Guide to the
Program Library and Abstracts
LA-5525-M, Vol. 2
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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
CURRENT REVISION RECORD
PIN VOLUME 2 - REVISION 9/73

Page Changes
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:PIN-2: 10 thru 17, 19 thru 26, 28, 29.

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Request for Documentation Change

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 submitter 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.

<table>
<thead>
<tr>
<th>Local Library</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract File</td>
<td>PIM Volume 2</td>
</tr>
<tr>
<td>Abstract, Writeup, and Listing File</td>
<td>Librarians' Office</td>
</tr>
<tr>
<td>System Library File</td>
<td>CDC 6600/7600 Disk</td>
</tr>
<tr>
<td>Card Deck File</td>
<td>Users' Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Libraries</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract, Writeup, and Listing File</td>
<td>Librarians' Office</td>
</tr>
</tbody>
</table>

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 personnel 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.
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<th>Page</th>
</tr>
</thead>
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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 COMMON, 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.
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:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALG</td>
<td>ALGOL</td>
</tr>
<tr>
<td>ATC</td>
<td>Autocoder</td>
</tr>
<tr>
<td>CØBØL</td>
<td>CØBØL</td>
</tr>
<tr>
<td>CMP</td>
<td>COMPASS</td>
</tr>
<tr>
<td>F4</td>
<td>FORTRAN IV</td>
</tr>
<tr>
<td>FØRTRAN IV Ext.</td>
<td>FORTRAN IV Extended</td>
</tr>
<tr>
<td>F2</td>
<td>FORTRAN II</td>
</tr>
<tr>
<td>GAP</td>
<td>Autocoder</td>
</tr>
<tr>
<td>LSC</td>
<td>LACENT</td>
</tr>
<tr>
<td>MDC</td>
<td>MADCAP</td>
</tr>
<tr>
<td>SPS</td>
<td>Autocoder</td>
</tr>
</tbody>
</table>

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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 SOURCE 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 OBJECT 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):

   ON 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 COMMON. If the routine references no externals, SELF CONTAINED should be indicated. For example,

LABRT(N103A)
INPUTN(SYSTEM)
M101AC(COMMØN)
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 FORTRAN main program, the PROGRAM 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 FORTRAN 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 BINAR Y 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 PII Vol. 2, Chapter 3 -

LASL - CCF Program Submittal Form

(Programmers fill in only numbers marked with *)

<table>
<thead>
<tr>
<th>1</th>
<th>Date of Submittal</th>
<th>09/23/70</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Submitter's Installation Code</td>
<td>F 4 1 5 A A</td>
</tr>
<tr>
<td>3</td>
<td>Program Number or Designation (and Suffix)</td>
<td>L A 1</td>
</tr>
<tr>
<td>*4</td>
<td>Submitter's Name</td>
<td>M O R R I S A K L E I N</td>
</tr>
<tr>
<td>*5</td>
<td>Submitter's Department (primarily for internal use)</td>
<td>C - 6</td>
</tr>
<tr>
<td>6</td>
<td>Reviewer's Name</td>
<td>B A L A B U Z B E E</td>
</tr>
<tr>
<td>*7</td>
<td>Year Completed (last 2 digits) or Status Code</td>
<td>7 0</td>
</tr>
<tr>
<td>*8</td>
<td>Title</td>
<td>E C S A G E N E R A L A L I N E A R A S Y S T E M A S O L V E R</td>
</tr>
<tr>
<td>*9</td>
<td>Principle Source Language</td>
<td>F 4 A A A A A</td>
</tr>
<tr>
<td>*10</td>
<td>Secondary Source Language</td>
<td>C 1 2 1 8</td>
</tr>
<tr>
<td>*11</td>
<td>Type of Routine</td>
<td>S R</td>
</tr>
<tr>
<td>*12</td>
<td>Machine</td>
<td>6 6 0 0 A A A</td>
</tr>
<tr>
<td>*13</td>
<td>Monitor or Operating System Required</td>
<td>S C P, 3.1</td>
</tr>
<tr>
<td>*14</td>
<td>Special Machine Requirements</td>
<td>E C S</td>
</tr>
<tr>
<td>15</td>
<td>Non-Library Routines or Subr. Req.</td>
<td>M O N E</td>
</tr>
<tr>
<td>16</td>
<td>Documents Available (indicate page counts):</td>
<td>S W A A 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L S A A 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T Y P E A 1</td>
</tr>
<tr>
<td>17</td>
<td>Type of Support</td>
<td>S O U R C E A R C A R D S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A, Count 1 2 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b, Medium B C D</td>
</tr>
<tr>
<td>18</td>
<td>Additional Form</td>
<td>S O U R C E A R C A R D S</td>
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<tr>
<td></td>
<td></td>
<td>A, Count 3 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b, Medium B I N</td>
</tr>
<tr>
<td>21</td>
<td>Identification</td>
<td>L A A F 4 1 5 A A</td>
</tr>
<tr>
<td>22</td>
<td>Residence</td>
<td>A G * C A R D S A A</td>
</tr>
<tr>
<td>*23</td>
<td>Language Compatibility</td>
<td>F 4 A A C O M P A T</td>
</tr>
<tr>
<td>24</td>
<td>Write-up Date</td>
<td>W U A 0 9 / 2 3 / 7 0</td>
</tr>
<tr>
<td>25</td>
<td>Write-up Revision Number</td>
<td>R E V A 0</td>
</tr>
<tr>
<td>26</td>
<td>Deck Date</td>
<td>D E C K A 0 9 / 2 3 / 7 0</td>
</tr>
<tr>
<td>27</td>
<td>Deck Revision Number</td>
<td>R E V A 0</td>
</tr>
</tbody>
</table>

Volume 2 - 10/72
SAMPLE ABSTRACT

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

PURPOSE: SOLVE IN THE LEAST SQUARES SENSE THE GENERAL
LINEAR SYSTEM CX=Y WHEN C AND Y ARE STORED COLUMN-WISE
IN ECS.

STORAGE: 717 (OCTAL) WORDS. AT LEAST IM*IN+IM=IK WORDS
RESERVED IN ECS.

TIMING: DEPENDS ON SIZE OF PROBLEM. SEE FULL WRITEUP.

ROUTINE NAME: ECSGLSS
ENTRY NAME: ECSGLSS

EXTERNALS: DOTPRD(F124A), LABRT(N103A), SQRT(B408A),
VECPPRD, 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)
down is stored in ECS by columns at addresses IR(i),
i=1,2,...,IN. The IM by IK input matrix Y of (1) down is
stored in ECS by columns at addresses IY(i), i=1,2,...,IK.
The IM by NR output matrix CT of (1) down is stored in
ECS by columns at addresses IR(i), i=1,2,...,NR. The IM by
IK residual matrix CX-Y of (1) down 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

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

where X is the solution to

\[
CX= Y \quad (2)
\]

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 DIMENSIONED WRONG or ECSGLSS CALLED WITH NONPOSITIVE INDICES indicates IM, IN, IK, or IL improperly set when routine called.
Accuracy and Timing:

A. Hilbert Segments \( N = 2 \) to \( N = 10 \)

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

B. Rectangular Identity Blocks

<table>
<thead>
<tr>
<th>M x N</th>
<th>SEC</th>
<th>SEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 3</td>
<td>.006</td>
<td>.006</td>
</tr>
<tr>
<td>1000 3</td>
<td>.062</td>
<td>.058</td>
</tr>
<tr>
<td>1000 3</td>
<td>.064</td>
<td>.060</td>
</tr>
</tbody>
</table>

* 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, OUTPUT)
DIMENSION C(10,10), B(10)
DIMENSION A(10), AID(10,10), IR(10), IY(10), AEC(10), CEC(10)
DATA APZER@/1.E-14/
C EXAMPLE SHOWS A SQ MATRIX C READ INTO CORE, THEN WRITTEN COLUMNWISE
C INTO ECS. THE INFORMATION STORED IS THEN PROCESSED BY ECSGLSS
READ 2,N
2 FORMAT(15)
ND=N
NW=N
C MATRIX C READ INTO MEMORY ROWWISE
DO 200 I=1,N
200 READ 3, (C(I,K), K=1,N)
3 FORMAT(4F20.0)
C SET AID EQUAL TO IDENTITY AND RT HAND SIDE B TO (1,0,...,0)
D0 150 I=1,NW
B(I)=0.
D0 140 K=1,NW
AID(I,K)=0.
AID(I,I)=1.
B(1)=1.
C STORE MATRICES C, B INTO ECS NOTE CA=B
IR(1)=0
CALL ECWR(C, IR(1), 100, JV)
IF(JV) 5, 5, 4
4 CONTINUE
STOP 4
5 D0 6 IRLP=1,3
CALL ECWR(B, 100, N, JV)
IF(JV) 7, 7, 6
6 CONTINUE
STOP 6
C STORE COL C(J) AT LOC (J-1)*10 IN ECS (J.LE. 10)
C STORE COL B(1) AT LOC 100
7 D0 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, APZER0)
PRINT 52, ND, NW, NRANK
52 FORMAT(*) RANK OF INPUT MATRIX OF SIZE *3X, I5, 3X*BY*3X, I5, 3X*IS*,
13X, I5)
PRINT 56, (A(K), K=1,NW)
56 FORMAT(*)SOLUTION VECTOR 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:

<table>
<thead>
<tr>
<th>General Form</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>psnn</td>
<td>N103</td>
</tr>
<tr>
<td>psnnv</td>
<td>N103A</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>General Form</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>psxx</td>
<td>N1AA</td>
</tr>
</tbody>
</table>

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

V. (Not Used)

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

W1. Access
E.g., OPEN, CLOSE, CREATE, RELEASE, MODIFY, UNLOAD,
RENAME, SWITCH, GETRQT, DATAREL. Also see Q1.

W2. Get information on status of I/O
E.g., IF(EOF), LENGTH, BOL, LOGCHECK.
W. (cont'd.)

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

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

X. (Not Used)
Y. (Not Used)
Z. (Not Used)
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
A101A B*UNPACK A FLOATING POINT NUMBER
A101A C*COMPASS SR66J0 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 .LT. ABS(Y) .LT. 1.0
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
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=UNPAK(X,I) YIELDS TWO
A102A 2*INTEGER 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
A103A B*ADD AN INTEGER TO THE EXPONENT OF A FLOATING PT. NUMBER
A103A C*COMPASS SR660C 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.
**A1-2**

**A104A**

A# JIM CLARK T-1

**A104A**

0#NUMBER RANGE

**A104A**

B#MATHEMATICS A1 COMPASS SR6600 SCOPE

**A104A**

C# SW 3 LS 1

**A104A**

D#COMPASS SOURCE CARDS 17\BCD\COMPASS 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

**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 10\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: \(Ox = DBLE(x)\)

**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

---

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• A* CONV

• A105B

• A1058

• A105B

• A1058

• A105B

• A1058

• A1058

• A105B

• A105B

• A106A

• A106A

• A106A

• A106A

• A106A

• A106A

• A106A

• A106A

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A106B  A*  LAURI RATHMANN  C-4  W. FULLERTON  73
A106B  B*CONVERT DOUBLE TO INTEGER  
A106B  C*COMP  SR7600  CROS  
A106B  D*  SOURCE 49 CARDS  OBJECT 5 CARDS  
A106B  E*DOUBLE TO INTEGER-IDINT  
A106B  F*CONVERT DOUBLE PRECISION FLOATING NUMBER INTO A  
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*COMP SOURCE CARDS 8 BCD OBJECT CARDS 3 BIN  
A107A  F*CONVERT 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 73
A108A B*DOUBLE PRECISION ABSOLUTE VALUE
A108A C*SMP 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  LAURI RATHMANN  C-4  W. FULLERTON  73
A108B  B*DOUBLE PRECISION ABSOLUTE VALUE
A108B  C*CMP  SR6600  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  LAURI RATHMANN  C-4  W. FULLERTON  73
A109A  B*GENERALIZED SIGNUM FUNCTION DOUBLE PRECISION
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  LAURI RATHMANN  C-4  W. FULLERTON  73
A109B  B*GENERALIZED SIGNUM FUNCTION DOUBLE PRECISION
A109B  C*CMP  SR6600  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.
COMPLEX NUMBERS

E.G., MULTIPLICATION, 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  H*MATH  A2  F4  SR6600  SCP 3.1
A202A  C*  SW 2  LS 1
A202A  D*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(8410A).

A203A  A*  J.L. DURAN  C-4  67
A203A  0*MAGNITUDE OF A COMPLEX NUMBER
A203A  H*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=ABS(Z) WHERE Z IS A COMPLEX ARGUMENT AND F IS THE
A203A  12*MAGNITUDE OF Z
A203A  13*STORAGE 17 WORDS
A203A  14*SQRT SUBROUTINE SELF-CONTAINED.
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  E#ARCTANGENT OF X OR OF Y/X
B104A  F#ON DISK  F4  COMPAT  WU11/05/68REV 2  DECK 11/05/68REV 2
B104A  G#CALLED BY Z=ATAN(X) OR Z=ATAN2(Y,X)
B104A  H#COMPUTES = ARCTANGENT OF X OR OF Y/X
B104A  I#PI/2 .LE. ATAN(X) .LE. PI/2
B104A  J#PI .LE. ATAN2(Y,X) .LT. PI
B104A  K#RELATIVE ERROR FOR ATAN IS APPROXIMATELY 7.2E-15
B104A  L#RELATIVE ERROR FOR ATAN2 IS APPROXIMATELY 1.1E-14
B104A  M#STORAGE=52(DECIMAL) WORDS
B104A  N#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  H#CALLED BY: Y=SIN(X), Y=COS(X) FOR ARGUMENT IN RADIANS
B106A  I#CALLED BY: Y=SIN(X), Y=COS(X) FOR ARGUMENT IN DEGREES
B106A  J#PURPOSE: COMPUTES = SINE OR COSINE OF THE ARGUMENT X.
B106A  K#RELATIVE ERROR IS APPROXIMATELY 1.5 E-14
B106A  L#ROUTINES CALLED: SYSTEM
B106A  M#STORAGE: 76 (DECIMAL) WORDS
A* PAUL N. IWANCHUK C-4

B* FLOATING POINT TANGENT OR COTANGENT ROUTINE

C*F-4

SR6000 SCP 3.1

D* SW 3 LS 2 TYPE 1

E* SOURCE CARDS 47 HCD OBJECT CARDS 21 BIN

F** TANGENT*COTANGENT ROUTINE

G* ON DISK F4 COMPAT WU 04/05/72REV.2 DECK 04/05/72REV.2

H* FORM: Y=TAN(X)

I* ENTRY NAMES: TAN, COT, COTAN

J* STORAGE: 310 (OCTAL) WORDS

K* ROUTINES CALLED: LARRT(N103A)

L* F-4 SN6600 SCP 3.1

M) Sti 3 1 TYPE 1

N* SOURCE CARDS 64 HCD OBJECT CARDS 22 BIN

O** TANGENT*COTANGENT ROUTINE

P* ON DISK F4 COMPAT WU 10/12/72REV 1 DECK 10/12/72REV 1

Q* FORM: Y=TAN(X)

R* ENTRY NAMES: TAN, COT, COTAN

S* STORAGE: 334 OCTAL WORDS

T* ROUTINES CALLED: LARRT(N103B), LIRMSG(SYSTEM).
A* B. L. BUZBEE C-4

B108A 8*ARCSINE OR ARCCOSINE
B108A C=CMP
B108A SR6600 SCP 3.1
B108A 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 08/02/71 REV 2 DECK 08/02/71 REV 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), SORT(B408A).

B108A A* B. L. BUZBEE C-4

B108B 8*ARCSINE OR ARCCOSINE
B108B C=CMP
B108B SR7600 CRS
B108B D* SW 3 LS 5 TYPE 1
B108B E=CMP SOURCE CARDS 159 BCD OBJECT CARDS 10 BIN
B108B F**ARCSINE*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), SORT(B408B).

B109A A* J. L. DURAN T-1

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 64BCD RELOCATABLE COL BIN SBIN
B109A S*COMPLEX*SINE*COMPLEX*COSINE
B109A 1*ON DISK F4 COMPAT WU 32/23/68 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(B116A), SINH(B120A), COSH(B203A).

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HYPERBOLIC FUNCTIONS

REVIEWER: WAYNE FULLERTON, C-4

A* J.L. DURAN T-1
B2

0*HYPERBOLIC SINE AND COSINE
B2
B2 MATH B2 COMPASS SR6600 SCOPE
B2 C* SW 2 LS 2
B2 D*COMPASS SYMBOLIC 31BCDRELOCATABLE COL BIN SBIN
B2 S*HYPERBOLIC SINE AND COSINE
B2 ON DISK F4 COMPAT WU 02/07/68 REV DECK 01/31/68 REV
B2 Y=SINH(X) OR Y=COSH(X) WHERE X IS A NORMALIZED FLOATING
B2 12*POINT ARGUMENT.
B2 13*STORAGE 42 FULL WORDS.
B2 14*THIS ROUTINE USES EXP(R306A).

A* J.L. DURAN C-4
B2

A* J.L. DURAN C-4
B2

0*HYPERBOLIC SINE AND COSINE
B2

C*COMPASS SR7600 CROS
B2
B2 SR 2 LS 3 TYPE 1
B2 E*CMP SOURCE CARDS 99 BCD OBJECT CARDS BIN
B2 F**SINE*COSINE*HYPERBOLIC SINE AND COSINE
B2 G*ON DISK F4 COMPAT WU 10/12/72 DECK 10/12/72
B2 1*FORM: Y=SINH(X)
B2 2* Y=COSH(X)
B2 3*PURPOSE: COMPUTE HYPERBOLIC SINE OR COSINE OF NORMALIZED
B2 4* FLOATING POINT ARGUMENT.
B2 5*ROUTINE NAME: SINH
B2 6*ENTRY NAMES: SINH*COSH
B2 7*STORAGE: 60 OCTAL WORDS.
B2 8*ROUTINES CALLED: EXP(R306B), LIBMSG(SYSTEM).

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A* W. FULLERTON T-4 I CHERRY C-4 67
B204A B*HYPERBOLIC TANGENT
B204A C*COMPASS SR6640 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)

A* W. FULLERTON T-4 I CHERRY C-4 72
B204B B*HYPERBOLIC TANGENT
B204B C*COMPASS SR7640 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)

A* J. L. DURAN C-4 68
B206A G*DOUBLE PRECISION HYPERBOLIC TANGENT
B206A B*MATH B2 COMPASS SR6600 SCOPE
B206A C* SW 2 LS 2
B206A D*COMPASS SYMBOLIC 828CDRELOCATABLE 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=UTANH(X). X AND F ARE DOUBLE PRECISION NORMALIZED FLOATING
B206A 12*POINT NUMBERS.
B206A 13*STORAGE 31 WORDS
B206A 14*USES DEXP(B308A).

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EXPONENTIAL AND LOGARITHMIC FUNCTIONS

REVIEWER: WAYNE FULLERTON, C-4

A*   A. SOLEM  C-4  W. FULLERTON 73
B305A B*NATURAL LOGARITHM OR LOG TO THE BASE 10
B305A C*COMP  SR6600  SCP 3.1
B305A D*   SW 1  LS 5  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)

A*   A. SOLEM  C-4  W. FULLERTON 73
B305B B*NATURAL LOGARITHM OR LOG TO THE BASE 10
B305B C*COMP  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)

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### Natural Logarithm

- **Purpose:** Computes the natural logarithm of an argument.
- **Routine Name:** ALNLOG
- **Entry Names:** ALOG, ALOG10
- **Storage:** 105 octal words
- **Routines Called:** LIBMSG(SYSTEM), SYSTEM(SYSTEM)

### Exponential Function

- **Purpose:** Calculates the exponential of a given argument.
- **Routine Name:** EXP
- **Storage:** 56 octal words
- **Routines Called:** LABRT(N103A), LABRT(N103B), LIBMSG(SYSTEM)
B306C A* EXPONENTIAL FUNCTION E**X ALLOWING LCM ARGUMENT  C-4  WE, FULLERTON  73
B306C C*EXPONENTIAL FUNCTION E**X ALLOWING LCM ARGUMENT
B306C D*SW 2  LS 4  TYPE 1.1
B306C E*CMPLX 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 H*FORM: LEXT EXP
B306C I*PURPOSE: CALCULATE EXPONENTIAL OF X
B306C J*ROUTINE NAME: EXP
B306C K*ENTRY NAMES: EXP
B306C L*STORAGE: 66 OCTAL WORDS
B306C M*ROUTES CALLED: LABRT(N103B), LIRMSG(SYSTEM).

B307A A* J.L. DURAN  C-4  67
B307A B*COMPLEX NATURAL LOG
B307A C**MATH  B3  COMPASS  SR6600  SCOPE
B307A D*SW 2  LS 2
B307A E*COMPASS SOURCE CARDS 81BCD OBJECT CARDS 6BIN
B307A F*COMPLEX NATURAL LOG SINGLE PRECISION FORTRAN IV COMPATIBLE
B307A G*ON DISK F4 COMPAT  WJ 04/15/68  REV  DECK 04/15/68  REV
B307A H*RESULT.
B307A I*STORAGE 39 WORDS
B307A J*ROUTINE USES ALOG(B305A), ATAN2(B104A).

B310A A* J.L. DURAN  T-1  68
B310A B*NATURAL EXPONENTIAL OF A COMPLEX NUMBER
B310A C**MATH  B3  COMPASS  SR6600  SCOPE
B310A D*SW 2  LS 1
B310A E*COMPASS SYMBOLIC 28BCDRELOCATABLE COL BIN 3BIN
B310A F*NATURAL EXPONENTIAL COMPLEX NUMBER
B310A G*ON DISK F4 COMPAT  WU 02/12/68  DECK 02/05/68
B310A H*ERROR MESSAGES CONTROLLED BY EXP AND COS.
B310A I*STORAGE 15 FULL WORDS.
B310A J*USES EXP(B306A), COS(B106A), SIN(B196A).

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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)
ROOTS AND POWERS

REVIEWER: WAYNE FULLERTON, C-4

A* B.L. RUZBEE 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.

A* C-4
B408A H*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)
**Routine 1: Compute Square Root (Floating Point)**

- **Purpose:** Compute square root of floating point value with relative error of approximately 1.2E-14.
- **Routine Name:** SQRT
- **Storage:** 63 octal words
- **Called Routines:** LABRT(N103B), OUTPTS(SYSTEM), LIBMSG(SYSTEM).

**Routine 2: Compute Complex Square Root (Allowing LCM Argument)**

- **Purpose:** Compute square root of complex value which may be in SCM or LCM within relative error of approximately 1.2E-14.
- **Routine Name:** SQRT
- **Storage:** 72 octal words
- **Called Routines:** SQRT
- **Volume:** 2 - 9/73
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
H409B  1*FORM:   Y = CSQRT(Z)
H409B  2*PURPOSE:   COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
H409B  3*   ARGUMENT Z.
H409B  4*TIMING:   14 MICROSECONDS
H409B  5*ROUTINE NAME:   CSQRT
H409B  6*ENTRY NAME:   CSQRT
H409B  7*STORAGE   41 OCTAL WORDS
H409B  8*ROUTINES CALLED:   SQRT(B409B)

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  5*TIMING = 30 MICROSECONDS
B413A  6*ROUTINE NAME:   FOUROT
B413A  7*ENTRY NAME:   FOUROT
B413A  8*STORAGE:   35 OCTAL WORDS
B413A  9*SELF-CONTAINED.
A*   B.L. Buzbee   C-4

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 = FOURRT(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: FOURRO
B413B  7*ENTRY NAME: FOURRT
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    SR6630   SCP 3.1
B4AA  D*        SW 2, LS 2   TYPE 2
B4AA  E*CMP SOURCE CARDS 61 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(x)
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),

VOLUME 2 - 9/73
POLYNOMIALS AND SPECIAL FUNCTIONS
EVALUATION OF POLYNOMIALS

REVIEWER: J. HANCOCK, C-4

A* R. M. FRANK C-4 D. WILLIAMS 67

0*POLYNOMIAL COEFFICIENT GENERATOR

B*MATHEMATICS C1 F4 SR6600 SCOPE

C* SW 2 LS 1

D*F4 SOURCE CARDS 24BCDBINARY DECK 9BIN

S**POLYNOMIAL*COEFFICIENT GENERATOR

10*CARDS F4 COMPAT WU 09/18/67 REV DECK 05/04/67

CALL GENPOL(N,R,P,C) GENERATES THE COEFFICIENTS OF AN NTH

ORDER POLYNOMIAL WHOSE ROOTS ARE STORED IN REAL ARRAY

R, OF DIMENSION N. P IS A TEMPORARY DBL PREC ARRAY OF DIM. 2N.

C IS AN ARRAY OF DIMEN. N+1 CONTAINING THE CALCULATED

COEFFICIENTS.

STORAGE= 145 (8) WORDS.

SELF CONTAINED.

A* B. BIZEE T-1 67

0*POLYNOMIAL COEFFICIENT GENERATOR-DUOUBLE PRECISION ROOTS

B*MATHEMATICS C1 F4 SR6600 SCOPE

C* SW 2 LS 1

D*SOURCE DECK 24BCDBINARY DECK 9BIN

S**POLYNOMIAL*COEFFICIENT GENERATOR IN DOUBLE PRECISION

10*CARDS F4 COMPAT WU 05/04/67 DECK 05/04/67

CALL GENPDP(N,R,P,C)

PURPOSE - TO GENERATE THE COEFFICIENTS OF A POLYNOMIAL WHOSE

ROOTS ARE GIVEN IN DOUBLE PRECISION AND ARE REAL.

N = NUMBER OF ROOTS

R, P, AND C ARE ALL DOUBLE PRECISION ARRAYS;

R = ARRAY OF ROOTS OF DIMENSION N

P = ARRAY OF 2N WORDS OF TEMPORARY STORAGE

C = ARRAY OF CALCULATED COEFFICIENTS, OF DIMENSION N+1;

WHERE C(1)=A0=1; C(2)=A1;....C(N+1)=AN

STORAGE=147 WORDS.

SELF CONTAINED.
*POLYNOMIAL COEFFICIENT GENERATOR-COMPLEX ROOTS

**MATHEMATICS**

C108A

**SOURCE DECK**

C108A

**POLYNOMIAL COEFFICIENT GENERATOR FOR COMPLEX ROOTS**

C108A

**CARDS**

C108A

**PURPOSE** - TO GENERATE THE COEFFICIENTS OF A POLYNOMIAL WHOSE

**ROOTS ARE GIVEN AND ARE COMPLEX.**

N - THE NUMBER OF ROOTS

R, P, AND C ARE COMPLEX ARRAYS:

R - ROOTS; OF DIMENSION N

P - 2N WORDS OF TEMPORARY STORAGE

C - CALCULATED COEFFICIENTS OF DIMENSION N+1, WHERE

C(1) = A0 = 1.0, C(2) = A1, ..., C(N+1) = AN

STORAGE = 144 WORDS.

SELF CONTAINED.

*(PSI) HAS BEEN REDESIGNATED* C112A
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. Huzbee 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 BCU 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 2*POLYNOMIAL.
C206A 3*STORAGE=512 WORDS.
C206A 4*USES SQR(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. Huzbee 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*F SOURCE CARDS 19BCDF4 OBJECT CARDS 9BIN
C210A 1*DERIVATIVE EVALUATION OF A REAL SINGLE PRECISION*POLYNOMIAL
C210A 10*CARDS F4 COMPAT WU 09/14/67 REV DECK 01/10/67
C210A 11*CALL SRPOLE(N,M,S,R,D,P,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).

VOLUME 2 - 9/73
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 18BCDF4 OBJECT CARDS 10BIN
C211A S*MTH+DERIVATIVE EVALUATION OF A 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).

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 14BCDF4 OBJECT CARDS 5BIN
C212A S*MTH+DERIVATIVE EVALUATION OF A REAL (DP) POLYNOMIAL
C212A 10*CARDS F4 COMPAT WU 01/13/67 DECK 01/18/67
C212A 11*CALL DCPOLE(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).

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 41BCDF4 OBJECT CARDS 15BIN
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).
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  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:  LAMB(N103A).

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  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).

C215B  A*  J HANCOCK  C-4  J. HANCOCK  73
C215B  B*SCPTACO--POLYNOMIAL AND DERIVATIVES WITH ERROR BOUNDS
C215B  C*F4  SR7600  CRDS
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  2*PURPOSE:  SIMULTANEOUS EVALUATION OF FIRST M+1 TAYLOR SERIES
C215B  3*COEFFICIENTS (ESSENTIALLY THE POLYNOMIAL AND ITS DERIVATIVES)
C215B  4*OF A COMPLEX POLYNOMIAL P(Z) AT A COMPLEX POINT Z.
C215B  5*STORAGE:  372 (OCTAL) WORDS.
C215B  6*Routine name:  SCPTACO
C215B  7*Entry name:  SCPTACO
C215B  8*Storage:  372 (OCTAL) WORDS.
C215B  9*Routines called:  LABRT(N103B).
C216A  A* B L BUZREE 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  I*PURPOSE: FIND ZEROS OF COMPLEX POLYNOMIAL WITH
C216A  J* OPTIONAL ERROR BOUNDS
C216A  K* TIMING: FOR N .LE. 5 AND NO INPUT ESTIMATES, EXECUTION TIME IS
C216A  L* 1 TO 5 MILLISECONDS PER ZERO.
C216A  M*ROUTINE NAME: NEWPOL
C216A  N*ENTRY NAME: NEWPOL
C216A  O*STORAGE: 1006 (OCTAL) WORDS
C216A  P*ROUTINES CALLED: CABS(A203A), COS(B106A), SIN(B106A),
C216A  Q*ALOG(B305A), EXP(B306A), SCPTACO(C215B).

C216B  A* B L BUZREE C-4 JOHN HANCOCK 72
C216B  B*NEWPOL ZEROS OF A POLYNOMIAL WITH OPTIONAL ERROR BOUNDS
C216B  C*F4 SR7600 CR08
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  H*FORM: CALL NEWPOL(N, A, R, T, S, LE)
C216B  I*PURPOSE: FIND ZEROS OF COMPLEX POLYNOMIAL WITH
C216B  J* OPTIONAL ERROR BOUNDS
C216B  K* TIMING: FOR N .LE. 5 AND NO INPUT ESTIMATES, EXECUTION TIME IS
C216B  L* LESS THAN 1 MILLISECOND PER ZERO.
C216B  M*ROUTINE NAME: NEWPOL
C216B  N*ENTRY NAME: NEWPOL
C216B  O*STORAGE: 1011 OCTAL WORDS
C216B  P*ROUTINES CALLED: CABS(A203B), SIN(B106B),
C216B  Q*ALOG(B305B), EXP(B306B), SCPTACO(C215B).
C2AA A * B.L. BUZBEE C-4
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
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)*POLYNOMIAL
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
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 05/13/72 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).

VOLUME 2 - 9/73
A*  B.L. BUZBEE  C=4  72
B*ZEROS OF A COMPLEX (DP) POLYNOMIAL
C*F4  SR6600  SCP 3.1
D*  SW 3  LS 4  TYPE 2
E*F4 SOURCE CARDS  170  BCD  OBJECT CARDS  68  BIN
F**ZEROS OF A COMPLEX (DP)*POLYNOMIAL
G*CARDS  F4  COMPAT  WU 05/18/72  DECK 05/18/72
H*FORM: CALL DCPOLY(N,DC,DP,DZ,IE)
I*PURPOSE: FIND THE ZEROS OF A COMPLEX POLYNOMIAL WITH
J*  DOUBLE PRECISION COEFFICIENTS.
K*ROUTINE NAME: DCPOLY
L*ENTRY NAME: DCPOLY
M*STORAGE: 1617 OCTAL WORDS.
N*USES: DCABS(A202A), USQRT(B410A), AND LABRT(N103A).
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 D*BESSEL FUNCTION OF THE FIRST KIND FOR INTEGRAL N
C301A B*MATHEMATICS C3 F4 SR6600 SCOPE
C301A C* SW 3 LS 2
C301A D*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*R IS THE RESULT.
C301A 16*STORAGE=296 WORDS
C301A 17*USES=LAHRT(N103A), SIN(B106A), COS(B106A).

C302A A* B. L. BUZEE C-4 CHERRY 67
C302A R*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 WHITEUP)
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).

VOLUME 2 - 9/73
COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS

1. PURPOSE - TO COMPUTE THE INCOMPLETE OR COMPLETE ELLIPTIC
   INTEGRALS OF THE FIRST AND SECOND KIND.

2. PHI - THE UPPER LIMIT OF THE INTEGRAL (A DUMMY VAR IN CELLI).

3. F - ON RETURN, THE ELLIPTIC INTEGRAL OF THE FIRST KIND.

4. E - ON RETURN, THE ELLIPTIC INTEGRAL OF THE SECOND KIND.

5. ACCURACY - AT LEAST TEN SIGNIFICANT FIGURES.

6. STORAGE - 335 (DEC) WORDS

7. USES - LARRT(N103A), SQRT(B408A), SIN(B106A), TAN(B107A),
   ATAN(B104A), ALOG(B305A).

C305A *(BESSJ) DELETED FROM THE LIBRARY -
   C361(BESJN), C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.

C306A *(BESSY) DELETED FROM THE LIBRARY -
   C361(BESJN), C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.

C307A *(BESSI) DELETED FROM THE LIBRARY -
   C361(BESJN), C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.

C308A *(BESSK) DELETED FROM THE LIBRARY -
   C361(BESJN), C328(BJYIK), AND C327(BJSN) ARE RECOMMENDED.
C309A A* CHERRY T-1
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(R309A).

C310A A* CHERRY T-1
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(R306A).

C310B A* I. CHERRY C-4
C310B B*ERF - ERROR FUNCTION
C310B C*F4 SR7696 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(R306A).
C312A A*  IVAN CHERRY  C=4  72
C312A B*COMPLEX DIGAMMA (PSI) FUNCTION FOR COMPLEX NUMBER Z
C312A C*F4  SR6600  SCOPE 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  9BCDF4  OBJECT CARDS  4BIN
C313A S**EXponential*Integral
C313A T*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).

VOLUME 2 - 9/73
C3-5

A* DONALD L WILLIAMST-1 IVAN CHERRY 67

0*BESSEL FUNCTION EVALUATION FOR COMPLEX ARGUMENT AND ORDER

B*MATHEMATICS C3 F4 SR6600 SCOPE

D*F4 SOURCE CARDS 101BCDF4 OBJECT CARDS 56BIN

S**BESSEL FUNCTION EVALUATION FOR COMPLEX ARGUMENT AND ORDER

16*CARDS F4 COMPAT WU 09/18/67 REV DECK 05/19/67

11*CALL COHRES(Z,ANU,N,BJ,Y)

12*PURPOSE-TO COMPUTE N+1 VALUES OF THE BESSEL FUNCTIONS J(Z)

13*AND Y(Z) FOR COMPLEX ARGUMENT Z AND COMPLEX ORDERS ANU TO

14*ANU+N. UJ-COMPLEX STORAGE FOR J(Z) FOR ORDERS ANU TO ANU+N.

