE
OVER14	NONE		DISK	NONE
OVER15	NONE		DISK	NONE
OVER16	NONE		DISK	NONE
OVER17	NONE		DISK	NONE
OVER18	NONE		DISK	NONE
OVER19	NONE		DISK	NONE
OVERFL	NONE		DISK	NONE
OVERLAY	NONE	DISK	DISK	NONE
OVERLOD	NONE		DISK	NONE
PACKAGE	Q413	DISK		Q4
PARITY	W210	DISK		W2
PARITY$	NONE	DISK		NONE
PARM	NONE		DISK	NONE
PASS14$	NONE		DISK	NONE
PASS15$	NONE		DISK	NONE
PAUSE	NONE	DISK	DISK	NONE
PBISEQ	J597	DISK	CARDS	J5
PDUMP	NONE		DISK	NONE
	N209	DISK		N2
PDUMP↑	N209	DISK		N2
PFACTOR	J401	DISK	DISK	J4
PFTS	E208		CARDS	E2
	NONE	DISK		NONE
PHI	D124	DISK	CARDS	D1
PHIGRAD	E4AA	TAPE		E4
PHISTF	J598	DISK	CARDS	J5
PICTURE	J592	DISK	CARDS	J5
PLOJB	J562	DISK	DISK	J5
PLOPR	J596	DISK	CARDS	J5
PLOSB	J571	DISK	CARDS	J5
PLOT	J541		DISK	J5
	NONE	DISK		NONE
PLOTM	J599	DISK	CARDS	J5
PLOTS	J550		CARDS	J5
	NONE	DISK		NONE
PLOTZ	J544		CARDS	J5
	NONE	DISK		NONE
PLT	J516		DISK	J5
	NONE	DISK		NONE
PLT3D	J566		CARDS	J5
	NONE	DISK		NONE
PLTZ	J549		CARDS	J5
	NONE	DISK		NONE
POCKET	NONE		DISK	NONE
POLAR	J512	DISK	DISK	J5
POLAR3D	J572		CARDS	J5
	NONE	DISK		NONE
POLCC	J603	DISK	CARDS	J6
POLCON	J578		CARDS	J5

