Guide to the Program Library and Abstracts

For Reference

Not to be taken from this room
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.

Current Pages

Title Page (10/72), ii (9/73), iii thru iv (2/73)
Part I page (2/73)

CHAPTER 1:
1-1 thru 1-3 (10/72)

CHAPTER 2:
2-1 (10/72)

CHAPTER 3:
3-1 thru 3-17 (10/72)

CHAPTER 4:
4-1 thru 4-2 (10/72), 4-3 thru 4-4 (2/73), 4-5 thru 4-8 (10/72)
Part II page (9/73)

CATALOG A:
A-1 (9/73), A1-1 thru A1-6 (9/73), A2-1 (9/73)

CATALOG B:
B-1 (9/73), B1-1 thru B1-3 (9/73), B2-1 thru B2-2 (9/73),
B3-1 thru B3-4 (9/73), B4-1 thru B4-4 (9/73)

CATALOG C:
C-1 (9/73), C1-1 thru C1-2 (9/73), C2-1 thru C2-6 (9/73),
C3-1 thru C3-16 (9/73), C4-1 thru C4-3 (9/73)

CATALOG D:
D-1 (9/73), D1-1 thru D1-12 (9/73), D2-1 (9/73), D3-1 (9/73)

CATALOG E:
E-1 (9/73), E1-1 thru E1-4 (9/73), E2-1 thru E2-2 (9/73),
E3-1 (9/73), E4-1 (9/73)

CATALOG F:
F-1 (9/73), F1-1 thru F1-18 (9/73), F2-1 thru F2-15 (9/73),
F4-1 thru F4-12 (9/73), F5-1 thru F5-4 (9/73)

CATALOG G:
G-1 (9/73), G1-1 (9/73), G4-1 (9/73), G6-1 thru G6-4 (9/73),
G8-1 thru G8-2 (9/73)

CATALOG H:
H-1 (9/73), H3-1 (9/73)

CATALOG I:
I-1 (9/73), I1-1 (9/73)

CATALOG J:
J-1 (9/73), J1-1 (9/73), J4-1 (9/73), J5-1 thru J5-41 (9/73),
J6-1 thru J6-4 (9/73)

CATALOG K:
K-1 (9/73), K1-1 thru K1-2 (9/73), K2-1 thru K2-3 (9/73),
K3-1 thru K3-5 (9/73), K4-1 (9/73), K5-1 thru K5-2 (9/73),
K6-1 thru K6-2 (9/73)

CATALOG L:
L-1 (9/73), L2-1 (9/73), L3-1 (9/73), L4-1 thru L4-4 (9/73)

CATALOG M:
M-1 (9/73), M1-1 thru M1-4 (9/73), M2-1 thru M2-2 (9/73),
M4-1 thru M4-5 (9/73)

CATALOG N:
N-1 (9/73), N1-1 thru N1-3 (9/73), N2-1 thru N2-5 (9/73)

CATALOG O:
O-1 (9/73), O4-1 (9/73)

CATALOG P:
P-1 (9/73), P1-1 thru P1-6 (9/73), Q3-1 thru Q3-2 (9/73),
Q4-1 thru Q4-7 (9/73)

CATALOG Q:
Q-1 (9/73), Q1-1 thru Q1-6 (9/73), Q3-1 thru Q3-2 (9/73),
Q4-1 thru Q4-7 (9/73)

CATALOG R:
R-1 (9/73), R1-1 (9/73), T4-1 (9/73)

CATALOG S:
S-1 (9/73), S1-1 (9/73), V2-1 (9/73)

CATALOG T:
T-1 (9/73), T1-1 (9/73), T4-1 (9/73)

CATALOG U:
U-1 (9/73), U1-1 (9/73), V2-1 (9/73)

CATALOG V:
V-1 (9/73), V1-1 (9/73), V2-1 (9/73)

CATALOG W:
W-1 (9/73), W1-1 thru W1-8 (9/73), W2-1 thru W2-3 (9/73),
W3-1 thru W3-3 (9/73), W4-1 thru W4-2 (9/73)

CATALOG Z:
Z-1 (9/73), Z1-1 thru Z1-2 (9/73)

Part III page (2/73)

INDEX 1:
INDEX1-1 (2/73), INDEX1-2 thru INDEX1-24 (9/73)

INDEX 2:
INDEX2-1 (9/73)

Request for Documentation Change

AFTER YOU HAVE UPDATED YOUR MANUAL
THIS PAGE IS TO BE FILED AS PAGE ii IN THIS MANUAL

LOS ALAMOS SCIENTIFIC LABORATORY

Volume 2 - 9/73
CONTENTS

CURRENT REVISION RECORD .......................................................... ii

PART I - PROGRAM LIBRARY USAGE
Chapter 1 - Introduction ........................................................... 1-1
Chapter 2 - Using the Program Library ......................................... 2-1
Chapter 3 - Submitting Material to the Program Library 3-1
  Submission of New Programs .................................................... 3-2
  Revision of Existing Programs .................................................. 3-17
Chapter 4 - Program Classification Codes ................................. 4-1

PART II CATALOG OF PROGRAMS
A - Arithmetic Routines ............................................................ A-1
B - Elementary Functions .......................................................... B-1
C - Polynomials and Special Functions ....................................... C-1
D - Operations on Functions and Solution of
    Differential Equations ...................................................... D-1
E - Approximation Theory and Curve Fitting ................................ E-1
F - Numerical Linear Algebra .................................................... F-1
G - Statistical Analysis and Probability .................................... G-1
H - Operations Research Techniques .......................................... H-1
I - Input/Output with Conversion or Interpretation .................... I-1
J - Input/Output with Conversion or Interpretation .................... J-1
K - Information Transfer with no Particular Conversion
    or Interpretation Other Than Device-Dependent
    Requirements ................................................................. K-1
L - Program Maintenance ........................................................... L-1
M - Data Handling ................................................................. M-1
N - Debugging ..................................................................... N-1
O - Simulation of Computers and Data Processors-
    Interpreters ........................................................................ O-1
P - (Empty)
Q - Service ................................................................................. Q-1
R - (Empty)
S - (Empty)
T - Applications and Application-Oriented Programs .................. T-1
U - Languages ........................................................................... U-1
V - (Temporarily Contains Random Number Generators) ............. V-1
W - File Manipulation ............................................................... W-1
X - (Empty)
Y - (Empty)
Z - (Temporarily Contains Miscellaneous) ................................. Z-1

PART III - INDEXES
Index 1 - Programs by Name ....................................................... Index 1-1
Index 2 - Newsletters ................................................................. Index 2-1

Volume 2 - 2/73
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.
CHAPTER 3 - SUBMITTING MATERIAL TO THE PROGRAM LIBRARY

CONTENTS

SUBMISSION OF NEW PROGRAMS ................................................. 3-2

  Responsibilities of the Submitter ...................................... 3-2
  List of Materials Which Must Be Submitted
    With Each Program ....................................................... 3-2
  The Submittal Sheet ...................................................... 3-4
  The Abstract .............................................................. 3-6
  The Writeup ........................................................................ 3-8
  The Program Listing .......................................................... 3-9
  The Source Deck .............................................................. 3-9
  The Binary Deck .............................................................. 3-10
  The Test Problem ............................................................. 3-10
  Sample Submittal ............................................................. 3-11
  Sample Abstract .............................................................. 3-12
  Sample Writeup ............................................................... 3-12

REVISION OF EXISTING PROGRAMS ............................................. 3-17
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>ALG</th>
<th>ALGØL</th>
<th>F2</th>
<th>FØRTRAN II</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC</td>
<td>Autocoder</td>
<td>GAP</td>
<td>Autocoder</td>
</tr>
<tr>
<td>CØBØL</td>
<td>CØBØL</td>
<td>LSC</td>
<td>LACENT</td>
</tr>
<tr>
<td>CMP</td>
<td>COMPASS</td>
<td>MDC</td>
<td>MADCAP</td>
</tr>
<tr>
<td>F4</td>
<td>FØRTRAN IV</td>
<td>SPS</td>
<td>Autocoder</td>
</tr>
<tr>
<td>FTN</td>
<td>FØRTRAN IV Extended</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 inde-
  pendent, 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 (5 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):
    ØN DISK = if in the System Library,
    CARDS = if in the Program Library on cards,
    TAPE = if in the Program Library on tape.

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

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

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

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

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

THE ABSTRACT

The abstract is included in the Programmer's Information Manual. An example is given on page 3.12. It should be brief enough to be keypunched on ten cards, 61 columns each. All characters in the abstract must be keypunchable, as defined
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 CPW0RD(A)
FORM: MAIN PROGRAM
```

**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(NL03A)
INPUTN(SYSTEM)
M101AC(COMMON)
```
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 BINARY DECK

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

THE TEST PROBLEM

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

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

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

**LASL - CCF PROGRAM SUBMITTAL FORM**

(Programmers Fill in Only Numbers Marked with *)

<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>LA4A</td>
</tr>
<tr>
<td>3</td>
<td>Program Number or Designation (and Suffix)</td>
<td>F415A</td>
</tr>
<tr>
<td>4</td>
<td>Submitter's Name</td>
<td>MORRIS A KLEIN</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>BALABUZBE</td>
</tr>
<tr>
<td>7</td>
<td>Year Completed (last 2 digits) or Status Code</td>
<td>70</td>
</tr>
</tbody>
</table>

8. **Title**

<table>
<thead>
<tr>
<th>ECS</th>
<th>GENERAL</th>
<th>LINEAR</th>
</tr>
</thead>
</table>

9. **Title Card**

| F4 | AAAA | |

10. **Principle Source Language**

| F4 | AAAA | |

11. **Secondary Source Language**

| |

12. **Type of Routine**

| SR |

13. **Machine**

| 6600 | AAAA |

14. **Monitor or Operating System Required**

| SCF | P | 3 | 1 |

15. **Special Machine Requirements**

| ECS |

16. **Non-Library Routines or Subr. Req.**

| NO |

17. **Documents Available (indicate page counts):**

- Short Write-up: SWA5
- Listing: LSA5

18. **Type of Support**

| TYPE | A1 |

19. **Primary Form**

| SOURCE | CARDS |

- Count: 122
- Medium: BCD

20. **Additional Form**

| OBJECT | CARDS |

- Count: 39
- Medium: BIN

21. **Search Key**

| ECS | GENERAL | LINEAR | SYSTEM | SOLVER |

22. **Identification**

| LA | F4 | 15A |

23. **Language Compatibility**

| F4 | A4 | COMPAT |

24. **Write-up Date**

| WU | 09/23/70 |

25. **Write-up Revision Number**

| REV | 0 |

26. **Deck Date**

| DECK | 09/23/70 |

27. **Deck Revision Number**

| REV | 0 |
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), VECPRD, VECSSUM(F133A), ECRD, ECWR, EXIT(SYSTEM).

SAMPLE WRITEUP

Function:

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

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

Arguments:

IM = column length of a column in C --- input
IN = number of columns in C --- input
IK = number of columns in Y and X --- input
IL = number of rows in B --- input
NR = rank of C --- output
A, D = storage columns having length ≥ IM --- scratch
IR = array of size IN containing, in location j, the ECS starting address for column j of matrix C --- input
IY = array of size IK containing, in location j, the ECS starting address for column j of matrix Y --- input
B = auxiliary matrix of size IL by IN, usually set to identity of size IN. See section entitled METHOD for further details. --- input
IL by IN matrix BT of (1) below --- output
IB = column reserved length for B in calling program --- input
X = IL by IN solution matrix BX of (1) below --- output
JX = column reserved length for X in calling program --- input
EPS = machine constant - for 6600 user should set it to 1.E-14 --- input

Method:

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

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

where X is the solution to

\[
CX=Y
\] (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>
</tr>
</thead>
<tbody>
<tr>
<td>50 3</td>
<td>.006</td>
</tr>
<tr>
<td>1000 3</td>
<td>.062</td>
</tr>
<tr>
<td>1000 3</td>
<td>.064</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:

```fortran
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
D0 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
150 AID(I,K)=0.
B(I)=1.
D0 140 K=1,NW
140 AID(I,K)=0.
150 AID(I,I)=1.
B(I)=1.
C STORE MATRICES C,B INTO ECS NOTE CA=B
IR(1)=0
D0 4 IWRP=1,3
CALL ECWR(C, IR(1), 100, JV)
IF(JV) 5,5,4
4 CONTINUE
STOP 4
5 D0 6 IWRP=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,APZER)
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
```

Volume 2 - 10/72
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., ABORT, 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., SECON, CLOCK, TIME, DATE, REMARK, PAUSE.
Also includes some file manipulation (see W).

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

Q3. Dynamic storage allocation
Q. (cont'd.)

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

R. (Not Used)

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

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

T1. Physics (including nuclear)
T2. Chemistry
T3. Other physical sciences (geology, astronomy, etc.)
T4. Engineering
T5. Business data processing
T6. Manufacturing, (non-data) processing, and process
control
T7. Mathematics and applied mathematics
T8. Social and behavioral sciences and psychology
T9. Biological sciences

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

U1. Assembly
E.g., LACENT, CØMPASS.

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

V. (Not Used)

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

W1. Access
E.g., ØPEN, CLOSE, CREATE, RELEASE, MODIFY, UNLØAD,
RENAME, SWITCH, GØTRQT, DATAREL. Also see Q1.

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

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

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

X. (Not Used)

Y. (Not Used)

Z. (Not Used)
PART II

CATALOG OF PROGRAMS
ARITHMETIC ROUTINES
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  H*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 ≤F. ABS(Y) ≤(1.
A101A  3*AND AN INTEGER N SUCH THAT
A101A  4*X=Y*(2**N).
A101A  5*STORAGE=7 WORDS.
A101A  6*SELF CONTAINED.

A102A  A* B. L. BUZBEE C-4
A102A  B*UNPACK A FLOATING POINT NUMBER
A102A  C*COMPASS  SR660G 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=UNPAX(X,I) YIELDS TWO
A102A  2*INTEGERS J AND I SUCH THAT X= J*(2**I).
A102A  3*STORAGE=5 WORDS.
A102A  4*SELF CONTAINED.

A103A  A* B. L. BUZBEE C-4
A103A  H*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*1) YIELDS Y=A*(2**(N+1)).
A103A  3*STORAGE=6 WORDS.
A103A  4*SELF CONTAINED.

VOLUME 2 - 9/73
**A104A A+ JIM CLARK T-1 67**

A104A C* NUMBER RANGE
A104A B* MATHEMATICS A1 COMPASS SR6600 SCOPE
A104A C* SW 3 LS 1
A104A D* COMPASS SOURCE CARDS 17 HDCOMPASS OBJECT CARDS 48 IN
A104A S** RANGE** NUMBER EVALUATION
A104A 10# ON DISK F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
A104A 11# CALL RANGE(A, IND) RESULTS IN IND HAVING AN INTEGER VALUE OF
A104A 12# ONE IF THE FLOATING POINT NUMBER A IS INFINITE, IND IS TWO
A104A 13# IF A IS INDEFINITE, AND IND IS THREE IF A IS NEITHER
A104A 14# INDEFINITE NOR INFINITE.
A104A 15# STORAGE 11 OCTAL WORDS.
A104A 16# THIS ROUTINE IS SELF CONTAINED.