15*Y-COMPLEX STORAGE FOR Y(Z) FOR ORDERS ANU TO ANU+N. BJ AND Y

16*ARE OF LENGTH L WHERE L,=MAX(N,2*ABS(Z))+13. NOTE-Z,ANU,

17*BJ, AND Y MUST BE DECLARED COMPLEX IN A TYPE STATEMENT IN

18*THE USERS PROGRAM.

19*STORAGE-1630 (DECIMAL) WORDS.

20*USES-LNGAM(C326A),CLOG(B307A),CEXP(B310A),LABRT(N103A).

C325A A* DONALD L WILLIAMST-1 IVAN CHERRY 67

C325A Q*GAMMA FUNCTION

C325A B*MATH C3 F4 SR6600 SCOPE

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 HIG. SEE WRITEUP.

C325A 14* (2) GAM1 ARGUMENT A NONPOSITIVE INTEGER.

C325A 15*ACCURACY-APPROXIMATELY 13 SIGNIFICANT FIGURES.

C325A 16*STORAGE-151 (DECIMAL) WORDS.

C325A 17*USES LABRT(N103A).

C326A A* DONALD L WILLIAMST-1 IVAN CHERRY 67

C326A O*COMPLEX LN GAMMA

C326A B*MATH C3 F4 SR6600 SCOPE

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.

VOLUME 2 = 9/73
C3-6

C327A A* C-4 W. FULLERTON 68
C327A B*BESSLER 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**BESSLER*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 BESSLER 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*BESSLER 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**BESSLER*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 BESSLER 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*BESSLER 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**BESSLER 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 BESSLER 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,DBAIEX,DEXP,DCOS,DLOG,DSIN(N(ALL ON SYSTEM)

VOLUME 2 - 9/73
**BESSEL FUNCTIONS FOR REAL ORDER AND ARGUMENT**

**Purpose:** Compute a table of Bessel functions of the first and second kind or of the modified functions.

**Routine Name:** BSYIK

**Entry Name:** BSYIK

**Storage:** 1751 octal words

**Routines Called:** DBLE(A105B), DRAIEX(B313B), GAMMA(C302R), BASF(C327B), DABS, DBAREX, DEXP, DCOS, DLOG, DSIN (all on system)

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**(FFT) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED A3AB.**

FFT2(F502A) IS RECOMMENDED.

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**(FFT) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED A3AB.**

FFT2(F502B) IS RECOMMENDED.

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**(RFFT) REDESIGNATED F501A.**

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**(RFFT) REDESIGNATED F501B.**

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**(RFSN) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F5AR.**

RFTI(F503A) IS RECOMMENDED.

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**VOLUME 2 - 9/73**
**C3-8**

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C332A A* C-3 W, FULLERTON 68
C332A B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
C332A C*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.
C332A H*FORM: CALL CBSF(GAMMA,X,FJ,YK,SW)
C332A I*PURPOSE: COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER
C332A J* AND ARGUMENT
C332A K*ROUTINE NAME: CBSF
C332A L*ENTRY NAME: CBSF
C332A M*STORAGE: 1206 OCTAL WORDS
C332A N*ROUTINES CALLED: CSORT(B409A), CEXP(B310A)

C332B A* C-3 W, FULLERTON 73
C332B B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
C332B C*SR7606 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 H*FORM: CALL CBSF(GAMMA,X,FJ,YK,SW)
C332B I*PURPOSE: COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER
C332B J* AND ARGUMENT
C332B K*ROUTINE NAME: CBSF
C332B L*ENTRY NAME: CBSF
C332B M*STORAGE: 1211 OCTAL WORDS
C332B N*ROUTINES CALLED: CSORT(B409B), CEXP(B310B)

C333A A* C-3 W, FULLERTON 68
C333A B*COMPLEX BESSEL FUNCTIONS
C333A C*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.
C333A H*FORM: CALL CBJYIK(X,GAMMA,FN,FJ,YK,SW)
C333A I*PURPOSE: COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C333A J* FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS
C333A K*ROUTINE NAME: CBJYIK
C333A L*ENTRY NAME: CBJYIK
C333A M*STORAGE: 1666 OCTAL WORDS
C333A N*ROUTINES CALLED: CABS(A203A), CSIN/CCOS(B109A), CLOG(B307A),
C333A O* CEXP(B310A), LNGAM(C326A), CBSF(C332A)

VOLUME 2 - 9/73
C333A *(ERFINV) HAS BEEN DEMOTED TO TYPE 2 AND IS NOW C3AD.

C334B *(ERFINV) HAS BEEN DEMOTED TO TYPE 2 AND IS NOW C3AD.
C335B A* B.L. BUZHEE 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 BCU 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: ERFC(C310B), EXP(A356B)

C336B A* B.L. BUZHEE C-4 71
C336B B*INCOMPLETE BETA FUNCTION
C336B C*F4 SR7600 CROS
C336B D* SW 3 LS 2 TYPE 1
C336B E*SOURCE CARDS 58 BCU OBJECT CARDS 16 BIN
C336B F**INCOMPLETE BETA FUNCTION
C336B G*ON DISK F4 COMPAT WU 06/28/72 REV 1 DECK 12/13/71
C336B 1*FORM: /= BETAIC(X, P, Q, R)
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), RBAEX, OUTPTC(ALL ON SYSTEM)

C337A *(FFT2) HAS BEEN REDESIGNATED F502A.

C337B *(FFT2) HAS BEEN REDESIGNATED F502B.

C338A *(FFT) HAS BEEN REDESIGNATED F503A.

C338B *(FFT) HAS BEEN REDESIGNATED F503B.

VOLUME 2 - 9/73
**C339A**

A* B.L. BUZBEE C-3 W. FULLERTON 72

**C339B**

B* INVERSE ERROR FUNCTION

**C340A**

C* REAL HESSEL FUNCTION J₀ OF THE ARGUMENT X, GT.0

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**C339A**

R* INVERSE ERROR FUNCTION

**C339B**

C390 F* SOURCE CARDS 26 BCD OBJECT CARDS 10 BIN

**C339B**

F** INVERSE ERROR FUNCTION

**C340A**

C* SOURCE 92 CARDS OBJECT 27 CARDS

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**C339A**

C* SH6600 SCP 3.1

**C339B**

C390 SW 2 LS 1 TYPE 1.1

**C339B**

INVERSE ERROR FUNCTION

**C340A**

C* SW 2 LS 1 TYPE 1.1

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**C339A**

5* STORAGE: 142 OCTAL WORDS.

**C339B**

5* STORAGE: 142 OCTAL WORDS.

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**C339A**

6* ROUTINES CALLED: ERF(C310A) * EXP(B306A).

**C339B**

6* ROUTINES CALLED: ERF(C310B) * EXP(B306B).

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**C340A**

6* STORAGE: 440 OCTAL WORDS.

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**C340A**

7* SELF CONTAINED.

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**VOLUME 2 - 9/73**
REAL BESSEL FUNCTION J0 OF THE ARGUMENT X.GE.0

SOURCES: 27 CARDS
OBJECT: 26 CARDS

FUNCTION

PURPOSE: COMPUTES THE REAL BESSEL FUNCTION J0 OF THE REAL ARGUMENT X.GT.0

TIMING:
7 SECONDS FOR 1000 RANDOM VALUES 0. LT. X LE. 30.
36 SECONDS FOR 5000 RANDOM VALUES 0. LT. X LE. 1.

ROUTINE NAME: FJ0(X)
ENTRY NAME: FJ0(X)
STORAGE: 440 OCTAL WORDS
SELF CONTAINED.

VOLUME 2 - 9/73
C3-13

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**BESEL FUNCTION
C341B G*DISK F4 COMPAT WU 05/14/73 DECK 05/14/73
C341B 1*FORM: RI=FLJ1(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. L T. X, LE. 30.
C341B 6* 36 SECONDS FOR 5000 RANDOM VALUES 0. L T. 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 IO 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**BESEL FUNCTION
C342A G*CARDS F4 COMPAT WU 05/14/73 DECK 05/14/73
C342A 1*FORM: RI=FI0(X)
C342A 2*PURPOSE: COMPUTES THE REAL BESSEL FUNCTION IO 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.
**REAL BESSEL FUNCTION I0 OF THE ARGUMENT X .GE. 0**

**REAL BESSEL FUNCTION I1 OF THE ARGUMENT X .GE. 0**

**SOURCE**

**ENTRY NAME**

**STORAGE**

**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 CROSS
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 A*ENTRY NAME: FI1(X)
C343B 9*STORAGE: 342 OCTAL WORDS
C343B 10*SELF CONTAINED.

C3AA A*  W. D. BARFIELD  T-2
C3AA B*FINDMAP - COMPLEX GREENS 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(NBUY) + (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.
A* Ho 1..2uZBEE "C-4 10 CHERRY 72
B*IrJvERSE ERROR FuNCTION
C*F4 SR6600 SCP 3,1
D* SW 3 LS 2 TYPE 2
E*F4 SOURCE CARDS 44 BCD OBJECT CARDS 12 BIN
F**INVERSE*ERROR FUNCTION
G*CARDS F4 COMPAT WU 07/20/72 DECK 07/20/72
H*FORM: CALL ERFINV(Y,J,X,ANSWER,TEST,VE,RATIO,OUTNO)
I*PURPOSE: COMPUTE INVERSE ERROR FUNCTION
J*ROUTINE NAME: ERFINV
K*ENTRY NAME: ERFINV
L*STORAGE: 204 OCTAL WORDS.
M*TIMING: AVERAGE TIME = 7 MILLISEC.
N*ROUTINES CALLED: EXP(B306), ERF(C316).
SIMULTANEOUS NON-LINEAR ALGEBRAIC FUNCTIONS

ZEROES OF NON-LINEAR FUNCTIONS.

REVIEWER: J. HANCOCK, C-4

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

A* JOHN HANCOCK C-4

B* SOLVE—ROOT FINDER FOR REAL EQUATIONS

C402A ED*F44 SR6600 SCP 3.

D* SW 6 LS 15 TYPE 1

E SOURCE CARDS 697 BCD OBJECT CARDS 160 BIN

F*ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION

G*CARDS F4 COMPAT WU 11/02/72 REV 5 DECK 11/02/72 REV 5

H*FORM: CALL SOLVE (XROOT, FROOT, A, R, XIST, XABSER, XRELER, FABSER,

C402A 2* XROUND, X2CODE, NPRINT, NCOUNT, NCONV, NSEARCH, 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.
A* JOHN HANCOCK  C-4

B* SOLVE--ROOT FINDER FOR REAL EQUATIONS

C* SR7600 CROS

D* SW 6 LS 15 TYPE 1

E* SOURCE CARDS 697 BCD OBJECT CARDS 163 BIN

F* ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION

G* ON DISK F4 COMPAT WU 11/02/72 REV. 1 DECK 11/02/72 REV. 1

H* FORM: CALL SOLVE(XROOT,FROOT,A,B,XIST,XABSER,XRELER,FABSER)

I* 2* XBOUND*X2CODE*NPRINT,NCOUNT,NCONV,NSERCH,FNAME

J* FUNCTION, NSERCH, FILE

K* PURPOSE: LET F AND X BE REAL. SOLVE (C402)

L* APPLIES:

M* 6* I) A ROOT OF F(X) = 0 OR

N* 7* II) A POINT AT WHICH F(X) ASSUMES ITS MAXIMUM

O* OR MINIMUM VALUE.

P* ROUTINE NAME: SOLVE

Q* ENTRY NAME: SOLVE

R* STORAGE: 4514 OCTAL WORDS

S* SELF CONTAINED.

A* J SOPKA  C-4 SANDIA MATH LIB 72

B* ZEROIN -- FINDS A ZERO OF FUNCTION F(X) IN INTERVAL (B,C)

C* SR6600 SCP 3.1

D* SW 2 LS 4 TYPE 1

E* SOURCE CARDS 159 BCD OBJECT CARDS 22 BIN

F* ROOT*FUNCTION*INTERVAL

G* CARDS F4 COMPAT WU 01/31/72 DECK 01/31/72

H* FORM: CALL ZEROIN(F,R,C,RE,AE,IFLAG)

I* PURPOSE: SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)

J* ON THE INTERVAL (B,C).

K* ROUTINE NAME: ZEROIN

L* ENTRY NAME: ZEROIN

M* STORAGE: 344 OCTAL WORDS

N* REQUIRES SYSTEM OUTPUT FILESET-OUTPUT- TO BE AVAILABLE

O* FOR ERROR MESSAGES.
C4-3

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,R,C,RE,AE,IFLAG)
C403B 2*PURPOSE: SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)
C403B 3* ON THE INTERVAL (R,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,NERRO)
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,NERRO)
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

VOLUME 2 - 9/73
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 B*WEIGHTS AND ZEROES OF CHERYSHEV POLYNOMIALS
D111A C*MATH D1 F4 SR6600 SCOPE
D111A D* SOURCE DECK 83BCDREL. 20BIN
D111A S**CHEBYSHEV*WEIGHTS*ZEROES
D111A G*ON DISK F4 COMPAT WU 09/18/67 REV DECK 06/22/67
D111A 11* CALL CBHSV(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.
Call HRMTE(M,K,N) supplies the Kth zero and weights for the Nth order Hermite quadrature. M must be in (4,20). If not, 4 is used. Used primarily with GAUSS(D114A). Error is less than 3.E-13.

Storage is 294 words.

Call LAGRE(M,K,N) supplies the Kth zero and weights for the Nth order Laguerre quadrature. M must be in (4,15). If not, 4 is used. Used primarily with GAUSS(D114A). Error is less than 5.E-13.

Storage is 267 words.
**RKA, RKB** has been redesignated **D263B**.

**D116A**

A* G. WILLBANKS T=1 67

D116A 0*TABULAR INTEGRATION BY TAYLOR EXPANSION AND TRAPEZIODS

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 TRAPEZIODS

D116A 10*ON DISK F4 COMPAT WU 10/17/67 DECK 10/17/67

D116A 11*A = TABEL(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 7

D117A D*F4 SOURCE CARDS 81BCDF4 OBJECT CARDS 2IBIN

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(Y).

D117A 18*STORAGE = 457 WORDS,

D117A 19*USES SEARCH (E101A) AND LABRT (N103A).

**VOLUME 2 - 9/73**
**TWO-DIMENSIONAL SPLINE INTEGRATION**

**MATHEMATICS**

**SOURCE CARDS**

**OBJECT CARDS**

**COPYRIGHT**

**USAGE**

**ERRORS**

**STORAGE**

**LIBRARY**

**VOLUME 2 - 9/73**
DAVID K. KAHANER C-6

**ADAPTIVE NEWTON COTES QUADRATURE TEN POINT**

C\*F4

SR6600 SCP 3.1

D* SW 2 LS 2 TYPE 1

E*SOURCE CARDS 92 BCD OBJECT CARDS 19 BIN

F**QUADRATURE INTEGRATION NEWTON COTES

G*CARDS F4 COMPAT WU 06/19/69 REV 1 DECK 02/04/69

I*QUAD COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL FROM

2*A TO B OF THE FUNCTION, FUNC.

3*CALLING SEQUENCE IS Y = QUAD (FUNC, A, B, RE, KOUNT)

4*STORAGE IS 1166 (OCTAL) WORDS.

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**SHANKS ITERATIVE QUADRATURE**

C\*F4

SR6600 SCP 3.1

D* SW 2 LS 1 TYPE 1

E*SOURCE CARDS 36 BCD OBJECT CARDS 14 BIN

F*QUADRATURE INTEGRATION WYNN SHANK

G*CARDS F4 COMPAT WU 06/17/70 REV 2 DECK 06/17/70 REV 1

I*USE: Y = SHNK (FUNC, A, B, RE, KOUNT)

2*PURPOSE: COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL

3*FROM A TO B OF THE FUNCTION, FUNC.

4*STORAGE: 1103 (OCTAL) WORDS.

5*SELF CONTAINED.

---

**NUMERICAL QUADRATURE BY ADAPTIVE ITERATIVE METHODS**

C\*F4

SR6600 SCP 3.1

D* SW 2 LS 2 TYPE 1

E*SOURCE CARDS 107 BCD OBJECT CARDS 30 BIN

F**QUADRATURE INTEGRATION QABS

G*CARDS F4 COMPAT WU 10/14/69 DECK 10/14/69

I*CALL NAME: QABS (F, A, B, EPS, NO)

2*PURPOSE: NUMERICAL QUADRATURE TO ABSOLUTE ACCURACY.

3*STORAGE: 1,043 (OCTAL) WORDS.

4*SELF CONTAINED.
A* DAVID K. KAHANER C-6 69
B*GENERALIZED GAUSS QUADRATURE
C*FOR SR6600 SCP 3.1
D* SW 4 LS 1 TYPE 1.1
E*SOURCE CARDS 41 RCD OBJECT CARDS 21 BIN
F**GENGSQ GAUSS QUADRATURE INTEGRATION
G*CARDS F4 COMPAT WU 10/14/69 DECK 10/14/69
H*CALL NAME: GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EP)
I*ISWITCH,INIT).
J*PURPOSE: TO DO GENERALIZED GAUSS QUADRATURE.
K*STORAGE 1371 (OCTAL) WORDS.
L*RUTINES CALLED: PHI(D124A),STLTJS(D125A),GAUSSQ(D126A).

A* DAVID K. KAHANER C-6 73
B*GENERALIZED GAUSS QUADRATURE
C*FOR SR7600 CROS
D* SW 4 LS 2 TYPE 1.1
E*SOURCE CARDS 41 BCD OBJECT CARDS 21 BIN
F**GENGSQ GAUSS QUADRATURE INTEGRATION
G*DISK F4 COMPAT WU 08/01/73 DECK 08/01/73
H*CALL NAME: GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EP)
I*ISWITCH,INIT).
J*PURPOSE: TO DO GENERALIZED GAUSS QUADRATURE.
K*STORAGE 1377 (OCTAL) WORDS.
L*RUTINES CALLED: PHI(D124B),STLTJS(D125B),GAUSSQ(D126B).

A* DAVID K. KAHANER C-6 69
B*PRIVATE SUBROUTINE FOR D123A (GENGSQ)
C*FOR SR6600 SCP 3.1
D* SW 1 LS 1 TYPE 1.1
E*SOURCE CARDS 6 BCD OBJECT CARDS 6 BIN
F**PHI GAUSS
G*CARDS F4 COMPAT WU 05/22/73REV.1 DECK 05/22/73REV.1
H*CALL NAME: DX = PHI(DY,DPHI,A,B)
I*PURPOSE: CHANGES INTERVAL FOR GENERALIZED GAUSS QUADRATURE
J*FROM (-1,1) TO (A,B). PRESENTLY CODED FOR A,B FINITE.
K*STORAGE 52 (OCTAL) WORDS.
L*SELF CONTAINED.
PRIVATE SUBROUTINE FOR D123B (GENGSQ)

ENTRY NAMe: D124B  

ENTRY NAME: PHI

PURPOSE: CHANGES INTERVAL FOR GENERALIZED GAUSS QUADRATURE FROM (-1,1) TO (A,B). PRESENTLY CODED FOR A,B FINITE.

ROUTINE NAME: PHI

STORAGE: 55 (OCTAL) WORDS.

PRIVATE SUBROUTINE FOR D123A (GENGSQ) -- STLTJS

ENTRY NAME: STLTJS

STORAGE: 51111 OCTAL WORDS

ROUTINES CALLED: PHI(D124A), WF

PRIVATE SUBROUTINE FOR D123B (GENGSQ) -- STLTJS

ENTRY NAME: STLTJS

STORAGE: 51117 OCTAL WORDS

ROUTINES CALLED: PHI(D124A), WF
PRIVATE SUBROUTINE FOR D123A(GENGSQ). -- GAUSSQ
SR660 SCP 3.1

SOURCE 82 CARDS OBJECT 45 CARDS

CALL GAUSSQ(M,ATEMP,WTEMP,B,G,FM)
2*PURPOSE: FINDS EIGENVALUES OF TRIDIAGONAL MATRIX BY Q-R
3* DECOMPOSITION FOR GENERALIZED QUADRATURE.
4*Routine name: GAUSSQ
5*Entry names: GAUSSQ
6*Storage: 2552 OCTAL WORDS
7*Routines called: SELF CONTAINED

RECURSIVE SIMPSONS RULE INTEGRATION

CALL NAME: SMPS(X1,X2,N,ANS,FUNCT,DUMMY,SMPS)
2*Purpose: RECURSIVELY CALLED SIMPSON INTEGRATION ROUTINE
3*Storage: 412 (OCTAL) WORDS.
4*Self contained.
A* R M FRANK C-4
B*RECURSIVE SIMPSONS RULE INTEGRATION FOR TABULAR FUNCTIONS
C*F4 SR6600 SCP 3.1
D* SW 3 LS 1 TYPE 1
E*SOURCE CARDS 52 BCD OBJECT CARDS 18 BIN
F*RECURSIVE SIMPSON INTEGRATION FOR TABULAR FUNCTIONS
G*CARDS F4 COMPAT WU 01/09/70 DECK 01/09/70
H*CALL NAME: SIMTAB(I1,I2,DELTA,ANS,FUNCT,DUMMY,SIMTAB)
I*PURPOSE: RECURSIVELY CALLED SIMPSON INTEGRATION ROUTINE FOR
J*TABULAR FUNCTIONS.
K*STORAGE: 444 (OCTAL) WORDS.
L*SELF CONTAINED.

DAVID K. KAHANEK C-6 D KAHANEK 11
M*QUADRATIC INTEGRATION OVER UNEVENLY SPADED POINTS
N*C*F4 SR6600 SCP 3.1
O* SW J LS 2 TYPE 1.1
P*SOURCE CARDS 52 BCD OBJECT CARDS 16 BIN
Q*QUADRATIC INTEGRATION
R*CARDS F4 COMPAT WU 07/02/73 REV. 2 DECK 04/06/73 REV. 1
S*FORM: CALL SIMPUN(XX,FX,NX,1,AX)
T*PURPOSE: QUADRATIC INTEGRATION OVER UNEVENLY SPADED POINTS.
U*XX = INPUT ARRAY OF NX STRICTLY-INCREASING ABSISSAS
V*AT WHICH THE INTEGRAND IS EVALUATED.
W*FX = INPUT ARRAY OF NX INTEGRAND VALUES AT THE
X*POINTS XX(J), J=1,2,...,NX.
Y*NX = NUMBER OF POINTS IN XX, FX, ANU AX.
Z*I = DIRECTION OF INTEGRATION.
AA*AX = OUTPUT ARRAY OF NX VALUES OF INTEGRAL ON
BB*SUBINTERVALS. IF I.GE.0, AX(J) IS APPROXIMATELY
CC*EQUAL TO INTEGRAL FROM XX(I) TO XX(J). IF I.LT.0,
DD*AX(J) IS APPROXIMATELY EQUAL TO INTEGRAL FROM XX(J)
EE*TO XX(NX).
FF*ROUTINE NAME: SIMPUN
GG*ENTRY NAME: SIMPUN
HH*STORAGE: 310 OCTAL WORDS
II*ROUTINES CALLED: SELF CONTAINED

VOLUME 2 - 9/73
U1298 A*        D. KAHANER  C=6        D KAHANER  13
U1298 B*QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS
U1298 C*F4     SRC6000 SCHUS
U1298 D*        SW  J    LS 2  TYPE 1.1
U1298 E*F4 SOURCE CARDS  58 HCU  OBJECT CARDS  16 BIN
U1298 F**QUADRATIC INTEGRATION
U1298 G**ON DISK  F4 COMPAT WU 07/02/73 KEV.1 DECK 04/06/73
U1298 1*FORM: CALL SIMPUN (XX,FX,NX,1,AX)
U1298 2*PURPOSE: QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS.
U1298 3* XX = INPUT ARRAY OF NX STRICTLY-INCREASING ABSCISSAS
U1298 4* AT WHICH THE INTEGRAND IS EVALUATED.
U1298 5* FX = INPUT ARRAY OF NX INTEGRAND VALUES AT THE
U1298 6* POINTS XX(J), J=1,2,....,NX.
U1298 7* NX = NUMBER OF POINTS IN XX, FX, AND AX.
U1298 8* I = DIRECTION OF INTEGRATION.
U1298 9* AX = OUTPUT ARRAY OF NX VALUES OF INTEGRAL ON
U1298 10* SUBINTERVALS. IF I.UT.0, AX(J) IS APPROXIMATELY
U1298 11* EQUAL TO INTEGRAL FROM XX(1) TO XX(J). IF I.LT.0,
U1298 12* AX(J) IS APPROXIMATELY EQUAL TO INTEGRAL FROM XX(J)
U1298 13* TO XX(NX).
U1298 14*ROUTINE NAME: SIMPUN
U1298 15*ENTRY NAME: SIMPUN
U1298 16*STORAGE: 313 OCTAL WORDS.
U1298 17*ROUTINES CALLED: SELF CONTAINED

D1AA A*        D. KAHANER  C=6        71
D1AA B*CIRCLE - INTEGRATE F(X,Y) OVER CIRCUMFERENCE OF A CIRCLE
D1AA C*F4     SRC6000 SCP 3.1
D1AA D*        SW  I    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).

VOLUME 2 - 9/73
D1A8  A*                    D. KAHANER             C-6
D1A8  B*SPHERE = INTEGRATE F(X,Y,Z) OVER UNIT SPHERE
D1A8  C*F4                    SR6600              SCP 3.1
D1A8  D*                         SW 1                  LS 3              TYPE 2
D1A8  E*F4 SOURCE CARDS        137 BCD    OBJECT CARDS  33 BIN
D1A8  F**SPHERE*INTEGRATE
D1A8  G*CARDS             F* COMPAT             WU 09/27/71   DECK 09/27/71
D1A8  1*FORM: Y = SPHERE (F,NPTS)
D1A8  2*PURPOSE: INTEGRATE FUNCTION F OF 3 VARIABLES OVER THE
D1A8  3* UNIT SPHERE. NPTS CAN BE 50, 72, OR 128, AND
D1A8  4* INDICATES THE NUMBER OF POINTS TO BE USED IN THE
D1A8  5* APPROXIMATION. INCORRECT NPTS GIVES WARNING MESSAGE
D1A8  6* AND RUNS LIKE NPTS = 128. FOR NPTS = 50 AND 72,
D1A8  7* METHOD IS IN A.D. MCLAREN, MATH COMP
D1A8  8* V 17, P. 361-383 (1963),
D1A8  9* FOR NPTS = 128 METHOD IS THE STANDARD SPHERICAL PRODUCT
D1A8  10* GAUSS FORMULA,
D1A8  11*ACCURACY: FOR NPTS = 50 IT IS EXACT FOR SPHERICAL
D1A8  12* POLYNOMIALS OF DEGREE 11 OR LESS.
D1A8  13* FOR NPTS = 72 IT IS EXACT FOR SPHERICAL POLYNOMIALS
D1A8  14* OF DEGREE 14 OR LESS.
D1A8  15*ROUTINE NAME: SPHERE
D1A8  16*ENTRY NAME: SPHERE
D1A8  17*STORAGE: 564 OCTAL WORDS
D1A8  18*ROUTINES CALLED: SQRT (B408A), SIN (B106A), COS (B106A)

D1AC  A*                    DUANE HARDER             C-4
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               F* 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.
DIAD  A* M. BOLSTERLI T-9 D. KAHANER 72
DIAD  B*ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE INTEGRATION
DIAD  C*FORTRAN SR6600 SCP 3.1
DIAD  D* SW 2 LS 1 TYPE 2
DIAD  E*F4 SOURCE CARDS 21 BCD OBJECT CARDS 9 BIN
DIAD  F*ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE INTEGRATION
DIAD  G*CARDS F4 COMPAT WU 10/31/72 DECK 10/31/72
DIAD  H*FORM: CALL ABWTLAG(NSXWST)
DIAD  I*PURPOSE: COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE
DIAD  J* INTEGRATION.
DIAD  K*Routine Name: ABWTLAG
DIAD  L*ENTRY NAME: ABWTLAG
DIAD  M*STORAGE: 147 OCTAL WORDS
DIAD  N*TIMING: SEE WRITEUP
DIAD  O*ACCURACY: SEE WRITEUP
DIAD  P*Routines Called: S30VAL(F222).

DIAE  A* M. BOLSTERLI T-9 D. KAHANER 72
DIAE  B*ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE INTEGRATION
DIAE  C*FORTRAN SR6600 SCP 3.1
DIAE  D* SW 2 LS 1 TYPE 2
DIAE  E*F4 SOURCE CARDS 23 BCD OBJECT CARDS 10 BIN
DIAE  F*ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE INTEGRATION
DIAE  G*CARDS F4 COMPAT WU 10/31/72 DECK 10/31/72
DIAE  H*FORM: CALL ABWTLEG(NSXWST)
DIAE  I*PURPOSE: COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE
DIAE  J* INTEGRATION.
DIAE  K*Routine Name: ABWTLEG
DIAE  L*ENTRY NAME: ABWTLEG
DIAE  M*STORAGE: 160 OCTAL WORDS
DIAE  N*TIMING: SEE WRITEUP
DIAE  O*ACCURACY: SEE WRITEUP
DIAE  P*Routines Called: S30VAL(F222).
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

REVIEWER: J. SOPKA, C-4

A* DON DICKMAN C-4 J. SOPKA 72
D203A R* RK - INTERVAL DETERMINING RUNGE-KUTTA
D203A C* CMP SR6600 SCP 3*
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 DIFFERENTIAL EQUATIONS. ROUTINE IS SELF TESTING AND INTERVAL DETERMINING.
D203A 6* ROUTINE NAME: RKB
D203A 7* ENTRY NAMES: RKA, RKB
D203A 8* STORAGE: 410 LOCATIONS PLUS DATA IN CALL SEQ.
D203A 9* ROUTINES CALLED: LAHRIT(N103A).

A* DON DICKMAN C-4 J. SOPKA 72
D203B R* 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, UP, 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 EQUATIONS. ROUTINE IS SELF TESTING AND INTERVAL DETERMINING. SEE WRITUP FOR RKB(D203A) FOR FURTHER DETAILS.
D203B 6* ROUTINE NAME: RKB
D203B 7* ENTRY NAMES: RKA, RKB
D203B 8* STORAGE: 635 (OCTAL) WORDS
D203B 9* ROUTINES USED: LAHRIT(N103B) LIBMSG(SYSTEM).

VOLUME 2 - 9/73
NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

REVIEWER: F. DORR, C-4

**D301A**

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

**D301B**

A* B L BUZBEE C-4
B*TRUNCATED BUNEMAN POISSON SOLVER
C*F-4 SR7600 CRS
D* SW 12 LS 8 TYPE 1
E*SOURCE CARDS 359 BCD OBJECT CARDS 85 BIN
F**SOLVER*BUNEMAN POISSON SOLVER
G*ON DISK F4 COMPAT WU 04/11/73 REV.1 DECK 02/15/73
I*FORM: CALL TBPSDN(N, NY, UX, Ly, TB, DZDX, DRY, CC, ETA, LC, R1)
2*PURPOSE: USING A UNIFORM RECTANGULAR MESH, SOLVE THE
3* FIVE POINT DIFFERENCE APPROXIMATION TO POISSON'S
4* EQUATION IN X-Y OR Z-R COORDINATES.
5*ROUTINE NAME: TBPSDN
6*ENTRY NAME: TRPSDN
7*STORAGE: 2151 (OCTAL) WORDS
8*ROUTINES CALLED: FACTTO(F418B), SOLTDM(F419B)

VOLUME 2 - 9/73
APPROXIMATION THEORY AND CURVE FITTING
**EL1-1**

INTERPOLATION AND TABLE LOOK-UP

REVIEWER: B. SWARTZ, C-6

*(SEARCH) HAS BEEN REDESIGNATED M118A.*

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**E102A**

A.** TOM JORDAN COO BERTHA FAGAN 67
B.**SPLINE INTERPOLATION-COEFFICIENT EVALUATION
C.**FORTRAN SR6600 SCP 3,1
D.** F4 SOURCE CARDS 174 BCD OBJECT CARDS 57 BIN
E.**FIND COEFFICIENTS OF CUBIC FOR SPLINE INTERPOLATION
G.**ON DISK F4 COMPAT WU 04/25/69 REV3 DECK 01/20/67
H.**CALL SPL1D1(N,X,F,W,IOP,IJ,A,B,C) WHERE N,GE,3, IS NUMBER
I.**OF POINTS, X IS ORIGIN OF TABLE OF INDEPENDENT VARIABLE, F
J.**IS ORIGIN OF TABLE OF DEPENDENT VARIABLE, IOP IS AN ARRAY
K.**OF DIMENSION 2 CONTAINING COMBINATIONS OF INTEGERS 1 THRU 5
L.**FOR SPECIFYING BOUNDARY CONDITIONS, IJ IS SPACING IN TABLES
M.**F AND W, A,B,C ARE ARRAYS OF DIMENSION N USED FOR TEMPORARY
N.**STORAGE. N SECOND DERIVATIVES ARE COMPUTED AND STORED
O.**IN W, AT STORAGE INTERVAL IJ, TIME IS A LINEAR FUNCTION OF N,
P.**STORAGE=1214 WORDS.
Q.**THIS SUBROUTINE IS SELF CONTAINED.

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**E103A**

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

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El-2

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 38RCDFORT object cards 14BIN
E104A S* TWO DIMENSIONAL BICUBIC SPLINE INTERPOLATION
E104A 10* ON DISK F4 COMPAT WU 12/15/67 DECK 1/03/67
E104A 11* CALL SPL2D1 (NBRX, XB, NBRY, YB, FX, FY, FXY, MAXY, IBD, T1, T2, T3)
E104A 12* PURPOSE - TO CALCULATE THE COEFFICIENTS OF A BICUBIC POLYNOMIAL FOR USE IN SMOOTH TWO DIMENSIONAL INTERPOLATION
E104A 13* TIMING - TIME IS A LINEAR FUNCTION OF M*N
E104A 14* STORAGE - 227 WORDS
E104A 15* 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 71BCDFORT object cards 22BIN
E105A S* TWO DIMENSIONAL BICUBIC SPLINE INTERPOLATION
E105A 10* ON DISK F4 COMPAT WU 12/15/67 DECK 1/03/67
E105A 11* Y = SPL2D2(XB, YB, NBRX, X, NBRY, Y, 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 SPECIFIED DERIVATIVE OF A TWO DIMENSIONAL FUNCTION. E104A MUST BE USED PRIOR TO USING THIS PROGRAM TO COMPUTE INTERPOLATION COEFFS.
E105A 16* TIMING - THE CALCULATION IS EQUIVALENT TO 5 CUBIC EVALUATIONS FOR EACH INTERPOLATION.
E105A 20* STORAGE - 345 WORDS.
E105A 21* USES SEARCH(E101A).

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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
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 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
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 B*SPLINE INTERPOLATION FUNCTION TO BE USED ONLY WITH E105A
E107A C*F4 SR6600 SCOPE
E107A D*SW 2 LS 1
E107A E*FORTRAN SOURCE CARDS 16BCD FORTRAN OBJECT CARDS 8BIN
E107A F*TWO-DIMENSIONAL*SPLINE*INTERPOLATION
E107A G*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).