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
POLCON	NONE		DISK	NONE
POL3DCC	J576		CARDS	J5
	NONE	DISK		NONE
POLY	J587		CARDS	J5
	NONE	DISK		NONE
POSFIL.	NONE		DISK	NONE
PQERFC	C335	DISK	CARDS	C3
PRELDR	NONE	DISK		NONE
PRNSRD	J573		CARDS	J5
	NONE	DISK		NONE
PRODHH	F225	DISK	CARDS	F2
PROHHH	F229	DISK	CARDS	F2
PRTAB	NONE	DISK		NONE
PRUSIZE	Q408		CARDS	Q4
PSCALE	J401	DISK	DISK	J4
PSEARCH	E4AA	TAPE		E4
PSI	C312		CARDS	C3
	NONE	DISK		NONE
PSICTLA	NONE		DISK	NONE
PS1CTL$	NONE		DISK	NONE
PSX	NONE	DISK		NONE
PUNCHIT	NONE		DISK	NONE
PUT	M403		DISK	M4
	NONE	DISK		NONE
PUTIT	M404	DISK	CARDS	M4
PWRSPCT	G604	DISK	CARDS	G6
Q8DIAGP	NONE		DISK	NONE
Q8DIAGS	NONE		DISK	NONE
Q8NTRY	NONE	DISK	DISK	NONE
Q9DIAGF	NONE		DISK	NONE
QABS	D122		CARDS	D1
	NONE	DISK		NONE
QBRT4	B407		CARDS	B4
	NONE	DISK		NONE
QEXCH	K2AA	CARDS		K2
QMOVE	K2AB	CARDS		K2
QNC7	D119	DISK	CARDS	D1
QUAD	D120		CARDS	D1
	NONE	DISK		NONE
RANDOM	G801	DISK	DISK	G8
RANDST	G801	DISK	DISK	G8
RANDSV	G801	DISK	DISK	G8
RANF	G802		DISK	G8
	NONE	DISK		NONE
RANGE	A104		DISK	A1
	NONE	DISK		NONE
RANR	K101	DISK		K1
RANRE	K101	DISK		K1
RANRW	K101	DISK		K1
RANVECT	G801	DISK	DISK	G8
RANW	K101	DISK		K1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
RANWE	K101	DISK		K1
RAPROX	E207		CARDS	E2
	NONE	DISK		NONE
RBADEX	NONE	DISK	DISK	NONE
RBAIEX	NONE	DISK	DISK	NONE
RBAREX	NONE	DISK	DISK	NONE
RDBUF	Q411		CARDS	Q4
	Q417	DISK		Q4
RD94FBT	K502		CARDS	K5
RDNX	NONE	DISK		NONE
RDNXX	NONE	DISK		NONE
RDPRU	Q408		CARDS	Q4
RDPRU.	NONE		DISK	NONE
READ	NONE	DISK		NONE
READ94	K501		CARDS	K5
READDIR	NONE	DISK		NONE
READLD	NONE	DISK		NONE
READW	NONE	DISK		NONE
RECT	J588		CARDS	J5
	NONE	DISK		NONE
REGREF	L202	DISK		L2
REGREF$	NONE	DISK		NONE
REGRST	NONE	DISK		NONE
REGSAV	NONE	DISK		NONE
RELEASE	W111		DISK	W1
RELTAPE	NONE		DISK	NONE
REMARK	Q112		DISK	Q1
	Q116	DISK		Q1
RENAME			(SWITCH)	NONE
	W104	DISK		W1
REORDR	K402		CARDS	K4
REPLACE	K306	DISK		K3
RETN	N107	DISK		N1
RETND	N107	DISK		N1
RETNH	N107	DISK		N1
RETNS	N107	DISK		N1
RETNTM	N107	DISK		N1
REVAL	F208		DISK	F2
	NONE	DISK		NONE
REVEV	F206		DISK	F2
	NONE	DISK		NONE
REWIND	NONE		DISK	NONE
	W301	DISK		W3
REWIND$	NONE	DISK		NONE
REWINM	NONE		DISK	NONE
	W301	DISK		W3
RFFT	F501	DISK	CARDS	F5
RFSN	F5A8		CARDS	F5
RFTI	F503	DISK	CARDS	F5
RKA	D203	DISK	DISK	D2
RKB	D203		DISK	D2

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
RKB	D203	DISK		D2
RLDSR	NONE		DISK	NONE
ROLLOUS	NONE	DISK		NONE
ROLLOUT	Q118	DISK		Q1
RPOLY	C206		DISK	C2
	NONE	DISK		NONE
RQTA.	NONE	DISK		NONE
RSEVAL	F2AA		CARDS	F2
	NONE	DISK		NONE
RSEVEV	F2AB		CARDS	F2
	NONE	DISK		NONE
RUN	NONE		DISK	NONE
RUN1	NONE	DISK	DISK	NONE
RUNS	NONE	DISK		NONE
RWBUF	Q411		CARDS	Q4
RXPLOT	J597	DISK	CARDS	J5
S3DVAL	F222	DISK	DISK	F2
S3DVEV	F224	DISK	CARDS	F2
SAFST	NONE	DISK		NONE
SBLIN	J535		DISK	J5
	NONE	DISK		NONE
SBLOG	J540	DISK	DISK	J5
SCALE	J546		CARDS	J5
	NONE	DISK		NONE
SCALED	J577		CARDS	J5
	NONE	DISK		NONE
SCOPE2B	NONE		DISK	NONE
SCP20	NONE		DISK	NONE
SCPOLE	C211		CARDS	C2
	NONE	DISK		NONE
SCPOLY	C2AB		CARDS	C2
	NONE	DISK		NONE
SCPTACO	C215	DISK	CARDS	C2
SCPTEXT	NONE		DISK	NONE
SCPTXT2	NONE		DISK	NONE
SDG	B106		DISK	B1
	NONE	DISK		NONE
SDG↑	NONE	DISK		NONE
SEARCH	M118		DISK	M1
	NONE	DISK		NONE
SECOND	Q110		DISK	Q1
	Q115	DISK		Q1
SECTN1	NONE		DISK	NONE
SECTN4	NONE		DISK	NONE
SEGMENT	NONE		DISK	NONE
SET	NONE		DISK	NONE
SETDPK	Q413	DISK		Q4
SETEXT	NONE	DISK		NONE
SETHPK	Q413	DISK		Q4
SETNPK	Q413	DISK		Q4
SETPLT	J506		DISK	J5