---

**A105A A+ B L BUZBEE C-4 I CHERRY C-4 72**

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

**CONVERT DOUBLE TO INTEGER**

**Purpose:** Generate double precision form DX of a single precision number X.

**Warning:** This routine is made available for compatibility considerations with older FORTRAN.

**Since DBLE is an external routine, mixed-mode statements are preferred instead of DBLE when speed is a consideration.

**Routine Name:** DBLE

**Entry Name:** DBLE

**Storage:** 4 OCTAL WORDS

**Routines Called:** Self contained

---

**Purpose:** Convert a double precision floating number into a 59-bit signed integer.

**Routine Name:** IDINT

**Entry Name:** IDINT

**Storage:** 25 OCTAL WORDS

**Routines Called:** System

---

**Purpose:** Convert single precision number to double precision.

**Routine Name:** CONV

**Entry Name:** CONV

**Storage:** 4 OCTAL WORDS

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

A107A  A*   B L BUBBEE  C-4  I CHERRY C-4  72
A107A  B*CONVERT DOUBLE PRECISION NUMBER TO SINGLE PRECISION
A107A  C*COMPASS  SR6600  SCP 3.1
A107A  D*  SW 1  LS 1  TYPE 1
A107A  E*CMP  SOURCE CARDS  8  BCD  OBJECT CARDS  3  BIN
A107A  F**SINGLE PRECISION*DUPUICESSION
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

VOLUME 2 - 9/73
A107B A* B L BUZBEE C-4 I CHERRY C-4 72
A107B B* CONVERT DOUBLE PRECISION NUMBER TO SINGLE PRECISION
A107B C* COMPASS SR7600 CROS
A107B D* SW 1 LS 1 TYPE 1
A107B E* CMP SOURCE CARDS 8 BCD OBJECT CARDS 3 BIN
A107B F** SINGLE PRECISION DOUBLE PRECISION
A107B G* ON DISK F4 COMPAT WU 11/22/72 DECK 11/22/72
A107B 1* FORM: X = SNGL (DX)
A107B 2* PURPOSE: GENERATE THE SINGLE PRECISION FORM X OF A
A107B 3* DOUBLE PRECISION NUMBER DX.
A107B 4* WARNING: THIS ROUTINE IS MADE AVAILABLE FOR
A107B 5* COMPATIBILITY CONSIDERATIONS WITH OLDER FORTRANS.
A107B 6* SINCE SNGL IS AN EXTERNAL ROUTINE, MIXED-MODE
A107B 7* STATEMENTS ARE PREFERRED INSTEAD OF SNGL WHEN
A107B 8* SPEED IS A CONSIDERATION.
A107B 9* ROUTINE NAME: SNGL
A107B 10* ENTRY NAME: SNGL
A107B 11* STORAGE: 3 OCTAL WORDS
A107B 12* ROUTINES CALLED: SELF CONTAINED

A108A A* LAURI RATHMANN C-4 W. FULLERTON 73
A108A B* DOUBLE PRECISION ABSOLUTE VALUE
A108A C* CMP SR6600 SCP 3.1
A108A D* SW 2 LS 2 TYPE 1.1
A108A E* SOURCE 31 CARDS OBJECT 4 CARDS
A108A F** ABSOLUTE VALUE DOUBLE DABS
A108A G* DISK F4 COMPAT WU 05/23/73 DECK 05/23/73
A108A 1* FORM: DY = DABS (DX)
A108A 2* PURPOSE: TO TAKE THE ABSOLUTE VALUE OF A DOUBLE PRECISION
A108A 3* NUMBER
A108A 4* ROUTINE NAME: DABS
A108A 5* ENTRY NAME: DABS
A108A 6* STORAGE: 15 OCTAL WORDS
A108A 7* ROUTINES CALLED: SYSTEM.
A108B  A*  LAURI RATHMANN  C-4  W. FULLERTON  73
A108B  B*DOUBLE PRECISION ABSOLUTE VALUE
A108B  C*CMP  SR7600  CROS
A108B  D*  SW  2  LS  2  TYPE 1.1
A108B  E*  SOURCE  31 CARDS  OBJECT  4 CARDS
A108B  F**ABSOLUTE VALUE DOUBLE*DABS
A108B  G*DISK  F4  COMPAT WU  05/23/73  DECK 05/23/73
A108B  1*FORM:  DY = DABS(DX)
A108B  2*PURPOSE:  TO TAKE THE ABSOLUTE VALUE OF A DOUBLE PRECISION
A108B  3*  NUMBER
A108B  4*ROUTINE NAME:  DABS
A108B  5*ENTRY NAME:  DABS
A108B  6*STORAGE:  15 OCTAL WORDS
A108B  7*ROUTINES CALLED:  SYSTEM.

A109A  A*  LAURI RATHMANN  C-4  W. FULLERTON  73
A109A  B*GENERALIZED SIGNUM FUNCTION DOUBLE 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.
COMPLEX NUMBERS

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

REVIEWER: WAYNE FULLERTON, C-4

A202A A*       B L BUZBEE       C-4
A202A O**ABSOLUTE VALUE OF DOUBLE PRECISION COMPLEX NUMBER
A202A H**MATH    A2       F4           SR6600  SCP 3.1
A202A C*       SW 2       LS 1
A202A D*F4 SOURCE CARDS  11Bcdf4 BINARY CARDS  10BIN
A202A S**ABSOLUTE VALUE OF DOUBLE PRECISION COMPLEX NUMBER
A202A J*ON DISK    F4 COMPAT  WU 1/3/69 REV. 2 DECK 1/3/69 REV. 2
A202A I*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 DSGRT(B410A).

A203A A*       J L DURAN       C-4
A203A O*MAGNITUDE OF A COMPLEX NUMBER
A203A H**MATH    83       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 J*ON DISK    F4 COMPAT  WU 04/17/68 REV DECK 04/17/68 REV
A203A I*F=CABS(Z) WHERE Z IS A COMPLEX ARGUMENT AND F IS THE
A203A 12*MAGNITUDE OF Z
A203A 13*STORAGE 17 WORDS
A203A 14*SGRT 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 F4 COMPAT WU11/65/68REV 2 DECK 11/65/68REV 2
B104A I*CALLED BY Z=ATAN(X) OR Z=ATAN2(Y,X)
B104A 10*ON DISK F4 COMPAT WU11/65/68REV 2 DECK 11/65/68REV 2
B104A 12*COMPUTES ARCTANGENT OF X OR OF Y/X
B104A 13*PI/2 .LE. ATAN(X) .LE. PI/2
B104A 14*PI .LE. ATAN2(Y,X) .LT. PI
B104A 15*RELATIVE ERROR FOR ATAN IS APPROXIMATELY 7.2E-15
B104A 16*RELATIVE ERROR FOR ATAN2 IS APPROXIMATELY 1.1E-14
B104A 17*STORAGE=52 (DECIMAL) WORDS
B104A 18*SELF CONTAINED.

B106A A* KARL J MELENDEZ C-4
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 I*CALLED BY: Y=SIN(X), Y=COS(X) FOR ARGUMENT IN RADIANS
B106A 2*CALLED BY: Y=SG(X), Y=CDG(X) FOR ARGUMENT IN DEGREES
B106A 3*PURPOSE: COMPUTES SINE OR COSINE OF THE ARGUMENT X.
B106A 4*RELATIVE ERROR IS APPROXIMATELY 1.5 E-14
B106A 5*Routines Called: SYSTEM
B106A 6*STORAGE: 76 (DECIMAL) WORDS

VOLUME 2 - 9/73
A* PAUL N. IWANCHUK C-4
B*FLOATING POINT TANGENT OR COTANGENT ROUTINE
C*F-4 SR7600 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 04/15/72 REV 2 DECK 04/05/72 REV 2
1*FORM: Y=TAN(X)
2* Y=COT(X)
3* Y=COTAN(X)
* PURPOSE: COMPUTE TANGENT OR COTANGENT OF
5* FLOATING POINT ARGUMENT X
6*ROUTINE NAME: TAN
7*ENTRY NAMES: TAN, COT, COTAN
8*STORAGE: 310 (OCTAL) WORDS
9*ROUTINES CALLED: LABRT(N103A)

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

VOLUME 2 - 9/73
**B108A**

**A**

H. L. BUZBEE C-4

8*ARCSINE OR ARCCOSINE

C=COMP 

SR6600 SCP 3.1

D* SW 3 LS 4 TYPE 1

E*COMP SOURCE CARDS 159 BCD OBJECT CARDS 10 BIN

F**ARCSINE*ARCCOSINE*INVERSE FUNCTION

G*ON DISK F4 COMPAT WU 08/02/71 REV 2 DECK 08/02/71 REV 2

1*FORM: Z=ASIN(X), Z=ARSIN(X) Z=ARCSIN(X,B)

2* Z=ACOS(X), Z=ARCOS(X), Z=ARCCOS(X,B)

3*PURPOSE: ARCSINE OR ARCCOSINE OF A REAL ARGUMENT.

4*ROUTINE NAME: ASIN

5*ENTRY NAMES: ASIN, ARSIN, ARCSIN, ACOS, ARCOS, ARCCOS

6*RELATIVE ERROR APPROXIMATELY 1.1E-14.

7*STORAGE: 123 (OCTAL) WORDS.

8*Routines CALLED: LABRT(N103A), SORT(B408A).

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**B108B**

**A**

B. L. BUZBEE C-4

8*ARCSINE OR ARCCOSINE

C=COMP 

SR6600 CROS

D* SW 3 LS 5 TYPE 1

E=COMP SOURCE CARDS 159 BCD OBJECT CARDS 10 BIN

F**ARCSINE*ARCCOSINE*INVERSE FUNCTION

G*ON DISK F4 COMPAT WU 08/09/72 DECK 08/09/72

1*FORM: Z=ASIN(X), Z=ARSIN(X), Z=ARCSIN(X,B)

2* Z=ACOS(X), Z=ARCOS(X), Z=ARCCOS(X,B)

3*PURPOSE: ARCSINE OR ARCCOSINE OF A REAL ARGUMENT.

4*ROUTINE NAME: ASIN

5*ENTRY NAMES: ASIN, ARSIN, ARCSIN, ACOS, ARCOS, ARCCOS

6*RELATIVE ERROR APPROXIMATELY 1.1E-14.

7*STORAGE: 123 OCTAL WORDS.

8*Routines CALLED: LABRT(N103A), SORT(B408B).

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**B109A**

**A**

J. L. DURAN T-1

0*SINE OR COSINE OF A COMPLEX NUMBER

B=MATH B1 COMPASS 

SR6600 SCOPE

C* SW 2 LS 2

D=COMPASS SYMBOLIC 64 BCD RELOCATABLE COL BIN SBIN

S=COMPLEX*SINE*COMPLEX*COSINE

1*ON DISK F4 COMPAT WU 02/21/68 DECK 02/23/68

F=CSIN(Z) OR F=CCOS(Z). Z AND F ARE COMPLEX NUMBERS.

12*STORAGE 36 WORDS

13*USES SIN(B106A), COS(B116A), SINH(B203A), COSH(B203A).

VOLUME 2 - 9/73
HYPERBOLIC FUNCTIONS

REVIEWER: WAYNE FULLERTON, C-4

A* J.L. DURAN T-1
B203A 68

B203A A* HYPERBOLIC SINE AND COSINE
B203A 0* COMPASS SR6600 SCOPE
B203A B* MATH B2
B203A C* SW 2 LS 2
B203A D* COMPASS SYMBOLIC 81BCD RELOCATABLE COL BIN SBIN
B203A E* HYPERBOLIC SINE AND COSINE
B203A F** COMPASS SYMBOLIC 81BCD RELOCATABLE COL BIN SBIN

B203A 10* ON DISK F4 COMPAT WU 02/07/68 REV DECK 01/31/68 REV
B203A 11* Y = SINH(X) OR Y = COSH(X) WHERE X IS A NORMALIZED FLOATING
B203A 12* POINT ARGUMENT.
B203A 13* STORAGE 42 FULL WORDS.
B203A 14* THIS ROUTINE USES EXP(B306A).

A* J.L. DURAN C-4 I. CHERRY 72

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

A non-documentation feature

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

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

B206A A* J. L. DURAN C-4 68
B206A B** DOUBLE PRECISION HYPERBOLIC TANGENT
B206A C** MATH 82 COMPASS SR6600 SCOPE
B206A D* SW 2 LS 2
B206A E* COMPASS SYMBOLIC 820CDRELOCATABLE COL. BIN 4BIN
B206A F** HYPERBOLIC*TANGENT*DOUBLE*PRECISION
B206A G** ON DISK F4 COMPAT WU 01/16/68 DECK 01/16/68
B206A H** F=DTONH(X). X AND F ARE DOUBLE PRECISION NORMALIZED FLOATING
B206A 1* POINT NUMBERS.
B206A 2* STORAGE 31 WORDS
B206A 3* USES DEXP(B308A)
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*SR6600 SCP 3.1
B305A D* SW 1 LS 4 TYPE 1.1
B305A E* SOURCE 121 CARD OBJECT 7 CARD
B305A F*SOURCE 121 CARD OBJECT 7 CARD
B305A G*DISK F4 COMPAT WU 04/25/73 DECK 04/25/73
B305A H* Y = ALOG (X)
B305A I*Y = ALOG10 (X)
B305A J*PURPOSE: ALOG COMPUTES THE NATURAL LOGARITHM.
B305A K*ALOG10 COMPUTES THE LOGARITHM TO THE BASE 10.
B305A L*ROUTINE NAME: ALNLOG
B305A M*ENTRY NAMES: ALOG, ALOG10
B305A N*STORAGE: 67 OCTAL WORDS
B305A O*ROUTINES CALLED: SYSTEM(SYSTEM)
B305C A* A. SOLEM C-4 W. FULLERTON 73
B305C B*NATURAL LOG OR LOG TO THE BASE 10 FOR LCM ARGUMENT
B305C C*CMP SR7600 CROS
B305C D* SW 1 LS 5 TYPE 1.1
B305C E* SOURCE 154 CARD OBJECT 9 CARD
B305C F**NATURAL LOGARITHM BASE 10*LCM
B305C G*DISK F4 COMPAT WU 04/25/73 DECK 04/25/73
B305C 1*FORM: LEXT ALOG LEXT ALOG10
B305C 2* Y = ALOG (X) Y = ALOG10 (X)
B305C 3*PURPOSE: ALOG+ COMPUTES THE NATURAL LOGARITHM.
B305C 4* ALOG10+ COMPUTES THE LOGARITHM TO THE BASE 10.
B305C 5*Routine NAME: ALNLOG+
B305C 6*ENTRY NAMES: ALOG+, ALOG10+
B305C 7*STORAGE: 105 OCTAL WORDS
B305C 8*ROUTINES CALLED: LIBMSG(SYSTEM), SYSTEM(SYSTEM)

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

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

**F.L. BUZBEE**

**C-4**

**W. FULLERTON**

**73**

**B306C**

**A**

**EXPONENTIAL FUNCTION E**

**X**

**ALLOWING LCM ARGUMENT**

**B306C**

**C**

**CMP**

**SR7630**

**CROS**

**B306C**

**V**

**SW 2**

**LS 4**

**TYPE 1.1**

**B306C**

**E**

**CMP**

**SOURCE CARDS**

**119**

**BCD**

**OBJECT CARDS**

**7**

**BIN**

**B306C**

**F**

**EXPONENTIAL FUNCTION**

**E TO THE X**

**LCM**

**B306C**

**G**

**ON**

**DISK**

**F4**

**COMPAT**

**WU**

**04/12/73**

**DECK 04/12/73**

**B306C**

**1**

**FORM**

**LEX**

**EXP**

**B306C**

**2**

**Y = EXP**

**B306C**

**3**

**PURPOSE**

**CALCULATE EXPONENTIAL OF X**

**B306C**

**4**

**ROUTINE NAME**

**EXP**

**B306C**

**5**

**ENTRY NAME**

**EXP**

**B306C**

**6**

**STORAGE**

**66**

**OCTAL WORDS**

**B306C**

**7**

**ROUTINES CALLED**

**LABRT(N1038), LIAMSG(SYSTEM).**

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**B307A**

**A**

**J.L. DURAN**

**C-4**

**67**

**B307A**

**0**

**COMPLEX NATURAL LOG**

**B307A**

**B**

**MATH**

**B3**

**COMPASS**

**SR6600**

**SCOPE**

**B307A**

**C**

**SW 2**

**LS 2**

**B307A**

**D**

**COMPASS SOURCE CARDS**

**B18C0**

**OBJECT CARDS**

**6BIN**

**B307A**

**S**

**COMPLEX NATURAL LOG SINGLE PRECISION FORTRAN IV COMPATIBLE**

**B307A**

**10**

**ON**

**DISK**

**F4**

**COMPAT**

**WJ**

**04/15/68**

**REV DECK 04/15/68 REV**

**B307A**

**11**

**Y = CLOG(Z) WHERE Z IS A COMPLEX ARGUMENT AND Y THE COMPLEX**

**B307A**

**12**

**RESULT.**

**B307A**

**13**

**STORAGE 39 WORDS**

**B307A**

**14**

**ROUTINE USES ALOG(B305A), ATAN2(B104A).**

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**B310A**

**A**

**J.L. DURAN**

**T-1**

**68**

**B310A**

**0**

**NATURAL EXPONENTIAL OF A COMPLEX NUMBER**

**B310A**

**B**

**MATH**

**B3**

**COMPASS**

**SR6600**

**SCOPE**

**B310A**

**C**

**SW 2**

**LS 1**

**B310A**

**D**

**COMPASS SYMBOLIC 28BCDRELOCATABLE COL BIN 3BIN**

**B310A**

**S**

**NATURAL EXPONENTIAL COMPLEX NUMBER**

**B310A**

**10**

**ON**

**DISK**

**F4**

**COMPAT**

**WU**

**02/12/68**

**DECK 02/05/68**

**B310A**

**11**

**F = CEXP(Z) F AND Z ARE COMPLEX NUMBERS IN NORMALIZED FLOATING**

**B310A**

**12**

**POINT.**

**B310A**

**13**

**ERROR MESSAGES CONTROLLED BY EXP AND COS.**

**B310A**

**14**

**STORAGE 15 FULL WORDS.**

**B310A**

**15**

**USES EXP(B306A), COS(B106A), SIN(B196A).**

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**VOLUME 2 - 9/73**
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 6690 SCP .1
B313A D* SW 3 LS 3 TYPE 1
B313A E*SOURCE CARDS 107 BCD OBJECT CARDS 6 BIN
B313A F**EXPOENENTIATION
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)