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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 GRID
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.
LEAST SQUARES APPROXIMATION AND CURVE FITTING

REVIEWER: R. SW ARTZ, C-6

E203A  A* T. JORDAN  CDO  67
E203A  B*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(E161A) AND LSS(F464A).

E205A  A* T. JORDAN  CDO  B. FAGAN  67
E205A  B*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 03/08/66 REV. DECK 03/08/66 REV
E205A  11*ORTHOGONAL POLYNOMIAL LEAST SQUARES ROUTINE, PACKAGE BINARY
E205A  12*DECK NEEDS ID CARD IN FRONT, DATA CARDS IN BACK, FITS POLYNOM
E205A  13*IALS 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.
A* B L BUZBEE C-4
B. SWARTZ 67

**RATIONAL APPROXIMATION ROUTINE**

**F*SOURCE CARDS 17 BCD OBJECT CARDS 87 BIN**

**RATIONAL APPROXIMATION ROUTINE**

**G*CARDS F4 COMPAT WU 08/02/72 REV 3 DECK 11/14/68REV 2**


**PURPOSE: COMPUTE A RATIONAL APPROXIMATION, P(N)/Q(M), TO A TABULAR FUNCTION.**

**STORAGE: 2262 OCTAL WORDS.**

**ROUTINES CALLED: DRPOLY(C2AC), DCPOLY(C2AD), DDPOL(E(C212A), DCPOLE(C213A), DGLSS(F406A), AND LABRT(N103A).**

**ORTHOGONAL POLYNOMIAL LEAST SQUARES SUBROUTINE**

**MATHEMATICS E2 F4 SR6600 SCOPE**

**SOURCE CARDS 251 BCD OBJECT CARDS 77 BIN**

**ORTHOGONAL POLYNOMIAL LEAST SQUARES**

**CALL PFTS(M, KM, IOR, LP, IP, LOOK, MID, SIGMA, X, W, Y, DELY,**

**PFTS PRODUCES (WEIGHTED) LEAST SQUARES**

**POLYNOMIAL FITS, Y(X), OF DEGREE KM LE. 29, TO POINTS**

**OF ARGUMENTS IW THROUGH MID**

**CONTROL OPTIONS CONCERNING THE WEIGHTS, THE TYPE OF RESULTS**

**PRINTED AND EXAMINATION OF THE INTERMEDIATE FITS. SIGMA**

**AND Y THROUGH A ARE COMPUTED FOR EACH FIT TO DEGREE KM,**

**DIMENSION REQUIREMENTS, E.G. A(36, 30). STORAGE IS 2187 WDS.**

**PFTS USES SORT(B408A).**
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, ORRAY, 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).
NON-LINEAR OPTIMIZATION

REVIEWER: M. KLEIN, C-6

A* TOM DOYLE C-6 M. KLEIN 71
B* OPTIMIZE A CONTINUOUS N-PARAMETER SYSTEM
C* C=4 SR7600 CROS
D* SW 12 LS 0 TYPE 2
E* SOURCE TAPE NO. LE441L00
F** OPTIMIZE CONTINUOUS N-PARAMETER SYSTEM
G* TAPE F4 COMPAT WU 04/27/73REV.2 DECK 04/27/73REV.2
I* FORM: CALL OPTIMIZE(U+V)
E4AA 2* CALL PHIGRAD(V)
E4AA 3* PURPOSE: TO OPTIMIZE A CONTINUOUS N-PARAMETER SYSTEM
E4AA 4* BY EITHER MINIMIZING OR MAXIMIZING A SUM OF SQUARES
E4AA 5* ROUTINE NAME: OPTIMIZE
E4AA 6* ENTRY NAMES: OPTIMIZE, 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), ECWR/ECRD(SYSTEM)
E4AA 13* OTHER EXTERNALS:
E4AA 14* DOYLE1, DOYLE2, DOYLE3, DOYLE4, DOYLE5, DOYLE6,
E4AA 15* DOYLE7 (ALL COMMONS), PHIGRAD (ALSO A COMMON BLOCK)
VECTOR AND MATRIX OPERATIONS

REVIEWER: B. BUZBEE, C-4

F115A A* J. DURAN T-1 I. CHERRY 68
F115A B*VECTOR MAXIMUM, MINIMUM, MAXIMUM ABS., OR MINIMUM ABS.
F115A C* VECTORS F1 F4 SR6600 SCOPE
F115A D*SOURCE DECK 32BCD 9BIN
F115A E**VECTOR*MAXIMUM*MINIMUM
F115A F*ON DISK F4 COMPAT WU 06/03/68 REV DECK 04/16/68 REV
F115A G*CALL MAXV(X,IX,N,I,Y) OR MINV, MAXAV, MINAV
F115A H* DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F115A I* MINIMUM ABSOLUTE OF N NUMBER OF ELEMENTS OF A VECTOR X.
F115A J* IX IS THE SPACING AT WHICH THE X VALUES ARE TO BE EXAMINED.
F115A K* THE LENGTH OF VECTOR X MUST BE AT LEAST (N-1)*IX + 1.
F115A L* THE DESIRED ELEMENT IS STORED IN Y AND I.LE.1 AND
F115A M* I.LE.N IS THE ELEMENT NUMBER. 96 WORDS OF STORAGE.
F115A N*SELF-CONTAINED.

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 H* FORM: CALL MAXV(X,IX,N,I,Y) OR MINV, MAXAV, MINAV
F115B I* PURPOSE: DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F115B J* MINIMUM ABSOLUTE OF N NUMBER OF ELEMENTS OF A VECTOR X.
F115B K* IX IS THE SPACING AT WHICH THE X VALUES ARE TO BE
F115B L* EXAMINED. THE LENGTH OF VECTOR X MUST BE AT LEAST
F115B M* (N-1)*IX + 1. THE DESIRED ELEMENT IS STORED IN Y AND
F115B N* I.LE.1 AND I.LE.N IS THE ELEMENT NUMBER.
F115B O*ROUTINE NAME: MAXV
F115B P*ENTRY NAMES: MAXV, MINV, MAXAV, MINAV
F115B Q*STORAGE: 245 OCTAL WORDS
F115B R*ROUTINES CALLED: LIBMSG(SYSTEM).
F116A A* CHERRY T-1 R.* ANDERSON 68
F116A B*MATRICES F1 F4 SR6600 SCOPE
F116A C* F4 SW 1 LS 1
F116A D*F4 SOURCE DECK 35BCDBINARY 128BIN
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. I,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.

F116B A* I.CHERRY C-4 B.BUZBEE 72
F116B B*MATRICES F4 SR7600 CROS
F116B C*F4 SW 1 LS 2 TYPE 1
F116B D*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*FORMI 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).
A* PAUL HARPER T-1

B*MATRIX IDENTITY GENERATOR

C* Source cards 13 BCD Object cards 6 BIN

D* ON DISK F4 COMPAT WU 10/12/72 DECK 10/12/72

E* Purpose: Generates a standard n by n identity matrix in

F* A WHERE N IS THE ORDER OF A AND IA IS THE SPACING

G* BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION STATEMENT.

H* Useful for solving bx = i. The test program prints either

I* (GENID RESULTS ARE CORRECT) OR (GENID RESULTS ARE INCOR-

J* REC), STORAGE = 30 WORDS.

K* SELF CONTAINED.

B*MATRIX IDENTITY GENERATOR

C* Source cards 13 BCD Object cards 6 BIN

D* ON DISK F4 COMPAT WU 10/12/72 DECK 10/12/72

E* Purpose: Generates a standard n by n identity matrix in

F* A WHERE N IS THE ORDER OF A AND IA IS THE SPACING

G* BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION STATEMENT. USEFUL FOR SOLVING BX = I.

H* Routine name: GENID

I* Entry name: GENID

J* Storage: 52 OCTAL WORDS.

K* Routines called: LIBMSG(SYSTEM).
**F119A**

**A**  
*IVAN CHERRY*  
*T-1*  
* TOM JORDAN  67*

**F119A**

**0**  
* MATRIX TRANSPOSE IN PLACE  
**F119A**

**B**  
* MATRICES  
**F119A**

**F**  
* F1  
**F119A**

**F**  
* F4  
**F119A**

**F**  
* SR6600  
**F119A**

**S**  
* SCOPE  

**F119A**

**C**  
* SW 1  
**F119A**

**S**  
* LS 1  
**F119A**

**D**  
* F4  
**F119A**

**F**  
* SOURCE CARDS 15RCDF4  
**F119A**

**S**  
* OBJECT CARDS 5BIN  
**F119A**

**F**  
* ON DISK  
**F119A**

**F**  
* COMPAT  
**F119A**

**WU**  
* 01/23/67  
**F119A**

**OISK**  
* 01/23/67  

**F119A**

**F**  
* 10  
**F119A**

**C**  
* Called by: MATTRS (A;IA,N,M)  
**F119A**

**F**  
* PURPOSE: To transpose the matrix A, that is,  
**F119A**

**F**  
* A(N,M) is replaced by A(M,N).  
**F119A**

**F**  
* A is the origin of matrix A, IA is the spacing between  
**F119A**

**F**  
* columns of A, i.e., A(IA,J) as specified by the dimension  
**F119A**

**F**  
* statement, N is the number of rows, M is the number  
**F119A**

**F**  
* of columns, IA must be greater than or equal to  
**F119A**

**F**  
* the maximum of M and N, the dimensions of A must  
**F119A**

**F**  
* be at least as great as the maximum of MXM and MXN.  
**F119A**

**F**  
* Self contained storage requirement 46 words  

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**F119B**

**A**  
* IVAN CHERRY*  
*C-4*  
* B.BUZ8EE  72*

**F119B**

**B**  
* MATRIX TRANSPOSE IN PLACE  
**F119B**

**C**  
* F4  
**F119B**

**F**  
* SR7600  
**F119B**

**C**  
* CROS  
**F119B**

**D**  
* SW 1  
**F119B**

**S**  
* LS 1  
**F119B**

**E**  
* TYPE 1  
**F119B**

**F**  
* SOURCE CARDS 20  
**F119B**

**F**  
* BCD  
**F119B**

**F**  
* OBJECT CARDS 7  
**F119B**

**B**  
* BIN  
**F119B**

**F**  
* ON DISK  
**F119B**

**F**  
* COMPAT  
**F119B**

**WU**  
* 10/12/72  
**F119B**

**OISK**  
* 10/12/72  

**F119B**

**F**  
* FORM: CALL MATTRS(A;IA,N,M)  
**F119B**

**F**  
* PURPOSE: TRANSPOSE THE MATRIX A, THAT IS, A(N,M) IS  
**F119B**

**F**  
* REPLACED BY A(M,N).  
**F119B**

**F**  
* A IS THE ORIGIN OF MATRIX A.  
**F119B**

**F**  
* IA IS THE SPACING BETWEEN COLUMNS OF A, I.E., A(IA,J)  
**F119B**

**F**  
* AS SPECIFIED BY THE DIMENSION STATEMENT.  
**F119B**

**F**  
* N IS THE NUMBER OF ROWS.  
**F119B**

**F**  
* M IS THE NUMBER OF COLUMNS.  
**F119B**

**F**  
* IA MUST BE GREATER THAN OR EQUAL TO THE MAXIMUM  
**F119B**

**F**  
* OF M AND N, THE DIMENSIONS OF A MUST BE AT LEAST AS  
**F119B**

**F**  
* GREAT AS THE MAXIMUM OF MXM AND MXN.  
**F119B**

**F**  
* ROUTINE NAME: MATTRS  
**F119B**

**F**  
* ENTRY NAME: MATTRS  
**F119B**

**F**  
* STORAGE: 70 OCTAL WORDS.  
**F119B**

**F**  
* ROUTINES CALLED: LIBMSG(SYSTEM).  

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**VOLUME 2 - 9/73**
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  7BCDF4  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*IA 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

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).
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 7RCDF4 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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O*MATRIX MULTIPLY ROUTINE
F122A B*MATRICES F1 SCOPE
F122A C* SW 1 LS 1
F122A D*F4 SOURCE CARDS 7BCDF4 OBJECT CARDS 6BIN
F122A S**M4TRIX*MULTIPLY

10*ON DISK F4 COMPAT WU 10/18/68REV DECK 10/18/68REV
11* CALLED BY MATMPY (N*M*L,A,IA*B,IB,C+IC)
11* MULTIPLES NXM MATRIX A BY MXL MATRIX B
13* TO FORM NXL MATRIX C. IA, IB, IC ARE THE
14* COLUMN LENGTHS AS SPECIFIED IN DIMENSION STATEMENT,
15* I.E. DIMENSION A(IA,KA), B(IB,KB), C(IC,KC).
16* THE ELEMENTS OF THE PRODUCT ARE COMPUTED IN DOUBLE
17* PRECISION PRIOR TO STORING IN C.
18* USES DOTPRO (F124A). STORAGE REQUIREMENT 51 WORDS.

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**M4TRIX*TRANSPOSE*MULTIPLY
F123A G*DISK F4 COMPAT WU 04/03/73REV.1 DECK 04/03/73REV.1
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.

8*ROUTINE NAME: MTMPY
F123A 9*ENTRY NAME: MTMPY
F123A 10* STORAGE 64 OCTAL WORDS
F123A 11*ROUTINES CALLED: DOTPRO (F124A)
**F123B**

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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**

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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=DO TPRO (N,XIXYIY)
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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**VOLUME 2 - 9/73**
B. L. BUZBEE
C-4
R. M. FRANK

INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)

COMPASS SR7600 CROSS

SW 1  LS 3  TYPE 1

E*CMP SOURCE CARDS 107 BCD  OBJECT CARDS 5 BIN

VECTOR*PRODUCT

ON DISK  F4 COMPAT WU 10/02/72  DECK 10/02/72

1*FORM: Z=DOTPRO(N,X,IX,Y,IY)
2*PURPOSE: PRODUCES INNER PRODUCT OF TWO VECTORS WHERE X AND Y
3* ARE REAL VECTORS EACH CONTAINING N ELEMENTS. IX AND IY
4* ARE THE SPACINGS BETWEEN ELEMENTS OF X AND Y RESPECTIVELY.
5* THE RESULT IS THE INNER PRODUCT (X,Y) OF THE VECTORS
6* X AND Y, I.E., THE SUM OF X(I)*Y(I) FROM I = 1 TO N.
7* THE RESULT IS ZERO IF N = 0, INFINITE IF N<0.
8* RESULT IS DOUBLE PRECISION BUT MAY BE USED AS SINGLE
9* DEPENDING ON CALLING PROGRAM DEFINITION OF DOTPRO.

ROUTINE NAME: DOTPRO
ENTRY NAME: DOTPRO
STORAGE: 26 OCTAL WORDS.
SELF CONTAINED.

PAUL HARPER

CORRECTION OF AN APPROXIMATE INVERSE MATRIX

MATRIX THEORY F1 F4
6600 SCOPE
SW 2  LS 1

SOURCE CARDS 48BCOREL BIN
16BIN

ON DISK  F4 COMPAT WU 08/18/67  DECK 08/18/67
CALL CORINV(A,IA,N,IA,D) CORRECTS AN APPROXIMATE INVERSE
MATRICES B OF THE MATRIX A. A IS THE NAME OF THE MATRIX FOR
WHICH B IS THE APPROXIMATE INVERSE. N IS THE NUMBER OF ROWS
IN A, IA IS THE FIRST DIMENSION OF A(IN*N) AND B(IN*N) AS
SPECIFIED IN THE DIMENSION STATEMENT OF CALLING PROGRAM, AND
D IS THE NAME OF N(N+1) WORDS OF SINGLE DIMENSIONED TEMPORARY
STORAGE.
USES LA6RT(N103A). STORAGE 189 WORDS
MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION

C*F4 SR6600 SCP 3,1

D* SW 3 LS 2 TYPE 1,1

E*F4 SOURCE CARDS 70 BCD OBJECT CARDS 19 BIN

F*MODIFIED*GRAM-SCHMIDT*ORTHOGONALIZATION

G*ON DISK F4 COMPAT WU 03/22/73 REV 3 DECK 03/22/73 REV 2

1*FORM: CALL MGS(M, N, A, IA, NR)

2*PURPOSE: ORTHOGONALIZES THE COLUMNS OF THE M BY N MATRIX

3* STORED IN ARRAY A, THE COLUMN LENGTH OF A IS IA, AND

4* THE RANK OF THE MATRIX IS RETURNED IN NR.

5*ROUTINE NAME: MGS

6*ENTRY NAME: MGS

7*STORAGE: 333 OCTAL WORDS

8*ROUTINES CALLED: SQRT(B468A), DOTPRO(F124A).
**F132A**

A^* B. L. BUZBEE C-4 B L BUZBEE 67

**B*MATRIX INVERSE**

**C**

SR660 SCP 3.1

**D**

SW 2 LS 3 TYPE 1.1

**E**

SOURCE CARDS 99 BCD OBJECT CARDS 35 BIN

**F**

MATRIX INVERSE

G**ON DISK F**4 COMPAT WU 04/06/73 REV 5 DECK 04/06/73 REV 4

**I**

FORM: CALL MATINV(A, IA, N, R, DET)

**2**

PURPOSE: FIND THE INVERSE OF A MATRIX A.

**3**

TIMING: 87 MILLISECONDS FOR N = 20.

**4**

ROUTINE NAME: MATINV

**5**

ENTRY NAME: MATINV

**6**

STORAGE: 655 (OCTAL) WORDS.

**7**

ROUTINES CALLED: LABRT (N103A), DOTPRO (F124A).

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**F132B**

A^* B. L. BUZBEE C-4 B L BUZBEE 73

**B*MATRIX INVERSE**

**C**

SR760 CROS

**D**

SW 2 LS 3 TYPE 1.1

**E**

SOURCE CARDS 99 BCD OBJECT CARDS 35 BIN

**F**

MATRIX INVERSE

G**ON DISK F**4 COMPAT WU 04/06/73 DECK 04/06/73

**I**

FORM: CALL MATINV(A, IA, N, R, DET)

**2**

PURPOSE: FIND THE INVERSE OF A MATRIX A.

**3**

TIMING: 14 MILLISECONDS FOR N = 20.

**4**

ROUTINE NAME: MATINV

**5**

ENTRY NAME: MATINV

**6**

STORAGE: 665 (OCTAL) WORDS.

**7**

ROUTINES CALLED: LABRT (N163B), DOTPRO (F124B).

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**F133A**

A^* B L BUZBEE C-4 B L BUZBEE 69

**B*VECTOR ADDITION**

**C**

COMPASS SR660 SCP 3.1

**D**

SW 3 LS 3 TYPE 1.1

**E**

SOURCE 91 CARDS OBJECT 6 CARDS

**F**

VECTOR ADDITION*SUM*PRODUCT

**G**

DISK F**4 COMPAT WU 05/01/73 REV.3 DECK 05/01/73 REV.3

**I**

FORM: CALL ADDVEC (A, N, X, Y, Z, N, Z)

**2**

CALL VECSUM (Y, X, A, Z, N)

**3**

CALL VECADD (B, X, A, Z, N)

**4**

PURPOSE: COMPUTE Z = A*X + Y WHERE A IS SCALAR AND X, Y, AND Z ARE N-DIMENSIONAL VECTORS.

**5**

ROUTINE NAME: ADDVEC

**6**

ENTRY NAMES: ADDVEC, VECSUM, VECADD

**7**

STORAGE: 44 OCTAL WORDS

**8**

ROUTINES CALLED: SELF CONTAINED

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**F133B**

A* B L BUZBEE C=4 B.L.BUZBEE 73

B*VECTOR ADDITION

C*COMPASS SR760 CROS

D* SW 3 LS 3 TYPE 1.1

E* SOURCE 91 CARDS OBJECT 6 CARDS

F**VECTOR ADDITION SUM PRODUCT

G*DISK F4 COMPAT WU 05/01/73 DECK 05/01/73

F*FORM: CALL ADDVEC (N,A,X,NX,Y, NY, Z,NZ)

2* CALL VECSUM (Y,X,A,Z,N)

3* CALL VECPROD (B,X,A,Z,N)

4* PURPOSE: COMPUTE Z = A*X + Y WHERE A IS SCALAR AND

5* X, Y, AND Z ARE N-DIMENSIONAL VECTORS.

6* TIMEING: ON CDC 7600, AS N INCREASES AVERAGE TIME/ELEMENT

7* GOES FROM 3.8 TO 0.4 MILLISEC.

8* ROUTINE NAME: ADDVEC

9* ENTRY NAMES: ADDVEC, VECSUM, VECPROD

10* STORAGE: 44 OCTAL WORDS

11* ROUTINES CALLED: SELF CONTAINED

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**F134A**

A* B L BUZBEE C=4

B* ECS MATRIX MULTIPLY

C* SR60 SCP 3.1

D* SW 3 LS 2 TYPE 1

E* SOURCE CARDS 40 BCD OBJECT CARDS 13 BIN

F**MATRIX MULTIPLY ECS

G* CARDS F4 COMPAT WU 09/08/71REV1 DECK 09/08/71REV1

F*FORM: CALL ECMATPY (NN, MM, LL, KA, LA, MA, KB, LB, MB, KC, LC, MC, T)

2* PURPOSE: TO FORM THE PRODUCT IN ECS OF TWO MATRICES STORED

3* IN ECS,

4* ROUTINE NAME: ECMATPY

5* ENTRY NAME: ECMATPY

6* STORAGE: 222 (OCTAL) WORDS

7* TIMING: 4.34 SEC. FOR NN=MM=LL=100.

8* ROUTINES CALLED: DOTPRO (F124A), ECR (K203A), ECW (K204A).
B. L. BUZBEE C-4

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 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 B*ECS MATRIX TRANSPOSE MULTIPLY
F135A C*F4    SR600 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 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).

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 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).

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F136A \( A^* \quad B \quad L \quad B U Z B E E \quad C-4 \)

F136A \( B^* \) INNER PRODUCT OF TWO COMPLEX VECTORS

F136A \( C^* \quad F4 \quad S R 6 6 0 0 \quad S C P \ 3.1 \)

F136A \( D^* \quad S W \ 1 \quad L S \ 1 \quad T Y P E \ 1 \)

F136A \( E^* \) SOURCE CARDS 14 BCD OBJECT CARDS 9 BIN

F136A \( F^* \) INNER PRODUCT VECTOR

F136A \( G^* \) CARDS F4 COMPAT W4 04/26/73 REV 1 DECK 11/11/70

F136A 1*USE: \( Z=\text{COTPRO}(N;X,I X;Y,I Y) \)

F136A 2* \( Z=\text{CDOTPRO}(N;X,I X;Y,I Y) \)

F136A 3* PURPOSE: \( Z=\text{COTPRO}(N;X,I X;Y,I Y) \) Computes the

F136A 4* COMPLEX SUM \( Z=X(1)*Y(1)+X(1*I X)*Y(1*I Y)+\ldots \)

F136A 5* \( Z=X(1+(N-I)*I X)*Y(1+(N-I)*I Y) \) WHERE \( X \) AND \( Y \) ARE

F136A 6* COMPLEX VECTORS OF LENGTH \( N \).

F136A 7* \( Z=\text{CDOTPRO}(N;X,I X;Y,I Y) \) IS THE SAME AS COTPRO

F136A 8* EXCEPT ALL \( X(I) \)'S ARE CONJUGATED.

F136A 9* TIMING: \( N=100, \ 0.0015 \ \text{SEC.} \)

F136A 10* STORAGE: 133 (OCTAL WORDS).

F136A 11* ROUTINE NAME: COTPRO

F136A 12* ENTRY NAMES: COTPRO, CDOTPRO

F136A 13* ROUTINES CALLED: F124A(DOTPRO).

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F136B \( A^* \quad B \quad L \quad B U Z B E E \quad C-4 \quad B \quad L \quad B U Z B E E \quad 73 \)

F136B \( B^* \) INNER PRODUCT OF TWO COMPLEX VECTORS

F136B \( C^* \quad F4 \quad S R 7 6 0 0 \quad C R O \)

F136B \( D^* \quad S W \ 1 \quad L S \ 1 \quad T Y P E \ 1 \)

F136B \( E^* \) SOURCE CARDS 14 BCD OBJECT CARDS 10 BIN

F136B \( F^* \) INNER PRODUCT VECTOR

F136B \( G^* \) ON DISK F4 COMPAT W4 04/26/73 REV 1 DECK 03/02/73

F136B 1* FORM: \( Z=\text{COTPRO}(N;X,I X;Y,I Y) \)

F136B 2* \( Z=\text{CDOTPRO}(N;X,I X;Y,I Y) \)

F136B 3* PURPOSE: \( Z=\text{COTPRO}(N;X,I X;Y,I Y) \) Computes the complex sum,

F136B 4* \( Z=X(1)*Y(1)+X(1*I X)*Y(1*I Y)+\ldots \)

F136B 5* WHERE \( X \) AND \( Y \) ARE COMPLEX VECTORS OF LENGTH \( N \).

F136B 6* \( Z=\text{CDOTPRO}(N;X,I X;Y,I Y) \) 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).

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F137A  A*   B L BUZBEE       C-4
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
F137B  B*COMPLEX MATRIX INVERSION
F137B  C*F4   SR7600    CROS
F137B  D*       SW 1   LS 3   TYPE 1.1
F137B  E*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 IDENTICAL 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  RCD  OBJECT CARDS  4  BIN
F138A  F**SUMVEC*VECTOR ELEMENTS
F138A  G*CARDS  F4  COMPAT  WU  05/10/72  DECK  05/10/72
F138A  H*FORM#  SUM = SUMVEC(N, X, INCX)
F138A  I*WHEN#  N = NUMBER OF ELEMENTS TO BE SUMMED
F138A  J*INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138A  K*PURPOSE: PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138A  L* N ELEMENTS FASTER THAN THE EQUIVALENT FORTRAN CODE.
F138A  M*  SUM = 0.0
F138A  N* LENX = N*INCX
F138A  O* DO 1  I = 1,LENX,INCX
F138A  P*  1  SUM = SUM+X(I)
F138A  Q* SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138A  R* IF N IS LESS THAN 0.
F138A  S*STORAGE:  25 (OCTAL) WORDS
F138A  T*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*COMP SOURCE CARDS  83  RCD  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  H*FORM#  SUM = SUMVEC(N, X, INCX)
F138B  I*WHEN#  N = NUMBER OF ELEMENTS TO BE SUMMED
F138B  J*INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138B  K*PURPOSE: PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138B  L* N ELEMENTS FASTER THAN THE FORTRAN EQUIVALENT CODE.
F138B  M*  SUM = 0.0
F138B  N* LENX = N*INCX
F138B  O* DO 1  I = 1,LENX,INCX
F138B  P*  1  SUM = SUM+X(I)
F138B  Q* SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138B  R* IF N IS LESS THAN 0.
F138B  S*Routine NAME: SUMVEC
F138B  T*ENTRY NAME: SUMVEC
F138B  U*TIMING ON 7600 MACHİNE:
F138B  V* N = 10  N*0.72 MİCROSEC: EQUIVALENT TO FORTRAN
F138B  W* N = 100  N*2.1  MİCROSEC: 2.5 TIMES FASTER THAN FORTRAN
F138B  X* N = 1000  N*15  MİCROSEC: 3.5 TIMES FASTER THAN FORTRAN
F138B  Y*STORAGE:  50 OCTAL WORDS.
F138B  Z*Routines CALLED: LIBMSG(SYSTEM).
A* GENERATE NONSYMMETRIC MATRIX
C* SR6600 SCP 3.1
D* SW 3 LS 1 TYPE 2
E* SOURCE CARDS 23 BCD OBJECT CARDS 9 BIN
F* GENERATE NONSYMMETRIC MATRIX
G* CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
H* FORM CALL GNSM(N,M,A)
I* PURPOSE: GENERATE A REAL NONSYPMMETRIC MATRIX WITH KNOWN REAL AND/OR COMPLEX EIGENVALUES.
J* ROUTINE NAME: GNSM
K* ENTRY NAME: GNSM
L* STORAGE: 82 OCTAL WORDS.
M* SELF CONTAINED.

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

A* GENERATE HERMITIAN MATRIX
B* SR6600 SCP 3.1
C* SW 2 LS 1 TYPE 2
D* SOURCE CARDS 25 BCD OBJECT CARDS 14 BIN
E* GENERATE HERMITIAN MATRIX
F* CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
G* FORM CALL GHM(N,M,A,B)
H* PURPOSE: GENERATE A HERMITIAN MATRIX WITH KNOWN EIGENVALUES.
I* ROUTINE NAME: GHM
J* ENTRY NAME: GHM
K* STORAGE: 173 OCTAL WORDS.
L* SELF CONTAINED.
F1AD  A*  BRENDA GODFREY  T-6  B BUBBEE  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  $3/23/73
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*  REWIN(W301B), SETQ(Q414B), MEMORY(Q305B),
F1AD  12*  SKIPR(W304B), BOI(W201R), OPEN(W115B).

VOLUME 2 - 9/73
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 19BCDF4 OBJECT CARDS 10BIN
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 F207A,LABRT(N103A),AND DSQRT(B410A).

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 28BCDF4 OBJECT CARDS 14BIN
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.

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A* B L. BUZBEE T-1

GENERAL REAL MATRIX EIGENVALUE ROUTINE

B* MATH F2

F4 SR6600 SCOPE

C* SW 1 LS 6

D* SOURCE CARDS 349BCDF4 OBJECT CARDS 147BIN

S* GENERAL REAL MATRIX EIGENVALUE ROUTINE

ON DISK F4 COMPAT WU 04/27/67 DECK 04/27/67

CALLED BY F208A AND F214A. THIS ROUTINE SHOULD ONLY BE USED

IN CONJUNCTION WITH THOSE ROUTINES.

STORAGE=1981 WORDS.

USES=DSQRT(B410A).

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

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

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

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

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

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

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

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

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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.

F211A A* B L BUZBEE C-4 G. WILLBANKS 67
F211A B*EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX
F211A C*F4 MV SR6600 SCP 3.1
F211A D* SW 3 LS 7 TYPE 1
F211A E*F4 SOURCE CARDS 367 BCD OBJECT CARDS 89 BIN
F211A F**EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX
F211A G*CARDS F4 COMPAT WU 04/01/70REV 2 DECK 04/01/70REV 2
F211A 1*CALL MATVEC(N,IVEC,A,E,V,IM,AL,TRAC,SUM,DET,PROD,IE) FINDS
F211A 2*THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX.
F211A 3*TIMING .57 SEC, FOR N=10, STORAGE 2203(OCTAL) WORDS.
F211A 4*USES SQRT(B408A).

F222A A* B, L. BUZBEE C-4 69
F222A B*EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX
F222A C*F4 MV SR6600 SCP 3.1
F222A D* SW 3 LS 3 TYPE 1
F222A E*SOURCE CARDS 123 BCD OBJECT CARDS 32 BIN
F222A F**EIGENVALUES MATRIX SYMMETRIC SMEVAL STEVAL
F222A G*ON DISK F4 COMPAT WU 08/02/71REV 3 DECK 08/02/71REV 2
F222A 1*FORMI 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 SMHTR(F223A), DOTPRO(F124A), SQRT(B408A),
F222A 10* LABRT(N103A).
A* 8. L. BUZBEE C-4
F222B B*EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX
F222B C*F4 SR7600 CROS
F222B D* SW 1 LS 4 TYPE 1
F222B E*SOURCE CARDS 130 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*FORM1 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).

A* 8. L. BUZBEE C-4
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*FORM1 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(F124B), LABRT(N103A), SQRT(B408A).

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TRIDIAGONAL SYMMETRIC MATRIX

See SMHHTR(F223A) for further details.

Routine Name: SMHHTR

Entry Names: SMHHTR, STHHTR

Storage: 565 (octal) words

Timing: Time for N = 40 is .1 sec.

Routines Called: DOTPRO(F124A), LABRT(N103B), SQRT(B408B).

EIGENVALUE-EIGENVECTOR ROUTINE FOR REAL SYMMETRIC MATRIX

Routine Name: SMEVEV, STEVEV, S3DVEV

Storage: 757 octal words

Routines Called: SMHHTR(F223A), PRODH(F225A), DOTPRO(F124A), SQRT(B408B), LABRT(N103A).
F224B A* B. L. BUZBEE C-4
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*FORM1 CALL SMEVEV(NN,TR,VS,SEPKL,KE,M)
F224B 2* CALL STEVEV(NN,BR,VS,SRKL,KE,M)
F224B 3* CALL S3DVEV(NN,BR,VS,SRKL,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(F223A), PRODH(F225B), DOTPRO(F124A),
F224B 12* SQRT(B408B), LABRT(N103B).

F225A A* B. L. BUZBEE C-4
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**PRODH*TRANSFORM*TRIDIAGONAL*SYMMETRIC*MATRIX
F225A G*CARDS F4 COMPAT WU 09/20/71 REV. 1 DECK 09/20/71 REV. 1
F225A 1*FORM1 CALL PRODH(IN,AT,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: PRODH
F225A 5* ENTRY NAME: PRODH
F225A 6* STORAGE: 303 OCTAL WORDS
F225A 7* ROUTINES CALLED: DOTPRO(F124A), LABRT(N103A).
A* B, L, BUZBEE C-4

B*COMPUTE TRANSFORM WHICH TRIDIAGONALIZES A SYMMETRIC MATRIX

C*F4 SR7600 CROS

D* SW 1 LS 2 TYPE 1

E*F4 SOURCE CARDS 41 BCD OBJECT CARDS 17 BIN

F**PRODHH*TRANSFORM*TRIDIAGONAL*SYMMETRIC*MATRIX

G*ON DISK F4 COMPAT WU 05/12/72 DECK 05/12/72

1*FORM: CALL PRODHH(IN*A*T*KE*V*IV)

2*PURPOSE: COMPUTES THE SIMILARITY TRANSFORMATION USED BY

3* SMHHTR(F223B) TO TRIDIAGONALIZE A SYMMETRIC MATRIX.

4*FOR MORE DETAILS SEE PRODHH(F225A) WRITEUP

5*ROUTINE NAME: PRODHH

6*ENTRY NAME: PRODHH

7*STORAGE: 306 OCTAL WORDS

8*ROUTINES CALLED: DOTPRO(F124B), LABRT(N103B).

A* B L BUZBEE C-4

B*EIGENVALUE ROUTINE-COMPLEX HERMITIAN MATRIX

C*F4 SR6600 SCP 3.1

D* SW 1 LS 4 TYPE 1,1

E*F4 SOURCE CARDS 150 BCD OBJECT CARDS 39 BIN

F*EIGENVALUE*MATRIX*HERMITIAN

G*CARDS F4 COMPAT WU 09/16/71 DECK 09/16/71

1*FORM: CALL HMEVAL(NN,T,R,A,EPL,KE,M),

2* CALL HTEVAL(NN,B,R,A,EPL,KE)

3* CALL H3DVAL(NN,T,R,A,EPL,KE,M)

4*PURPOSE: COMPUTE EIGENVALUES OF A COMPLEX HERMITIAN

5* MATRIX, ARGUMENTS ARE IDENTICAL TO SMEVAL(F222A)

6* EXCEPT T, B, R, AND A MUST BE COMPLEX.