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
SETPLT	J506	DISK		J5
SETQ	Q414	DISK		Q4
SETSPK	Q413	DISK		Q4
SETTMPK	Q413	DISK		Q4
SHIFN	M401		DISK	M4
	NONE	DISK		NONE
SHIFT	M401		DISK	M4
	NØNE	DISK		NØNE
SHIFT	M413	INLINE	INLINE	M4
SHNK	D121		CARDS	D1
	NONE	DISK		NONE
SIGNOO	NONE		DISK	NONE
SIMPSN	D1AC		DISK	D1
	NONE	DISK		NONE
SIMPUN	D129	DISK	CARDS	D1
SIMTAB	D128		CARDS	D1
SIN	B106		DISK	B1
	NONE	DISK		NONE
SIN↑	NONE	DISK		NONE
SINCOS	B106		DISK	B1
	NONE	DISK		NONE
SINCOS↑	NONE	DISK		NONE
SINH	B203	DISK	DISK	B2
SIO.	NONE		DISK	NONE
SIO$	NONE		DISK	NONE
SIOG2D	E1AA		CARDS	E1
SIP	NONE		DISK	NONE
SKFILE	W110		DISK	W1
	W302	DISK		W3
SKIPF	W302	DISK		W3
SKIPF$	NONE	DISK		NONE
SKIPI	W303	DISK		W3
SKIPI$	NONE	DISK		NONE
SKIPR	W304	DISK		W3
SKIPR$	NONE	DISK		NONE
SKIPX	W304	DISK		W3
SKPDAT	NONE	DISK		NONE
SKPFIL	W110		DISK	W1
	W302	DISK		W3
SKPFIL$	NONE	DISK		NONE
SLINCNT	J506	DISK		J5
SLITE	NONE		DISK	NONE
	Q415	DISK		Q4
SLITET	NONE		DISK	NONE
	Q415	DISK		Q4
SLLIN	J533	DISK	DISK	J5
SLLOG	J540	DISK	DISK	J5
SMEVAL	F222	DISK	DISK	F2
SMEVEV	F224	DISK	CARDS	F2
SMHHTR	F223	DISK	DISK	F2
SMOOTH	E203		DISK	E2
	NONE	DISK		NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
SMPS	D127		CARDS	D1
SMSPCT	NONE	DISK		NONE
SMTXT2	NONE		DISK	NONE
SNGL	A107	DISK	DISK	A1
SOFF280	NONE		DISK	NONE
SOLPTD	F421	DISK	CARDS	F4
SOLTD1	F419	DISK	CARDS	F4
SOLTDM	F419	DISK	CARDS	F4
SOLUT	J589		CARDS	J5
	NONE	DISK		NONE
SOLVE	C402	DISK	CARDS	C4
SOLVITO	C404	DISK	CARDS	C4
SON280	NONE		DISK	NONE
SORT	M1AA		CARDS	M1
SORT1	M101		DISK	M1
	NONE	DISK		NONE
SORT2	M117	CARDS	CARDS	M1
SORTECS	M115		CARDS	M1
SPAL	G101		CARDS	G1
	NONE	DISK		NONE
SPCTRL	G601	DISK	CARDS	G6
SPERLSS	F414		CARDS	F4
SPHERE	D1AB		CARDS	D1
SPL1D1	E102		DISK	E1
	NONE	DISK		NONE
SPL1D2	E103		DISK	E1
	NONE	DISK		NONE
SPL2D1	E104		DISK	E1
	NONE	DISK		NONE
SPL2D2	E105		DISK	E1
	NONE	DISK		NONE
SPL2D3	E107		DISK	E1
	NONE	DISK		NONE
SPLINT	D117		DISK	D1
	NONE	DISK		NONE
SPLINT2	D118		DISK	D1
	NONE	DISK		NONE
SPLOT	J508	DISK	DISK	J5
SQRT	B408		DISK	B4
	NONE	DISK		NONE
SQRT↑	NONE	DISK		NONE
SRLIN	J534		DISK	J5
	NONE	DISK		NONE
SRLOG	J540	DISK	DISK	J5
SRPOLE	C210		CARDS	C2
	NONE	DISK		NONE
SRPOLY	C2AA		CARDS	C2
	NONE	DISK		NONE
SSWTCH	NONE		DISK	NONE
	Q416	DISK		Q4
START	NONE		DISK	NONE