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 7600 CROSS
B313A D* SW 3 LS 3 TYPE 1
B313A E*SOURCE CARDS 107 BCD OBJECT CARDS 6 BIN
B313A F**EXPOENENTIATION
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*TIMING: .9 MICROSECONDS FOR N=2.
B313A 5*ROUTINE NAME: DBAIEX
B313A 6*ENTRY NAME: DBAIEX
B313A 7*STORAGE: 57 OCTAL WORDS
B313A 8*Routines CALLED: SYSTEM (ON SYSTEM)
ROOTS AND POWERS

REVIEWER: WAYNE FULLERTON, C-4

A* E. 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 = QBRTH(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 12/03/79REV.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)
**Purpose:** Compute square root of floating point value

**Routine Name:** SQRT

**Storage:** 63 octal words

**Routines Called:** LABRT(N103B), OUTPTS(SYSTEM), LIBMSG(SYSTEM)

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**Purpose:** Compute complex square root of complex number

**Routine Name:** C-SQRT

**Storage:** 72 octal words

**Routines Called:** SQRT(B498A)

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**Purpose:** Compute complex square root of complex argument z

**Routine Name:** CSQRT

**Storage:** 41 octal words

**Routines Called:** SQRT(B498A)
A* B.L. BUZBEE C-4

IVAN CHERRY 72

B4098 B*COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
B4098 C*COMPASS SR7600
B4098 D* SW 2 LS 2 TYPE 1
B4098 E*SOURCE CARDS 75 BCD OBJECT CARDS 6 BIN
B4098 F**COMPLEX SQUARE ROOT
B4098 G*ON DISK F4 COMPAT WU 10/03/72REV.3 DECK 05/03/72REV.1
B4098 I*FOR M: Y = CSQRT(Z)
B4098 2*PURPOSE: COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
B4098 3* ARGUMENT Z.
B4098 4*TIMING: 14 MICROSECONDS
B4098 5*ROUTINE NAME: CSQRT
B4098 6*ENTRY NAME: CSQRT
B4098 7*STORAGE 41 OCTAL WORDS
B4098 8*Routines Called: SQRT(B4098)

B413A A* B.L. BUZBEE C-4

B413A R*FOURTH ROOT OF X
B413A C*CHP SR6690 SCP 3.1
B413A D* SW 2 LS 2 TYPE 1
B413A E*CHP SOURCE CARDS 61 BCD OBJECT CARDS 5 BIN
B413A F**ROOT OF FOURTH ROOT OF X
B413A G*ON DISK F4 COMPAT WU 10/24/72REV.2 DECK 10/24/72REV.1
B413A I*FOR M: 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*S ELF-CONTAINED.
A*  B.L. BUZBEE  C-4
B413B  B*FOURTH ROOT OF X
B413B  C*CMP  SR76JJ  CROS
B413B  D*  SW 2  LS 2  TYPE 1
B413B  E*CMP SOURCE CARDS 61 BCD OBJECT CARDS 5 BIN
B413B  F**ROOT*FOURTH ROOT OF X
B413B  G*ON DISK  F4 COMPAT WU 10/24/72 DECK 10/24/72
B413B  1*FORM: Y = FOUROT(X)
B413B  2*PURPOSE: OBTAINS THE 4TH ROOT OF X IF X IS NON-NEGATIVE.
B413B  3* IF X IS NEGATIVE, THE RESULT IS INDETERMINATE.
B413B  4*ACCURACY: MAXIMUM OBSERVED RELATIVE ERROR IS 3.5E-14.
B413B  5*TIMING = 7.2 MICROSECONDS
B413B  6*ROUTINE NAME: FOUROT
B413B  7*ENTRY NAME: FOUROT
B413B  8*STORAGE: 35 OCTAL WORDS
B413B  9*SELF-CONTAINED.

A*  B.L. BUZBEE  C-4
B41A  B*COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
B41A  C*COMPASS  SR6630  SCP 3.1
B41A  D*  SW 2  LS 2  TYPE 2
B41A  E*CMP SOURCE CARDS 81 BCD OBJECT CARDS 6 BIN
B41A  F**COMPLEX*QUARE*ROOT
B41A  G*CARDS  F4 COMPAT WU 05/03/72 DECK 05/03/72
B41A  1*FORM: Y = CSQRT(Z)
B41A  2*PURPOSE: COMPUTE COMPLEX SQUARE ROOT Y OF COMPLEX
B41A  3* ARGUMENT Z. THE RESULT IS ON THE FIRST RIEMANN SHEET.
B41A  4*TIMING: 58 MICROSECONDS
B41A  5*ROUTINE NAME: CSQRT
B41A  6*ENTRY NAME: CSQRT
B41A  7*STORAGE: 42 OCTAL WORDS
B41A  8*Routines CALLED: SQRT(B408A).
EVALUATION OF POLYNOMIALS

Reviewer: J. Hancock, C-4

C106A 0*POLYNOMIAL COEFFICIENT GENERATOR
C106A B*MATHEMATICS C1 F4 SR6600 SCOPE
C106A C* SW 2 LS 1
C106A D*SOURCE CARDS 240CD8INARY DECK 9BIN
C106A S*POLYNOMIAL*COEFFICIENT GENERATOR
C106A 10*CARDS F4 COMPAT WU 09/18/67 REV DECK 05/04/67
C106A 11*CALL GENPOL(N,R,P,C) GENERATES THE COEFFICIENTS OF AN NTH
C106A 12*ORDER POLYNOMIAL WHOSE ROOTS ARE STORED IN REAL ARRAY
C106A 13*R, OF DIMENSION N, P IS A TEMPORARY DBL PREC ARRAY OF DIM. 2N.
C106A 14*C IS AN ARRAY OF DIM. N+1 CONTAINING THE CALCULATED
C106A 15*COEFFICIENTS.
C106A 16*STORAGE= 145 (8) WORDS.
C106A 17*SELF CONTAINED.

C107A 0*POLYNOMIAL COEFFICIENT GENERATOR-DOWNLE PRECISION ROOTS
C107A B*MATHEMATICS C1 F4 SR6600 SCOPE
C107A C* SW 2 LS 1
C107A D*SOURCE DECK 240CD8INARY DECK 9BIN
C107A S*POLYNOMIAL*COEFFICIENT GENERATOR IN DOUBLE PRECISION
C107A 10*CARDS F4 COMPAT WU 05/04/67 DECK 05/04/67
C107A 11*CALL GENPDP(N,R,P,C)
C107A 12*PURPOSE - TO GENERATE THE COEFFICIENTS OF A POLYNOMIAL WHOSE
C107A 13* ROOTS ARE GIVEN IN DOUBLE PRECISION AND ARE REAL.
C107A 14* N = NUMBER OF ROOTS
C107A 15* R = P, AND C ARE ALL DOUBLE PRECISION ARRAYS.
C107A 16* P = ARRAY OF ROOTS OF DIMENSION N
C107A 17* P = ARRAY OF 2N WORDS OF TEMPORARY STORAGE
C107A 18* C = ARRAY OF CALCULATED COEFFICIENTS OF DIMENSION N+1.
C107A 19* WHERE C(1) =A0=1, C(2) =A1, C(N+1) =A0
C107A 20*STORAGE= 147 WORDS.
C107A 21*SELF CONTAINED.
CALL GNCPX(N,R,P,C)

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 C312A
C205A *(SRPOLY) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED C2AA.

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

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

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

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

C210A A* B. L. BUZBEE T-1 D. WILLIAMS 67
C210A B*MTH DERIVATIVE EVALUATION OF REAL (SP) POLYNOMIAL
C210A C*MATHEMATICS C2 F4 SR6600 SCOPE
C210A D SW 2 LS 1
C210A E*D4 SOURCE CARDS 19BCDF4 OBJECT CARDS 9BIN
C210A F*MTH*DERIVATIVE*EVALUATION OF A REAL SINGLE PRECISION POLYNOMIAL
C210A G*CARDS F4 COMPAT WU 09/14/67 REV DECK 01/10/67
C210A H*CALL SRPOLE(N,M,SR,DP,Z,Y) EVALUATES THE MTH DERIVATIVE OF
C210A I*NTH DEGREE REAL POLYNOMIAL WITH SINGLE PRECISION COEFF-
C210A J*ICIENTS.
C210A K*STORAGE=110 WORDS.
C210A L*USES LARHT(N103A), DCPOLE(C213A).

VOLUME 2 - 9/73
**C211A**

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**

SUM**TH** DERIVATIVE EVALUATION OF A COMPLEX (SP)**POLYNOMIAL

**C211A**

10**CARDS** F4 COMPAT WU 01/19/67 DECK 01/18/67

**C211A**

CALL SCPOLE(NSMDCPOLE,DCDF4) EVALUATES THE MTH DERIVATIVE OF A

**C211A**

12**NTH DEGREE COMPLEX POLYNOMIAL WITH SINGLE PRECISION COEFF**-

**C211A**

13**ICIENTS.

**C211A**

14**STORAGE=126 WORDS.

**C211A**

15**USES DCPOLE(C213A).

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**C212A**

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**

SUM**TH** DERIVATIVE EVALUATION OF A REAL (DP)**POLYNOMIAL

**C212A**

10**CARDS** F4 COMPAT WU 01/13/67 DECK 01/18/67

**C212A**

CALL DHPOLE(NSMDCPOLDP,DSDF4) EVALUATES THE MTH DERIVATIVE OF

**C212A**

12**NTH DEGREE REAL POLYNOMIAL WITH DOUBLE PRECISION COEFF**-

**C212A**

13**ICIENTS.

**C212A**

14**STORAGE=49 WORDS.

**C212A**

15**USES DCPOLE(C213A).

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**C213A**

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**

SUM**TH** DERIVATIVE EVALUATION OF A COMPLEX (DP)**POLYNOMIAL

**C213A**

10**CARDS** F4 COMPAT WU 07/15/68 REV DECK 07/11/68 REV

**C213A**

CALL DCPOLE(NSMDCPOLE,DCDF4) EVALUATES THE MTH DERIVATIVE OF

**C213A**

12**NTH DEGREE COMPLEX POLYNOMIAL WITH DOUBLE PRECISION COEFF**-

**C213A**

13**ICIENTS.

**C213A**

14**STORAGE=180 WORDS.

**C213A**

15**USES LABRT(N103A).

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VOLUME 2 - 9/73
A* JOHN HANCOCK C-4
B*SCPTACO -- POLYNOMIAL AND DERIVATIVES WITH ERROR BOUNDS
C215A C*F4 SR7600 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 02/15/73 DECK 02/15/73
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: 372 (OCTAL) WORDS.
C215A 6*Routines Called: LABRT(N103A).
**NEWPOL**

**ZEROS OF A POLYNOMIAL WITH OPTIONAL ERROR BOUNDS**

**Purpose:** Find zeros of complex polynomial with optional error bounds.

**Timing:** For N ≤ 5 and no input estimates, execution time is less than 1 millisecond per zero.

**Routine Name:** NEWPOL

**Entry Name:** NEWPOL

**Storage:** 1006 (OCTAL) WORDS

**Routines Called:** CABS(A203A), COS(B106A), SIN(B106A), ALOG(B305B), EXP(B306B), SCPTACO(C215A).
$C2AA\quad A^*\quad B.L.\quad BUZBEE\quad C-4$

$C2AA\quad B*ZEROS\quad OF\quad REAL\quad (SP)\quad POLYNOMIAL$

$C2AA\quad C*D4\quad SR6600\quad SCP\quad 3.1$

$C2AA\quad D*\quad SW\quad 2\quad LS\quad 1\quad TYPE\quad 2$

$C2AA\quad E*F4\quad SOURCE\quad CARDS\quad 23\quad BCD\quad OBJECT\quad CARDS\quad 9\quad BIN$

$C2AA\quad F**ZEROS\quad OF\quad REAL\quad (SP)*POLYNOMIAL$

$C2AA\quad G*CARDS\quad F4\quad COMPAT\quad WU\quad 05/18/72\quad DECK\quad 05/18/72$

$C2AA\quad 1*FORM:\quad CALL\quad SRPOLY(N*SR*DP*Z*IE)$

$C2AA\quad 2*PURPOSE:\quad FIND\quad THE\quad ZEROS\quad OF\quad A\quad REAL\quad POLYNOMIAL\quad WITH\quad SINGLE\quad PRECISION\quad COEFFICIENTS.$

$C2AA\quad 4*ROUTINE\quad NAME:\quad SRPOLY$

$C2AA\quad 5*ENTRY\quad NAME:\quad SRPOLY$

$C2AA\quad 6*STORAGE:\quad 85\quad OCTAL\quad WORDS.$

$C2AA\quad 7*USES:\quad DCPOLY(C2AD).$

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$C2AB\quad A^*\quad B.L.\quad BUZBEE\quad C-4$

$C2AB\quad B*ZEROS\quad OF\quad COMPLEX\quad (SP)\quad POLYNOMIAL$

$C2AB\quad C*D4\quad SR6600\quad SCP\quad 3.1$

$C2AB\quad D*\quad SW\quad 2\quad LS\quad 1\quad TYPE\quad 2$

$C2AB\quad E*F4\quad SOURCE\quad CARDS\quad 22\quad BCD\quad OBJECT\quad CARDS\quad 9\quad BIN$

$C2AB\quad F**ZEROS\quad OF\quad COMPLEX\quad (SP)*POLYNOMIALS$

$C2AB\quad G*CARDS\quad F4\quad COMPAT\quad WU\quad 05/18/72\quad DECK\quad 05/18/72$

$C2AB\quad 1*FORM:\quad CALL\quad SCPOLY(N*SC*DP*Z*IE)$

$C2AB\quad 2*PURPOSE:\quad FIND\quad THE\quad ZEROS\quad OF\quad A\quad COMPLEX\quad POLYNOMIAL\quad WITH\quad SINGLE\quad PRECISION\quad COEFFICIENTS.$

$C2AB\quad 4*ROUTINE\quad NAME:\quad SCPOLY$

$C2AB\quad 5*ENTRY\quad NAME:\quad SCPOLY$

$C2AB\quad 6*STORAGE:\quad 89\quad OCTAL\quad WORDS.$

$C2AB\quad 7*USES:\quad DCPOLY(C2AD).$

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$C2AC\quad A^*\quad B.L.\quad BUZBEE\quad C-4$

$C2AC\quad B*ZEKOS\quad OF\quad A\quad REAL\quad (DP)\quad POLYNOMIAL$

$C2AC\quad C*D4\quad SR6600\quad SCP\quad 3.1$

$C2AC\quad D*\quad SW\quad 2\quad LS\quad 1\quad TYPE\quad 2$

$C2AC\quad E*F4\quad SOURCE\quad DECK\quad 14\quad BCD\quad OBJECT\quad DECK\quad 6\quad BIN$

$C2AC\quad F**ZEKOS\quad OF\quad A\quad REAL\quad (DP)*POLYNOMIAL$

$C2AC\quad G*CARDS\quad F4\quad COMPAT\quad WU\quad 05/13/72\quad DECK\quad 05/18/72$

$C2AC\quad 1*FORM:\quad CALL\quad DRPOLY(N*DBR*DP*DZ*IE)$

$C2AC\quad 2*PURPOSE:\quad FIND\quad THE\quad ZEROS\quad OF\quad A\quad REAL\quad POLYNOMIAL\quad WITH\quad DOUBLE\quad PRECISION\quad COEFFICIENTS.$

$C2AC\quad 4*ROUTINE\quad NAME:\quad DRPOLY$

$C2AC\quad 5*ENTRY\quad NAME:\quad DRPOLY$

$C2AC\quad 6*STORAGE:\quad 48\quad OCTAL\quad WORDS.$

$C2AC\quad 7*USES:\quad DCPOLY(C2AD).$

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$\text{VOLUME 2 - 9/73}$
A* B.L. BUZBYE C-4
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
1*FORM: CALL DCPOLY(N,DC,DP,DZ,IE)
2* PURPOSE: FIND THE ZEROS OF A COMPLEX POLYNOMIAL WITH
3* DOUBLE PRECISION COEFFICIENTS.
4* ROUTINE NAME: DCPOLY
5* ENTRY NAME: DCPOLY
6* STORAGE: 1617 OCTAL WORDS.
7*USES: DCABS(A202A), USQRT(B410A), AND LABRT(N103A).