7*ROUTINE NAME: HMEVAL

8*ENTRY NAMES: HMEVAL, HTEVAL, H3DVAL

9*STORAGE: 1002 OCTAL WORDS

10*ROUTINES CALLED: HMHHTR(F227A), SQRT(B408A), CABS(A203A)
B. L. Buzbee  

**EIGENVALUE ROUTINE - COMPLEX HERMITIAN MATRIX**

- **EIGENVALUE ROUTINE - COMPLEX HERMITIAN MATRIX**
  - **ENTRY NAMES**: HMEVAL, HTEVAL, H3DVAL
  - **ROUTINE NAME**: HMEVAL
  - **ENTRY NAMES**: HMEVAL, HTEVAL, H3DVAL
  - **STORAGE**: 1040 OCTAL WORDS
  - **ROUTINES CALLED**: MMHTR(F227B), SQRT, CABS (ON THE SYSTEM)

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**TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX**

- **ENTRY NAMES**: MMHTR, HTHHTR
  - **ROUTINE NAME**: HMHTR
  - **ENTRY NAMES**: HMHTR, HTHHTR
  - **STORAGE**: 732 OCTAL WORDS
  - **ROUTINES CALLED**: COTPRO (F136A), LABRT (N103A)
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*FORM1 CALL HMMHTR(IN,A,T,KE,IA)
F227B 2* CALL HTMMHTR(IN,B,T,KE)
F227B 3*PURPOSE: TRANSFORM A COMPLEX HERMITIAN MATRIX INTO A
F227B 4* TRIDIAGONAL MATRIX. ARGUMENTS ARE IDENTICAL TO
F227B 5* SMHHMTR/STHMTR(F227B) EXCEPT A,B, AND T MUST BE
F227B 6* COMPLEX.
F227B 7*ROUTINE NAME: HMMHTR
F227B 8*ENTRY NAMES: HMMHTR, HTMMHTR
F227B 9*STORAGE: 751 OCTAL WORDS
F227B 10*ROUTINES CALLED: COTPRO(F136B), LABRT(ON THE SYSTEM).

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 2* CALL HTEVEV(NN,T,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: HMMHTR(F227A), PROHHH(F229A), COTPRO(F136A),
F228A 15* DOTPRO(F124A), CABS(A203A), SQRT(B408A).

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F228B  A*  B L BUZBEE  C-4
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  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: HMMHTR(F227A), PROHHH(F229B), COTPRO(F136A),
F228B  15*  DOTPRO(F124A), CABS(A203B), SQRT(B408B).

F228B  A*  B L BUZBEE  C-4
F228B  B*COMPUTE TRANSFORM TO TRIDIAGONALIZE HERMITIAN MATRIX
F228B  C*F4  SR6600  SCP 3.1
F228B  D*  SW 1  LS 2  TYPE 1
F228B  E*F4 SOURCE CARDS  49  BCD  OBJECT CARDS  20  BIN
F228B  F*TRANSFORM*TRIDIAGONAL*HERMITIAN*MATRIX
F228B  G*CARDS  F4  COMPAT  WU 07/13/72REV.1  DECK 09/16/71
F228B  1*FORM: CALL PROHHH(IN,A,T,KE,V,IV)
F228B  2*PURPOSE: COMPUTE THE SIMILARITY TRANSFORMATION USED BY
F228B  3*  HMMHTR(F227A) AND HTMMHTR(F227A) TO TRIDIAGONALIZE A
F228B  4*  HERMITIAN MATRIX, THE ARGUMENTS ARE IDENTICAL TO
F228B  5*  THOSE OF PRODHH(F225A) EXCEPT THAT A,T, AND V
F228B  6*  MUST BE COMPLEX. SEE PRODHH(F225A) WRITEUP FOR DETAILS.
F228B  7*ROUTINE NAME: PROHHH
F228B  8*ENTRY NAME: PROHHH
F228B  9*STORAGE: 354 OCTAL WORDS.
F228B  10*ROUTINES CALLED: COTPRO(F136A), LABRT(N103A)
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*FORM1. CALL PROHHH(IN,A,T,KE,V,IV)
F229B 2*PURPOSE: COMPUTE THE SIMILARITY TRANSFORMATION USED BY
F229B 3* HMMHTR(F227A) AND HTHHTR(F227A) TO TRIDIAGONALIZE A
F229B 4* HERMITIAN MATRIX. THE ARGUMENTS ARE IDENTICAL TO
F229B 5* THOSE OF PRODHN(F225A) EXCEPT THAT A,T, AND V
F229B 6* MUST BE COMPLEX. SEE PRODHN(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)

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 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).

F2AA A*  B. L. BUZBEE  C-4  70
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*FORM1. CALL RSEVAL(NsM,AsE,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).

VOLUME 2 = 9/73
A* B. L. BUZBEE C-4
B*SYMMETRIC MATRIX EIGENVALUE EIGENVECTOR ROUTINE
C*F4 SR6600 SCP 3.1
D* SW 3 LS 1 TYPE 2
E*F4 SOURCE CARDS 15 BCD OBJECT CARDS 7 BIN
F**REAL*SYMMETRIC MATRIX*EIGENVALUE*EIGENVECTOR ROUTINE
G*CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
1*FORM: CALL RSEEV(N,M,A,E,V,T,K)
2*PURPOSE: COMPUTE THE SINGLE PRECISION EIGENVALUES AND
3* EIGENVECTORS OF A REAL SYMMETRIC MATRIX.
4*ROUTINE NAME: RSEEV
5*ENTRY NAME: RSEEV
6*TIMING: N=20* 5 SEC.
7*STORAGE: 49 OCTAL WORDS.
8*USES: TRSEVV(F2AH).

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

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

VOLUME 2 - 9/73
F2AE  A*  B, L. BUZBEE C-4
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*FORM1 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=30; 2 SEC.
F2AE  7*STORAGE: 106 OCTAL WORDS.
F2AE  8*USES: F209A AND LABRT(N103A).

F2AF  A*  B, L. BUZBEE C-4
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*FORM1 CALL DRSVAL(N,M,DA,DE,T)M)
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
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*FORM1 CALL TREVAL(N+TR+VE,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).

VOLUME 2 - 9/73
F2AH A* B. L. BUZBEE C=4
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*FORM1 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: DSGRT(B41OA) AND LABRT(N103A).

F2AJ A* B. L. BUZBEE C=4
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*FORM1 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.

VOLUME 2 - 9/73
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).

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).

VOLUME 2 - 9/73
SIMULTANEOUS LINEAR EQUATIONS AND LINEAR LEAST SQUARES

REVIEWER: B. BUZBEE, C-4

A* B L BUZBEE C-4 R M FRANK 68
F4 LINEAR SYSTEM SOLVER
F4 C*F4 SR6600 SCP 3.1
F4 D* SW 3 LS 2 TYPE 1
F4 E*F4 SOURCE CARDS 76 BCD OBJECT CARDS 28 BIN
F4 F**MATRIX EQUATION SOLVER DETERMINANT EVALUATION
F4 G*ON DISK F4 COMPAT WU 07/13/73REV. 3 DECK 06/14/71REV 2
F4 H*FORMI CALL LSS(N,M,I,A,B,D,DET)
F4 I*PURPOSE: TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
F4 J*ROUTINE NAME: LSS
F4 K*ENTRY NAME: LSS
F4 L*STORAGE: 522 (OCTAL) WORDS.
F4 M*TIMING: .025 SEC. FOR N=M=10.
F4 N*ROUTINES CALLED: DOTPRO(F124A), LABRT(N103A).

A* B L BUZBEE C-4 R M FRANK 72
F4 LINEAR SYSTEM SOLVER
F4 C*F4 SR7600 CROS
F4 D* SW 3 LS 3 TYPE 1
F4 E*F4 SOURCE CARDS 81 BCD OBJECT CARDS 29 BIN
F4 F**MATRIX EQUATION SOLVER DETERMINANT EVALUATION
F4 G*ON DISK F4 COMPAT WU 07/13/73REV. 1 DECK 03/17/72
F4 H*FORMI CALL LSS(N,M,I,A,B,D,DET)
F4 I*PURPOSE: TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
F4 J*ROUTINE NAME: LSS
F4 K*ENTRY NAME: LSS
F4 L*STORAGE: 534 OCTAL WORDS.
F4 M*ROUTINES CALLED: DOTPRO(F124B), LABRT(N103B), LIBMSG(SYSTEM)

VOLUME 2 - 9/73
**FILE 405A**

**A** B L BUZBEE C-4 R M FRANK 67

**FILE 405A**

B GENERAL LINEAR SYSTEM SOLVER

**FILE 405A**

C F4 SR6600 SCP 3,1

**FILE 405A**

D SW 5 LS 2

**FILE 405A**

E SOURCE CARDS 66 BCD OBJECT DECK 31 BIN

**FILE 405A**

F GENERAL LINEAR SYSTEM SOLVER

**FILE 405A**

G ON DISK F4 COMPAT WU 02/07/69 REV 5 DECK 11/12/68 REV 1

**FILE 405A**

1 CALL GLSS(M,N,K,L,NR,AA,IA,YA,Y,BA,BA,IB,XA,I) SOLVES THE

**FILE 405A**

2 LINEAR SYSTEM AX=Y WHERE A IS AN M BY N MATRIX, M GREATER

**FILE 405A**

3 THAN, EQUAL TO, OR LESS THAN N, AND WHERE A MAY BE SINGULAR

**FILE 405A**

4 OR NONSINGULAR IF M=N.

**FILE 405A**

5 TIMING, M=10, N=8, 2 SEC.

**FILE 405A**

6 STORAGE=602 OCTAL WORDS

**FILE 405A**

7 USES! LABRT(N103A) DOTPRO(F124A) VECSUM(F133A)

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**FILE 405B**

A A SOLEM, B BUZBEE C-4 R M FRANK 72

**FILE 405B**

B GENERAL LINEAR SYSTEM SOLVER

**FILE 405B**

C F4 SR7600 CROS

**FILE 405B**

D SW 1 LS 3 TYPE 1

**FILE 405B**

E SOURCE CARDS 65 BCD OBJECT CARDS 33 BIN

**FILE 405B**

F GENERAL LINEAR SYSTEM SOLVER

**FILE 405B**

G ON DISK F4 COMPAT WU 03/17/72 DECK 03/17/72

**FILE 405B**

1 FORMI CALL GLSS(M,N,K,L,NR,AA,IA,YA,Y,BA,BA,IB,XA,I)

**FILE 405B**

2 PURPOSE: SOLVE THE LINEAR SYSTEM AX=Y WHERE A IS AN M BY N

**FILE 405B**

3 MATRIX, M GREATER THAN, EQUAL TO, OR LESS THAN N, AND

**FILE 405B**

4 WHERE A MAY BE SINGULAR OR NONSINGULAR IF M=N. SEE

**FILE 405B**

5 WRITEUP FOR GLSS (F405A) FOR FURTHER DETAILS.

**FILE 405B**

6 ROUTINE NAME! GLSS

**FILE 405B**

7 ENTRY NAME! GLSS

**FILE 405B**

8 STORAGE! 617 (OCTAL) WORDS

**FILE 405B**

9 ROUTINES USED: LABRT(N103B), DOTPRO(F124B), VECSUM(F133B),

**FILE 405B**

10 LIBMSG(SYSTEM)

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**FILE 406A**

A B L BUZBEE C-4 67

**FILE 406A**

DOUBLE PRECISION GENERAL LINEAR SYSTEM SOLVER

**FILE 406A**

B MATHEMATICS F4 SR6600 SCP 3,1

**FILE 406A**

C SW 1 LS 2

**FILE 406A**

D F4 SOURCE CARDS 95BCDF4 OBJECT CARDS 46BIN

**FILE 406A**

S DOUBLE PRECISION GENERAL LINEAR SYSTEM SOLVER

**FILE 406A**

10 CARDS F4 COMPAT WU 11/18/68 REV 6 DECK 11/18/68 REV 2

**FILE 406A**

11 CALL DGLSS(M,N,K,L,NR,AA,IA,YA,Y,BA,BA,IB,XA,I) IS THE DOUBLE

**FILE 406A**

12 PRECISION VERSION OF F405A. USAGE IS IDENTICAL TO F405A

**FILE 406A**

13 EXCEPTION THAT ALL FLOATING POINT ARGUMENTS MUST BE DOUBLE

**FILE 406A**

14 PRECISION.

**FILE 406A**

15 STORAGE=570 WORDS

**FILE 406A**

16 USES LABRT(N103A) AND DSQRT(B410A).

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**VOLUME 2 - 9/73**
I

FRANK F

LINEAR SYMMETRIC SYSTEM SOLVER

B=MATH P

LINEAR SYMMETRIC SYSTEM SOLVER

C*

c+ IVAN CHERRY 67

SOURCE CARDS 119BCDF OBJECT CARDS 31BIN

SOLVER

SR6600 SCOPE

SOURCE CARDS 63BCDF OBJECT CARDS 30BIN

COMPLEX LINEAR SYSTEM SOLVER

MATRIX THEORY

COMPLEX EQUATION SOLVER

ON DISK COMPAT WU 11/29/67 REV DECK 11/29/67 REV

PURPOSE - TO SOLVE THE MATRIX EQUATION AX=XB, WHERE A AND B

HAVE COMPLEX ELEMENTS.

CALL CLSS(N,M,A,IA,B,IB) N - ORDER OF THE SYSTEM M - NUMBER OF COLUMNS IN B

A - ORIGIN OF NXN MATRIX A B - ORIGIN OF NXM MATRIX B

IA - FIRST DIMENSION OF A AS SPECIFIED IN CALLING PROGRAM.

IB - FIRST DIMENSION OF R AS SPECIFIED IN CALLING PROGRAM.

STORAGE= 362(DECIMAL) WORDS.

USES LABRT(N103A).
**F408B**

A* IVAN CHERRY C-4 B.L.BUZBEE 72

**F408B**

B*COMPLEX LINEAR SYSTEM SOLVER

**F408B**

C*SR7600 CROS

**F408B**

D* SW 3 LS 2 TYPE 1

**F408B**

E*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*FORMI 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*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*USEI 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).
**LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION (LU)**

- **Authors:** B.L. Buzbee, C.-4
- **Language:** English
- **Purpose:** Solves a linear system of algebraic equations, where the matrix has band structure and only the band is stored.

- **Input Parameters:**
  - N (Number of equations)
  - L1, L2 (Lower and upper bandwidths)
  - NT (Number of band matrices)

- **Output:**
  - Solution vector (y)

- **Storage:** 666 (octal) words

- **Routines Called:** DOPRO(F124A), ADDVEC(F133A)

**Related Routines:**
- **BANMAT:** Band matrix factorization and linear system solver
- **LSSIT:** Iterative solution of linear systems

**Specifications:**
- **Volume:** 2
- **Date:** 9/73
BAND MATRIX FACTORIZATION AND LINEAR SYSTEM SOLVER

**PURPOSE:** SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE

**THE MATRIX HAS BAND STRUCTURE AND ONLY THE BAND IS STORED.**

**THE FIRST CALL TO THE ROUTINE FACTORS THE MATRIX INTO A**

**PRODUCT OF TRIANGULAR MATRICES, AND SUBSEQUENT CALLS USE**

**THESE FACTORS.**

**TIMING:** .022 SEC WITH NT=1, AND .0636 SEC

**ROUTINE NAME:** BANMAT

**ENTRY NAME:** BANMAT

**STORAGE:** 666 (OCTAL) WORDS

**ROUTINES CALLED:** DOTPRO(F124B), ADDVEC(F133B)
**TRIANGULAR LINEAR SYSTEM SOLVER**

- **Purpose:** Solves a system of linear algebraic equations where the matrix is triangular and only the three diagonals are stored. The first call to the routine factors the matrix into a product, and subsequent calls may use these factors.

- **Routine Name:** TLSS
- **Entry Name:** TLSS
- **Storage:** 605 octal words
- **Self-Contained:** Yes

**SYMMETRIC CONSTANT TRIANGULAR LINEAR SYSTEM SOLVER**

- **Purpose:** Solves a triangular linear system with constant diagonals.
- **Timing:** 0.001 sec for N=100
- **Storage:** 57 (octal) words
- **Self-Contained:** Yes

**SYMMETRIC PERIODIC LINEAR SYSTEM SOLVER**

- **Purpose:** Solves a symmetric periodic linear system.
- **Timing:** 0.009 sec for N=100
- **Storage:** 703 (octal) words
- **Self-Contained:** Yes
**ECS GENERAL LINEAR SYSTEM SOLVER**

**Purpose:** To solve in the least squares sense the general linear system \( Cx = y \) when \( C \) and \( y \) are stored column-wise in ECS.

**Storage:** 717 (octal) words. At least \( IM*IN*IM*IK \) words reserved in ECS.

**Routines Called:**
- DOTPRO(F124A), LABRT(N103A), SQRT(B408A), VECCTPRO, VECRUM(F133A), ECWR, EXIT(SYSTEM).

---

**ECS COMPLEX LINEAR SYSTEM SOLVER**

**Purpose:** To solve a complex linear system \( AX = Y \).

**Storage:** 733 octal words

**Routines Called:**
- CATFAC(N103A), LABRT(N103A).

---

**ECS COMPLEX LINEAR SYSTEM SOLVER**

**Purpose:** To solve a complex linear system \( AX = Y \). The arguments are identical to F409 except all floating point arguments \( A, Y, R, \) and \( DET \) must be complex.

**Routine Name:** CATFAC

**Entry Name:** CATFAC

**Timing:** .006 sec. for \( N=10 \) and \( IT=0 \), .002 sec. for \( N=10 \) and \( IT=1 \)

**Storage:** 745 octal words.

**Routines Called:** COTPRO(F136A), LABRT(ON THE SYSTEM).
A* B. L. BUZBEE C-4

**SOLUTION OF COMPLEX LINEAR SYSTEMS BY ITERATIVE REFINEMENT**

**SOURCE CARDS**

**COMPLEX**

**OBJECT CARDS**

**DIAGONALLY DOMINANT TRIANGULAR MATRIX**

**ENTRY NAME**

**STORAGE**

**ROUTINES CALLED**

**VOLUME 2 - 9/73**
A* B L BUZBEE C-4 B L BUZBEE 72
B**LU DECOMPOSITION OF DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
C**COMPASS SR7600 CROS
D** SW 5 LS 3 TYPE 1
E**SOURCE CARDS 115 BCD OBJECT CARDS 5 BIN
F**LU DECOMPOSITION*DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
G**ON DISK F4 COMPAT WU 08/29/72REV 1 DECK 08/29/72REV 1
H**FORM CALL FACTTD(N,B,LS,EP,SN)
I**CALL FACTTD
J**ROUTINE NAME: FACTTD
K**ENTRY NAMES: FACTTD
L**STORAGE: 34 OCTAL WORDS
M**ROUTINES CALLED: SELF CONTAINED

A* B L BUZBEE C-4 B L BUZBEE 72
B**SOLVE DIAGONALLY DOMINANT TRIDIAGONAL LINEAR SYSTEM
C**COMPASS SR6600 SCP 3.1
D** SW 3 LS 4 TYPE 1
E**SOURCE CARDS 193 BCD OBJECT CARDS 7 BIN
F**DIAGONALLY DOMINANT*TRIDIAGONAL LINEAR SYSTEM
G**CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
H**FORM: CALL SOLTDM(N,B,LS,LY,SN)
I**CALL SOLTDM(N,B,LS,LY,LY,SN)
J**CALL SOLTDM(N,B,LS,LY,LY,LY,SN)
K**PURPOSE: SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY
L**DOMINANT MATRIX, USING THE DECOMPOSITION FROM
M**ROUTINE NAME: SOLTDM
N**ENTRY NAMES: SOLTDM, SOLTDM
O**STORAGE: 64 OCTAL WORDS
P**ROUTINES CALLED: FACTTD(F418A)
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 H*FORMI CALL SOLTD1(N,B,L,B,Y,L,Y,SN)
F419B I*C*L T1 CALL SOLTD1(N,B,L,B,Y,L,Y,K,M,SN)
F419B J*PURPOSEI SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY
F419B K*DOMINANT MATRIX, USING THE DECOMPOSITION FROM
F419B L*FACTTD(F418B).
F419B M*ROUTINE NAMEI SOLTD1
F419B N*ENTRY NAMESI SOLTD1, SOLTD2
F419B O*STORAGEI 64 OCTAL WORDS
F419B P*TIMINGI .1 MS FOR N=100 AND M=1
F419B Q*Routines CalledI FACTTD(F418B)

F420A A* B L BUZBEE C-4 B L BUZBEE 73
F420A B*LU DECOMPOSITION OF PERIODIC TRIDIAGONAL MATRIX
F420A C*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 H*FORMI CALL DECPTD (N,A,B,C,EP,NE)
F420A I*PURPOSEI COMPUTE LU DECOMPOSITION OF A DIAGONALLY
F420A J*DOMINANT PERIODIC TRIDIAGONAL MATRIX
F420A K*ROUTINE NAMEI DECPTD
F420A L*ENTRY NAMESI DECPTD
F420A M*STORAGEI 204 OCTAL WORDS
F420A N*Routines CalledI SELF CONTAINED

VOLUME 2 = 9/73
**LU DECOMPOSITION OF PERIODIC-TRIDIAGONAL MATRIX**

**Purpose:**
Compute LU decomposition of a diagonally dominant periodic-tridiagonal matrix.

**Timing:**
- N = 25, M = 2; 29 milliseconds
- N = 50, M = 2; 58 milliseconds

**Routines Called:**
Self contained

**Solution of Periodic-Tridiagonal System of Equations**

**Purpose:**
Solve a periodic-tridiagonal system of equations.

**Timing:**
- N = 25, M = 2; 29 milliseconds
- N = 50, M = 2; 58 milliseconds

**Routines Called:**
Self contained

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**Volume 2 - 9/73**
FAST TRANSFORMS

E.G., FOURIER.

REVIEWER: R. HUNT, C=5

F501A A* B.R.HUNT C=5
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 2*PURPOSE1 PERFORM THE FAST FOURIER TRANSFORM OF
F501A 3* REAL-VALUED DATA.
F501A 4*ROUTINE NAME1 RFFT
F501A 5*ENTRY NAME1 RFFT
F501A 6*STORAGE1 64 (OCTAL) WORDS
F501A 7*TIMING1 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 CALLED1 FFT2(F502A), SIN(B106A), COS(B106A).

F501B A* B.R.HUNT C=5
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*FORM1 CALL RFFT(A*N)
F501B 2*PURPOSE1 PERFORM THE FAST FOURIER TRANSFORM OF
F501B 3* REAL-VALUED DATA.
F501B 4*ROUTINE NAME1 RFFT
F501B 5*ENTRY NAME1 RFFT
F501B 6*STORAGE1 64 OCTAL WORDS
F501B 7*TIMING1 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 CALLED1 FFT2(F502B), SIN(B106B), COS(B106B).
A*  B.R. HUNT  C-5  72
B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
C*CMP  SR6600  SCP 3.1
D*  SW 3  LS 5  TYPE 1
E*CMP SOURCE CARDS  160 BCD OBJECT CARDS  8 BIN
F**FAST*FOURIER*TRANSFORM*COMPLEX
G*CARDS  F4  COMPAT WU 09/13/72  DECK 09/13/72
1*FORM1 CALL FFT2(A*B*N*INC)
2*PURPOSE1 PERFORM THE FAST FOURIER TRANSFORM OF
3* COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
4*ROUTINE NAME1 FFT2
5*ENTRY NAME1 FFT2
6*TIMING1 ABOUT 4.7E-6*N*LOG2(N) SECONDS FOR CDC 6600.
7* WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
8* CALL STATEMENT.
9*STORAGE1 73 OCTAL WORDS.
10*SELF CONTAINED.

A*  B.R. HUNT  C-5  72
B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
C*CMP  SR6600  SCP 3.1
D*  SW 3  LS 5  TYPE 1
E*CMP SOURCE CARDS  160 BCD OBJECT CARDS  8 BIN
F**FAST*FOURIER*TRANSFORM*COMPLEX
G*CARDS  F4  COMPAT WU 09/13/72  DECK 09/13/72
1*FORM1 CALL FFT2(A*B*N*INC)
2*PURPOSE1 PERFORM THE FAST FOURIER TRANSFORM OF
3* COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
4*ROUTINE NAME1 FFT2
5*ENTRY NAME1 FFT2
6*TIMING1 ABOUT 8.1E-7*N*LOG2(N) SECONDS FOR CDC 6600.
7* WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
8* CALL STATEMENT.
9*STORAGE1 73 OCTAL WORDS.
10*SELF CONTAINED.
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*FORM1 CALL RFTI(AN)
F503A 2*PURPOSE1 PERFORM THE INVERSE FAST FOURIER TRANSFORM
F503A 3* FOR REAL-VALUED DATA.
F503A 4*ROUTINE NAME1 RFTI
F503A 5*ENTRY NAME1 RFTI
F503A 6*TIMING1 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*STORAGE1 74 OCTAL WORDS
F503A 10*EXTERNALS1 FFT2(F502A), SIN(B106B), COS(B106B).

F503B A* B*RFTI C=5
F503B B*RFTI - INVERSE FAST FOURIER TRANSFORM OF REAL DATA
F503B C*CMP SR7600 CRDS
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*FORM1 CALL RFTI(AN)
F503B 2*PURPOSE1 PERFORM THE INVERSE FAST FOURIER TRANSFORM
F503B 3* FOR REAL-VALUED DATA.
F503B 4*ROUTINE NAME1 RFTI
F503B 5*ENTRY NAME1 RFTI
F503B 6*TIMING1 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*STORAGE1 74 OCTAL WORDS
F503B 10*EXTERNALS1 FFT2(F502B), SIN(B106B), COS(B106B).
**F5-4**

**F5AA**

*FF13* FAST FOURIER TRANSFORM FOR COMPLEX 3 DIMENSIONAL DATA.

**F5AA**

*FF14* SOURCE CARDS 319 BCD OBJECT CARDS 60 BIN

**F5AA**

*FF15* PURPOSE: COMPUTE THE FOURIER TRANSFORM OF COMPLEX THREE-DIMENSIONAL DATA.

**F5AA**

*NOTE:* C DIVISION RECOMMENDS THE USE OF FFT2(F502A)

**F5AA**

*IN PLACE OF THIS ROUTINE.

**F5AA**

*ROUTINE NAME:* FFT

**F5AA**

*ENTRY NAME:* FFT

**F5AA**

*TIMING:* APPR. 2.3*10**-5*N*LOG2(N) SECONDS, WHERE N REPRESENTS THE TOTAL NUMBER OF COMPLEX ELEMENTS IN A.

**F5AA**

*STORAGE:* 1541 OCTAL WORDS

**F5AA**

*ROUTINES USED;* SQRT(B408A), SIN(B106A), COS(B106A).

---

**F5AB**

*FF313* FAST INVERSE FOURIER TRANSFORM

**F5AB**

*FF314* SOURCE CARDS 65 BCD OBJECT CARDS 18 BIN

**F5AB**

*FF315* PURPOSE: COMPUTE THE REAL INVERSE FOURIER TRANSFORM

**F5AB**

*NOTE:* C DIVISION RECOMMENDS USE OF RFTI(F503A)

**F5AB**

*IN PLACE OF THIS ROUTINE.

**F5AB**

*ROUTINE NAME:* RFSN

**F5AB**

*ENTRY NAME:* RFSN

**F5AB**

*STORAGE:* 347 OCTAL WORDS

**F5AB**

*TIMING:* 1.2*10**-5*N*LOG2(N) SECONDS.

**F5AB**

*ROUTINES CALLED:* FFT(F5AA), SIN(B106A), COS(B106A).
G1 DESCRIBATIVE STATISTICS

REVIEWER: R. LOHRDING, C-5

G101A A* B HUNT C-5
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 G101A 1G*CARDS F4 COMPAT WU 07/13/72REV.1 DECK 08/12/68
G101A 1*FORM1 CALL SPAL(T,N,P,DUM,NA,IDT,SR,FF)
G101A 2*PURPOSE: PROVIDE POWER SPECTRAL ESTIMATES FOR A
G101A 3* ONE-DIMENSIONAL 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).

VOLUME 2 - 9/73
DISTRIBUTION FUNCTIONS AND THEIR INVERSE

REVIEWER: R. LOHRDING, C-5

A* LARA BAKER ENG-DO KEN LYONS 69

B*FISHER EVALUATION OF FISHER'S F VALUE.

C*FORTRAN IV SR6600 SCP 3.1

D* SW 2 LS 1 TYPE 1

E*SOURCE CARDS 51 BCD OBJECT CARDS 13 BIN

F*STATISTICS FISHER FTEST

G*CARDS P4 COMPAT WU 08/01/69 DECK 08/01/69

H*USAGE: P=FISHER (NUMDEG, IDENDEG, FVAL)

I*PURPOSE: TO CALCULATE THE PROBABILITY LEVEL OF A FISHER'S

J*F VALUE GIVEN THE NUMERATOR AND DENOMINATOR DEGREES OF

K*FREEDOM.

L*STORAGE: 230 (OCTAL) WORDS

M*SELF CONTAINED.
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 I*FORM: CALL SPCTRL(X,ACX,PSX,T,NX,NM,NF,DELTA,TITLE,)
G601A 2* IA,IWIN,IDF,IP)
G601A 3*PURPOSE: 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 I*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).

VOLUME 2 - 9/73
**ACFCN - AUTOCOVARIANCE/AUTOCORRELATION FUNCTION**

**Purpose:** Compute the autocovariance function of a time series.

**Routine Name:** ACFCN

**Entry Name:** ACFCN

**Storage:** 202 (OCTAL) WORDS PLUS N*M WORDS RESERVED

**Routines Called:** Self contained.

**Description:**
- **On Disk F4 COMPAT WU 10/04/72 DECK 10/04/72**
- **Call ACFCN(X,ACX,N,M,IOPT,XM,XVAR)
- **Purpose:** Compute the autocovariance function of a time series.
- **Routine Name:** ACFCN
- **Entry Name:** ACFCN
- **Storage:** 202 (OCTAL) WORDS PLUS N*M WORDS RESERVED
- **Routines Called:** Self contained.

**WIND - LAG-WINDOW GENERATOR**

**Description:**
- **On Disk F4 COMPAT WU 10/04/72 DECK 10/04/72**
- **Call WIND(ACX,N,IOPT,M,IDF)
- **Purpose:** Modify a raw autocovariance/autocorrelation function by multiplying it by a specified lag-window.
- **Routine Name:** WIND
- **Entry Name:** WIND
- **Storage:** 317 (OCTAL) WORDS PLUS M WORDS RESERVED IN THE CALLING PROGRAM FOR ARRAY ACX.
- **Routines Called:** COS(B106A)
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<th>A*</th>
<th>B.R.HUNT</th>
<th>C-5</th>
<th>B.R.HUNT</th>
<th>72</th>
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<td>B*</td>
<td>LAG-WINDOW GENERATOR</td>
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<td>G603B</td>
<td>C*F4</td>
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<td>G603B</td>
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<td>SW 2</td>
<td>LS 2</td>
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<td>G603B</td>
<td>E*SOURCE CARDS</td>
<td>39</td>
<td>BCD</td>
<td>OBJECT CARDS</td>
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<td>G603B</td>
<td>F**LAG-WINDOW GENERATOR</td>
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<td>F4</td>
<td>COMPAT</td>
<td>WU 10/04/72</td>
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<td>G603B</td>
<td>1*FORM</td>
<td>CALL WINDOW(ACX,N,OPT,M,UF)</td>
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<tr>
<td>G603B</td>
<td>2*PURPOSE</td>
<td>MODIFY A RAW AUTOCOVARIANCE/AUTOCORRELATION</td>
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<td>G603B</td>
<td>3*</td>
<td>FUNCTION BY MULTIPLYING IT BY A SPECIFIED</td>
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<td>G603B</td>
<td>4*</td>
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<td>G603B</td>
<td>5*ROUTINE NAME</td>
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<td>G603B</td>
<td>6*ENTRY NAME</td>
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<td>G603B</td>
<td>7*STORAGE</td>
<td>323 (OCTAL) WORDS PLUS M WORDS RESERVED IN THE</td>
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<td>G603B</td>
<td>8*</td>
<td>CALLING PROGRAM FOR ARRAY ACX,</td>
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<td>G603B</td>
<td>9*ROUTINES CALLED</td>
<td>COS(B106B)</td>
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<td>G604A</td>
<td>B*</td>
<td>POWER SPECTRUM COMPUTATION</td>
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<td>G604A</td>
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<td>LS 1</td>
<td>TYPE 1</td>
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<td>E*SOURCE CARDS</td>
<td>10</td>
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<td>OBJECT CARDS</td>
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<td>F**POWER SPECTRUM COMPUTATION</td>
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<tr>
<td>G604A</td>
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<td>COMPAT</td>
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<td>G604A</td>
<td>1*FORM</td>
<td>CALL PWRSPCT(ACX,M,PSX,NF,DELTA)</td>
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<td>COMPUTE THE POWER SPECTRUM OF A TIME SERIES</td>
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<td>G604A</td>
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<td>FROM AN AUTOCOVARIANCE/AUTOCORRELATION FUNCTION</td>
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<td>G604A</td>
<td>4*</td>
<td>OF THE SERIES.</td>
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<tr>
<td>G604A</td>
<td>5*ROUTINE NAME</td>
<td>PWRSPCT</td>
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<td>G604A</td>
<td>6*ENTRY NAME</td>
<td>PWRSPCT</td>
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<tr>
<td>G604A</td>
<td>7*STORAGE</td>
<td>73 (OCTAL) WORDS PLUS M+NF WORDS RESERVED</td>
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<tr>
<td>G604A</td>
<td>8*</td>
<td>IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.</td>
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<tr>
<td>G604A</td>
<td>9*ROUTINES CALLED</td>
<td>COS(B106A)</td>
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</tbody>
</table>
POWER SPECTRUM COMPUTATION

**ROUTINE NAME**: PWRSPCT

**ENTRY NAME**: PWRSPCT

**STORAGE**: 76 (OCTAL) WORDS PLUS M*NF WORDS RESERVED IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.

**ROUTINES CALLED**: COS(B106B)

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**AIDS - AUTO NUMERICAL FILTERING WITH CONVERGENCE TESTS**

**ROUTINE NAME**: AIDS

**ENTRY NAME**: AIDS

**STORAGE**: 2631 OCTAL WORDS

**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 E 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 NUMBERS ON THE OPEN INTERVAL (0,1). RANDOM PRODUCES A SINGLE RANDOM NUMBER. RANVECT RETURNS N RANDOM NUMBERS INTO X ARRAY. PROVISION IS MADE FOR SAVING THE GENERATING NUMBER AND FOR RESTARTING.
G801A 6* ROUTINE NAMES: RANDOM, RANDST, RANDSV, RANVECT
G801A 7* STORAGE: 23 OCTAL WORDS
G801A 8* 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 RANVECT(X, N)
G801B 4* PURPOSE: GENERATES A RANDOM SEQUENCE OF FLOATING POINT NUMBERS ON THE OPEN INTERVAL (0,1). RANDOM PRODUCES A SINGLE RANDOM NUMBER. RANVECT RETURNS N RANDOM NUMBERS INTO X ARRAY. PROVISION IS MADE FOR SAVING THE GENERATING NUMBER AND FOR RESTARTING.
G801B 6* ROUTINE NAMES: RANDOM, RANDST, RANDSV, RANVECT
G801B 7* STORAGE: 44 OCTAL WORDS
G801B 8* ROUTINES CALLED: LIBMSG(SYSTEM).