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
STAT	NONE	DISK		NONE
STATB	NONE	DISK		NONE
STATBS	NONE	DISK		NONE
STATD	NONE	DISK		NONE
STATDS	NONE	DISK		NONE
STATQ	NONE	DISK		NONE
STATQS	NONE	DISK		NONE
STATS	NONE	DISK		NONE
STB	J524		DISK	J5
	NONE	DISK		NONE
STEREO	J513		DISK	J5
	NONE	DISK		NONE
STEVAL	F222	DISK	DISK	F2
STEVEV	F224	DISK	CARDS	F2
STHHTR	F223	DISK	DISK	F2
STLIN	J535		DISK	J5
	NONE	DISK		NONE
STLOG	J540	DISK	DISK	J5
STLTJS	D125	DISK	CARDS	D1
STOP	NONE	DISK	DISK	NONE
STORE	J553		CARDS	J5
	NONE	DISK		NONE
SUBLST	K403		CARDS	K4
SUM	K306	DISK		K3
SUMVEC	F138	DISK	CARDS	F1
SUN	NONE		DISK	NONE
SUN1	NONE	DISK	DISK	NONE
SUNS	NONE	DISK		NONE
SWEEP	J570	CARDS	CARDS	J5
SWITCH	Q114	(RENAME)	DISK	Q1
SWITCHS	NONE	DISK		NONE
SYMBOL	J559		CARDS	J5
	NONE	DISK		NONE
SYSFS	W116	DISK		W1
SYSTBAC	NONE	DISK	DISK	NONE
SYSTEM	NONE	DISK	DISK	NONE
SYSTEMC	NONE	DISK	DISK	NONE
SYSTEMP	NONE	DISK	DISK	NONE
SYSTEXT	NONE		DISK	NONE
SYSTXT2	NONE		DISK	NONE
TABINT	D116		DISK	D1
	NONE	DISK		NONE
TACS1	T1AB		CARDS	T1
TAN	B107	DISK	DISK	B1
TANH	B204	DISK	DISK	B2
TAPDMP	N205		CARDS	N2
TAPER	NONE	DISK		NONE
TAPMAT	NONE		DISK	NONE
TAPWRI	J552	DISK	CARDS	J5
TBPSDN	D301	DISK	CARDS	D3
TCP	J521		DISK	J5

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
TCP	NONE	DISK		NONE
TCR	J527		DISK	J5
	NONE	DISK		NONE
THEVAL	F2AK		CARDS	F2
	NONE	DISK		NONE
THEVEV	F2AL		CARDS	F2
	NONE	DISK		NONE
TIDY	L301		DISK	L3
TIDYS	L301	DISK		L3
TIMAV	E302	CARDS	CARDS	E3
TIME	Q111		DISK	Q1
	Q116	DISK		Q1
TINT	E302	CARDS	CARDS	E3
TLE	NONE	DISK		NONE
TLSS	F412	DISK	CARDS	F4
TRACER	NONE	DISK		NONE
TRANS	NONE		DISK	NONE
	F1AD	CARDS		F1
TREVAL	F2AG		CARDS	F2
	NONE	DISK		NONE
TRICJB	J564		DISK	J5
	NONE	DISK		NONE
TRICON	J561		CARDS	J5
	NONE	DISK		NONE
TRIPOL	J579		CARDS	J5
	NONE	DISK		NONE
TRSEVV	F2AH		CARDS	F2
	NONE	DISK		NONE
TSP	J520		DISK	J5
	NONE	DISK		NONE
TSPV	J522		DISK	J5
	NONE	DISK		NONE
TSUB	K5AA	CARDS		K5
UDUMP	NONE	DISK		NONE
UEXT	NONE	DISK		NONE
ULCR	K304	DISK		K3
ULCRS	NONE	DISK		NONE
UMTR	NONE	DISK		NONE
UNLOAD	NONE		DISK	NONE
UNLODE	W112		DISK	W1
UNPAK	A101		CARDS	A1
	NONE	DISK		NONE
UPD2S	NONE	DISK		NONE
UPDATE	L407		DISK	L4
	NONE	DISK		NONE
UPDATES	NONE	DISK		NONE
UT01	K6AA		CARDS	K6
UT02	K6AB		CARDS	K6
UT03	K6AC		CARDS	K6
VECPROD	F133	DISK	DISK	F1
VECSUM	F133		DISK	F1