VOLUME 2 - 9/73
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 B*RESSEL FUNCTION OF THE FIRST KIND FOR INTEGRAL N
C301A C*MATHEMATICS C3 SR6600 SCOPE
C301A D*SOURCE CARDS 100BCDF OBJECT CARDS 24BIN
C301A E*FUNCTION J
C301A F*ON DISK F4 COMPAT WU 09/12/66 DECK 09/08/66
C301A G*CALL BEJHN(X,N,T,B)
C301A H*COMPUTES RESSEL FUNCTION JN(X) FOR N LE 20 AND ALL X.
C301A I*X IS FLOATING-POINT ARGUMENT. N IS THE ORDER.
C301A J*T IS TEMPORARY STORAGE OF LENGTH 12+MAX(2X,N).
C301A K*R IS THE RESULT.
C301A L*STORAGE-296 WORDS

C302A A* B. L. BUZEE C-4 CHERRY 67
C302A B*INCOMPLETE GAMMA FUNCTION
C302A C*FORTRAN IV SR6600 SCF 3.1
C302A D*SOURCE CARDS 88 BCD OBJECT CARDS 46 BIN
C302A E*FUNCTION INCOMPLETE GAMMA FUNCTION
C302A F*ON DISK F4 COMPAT WU 09/15/72REV.4 DECK 06/13/68REV 1
C302A G*FORM: Z=GAMMA(A,X)
C302A H*PURPOSE: EVALUATE (GAMMA)(A,X) = THE INTEGRAL FROM
C302A I*X TO INFINITY OF (EXP(-U)*(U**(A-1)))/(U)
C302A J*ERROR CONDITIONS: 1. X LT 0. 2. A INTEGRAL, NEGATIVE
C302A K* AND SMALL VALUES OF X. (SEE WHITEUP)
C302A L*ACCURACY: REL. ERROR LT 1.*E-9.
C302A M*ROUTINE NAME: GAMMA
C302A N*ENTRY NAME: GAMMA
C302A O*STORAGE: 608 (DECIMAL WORDS)
C302A P*Routines Called: E1(C309A), ALOG(B305A), EXP(B306A),
C302A Q* LABRT(N103A), GAMI(C325A).
COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS

SOURCE CARDS 92BCDF4 OBJECT CARDS 28BIN

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

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

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

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

ACCURACY - AT LEAST TEN SIGNIFICANT FIGURES.

STORAGE - 335 (DEC) WORDS

USES - LARRT(N1Q3A),SORT(B4O8A),SIN(B1O6A),TAN(B1O7A),ATAN(B1O4A),ALOG(B305A).

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

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

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

BESSK) DELETED FROM THE LIBRARY - C301(BESJN), C328(BJYIK) AND C327(BJSN) ARE RECOMMENDED.
C3-3

C309A  A* CHERRY T-1  67
C309A  0*EXPONENTIAL INTEGRAL E1(X)
C309A  B*MATH  C3  F4  SR6600 SCOPE
C309A  C*  SW 2  LS 1
C309A  D*F4 SOURCE  20BCD RELOCATABLE  10BIN
C309A  S**EXPONENTIAL INTEGRAL E1
C309A  10*ON DISK  F4 COMPAT WU 09/13/67 REV DECK 06/08/67
C309A  11*CALLED BY  Y=E1(X), X:Y,REAL
C309A  12*PURPOSE: TO COMPUTE THE EXPONENTIAL INTEGRAL E1(X)
C309A  13*RELATIVE ERROR ABOUT 1.0E-13
C309A  14*STORAGE: 88 WORDS.
C309A  15*USES: LABRT(N103A), GAMMA(C302A), DLOG(B309A).

C310A  A* CHERRY T-1  66
C310A  0*ERROR FUNCTION
C310A  B*MATH  C3  F4  SR6600 SCOPE
C310A  C*  SW 2  LS 1
C310A  D*F4 SOURCE DECK  30BCDF4 OBJECT DECK  14BIN
C310A  S**ERROR FUNCTION=ERF
C310A  10*ON DISK  F4 COMPAT WU 09/18/67 REV DECK 12/30/66
C310A  11* Y = ERF(X)
C310A  12*ACCURACY: 6.0E-14
C310A  13*STORAGE: 170 WORDS.
C310A  14*USES: LABRT(N103A) AND EXP(B306A).

C310B  A* I. CHERRY  C-4  72
C310B  B*ERF - ERROR FUNCTION
C310B  C*F4  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(B306A).

VOLUME 2 - 9/73
*LOGGAM) DELETED FROM THE LIBRARY; USE C326 INSTEAD.

C311A  A*  IVAN CHERRY    C-4  72
C311A  B*COMPLEX DIGAMMA (PSI) FUNCTION FOR COMPLEX NUMBER Z
C311A  C*F4  SR6600  SCP 3.1
C311A  D*  SW 2  LS 2  TYPE 1
C311A  E*F4 SOURCE CARDS 50  BCD  OBJECT CARDS 33  BIN
C311A  F**COMPLEX*DIGAMMA*PSI FUNCTION
C311A  G*CARDS  F4  COMPAT WU 08/29/72  DECK 08/29/72
C311A  1*FORM:  Y = PSI (Z)
C311A  2*PURPOSE: APPROXIMATES COMPLEX DERIVATIVE OF ALOG(GAMMA(Z)).
C311A  3*NOTE: PSI MUST BE DECLARED COMPLEX IN A TYPE STATEMENT
C311A  4* IN THE USERS PROGRAM, Y AND Z ARE ALSO COMPLEX.
C311A  5*Routine Name: PSI
C311A  6*Entry Name: PSI
C311A  7*Accuracy=8 DECIMAL PLACES.
C311A  8*Storage: 428 OCTAL WORDS.
C311A  9*Routines Called: LABRT(N103A), DATAN2(B110A), DLOG(B309A).

C312A  A*  DONALD L WILLIAMST-1  IVAN CHERRY    67
C312A  B*EXponential INTEGRal
C312A  C*MATHEMATICS C3  F4  SR6600  SCOPE
C312A  C*  SW 2  LS 1
C312A  D*F4 SOURCE CARDS 9BCDF4 OBJECT CARDS 48IN
C312A  S**EXPONENTIAL*INTEGRAL
C312A  10*CARDS  F4  COMPAT WU 03/15/67  DECK 03/15/67
C312A  11*Called By Y=EXPINT(N,X)
C312A  12*Accuracy--SEE GAMMA(A,X)(C302A)
C312A  13*Storage=44 WORDS.
C312A  14*Uses---GAMMA(C302A).

VOLUME 2 - 9/73
C3-5

C323A A* DONALD L. WILLIAMST=1 IVAN CHERRY 67
C323A 0*BESSEL FUNCTION EVALUATION FOR COMPLEX ARGUMENT AND ORDER
C323A B*MATHEMATICS C3 F4 SR6600 SCOPE
C323A C* SW 3 LS 2
C323A D*F4 SOURCE CARDS 101BCDF4 OBJECT CARDS 56BIN
C323A S**HESSEL FUNCTION EVALUATION FOR COMPLEX ARGUMENT AND ORDER
C323A 16*CARDS F4 COMPAT WU 09/18/67 REV DECK 5/19/67
C323A 11*CALL COHRES(Z,ANU,N,BJ,Y)
C323A 12*PURPOSE TO COMPUTE N+1 VALUES OF THE BESSEL FUNCTIONS J(Z)
C323A 13*AND Y(Z) FOR COMPLEX ARGUMENT Z AND COMPLEX ORDERS ANU TO
C323A 14*ANU-N. Y=COMPLEX STORAGE FOR J(Z) FOR ORDERS ANU TO ANU+N.
C323A 15*Y=COMPLEX STORAGE FOR Y(Z) FOR ORDERS ANU TO ANU+N. BJ AND Y
C323A 16*ARE OF LENGTH L WHERE L=MAX(N,2*ABS(Z))+13. NOTE Z, ANU,
C323A 17*BJ, AND Y MUST BE DECLARED COMPLEX IN A TYPE STATEMENT IN
C323A 18*THE USERS PROGRAM.
C323A 19*STORAGE=1630 (DECIMAL) WORDS.
C323A 20*USES=LNGAM(C326A),CLOG(B310A),CEXP(B310A),LABRT(N103A).

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

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

VOLUME 2 9/73
A* C-4 W. FULLERTON 68
C327A BESSEL FUNCTIONS FOR LARGE REAL ARGUMENTS
C327A C#F4 SR6600 SCP 3.1
C327A D* SW 3 LS 1 TYPE 1.1
C327A E* SOURCE 31 CARDS OBJECT 38 CARDS
C327A F**BESSEL*FUNCTIONS
C327A G*DISK F4 COMPAT WU 04/30/73 REV 2 DECK 04/30/73 REV 1
C327A 1*FORM: CALL BASF(GAMMA,X,FJI,YK,SW)
C327A 2*PURPOSE: COMPUTE BESSEL FUNCTIONS J AND Y OR I AND K
C327A 3* FOR LARGE REAL ARGUMENTS.
C327A 4*ROUTINE NAME: BASF
C327A 5*ENTRY NAME: BASF
C327A 6*STORAGE: 742 OCTAL WORDS
C327A 7*ROUTINES CALLED: DBLE(A105A), DCOG, DEXP, DSIN, DSQRT(ALL ON SYSTEM)
C327A 8* SYSTEM

VOLUME 2 - 9/73
**C3-7**

**C328B** A* C=4  W. FULLERTON  73
**C328B** B* BESSSEL FUNCTIONS FOR REAL ORDER AND ARGUMENT
**C328B** C=F4  SR7600
**C328B** D* SW 4  LS 3  TYPE 1.1
**C328B** E* SOURCE 127 CARDS  OBJECT 77 CARDS
**C328B** F** BESSSEL FUNCTIONS
**C328H** G*DISK  F4 COMPAT WU 04/30/73  DECK 04/30/73
**C328B** 1*FORM: CALL BJYIK(X,GAMMA,FN,FJI,YK,SW)
**C328B** 2*PURPOSE: COMPUTE A TABLE OF BESSSEL FUNCTIONS OF THE
**C328B** 3* FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS.
**C328B** 4*ROUTINE NAME: BJYIK
**C328B** 5*ENTRY NAME: BJYIK
**C328B** 6*STORAGE: 1751 OCTAL WORDS
**C328B** 7*ROUTINES CALLED: DBLE(A105B),DRAIEX(B313B),GAMMA(C302B),
**C328B** 8* BASF(C327B),DBABS,DBAREX,DEXP,DCOS,DLOG,DSIN(ALL ON SYSTEM)

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

FFT2(F502A) IS RECOMMENDED.

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

FFT2(F502B) IS RECOMMENDED.

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

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

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

RFTI(F503A) IS RECOMMENDED.
**C3-8**

**A* C-3**

**C332A**

**B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT**

**C332A**

**C*F4**

SR6600 SCP 3.1

**C332A**

**D* SW 2 LS 2 TYPE 1.1**

**C332A**

**E* SOURCE 72 CARDS OBJECT 50 CARDS**

**C332A**

**F** BESSEL FUNCTIONS

**G** CARDS F4 COMPAT WU 04/30/73 REV.2 DECK 04/30/73 REV.1

**C332A**

**1*FORM: CALL CBSF(GAMMA,X,FJ1,YK,SW)**

**C332A**

**2*PURPOSE: COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER AND ARGUMENT.**

**C332A**

**3* ROUTINE NAME: CBSF**

**C332A**

**5*ENTRY NAME: CBSF**

**C332A**

**6*STORAGE: 1206 OCTAL WORDS**

**C332A**

**7* ROUTINES CALLED: CSORT(B409A), CEXP(B310A)**

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**C332B**

**A* C-3**

**C332B**

**B*COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT**

**C332B**

**C*F4**

SR7600 CRS

**C332B**

**D* SW 2 LS 2 TYPE 1.1**

**C332B**

**E* SOURCE 72 CARDS OBJECT 50 CARDS**

**C332B**

**F** BESSEL FUNCTIONS

**G** DISK F4 COMPAT WU 04/30/73 DECK 04/30/73

**C332B**

**1*FORM: CALL CBSF(GAMMA,X,FJ1,YK,SW)**

**C332B**

**2*PURPOSE: COMPUTE BESSEL FUNCTIONS OF COMPLEX ORDER AND ARGUMENT.**

**C332B**

**3* ROUTINE NAME: CBSF**

**C332B**

**5*ENTRY NAME: CBSF**

**C332B**

**6*STORAGE: 1211 OCTAL WORDS**

**C332B**

**7* ROUTINES CALLED: CSORT(B409B), CEXP(B310B)**

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**C333A**

**A* C-3**

**C333A**

**B*COMPLEX BESSEL FUNCTIONS**

**C333A**

**C*F4**

SR6600 SCP 3.1

**C333A**

**D* SW 4 LS 3 TYPE 1.1**

**C333A**

**E* SOURCE 122 CARDS OBJECT 72 CARDS**

**C333A**

**F** BESSEL FUNCTIONS

**G** CARDS F4 COMPAT WU 04/30/73 REV.2 DECK 04/30/73 REV.1

**C333A**

**1*FORM: CALL CBJYIK(X,GAMMA,FN,FJ1,YK,SW)**

**C333A**

**2*PURPOSE: COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE**

**C333A**

**3* FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS**

**C333A**

**4* ROUTINE NAME: CBJYIK**

**C333A**

**5*ENTRY NAME: CBJYIK**

**C333A**

**6*STORAGE: 1666 OCTAL WORDS**

**C333A**

**7* ROUTINES CALLED: CABS(A203A), CSIN/CCOS(B109A), CLOG(B307A), C333A**

**8**

CEXP(B310A), LNGAM(C326A), CBSF(C332A)

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

C333B A* B*COMPLEX BESSEL FUNCTIONS W. FULLERTON 73
C333B C*F4 SR7600 CROS
C333U D* SW 4 LS 3 TYPE 1.1
C333B E* SOURCE 122 CARDS OBJECT 72 CARDS
C333B F**BESSEL FUNCTIONS
C333B G*DISK F4 COMPAT WU 04/30/73 DECK 04/30/73
C333B 1*FORM: CALL CBJYIK(X,GAMMA,FN,FJ1,YK,SW)
C333B 2*PURPOSE: COMPUTE A TABLE OF BESSEL FUNCTIONS OF THE
C333B 3* FIRST AND SECOND KIND OR OF THE MODIFIED FUNCTIONS
C333B 4*ROUTINE NAME: CBJYIK
C333B 5*ENTRY NAME: CBJYIK
C333B 6*STORAGE: 1672 OCTAL WORDS
C333B 7*ROUTINES CALLED: CABE(A203B), CSYN/CCOS(B109B), CLOG(B307B),
C333B 8* CEXP(B310B), LNEGAM(C326B), CESF(C332B)