VOLUME 2 - 9/73
ROUTINE NAME: RANF
ENTRY NAME: RANF
STORAGE: 14 OCTAL WORDS.
SELF CONTAINED.

G802A A* B.L. BUZBEE C=4 R.LORRDING 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.LORRDING 72
G803A B* GENERATE M-ELEMENT SUBSET 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.
CRITICAL PATH PROGRAMS

REVIEWER: J. NEERGAARD, C-7

(THIS CATEGORY WILL NOT BE USED FOR FUTURE PROGRAMS)

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

VOLUME 2 - 9/73
INPUT/OUTPUT WITH CONVERSION OR INTERPRETATION
FREE FORM AND NAMELIST I/O

REVIEWER: J. MOORE, C-2

LOAD FORTRAN IV FORMAT FREE INPUT

SOURCE CARDS 172 BCD OBJECT CARDS 61 BIN

LOAD*INPUT

G*CARDS F4 COMPAT WU 04/08/70REV 1 DECK 04/08/70REV

CALL LOAD(LIST,N,ERROR) WHERE LIST IS ORIGIN OF TABLE OF

ABSOLUTE LOCATIONS; N IS THE NUMBER OF LOCATIONS; ERROR

IS A LOGICAL VARIABLE; TRUE, INDICATES AN ERROR DURING

INPUT; FALSE, INDICATES A VALID LOAD.

PROVIDES 6600 FORTRAN IV WITH DATA INPUT UNRESTRICTED

REAL, INTEGER, HOLLRITH AND

LOGICAL CONSTANTS PROVIDES INPUT ARITHMETIC, ARRAY LOADING,

AND ERROR COMMENTS.

STORAGE-834 WORDS,

USES SHIFT (M401A), LOC, MINO, AND MOD.
REVIEWER: R. M. FRANK, C-4

J1AA  A*  P. SEEGER  P=11
J1AA  B* BASIC ZETA PLOTTER PACKAGE
J1AA  C* 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*FORM1 CALL ADV, COLOR, CONVRT, DGA, DLCH, DLCV, DLGLG, DLGLN, DLNLG,
J1AA  2* DLNLN, DRV, EMPTY, EXH, EXL, EXPIM, FRAME, GXA, GYA, LINCNT, NORM,
J1AA  3* PLOT, PLT, SBLN, SBLG, SETPLT, SLLIN, SLYLOG, SRLIN, SRLOG, STB,
J1AA  4* STLIN, STLLOG, 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, CJEG7, ZETAF (COMMON), ENDFIL, JOBNAME, OUTPTC
J1AA  12* (SYSTEM), AXIS, LINE, BLKDATA, BLOT, OUTBUF, PLTS, SYMBOL, ZPLOTS,
J1AA  13* ZWHERE (PERMFILE W8ZETA, OR PERMFILE ZETABIN)
FORMATTED I/O

REVIEWER: J. MOORE, C-2

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

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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 WI 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 WI 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 SR660 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*4 SR660 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 04/26/72REV3 DECK 04/26/72REV2
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),SLLN(J533A),SLLG(J540A),SBLIN(J535A),
J508A 15* SBLG(J540A),PLUT(J541A),DGA(J528A).

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J508B  A*  V. GARDINER  C-4  G. WILLBANKS  72
J508B  B*STANDARDIZED PLOT
J508B  C*F4  SR760 CROS
J508B  D*  SW 1 LS 2 TYPE 1
J508B  E*SOURCE CARDS  43 BCD OBJECT CARDS  17 BIN
J508B  F**STANDARDIZED PLOT*ROUTINE
J508B  G*ON DISK  F4 COMPAT WU 04/26/72 DECK 04/26/72
J508B  1*FORM: CALL SPLIT(IOP,N,X,Y,ICHAR,ICON)
J508B  2*PURPOSE: CREATE A BOX WITH A GRID AND PROVIDE A
J508B  3* STANDARDIZED PLOT
J508B  4* IOP DEFINES TYPE OF GRID.
J508B  5* N POINTS ARE PLOTTED USING DATA FROM TABLES OF X AND Y
J508B  6* ICHAR DEFINES THE PLOTTING CHARACTER TO BE USED.
J508B  7* IF ICON NOT ZERO CONSECUTIVE POINTS WILL BE CONNECTED
J508B  8* BY VECTORS. SEE ADV(J566A) FOR COMPREHENSIVE DESCRIPTION.
J508B  9*STORAGE: 266 OCTAL WORDS
J508B  10*ROUTINE NAME: SPLIT
J508B  11*ENTRY NAME: SPLIT
J508B  12*ROUTINES CALLED: MAXV(F115B), MINV(F115B), ASCL(J510B),
J508B  13* ADV(J506B), DLNLN(J529B), DLNLG(J530B), DLGLG(J530B),
J508B  14* SBLIN(J530B), SLLIN(J535B), SLLLOG(J540B), SBLOG(J540B),
J508B  15* SBLIN(J540B), PLOT(J541B), DAGL(J528B).

J510A  A*  VERA GARDINER  C-4  67
J510A  B*AUTOMATIC GRAPH SCALING
J510A  C*F4  SR660 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(MIN,MAX,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.
**J5-4**

**J510B**

A* VERNA GARDINER C-4

**J510B**

B*AUTOMATIC GRAPH SCALING

**J510B**

C*F4 SR7600 CROS

**J510B**

D* SW 1 LS 3 TYPE 1

**J510B**

E*F4 SOURCE CARDS 102 RCD 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,2MIN,2MAX,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

**J511A**

B*AUTOMATIC GRAPHING OF A SET OF POINTS

**J511A**

C*F4 SR6600 SCP 3.1

**J511A**

D* SW 5 LS 2 TYPE 1

**J511A**

E*SOURCE CARDS 106 RCD 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 05/27/67

**J511A**

1*CALL GRAPH(IOP,N,X,M,X,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*SLLIN(J535A), PLOT(J541A), DLNLG(J539A), SLLOG(J543A),

**J511A**

6*SBLG(J540A), DLGLN(J530A), DLGLG(J530A).

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**J512A**

A* V. GARDINER C-4 R. FRANK 67

**J512A**

B*POLAR COORDINATE GRAPH USING THE 4020

**J512A**

C*F4 SR6600 SCP 3.1 4020

**J512A**

D* SW 4 LS 4 TYPE 1.1

**J512A**

E*SOURCE CARDS 147 RCD OBJECT CARDS 40 BIN

**J512A**

F**POLAR*COORDINATE*GRAPH*4020

**J512A**

G*ON DISK F4 COMPAT WU 03/29/73REV1 DECK 03/29/73REV1

**J512A**

1*FORM: CALL POLAR(N,R,THETA,ICHAR,ICON,GRID,IXC,ICY,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.

---

**VOLUME 2 - 9/73**
A* V. GARDINER C-4 R. FRANK 73
B*POLAR COORDINATE GRAPH USING THE 4020
C*F-4 SR7600 CROS 4020
D* SW 4 LS 4 TYPE 1
E*SOURCE CARDS 147 BCD OBJECT CARDS 41 BIN
F**POLAR*COORDINATE*GRAPH*4020
G**ON DISK F4 COMPAT WU 03/29/73 DECK 03/29/73
1*FORM: CALL POLAR(N,R,THETA,ICON,GRID,IXC,IYC,IR)
2*PURPOSE: DRAW A POLAR COORDINATE GRAPH OF A SET OF POINTS
3* USING THE 4020, MORE THAN ONE SET OF POINTS
4* CAN BE PLOTTED ON THE SAME POLAR GRID.
5*ROUTINE NAME: POLAR
6*ENTRY NAME: POLAR
7*STORAGE: 1005 OCTAL WORDS
8*ROUTINES CALLED: THIS PROGRAM USES BASIC SET OF 4020
9* SUBROUTINES. SEE J506A WRITEUP.

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

A* R.M.FRANK C-4 GENE WILLBANKS 67
B*EXPAND OR RETURN IMAGE SIZE TO NORMAL
C*COMPASS SR6600 SCP 3.1
D* SW 1 LS 1 TYPE 1
E*SOURCE CARDS 22 BCD OBJECT CARDS 4 BIN
F**EXPAND OR*RETURN*IMAGE*SIZE TO*NORMAL
G**ON DISK F4 COMPAT WU 08/19/70REV 3 DECK 01/17/69REV2
1*USE: CALL EXPIM PROVIDES FOR LARGER IMAGE AND THUS BUTTED
2*FRAMES, ON THE SC 4020. NO EFFECT ON CDC 284.
3*USE: CALL NORIM RETURNS IMAGE SIZE TO NORMAL, ALLOWING A GAP
4* BETWEEN FRAMES.
5*STORAGE: 15 (OCTAL) WORDS.
6*SELF CONTAINED.

VOLUME 2 = 9/73
**J516A**

*GENE WILLBANKS C-4*

- **A** - PLOT A POINT
- **B** - PLOTTING J5 COMPASS SR6600 SCOPE
- **C** - SW 1 LS 1
- **D** - COMPASS SOURCE DECK 15RCD3.1 OBJECT DECK 4BIN

- **S** - PLOT*A*POINT

- **J516A** 10*ON DISK F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
- **J516A** 11*CALL PLT(Ix1, iy1, ichar). THE CHARACTER SPECIFIED BY ICHAR IS PLOTTED AT POINT (Ix1, iy1). SEE J506A WRITEUP FOR DETAILS.
- **J516A** 12*STORAGE - 6 WORDS
- **J516A** 13*SELF CONTAINED.

**J517A**

*GENE WILLBANKS C-4*

- **A** - DRAW VECTOR
- **B** - PLOTTING J5 COMPASS SR6600 SCP 3.1
- **C** - SW 1 LS 2
- **D** - COMPASS SOURCE DECK 84RCD3.1 OBJECT DECK 5BIN

- **S** - DRAW*VECTOR

- **J517A** 10*ON DISK F4 COMPAT WU 11/14/68 REV 2 DECK 11/14/68 REV
- **J517A** 11*CALL DRV(Ix1, iy1, Ix2, iy2). A STRAIGHT LINE VECTOR WILL BE DRAWN FROM POSITION (Ix1, iy1) TO (Ix2, iy2). FOR FULL DESCRIPTION SEE J506A WRITEUP.
- **J517A** 12*STORAGE - 36 WORDS
- **J517A** 13*SELF CONTAINED.

**J518A**

*R. M. FRANK C-4 GENE WILLBANKS 67*

- **A** - GENERATE X OR Y AXIS
- **B** - COMPASS SR6600 SCP 3.1
- **C** - SW 1 LS 1
- **D** - SOURCE CARDS 42 BCD OBJECT CARDS 5 BIN

- **F** - GENERATE*X OR Y*AXIS

- **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.

**VOLUME 2 - 9/73**
J520A  A* GENE WILLRANKS  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 REV
J520A  11*CALL TSP(Ix.Iy,NC,BCD). THE NC CHARACTERS LOCATED STARTING
J520A  12*AT RCD 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(J520A).

J521A  A* GENE WILLRANKS  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  38BCD3.1 OBJECT DECK  20BIN
J521A  S**TYPE*CURRENT*POINT
J521A  10*ON DISK  F4 COMPAT WU 07/12/68 REV DECK 07/12/68 REV
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 - 23A WORDS
J521A  15*SELF CONTAINED.

J522A  A* GENE WILLRANKS  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).

VOLUME 2 = 9/73
J5-8

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, IYR). 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).

J524A A* GENE WILLBANKS T-1 67
J524A B*STORE WORD IN BUFFER
J524A C* PLOTTING J5 COMPASS SR6600 SCOPE
J524A D* SW 1 LS 1
J524A E* COMPASS SOURCE DECK 98CD3.1 OBJECT DECK 3 BIN
J524A F**STORE WORD IN BUFFER
J524A G* ON DISK F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
J524A H* 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.

J526A A* G. WILLBANKS T-1 67
J526A B* CONVERT TO 4020 COORDINATE
J526A C* F4 SR6600 SCOPE
J526A D* SW 1 LS 1
J526A E* SOURCE CARDS 11BCDF4 OBJECT DECK 7 BIN
J526A F**CONVERT TO 4020 COORDINATE
J526A H* CALL CONVRT(7*IZ, ZI, 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* STORAGE - 63 WORDS
J526A 16* USES LABRT (N103A).

VOLUME 2 - 9/73
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  5BCDF4 OBJECT CARDS  4BIN
J527A S*TEST*COORDINATE FOR RANGE
J527A T*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 2*STORAGE - 18 WORDS.
J527A 14*SELF CONTAINED.

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 T*ON DISK  F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
J528A 11*CALL DGA(ILX,IXR,ITY,ITY,IXL,IXR,ITY,ITY) ILX,IXR,ITY,ITY 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 12*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 CJEO7(8 WORDS).

J529A A*  R.M. FRANK  C-4  GENE WILLBANKS  67
J529A B*DRAW LINEAR-LINEAR GRID
J529A C*F4  SR6600 SCP 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 CJEO7(8 WORDS).

VOLUME 2 - 9/73
J530A  A*                R. M. FRANK  C-4 VERN A GARDINER 67
J530A  B*DRAW COMBINATION OF LINEAR AND LOG GRIDS
J530A  C*F4                SR7600  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).

VOLUME 2 - 9/73
J533A
A* Verna Gardiner C-4
B*SCALE LEFT SIDE LINEARLY
C*F4 SR6600 SCP 3.1
D* SW 1 LS 1 TYPE 1
E*F4 SOURCE CARDS 30 BCD OBJECT CARDS 15 BIN
F**SCALE*LEFT SIDE*LINEARLY
G*ON DISK F4 COMPAT WU 08/02/71 REV 1 DECK 08/02/71 REV
I*FORM1 CALL SLLIN(NY,K)
J533A 2*THE LEFT SIDE OF A GRID IS SCALED AT NY INTERVALS ACCORDING TO A FORMAT SPECIFIED BY K. SEE J506A WRITEUP FOR MORE DETAILS.
J533A 3*ROUTINE NAME: SLLIN
J533A 4*ENTRY NAME: SLLIN
J533A 5*STORAGE: 205 (OCTAL) WORDS.
J533A 6*Routines Used: TSP(J520A), NAME COMMON CJE07(8 WORDS).
J533A 7* (ON THE SYSTEM).

J533B
A* Verna Gardiner C-4
B*SCALE LEFT SIDE LINEARLY
C*F4 SR7600 CROS
D* SW 1 LS 2 TYPE 1
E*F4 SOURCE CARDS 30 BCD OBJECT CARDS 14 BIN
F**SCALE*LEFT SIDE*LINEARLY
G*ON DISK F4 COMPAT WU 07/27/72 DECK 07/27/72
J533B 1*FORM1 CALL SLLIN(NY,K)
J533B 2*PURPOSE: THE LEFT SIDE OF A GRID IS SCALED AT NY INTERVALS ACCORDING TO A FORMAT SPECIFIED BY K.
J533B 3*ROUTINE NAME: SLLIN
J533B 4*ENTRY NAME: SLLIN
J533B 5*STORAGE: 205 (OCTAL) WORDS.
J533B 6*Routines Used: TSP(J520B), NAME COMMON CJE07(8 WORDS).
J533B 7* (ON THE SYSTEM).

J534A
A* Gene Willranks T-1
B*PLOTTING J5 F4 SR6600 SCOPE
C* SW 1 LS 1
D*F4 SOURCE DECK 33BCDF4 OBJECT CARDS 16 BIN
E**SCALE*RIGHT*LINEARLY
F**SCALE*RIGHT*LINEARLY
G*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 INTERVALS ACCORDING TO A FORMAT SPECIFIED BY K. FOR MORE DETAILS SEE J506A WRITEUP.
J534A 12*STORAGE - 170 WORDS
J534A 13*USES TSP(J520A), TCP(J521A), NAME COMMON CJE07(8 WORDS).

VOLUME 2 - 9/73
J535A  A* R. M. FRANK C-4 GENE WILDBANKS 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 02/12/69 REV 3 DECK 02/12/69 REV 3
J535A  1*CALL SBLIN(NX*K), A GRID IS SCALLED 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 CJEO7(8 WORDS).

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 02/21/73 REV J DECK 02/21/73 REV J
J540A  1*CALL SBLOG, A LOG SCALE IS TYPED ALONG THE BOTTOM BOUNDARY.
J540A  2*CALL SLLLOG, A LOG SCALE IS TYPED ON THE LEFT BOUNDARY.
J540A  3*CALL SRLLOG, 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, SLLLOG, SRLLOG, STLOG
J540A  9*ROUTINES CALLED: TSP(J520A),
J540A  10* NAME. COMMON CJEO7(10 OCTAL WORDS)
J540B A* V. GARDINER C-4 R.M.FRANK 73
J540B B*SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY
J540B C*FORTRAN IV 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 SRLLOG, 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 J596B WRITEUP.
J540B 6*STORAGE - 374 OCTAL WORDS
J540B 7*ROUTINE NAME: SBLOG
J540B 8*ENTRY NAMES: SBLOG, SLLOG, SRLLOG, STLOG
J540B 9*ROUTINES CALLED: TSP(J520A),
J540B 10* NAME COMMON CJE07(10 OCTAL WORDS)

J541A A* GENE WILLFRANKS 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,ICAR,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), TCR(J527A), PLT(J516A), DRV(J517A), NAME
J541A 8*COMMON CJE07(8 WORDS).

VOLUME 2 - 9/73
A* K. J. MELENDEZ C=4 R. M. FRANK 67
B*WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
C*COMPASS SR6600 SCP, 3,1
D* SW 1 LS 9 TYPE 1
E*SOURCE CARDS 312 BCD OBJECT CARDS 20 BIN
F**WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
G*ON DISK F4 COMPAT WU 01/28/71 REV 3 DECK 01/28/71 REV 3
H**WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
I*CALL WLCH(I, I, NC, BCD, ISIZE), THE NC CHARACTERS LOCATED AT
J*BCD ARE PRINTED STARTING AT (IX, IY). THE SIZE OF THE
K*CHARACTERS IS CONTROLLED BY ISIZE FROM 1 TO 6,
L*CALL WLCV(I, I, NC, BCD, ISIZE), THE NC CHARACTERS LOCATED AT
M*BCD ARE PRINTED OVERSIZE STARTING AT (IX, IY). THE SIZE IS
N*CONTROLLED BY ISIZE. SEE J506A WRITEUP FOR FULL DETAILS.
O*STORAGE - 222 WORDS
P*SELF CONTAINED.
**J544A**

A* V. GARDINER C-4 R FRANK C-4 68

B* CALCOMP STANDARDIZED PLOT

C* F4 SR6600 SCOPE 3.1

D* SW 27 LS 2 TYPE 1

E* SOURCE CARDS 70 BCD OBJECT CARDS 20 BIN

F** CALCOMP PLOT

G* CARDS F4 COMPAT WU 01/03/73 REV. 2 DECK 01/06/69 REV 1

1* FORM: CALL PLOTZ(X, Y, N, I, LIN, ISYM, B, XA, YA, ITITLE)

2* NTITLE, LABELX, NBBLX, NBLRY

3* PURPOSE: CREATE A BOX WITH TIC MARKS ON ALL SIDES.

4* LEFT AND BOTTOM AXES ARE LABELLED, TITLE IS

5* WRITTEN AT TOP OF GRAPH. VALUES OF X AND Y ARE

6* PLOTTED.

7* NOTE: THE J544 WRITEUP ALSO DESCRIBES MANY OF THE

8* CALCOMP Routines.

9* ROUTINE NAME: PLOTZ

10* ENTRY NAME: PLOTZ

11* STORAGE: 321 OCTAL WORDS

12* ROUTINES CALLED: SCALE(J544A), AXES(J547A), LINE(J548A),

13* PLTz(J549A), SYMBOL(J559A).

**J545A**

A* R. M. FRANK C-4 68

B* CALCOMP NUMBER LABELING

C* PLOTTING J5 F4 SR6600 SCOPE

D* SOURCE CARDS 43BCDF4 OBJECT CARDS 14BIN

S** CALCOMP LABEL

10* CARDS F4 COMPAT WU 09/12/68 DECK 09/12/68

11* CALL NUMBER (X, Y, HT, BCD, TH, NS)

12* SEE WRITEUP FOR J544A FOR FULL DETAILS.

13* USES SYMBOL(J559A) AND ALOG10(B305A)

14* STORAGE 250(8) WORDS.

**J546A**

A* ROBERT M FRANK C-4 68

B* GENERATE SCALE FOR AXIS

C* PLOTTING J5 F4 SR6600 SCOPE

D* SOURCE CARDS 96BCDF4 OBJECT CARDS 22BIN

S* CALCOMP SCALE

10* CARDS F4 COMPAT WU 08/19/68 08/19/68

11* CALL SCALE (X, F, D, A, N, I)

12* SEE WRITEUP FOR J544A FOR FULL DETAILS.

13* USES ALOG10(B305A)

14* STORAGE 371(8) WORDS.
**AXIS**

**Purpose:**
- Generate and label axis on CALCOMP.

**Routines Called:**
- NUMBER(J544A), PLTZ(J545A), SINCOS(B106A),
- SYMROL(J559A).

**Storage:** 1040 octal words.

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**SYMBOL**

**Purpose:**
- Plot symbol and draw line through successive data points.

**Routines Called:**
- NUMBER(J544A), PLTZ(J545A), SINCOS(B106A),
- SQRT(B408A).

**Storage:** 1340(8) words.
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 17BIN
J549A 10*CARDS F4 COMPAT WU 08/19/68 DECK 08/19/68
J549A 11*CALL PLOTZ( 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.

J550A
A* ROBERT M FRANK C-4 68
J550A 0*INITIALIZE CALCOMP ROUTINES AND ASSIGN TAPE
J550A B*PLOTTING J5 F4 COMPAT SR6600 SCOPE
J550A C* SW 1 LS 1
J550A D*F4 SOURCE CARDS 21BCDF4 OBJECT CARDS 10BIN
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.

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 39BCDF4 OBJECT CARDS 14BIN
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.

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 21BCDF4 OBJECT CARDS 11BIN
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

VOLUME 2 - 9/73
J552B  A*  R.M. FRANK  C=4  R M FRANK  72
J552B  B*WRITE ON TAPE
J552B  C*F4  SR7600  CROS
J552B  D*  SW 1  LS 1  TYPE 1
J552B  E*SOURCE CARDS  9  RCD  OBJECT CARDS  5  BIN
J552B  F**CALCOMP*TAPE*WRITE*PLOTTING
J552B  G*ON DISK  F4  COMPAT  WU 11/15/72  DECK 11/15/72
J552B  I*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J552B  2*ROUTINE NAME: TAPWRI
J552B  3*STORAGE 32 OCTAL WORDS
J552B  4*ROUTINES CALLED: SELF CONTAINED

J553A  A*  R. M. FRANK  C=4  68
J553A  B*PACK COMMANDS FOR TAPE
J553A  C*PLOTTING  J5  F4  SR6600  SCOPE
J553A  D*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

J554A  A*  R. M. FRANK  C=4  68
J554A  0*CURRENT PLOTTER POSITION
J554A  B*PLOTTING  J5  F4  SR6600  SCOPE
J554A  C*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.

J555A  A*  R.M. FRANK  C=4  68
J555A  0*SCALING FACTOR FOR SUBSEQUENT PLOTTING
J555A  B*PLOTTING  J5  F4  SR6600  SCOPE
J555A  C*SOURCE CARDS  7RCDF4  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  9BCDF4 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.

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  22BCD OBJECT 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.

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.
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,NX,NZY,NC,ZM,ZNX,DLY,ZC,DMPY,
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      61BCDDBINARY  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,LABELEX,NXLB,LABELY,NYL)
J562A  3*PURPOSE: PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
J562A  4* OF AXES AND TITLE.
J562A  5*ENTRY NAME: PLOJB
J562A  6*ROUTINE NAME: PLOJB
J562A  7*STORAGE 1021 (OCTAL) WORDS
J562A  8*ROUTINES CALLED: MAXV(F115A), MINV(F115A), ADV(J566A),
J562A  9* ASCL(J510A), PLT(J516A), DRV(J517A), TSP(J520A),
J562A  10* TSPV(J522A), FRAME(J523A), CONVRT(J524A), DNLN(J529A),
J562A  11* DLGLG(J530A), DLGLN(J530A), DNLN(J530A), SLIN(J533A),
J562A  12* SBLIN(J535A), SBLOG(J540A), SLLN(J540A), DLCH(J567A),
J562A  13* DGA(J528A), ALL ON DISK.

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J5-21

J562B A* V. GARDINER C-4 R FRANK 72
J562B B*STANDARDIZED PLOT ON FILM
J562B C*F4 SR7600 CR5S
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,LARELY,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(F115R), MINV(F115B), ADV(J506B),
J562B 9* ASCL(J510R), PLT(J516B), DRV(J517B), TSP(J520R),
J562B 10* TSPV(J522B), FRAME(J523B), CONVRT(J526B), DLNLN(J529B),
J562B 11* DLGLG(J530A), DLGLN(J530B), DLMG(J530B), SLLIN(J533B),
J562B 12* SRLIN(J535B), SBLOG(J540B), SLLOG(J540B), DLCH(J567B),
J562B 13* DGA(J528B), ALL ON DISK.

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 CONTORB(X,NXX,Y,NYY,Z,NZX,NZZ,NZY,NC,ZNZ,DLC,LC,
J563A 2*DMPX,DMPY,IGRD,ITITLE,NITITLE,XLABEL,NXBL,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

**PRIVATE SUBROUTINE FOR CONTRJB(J563A)**

C**F4** SR6600 SCP.3.1

SW 1 LS 5 TYPE 1

E*SOURCE CARDS 269 BCD OBJECT CARDS 14 BIN

F**DOUBLE BUFFER FILM OUTPUT**

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 FALL EMTY BEFORE TERMINATING EXECUTION.

J565A 7*J565A USES 143(DECIMAL) WORDS OF STORAGE.
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,Z,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).

J567A  A*  R. M. FRANK  C-4  69
J567A  B*DRAW LARGE CHARACTERS
J567A  C*FORTRAN  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:  DLCV(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),  STR(J524A),
J567A  5*B54020(ON  THE  SYSTEM).

J568A  *(FLASH)  DELETED  FROM  THE  LIBRARY-SEE  CCF:PIM-2:003

J569A  A*  JERRY MELENDEZ  C-4  R FRANK  69
J569A  B*COLOR
J569A  C*FORTRAN  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)
J5-24

J569B A* JERRY MELENDEZ C-4 R FRANK 72
J569B B*COLOR
J569B C*F4 SR7600 CRS
J569B D* SW 6 LS 2 TYPE 1
J569B E*SOURCE CARDS 47 BCD OBJECT CARDS 8 BIN
J569B F**COLOR*FILM*MICROFILM*COLOR MICROFILM
J569B G*ON DISK F4 COMPAT WJ 09/26/72 DECK 09/26/72
J569B 1*FORM: CALL COLOR(C)
J569B 2* CALL COLOR(IC)
J569B 3*PURPOSE: SELECT COLOR FILTERS TO GENERATE COLOR MICROFILM
J569B 4*Routine Name: COLOR
J569B 5*ENTRY NAME: COLOR
J569B 6*STORAGE: 101 OCTAL WORDS
J569B 7*ROUTINES CALLED: STB(J524R)

J570A A* DON DICKMAN C-4 R FRANK 69
J570A B*Sweep - BACKGROUND COLOR ON MICROFILM
J570A C*F4 SR6600 SCP31 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 WJ 09/07/72 REV 1 DECK 09/07/72 REV 1
J570A 1*FORM: CALL SWEEP(I1X1*Y1*IX2*Y2)
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 CRS 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 WJ 09/07/72 DECK 09/07/72
J570B 1*FORM: CALL SWEEP(I1X1*Y1*IX2*Y2)
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).

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(F115R), MINV(F115B), ASCL(J510B),
J571B  9*  PUT(M403B), FETCH(M403B), LIBMSG(SYSTEM).

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), PLOJR(J562A),
J572A  6*DLCH(J567A).

VOLUME 2  9/73
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 PDS# 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. TAPE=8 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,SYM,C,)
J574A 2*XAA,YAA,LABELZ,NXL,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), DGLG(J530A), DLGLN(J530A),
J574A 12*DLNLG(J530A), SLLIN(J533A), SBLIN(J535A), SLOG(J540A),
J574A 13*SLLLOG(J540A), DLCH(J567A),

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J574B A* R.M. FRANK C-4 J.BORING/S.BLIVICE 69
J574B B*CALCOMP ERROR BAR PLOTTER
J574B C*F4 SR6600 SCP 3.1 CALCOMP
J574B D* SW 8 LS 3 TYPE 1
J574B E*SOURCE CARDS 132 RCD OBJECT CARDS 35 BIN
J574B F**CALCOMP ERROR BAR PLOTTER
J574B G**CARDS F4 COMPAT WU 03/23/71REV 1 DECK 03/23/71REV 1
J574B 1*CALL NAME: ERRBAR
J574B 2*PURPOSE: TO PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN
J574B 3*X,Y TABLE, INCLUDING LABELING OF AXES AND TITLE, ON THE
J574B 4*CALCOMP PLOTTER.
J574B 5*STORAGE: 706 (OCTAL) WORDS.
J574B 6*ROUTINES CALLED: SCALE(J546A), AXIS(J547A), LINE(J548A),
J574B 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 RCD 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 H*FORM:  CALL EROBAR(X,Y,NPTS,INC,YPOS,YMIN,INCERR,J,NSYM,B,
J575B J*  XXA*YYA*LABELZ*NZL*LABELX*NXL*LABELY*NYL)
J575B K* PURPOSE:  PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN X,Y
J575B L* TABLE, INCLUDING LABELING OF AXES AND TITLE ON THE
J575B M* CALCOMP PLOTTER.  SEE EROBAR(J575A) FOR FURTHER DETAILS.
J575B N* ROUTINE NAME:  EROBAR
J575B O*ENTRY NAME:  EROBAR
J575B P*STORAGE:  716 OCTAL WORDS
J575B Q*Routines called:  SCALE(J546R), AXIS(J547B), LINE(J548B),
J575B R*PLTZ(J549B), SYMBOL(J559A).

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  DECK 09/30/69
J576A H*CALL NAME:  POL3DCC(THETA,R,NTH,F,NTHF,THX,THY,X,Y,TITLE,
J576A I*  2*NTITLE).
J576A J* PURPOSE:  PLOTS THE MATRIX F IN 3-DIMENSION VS. R AND THETA,
J576A K* FOR THE CALCOMP.
J576A L*STORAGE:  1,164 (OCTAL) WORDS.
J576A M*Routines called:  ATAN(B104A), SIN(B106A), MAXV(F115A),
J576A N*MAXM(F116A), LINE(J548A), PLTZ(J549A), SYMBOL(J559A),
J576A O*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 H*CALL NAME:  CALL SCALED(ARRAY,FIRSTV,DELTAV,AXLE,NPTS,INC,
J577A I*AMN,AMX)
J577A J* PURPOSE:  TO ESTABLISH FIRST VALUE AND INCREMENT FOR LINE
J577A K*Routine when using POL3DCC.
J577A L*STORAGE:  207 (OCTAL) WORDS.
J577A M*Routines called:  ATAN2(B104A), ALOG(B305A), ALOG10(B305A).

VOLUME 2 - 9/73
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 CARDS  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),
J578A  7*MINM(F116A), MAXM(F116A), ADV(J506A), EXH(J507A), EXL(J507A),
J578A  8*POLJB(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 746 (OCTAL) WORDS.
J579A  4*USES CDG(B106A), SDG(B106A), POLJB(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*DRAW 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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A* R. M. FRANK C-4 69
B*DRAW 5 A CIRCLE, ARC, OR SPIRAL ON THE CALCOMP
C*F4 SR660 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 52 RCD OBJECT CARDS 14 BIN
F**PLOT**CALCOMP
G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69

CALL NAME: CALL CIRCL(XPAGE,YPAGE,TH,F,RO,RF,DI)
PURPOSE: TO DRAW, STARTING AT A GIVEN POINT, AN ARCH WHICH MAY BE EXTENDED TO FORM A CIRCLE OR SPIRAL.
ROUTINES CALLED: COS(B106A), SIN(B106A), PLTZ(J549A), WHERE(J554A).

A* R. M. FRANK C-4 69
B*DRAW S A DASHED LINE CONNECTING DATA POINTS ON THE CALCOMP
C*F4 SR660 SCP 3.1 CALCOMP
D* SW 2 LS 2 TYPE 1
E*SOURCE CARDS 76 RCD OBJECT CARDS 15 BIN
F**PLOT**CALCOMP
G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69

CALL NAME: DASHL(XARRAY,YARRAY,POINT)
PURPOSE: TO DRAW A DASHED LINE CONNECTING A SERIES OF DATA POINTS.
ROUTINES CALLED: SQRT(B408A), PLTZ(J549A), WHERE(J554A).

A* R. M. FRANK C-4 69
B*DRAW S A DASHED LINE TO A SPECIFIED POINT ON THE CALCOMP
C*F4 SR660 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 53 RCD OBJECT CARDS 9 BIN
F**PLOT**CALCOMP
G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69

CALL NAME: DASHP(XPAGE,YPAGE,DASH)
PURPOSE: TO DRAW A DASHED LINE FROM THE PEN'S PRESENT POSITION TO A SPECIFIED POINT.
ROUTINES CALLED: SQRT(B408A), PLTZ(J549A), WHERE(J554A).

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J5-31

A* F. M. FRANK C-4 69
B* DRAWS AN ELLIPSE OR ELLIPTICAL ARC ON THE CALCOMP
C* F4 SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E* SOURCE CARDS 39 BCD OBJECT CARDS 16 BIN
F** PLOT* CALCOMP
G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
H* CALL NAME: ELIPS(XPAGE1,YPAGE1,RMAJ,RMIN,ANGLE,THO,THF,IPEN)
I* PURPOSE: TO DRAW AN ELLIPSE OR ELLIPTICAL ARC.
J* STORAGE: 303 (OCTAL) WORDS.
K* ROUTINES CALLED: COS(B106A), SIN(B106A), SQRT(B408A),
L* PLTZ(J549A), WHERE(J554A).