PROGRAM NAME	PROGRAM NUMBER	7600 RESIDENCE	6600 RESIDENCE	ABSTRACT IN CATALOG SECTION
VECSUM	F133	DISK		F1
VERSION	NONE	DISK		NONE
WAITR	NONE	DISK		NONE
WEOFS	NONE	DISK		NONE
WFH	J593		CARDS	J5
	NONE	DISK		NONE
WHEN	NONE	DISK		NONE
WHERE	J554		CARDS	J5
	NONE	DISK		NONE
WINDOW	G603	DISK	CARDS	G6
WLCH	J542	DISK	DISK	J5
WLCV	J542	DISK	DISK	J5
WOF	NONE	DISK		NONE
WR94FBT	K502		CARDS	K5
WRITE	K6AA		CARDS	K6
WRIT94	K501		CARDS	K5
WRITBUF	Q411		CARDS	Q4
WRITPRU	Q408		CARDS	Q4
WTBUF	Q417	DISK		Q4
WTNX	NONE	DISK		NONE
WTNXX	NONE	DISK		NONE
W	NONE	DISK		NONE
XCLOSE	NONE	DISK		NONE
XHATCH	J594	DISK	CARDS	J5
XIT	N108	DISK		N1
XITFIX	N108	DISK		N1
XITSAVE	N108	DISK		N1
XJDFSC	NONE	DISK		NONE
XJDFSC$	NONE	DISK		NONE
XLOCF	NONE	DISK	DISK	NONE
XLOCF↑	NONE	DISK		NONE
XOPEN	NONE	DISK		NONE
XQUAD	NONE	DISK		NONE
XRCL	NONE		DISK	NONE
XREAD	NONE	DISK		NONE
XREADER	NONE	DISK		NONE
XWRITE	NONE	DISK		NONE
XWRITER	NONE	DISK		NONE
XXXDMPQ	NONE		DISK	NONE
XXXRESQ	NONE		DISK	NONE
ZEROIN	C403	CARDS	CARDS	C4
ZETABAS	J1AA		CARDS	J1
ZNAME	NONE	DISK		NONE
ZZZZZZ	NONE	DISK		NONE
ZZZZZZ$	NONE	DISK		NONE

INDEX2 - NEWSLETTERS

SUBJECT INDEX THRU CCF:PIM-2:030

Copies of current PIM-2 newsletters may be obtained from the Program Library.

Current Newsletters thru CCF:PIM-2:030: 18, 27, 30.

Disposition of Cancelled Newsletters:

1. See CØLØR (J569)
2 thru 9. See Catalog of Programs
10. See CCF:PIM-2:011
11. See Catalog of Programs
12. See CCF:PIM-2:023
13 thru 17. See Catalog of Programs
19 thru 21. See Catalog of Programs
22. See CCF:PIM-2:029
23. See CCF:PIM-2:026
24 thru 26. See Catalog of Programs
28 thru 29. See Catalog of Programs

REQUEST FOR DOCUMENTATION CHANGE

C-Division solicits your comments about documentation with a view to improving its usefulness through revisions. Please recommend improvements to better serve your needs and note specific errors discovered.

Name_____ Group_____ Phone_____ Date_____

PIM Volume _____1 _____2 _____4 _____5A Other_____

Pages_____

Typographical errors on lines_____

correct wording_____

Description of request:

PLEASE SEND TO THE C-DIVISION CONSULTING OFFICE, C-4

Reply:

Status_____ Name_____ Date_____

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FOLD

INTEROFFICE ROUTING

FROM _____

TO C-DIVISION CONSULTING OFFICE

C-4

FOLD