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

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

C335A A* B.L. BUZBEE C-4 D. HENDERSON 70
C335A B*ERROR FUNCTION COMPLEMENT
C335A C*F4 SR6600 SCP 31
C335B D* SW 3 LS 1 TYPE 1
C335A E*SOURCE CARDS 39 BCD OBJECT CARDS 18 BIN
C335A F**ERROR*FUNCTION*COMPLEMENT
C335A G*CARDS F4 COMPAT WU 12/14/71REV.1 DECK 05/15/70
C335A 1*FORM: Y = ERFC(X)
C335A 2* Y = PQERFC(X)
C335A 3*PURPOSE: COMPUTE ERROR FUNCTION COMPLEMENT
C335A 4*STORAGE: 257 (OCTAL) WORDS
C335A 5*TIMING: AVERAGE IS 42 MICROSEC.
C335A 6*ROUTINES CALLED: ERF(C310A)* EXP(B36A)

VOLUME 2 - 9/73
C3-10

A* B. L. BUZBEE C-4  / I CHERRY / 73
C335B
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C337A *(FFT2) HAS BEEN REDESIGNATED F502A.
C337B *(FFT2) HAS BEEN REDESIGNATED F502B.
C338A *(RFTI) HAS BEEN REDESIGNATED F503A.
C338B *(RFTI) HAS BEEN REDESIGNATED F503B.
VOLUME 2 - 9/73
A* B.L. BUZBEE C-3 W. FULLERTON 72

**INVERSE ERROR FUNCTION**

C339A C*F4 SH6600 SCP 3,1
C339A d* SW 2 LS 1 TYPE 1,1
C339A E*F4 SOURCE CARDS 26 BCD OBJECT CARDS 10 BIN
C339A F**INVERSE ERROR FUNCTION
C339A G*CARDS F4 COMPAT WU 05/18/73 REV 2 DECK 05/18/73 REV.1
C339A 1*FORM: \( x = \text{ERFI}(y) \)
C339A 2*PURPOSE: GIVEN \( y \), DETERMINE \( x \) SUCH THAT \( y = \text{Erf}(x) \).
C339A 3*ROUTINE NAME: \( \text{ERFI} \)
C339A 4*ENTRY NAME: \( \text{ERFI} \)
C339A 5*STORAGE: 142 OCTAL WORDS.
C339A 6*Routines Called: \( \text{ERF}(C310A) \cdot \exp(B306A) \).

C339B A* B.L. BUZBEE C-3 W. FULLERTON 72

**INVERSE ERROR FUNCTION**

C339B C*F4 SR7600 CROS
C339B D* SW 2 LS 1 TYPE 1,1
C339B E*F4 SOURCE CARDS 26 BCD OBJECT CARDS 10 BIN
C339B F**INVERSE ERROR FUNCTION
C339B G*DISK F4 COMPAT WU 05/18/73 REV 2 DECK 05/18/73 REV.1
C339B 1*FORM: \( x = \text{ERFI}(y) \)
C339B 2*PURPOSE: GIVEN \( y \), DETERMINE \( x \) SUCH THAT \( y = \text{Erf}(x) \).
C339B 3*ROUTINE NAME: \( \text{ERFI} \)
C339B 4*ENTRY NAME: \( \text{ERFI} \)
C339B 5*TIMING: AVERAGE 7600 EXECUTION TIME IS .14 MS.
C339B 6*STORAGE: 142 OCTAL WORDS.
C339B 7*Routines Called: \( \text{ERF}(C310B) \cdot \exp(B306B) \).

C340A A* W. FULLERTON 73

**REAL BESSEL FUNCTION J0 OF THE ARGUMENT X GE 0**

C340A C*F4 SH6600 SCP 3,1
C340A D* SW 2 LS 2 TYPE 1,1
C340A E* SOURCE 92 CARDS OBJECT 27 CARDS
C340A F**BESSEL FUNCTION
C340A G*CARDS F4 COMPAT WU 05/14/73 DECK 05/14/73
C340A 1*FORM: \( RJ=J0(X) \)
C340A 2*PURPOSE: COMPUTES THE REAL BESSEL FUNCTION J0 OF THE REAL ARGUMENT X GT 0
C340A 3*ROUTINE NAME: \( J0(X) \)
C340A 4*ENTRY NAME: \( J0(X) \)
C340A 5*STORAGE: 440 OCTAL WORDS
C340A 7*SELF CONTAINED.

VOLUME 2 - 9/73
REAL BESSEL FUNCTION J0 OF THE ARGUMENT X GT 0

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

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

REAL BESSEL FUNCTION J1 OF THE ARGUMENT X LT 0

PURPOSE: COMPUTES THE REAL BESSEL FUNCTION J1 OF THE REAL ARGUMENT X LT 0

ROUTINE NAME: FJ1(X)
ENTRY NAME: FJ1(X)
STORAGE: 445 OCTAL WORDS
SELF CONTAINED.
REAL BESSEL FUNCTION J1 OF THE ARGUMENT X, \geq 0

Purpose: Computes the real Bessel function J1 of the real argument X. Geometrically.

Timing:
- 7 SECONDS FOR 1000 RANDOM VALUES 0. \lt X \leq 30.
- 36 SECONDS FOR 5000 RANDOM VALUES 0. \lt X \leq 1.

Routine Name: FJ1(X)
Entry Name: FJ1(x)
Storage: 445 OCTAL WORDS
Self Contained.
C342B 8*REAL BESSEL FUNCTION 10 OF THE ARGUMENT X.GE.0
C342B C*F4 8R7600 CROS
C342B D* SW 2 LS 2 TYPE 1,1
C342B E* SOURCE 88 CARDS OBJECT 21 CARDS
C342B F**BESSEL FUNCTION
C342B G*DISK F4 COMPAT WU 05/14/73 DECK 05/14/73
C342B I*FORM: RJ=FI0(X)
C342B 2*PURPOSE: COMPUTES THE REAL BESSEL FUNCTION 10 OF
C342B 3* THE REAL ARGUMENT X.GT.0
C342B 4*TIMING:
C342B 5* 7 SECONDS FOR 1000 RANDOM VALUES 0. LT. X .LE. 30.
C342B 6* 37 SECONDS FOR 5000 RANDOM VALUES 0. LT. X .LE. 1.
C342B 7*ROUTINE NAME: FI0(X)
C342B 8*ENTRY NAME: FI0(X)
C342B 9*STORAGE: 331 OCTAL WORDS
C342B 10*SELF CONTAINED.

C343B 8*REAL BESSEL FUNCTION 11 OF THE ARGUMENT X.GE.0
C343B C*F4 8R6600 SCP 3,1
C343B D* SW 2 LS 2 TYPE 1,1
C343B E* SOURCE 89 CARDS OBJECT 22 CARDS
C343B F**BESSEL FUNCTION
C343B G*CARDS F4 COMPAT WU 05/14/73 DECK 05/14/73
C343B I*FORM: RJ=FI1(X)
C343B 2*PURPOSE: COMPUTES THE REAL BESSEL FUNCTION 11 OF
C343B 3* THE REAL ARGUMENT X.GT.0
C343B 4*ROUTINE NAME: FI1(X)
C343B 5*ENTRY NAME: FI1(X)
C343B 6*STORAGE: 342 OCTAL WORDS
C343B 7*SELF CONTAINED.
A * W. D. BARFIELD T-2
B *FINDMAP - COMPLEX GREEN* FUNCTION - CONFORMAL MAPPING
C *F4 SR6600 SCP 3.1
D * SW 4 LS 3 TYPE 2
E *SOURCE CARDS 169 BCD OBJECT CARDS 62 BIN
F **FINDMAP*GREEN*CONFORMAL* MAPPING
G *CARDS F4 COMPAT WU 10/17/69 DECK 10/17/69
1 *CALL NAME: FINDMAP(XO,YO,NBDY,N2,X,Y,NN,XA,YA,SIG,G,H,GA,
2 *HA,DS,AA)
3 *PURPOSE: TO FIND VALUES OF THE (COMPLEX) FUNCTION WHICH
4 *CONFORMALLY MAPS A CLOSED TWO DIMENSIONAL REGION INTO THE
5 *UNIT CIRCLE.
6 *STORAGE: 1477 (OCTAL) * 4 (NBUS) + (NBDY)**2/4
7 *ROUTINES CALLED: ATAN2(R104A), ALOG(B305A), SQRT(B408A),
8 *LSS(F404A).

*(FFT) HAS BEEN REDESIGNATED F5AA.

*(RFSN) HAS BEEN REDESIGNATED F5AB.
INVERSE ERROR FUNCTION

SOURCE CARDS 44 BCD

OBJECT CARDS 12 BIN

SOURCE CARDS 44 BCD

OBJECT CARDS 12 BIN

PURPOSE: COMPUTE INVERSE ERROR FUNCTION

ROUTINE NAME: ERFINV

STORAGE: 204 OCTAL WORDS,

TIMING: AVERAGE TIME = 7 MILLISEC.

ROUTINES CALLED: EXP(B306), ERF(C316).
SIMULTANEOUS NON-LINEAR ALGEBRAIC FUNCTIONS

ZEROES OF NON-LINEAR FUNCTIONS.

REVIEWER: J. HANCOCK, C-4

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

C402A A* JOHN HANCOCK C-4
C402A B*SOLVE--ROOT FINDER FOR REAL EQUATIONS
C402A C*F4 SR6600 SCP 3
C402A D* SW 6 LS 15 TYPE 1
C402A E*SOURCE CARDS 697 BCD OBJECT CARDS 160 BIN
C402A F**ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION
C402A G*CARDS F4 COMPAT WU 11/02/72 REV 5 DECK 11/02/72 REV 5
C402A 1*FORM: CALL SOLVE(XROOT,FROOT,A,R,XIST,XABSER,XRELER,FABSER,
C402A 2* XBOUND,X2CODE,NPRINT,NCOUNT,NCONV,NSERCH,FNAME,
C402A 3* FUNCTN,NERROF,SOLVE).
C402A 4*PURPOSE: LET F AND X BE REAL. SOLVE (C402)
C402A 5* APPROXIMATES:
C402A 6* I) A ROOT OF F(X) = 0* OR
C402A 7* II) A POINT AT WHICH F(X) ASSUMES ITS MAXIMUM
C402A 8* (OR MINIMUM) VALUE.
C402A 9*ROUTINE NAME: SOLVE
C402A 10*ENTRY NAME: SOLVE
C402A 11*STORAGE: 4455 (OCTAL) WORDS.
C402A 12*SELF CONTAINED.
C402B  A* JOIN HANCOCK  C-4
C402B  B*SOLVE--ROOT FINDER FOR REAL EQUATIONS
C402B  C*F4  SR7600  CROS
C402B  D* SW 6  LS 15  TYPE 1
C402B  E*F4 697 BCD  OBJECT CARDS 163 BIN
C402B  F**ROOTS*ZEROS*EQUATIONS*MAXIMUM*MINIMUM*ROOTS SEPARATION
C402B  G*ON DISK  F4  COMPAT WU 11/02/72 REV.1 DECK 11/02/72 REV.1
C402B  1*FORM:  CALL SOLVE(XROOT,FRONT,A,B,IST,FASTER,FASTER,FASTER)
C402B  2*  XBOUND,X2CODE,NPRINT,NCOUNT,NCONV,NSERCH,FNAME,
C402B  3*  FUNCTN,NERROR,SOLVE.
C402B  4*PURPOSE:  LET F AND X BE REAL.  SOLVE (C402)
C402B  5* APPROXIMATES:
C402B  6*  I) A ROOT OF F(X) = 0* OR
C402B  7*  II) A POINT AT WHICH F(X) ASSUMES ITS MAXIMUM
C402B  8*  (OR MINIMUM) VALUE.
C402B  9*ROUTINE NAME:  SOLVE
C402B  10*ENTRY NAME:  SOLVE
C402B  11*STORAGE:  4514 OCTAL WORDS.
C402B  12*SELF CONTAINED.

C403A  A*  J SOPKA  C-4  SANDIA MATH LIB 72
C403A  B*ZER0IN - FINDS A ZERO OF FUNCTION F(X) IN INTERVAL (B,C)
C403A  C*F4  SR6600  SCP 3.1
C403A  D* SW 2  LS 4  TYPE 1
C403A  E*F4  159 BCD  OBJECT CARDS 22 BIN
C403A  F**ZER0*ROOT*FUNCTION*INTERVAL
C403A  G*CARDS  F4  COMPAT WU 01/31/72 DECK 01/31/72
C403A  1*FORM:  CALL ZER0IN(F,A,B,C,RE,AE,IFLAG)
C403A  2*PURPOSE:  SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)
C403A  3* ON THE INTERVAL (B,C).
C403A  4*ROUTINE NAME:  ZER0IN
C403A  5*ENTRY NAME:  ZER0IN
C403A  6*STORAGE:  344 OCTAL WORDS
C403A  7*REQUIRES SYSTEM OUTPUT FILESET -OUTPUT- TO BE AVAILABLE
C403A  8*  FOR ERROR MESSAGES.

VOLUME 2 - 9/73
A* JOHN HANCOCK  C-4  J. HANCOCK  72
C403B B*ZER0IN - 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*FUNCTION*INTERVAL
C403B G*CARDS  F4 COMPAT WU 01/31/72  DECK 01/31/72
C403B 1*FORM:  CALL ZER0IN(F,B,C,RE,AE,IFLAG)
C403B 2*PURPOSE:  SEARCH FOR A REAL ZERO OF THE FUNCTION F(X)
C403B 3*  ON THE INTERVAL (B,C).
C403B 4*ROUTINE NAME: ZER0IN
C403B 5*ENTRY NAME: ZER0IN
C403B 6*STORAGE:  350 OCTAL WORDS
C403B 7*REQUIRES SYSTEM OUTPUT FILESET -OUT- TO BE AVAILABLE
C403B 8* FOR ERROR MESSAGES.

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 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
OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS
NUMERICAL INTEGRATION

REVIEWER: D. KAHANER, C-6

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

D110A A* CHERY C-2
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* CHERY T-1
D111A O*WEIGHTS AND ZEROES OF CHEBYSHEV POLYNOMIALS
D111A B*MATH D1 F4 SR6600 SCOPE
D111A C* SW 1 LS 2
D111A D*F4 SOURCE DECK 83BCDREL. 20BIN
D111A S*CHEBYSHEV*WEIGHTS*ZEROES
D111A 10*ON DISK F4 COMPAT WU 09/18/67 REV DECK 06/22/67
D111A 11* CALL 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.
D112A A* CHERRY T=1 67
D112A O*WEIGHTS AND ZEROES OF HERMITE POLYNOMIALS
D112A B*MATH F4 SR6600 SCOPE
D112A C* SW 1 LS 4
D112A D*F4 SOURCE 222CDRELOCATABLE 48BIN
D112A S**HERMITE*WEIGHTS*ZEROES
D112A 10*ON DISK F4 COMPAT WU 09/18/67 REV DECK 06/22/67
D112A 11* CALL HRMTE(M,K,A,Z) SUPPLIES THE KTH ZERO z, AND
D112A 12* WEIGHT, A, FOR MTH ORDER GAUSS-HERMITE QUADRATURE.
D112A 13* M MUST BE IN (4,20). IF NOT, 4 IS USED. USED PRIMARILY
D112A 14*WITH GAUSS(D114A). ERROR .LT. 3.E-13
D112A 15* STORAGE 294 WORDS.

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

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

D115A *(RKA,RKB) HAS BEEN REDESIGNATED D263A.

VOLUME 2 - 9/73
D115B *(RKA,RKB) HAS BEEN REDESIGNED D203B.