J585A A* R. M. FRANK C-4 69
B* DRAWS A CURVE THROUGH THREE POINTS ON THE CALCOMP
C* F4 SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E* SOURCE CARDS 61 BCD OBJECT CARDS 17 BIN
F** PLOT* CALCOMP
G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
H* CALL NAME: CALL FIT(XPAGE1,YPAGE1,XPAGE2,YPAGE2,XPAGE3,YPAGE3)
I* PURPOSE: TO DRAW A SEMI-HYPERBOLIC CURVE THROUGH THREE
J* POINTS.
K* STORAGE: 421 (OCTAL) WORDS
L* ROUTINES CALLED: ATAN(B104A), COS(B106A), SQRT(B408A),
M* PLTZ(J549A), WHERE(J554A), SOLUT(J589A).

J586A A* R. M. FRANK C-4 69
B* DRAWS A LINEAR GRID ON THE CALCOMP
C* F4 SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E* SOURCE CARDS 36 BCD OBJECT CARDS 9 BIN
F** PLOT* CALCOMP
G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
H* CALL NAME: CALL GRID(XPAGE,YPAGE,DELTAx,DELTAy,NXSP,NYSP)
I* PURPOSE: TO DRAW A LINEAR GRID.
J* STORAGE: 114 (OCTAL) WORDS
K* ROUTINES CALLED: PLTZ(J549A).

VOLUME 2 - 9/73
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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H@THREE-D PLoT pRoGRAM FOR 4020
C*F4 SR6600 SCP 3.1
D* SW 3 LS 3 TYPE 1
E*SOURCE CARDS 128 RCD OBJECT CARDS 65 BIN
F**THREE-D PLOT 4020
G*CARDS F4 COMPAT WU 01/20/70 DECK 01/20/70
I*CALL NAME: CART3D(X,Y,NX,NY,F,NF,FO,THX,THY,SO,U,V,TITLE,
J 2*NTITLE)
J 3*PURPOSE: MAKE AN ISOMETRIC 3-DIMENSIONAL PLOT OF F VS X,Y
J 4*ON THE 4020
J 5*STORAGE: 1514 (OCTAL) WORDS.
J 6*ROUTINES CALLED: ATAN2(B104A), CDG(B106A), SDG(B106A),
J 7*MAXV(F115A), MINV(F115A), MAXM(F116A), MINM(F116A), ADV(J506A),
J 8*EXH(J507A), EXL(J507A), CONVRT(J526A), PLOJB(J562A), DLCH(J567A),
J 9*DLCV(J567A).

H@FILM ElJIT
C*F 6600 SCP 3.1
D* SW 3 LS 3 TYPE 1
E*SOURCE CARDS 112 RCD OBJECT CARDS 33 BIN
F*FILM EDIT
G*CARDS F4 COMPAT WU 06/23/70 DECK 06/23/70
I*USE: CALL EDITFF(IFLG,JMAX,IN,OUT,NFRM),
J 2*PURPOSE: TO EDIT A FILM FILE IN TERMS OF FRAMES.
J 3*STORAGE: 3323 (OCTAL) WORDS.
J 4*ROUTINES CALLED: SHIFN(M401A).
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 (FX, NY, XX, NV, XX, NV, XX, XV, XV, XV)
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), WLC(J542A), COLOR(J569A), ACGOER(SYSTEM),
J592A  12*  OUTPTS(SYSTEM).
J592A  13*OTHER EXTERNALS:  INSECT

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*CARDS  F4  COMPAT  WU  02/16/73  DECK  02/16/73
J592B  1*FORM:  CALL PICTURE (FX, NY, XX, NV, XX, NV, XX, XV, XV, XV)
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), WLC(J542B), COLOR(J569B), ACGOER(SYSTEM),
J592B  12*  OUTPTS(SYSTEM).
J592B  13*OTHER EXTERNALS:  INSECT

VOLUME 2 - 9/73
J594A A* JOHN SAVAGE ENG-6 71
J594A B*XHATCH TO HATCH RECTANGULAR AREAS ON FILM.
J594A C*F4 SR6600 SCP 3,15C=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(IIXl,Yl,IX2,Y2,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).
A* JOHN SAVAGE ENG-6

B*XHATCH TO HATCH RECTANGULAR AREAS ON FILM.

C*F4 SR7600 CROS SC-4020

D* SW 2 LS 2 TYPE 1

E*F4 SOURCE CARDS 45 RCD OBJECT CARDS 15 BIN

F**XHATCH*VECTOR*GENERATOR FOR*HATCHING*FILM

G*ON DISK F4 COMPAT WU 06/08/71 DECK 06/08/71

1*FORM: CALL XHATCH(Ix1*Iy1*Ix2*Iy2*INC)

2*PURPOSE: FILL A SPECIFIED RECTANGULAR AREA ON A FILM PLOT

3* WITH SLOPING PARALLEL VECTORS. VECTOR SLOPE AND

4* SPACING CAN BE SPECIFIED.

5*TIMING: CP TIME USED BY DEMONSTRATION PROGRAM CALLING THIS

6* SUBROUTINE TO CROSSHATCH 30 RECTANGLES WITH VARIOUS

7* PATTERNS: 2.384 SECONDS ON 6600, 2.750 SECONDS ON

8* 7600.

9*ROUTINE NAME: XHATCH

10*ENTRY NAME: XHATCH

11*STORAGE: 241 OCTAL WORDS

12*ROUTINES CALLED: DRV(J517A).

A* JERRY MELENDEZ C-4

B*CHECK NUMBER OF WORDS IN THE PLOT FILESET

C*CMP SR7600 CROS

D* SW 2 LS 0 TYPE 1

E*CMP SOURCE CARDS 0 RCD OBJECT CARDS 0 BIN

F**CHECK*NUMBER OF WORDS IN*PLOT*FILESET

G*ON DISK F4 COMPAT WU 08/04/71 DECK NONE

1*FORM: CALL FILMCK(N)

2*PURPOSE: CHECK THE NUMBER OF WORDS WRITTEN ON THE PLOT

3* FILESET AND RELEASE THE DATA IF THE PLOT FILESET

4* CONTAINS MORE THAN N WORDS OF DATA.

5*ROUTINE NAME: FILMCK

6*ENTRY NAME: FILMCK

7*STORAGE: 34 OCTAL WORDS OF SCM

8*ROUTINES CALLED: DATAREL(W1Q5B), RGTA (BS4020), BS4020

9* (ALL ON THE SYSTEM).
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  RCD  OBJECT CARDS  56  BIN
J596A F**FILM*PLOT*NORMAL PROBABILITY PAPER
J596A G*CARDS F4  COMPAT WI 06/01/72  DECK 06/01/72
J596A 1*FORM: CALL PLOPR(X,Y,NPTS,INC,LIN,NSYM,CXAA,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), GTA(J528A), DLCH(J567A), DCLV(J567A),
J596A 11* DLGLG(J530A), DLGLN(J530A), DLNLG(J530A), DNLN(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), SBLNG(J540A), SLLIN(J533A),
J596A 15* SLL0G(J540A), TSP(J520A), ALL ON DISK.

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  RCD  OBJECT CARDS  56  BIN
J596B F**FILM*PLOT*NORMAL PROBABILITY PAPER
J596B G*ON DISK F4  COMPAT WI 06/01/72  DECK 06/01/72
J596B 1*FORM: CALL PLOPR(X,Y,NPTS,INC,LIN,NSYM,CXAA,YAA*)
J596B 2*   LABELZ,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(J506A), ALOG10(B305A), ASCL(J510A),
J596B 11* CONVRT(J526A), GTA(J528A), DLCH(J567A), DCLV(J567A),
J596B 12* DLGLG(J530A), DLGLN(J530A), DLNLG(J530A), DNLN(J529A),
J596B 13* DRV(J517A), EXH(J507A), EXL(J507A), FRAME(J523A),
J596B 14* GXA(J518A), GYA(J518A), MAXV(F115A), MINV(F115A),
J596B 15* PLT(J516A), SBLIN(J535A), SBLNG(J540A), SLLIN(J533A),
J596B 16* SLL0G(J540A), TSP(J520A), ALL ON DISK.
**CONTOUR PLOTTING OF ARBITRARILY SPACED DATA POINTS**

**F4** SR6600 SCP 3.1

**D** SW 4 LS 12 TYPE 1

**E** F4 SOURCE CARDS 376 BCD OBJECT CARDS 125 BIN

**F** CONTOUR PLOTTING OF ARBITRARILY SPACED DATA POINTS

**G** CARDS F4 COMPAT WU 04/12/72 DECK 04/12/72

**H** FORM CALL RXPLOT(X, Y, Z, N, NC, CONVAL, DMPX, DMPY, CTITLE, N)

**I** PURPOSE: PRODUCE CONTOUR PLOTS ON FILM OF THE FUNCTION 

**J** WHERE THE (X, Y) PAIRS ARE PERMITTED

**K** TO BE IRREGULARLY SPACED.

**L** IS REQUIRED TO SCALE THE X, Y VALUES TO THE SAME ORDER

**M** OF MAGNITUDE.

**N** ROUTINE NAME: RXPLOT

**O** ENTRY NAMES: RXPLOT, NGONS, IFNGH, PBISEQ, LSTUP

**P** LABELLED COMMON: PRLK01, TRBLK

**Q** STORAGE: 3775 OCTAL WORDS (EXCLUSIVE OF STORAGE WHICH MUST

**R** BE ASSIGNED BY USER)

**S** ROUTINES CALLED: MINV(F115A), MAXV(F115A), PLOJB(J562A), ATAN(B104A), SQRT(B408A).
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  ACD  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)

J598B  A*  V GARDINER    C-4  R MITCHELL T-6  73
J598B  B*PHISTF, HISTOGRAM PLOT ROUTINE
J598B  C*F4    SR16600  CROS MICROFILM
J598B  D*        SW 7  LS 2  TYPE 1
J598B  E*SOURCE CARDS  69  ACD  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)
VOLUME 2 - 9/73
FORM: MAIN PROGRAM

PURPOSE: MAKE MOVIES FROM DATA GIVEN ON TAPE. SEE PAGE 4 OF WRITEUP FOR OTHER USES.

PROGRAM CARD: PROGRAM CALCVT (CALTAPE=100, MUXTAPE=100)

ROUTINES CALLED: PUT/FETCH(M403) * CPAREA(Q401)

VOLUME 2 - 9/73
J601A  A* V. GARDINER C-4 R FRANK 73
J601A  B*DRAW LINEAR-LINEAR TIC MARKS ON FILM.
J601A  C*S4 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 DNLNTM (NX,NY)
J601A  2*PURPOSE: DNLNTM DRAWS A FRAME AROUND THE AREA SPECIFIED
J601A  IN THE LAST CALL TO DGA(J528), IT DRAWS A
J601A  LINEAR-LINEAR GRID OF TIC MARKS, DIVIDING THE
J601A  FRAME INTO A SPECIFIED NUMBER OF INTERVALS.
J601A  NX = NUMBER OF INTERVALS IN WHICH THE X AXIS
J601A  IS DIVIDED, NX GT 0.
J601A  NY = NUMBER OF INTERVALS IN WHICH THE Y AXIS
J601A  IS DIVIDED, NY GT 0.
J601A  10*Routine Name: DNLNTM
J601A  11*ENTRY NAME: DNLNTM
J601A  12*STORAGE: 152 OCTAL WORDS
J601A  13*Routines Called: GXA(J518A), GYA(J518A), DRV(J517A),
J601A  14* NAME COMMON CJE07(10 OCTAL WORDS).
**J602A**

A* V. GARDINER C-4 R FRANK 73

B* DRAW LINEAR AND LOG TIC MARKS ON FILM

C*F4 SR6600 SCP 3.1

D* SW 2 LS 3 TYPE 1.1

E* SOURCE CARDS 99 OBJECT CARDS 30 BIN

F* FILM TIC MARKS

G* DISK F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1

1* FORM1 CALL DLNLGTM(NX) LINEAR X LOG Y

2* CALL DLGLNTM(NY) LOG X, LINEAR Y

3* CALL DLGLGTM LOG X, LOG Y

4* PURPOSE: DRAW GRID OF TIC MARKS, AS DETERMINED BY

5* DGA(J528). A LOG AXIS IS LIMITED TO 25 DECADES.

6* A LINEAR GRID DIVIDES THE AXIS INTO NX OR NY INTERVALS.

7* ROUTINE NAME: DLNLGTM

8* ENTRY NAMES: DLNLGTM, DLGLNTM, DLGLGTM

9* STORAGE: 524 (OCTAL) WORDS

10* ROUTINES CALLED: GXA(J518A), GYA(J518A), DLNLNTM(J601A),

11* DRV(J517A), NAME COMMON CJEO7(10 OCTAL WORDS).

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**J602B**

A* V. GARDINER C-4 R FRANK 73

B* DRAW LINEAR AND LOG TIC MARKS ON FILM

C*F4 SR7600 CROS

D* SW 2 LS 3 TYPE 1

E* SOURCE CARDS 99 OBJECT CARDS 30 BIN

F* FILM TIC MARKS

G* DISK F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1

1* FORM1 CALL DLNLGTM(NX) LINEAR X LOG Y

2* CALL DLGLNTM(NY) LOG X, LINEAR Y

3* CALL DLGLGTM LOG X, LOG Y

4* PURPOSE: DRAW GRID OF TIC MARKS, AS DETERMINED BY

5* DGA(J528). A LOG AXIS IS LIMITED TO 25 DECADES.

6* A LINEAR GRID DIVIDES THE AXIS INTO NX OR NY INTERVALS.

7* ROUTINE NAME: DLNLGTM

8* ENTRY NAMES: DLNLGTM, DLGLNTM, DLGLGTM

9* STORAGE: 531 (OCTAL) WORDS

10* ROUTINES CALLED: GXA(J518A), GYA(J518A), DLNLNTM(J601A),

11* DRV(J517A), NAME COMMON CJEO7(10 OCTAL WORDS).

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**VOLUME 2 - 9/73**
VOLUME 2 - 9/73
A* R.M.FRANK C-4 R.M.FRANK 73

B*DRAW AND SHADE RECTANGLE ON FILM
C*F4 SR6600 SCP 3.1 MICROFILM
D* SW 4 LS 3 TYPE 1.1
E* SOURCE 88 CARDS OBJECT 25 CARDS
F**MICROFILM*RECTANGLE
G*CARDS F4 COMPAT WU 06/11/73 DECK 06/11/73
H*FORM: CALL BARPLOT (X1,X2,Y1,Y2,SPACING,ANGLE)
I*PURPOSE: DRAW SCALED RECTANGLE AND SHADE IT. SCALING
J* IS ESTABLISHED BY PRIOR CALL TO PLOJB(J562) OR
K* PLOTM(J599).
L*ROUTINE NAME: BARPLOT
M*ENTRY NAMES: BARPLOT
N*STORAGE: 467 OCTAL WORDS
O*Routines CALLED: PLOTM(J599)

VOLUME 2 - 9/73
INFORMATION TRANSFER WITH NO PARTICULAR CONVERSION OR INTERPRETATION OTHER THAN DEVICE-DEPENDENT REQUIREMENTS
DIRECT ACCESS CORE/DISK I/O

REVIEWER: J. MOORE, C-2

K101B  A*  EMILY WILLBANKS C-2  J. MOORE  71
K101B  B*IRANR,IRANW,IRANRE,IRANWE - 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**IRANR*IRANW*IRANRE*IRANWE*DIRECT ACCESS*RANDOM*I0
K101B  G*ON DISK  F4  COMPAT  WU 10/10/72REV 1 DECK 10/10/72REV 1
K101B  I*FORM1  CALL IRANR(RQT,LCMV,NWORDS,NSECT,IWAIT)
K101B  2*  CALL IRANW(RQT,LCMV,NWORDS,NSECT,IWAIT)
K101B  3*  CALL IRANRE(RQT,LCMV,NWORDS,NSECT,IWAIT)
K101B  4*  CALL IRANWE(RQT,LCMV,NWORDS,NSECT,IWAIT)
K101B  5*PURPOSE: IRANR/IRANRE READS NWORDS FROM SECTOR NSECT OF FILESET
K101B  6*  SET N INTO LCM VARIABLE LCMV OR WORD NLCM. IRANW/IRANWE
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: IRANW
K101B  11*Entry Names: IRANR,IRANW,IRANRE,IRANWE
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*I0
K102B  G*ON DISK  F4  COMPAT  WU 10/10/72REV 1 DECK 10/10/72REV 1
K102B  I*FORM1  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 REAUS NWORDS FROM SECTOR NSECT OF FILESET
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*  IRANW(K101B).
K102B  10*Routine Name: IRAN
K102B  11*Entry Names: IRANR,IRANW,IRANRE,IRANWE
K102B  12*Storage: 44 OCTAL WORDS
K102B  13*Self Contained.
K1-2

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
B*MOVEMC MOVES AN ARRAY IN MAIN CORE THROUGH ECS
C*FORTRAN IV SR6600 SCP 3.1
D* SW 3 LS 1 TYPE 1
E*SOURCE DECK 25 BCD OBJECT CARDS 10 BIN
F*ECR, ECWR (ON THE SYSTEM)

K202A

A* LARA BAKER ENG-DO 69
B*MOVEEC MOVES AN ARRAY IN ECS THROUGH MAIN CORE
C*FORTRAN IV SR6600 SCP 3.1
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 20 BCD OBJECT CARDS 9 BIN
F*ECR, ECWR (ON THE SYSTEM)
A* LARA BAKER ENG-00 69
B*ECR READS ONE WORD FROM ECS
C*COMPASS SR6600 SCP 3.1
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 13 BCD OBJECT CARDS 4 BIN
F**ECS*ECR*READ
G*CARDS F4 COMPAT WU 08/01/69 DECK 08/01/69
1*USAGE: ANS = ECR (LOCE)
2*PURPOSE: TO READ ONE WORD FROM EXTENDED CORE STORAGE AND
3*RETURN THE CONTENTS OF THAT WORD AS THE RESULT OF THE
4*FUNCTION CALL.
5*TIMING: 15.0 MICROSECONDS
6*STORAGE: 7 WORDS
7*SELF CONTAINED.

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

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A* LARA BAKER ENG-00 69
B*ECW WRITES ONE WORD TO ECS
C*COMPASS SR6600 SCP 3.1
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 11 BCD OBJECT CARDS 3 BIN
F**ECS*ECW*WRITE
G*CARDS F4 COMPAT WU 08/01/69 DECK 08/01/69
1*USAGE: CALL ECW (MCAD,LOCE)
2*PURPOSE: TO WRITE ONE WORD INTO EXTENDED CORE STORAGE
3*FROM MAIN CORE.
4*TIMING: 12.6 MICROSECONDS
5*STORAGE: 5 WORDS
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(MCAP,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).

K22A A* O PLAISTED   C-4   J. MOORE   C-2   72
K22A B*QUICK EXCHANGE OF TWO SCM ARRAYS
K22A C*COMPASS   SR7600   CROS
K22A D* SW 2   LS 2   TYPE 2
K22A E*SOURCE CARDS 85 BCD OBJECT CARDS 5 BIN
K22A F**VECTOR*SCM VECTOR*VECTOR EXCHANGE*QEXCH
K22A G*CARDS   F4 COMPAT WU 09/18/72   DECK 09/18/72
K22A 1*FORM: CALL QEXCH(A,B,N,M,K)
K22A 2*PURPOSE: QUICK EXCHANGE OF TWO SCM ARRAYS
K22A 3*ROUTINE NAME: QEXCH
K22A 4*ENTRY NAME: QEXCH
K22A 5*STORAGE: 26 OCTAL WORDS
K22A 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

VOLUME 2 - 9/73
K3  SEQUENTIAL I/O

REVIEWER: J. NORRIS, C-2

K301B  A*  EMILY WILLBANKS  C-2  71
K301B  B*COPY, COPYF, COPYR - COPY PORTIONS OF FILESETS
K301B  C*CMP  SR7600  CROS
K301B  D*  SW 3  LS 0  TYPE 1
K301B  E*  0  BCD  0  BIN
K301B  F**COPY*COPYF*COPYR - COPY PORTIONS OF*FILESETS
K301B  G*ON DISK  F4  COMPAT  WU 07/12/71  DECK NONE
K301B  H*FORM1  CALL COPY(I,0)
K301B  I*CALL COPYF(I,0,NF)
K301B  J*CALL COPYR(I,0,NR)
K301B  K*PURPOSE: COPY DATA FROM FILESET I TO FILESET O, STARTING
K301B  L*AT CURRENT FILESET POSITIONS, COPY COPIES TO EOI.
K301B  M*COPYF COPIES NF FILES OR TO EOI, "COPYR COPIES NR RECORDS
K301B  N*OR TO EOI.
K301B  O*Routine NAME: COPY
K301B  P*ENTRY NAMES: COPY, COPYF, COPYR
K301B  Q*STORAGE: 145B WORDS OF SCM.
K301B  R*ROUTINES CALLED: GETBA, OPEN, WAITR, SYSTEM, ABNORML.
K301B  S*OTHER SCM EXTERNALS: IOGEN, BUFF.

K303B  A*  EMILY WILLBANKS  C-2  71
K303B  B*COPYSF - COPY SHIFTED FILE FOR SINGLE SPACED LISTING
K303B  C*FIV  SR7606  CROS
K303B  D*  SW 3  LS 0  TYPE 1
K303B  E*  0  BCD  0  BIN
K303B  F**COPYSF*COPY*SHIFTED FILE
K303B  G*ON DISK  F4  COMPAT  WU 06/22/71  DECK NONE
K303B  H*FORM1  CALL COPYSF(I0,N,P)
K303B  I*PURPOSE: COPY N FILES OF FILESET I (CONTAINING BCD CHAR-
K303B  J*ACTERS) TO FILESET O, INSERTING A BLANK AS THE FIRST CHAR-
K303B  K*ACTER OF EACH RECORD. IF FILESET O HAS FILM OR SFILM ACTIVE
K303B  L*DISPOSITION, IT WILL BE WRITTEN IN 4020 COMMAND FORMAT.
K303B  M*ENTRY NAMES: COPYSF
K303B  N*ROUTINE NAME: COPYSF
K303B  O*STORAGE: 2618 WORDS.
K303B  P*ROUTINES CALLED: EOI, IFENDF, INPUTC, LENGTH, MARG, OUTPTC,
K303B  Q* (ALL ON SYSTEM).

VOLUME 2 - 9/73
**BULLET USER LIBRARY CONTROL ROUTINE**

**C**SR7600 CROS

**D**SW 3 LS 0 TYPE 1

**E**0 BCD 0 BIN

**F**ULCR=USER=LIBRARY

**G**ON DISK F4 COMPAT WU 06/22/71 DECK NONE

**I**FORM: CALL ULCR(ISL)

**2**PURPOSE: CONVERT SET OF RELOCATABLE BINARY DECKS ON SEQUENTIAL FILESET I INTO RANDOM LIBRARY FILESET L.

**4** SUITABLE FOR LIBRARY L ON SLOAD OR $LDGO CONTROL CARDS.

**5**ROUTINE NAME: ULCR

**6**ENTRY NAME: ULCR

**7**STORAGE: 6,400B WORDS OF SCM, 5,000B WORDS OF LCM.

**8**ROUTINES CALLED: GETBA(ON SYSTEM).

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**COPYFF: COPY FORTRANFILE**

**C**SR7600 CROS

**D**SW 3 LS 0 TYPE 1

**E**0 BCD 0 BIN

**F**COPYFF=COPY FORTRAN FILE

**G**ON DISK F4 COMPAT WU 06/22/71 DECK NONE

**I**FORM: CALL COPYFF(IOO~N~NAOV)

**2**PURPOSE: COPY N FILES OF FILESET I (CONTAINING BCD CHARACTERS) TO FILESET O. NAOV PAGE EJECTS ARE DONE BETWEEN EACH 129 CHARACTERS ARE READ AND WRITTEN PER RECORD. IF FILESET 0 HAS FILN OR SFILM ACTIVE DISPOSITION, IT WILL BE WRITTEN IN 4020 COMMAND FORMAT.

**5**FILESET 0 HAS FILN OR SFILM ACTIVE DISPOSITION; IT WILL BE WRITTEN IN 4020 COMMAND FORMAT.

**7**ROUTINE NAME: COPYFF

**8**ENTRY NAMES: COPYFF

**9**STORAGE: 223B WORDS OF SCM.

**10**ROUTINES CALLED: EO1, IFENDF, INPUTC, LENGTH, NARG, OUTPTC.

**11** (ALL ON SYSTEM).

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**VOLUME 2 - 9/73**
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 05/10/72 REV. 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, DFILF, 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, OUTPB, OUTPTC, PUTIT, RDBUF,
K306B 12* REWIND, SHIFN, SKIPF, SKIPR (ON THE SYSTEM).

K307B A* J. NORRIS     C-2 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 06/15/73 REV. 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(W364B),
K307B 7* CKSUM2(K310B), LCROLT/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).

VOLUME 2 - 9/73
K3088 A*  EMILY WILLBANKS C-2  J. NORRIS  73
K3088 B**COPYRS - COPY ONE SEQUENTIAL RECORD TO RANDOM FILESET
K3088 C**COMPASS SR7600 CRS
K3088 D* SW 3 LS 0 TYPE 1.2
K3088 E* SOURCE 0 C-2 OBJECT 0 C-2
K3088 F**COPY*RANDOM*SEQUENTIAL
K3088 G**ON DISK F4 COMPAT WU 06/13/73 REV.1 DECK NONE
K3088 1*FORM1 CALL COPYRS(IS,OR,SL)
K3088 2* CALL COPYRS(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: COPYRS
K3088 9* ENTRY NAME: COPYRS
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* LCMREL(Q306B), LCROFS(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 CRS
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*FORM1 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* LCROFS(W404B), COPYBSF(W404B).
K3098 15*OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)
K3098 16*LCM BLOCK NAMES: MALCM, RANSEQ

VOLUME 2 - 9/73
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
CONVERT SEQUENTIAL/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 I*FORM: CALL WRIT94(A,NW,NT)
K501A 2* CALL READ94(A,NW,NT)
K501A 3*PURPOSE: WRITES BITS 56 THRU 21 OF WORDS 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 WR94F8T(A,NW,NT,T)
K502A 2* CALL RD94F8T(A,NW,NT,T)
K502A 3*PURPOSE: WR94F8T 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* RD94F8T 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: WR94F8T
K502A 11*Entry Names: WR94F8T, RD94F8T
K502A 12*Storage: 129 OCTAL WORDS
K502A 13*Routines Called: SHIFN(M401A) WRIT94F8T AND READ94(K501A).

VOLUME 2 - 9/73
K503A  A*  JAMES F. BEM  C-4  J. NORRIS  73
K503A  B*CR0S76 - 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  I*CONTROL CARD FORM:
K503A  2* ASSIGN AB, CR0S76.
K503A  3* COPY(CROS76,CROS)
K503A  4* RETURN(CROS76)
K503A  5* ASSIGN MT, TAPEIN(PUL,XX,....,SMB)
K503A  6* ASSIGN MT, TAPEOUT(....)
K503A  7* CR0S(BIN, TAPEIN, TAPEOUT, OUTPUT)
K503A  8* PURPOSE: CONVERT 7600-FORMAT TAPE TO 6600-FORMAT TAPE
K503A  9* ROUTINE NAME: CR0S76
K503A  10* STORAGE: 16000 OCTAL WORDS FOR BCD OUTPUT, VARIABLE
K503A  11* FOR BINARY. SEE WRITEUP.
K503A  12* SELF CONTAINED

K503A  A*  JAMES F. BEM  C-4  J. NORRIS  73
K503A  B*CR0S76 - 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  I*CONTROL CARD FORM:
K503A  2* ASSIGN AB, CR0S76.
K503A  3* COPY(CROS76,CROS)
K503A  4* RETURN(CROS76)
K503A  5* ASSIGN MT, TAPEIN(PUL,XX,....,SMB)
K503A  6* ASSIGN MT, TAPEOUT(....)
K503A  7* CR0S(BIN, TAPEIN, TAPEOUT, OUTPUT)
K503A  8* PURPOSE: CONVERT 7600-FORMAT TAPE TO 6600-FORMAT TAPE
K503A  9* ROUTINE NAME: CR0S76
K503A  10* STORAGE: 16000 OCTAL WORDS FOR BCD OUTPUT, VARIABLE
K503A  11* FOR BINARY. SEE WRITEUP.
K503A  12* SELF CONTAINED

K503A  A*  JAMES F. BEM  C-4  J. NORRIS  73
K503A  B*CR0S76 - 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  I*CONTROL CARD FORM:
K503A  2* ASSIGN AB, CR0S76.
K503A  3* COPY(CROS76,CROS)
K503A  4* RETURN(CROS76)
K503A  5* ASSIGN MT, TAPEIN(PUL,XX,....,SMB)
K503A  6* ASSIGN MT, TAPEOUT(....)
K503A  7* CR0S(BIN, TAPEIN, TAPEOUT, OUTPUT)
K503A  8* PURPOSE: CONVERT 7600-FORMAT TAPE TO 6600-FORMAT TAPE
K503A  9* ROUTINE NAME: CR0S76
K503A  10* STORAGE: 16000 OCTAL WORDS FOR BCD OUTPUT, VARIABLE
K503A  11* FOR BINARY. SEE WRITEUP.
K503A  12* SELF CONTAINED

VOLUME 2 - 9/73
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 PAPER TAPE I/O
K6AA  D*             SW 7       LS 17 TYPE 2
K6AA  E*F4 SOURCE CARDS 650 BCD OBJECT CARDS 84 BIN
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* CARD1 REQUEST TAPE5,PR,UL,
K6AA  5*ROUTINE NAME: UT01
K6AA  6*ENTRY NAMES: UT01,FILL,WRITE,BUF,GETNEXT,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 CARD1 REQUEST TAPE,PP,UD.
K6AB  6*ROUTINE NAME: UT02
K6AB  7*ENTRY NAME: UT02
K6AB  8*STORAGE: 416000 (OCTAL) OWNDS
K6AB  9*SELF CONTAINED.
A* LARA BAKER  TD=7  JAN NORRIS  72
B*UT03 - RUN FORTRAN CARDS TO GE PAPER TAPE CONVERTER
C*F4 MP6600  SCP 3,1 PAPER TAPE I/O
D* SW 3  LS 26  TYPE 2
E*F4 SOURCE CARDS  724 BCD  OBJECT CARDS  125 BIN
F**UT03*CARDS*TAPE*GE
G*CARDS F4 COMPAT WU 08/29/72  DECK 08/29/72
1*FORM: MAIN PROGRAM
2*PURPOSE: THIS PROGRAM CONVERTS A RUNNING 6600 FORTRAN
3* PROGRAM ON CARDS TO GE FORTRAN FORMAT ON PAPER TAPE,
4* LINE NUMBERS ARE ADDED AND TRAILING BLANKS ARE REMOVED.
5* REQUIRES THE CONTROL CARD: REQUEST TAPE5,PP,UD.
6*ROUTINE NAME: UT03
7*ENTRY NAME: UT03
8*STORAGE: 42,200 OCTAL WORDS.
9*SELF CONTAINED.
PROGRAM MAINTENANCE

PROGRAMS WHICH MAKE IT EASIER TO MAINTAIN AND DOCUMENT PROGRAMS.
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*MP7600 CROS 3.1
L301A D* SW 15 LS 44 TYPE 1
L301A E*7600 SOURCE DECK = TAPE NO. LE242LO0 OBJECT DECK 809 BIN
L301A F**TIDY*RENUMBER AND *EDIT*FORTRAN*SOURCE PROGRAMS
L301A G*ON DISK F4 COMPAT WU 08/29/72 DECK 08/29/72
L301A H*6600 CONTROL CARD FORM:
L301A I*OBJECT DECK = TAPE NO. LC650LO0 OBJECT DECK 1583 BIN
L301A J*TIDY (INPUT, PUNCH, OUTPUT, TAPE20, TAPE21)
L301A K*ENTRY NAME: TIDY
L301A L*Routine Name: TIDY
L301A M*STORAGE: 57000 OCTAL WORDS
L301A N*Routines Called: SELF CONTAINED

VOLUME 2 - 9/73
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

VOLUME 2 - 9/73
L4-2

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

VOLUME 2 - 9/73
M1 SORTING

REVIEWER: P. IWANICHUK, C-4

M101A A* R. M. FRANK C-4

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,X,T,Y1,...,YN)

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

M115A B*SORECS

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**SORECS

M115A G*CARDS F4 COMPAT WU 08/13/70 DECK 08/13/70

M115A 1*USE: CALL SORTECS(N,L,X,S,T,Y1,...,YN)

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 6* I.E.: 2*58*N**1.29 MICROSECONDS.

M115A 7*Routines Called: ECWR (ON THE SYSTEM).

M116A A* ROGER STUTZ T-2

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,JX,NZ)

M116A 2* CALL ORDER2(IA,ISEARCH,NX,IC,JX,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).
A* PAUL IWANCHUK C-4 P. IWANCHUK 72

B*SORT2 - TWO LEVEL EXTENDED SORT ROUTINE

C*F4

SR6600 SCP 3.1

D* SW 3 LS 2 TYPE 1.1

E*F4 SOURCE CARDS 44 BCD OBJECT CARDS 12 BIN

F**SORT2*SORTING*TWO LEVEL EXTENDED SORT

G*CARDS F4 COMPAT WU 06/14/73 REV 2 DECK 06/14/73 REV 1

H*FORM: CALL SORT2(N,IY1,INC1,IY2,INC2,IT,M)

I*PURPOSE: OBTAIN THE SORTING ORDER FOR TWO TABLES IY1 AND IY2.

J* IY2 IS USED TO DETERMINE THE ORDERING ONLY OF ELEMENTS

K* OF IY1 WHICH ARE IDENTICAL. OTHERWISE, THE ORDERING

L* IS BASED ON THE ELEMENTS OF IY1.

M*ROUTINE NAME: SORT2

N*ENTRY NAME: SORT2

O*STORAGE: 204 (OCTAL) WORDS

P*SELF CONTAINED

A* PAUL IWANCHUK C-4 P. IWANCHUK 72

B*SORT2 - TWO LEVEL EXTENDED SORT ROUTINE

C*F4

SR7600 CROS

D* SW 3 LS 2 TYPE 1.1

E*F4 SOURCE CARDS 44 BCD OBJECT CARDS 12 BIN

F**SORT2*SORTING*TWO LEVEL EXTENDED SORT

G*CARDS F4 COMPAT WU 06/14/73 REV 2 DECK 06/14/73 REV 1

H*FORM: CALL SORT2(N,IY1,INC1,IY2,INC2,IT,M)

I*PURPOSE: OBTAIN THE SORTING ORDER FOR TWO TABLES IY1 AND IY2.

J* IY2 IS USED TO DETERMINE THE ORDERING ONLY OF ELEMENTS

K* OF IY1 WHICH ARE IDENTICAL. OTHERWISE, THE ORDERING

L* IS BASED ON THE ELEMENTS OF IY1.