D116A A* G. WILLBANKS T-1 67
D116A GG**TABULAR INTEGRATION BY TAYLOR EXPANSION AND TRAPEZIODS
D116A B**MATHEMATICS D1 F4 SR6600 SCOPE
D116A C* SW 2 LS 1
D116A D**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 = TABINT(NP,X,Y) WHERE NP = NO OF POINTS AND X,Y ARE THE
D116A 12*LOCATIONS OF TABLES IN X AND Y RESPECTIVELY.
D116A 13*STORAGE = 339 WORDS
D116A 14*THIS ROUTINE USES NO OUTSIDE ROUTINES.

D117A A* B. FAGAN T-1 T. JORDAN 68
D117A GG**TABULAR AND SPLINE INTEGRATION
D117A B**MATHEMATICS D1 F4 SR6600 SCOPE
D117A C* SW 4 LS 7
D117A D**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
A* T JORDAN C DO B FAGAN

D118A O* TWO-DIMENSIONAL SPLINE INTEGRATION

D118A B* MATHEMATICS D1 F4 SR6600 SCOPE

D118A C* SW 5 LS 1

D118A D* F4 SOURCE CARDS 37RDCDF4 OBJECT CARDS 14BIN

D118A S** TWO-DIMENSIONAL SPLINE INTEGRATION

D118A 10* ON DISK F4 COMPAT WU 09/16/68 DECK 09/16/68

D118A 11* Y = SPLINT2 (NX, NY, X, FXX, FYY, FXXY, MAXY, A, B, C, D, T1, T2) WHERE

D118A 12* NX IS NUMBER OF X POINTS, X IS TABLE OF ASCENDING VALUES OF

D118A 13* THE X VARIABLE, NY IS NUMBER OF Y POINTS, Y IS TABLE OF

D118A 14* ASCENDING VALUES OF Y VARIABLE, F IS 2-DIMENSIONAL TABLE OF

D118A 15* FUNCTION VALUES, FXX, FYY, AND FXXY ARE 2-DIMENSIONAL TABLES

D118A 16* OF SECOND DERIVATIVES AT EACH VALUE OF THE FUNCTION, MAXY IS

D118A 17* INTEGER EQUAL TO FIRST DIMENSION OF F TABLE, A AND B ARE THE

D118A 18* LOWER AND UPPER INTEGRATION LIMITS OF X, C AND D ARE SAME FOR

D118A 19* Y, T1 AND T2 = TEMPORARY ARRAYS EACH >= NY, STORAGE=217.

D118A 20* NO ERROR RETURNS, USES SPLINT(D117A), SEARCH(E101A) AND

D118A 21* LABRT(N103A).

David K. Kahaner C-6

D119A A* ADAPTIVE NEWTON COTES QUADRATURE SEVEN POINT

D119A C* F4 SR6600 SCP. 3.1

D119A D* SW 2 LS 2 TYPE 1

D119A E* SOURCE CARDS 84 BCD OBJECT CARDS 17 BIN

D119A F** QUADRATURE INTEGRATION, NEWTON COTES

D119A G* CARDS F4 COMPAT WU 06/19/69 REV 1 DECK 02/04/69

D119A 1* QNC7 COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL FROM

D119A 2* A TO B OF THE FUNCTION, FUNC.

D119A 3* CALLING SEQUENCE IS Y = QNC7 (FUNC, A, B, RE, KOUNT)

D119A 4* STORAGE IS 1030 (OCTAL) WORDS.

So lem C-4

D119B A* A SOLEM C-4 D KAHANER 72

D119B B* ADAPTIVE NEWTON COTES QUADRATURE SEVEN POINT

D119B C* F4 SR7600 CROS

D119B D* SW 1 LS 3 TYPE 1

D119B E* SOURCE CARDS 89 BCD OBJECT CARDS 19 BIN

D119B F** QUADRATURE INTEGRATION, NEWTON COTES

D119B G* ON DISK F4 COMPAT WU 03/17/72 DECK 03/17/72

D119B 1* FORM1, CALL QNC7(FUNC, A, B, RE, KOUNT)


D119B 3* FROM A TO B OF THE FUNCTION, FUNC. SEE WRITEUP FOR

D119B 4* D119A FOR FURTHER DETAILS.

D119B 5* ROUTINE NAME: QNC7

D119B 6* ENTRY NAME: QNC7

D119B 7* STORAGE: 1044 (OCTAL) WORDS.

D119B 8* ROUTINES CALLED: LIBMSG(SYSTEM)
D120A  A*  DAVID K. KAHANER C-6  69
D120A  B*ADAPTIVE NEWTON COTES QUADRATURE TEN POINT
D120A  C*F4  SR6600 SCP 3.1
D120A  D*  SW 2  LS 2  TYPE 1
D120A  E*SOURCE CARDS  92 BCD OBJECT CARDS  19 BIN
D120A  F**QUADRATURE*INTEGRATION*NEWTON COTES
D120A  G*CARDS  F4 COMPAT WU 06/19/69 REV 1 DECK 02/04/69
D120A  1*QUAD COMPUTES THE APPROXIMATE VALUE OF THE INTEGRAL FROM
D120A  2*A TO B OF THE FUNCTION, FUNC.
D120A  3*CALLING SEQUENCE IS  Y = QUAD (FUNC,A,B,RE,KOUNT)
D120A  4*STORAGE IS 1166 (OCTAL) WORDS.

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

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

**DAVID K. KAHANER C-6**

**GENERALIZED GAUSS QUADRATURE**

SR6600 SCP 3.1

**SOURCE CARDS** 41 RCD OBJECT CARDS 21 BIN

**GENGSQ**GAUSS*QUADRATURE**INTEGRATION**

GSCARDS F4 COMPAT WU 10/14/69 DECK 10/14/69

**CALL NAME** GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EPS)

**PURPOSE**: TO DO GENERALIZED GAUSS QUADRATURE.

**STORAGE**: 1,371 (OCTAL) WORDS.

**ROUTINES CALLED**: PHI(D124A), STLTJS(D125A), GAUSSQ(D126A).

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**DAVID K. KAHANER C-6**

**GENERALIZED GAUSS QUADRATURE**

SR7600 CROS

**SOURCE CARDS** 41 BCD OBJECT CARDS 21 BIN

**GENGSQ**GAUSS*QUADRATURE**INTEGRATION**

DISK F4 COMPAT WU 08/01/73 DECK 08/01/73

**FORM**: CALL GENGSQ(M,B,G,A,W,WF,JS,EL,ER,FM,JORTH,EPS)

**PURPOSE**: TO DO GENERALIZED GAUSS QUADRATURE.

**ROUTINE NAME**: GENGSQ

**ENTRY NAME** GENGSQ

**STORAGE**: 1377 OCTAL WORDS

**ROUTINES CALLED**: PHI(D124B), STLTJS(D125B), GAUSSQ(D126B).

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**DAVID K. KAHANER C-6**

**PRIVATE SUBROUTINE FOR D123A (GENGSQ)**

SR6600 SCP 3.1

**SOURCE CARDS** 6 BCD OBJECT CARDS 6 BIN

**PHI**GAUSS

**CARDS** F4 COMPAT WU 05/22/73 REV. 1 DECK 05/22/73 REV. 1

**FORM**: DX = PHI(DY,DPHI,A,B)

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

**ROUTINE NAME**: PHI

**ENTRY NAME**: PHI

**STORAGE**: 52 (OCTAL) WORDS.

**SELF CONTAINED**.
PRIVATE SUBROUTINE FOR D123B (GENGSQ)

C*F4 
SR7600 CROS 
D* SW 1 LS 1 TYPE 1.1 
E*SOURCE CARDS 6 BCD OBJECT CARDS 6 BIN 
F**PHI*GAUSS 
G*DISK F4 COMPAT WU 05/22/73 DECK 05/22/73 
1*FORM: DX = PHI(DY*DPHI*A,B) 
PURPOSE: CHANGES INTERVAL FOR GENERALIZED GAUSS QUADRATURE 
3* FROM (-1,1) TO (A,B). PRESENTLY CODED FOR A,B FINITE. 
ROUTINE NAME: PHI 
ENTRY NAMES: PHI 
STORAGE: 55 (OCTAL) WORDS. 
SELF CONTAINED.

PRIVATE SUBROUTINE FOR D123A (GENGSQ)---STLTJS 
C*F4 
SR6600 SCP 3.1 
D* SW 1 LS 2 TYPE 1.1 
E*SOURCE 83 CARDS OBJECT 43 CARDS 
F**STLTJS*GAUSS 
G*CARDS F4 COMPAT WU 07/12/73 REV.1 DECK 07/12/73REV.1 
1*FORM: CALL STLTJS(MINIT,RG,FM,JS,WF,PHI,EL,ER) 
PURPOSE: GENERATE COEFFICIENTS OF THREE TERM ORTHOGONAL 
POLYNOMIAL RECURSION 
ROUTINE NAME: STLTJS 
ENTRY NAMES: STLTJS 
STORAGE: 5117 OCTAL WORDS 
ROUTINES CALLED: PHI(D124A),WF
PRIVATE SUBROUTINE FOR D123A(GENGSGQ). -- GAUSSQ

* SOURCE 82 CARDS

* GAUSSQ: GAUSS*MATRIX*EIGENVALUES

* SOURCE CARDS

* SELF CONTAINED.

PRIVATE SUBROUTINE FOR D123A(GENGSGQ). -- GAUSSQ

* SOURCE CARDS

* SELF CONTAINED.

RECURSIVE SIMPSONS RULE INTEGRATION

* SOURCE CARDS

* SELF CONTAINED.

VOLUME 2 - 9/73
A RECURSIVE SIMPSON'S RULE INTEGRATION FOR TABULAR FUNCTIONS

PURPOSE: RECURSIVELY CALLED SIMPSON INTEGRATION ROUTINE FOR TABULAR FUNCTIONS.

STORAGE: 444 (OCTAL) WORDS.

SELF CONTAINED.
**U129B**

**A129B** QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS

**C129B** SOURCE CARDS 58 58 OBJECT CARDS 16 16

**D129B** F* QUADRTIC INTEGRATION

**E129B** G0N DISK F* COMPAT WU 07/02/73 DECK 04/06/73

**F129B** 1* PURPOSE: QUADRATIC INTEGRATION OVER UNEVENLY SPACED POINTS.

**G129B** 2* XX = INPUT ARRAY OF NX STRICTLY INCREASING ABSCISSAS

**H129B** 3* AT WHICH THE INTEGRAND IS EVALUATED.

**I129B** 4* POPIS XX(J), J=1,2,...,NX.

**J129B** 5* FX = INPUT ARRAY OF NX INTEGRAND VALUES AT THE

**K129B** 6* POINTS XX(J), J=1,2,...,NX.

**L129B** 7* NX = NUMBER OF POINTS IN XX, FX AND AX.

**M129B** 8* I = DIRECTION OF INTEGRATION.

**N129B** 9* AX = OUTPUT ARRAY OF NX VALUES OF INTEGRAL ON

**O129B** 10* SUBINTERVALS. IF I.EQ.0, AX(J) IS APPROXIMATELY

**P129B** 11* EQUAL TO INTEGRAL FROM XX(J) TO XX(J).

**Q129B** 12* AX(J) IS APPROXIMATELY EQUAL TO INTEGRAL FROM XX(J) TO XX(J).

**R129B** 13* TO XX(NX).

**S129B** 14* ROUTINE NAME: SIMPUN

**T129B** 15* ENTRY NAME: SIMPUN

**U129B** 16* STORAGE: 313 OCTAL WORDS.

**V129B** 17* ROUTINES CALLED: SELF CONTAINED

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**D1AA**

**A1AA** CIRCLE - INTEGRATE F(X,Y) OVER CIRCUMFERENCE OF A CIRCLE

**B1AA** SOURCE CARDS 14 BCD OBJECT CARDS 7 7 BIN

**C1AA** F* CIRCLE INTEGRATION

**D1AA** G0N DISK F* COMPAT WU 09/27/71 DECK 09/27/71

**E1AA** 1* PURPOSE: INTEGRATE FUNCTION F OF 2 VARIABLES OVER THE

**F1AA** 3* CIRCLE WITH CENTER (U,V) AND RADIUS R. M DENOTES

**G1AA** 4* THE ORDER OF THE APPROXIMATION. METHOD IS THE

**H1AA** 5* STANDARD GAUSS FORMULA.

**I1AA** 6* ROUTINE NAME: CIRCLE

**J1AA** 7* ENTRY NAME: CIRCLE

**K1AA** 8* STORAGE: 104 OCTAL WORDS

**L1AA** 9* ROUTINES CALLED: SIN(B106A), COS(B106A).

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**VOLUME 2 - 9/73**
**D1A8**  
A*  
D. KAHANER  
C-6  

**D1A8**  
B*S PHERE = 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**S PHERE* INTEGRATE  

**D1A8**  
G+CARDS  
F4 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**  

**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)  

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**D1A8**  
A*  
DUANE HARDER  
C-4  
D. KAHANER  

**D1A8**  
B* SIMPSONS RULE INTEGRATION  

**D1A8**  
C+F4  
SR6600  
SCP 3.1  

**D1A8**  
D*  
SW 3  
LS 3  
TYPE 2  

**D1A8**  
E+F4 SOURCE CARDS  
87 BCD  
OBJECT CARDS 21 BIN  

**D1A8**  
F**ADAPTIVE*SIMPSONS RULE*INTEGRATION  

**D1A8**  
G+ON DISK  
F4 COMPAT  
WU 09/22/72  
DECK 09/22/72  

**D1A8**  
1*FORM ANS = SIMPSN(ARG, A, B, EPS).  

**D1A8**  
2*PURPOSE: SIMPSONS RULE INTEGRATION  

**D1A8**  
3* ARG IS A FUNCTION SUBPROGRAM WHICH EVALUATES THE  

**D1A8**  
4* FUNCTION BEING INTEGRATED.  

**D1A8**  
5* A IS THE LOWER LIMIT OF INTEGRATION,  

**D1A8**  
6* B IS THE UPPER LIMIT.  

**D1A8**  
7* EPS IS A CONVERGENCE CRITERION.  

**D1A8**  
8*ROUTINE NAME: SIMPSN  

**D1A8**  
9*ENTRY NAME: SIMPSN  

**D1A8**  
10*SELF CONTAINED.
**DIAD**

M. BOLSTERLI  T-9  D. KAHANER  72

**D1AD**

B*ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE INTEGRATION

**D1AD**

C*FORTRAN SR6600 SCP 3.1

**D1AD**

D* SW 2 LS 1 TYPE 2

**D1AD**

E*F4 SOURCE CARDS 21 BCD OBJECT CARDS 9 BIN

**D1AD**

F*ABSCISSAS AND*WEIGHTS FOR*GAUSS-LAGUERRE*INTEGRATION

**D1AD**

G*CARDS F4 COMPAT WU 10/31/72 DECK 10/31/72

**D1AD**

I*FORM: CALL ABWTLAG(N*X*W*C*T)

**D1AD**

J*PURPOSE: COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LAGUERRE

**D1AD**

K* INTEGRATION,

**D1AD**

L*ROUTINE NAME: ABWTLAG

**D1AD**

M*ENTRY NAME: ABWTLAG

**D1AD**

N*STORAGE: 147 OCTAL WORDS

**D1AD**

O*TIMING: SEE WRITEUP

**D1AD**

P*ACCURACY: SEE WRITEUP

**D1AD**

Q*ROUTINES CALLED: S3DVAL(F222).

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**DIAD**

M. BOLSTERLI  T-9  D. KAHANER  72

**D1AD**

B*ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE INTEGRATION

**D1AD**

C*FORTRAN SR6600 SCP 3.1

**D1AD**

D* SW 2 LS 1 TYPE 2

**D1AD**

E*F4 SOURCE CARDS 23 BCD OBJECT CARDS 10 BIN

**D1AD**

F*ABSCISSAS AND*WEIGHTS FOR*GAUSS-LEGENDRE*INTEGRATION

**D1AD**

G*CARDS F4 COMPAT WU 10/31/72 DECK 10/31/72

**D1AD**

I*FORM: CALL ABWTLEG(N*X*W*C*T)

**D1AD**

J*PURPOSE: COMPUTE ABSCISSAS AND WEIGHTS FOR GAUSS-LEGENDRE

**D1AD**

K* INTEGRATION

**D1AD**

L*ROUTINE NAME: ABWTLEG

**D1AD**

M*ENTRY NAME: ABWTLEG

**D1AD**

N*STORAGE: 160 OCTAL WORDS

**D1AD**

O*TIMING: SEE WRITEUP

**D1AD**

P*ACCURACY: SEE WRITEUP

**D1AD**

Q*ROUTINES CALLED: S3DVAL(F222).

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**VOLUME 2 - 9/73**
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

REVIEWER: J. SOPKA, C-4

D203A A* DON DICKMAN C-4 J. SOPKA 72
D203A R*RK - INTERVAL DETERMINING RUNGE-KUTTA
D203A C*CMPS SR6600 SCP 3
D203A D* SW 5 LS 19 TYPE 1
D203A E*CMPS 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,Y1,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: LAHT(N103A).

D203B A* DON DICKMAN C-4 J. SOPKA 72
D203B R*RK - INTERVAL DETERMINING RUNGE-KUTTA
D203B C*CMPS SR7600 CROS
D203B D* SW 1 LS 19 TYPE 1
D203B E*CMPS 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,Y1,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: LABRT(N103B) LIBMSG(SYSTEM).
NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

REVIEWER: F. DORR, C-4

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
H**FORM: CALL TBPSDN(N, NY, U, LX, T, LB, DZX, DRY, CC, ETA, LC, R1)
I**PURPOSE: USING A UNIFORM RECTANGULAR MESH, SOLVE THE
J**ROUTINE NAME: TBPSDN
K**ENTRY NAME: TBPSDN
L**STORAGE: 2144 (OCTAL) WORDS
M**ROUTINES CALLED: FACTTD(F418A), SOLTOM(F419A)

A*   B. L. BUZBEE C-4
B. TRUNCATED BUNEMAN POISSON SOLVER
C*F-4   SR7600 CROS
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
H**FORM: CALL TBPSDN(N, NY, U, LX, T, LB, DZX, DRY, CC, ETA, LC, R1)
I**PURPOSE: USING A UNIFORM RECTANGULAR MESH, SOLVE THE
J**ROUTINE NAME: TBPSDN
K**ENTRY NAME: TBPSDN
L**STORAGE: 2151 (OCTAL) WORDS
M**ROUTINES CALLED: FACTTD(F418B), SOLTDM(F419B)

VOLUME 2 - 9/73
APPROXIMATION THEORY AND CURVE FITTING

VOLUME 2 - 9/73
**INTERPOLATION AND TABLE LOOK-UP**

**REVIEWER: B. SWARTZ, C-6**

**E101A** *(SEARCH) HAS BEEN REDESIGNATED M118A.*

**E102A** *(SEARCH) HAS BEEN REDESIGNATED M118A.*

**E103A** *(SEARCH) HAS BEEN REDESIGNATED M118A.*

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**E102A**

A** B** C**

TOM JORDAN  BERTHA FAGAN  67

B** C**

SPLINE INTERPOLATION-COEFFICIENT EVALUATION FORTRAN SR6600 SCP 3.1

D**

E102A
e**

F**

G**

H**

I**

J**

K**

L**

M**

N**

O**

P**

Q**

R**

S**

T**

U**

V**

W**

X**

Y**

Z**

**E101A**

*(SEARCH) HAS BEEN REDESIGNATED M118A.*

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**E102A**

**E103A**

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**VOLUME 2 - 9/73**
El-2

THOMAS L. JORDAN T-1

104A 0* TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION-COEFF. CALC.

104A B* BASIC NUMERIC E1 F4 SR6600 SCOPE

104A C* SW 8 LS 1

104A D* FORTRAN SOURCE CARDS 38RCD FORTRAN OBJECT CARDS 14B IN

104A S* TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION

104A 10* ON DISK F4 COMPAT WU 12/15/67 DECK 11/63/67

104A 11* CALL SPL2D1 (NBRX, X, NBRY, Y, F, FX, FY, FXY, MAXY, IBD, T1, T2, T3)

104A 12* PURPOSE - TO CALCULATE THE COEFFICIENTS OF A BICUBIC

104A 14* POLYNOMIAL FOR USE IN SMOOTH TWO DIMENSIONAL

104A 15* INTERPOLATION

104A 16* TIMING - TIME IS A LINEAR FUNCTION OF M*N

104A 17* STORAGE - 227 WORDS

104A 18* USES SPL1D1(E102A).

El-5

THOMAS L. JORDAN T-1

105A 0* TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION-FUNCT. EVAL.

105A B* BASIC NUMERIC E1 F4 SR6600 SCOPE

105A C* SW 3 LS 2

105A D* FORTRAN SOURCE CARDS 71RCD FORTRAN OBJECT CARDS 22B IN

105A S* TWO DIMENSIONAL BI-CUBIC SPLINE INTERPOLATION

105A 10* ON DISK F4 COMPAT WU 12/15/67 DECK 11/63/67

105A 11* Y = SPL2D2 (XB, YB, NBRX, X, NBRY, Y, F, FX, FY, FXY, MAXY, K, L)

105A 12* AND

105A 13* Y = SPL2D3 (K, L). THIS IS IN LIB AS E107A.

105A 14* PURPOSE - TO INTERPOLATE FOR A FUNCTION VALUE OR A

105A 15* SPECIFIED DERIVATIVE OF A TWO DIMENSIONAL

105A 16* FUNCTION. E104A MUST BE USED PRIOR TO USING

105A 17* THIS PROGRAM TO COMPUTE INTERPOLATION COEFFS.

105A 18* TIMING - THE CALCULATION IS EQUIVALENT TO 5 CUBIC EVALUATIONS

105A 19* FOR EACH INTERPOLATION.

105A 20* STORAGE - 345 WORDS.

105A 21* USES SEARCH(E101A).

VOLUME 2 - 9/73
INTERPOLATION BY AITKEN'S REPEATED PROCESS

PURPOSE: GIVEN IABS(N) POINTS FROM THE GRAPH OF A FUNCTION, 
I.E., (X(I), F(X(I))), I=1, 2, ..., IABS(N), AKINT EVALUATES A 
MTH DEGREE LAGRANGIAN INTERPOLANT OF THIS FUNCTION AT 
XBAR.

ROUTINE NAME: AKINT
ENTRY NAME: AKINT
STORAGE: 354 OCTAL WORDS.
Routines Called: LABRT(N103A).

SPLINE INTERPOLATION FUNCTION TO BE USED ONLY WITH E105A

BASIC NUMERICS E1
SR6600 SCOPE
C* SW 2 LS 1
FORTRAN SOURCE CARDS 16BDCFORTRAN OBJECT CARDS 8BIN
TWO-DIMENSIONAL SPLINE INTERPOLATION
ON DISK F4 COMPAT WU 11/03/67 DECK 11/03/67
THIS FUNCTION SUBPROGRAM IS USED BY E105A WHEN A
SUCCESSION OF VALUES IS DESIRED.
STORAGE - 98 WORDS
USES SPL2D2, SPL2D3(E105A).
E109A *(ESearch) has been redesignated M119A.

E1AA A* R. MILLS MP-9 JAMESON AND MILLS 72
E1AA B*SI0G20 - 2D SEARCH, INTERPOLATION ON DISTORTED RECT. GRID
E1AA C*F4 MP6600 SCP 3.1
E1AA D* SW 4 LS 3 TYPE 2
E1AA E*F4 SOURCE CARDS 155 BCD OBJECT CARDS NONE
E1AA F*TWO-DIMENSIONAL*SEARCH*INTERPOLATION*DISTORTED*RECTANGULAR GRD
E1AA G*CARDS F4 COMPAT WU 03/15/72 DECK 03/15/72
E1AA 1*FORM1: 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.

VOLUME 2 - 9/73
LEAST SQUARES APPROXIMATION AND CURVE FITTING

REVIEWER: R. SWARTZ, C-6

E203A A* T. JORDAN CDO 67
E203A B*LEAST-SQUARE SPLINE APPROXIMATION
E203A C* MATH E2 F4 SR6600 SCOPE
E203A D*F4 SOURCE CARDS 335BCDREL COL BIN CARDS 93BIN
E203A E**LEAST-SQUARES*SPLINE*APPROXIMATION
E203A F**ON DISK F4 COMPAT WU 01/20/67 DECK 01/20/67
E203A G*CALL SMOOTH(J*I*OP*T*X*Y*W,F*A) WHERE J IS NUMBER OF DATA
E203A H*POINTS; I IS TWICE THE NUMBER OF KNOTS, IOP IS ARRAY OF
E203A I*DIMENSION 2 CONTAINING COMBINATIONS OF INTEGERS 1 THRU 5
E203A J*FOR SPECIFYING BOUNDARY CONDITIONS, T IS TABLE OF ABSCISSAS
E203A K*OF DATA POINTS, X IS TABLE OF KNOTS, Y IS TABLE OF
E203A L*ORDINATES OF DATA POINTS, W IS TABLE OF WEIGHTS; A IS ARRAY
E203A M*DERIVATIVES AND FUNCTION VALUES ARE COMPUTED AND STORED IN
E203A N*LENGTH I, THERE ARE NO ERROR MESSAGES. CODE OCCUPIES OCT
E203A O*STORAGE=4212 WORDS, USES SEARCH(E101A) AND LSS(F464A).

E205A A* T. JORDAN CDO 67
E205A B*ORTHOGONAL POLYNOMIAL LEAST SQUARES PACKAGE
E205A C*MATHEMATICS E2 F4 SR6600 SCOPE
E205A D*F4 SOURCE CARDS 306BCDF4 OBJECT CARDS 98BIN
E205A E**ORTHOGONAL*POLYNOMIAL*LEAST SQUARES
E205A F**CARDS F4 COMPAT WU 03/08/68 REV DECK 03/08/68 REV
E205A G*ORTHOGONAL POLYNOMIAL LEAST SQUARES ROUTINE. PACKAGE BINARY
E205A H*DECK NEEDS ID CARD IN FRONT, DATA CARDS IN BACK. FITS POLYNOM
E205A I*IALS UP TO A SPECIFIED MAXIMUM WITH OPTIONS TO PLOT, OBTAIN
E205A J*LEGENDRE COEF, EVALUATE FIT OVER A SPECIFIED INTERVAL, WITH
E205A K*OR WITHOUT WEIGHTS, VARIABLE INPUT FORMAT. FITS OBTAINED IN
E205A L*TERMS OF ORTHOGONAL POLYNOMIALS. MAXIMUM DEGREE OF
E205A M*FIT=20, FOR LEGENDRE POLYN. =10. FIELD LENGTH ON JOB CARD
E205A N*IS 060000.
E205A O**CONTAINS POLEYI
E205A P*USES PLT(J516A) AND GRAPH(J511A) FOR PLOTTING.

VOLUME 2 - 9/73
A* BLAIR SWARTZ C-6

A* ORTHOGONAL POLYNOMIAL LEAST SQUARES SUBROUTINE

CALL PFTS(M,KM,IW,IOR,LP,IP,LOOK,MID,K,SIGMA,X,F,W,Y,DELY, A)

PFTS PRODUCES (WEIGHTED) LEAST SQUARES

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

(X(I), F(I)), I=1,...,M LE 300. 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.

E.G. B CONTAINS THE COEFFICIENTS OF Y(X). X THRU A HAVE

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

PFTS USES SQRT(B486A),

VOLUME 2 - 9/73
SMOOTHING TABULAR DATA

REVIEWER: B. SWARTZ; C-6

E302A

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

E302B

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

REVIEWER: M. KLEIN, C-6

A* TOM DOYLE C-6 M. KLEIN 71

B*OPTIMIZE A CONTINUOUS N-PARAMETER SYSTEM
C*F4 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

1*FORM: CALL OPTIMIZE(U,V)
2* CALL PHIGRAD(V)
3*PURPOSE: TO OPTIMIZE A CONTINUOUS N-PARAMETER SYSTEM
4* BY EITHER MINIMIZING OR MAXIMIZING A SUM OF SQUARES
5*ROUTINE NAME: OPTIMIZE
6*ENTRY NAMES: OPTIMIZE,PSEARCH,GLSS,BOUNDS,HSHLECS,ETASRCH,
7* PHIGRAD
8*STORAGE: 66800 OCTAL WORDS OF SCM
9* ALL OF LCM
10*Routines Called: SECOND(Q115B),DOTPRO(F124B),SQRT(B408B),
11* LABRT(N103B),VECPROD(F133B),VECSUM(F133B),ADDVEC(F133B),
12* DSQRT(B410B),ECRD/ECWR(SYSTEM)
13*OTHER EXTERNALS:
14* DOYLE1,DOYLE2,DOYLE3,DOYLE4,DOYLE5,DOYLE6,
15* DOYLE7 (ALL COMMONS), PHIGRAD (ALSO A COMMON BLOCK)

VOLUME 2 - 9/73
VECTOR AND MATRIX OPERATIONS

REVIEWER: B, BUZBEE, C-4

F115A A* J. DURAN  
F115A B*VECTORS F4 SR6600 SCOPE
F115A C*  
F115A D*SOURCE DECK 32BCD
F115A E**VECTOR MAXIMUM MINIMUM

F115B A* J. DURAN  C-4  B, BUZBEE
F115B B*VECTORS MINIMUM MAXIMUM ABS; OR MINIMUM ABS.
F115B C*F4 SR7600 CROS
F115B D*  
F115B E*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 EXAMINED.
F115B L* THE LENGTH OF VECTOR X MUST BE AT LEAST (N-1)*IX +1.
F115B M* THE DESIRED ELEMENT IS STORED IN Y AND I,GE,1 AND
F115B N* I,LE,N IS THE ELEMENT NUMBER. 96 WORDS OF STORAGE.
F115B O*SELF-CONTAINED.

F115B P*ROUTINE NAME: MAXV
F115B Q*ENTRY NAMES: MAXV, MINV, MAXAV, MINAV
F115B R*STORAGE: 245 OCTAL WORDS.
F115B S*ROUTINES CALLED: LIBMSG(SYSTEM).
F116A  A*  CHERRY   T-1    R. ANDERSON  68
F116A  G* MATRIX MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE, MINIMUM ABS.
F116A  B MATRIXES F1     F4     SR6600 SCOPE
F116A  C*     SW 1   LS 1
F116A  D*F4 SOURCE DECK  35BCDBINARY  12BIN
F116A  S**MAXIMUM*MINIMUM*MATRIX ELEMENT
F116A  10*ON DISK F4 COMPAT WU 04/18/68 DECK #04/18/68
F116A  11*CALLED BY MAXM(A,IA,N,M,I,J,B) OR MINM,MAXAM,MINAM
F116A  12*DETERMINES THE MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE,
F116A  13*OR MINIMUM ABSOLUTE ELEMENT AND THE INDICES OF THAT
F116A  14*ELEMENT IN MATRIX A. IA IS THE COLUMN LENGTH OF A AS
F116A  15*SPECIFIED IN THE DIMENSION STATEMENT, I.E. DIMENSION
F116A  16*A(IA,KA). N AND M ARE THE NUMBER OF ROWS AND COLUMNS
F116A  17*RESPECTIVELY. I IS THE ROW(FIRST) INDEX TO THE
F116A  18*RESULTANT ELEMENT. J IS THE COLUMN(SECOND) INDEX TO
F116A  19*THE RESULTANT ELEMENT. B CONTAINS THE DESIRED ELEMENT.
F116A  20*120 WORD STORAGE, SELF CONTAINED.