M*ROUTINE NAME: SORT2

N*ENTRY NAME: SORT2

O*STORAGE: 207 (OCTAL) WORDS

P*SELF CONTAINED
M118A A* R.M. FRANK C-4 P. IWANCHUK 72
M118A R*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, XBAR-N, I, MFLAG)
M118A 2*PURPOSE: SEARCHES A TABLE OF N MONOTONIC INTEGER OR NORMALIZED FLOATING POINT NUMBERS, X, FOR XBAR, ON RETURN
M118A 3* I CONTAINS THE INDEX OF THE TABLE ENTRY FOUND EQUAL
M118A 4* TO XBAR AND MFLAG = 0, OR I IS SET SO THAT ABS(X(I)) = 0. IF XBAR IS NOT
M118A 5* WITHIN THE RANGE OF THE TABLE X RETURN IS WITH MFLAG = 2.
M118A 6* ROUTINE NAME: SEARCH
M118A 7* ENTRY NAME: SEARCH
M118A 8* STORAGE: 207 OCTAL WORDS,
M118A 9* 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, XBAR-N, I, MFLAG, INC)
M119A 2*PURPOSE: TO RAPIDLY SEARCH AN ARRAY OF MONotonically INCREASING INTEGERS OR NORMALIZED FLOATING POINT NUMBERS IN ECS.
M119A 3* ROUTINE NAME: ESEARCH
M119A 4* ENTRY NAME: ESEARCH
M119A 5* STORAGE: 154 OCTAL WORDS.
M119A 7* ROUTINES CALLED: ECR(K203A).
M1AA A * R. F. THOMAS T-5
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*, RSRST*, MERGE*, LEN1*,
M1AA 7 AND LEN2*. THE FOLLOWING STANDAR 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 7094 INTERNAL 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).
<table>
<thead>
<tr>
<th>M401A</th>
<th>A</th>
<th>H.L. BUZBEE</th>
<th>C-4</th>
<th>J.D. KERSHNER</th>
<th>67</th>
</tr>
</thead>
<tbody>
<tr>
<td>M401A</td>
<td>B</td>
<td>SHIFT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>C</td>
<td>COMPASS</td>
<td>SR6600</td>
<td>SCP 3.1</td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>D</td>
<td>SW 1</td>
<td>LS 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>E</td>
<td>COMPASS SOURCE CARDS</td>
<td>30 HCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>F</td>
<td>#SHIFT AND SHIFT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>G</td>
<td>ON DISK</td>
<td>F4 COMPAT</td>
<td>WU 01/24/69REV 3</td>
<td>DECK 01/02/69REV 2</td>
</tr>
<tr>
<td>M401A</td>
<td>H</td>
<td>CALL SHIFT(IN,OUT, NBITS) WHERE IN IS THE WORD TO BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>I</td>
<td>2*SHIFTED, OUT IS THE SHIFTED RESULT NBITS IS THE NUMBER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>J</td>
<td>3*OF BITS TO BE SHIFTED LEFT OR RIGHT, NBITS POSITIVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>K</td>
<td>4*INDICATES A RIGHT SHIFT, NEGATIVE A LEFT SHIFT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>L</td>
<td>5*SIGN EXTENSION AND END AROUND ARE ZEROED OUT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>M</td>
<td>CALL SHIFTN(A,B,N) WHERE A IS THE WORD TO BE SHIFTED, B IS THE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>N</td>
<td>7*RESULT, AND N IS THE NUMBER OF BITS TO SHIFT. N POSITIVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>O</td>
<td>8*PROduces LEFT SHIFT(ENd AROUND), N NEGATIVE PROduces RIGHT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>P</td>
<td>9*SHIFT(END-OFF WITH SIGN EXTENSION).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>Q</td>
<td>10*STORAGE 13 WORDS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M401A</td>
<td>R</td>
<td>11*THIS ROUTINE IS SELF CONTAINED</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**M4.2**

**A.** PUTS AND FETCHES CHARACTERS

**C.** COMPASS

**R.** F. FRANK  

**P.** IWANCHUK

**M403A**

**E.** SOURCE CARDS  

**S.** SW 1  

**O.** LS 1  

**C.** SCP 3.1  

**E.** M403A  

**P.** PUTS AND FETCHES CHARACTERS

**C.** COMPASS

**R.** F. FRANK

**P.** IWANCHUK

**M403A**

**F.** M403A

**P.** PUT*FETCH*CHARACTER

**C.** DISK

**R.** SR6600

**P.** SCP 3.1

**M403A**

**O.** M403A  

**C.** E*SOURCE CARDS  

**E.** 43  

**P.** BCD

**M403A**

**E.** OBJECT CARDS

**S.** 6

**C.** BIN

**M403A**

**E.** M403A  

**P.** CHARACTERS

**C.** DISK

**R.** F4 COMPAT

**P.** WU 05/25/73 REV.3

**M403A**

**O.** M403A  

**C.** CALL PUT 

**R.** (N,x,Y)

**M403A**

**O.** M403A  

**C.** WHERE

**R.** N = NTH CHARACTER OF ARRAY X

**M403A**

**O.** M403A  

**C.** X = ARRAY INTO WHICH Y IS TO BE PUT

**M403A**

**O.** M403A  

**C.** Y = CHARACTER TO BE PUT INTO ARRAY X

**M403A**

**O.** M403A  

**C.** CALL FETCH(N, X, Y)

**M403A**

**O.** M403A  

**C.** WHERE

**R.** N = NTH CHARACTER OF ARRAY X

**M403A**

**O.** M403A  

**C.** X = ARRAY FROM WHICH CHARACTER IS TO BE FETCHED

**M403A**

**O.** M403A  

**C.** Y = WORD INTO WHICH NTH CHARACTER OF X IS TO BE STORED

**M403A**

**O.** M403A  

**C.** PURPOSE: PUT A CHARACTER INTO NTH CHARACTER OF AN ARRAY

**M403A**

**O.** M403A  

**C.** OR FETCH THE NTH CHARACTER FROM AN ARRAY OF

**M403A**

**O.** M403A  

**C.** 10 CHARACTER WORDS

**M403A**

**O.** M403A  

**C.** AND STORE IT RIGHT ADJUSTED INTO A WORD

**M403A**

**O.** M403A  

**C.** ROUTINE NAME: PUT

**M403A**

**O.** M403A  

**C.** ENTRY NAMES: PUT, FETCH

**M403A**

**O.** M403A  

**C.** STORAGE: 42 (OCTAL) WORDS

**M403A**

**O.** M403A  

**C.** SELF CONTAINED
**M404A**

A* L. RUDSINSKI  C-4  R FRANK  72

M404A B*MOVE STRING OF CHARACTERS FROM X TO Y

M404A C*COMPASS  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*FORMT  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 NAMEI  PUTIT

M404A 5*ENTRY NAMEI  PUTIT

M404A 6*STORAGEI  102  OCTAL WORDS

M404A 7*ROUTINES CALLEDI  PUT(M403A)

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**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*USAGE1  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*STORAGEI  76  (OCTAL) WORDS

M405A 5*USES1  ASHIFT(M406A), SHIFT(M401A).

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VOLUME 2 - 9/73
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 OR 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  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.

VOLUME 2 - 9/73
M411B
 A* VERNA GARDINER C-4
 B* NONES AND IPARITY -RETURN NUMBER OF ONES OR PARITY
 C* CMP SR7600 CROS
 D* SW 2 LS 1 TYPE 1
 E* CMP SOURCE CARDS 20 BCD OBJECT CARDS 4 BIN
 F** NONES* IPARITY
 G* ON DISK F4 COMPAT WU 03/02/72 DECK 03/02/72
 H1*FORM1 N = NONES(WORD)
 H2* I = IPARITY(WORD)
 H3* PURPOSE! NONES RETURNS NUMBER OF ONES IN WORD, IPARITY
 H4* RETURNS 1 IF NUMBER OF ONES IN WORD IS ODD OR 0 IF
 H5* NUMBER OF ONES IS EVEN.
 H6* ROUTINE NAME! NONES
 H7* ENTRY POINTS! NONES, IPARITY
 H8* STORAGE! 12(OCTAL) WORDS.
 H9* SELF CONTAINED.

M412A
 A* B, BACON C-2 P, IWANCHUK, C-4 70
 B* LOGICAL DIFFERENCE (EXCLUSIVE OR) INLINE FUNCTION
 C* CMP OR6600 SCP 3. RUN COMPILER
 D* SW 1 LS 0 TYPE 1, 2
 E* SOURCE 0 C-2 OBJECT 0 C-2
 F** EXCLUSIVE OR* LOGICAL DIFFERENCE* INLINE FUNCTION
 G* DISK F4 COMPAT WU 04/20/73 DECK NONE
 H1* FORM1 OUT = EXOR (IN1, IN2)
 H2* PURPOSE! RETURN THE LOGICAL DIFFERENCE (i.e. EXCLUSIVE
 H3* OR) OF THE TWO ARGUMENTS IN1 AND IN2. THIS
 H4* FUNCTION IS INLINE (IN THE RUN COMPILER) AND IS
 H5* MODELESS (i.e., THE RESULT WILL NEVER BE CONVERTED
 H6* TO ANOTHER MODE).
 H7* ENTRY NAMES! EXOR

M412B
 A* B, BACON C-2 P, IWANCHUK, C-4 70
 B* LOGICAL DIFFERENCE (EXCLUSIVE OR) INLINE FUNCTION
 C* CMP OR7600 CROS RUN COMPILER
 D* SW 1 LS 0 TYPE 1, 2
 E* SOURCE 0 C-2 OBJECT 0 C-2
 F** EXCLUSIVE OR* LOGICAL DIFFERENCE* INLINE FUNCTION
 G* DISK F4 COMPAT WU 04/20/73 DECK NONE
 H1* FORM1 OUT = EXOR (IN1, IN2)
 H2* PURPOSE! RETURN THE LOGICAL DIFFERENCE (i.e., EXCLUSIVE
 H3* OR) OF THE TWO ARGUMENTS IN1 AND IN2. THIS
 H4* FUNCTION IS INLINE (IN THE RUN COMPILER) AND IS
 H5* MODELESS (i.e., THE RESULT WILL NEVER BE CONVERTED
 H6* TO ANOTHER MODE).
 H7* ENTRY NAMES! EXOR

VOLUME 2 - 9/73
M413A A* B. BACON C-2 P. IWANCHUK, C-4 70
M413A B*SHIFT - INLINE FUNCTION
M413A C*CMP OR6600 SCP 3. RUN 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*FORM1 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*FORM1 OUT = SHIFT (IN:BITS)
M413B 2*PURPOSE: 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
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 0*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 21BCDREL 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,LIHOL,INT) WHERE ISW AND INT ARE NAMES OF
N103A 12*FORTRAN IV INTEGERS AND LIHOL 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*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 0*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).
N1-2

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

A*  JERRY MELENDEZ  C-4  71
B*RETURN FROM AN INTERRUPT STATE
C*CMP  SR7600  CROS
D*  SW 2  LS 0  TYPE 1
E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
F**RETURN FROM AN INTERRUPT STATE
G*ON DISK  F4 COMPAT WU 08/04/71 DECK NONE
1*FORM: CALL RETNH
2* CALL RETNS
3* CALL RETNTM
4* CALL RETND
5*PURPOSE: RETURN THE JOB TO ITS PREVIOUS OPERATING STATE.
6*Routine name: RETN
7*ENTRY NAMES: RETNH, RETNS, RETNTM, RETND.
8*STORAGE: 30 OCTAL WORDS OF SCM.
9*SELF CONTAINED.
N108B A* ANN SOLEM C-4 71
N108B B*XIT, XITFIX AND XITSAVE - HANDLE TASK ABORT
N108B C*F4 SR7600 CROS
N108B D* SW 4 LS 0 TYPE 1.2
N108B E*F4 SOURCE CARDS 0 C-2 OBJECT CARDS 0 C-2
N108B F**XIT*HANDLE*TASK*ABORT*SOFTWARE*INTERRUPT
N108B G*ON DISK F4 COMPAT WU 03/14/73 REV 1 DECK NONE
N108B 1*FORM: CALL XIT(LOC)
N108B 2* CALL XITFIX(KJST,IP,IPSD)
N108B 3* CALL XITSAVE(LOC,LOOP)
N108B 4* CALL XIT(LOC,LOOP)
N108B 5*PURPOSE: XIT ALLOWS A TASK TO CONTINUE RUNNING AFTER A
N108B 6* TASK ABORT HAS BEEN REQUESTED, TRANSFERRING
N108B 7* CONTROL TO LOC.
N108B 8* XITFIX RETURNS INFORMATION REGARDING THE LAST
N108B 9* TASK ABORT AND TURNS OFF THE ERROR FLAG.
N108B 10* XITSAVE AND XIT SAVE AND RESTORE AN EXIT, SO THAT
N108B 11* A DIFFERENT EXIT CAN BE ESTABLISHED,
N108B 12*ROUTE NAME: XIT
N108B 13*ENTRY NAMES: XIT, XITFIX, XITSAVE
N108B 14*STORAGE: 266 OCTAL WORDS OF SCM
N108B 15*ROUTINES CALLED: ENTR(N106), GETSPK(Q413), SETSPK(Q413),
N108B 16* RETNS(N107), REMARK(Q116), ABORT(N203), OUTPTS(SYSTEM)

N109B A* JERRY MELENDEZ C-4 71
N109B B*END INTERRUPT REQUEST
N109B C*CMP SR7600 CROS
N109B D* SW 2 LS 0 TYPE 1
N109B E*CMP SOURCE CARDS 0 BCD 0 BIN
N109B F**END*INTERRUPT REQUEST
N109B G*ON DISK F4 COMPAT WU 08/05/71 DECK NONE
N109B 1*FORM: CALL ENDH
N109B 2* CALL ENDS
N109B 3* CALL ENDTM
N109B 4* CALL ENDD
N109B 5*PURPOSE: TO END THE OUTSTANDING INTERRUPT REQUEST(S) OF A
N109B 6* GIVEN TYPE.
N109B 7*ROUTE NAME: ENDS
N109B 8*ENTRY NAMES: ENDH, ENDS, ENDTM, ENDD
N109B 9*STORAGE: 33 OCTAL WORDS OF SCM.
N109B 10*SELF CONTAINED
DUMPING

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

REVIEWER: A. SOLEM, C-4

N203A A*       VERA GARDINER  C-4
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*       VERA GARDINER  C-4
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  B*DUMP CENTRAL MEMORY LOCATIONS
N204A  C*DUMPING  N2  FORTRAN COMPASS SR6600  SCOPE
N204A  SW 2  LS 2
N204A  D*FORTRAN, COMPASS CARDS 73BCD BINARY CARDS 28BIN
N204A  E*DUMPING
N204A  F*ON DISK  F4  COMPAT  WU 05/09/68 REV  DECK 05/09/68 REV
N204A  G*CALL DUMP A (FWA,LWA,M)
N204A  H*DUMPS CENTRAL MEMORY FROM LOCATION RA+FWA TO
N204A  I*LOCATION RA+LWA IN FORMAT M.
N204A  J*STORAGE - 430 OCTAL WORDS
N204A  K*Routines Called:  SYSTEM, OUTPTC, SIOS, C4020, BS4020, XRCL,
N204A  L*ON THE SYSTEM)

N205A  A*  B L BUZBEE  C-4  68
N205A  B*SELECTIVE DUMPING OF A CDC 6600 LOGICAL I/O UNIT
N205A  C*DEBUGGING  N2  F4  SR6600  SCOPE
N205A  SW 4  LS 1
N205A  D*F4 SOURCE CARDS 22BCDF4 OBJECT CARDS 20BIN
N205A  E*selective dumping of a Cdc 6600 logical i/o unit
N205A  F*CARDS  F4  COMPAT  WU 10/01/68  DECK 10/01/68
N205A  G*CALL TAPDMP(NF,M,F,NF,1,NF,N1,N2,M0,A,ML) DUMPS RECORDS N1
N205A  H*THRU N2 OF FILE NF ON UNIT NT, STORAGE = 220 WORDS, USES
N205A  I*ON THE SYSTEM)

N207A  A*  EMILY WILLBANKS  C-2  71
N207A  B*DUMP BLOCK NAME
N207A  C*CMP BLOCK NAME  SR7600  CROS
N207A  D*SW 2  LS 0  TYPE 1
N207A  E*NO CARDS
N207A  F**DMPBN*DUMP BLOCK NAME
N207A  G**ON DISK  F4  COMPAT  WU 10/19/72  DECK NONE
N207A  H*FORM: CALL DMPBN(BN,FWA,LWA,FORMAT,TYPE,FSO)
N207A  I*CALL DMPBN(BN,LWA)
N207A  J*PURPOSE: DUMP PORTION OF SCM OR LCM NAMED BLOCK
N207A  K*ONTO A FILESET ACCORDING TO A FORMAT.
N207A  L*Routine Name: DMPBN
N207A  M*Entry Names: DMPBN
N207A  N*SCM-LCM BLOCK NAMES: MALCM OR MASCN AND
N207A  O*BLOCK NAME GIVEN AS ARGUMENT(SCM OR LCM).
N207A  P*STORAGE: 146 OCTAL WORDS OF SCM
N207A  Q*Routines Called: MEMREQ, MEMLEN, MEMREL(ALL ON THE SYSTEM).
N208B A* EMILY WILLBANKS C-2 71
N208B B*DMPPK, DMPXX, DMPXPG - DISPLAY EXCHANGE PACKAGE
N208B C*F4 0 BCD 0 BIN
N208B D* SW 3 LS 0 TYPE 1
N208B E* 0 BCD 0 BIN
N208B F**DMPPK*DMPXX*DMPXPG*DISPLAY*EXCHANGE PACKAGE
N208B G*ON DISK F4 COMPAT WU 07/09/71 DECK NONE
N208B 1*FORM1 CALL DMPPK(FSO,PACK)
N208B 2* CALL DMPXX(FSO,PACK,NTASK,NAME)
N208B 3* CALL DMPXPG(FSO)
N208B 4*PURPOSE: PRINT THE 16-WORD EXCHANGE PACKAGE IN PACK IN
N208B 5* DMPX EXCHANGE PACKAGE FORMAT ON FILESET FSO, LABEL IT
N208B 6* WITH THE TASK NAME IN NAME AND NUMBER IN NTASK. DMPXPG
N208B 7* SKIPS TWO LINES ON FILESET FSO.
N208B 8*ROUTINE NAME: DMPXX
N208B 9*ENTRY NAMES: DMPPK, DMPXPG, DMPXX
N208B 10*STORAGE: 327B WORDS OF SCM.
N208B 11*ROUTINES CALLED: OUTPTC, SHIFT(ALL ON SYSTEM).

N209B A* EMILY WILLBANKS C-2 71
N209B B*PDUMP AND DUMP - DUMP SCM AND LCM LOCATIONS
N209B C*SR7600 CROS
N209B D* SW 3 LS 0 TYPE 1
N209B E* 0 BCD 0 BIN
N209B F**DUMP*PDUMP
N209B G*ON DISK F4 COMPAT WU 06/22/71 DECK NONE
N209B 1*FORM1 CALL PDUMP(A1,B1,F1,...,AN,BN,FN)
N209B 2* FOR N+LE.20
N209B 3* CALL DUMP(A1,B1,F1,...,AN,BN,FN)
N209B 4*PURPOSE: DUMP CONTENTS OF SCM OR LCM LOCATIONS IN AN
N209B 5* INDICATED FORMAT ON FILESET OUT.
N209B 6*ROUTINE NAME: DUMP
N209B 7*ENTRY NAMES: DUMP,PDUMP+,PDUMP+,PDUMP
N209B 8*STORAGE: 2048 WORDS OF SCM.
N209B 9*ROUTINES CALLED: STOP, OUTPTC, 8ENDDM (ALL ON SYSTEM).
N210B  A*        EMILY WILLBANKS  C-2  71
N210B  B*DUMPA*DUMPL - DUMP ABSOLUTE SCM OR LCM MEMORY LOCATIONS
N210B  C*CMP    SR7600  CROS
N210B  D*        SW  2  LS  0  TYPE 1
N210B  E*        0  BCD  0  BIN
N210B  F**DUMPA*DUMPL*DUMP*SCM AND *LCM*MEMORY
N210B  G*ON DISK F4 COMPAT WU 06/28/71 DECK NONE
N210B  1*FORM:  CALL DUMPA(FWA*LWA*M)
N210B  2*        CALL DUMPL(FWA*LWA*M)
N210B  3*PURPOSE: DUMP SCM OR LCM MEMORY LOCATIONS RA+FWA THRU
N210B  4*        RA+LWA IN FORMAT M.
N210B  5*ROUTINE NAME: DUMPA
N210B  6*ENTRY NAMES: DUMPA, DUMPL
N210B  7*STORAGE: 22B WORDS OF SCM.
N210B  8*ROUTINES CALLED: GEN DMP (ON THE SYSTEM)

N211B  A*        LARRY RUDSINSKI  C-4  71
N211B  B*DMPXI AND DMPX - PRINT THE EXCHANGE PACKAGE
N211B  C*CMP    SR7600  CROS
N211B  D*        SW  2  LS  0  TYPE 1
N211B  E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
N211B  F**DUMP*EXCHANGE PACKAGE*DMPX
N211B  G*ON DISK F4 COMPAT WU 08/26/71 DECK NONE
N211B  1*FORM:  CALL DMPXI(LOC)
N211B  2*        CALL DMPX
N211B  3*PURPOSE: DMPX PRINTS THE EXCHANGE PACKAGE AT THE TIME
N211B  4*        OF THE CALL. DMPXI INITIALIZES DMPX.
N211B  5*ROUTINE NAME: DMPXI
N211B  6*ENTRY NAMES: DMPXI,DMPX
N211B  7*STORAGE: 60 OCTAL WORDS OF SCM.
N211B  8*ROUTINES CALLED: ENTRH(N106B), SETHPK(Q413B), SETHPK(Q413B),
N211B  9*        DMPPK(N208B), RETNH(N107B), ENDH(N109B).
N211B  10* (ALL ON THE SYSTEM).
**A* J. NORRIS C=4  A. SOLEM /3

**B** DUMP MEMORY TO ANY FILESET WITH SPECIFIED RA AND FORMAT
**C** CMP SK/600 CRUS
**D** SW 4 LS 0 TYPE 1,2
**E** SOURCE OLVPL4 C=2 OBJECT 0 C=2

**F** DUMP
**G** DISK F4 COMPAT WU 06/12/73 DECK NONE

**1** FORM: CALL UMP(FWA,LWA,FORMAT,TYPE,FSO,RA)

**2** CALL UMP(LWA)

**3** PURPOSE: DUMP CONTENTS OF SCM OR LCM IN AN INDICATED

**4** FORMAT INTO A FILESET. THE DUMP MAY BE RELATIVE TO AN

**5** ADDRESS OTHER THAN THE USERS RA,

**6** ROUTINE NAME: UMP

**7** ENTRY NAMES: UMP, DMP

**8** STORAGE: 77 OCTAL WORDS OF SCM

**9** ROUTINES CALLED: GENMP, OUTFPC(ON SYSTEM).

**VOLUME 2 - 9/73**
PEUSDO-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 MP600 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*UNIT$*USER*DEFINED OPERATIONS
04AA  G *CARDS F4 COMPAT WU 06/02/69 DECK 06/02/69
04AA  I 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.

VOLUME 2 - 9/73
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 0*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 CLOCK1(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 0*CLOCK ROUTINE
Q105A B*SERVICE Q1 COMPASS SR6600 SCOPE
Q105A C* SW 2 LS 1
Q105A D*COMPASS SOURCE CARDS 35BCDCOMPASS 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 O*DATE ROUTINE
Q106A B*SERVICE Q1  COMPASS  SR6600  SCOPE
Q106A C*  SW 2  LS 1
Q106A D*COMPASS SOURCE CARDS  28BCDCOMPASS OBJECT CARDS  48BIN
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.

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*  
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.

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A* ANN SOLEM C-2 JIM CLARK 70
B*TIME - ENTER TIME OF DAY AND COMMENT IN DAYFILE
C*CMP SR6600 SCP 3,1
D* SW 2 LS 1 TYPE 1
E* 0 BCD OBJECT CARDS 0 BIN
F**TIME*COMMENT*DAYFILE
G*ON DISK WU 03/12/70 DECK NONE

1*CALL NAME: CALL TIME(MESSAGE)
2*PURPOSE: TO ENTER A MESSAGE OF 34 CHARACTERS OR LESS IN THE
3*DAYFILE PRECEDED BY THE CHARACTERS #TIME#, STRING MUST BE
4*TERMINATED BY A ZERO BYTE (12-BITS).
5*STORAGE: 23 (OCTAL) WORDS.
6*SELF CONTAINED

A* ANN SOLEM C-2 BARBARA BACON 70
B*REMARK - ENTER COMMENT IN DAYFILE
C*CMP SR6600 SCP 3,1
D* SW 2 LS 1 TYPE 1
E* 0 BCD OBJECT CARDS 0 BIN
F**REMARK*COMMENT*DAYFILE
G*ON DISK WU 03/12/70 DECK NONE

1*CALL NAME: CALL REMARK(MESSAGE)
2*PURPOSE: TO ENTER A MESSAGE OF 40 CHARACTERS OR LESS IN THE
3*DAYFILE. THE CHARACTER STRING MUST BE TERMINATED BY A ZERO
4*BYTE (12-BITS).
5*STORAGE: 22 (OCTAL) WORDS.
6*SELF CONTAINED

A* ANN SOLEM C-2 70
B*DISPLA - DISPLAY CURRENT VALUE OF VARIABLE IN DAYFILE
C*CMP SR6600 SCP 3,1
D* SW 3 LS 5 TYPE 1
E* 0 BCD OBJECT CARDS 0 BIN
F**DISPLAY CURRENT*VALUE OF*VARIABLE IN*DAYFILE
G*ON DISK WU 03/12/70 DECK NONE

1*CALL NAME: CALL DISPLA(MESSAGE, VALUE)
2*PURPOSE: TO DISPLAY IN THE DAYFILE A MESSAGE OF 10 CHAR-
3*ACTERS OR LESS AND A VALUE. THE VALUE WILL BE TREATED AS
4*FLOATING POINT OR INTEGER.
5*STORAGE: 247 (OCTAL) WORDS.
6*SELF CONTAINED.
ANN SCHEM C.2 DAVE SCHULTZ 70

SWITCH - BUFFER POOLING, MULTIREEL TAPE SWITCHING

C*CMP SR660 SCP 3.1

D* SW 2 LS 1 TYPE 1

CALL NAME: CALL SWITCH(NAME1,NAME2)

PURPOSE: TO CHANGE FILE REFERENCES DURING FORTRAN EXECUTION,

IN ORDER TO POOL BUFFERS AND/OR SWITCH REELS FOR MULTIREEL FILES.

STORAGE: 24 (OCTAL) WORDS.

SELF CONTAINED.

EMILY WILLBANKS C.2 71

CLOCK, DATE AND SECOND ROUTINE

C*CMP SR7600 CROS

D* SW 3 LS 0 TYPE 1

CALL CLOCK(C1) CALL CLOCK1(C2)

CALL SECOND(S)

CALL DATE(D1) CALL DATE1(D2)

PURPOSE: TO GIVE TIMES AND DATE TO USER.

C1=TIME OF DAY IN MINUTES (FLOAT PT)

C2=TIME OF DAY IN DISPLAY CODE 8HR, MI, SE WHERE HR=HOURS,

MI=MINUTES, SE=SECONDS

S=ELAPSED CP(REAL) TIME IN SECONDS (FLOAT PT)

D1=DATE IN DISPLAY CODE 6HMMDDYY

D2=DATE IN DISPLAY CODE 8HMM/DD/YY

WHERE MM=MONTH, DD=DAY, YY=YEAR

ROUTINE NAME: CLOCKF

ENTRY NAMES: CLOCK, CLOCK1, DATE, DATE1, SECOND

STORAGE: 103B WORDS.

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 11/21/72 REV.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)

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Q119B  A* JAN NURRIS C-4 J MELENDEZ 13
Q119B  B* COPY DAYFILE TO GIVEN FILESET
Q119B  C*F4  SR7600 CRUS
Q119B  D*    SW 3  LS 0  TYPE 1.2
Q119B  E*    SOURCE OLUPL4 C-4  OBJECT 0 C-4
Q119B  F**DAYFILE
Q119B  G*DISK  F4 COMPAT WU 07/16/73 DECK NONE
Q119B  1*FORM: CALL COPYDF (FSNAME)
Q119B  2*PURPOSE: COPY THE JOB DAYFILE TO THE FILESET - FSNAME-
Q119B  3*Routine NAME: COPYDF
Q119B  4*ENTRY NAMES: COPYDF
Q119B  5*STORAGE: 224 OCTAL WORDS OF SCM
Q119B  6*Routines CALLED: CLOSEK(114B), LENGTH(W204B), REMARK(Q118B),
Q119B  7* SYFS(W116B), AUDRQT, UPNAME, FLUSHDF, INPUTC, NARG,
Q119B  8* OUTFIC (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(IODEATE).
Q1AA  2* I=JULIAN(IODEATE)
Q1AA  3*PURPOSE: IF IODEATE 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* IODEATE IN THE ABOVE FORMAT. IODEATE IS NOT ALTERED
Q1AA  9* BY EITHER ENTRY.
Q1AA  10*NOTE: THE FIRST VALUE OF IODEATE 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. MELENEZ, 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 MELENEZ 72
Q305B B*MEMREQ, MEMREL, MEMLEN
Q305B C* CPR 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 05/03/73 REV 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

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**Q3-2**

**Q306B**

A* EMILY WILLBANKS C-2 J MELENDENZ 73

B* LCRLOT LCROLIN - MALCM ROLL OUT OR IN

C* COMRASS SR7600 CROS

D* SW 2 LS 0 TYPE 1.2

E* SOURCE 0 C-2 OBJECT 0 C-2

F** ROLL OUT ROLL IN LCM

G** ON DISK F4 COMPAT WU 06/13/73 REV.1 DECK NONE

I** FORM I CALL LCRLOT (NWDS, LCADD)

J** CALL LCROLIN (NWDS, LCADD)

K** PURPOSE: ROLL OUT OR ROLL IN DATA BETWEEN MALCM AND

L** RANDOM FILESET RANLCM. DEFAULT NWDS IS ALL OF

M** MALCM. DEFAULT LCADD IS LOCATION ZERO.

N** ROUTINE NAME: LCRLOT

O** ENTRY NAMES: LCRLOT, LCROLIN

P** STORAGE: 57 (OCTAL) WORDS SCM

Q** ROUTINES CALLED: MEMLEN (Q305B) ON SYSTEM

R** OTHER SCM EXTERNALS: IGEN (SYSTEM)

S** LCM BLOCK NAME: MALCM

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**Q3AA**

A* FRANK MCGIRT C-4 J. MELENDENZ 72

B* ASAP - AUTOMATED STORAGE ALLOCATION PROGRAM

C* F4 SR6600 SCP 3.1

D* SW 24 LS 22 TYPE 2

E* F4 SOURCE CARDS 467 BCD OBJECT CARDS 148 BIN

F** DYNAMIC ALLOCATION

G** CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72

I** FORM: COMPLETE INSTRUCTIONS FOR USE ARE GIVEN IN K-1=4620;

J** AN INTERNAL K-1 DOCUMENT WHICH IS ATTACHED TO THIS

K** WRITEUP, INCLUDING A SAMPLE PROBLEM UTILIZING ALL THE

L** ASAP FEATURES.

M** PURPOSE: Q3AA IS A PACKAGE OF SUBROUTINES WHICH CAN BE

N** USED TO ASSIGN STORAGE AND DEFINE INTEGER POINTERS FOR

O** USE WITH DYNAMIC STORAGE ALLOCATION PROGRAMMING

P** TECHNIQUES.

Q** METHOD: SEE K-1=4620 OR ALLEN S. KENNEDY, #POINTR, A

R** DYNAMIC STORAGE ALLOCATION PROGRAM, # ARGONNE NATIONAL


T** ROUTINE NAME: ASAP

U** ENTRY NAME: ASAP

V** STORAGE: 1420 OCTAL CELLS.

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**VOLUME 2 - 9/73**
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 04/17/73 REV 6  DECK 04/01/70 REV 2
Q401A  1*FORM1 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: CP145 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*FORM1 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)
*(TIDY) HAS BEEN REDESIGNATED L301A.

*(TIDY) HAS BEEN REDESIGNATED L301B.

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

A* BILL HUNTEMAN C-2 69
B*PROGRAM CYCLE CHECK
C*COMPASS SR6600 SCP 3.1
D* SW 3 LS 1 TYPE 1
E*SOURCE CARDS 45 BCD OBJECT CARDS 5 BIN
F**PROGRAM*CYCLE*CHECK
G*ON DISK F4 COMPAT WU 05/19/69 DECK 05/19/69
*CALL NAME CALL INTVL ERROR RETURN CONTROL WORD INTERVAL
2*PURPOSE ESTABLISHES A SECONDARY TIME LIMIT OR CYCLE CHECK
3*FOR PORTIONS OF A PROGRAM EXECUTION.
4*STORAGE 22 WORDS
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*USE1 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*USE1 CALL ECSBUF0(FWA,LFN,NOWDS,SCRATCH)
Q409A 2* CALL ECSBUF1(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*USE1 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.

VOLUME 2 = 9/73
**Q411A**

A* R. M. FRANK C-4

B*READ/_WRITE A BINARY BUFFERFULL

C*CMP SR6600 SCP 3.1

D* SW 3 LS 4 TYPE 1

E*SOURCE CARDS 167 BCD OBJECT CARDS 9 BIN

F**BUFFER*READ*WRITE* BINARY

G*CARDS F4 COMPAT WU 09/22/70 DECK 09/22/70

H*USE: CALL BUFSIZE(NOWDS,LFN)

I* CALL RD_BUF(A,LFN,LEN)

J* CALL WR_BUF(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).

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**Q413B**

A* JERRY MELENDEZ C-4

B*GET AND SET EXCHANGE PACKAGE

C*CMP SR7600 CROS

D* SW 3 LS 0 TYPE 1

E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN

F**GET*SET* INTERRUPT* EXCHANGE PACKAGE

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 SEDPCK(IPAK)

**Q413B 5** CALL GETMPK(IPAK)

**Q413B 6** CALL SETMPK(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, GETMPK, GETSPK, GETHPK,

**Q413B 16** GETEPK, SETNPK, SETDPK, SETMPK, SETSPK, SETHPK

**Q413B 17** STORAGE: 65 OCTAL WORDS OF SCM.

**Q413B 18** SELF CONTAINED.

---

**VOLUME 2 - 9/73**
Q414B  A* JERRY MELENDEZ  C=4  J. MELENDEZ  71
Q414B  B*SETQ, GETQ - SET AND GET JOB RELATED QUANTITIES
Q414B  C*CMP   SR7600 CROS
Q414B  D*   SW 10 LS 0 TYPE 1,2
Q414B  E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
Q414B  F**SETQ*GETQ*SET AND*GET*JOB RELATED*QUANTITIES
Q414B  G*ON DISK F4 COMPAT WU 09/09/73 REV.2 DECK NONE
Q414B  1*FORM1 CALL SETQ(KEY,Q,OP)
Q414B  2* CALL GETQ(KEY,Q)
Q414B  3*PURPOSE: SET OR GET JOB-RELATED QUANTITIES LOCATED IN
Q414B  4* SPECIAL USER MONITOR CELLS.
Q414B  5*TIMING: SETQ = 70 - 120 MS, GETQ = 65 MS
Q414B  6*ROUTINE NAME: SETQ
Q414B  7*ENTRY NAMES: SETQ, GETQ
Q414B  8*STORAGE: 236 OCTAL WORDS OF SCM.
Q414B  9*SELF CONTAINED.

Q415B  A* EMILY WILLBANKS  C=2  71
Q415B  B*SLITE,SLITET - SET AND TEST SENSE LIGHTS
Q415B  C*CMP   SR7600 CROS
Q415B  D*   SW 3 LS 0 TYPE 1
Q415B  E*   0 BCD 0 BIN
Q415B  F**SLITE*SLITET - SET AND TEST*SENSE*LIGHTS
Q415B  G*ON DISK F4 COMPAT WU 07/19/71 DECK NONE
Q415B  1*FORM1 CALL SLITE(I)
Q415B  2* CALL SLITET(I,J)
Q415B  3*PURPOSE: SLITE(I) TURNS ON SENSE LIGHT I WHERE 1.LE.I.LE.60.
Q415B  4* SLITE(Q) TURNS OFF ALL LIGHTS.
Q415B  5* SLITET(I,J) TESTS AND TURNS OFF LIGHT I, SETTING J=1 IF
Q415B  6* LIGHT WAS ON, J=2 IF OFF.
Q415B  7*ROUTINE NAME: SLITE
Q415B  8*ENTRY NAMES: SLITE, SLITET
Q415B  9*STORAGE: 418 WORDS OF SCM.
Q416B A* EMILY WILLBANKS C-2 71
Q416B B*ONSWCH, OFFSWCH, COMPSW, SSWITCH - SENSE SWITCH ACCESS
Q416B C*CMP SR7600 CROS
Q416B D* SW 3 LS 0 TYPE 1
Q416B E* 0 BCD 0 BIN
Q416B F**SSWITCH*ONSWCH*OFFSWCH*COMPSW*SENSE*SWITCH ACCESS
Q416B G*ON DISK F4 COMPAT WU 07/16/71 DECK NONE
Q416B 1*FORM1 CALL ONSWCH(I)
Q416B 2* CALL OFFSWCH(I)
Q416B 3* CALL COMPSW(I)
Q416B 4* CALL SSWITCH(I,J)
Q416B 5*PURPOSE: ONSWCH TURNS ON SENSE SWITCH I, WHERE 1.IE.1.IE.60.
Q416B 6* OFFSWCH TURNS OFF SWITCH I.
Q416B 7* COMPSW SWITCHES SWITCH I.
Q416B 8* SSWITCH TESTS AND TURNS OFF SWITCH I, SETTING J=1
Q416B 9* IF SWITCH I WAS ON, J=2 IF OFF.
Q416B 10*ROUTINE NAME! SSWITCH
Q416B 11*ENTRY NAMES: SSWITCH, ONSWCH, OFFSWCH, COMPSW
Q416B 12*STORAGE: 66B WORDS OF SCM.
Q416B 13*ROUTINE CALLED: SYSTEM (ON THE SYSTEM).

Q417B A* JAN NORRIS C-2 J, MELENDEZ 71
Q417B B*RDBUF = READ OR WRITE FIXED NUMBER WORDS FROM/TO FILESET
Q417B C*CMP SR7600 CROS
Q417B D* SW 3 LS 0 TYPE 1.2
Q417B E* SOURCE NONE C-2 OBJECT NONE C-2
Q417B F**RDBUF*READ OR*WRITE*FIXED*NUMBER WORDS FROM/TO FILESET
Q417B G*DISK F4 COMPAT WU 06/06/73 REV.1 DECK NONE
Q417B 1*FORM1 CALL RDBUF(FSET,BUFFER,LENGTH,LENGTH2,LSTATUS,I)
Q417B 2* CALL WTBUF(FSET,BUFFER,LENGTH,I)
Q417B 3*PURPOSE: RDBUF IS USED TO READ A SPECIFIED NUMBER OF WORDS
Q417B 4* FROM A DESIGNATED SEQUENTIAL FILESET. WTBUF IS USED TO
Q417B 5* WRITE A SPECIFIED NUMBER OF WORDS TO A DESIGNATED SEQUEN-
Q417B 6* TIAL FILESET. THESE ROUTINES READ BINARY INFORMATION
Q417B 7* WITHOUT REGARD TO FORMAT CONSIDERATION.
Q417B 8*ROUTINE NAME! RDBUF
Q417B 9*ENTRY NAMES: RDBUF,WTBUF
Q417B 10*STORAGE: 131 (OCTAL) WORDS.
Q417B 11*ROUTINES CALLED: ABNORML, GETBA, SYSTEM (ALL ON SYSTEM).
Q418A A* M. CARPENTER C-2  
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*FORM1 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

Q44A A* DUANE HARDER C-2  
Q44A B*LINES  
Q44A C*CMP SR6600 SCP 3.1  
Q44A D* SW 1 LS 0 TYPE 2  
Q44A E* 0 BCD OBJECT CARDS 4 BIN  
Q44A F**OUTPUT*LINE*LIMIT  
Q44A G*CARDS F4 COMPAT WU 02/20/70 DECK 02/20/70  
Q44A 1*CALL NAME: LINES  
Q44A 2*PURPOSE: LINES IS A FUNCTION SUBPROGRAM WHICH RETURNS THE  
Q44A 3*NUMBER OF LINES AVAILABLE ON THE OUTPUT (PRINT) FILE.  
Q44A 4*USAGE: I = LINES(DUM,) DUM IS A DUMMY VARIABLE WHICH IS  
Q44A 5*USED ONLY TO INDICATE TO THE COMPILER THAT LINES IS A  
Q44A 6*FUNCTION.  
Q44A 7*STORAGE: 10 (OCTAL) WORDS.  
Q44A 8*Routines Called: GETBA (SYSTEM ROUTINE).
APPLICATIONS AND APPLICATION-ORIENTED PROGRAMS

REVIEWER! SEE SUBMITTER FOR PARTICULAR #T# ROUTINE

VOLUME 2 - 9/73
PHYSICS (INCLUDING NUCLEAR)

T1A8  A*  CHARLES WILSON  C-7  FRED CORNWELL  69
T1A8  B*TACS1 TRANSPORT AND CHARGE STORAGE DEVICE ANALYSIS CODE
T1A8  C*F4  6600  SCP  3.1
T1A8  D*  SW 37  LS 72  TYPE 2
T1A8  E*SOURCE CARDS  3421 BCD  0  BIN
T1A8  F**TACS1*TRANSPORT AND*CHARGE*STORAGE*DEVICE*ANALYSIS CODE
T1A8  G*CARDS  F4  COMPAT WU 12/08/69 DECK 12/08/69
T1A8  1*USES THE FOLLOWING SUBROUTINES: ADV(J506A), CONVRT(J526A),
T1A8  2*ERF(C310A), GYA(J518A), PLOT(J541A), SORT1(M101A),
T1A8  3*SPLT(J508A), TCP(J521A), TSP(J520A), WLCH(J542A), WLCV(J542A).
**ENGINEERING**

### T4AB

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<td>T4AB</td>
<td>A*</td>
<td>TOM DOYLE</td>
<td>C-6</td>
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<td>T4AB</td>
<td>B*</td>
<td>LENS DESIGN</td>
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<td>T4AB</td>
<td>C*F4</td>
<td>MP7600</td>
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<td>SW 14</td>
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<td>E*</td>
<td>SOURCE TAPE NO. LE441L00</td>
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<td>T4AB</td>
<td>G*</td>
<td>TAPE AND FILESET F4 COMPAT WU 04/27/73</td>
<td>DECK NONE</td>
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<td>T4AB</td>
<td>1*</td>
<td>MAIN PROGRAM</td>
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<td>2*</td>
<td>PURPOSE: LENS DESIGN</td>
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<td>3*</td>
<td>ROUTINE NAME: LENSDES</td>
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<td>T4AB</td>
<td>4*</td>
<td>STORAGE: 100300 OCTAL WORDS OF SCM, ALL OF LCM</td>
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<td>T4AB</td>
<td>5*</td>
<td>ROUTINES CALLED: OPTIMIZ(E44A)</td>
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### T4AA

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

E.G., COMPASS

REVIEWER: J. MOORE, C-2

*(FTN) HAS BEEN REDESIGNATED U2AA.

*(AGENT) HAS BEEN REDESIGNATED U1AA.

A# GLEN CARTER C-4 J. MOORE 72
B*LACENT 6600 ASSEMBLY LANGUAGE
C*LACENT MP6600 SCP 3.1
D* SW 55 LS 0 TYPE 2
E*SOURCE CARDS 0 OBJECT CARDS 0
F**LACENT*ASSEMBLER
G*ON DISK WU 09/22/72 DECK NONE
H*FORM1 MAIN PROGRAM
I*PURPOSE: LACENT IS A 6600 ASSEMBLY LANGUAGE ON THE SYSTEM,
J* CALLABLE VIA CONTROL CARDS.
K*ROUTINE NAME: LACENT
L*STORAGE: 40000 (OCTAL) WORDS
M*SELF CONTAINED.
COMPILING
E.G., RUN.

REVIEWER: J. MOORE, C-2

BARBARA BACON C-2 J. MOORE 72

FORTRAN EXTENDED LANGUAGE

MP6600 SCP 3.1

SW 24 LS 0 TYPE 2

SOURCE CARDS NONE OBJECT CARDS NONE

FORTRAN EXTENDED COMPILER

F4 COMPAT WU 02/22/72 DECK NONE

MAIN PROGRAM

FTN FORTRAN EXTENDED IS A FORTRAN COMPILER ON
THE SYSTEM, CALLABLE VIA CONTROL CARDS.

ROUTINE NAME: FTN

STORAGE: 50000 (OCTAL) WORDS

VOLUME 2 - 9/73
(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.
ACCESS

E.g., OPEN, CLOSE, CREATE, RELEASE, MODIFY, UNLOAD, RENAME, SWITCH, GET RQT, DATEREL. (Also see Q1).

REVIEWER: J. NORRIS, C-2

W104B A* J. NORRIS C=4 J. NORRIS 13
W104B B*CHANGE NAME IN FILESET REQUEST TABLE
W104B C*CMP SR/600 CHKOS
W104B D* SW 3 LS 0 TYPE 1,2
W104B E* SOURCE 0 ULUP4 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* CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
W105B E**RELEASE*DATA FROM A*TEMPORARY*SEQUENTIAL*FILESET
W105B F**ON DISK F4 COMPAT WU 08/04/71 DECK NONE
W105B 1*FORM: CALL DATEREL(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: DATEREL
W105B 5*ENTRY NAME: DATEREL
W105B 6*STORAGE: 150 OCTAL WORDS OF SCR.
W105B 7*ROUTINES USED: AFSREL(W101B), GETBA, SYSTEM, ABNORML.
W105B 8* (ALL ON SYSTEM).
FORQTS - CREATE I/O REQUEST TABLE (RQT) IN 20-WORD ARRAY

1. CALL FORQTS(FS, ARRAY)
2. CALL SETQ(36, ICCD)
3. CALL SETQ(37, PW)
4. CALL CREVER(FS, CL, OAC, NF, MT, MTB, FSL)
5. PURPOSE: STAGE TAPE AND RESTORE RESIDENT FILESETS
6. ROUTINE NAME: CREVER
7. ENTRY NAME: CREVER
8. STORAGE: 1005 OCTAL WORDS OF SEM, (NOTE THAT CKSUM(K307B)
9. REQUIRES 10000 OCTAL WORDS OF LCM FROM THE FREE POOL
10. ROUTINES CALLED: GETQ(Q414B), XIT(N108B), Rdbuf(Q417B),
11. SKIPF(W302B), SETQ(Q414B), CREATE(L401B), ABOIT(N203B)
12. REOPEN(W301B), OPEN(Q304B), CKSUM(K307B),
13. MEMLEN(Q305B), MESSAGE(Q116B), AFSREL, ADDRQT, RENAME,
14. ENDFILE, CLOSER, (ALL ON SYSTEM).

VOLUME 2 - 9/73
A* FRED SCHILLING C-2 J. NORRIS 72
W109B B*OPERM CMP SR7600 CROS SW 2 LS 0 TYPE 1
W109B D* E*NO CARDS
W109B F**OPERM
W109B G*ON DISK F4 COMPAT WU 05/12/72 DECK NONE
W109B I*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, ABNORME(ALL ON
W109B 8*THE SYSTEM).

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).

VOLUME 2 - 9/73
**RELEASE**

**PURPOSE:** REWIND AND UNLOAD TAPE DURING EXECUTION, WHEN THE PROGRAM NO LONGER HAS ANY USE FOR THE TAPE. N IS EITHER A LOGICAL TAPE NUMBER OR A LEFT ADJUSTED HOLLERITH LITERAL, I.E., SLTAPE3

**ROUTINE NAME:** RELEASE

**ENTRY NAME:** RELEASE

**STORAGE:** 50 OCTAL WORDS

**SELF CONTAINED.**
A* JENNIE BORING C=DO JAN NORRIS 72
B*OPEN AND CLOSE FILES
C*CMP SR6600 SCP 3.1
D* SW 1 LS 3 TYPE 1
E*CMP SOURCE CARDS 76 BCD OBJECT CARDS 7 BIN
F*OPEN*CLOSE*FILE
G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
H*FORM CALL OPEN(KODE,NAME)
I*CALL CLOSE(KODE,NAME)
J* PURPOSE: KODE IS A FUNCTION CODE FROM SCOPE 3.1 MANUAL,
K* SUGGESTED VALUES FOR KODE ON OPEN ARE 122B FOR BINARY
L* AND 120B FOR BCD. SUGGESTED VALUES ON CLOSE ARE 132B
M* FOR BINARY AND 130B FOR BCD. NAME EITHER A LOGICAL UNIT
N* NUMBER OR A LEFT ADJUSTED HOLLERITH LITERAL, I.E.:";
O* ROUTINE NAME: OPEN
P* ENTRY NAMES: OPEN, CLOSE
Q* STORAGE: 51 OCTAL WORDS
R* SELF CONTAINED.

A* N. NAGY C=2 J. NORRIS 73
B*CLOSE AND REWIND FILESET
C*COMPASS SR7600 CROS
D* SW 2 LS 0 TYPE 1
E*NO CARDS
F**CLOSE*FILESET*REWIND
G*ON DISK F4 COMPAT WU 02/01/73 DECK NONE
H*FORM CALL CLOSER (FSET)
I* PURPOSE: CLOSE AND REWIND THE FILESET
J* ROUTINE NAME: CLOSER
K* ENTRY NAME: CLOSER
L* STORAGE: 71 (OCTAL) WORDS
M* ROUTINES CALLED: GETBA, BS4020, RQTA.(ALL ON SYSTEM)
A* JAN NORRIS  C=2  JAN NORRIS  73
B*OPEN A FILESET
C*CMP  SR7600  CROS
D*  SW 6  LS 0  TYPE 1.2
E*NO CARDS
F***OPEN*SEQUENTIAL*FILESET*BUFFER
G*ON DISK  F4  COMPAT  WU 03/27/73  DECK NONE
1*FORM:  CALL OPEN(FS,TYPE,BUF,USE,OAC,PW,SCT,ADISP,DEV)
2*PURPOSE: MAKE A FILESET AVAILABLE TO A JOB, SET
3* FILESET PARAMETERS, AND ESTABLISH BUFFERS.
4* FS=FILESET NAME(REQUIRED)
5* TYPE=2LST,2LSR,2LRT, OR 2LRR
6* BUF=LCM BUFFER LENGTH
7* USE=1LR OR 2LRW
8* OAC=OWNER ACCESS CODE
9* PW=PASSWORD
10* SCT=SECTOR LIMIT
11* ADISP=3LPRT,4LPCHB,5LPCHD,5LPCH80,4LTAPE,
12* 4LFILE,5LSFILE,4LNONE,3LNOT - IN TABLE FORM,
13* DEV=5LDISKA,5LDISKB, OR 5LDISKC
14*ROUTINE NAME: OPEN
15*ENTRY NAME: OPEN
16*STORAGE: 502 OCTAL WORDS OF SCM
17*ROUTINES CALLED: GETBA,SYSFS (ON SYSTEM)

A* JAN NORRIS  C=2  JAN NORRIS  73
B*SYSFS - CHECK FILESET NAME, AND FORMAT IF IT IS AN INTEGER
C*CMP  SR7600  CROS
D*  SW 2  LS 0  TYPE 1.2
E*NO CARDS
F***FILESET*NAME
G*ON DISK  F4  COMPAT  WU 04/12/73  DECK NONE
1*FORM:  CALL SYSFS(INAME,ONAME)
2*PURPOSE: CHECK INAME TO SEE IF IT IS A LEGAL FILESET
3* NAME OR INTEGER 1-99. IF IT IS AN INTEGER N, CONVERT
4* IT TO FSETN, THE PROPERLY FORMATTED NAME IS RETURNED
5* IN ONAME. IF INAME IS NOT A LEGAL FILESET NAME OR
6* NUMBER, -1 IS RETURNED.
7*ROUTINE NAME: SYSFS
8*ENTRY NAME: SYSFS
8*STORAGE: 34 OCTAL WORDS OF SCM,
10*ROUTINES CALLED: SELF CONTAINED
WA-7

W1178 A* JAN NORRIS C-4 JAN NORRIS 13
W1178 B*ACTIVE FILESET RELEASE = RELEASE BUFFER, INITIATE OUTPUT
W1178 C**CMP SR7600 CROS
W1178 D* SW 5 LS 0 TYPE 1.2
W1178 E* SOURCE 0 ULUPL4 C-2 OBJECT 0 C-2
W1178 F**AFSREL*ACTIVE*FILESET*RELEASE*BUFFER*DISPOSITION
W1178 G**DISK F4 COMPAT WU 07/06/73 DECK NONE
W1178 1*FORM: CALL AFSREL(FS,ADISP,ITAPE,RENAME)
W1178 2*PURPOSE: INITIATE OUTPUT PROCESSING OF AN ACTIVE
W1178 3* FILESET BEFORE JOB COMPLETION AND RELEASE UNNEEDED
W1178 4* LCM AND DISK SPACE,
W1178 5* FS = NAME OF FILESET TO BE RELEASED (REQUIRED),
W1178 6* ADISP = TABLE OF DISPOSITIONS,
W1178 7* ITAPE = POSTSTAGE PARAMETERS (MODE,DENSITY,FILES,LABEL),
W1178 8* RENAME = NEW FILESET NAME,
W1178 9*ROUTINE NAME: AFSREL
W1178 10*ENTRY NAMES: AFSREL
W1178 11*STORAGE: 665 OCCAL WORDS OF SCM
W1178 12*ROUTINES CALLED: SYSFS(W1168),GETBA,B54020 (ON SYSTEM)
W1178 13*OTHER EXTERNAL: RTA,
WI-8

W1188 CREATE A FILESET OR MODIFY RESIDENT FILESET PARAMETERS
W1188 C=1600 CRUS
W1188 D= SOURCE OLDPL4 C=4 OBJECT 0 C=4
W1188 F**CHMOD*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,ITAPE,RWU,
W1188 2* RUI,SCT,DEV)
W1188 3* CALL MODIFY(FS,OPW,HEL,RDISP,DROP,RWU,RUI,SCT,
W1188 4* RENAME)
W1188 5*PURPOSE: CREATE AND ACTIVATE FILESET, STAGE IN TAPE
W1188 6* FS=FILESET NAME, CL=CLASSIFICATION,
W1188 7* TYPE=2LS,2LSR,2LHT,OK 2LRR, OPW=OWNER PASSWORD,
W1188 8* REL=RELEASE DATE,
W1188 9* RDISP=TABLE OF DISPOSITIONS,
W1188 10* ITAPE=PUESTAGE PARAMETERS(MODE, DENSITY, FILES, LABEL),
W1188 11* RWU=TABLE OF READ/ WRITE USERS AND PASSWORDS,
W1188 12* RUI=TABLE OF READ ONLY USERS AND PASSWORDS,
W1188 13* SCT=SECURITY LIMIT, DEV=DEVICE,
W1188 14* DROP=TABLE OF USERS TO BE DROPPED,
W1188 15* RENAME=NEW FILESET NAME,
W1188 16*ROUTINE NAME: CHMOD,
W1188 17*ENTRY NAMES: CREATE, MODIFY
W1188 18*STORAGE: 1754 OCTAL WORDS OF SCM,
W1188 19*ROUTINES CALLED: SYSFS(W1168), GETBA(SYSTEM),

VOLUME 2 - 9/73
GET INFORMATION ON STATUS OF I/O

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

REVIEWER: J. NORRIS, C-2
**W203B**

A* ANNE SOLEM C-4

B*IOCHECK = DETERMINE STATUS OF I/O REQUEST

C*SR7600 CROS

D* SW 4 LS 0 TYPE 1

E* 0 BCD 0 BIN

F*IOCHECK = DETERMINE STATUS OF I/O REQUEST

G*ON DISK F4 COMPAT WU 06/22/71 DECK NONE

I*FORM: IOCHECK(I,ITIME)

2*PURPOSE: FUNCTION TO DETERMINE STATUS (EOF, EOI) OF I/O ON

3* UNIT I. ITIME MAY BE SET TO AMOUNT OF TIME WAITED IF

4* ITIME.EQ.2

5*ROUTINE NAME: IOCHECK

6*ENTRY NAME: IOCHECK

7*STORAGE: 240B WORDS OF SCM.

8*ROUTINES CALLED: BOI, EOI, IOCHECK, LENGTH,

9* OUTTPC (ALL ON SYSTEM).

---

**W204B**

A* EMILY WILLBANKS C-2

B*LENGTH = AMOUNT OF DATA TRANSFERRED BY INPUT OPERATION

C*SR7600 CROS

D* SW 2 LS 0 TYPE 1

E* 0 BCD 0 BIN

F*LENGTH = AMOUNT OF DATA TRANSFERRED BY INPUT OPERATION

G*ON DISK F4 COMPAT WU 07/19/71 DECK NONE

I*FORM: LENGTH(N)

2*PURPOSE: INTEGER FUNCTION TO RETURN THE NUMBER OF WORDS

3* TRANSFERRED INTO MEMORY BY THE PREVIOUS I/O OPERATION

4* ON UNIT N,

5*ROUTINE NAME: LENGTH

6*ENTRY NAME: LENGTH

7*STORAGE: 20B WORDS OF SCM.

8*ROUTINES CALLED: SYSTEM, ABNORML, GETBA, WAITR,

9* (ALL ON SYSTEM).

---

**W205B**

A* R. STUTZ TD-3

B*GETADD = GET ADDRESS OF RQT FOR A FILESET

C*SR7600 CROS

D* SW 2 LS 2 TYPE 1

E*CMP SOURCE CARDS 48 BCD OBJECT CARDS 4 BIN

F*GETADD*ADDRESS*RQT

G*CARDS F4 COMPAT WU 10/14/71 DECK 10/14/71

I*FORM: RQT = GETADD(N)

2*PURPOSE: RETURN ADDRESS OF I/O REQUEST TABLE(RQT) FOR

3* FILESET N,

4*ROUTINE NAME: GETADD

5*ENTRY NAME: GETADD

6*STORAGE: 13 (OCTAL) WORDS.

7*ROUTINES CALLED: FORMF(W208B).

VOLUME 2 = 9/73
W206B  A*  EMILY WILLBANKS  C-2  J. NORRIS  71
W206B  B*IDONE, IDONEQ, ISTATUS
W206B  C*CMP  SR7600  CROS
W206B  D*  SW 2  LS 3  TYPE 1
W206B  E*CMP  SOURCE  CARDS  94  BCD  OBJECT  CARDS  5  BIN
W206B  F**IDONE, IDONEQ, ISTATUS, STATUS
W206B  G*ON  DISK  F4  COMPAT  WU 10/10/72REV 1  DECK 10/10/72REV 1
W206B  1*FORM:  I = IDONE(N)
W206B  2*  I = IDONEQ(RQT)
W206B  3*  I = ISTATUS(RQT)
W206B  4*PURPOSE:  IDONE, IDONEQ FUNCTION RETURNS STATUS OF I/O FOR
W206B  5*  FILESET N OR FOR FILESET IN REQUEST TABLE RQT.*=1 FOR
W206B  6*  I/O COMPLETE. =0 OTHERWISE. ISTATUS FUNCTION RETURNS
W206B  7*  THE I/O STATUS AS IS OF THE INDICATED FS. IDONE IS
W206B  8*  SLOWER THAN IDONEQ OR ISTATUS.
W206B  9*ROUTINE NAME:  IDONE
W206B  10*ENTRY NAMES:  IDONE, IDONEQ, ISTATUS
W206B  11*STORAGE:  13 OCTAL WORDS.
W206B  12*Routines called:  GETBA(ON THE SYSTEM).

W207B  *(STATUS) DELETED FROM LIBRARY-NOW COMBINED WITH W206B.

W208B  A*  R. STUTZ  TD-3  71
W208B  B*FORMF - CONVERT UNIT NUMBER TO FILESET NAME
W208B  C*CMP  SR7600  CROS
W208B  D*  SW 2  LS 3  TYPE 1
W208B  E*CMP  SOURCE  CARDS  57  BCD  OBJECT  CARDS  4  BIN
W208B  F**FORMF, UNIT NUMBER, FILESET NAME
W208B  G*CARDS  F4  COMPAT  WU 10/14/71  DECK 10/14/71
W208B  1*FORM:  FS = FORMF(N)
W208B  2*PURPOSE:  GIVEN INTEGER UNIT NUMBER N, RETURN
W208B  3*  ALPHANUMERIC FILESET NAME 5LFSETN.
W208B  4*ROUTINE NAME:  FORMF
W208B  5*ENTRY NAME:  FORMF
W208B  6*STORAGE:  16 (OCTAL) WORDS.
W208B  7*SELF CONTAINED.

W209B  *(IDONEQ) DELETED FROM LIBRARY-NOW COMBINED WITH W206B.
A* CHECK FOR UNRECOVERED PARITY ERRORS ON MAG TAPE INPUT

CROSS- COMPASS SR7600 CROS

D* SW 2 LS 0 TYPE 1

E* NO. CARDS

F** PARITY*ERROR

G* ON DISK F4 COMPAT WU 01/30/73 DECK NONE

H* FORMI CALL PARITY(FSNAMES,N)

I* PURPOSE: CHECK FOR EXISTENCE OF AN UNRECOVERED PARITY

J* ERROR WHEN A FILESET WAS STAGED IN FROM MAGNETIC TAPE.

K* ROUTINE CALL PARITY

L* ENTRY NAME: PARITY

M* STORAGE: 70 (OCTAL) WORDS

N* ROUTINES CALLED: MESSAGE(Q116), SYSFS (ON SYSTEM)

VOLUME 2 - 9/73
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*REWIND
W301B G*ON DISK F4 COMPAT WU 06/22/71 DECK NONE
W301B 1*FORM1 CALL REWIND(FS)
W301B 2*PURPOSE REWIND FILESET FS
W301B 3*ROUTINE NAME REWIN
W301B 4*ENTRY NAMES REWIN, REWIN
W301B 5*STORAGE 33B 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*SKIP*, 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 11/01/72 REV.1 DECK 11/01/72
W302B 1*FORM1 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)
<table>
<thead>
<tr>
<th>WN3B</th>
<th>A*</th>
<th>EMILY WILLBANKS C-2 71</th>
</tr>
</thead>
<tbody>
<tr>
<td>WN3B</td>
<td>B*</td>
<td>SKIPI - SKIP TO END-OF-INFORMATION</td>
</tr>
<tr>
<td>WN3B</td>
<td>C*</td>
<td>CMP SR7600 CROS</td>
</tr>
<tr>
<td>WN3B</td>
<td>D*</td>
<td>SW 2 LS 0 TYPE 1</td>
</tr>
<tr>
<td>WN3B</td>
<td>E*</td>
<td>0 BCD 0 BIN</td>
</tr>
<tr>
<td>WN3B</td>
<td>F**</td>
<td>SKIPI EOI</td>
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<tr>
<td>WN3B</td>
<td>G*</td>
<td>ON DISK F4 COMPAT WU 06/22/71 DECK NONE</td>
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<td>WN3B</td>
<td>1*</td>
<td>FORM: CALL SKIPI(FS)</td>
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<tr>
<td>WN3B</td>
<td>2*</td>
<td>PURPOSE: POSITION FILESET FS AT END-OF-INFORMATION</td>
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<td>WN3B</td>
<td>3*</td>
<td>ROUTINE NAME: SKIPI</td>
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<td>4*</td>
<td>ENTRY NAME: SKIPI</td>
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<td>WN3B</td>
<td>5*</td>
<td>STORAGE: 128 WORDS OF SCM</td>
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<td>6*</td>
<td>OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)</td>
</tr>
<tr>
<td>WN3B</td>
<td>7*</td>
<td>ROUTINES CALLED: SKIPX (ON SYSTEM)</td>
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<table>
<thead>
<tr>
<th>WN3B</th>
<th>A*</th>
<th>EMILY WILLBANKS C-2 71</th>
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<tbody>
<tr>
<td>WN3B</td>
<td>B*</td>
<td>SKIPR - SKIP RECORDS FORWARD OR BACKWARD</td>
</tr>
<tr>
<td>WN3B</td>
<td>C*</td>
<td>CMP SR7600 CROS</td>
</tr>
<tr>
<td>WN3B</td>
<td>D*</td>
<td>SW 2 LS 0 TYPE 1</td>
</tr>
<tr>
<td>WN3B</td>
<td>E*</td>
<td>0 BCD 0 BIN</td>
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<tr>
<td>WN3B</td>
<td>F**</td>
<td>SKIPR</td>
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<tr>
<td>WN3B</td>
<td>G*</td>
<td>ON DISK F4 COMPAT WU 06/22/71 DECK NONE</td>
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<tr>
<td>WN3B</td>
<td>1*</td>
<td>FORM: CALL SKIPR(FS,N)</td>
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<tr>
<td>WN3B</td>
<td>2*</td>
<td>PURPOSE: SKIP N RECORDS FORWARD OR BACKWARD ON FILESET FS</td>
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<td>WN3B</td>
<td>3*</td>
<td>ROUTINE NAME: SKIPR</td>
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<td>WN3B</td>
<td>4*</td>
<td>ENTRY NAMES: SKIPX, SKIPR</td>
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<td>WN3B</td>
<td>5*</td>
<td>STORAGE: 512 WORDS OF SCM</td>
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<td>WN3B</td>
<td>6*</td>
<td>OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)</td>
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<tr>
<td>WN3B</td>
<td>7*</td>
<td>ROUTINES CALLED: SYSTEM, ABNORM; GETBA, OPEN</td>
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<td>WN3B</td>
<td>8*</td>
<td>WAITR(ALL ON SYSTEM)</td>
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</tbody>
</table>
W3-3

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*FORM1 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)

VOLUME 2 = 9/73
**GET INFORMATION ON FILE**

**DUMP FILE, CATALOG, DIRL, CRSREF.**

**REVIEWER: J. NORRIS, C-2**

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<tr>
<th>W402B</th>
<th>A*</th>
<th>RON KRANTZ</th>
<th>C-2</th>
<th>71</th>
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<tbody>
<tr>
<td>W402B</td>
<td>B*</td>
<td>DIRL - LIST DIRECTORY OF RANDOM LIBRARY FILESET</td>
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<tr>
<td>W402B</td>
<td>C*</td>
<td>CMP</td>
<td>SR7600</td>
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<tr>
<td>W402B</td>
<td>D*</td>
<td>SW 2</td>
<td>LS 0</td>
<td>TYPE 1</td>
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<td>BCD</td>
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<tr>
<td>W402B</td>
<td>G*</td>
<td>ON DISK</td>
<td>F4</td>
<td>COMPAT</td>
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<td>1*</td>
<td>FORM</td>
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<td>CALL DIRL(D=0)</td>
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<td>PURPOSE</td>
<td>LIST DIRECTORY OF RANDOM LIBRARY FILESET D ONTO</td>
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<td>W402B</td>
<td>3*</td>
<td>OUTPUT FILESET 0.</td>
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<td>W402B</td>
<td>4*</td>
<td>ROUTINE NAME</td>
<td>DIRL</td>
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<tr>
<td>W402B</td>
<td>5*</td>
<td>ENTRY NAME</td>
<td>DIRL</td>
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<td>W402B</td>
<td>6*</td>
<td>STORAGE</td>
<td>5,300B WORDS OF SCM, 10,000B WORDS OF LCM.</td>
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<tr>
<td>W402B</td>
<td>7*</td>
<td>ROUTINES CALLED: GETBA(ON SYSTEM).</td>
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<thead>
<tr>
<th>W403B</th>
<th>A*</th>
<th>EMILY WILLBANKS</th>
<th>C-2</th>
<th>J. NORRIS</th>
<th>71</th>
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<tbody>
<tr>
<td>W403B</td>
<td>B*</td>
<td>DMPFS - DUMP CONTENTS OF FILESET</td>
<td></td>
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<td>W403B</td>
<td>C*</td>
<td>F4</td>
<td>SR7600</td>
<td>CROS</td>
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<tr>
<td>W403B</td>
<td>D*</td>
<td>SW 3</td>
<td>LS 3</td>
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<td>W403B</td>
<td>E*</td>
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**VOLUME 2 - 9/73**
B* COPYBFS - DETERMINE OPTIMUM RANDOM AND SEQUENTIAL BUFFERS

C*F4  SR7600  CROS

D*  SW 2  LS 0  TYPE 1,2

E*  SOURCE 0 C-2  OBJECT 0 C-2

F** COPYBFS

G*ON DISK  F4  COMPAT  WU 06/13/73 REV.1  DECK NONE

I*FORM1 CALL COPYBFS(LCAV,IRANBL,ISEQ,MALCM,ROLL)

J* PURPOSE1 GIVEN AMOUNT OF FREE LCM AND SIZE OF MALCM,

J* DETERMINE THE OPTIMUM SIZES FOR RANDOM AND

L* SEQUENTIAL BUFFERS AND ROLL OUT MALCM TO PROVIDE

M* ROOM;

N* ROUTINE NAME1 COPYBFS

O* ENTRY NAME1 COPYBFS

P* STORAGE1 66 OCTAL WORDS

Q* ROUTINES CALLED1 LCROLOT(Q306B) ON SYSTEM

VOLUME 2 - 9/73
(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  H*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  H*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 CSM
Z102B  8* AND 46000 TO 303000 OCTAL WORDS LCM

Z103A  *(NXTDAY) HAS BEEN REDESIGNATED Q1AA.

Z104A  *(F66F94) HAS BEEN REDESIGNATED M2AD.

Z105A  *(DI5I94) HAS BEEN REDESIGNATED M2AE.

Z106A  *(WRIT94) HAS BEEN REDESIGNATED M501A.

VOLUME 2 - 9/73
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.

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*Volume 2 - 2/73*
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