F116B  A*  I.CHERRY   C-4  B.BUZBEE  72
F116B  B* MATRIX MAXIMUM, MINIMUM, MAXIMUM ABSOLUTE, MINIMUM ABS.
F116B  C*F4   SR7600 CROS
F116B  D*     SW 1   LS 2   TYPE 1
F116B  E*F4 SOURCE CARDS  55  BCD OBJECT CARDS  18  BIN
F116B  F**MAXIMUM*MINIMUM*MATRIX ELEMENT
F116B  G*ON DISK F4 COMPAT WU 10/12/72 DECK #10/12/72
F116B  1*FORM1 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).
F117A  A#  PAUL HARPER  T-1  67
F117A  B# MATRIX IDENTITY GENERATOR
F117A  C# MATRICES    F4    F4    SR6600    SCOPE
F117A  D# F4 SOURCE CARDS    8BCDREL BIN    4BIN
F117A  E# IDENTITY*MATRIX*GENERATOR
F117A  F# ON DISK    F4    COMPAT    WU 08/25/67    DECK 08/25/67
F117A  G# CALL GENID(A,N,IA), GENERATES A STANDARD N BY N IDENTITY
F117A  H# MATRIX IN A WHERE N IS THE ORDER OF A AND IA IS THE SPACING
F117A  I# BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION STATEMENT.
F117A  J# USEFUL FOR SOLVING BX = I. THE TEST PROGRAM PRINTS EITHER
F117A  K# (GENID RESULTS ARE CORRECT) OR (GENID RESULTS ARE INCOR-
F117A  L# RECT). STORAGE - 36 WORDS.
F117A  M# SELF CONTAINED.

F117B  A#  B.L.BUZBEE  C-4  72
F117B  B# MATRIX IDENTITY GENERATOR
F117B  C# F4    SR7600    CROS
F117B  D#    SW 1    LS 1    TYPE 1
F117B  E# F4 SOURCE CARDS    13    BCD    OBJECT CARDS    6    8 BIN
F117B  F# IDENTITY*MATRIX*GENERATOR
F117B  G# ON DISK    F4    COMPAT    WU 10/12/72    DECK 10/12/72
F117B  H# FORM: CALL GENID(A,N,IA)
F117B  I# PURPOSE: GENERATES A STANDARD N BY N IDENTITY MATRIX IN
F117B  J# A WHERE N IS THE ORDER OF A AND IA IS THE SPACING
F117B  K# BETWEEN COLUMNS OF A AS SPECIFIED IN THE DIMENSION
F117B  L# STATEMENT. USEFUL FOR SOLVING BX = I.
F117B  M# ROUTINE NAME: GENID
F117B  N# ENTRY NAME: GENID
F117B  O# STORAGE: 52 OCTAL WORDS.
F117B  P# ROUTINES CALLED: LIBMSG(SYSTEM).
F119A A* IVAN CHERRY T-1 TOM JORDAN 67
F119A O*MATRIX TRANSPOSE IN PLACE
F119A B*MATRICES F1 F4 F4 SR6600 SCOPE
F119A C* SW 1 LS 1
F119A D*F4 SOURCE CARDS 15BCDF4 OBJECT CARDS 5BIN
F119A S*MATRIX*TRANSPOSE
F119A 10*ON DISK F4 COMPAT WU 01/23/67 DECK 01/23/67
F119A 11*CALLED BY-MATTRS (A,IA,N,M)
F119A 12*PURPOSE: TO TRANSPOSE THE MATRIX A, THAT IS,
F119A 13*A(N,M) IS REPLACED BY A(M,N). A IS THE ORIGIN
F119A 14*OF MATRIX A, IA IS THE SPACING BETWEEN
F119A 15*COLUMNS OF A, I.E., A(IA,J) AS SPECIFIED BY THE DIMENSION
F119A 16*STATEMENT, N IS THE NUMBER OF ROWS. M IS THE NUMBER
F119A 17*OF COLUMNS. IA MUST BE GREATER THAN OR EQUAL TO
F119A 18*THE MAXIMUM OF M AND N. THE DIMENSIONS OF A MUST
F119A 19*BE AT LEAST AS GREAT AS THE MAXIMUM OF MXM AND NXN.
F119A 20*SELF CONTAINED STORAGE REQUIREMENT 46 WORDS

F119B A* IVAN CHERRY C-4 B.BUZBEE 72
F119B B*MATRIX TRANSPOSE IN PLACE
F119B C*F4 SR7600 CROS
F119B D* SW 1 LS 1 TYPE 1
F119B E*F4 SOURCE CARDS 20 BCD OBJECT CARDS 7 BIN
F119B F*A*MATRIX*TRANSPOSE
F119B G*ON DISK F4 COMPAT WU 10/12/72 DECK 10/12/72
F119B 1*FORM: CALL MATTRS(A,IA,N,M)
F119B 2*PURPOSE: TRANSPOSE THE MATRIX A, THAT IS, A(N,M) IS
F119B 3* REPLACED BY A(M,N).
F119B 4* A IS THE ORIGIN OF MATRIX A.
F119B 5* IA IS THE SPACING BETWEEN COLUMNS OF A, I.E., A(IA,J)
F119B 6* AS SPECIFIED BY THE DIMENSION STATEMENT.
F119B 7* N IS THE NUMBER OF ROWS.
F119B 8* M IS THE NUMBER OF COLUMNS.
F119B 9* IA MUST BE GREATER THAN OR EQUAL TO THE MAXIMUM
F119B 10* OF M AND N. THE DIMENSIONS OF A MUST BE AT LEAST AS
F119B 11* GREAT AS THE MAXIMUM OF MXM AND MXN.
F119B 12*ROUTINE NAME: MATTRS
F119B 13*ENTRY NAME: MATTRS
F119B 14*STORAGE: 70 OCTAL WORDS.
F119B 15*ROUTINES CALLED: LIBMSG(SYSTEM).
F120A A* IVAN CHERRY T-1 TOM JORDAN 67
F120A D*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*B IS THE ORIGIN OF THE MATRIX B
F120A 17*IA AND IB ARE THE SPACINGS BETWEEN COLUMNS OF THE MATRICES A
F120A 18*AND B RESPECTIVELY, I.E., A(IA,J) AS SPECIFIED IN THE
F120A 19*DIMENSION STATEMENT.
F120A 20*SELF CONTAINED, STORAGE REQUIREMENT 35 WORDS

F120B A* IVAN CHERRY C-4 B.BUZBEE 72
F120B D*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 O*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.

F121B A#    IVAN CHERRY C-4    BUZBEE 72
F121B B*MATRIX MOVE AND TRANSPOSE
F121B C*F4 SR7600 CROS
F121B D*    SW 1    LS 1 TYPE 1
F121B E*F4 SOURCE CARDS 12 BCD OBJECT CARDS 6 BIN
F121B F**MATRIX*TRANSPOSE*MOVE
F121B G*ON DISK    F4 COMPAT WU 10/12/72 DECK 10/12/72
F121B 1*FORM: CALL MATTRA(N,M,A,IA,B,IB)
F121B 2*PURPOSE: STORES THE TRANSPOSE OF THE NXM MATRIX A IN
F121B 3* MATRIX B.
F121B 4* N IS THE NUMBER OF ROWS (1ST INDEX) IN THE MATRIX.
F121B 5* M IS THE NUMBER OF COLUMNS (2ND INDEX) IN THE MATRIX.
F121B 6* A AND B ARE THE ORIGINS OF THE MATRICES.
F121B 7* IA AND IB ARE THE SPACINGS BETWEEN THE COLUMNS OF THE
F121B 8* MATRICES A AND B RESPECTIVELY, E.G., A(IA+J) AS
F121B 9* SPECIFIED IN THE DIMENSION STATEMENT.
F121B 10*ROUTINE NAME: MATTRA
F121B 11*ENTRY NAME: MATTRA
F121B 12*STORAGE: 62 OCTAL WORDS
F121B 13*ROUTINES CALLED: LIBMSG(SYSTEM).
**O**-MATRIX MULTIPLY ROUTINE

**B**-MATRICES

**F**

**SR6600**

**SCOPE**

**C**

**SW 1**

**LS 1**

**D**

**F**

**SOURCE CARDS**

**7BCDF**

**OBJECT CARDS**

**6BIN**

**S**

**MATRIX**

**MULTIPLY**

**1**

**ON DISK**

**F**

**COMPAT WU 10/18/68REV**

**DECK 10/18/68REV**

**CALLED BY**

**MATMPY (N, M, L, A, IA, B, IB, C, IC)**

**MULTIPLIES**

**N x M**

**MATRIX A BY M x L**

**MATRIX B**

**TO FORM N x L**

**MATRIX C. IA, IB, IC ARE THE**

**COLUMN LENGTHS AS SPECIFIED IN DIMENSION STATEMENT.**

**USES DOTPRO (F124A), STORAGE REQUIREMENT 51 WORDS.**

**B**

**MATRIX TRANSPOSE MULTIPLY ROUTINE**

**C**

**F**

**SR6600**

**SCP 3.1**

**D**

**SW 1**

**LS 1**

**E**

**SOURCE CARDS**

**OBJEC**

**OBJECT CARDS**

**6**

**F**

**MATRIX TRANSPOSE MULTIPLY**

**G**

**DISK**

**F**

**COMPAT WU 04/03/73REV.1**

**DECK 04/03/73REV.1**

**PURPOSE: MULTIPLY THE TRANSPOSE OF**

**M x N**

**MATRIX A BY M x L**

**MATRIX B TO FORM N x L**

**MATRIX C. IA, IB, IC ARE THE**

**COLUMN LENGTHS AS SPECIFIED IN THE DIMENSION**

**STATEMENT. IA, IB, IC ARE THE**

**COLUMN LENGTHS AS SPECIFIED IN THE DIMENSION**

**THE ELEMENTS OF THE PRODUCT ARE COMPUTED IN DOUBLE**

**PRECISION PRIOR TO STORING IN C.**

**USES DOTPRO (F124A), STORAGE REQUIREMENT 51 WORDS.**

**B**

**BUZBEE**

**C**

**4**

**B BUZBEE**

**67**

**VOLUME 2 = 9/73**
F1-8

F123B A* B BUZBEE C-4 B BUZBEE 73
F123B B*MATRIX TRANSPOSE MULTIPLY ROUTINE
F123B C*F-4 SR7600 CROS
F123B D* SW 1 LS 1 TYPE 1.1
F123B E*SOURCE CARDS 7 BCD OBJECT CARDS 7 BIN
F123B F**MATRIX*TRANSPOSE*MULTIPLY
F123B G*DISK F4 COMPAT WU 04/03/73 DECK 04/03/73
F123B 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,KR), C(IC,KC).
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)

F124A A* B. L. BUZBEE C-4 R. M. FRANK 67
F124A B*INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)
F124A C*COMPASS SR6600 SCP 3.1
F124A D* SW 1 LS 3 TYPE 1.
F124A E*CMP SOURCE CARDS 107 BCD OBJECT CARDS 5 BIN
F124A F**VECTOR*PRODUCT
F124A G*ON DISK F4 COMPAT WU 10/02/72REV 4 DECK 10/02/72REV 4
F124A 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.

VOLUME 2 - 9/73
**INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)**

**PRODUCT**

- **Purpose:** Produces inner product of two vectors where \( X \) and \( Y \) are real vectors each containing \( N \) elements, \( \text{IX} \) and \( \text{IY} \) are the spacings between elements of \( X \) and \( Y \) respectively.
- **Result:** The sum of \( X(i) \cdot Y(i) \) from \( i = 1 \) to \( N \).
- **Result:** Is zero if \( N = 0 \), infinite if \( N \neq 0 \).
- **Result:** Is double precision but may be used as single depending on calling program definition of DOTPRO.

**Name:** DOTPRO

**Storage:** 26 octal words.

**Self contained.**

**CORRECTION OF AN APPROXIMATE INVERSE MATRIX**

**INVERSE CORRECTOR**

- **Purpose:** Corrects an approximate inverse \( B \) of the matrix \( A \). \( A \) is the name of the matrix for which \( B \) is the approximate inverse. \( N \) is the number of rows \( B \) and \( IA \) is the first dimension of \( A(IA \cdot N) \) and \( B(IA \cdot N) \) 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:** LABRT(N103A), storage 189 words

**Name:** CORINV

**Storage:** 26 octal words.

**Self contained.**

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**Contributors:**
**F128A**

A* B.L.BUZBEE C-4

B*MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION

C*F4 SR7600 CROS

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

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(B408A), DOTPRO(F124A).

**F128B**

A* B.L.BUZBEE C-4

B*MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION

C*F4 SR7600 CROS

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

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: 336 OCTAL WORDS

8*ROUTINES CALLED: SQRT(B408A), DOTPRO(F124A).

**F129A** *(GNSM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AA.*

**F130A** *(GSM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AB.*

**F131A** *(GHM) DEMOTED TO TYPE 2 STATUS AND IS NOW DESIGNATED F1AC.*

**VOLUME 2 - 9/73**
F132A A* B. L. BUZBEE C-4 B L BUZBEE 67
F132A B*MATRIX INVERSE
F132A C* SR660 SCP 3.1
F132A D* SW 2 LS 3 TYPE 1.1
F132A E*SOURCE CARDS 99 BCD OBJECT CARDS 35 BIN
F132A F**MATRIX*INVERSE
F132A G*ON DISK F4 COMPAT WU 04/06/73 REV 5 DECK 04/06/73 REV 4
F132A 2*PURPOSE: FIND THE INVERSE OF A MATRIX A,
F132A 3*TIMING: 87 MILLISECONDS FOR N = 20.
F132A 4*ROUTINE NAME: MATINV
F132A 5*ENTRY NAME: MATINV
F132A 6*STORAGE: 655 (OCTAL) WORDS.
F132A 7*ROUTINES CALLED: LABRT (N103A), DOTPRO (F124A).

F132B A* B. L. BUZBEE C-4 B L BUZBEE 73
F132B B*MATRIX INVERSE
F132B C* SR760 CROS
F132B D* SW 2 LS 3 TYPE 1.1
F132B E*SOURCE CARDS 99 BCD OBJECT CARDS 35 BIN
F132B F**MATRIX*INVERSE
F132B G*ON DISK F4 COMPAT WU 04/06/73 DECK 04/06/73
F132B 2*PURPOSE: FIND THE INVERSE OF A MATRIX A,
F132B 3*TIMING: 14 MILLISECONDS FOR N = 20
F132B 4*ROUTINE NAME: MATINV
F132B 5*ENTRY NAME: MATINV
F132B 6*STORAGE: 665 (OCTAL) WORDS.
F132B 7*ROUTINES CALLED: LABRT (N163B), DOTPRO (F124B).

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

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

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

VOLUME 2 - 9/73
**ECS MATRIX MULTIPLY**

**ECMATPY** (F134A)

- **Routine Name:** ECMATPY
- **Entry Name:** ECMATPY
- **Storage:** 216 (OCTAL) WORDS.
- **Routines Called:** DOTPRO(F124B), ECR(K203B), ECW(K204B).

**ECS MATRIX TRANSPOSE MULTIPLY**

**ECMTRPY** (F134A)

- **Routine Name:** ECMTRPY
- **Entry Name:** ECMTRPY
- **Storage:** 214 (OCTAL) WORDS.
- **Routines Called:** DOTPRO(F124A), ECR(K203A), ECW(K204A).
F136A A* B.L. BUZBEE C-4
F136B B*INNER PRODUCT OF TWO COMPLEX VECTORS
F136A C+F4 SR6600 SCP 3.1
F136A D* SW 1 LS 1 TYPE 1
F136A E*SOURCE CARDS 14 BCD OBJECT CARDS 9 BIN
F136A F**INNER PRODUCT VECTOR
F136A G*CARDS F4 COMPAT WU 04/26/73 REV. 1 DECK 11/11/70
F136A H*USE: Z=COTPRO(N*X,IX,Y,IY).
F136A I*COTPRO(N*X,IX,Y,IY) COMPUTES THE
F136A J*COMPLEX SUM Z=X(1)*Y(1)+X(1+IX)*Y(1+IY)+...
F136A K*X WHERE X AND Y ARE
F136A L*COMPLEX VECTORS OF LENGTH N.
F136A M*COTPRO(N*X,IX,Y,IY) IS THE SAME AS COTPRO
F136A N*EXCEPT ALL X(I) S ARE CONJUGATED.
F136A O*TIMING: N=100, .0015 SEC.
F136A P*STORAGE: 153 (OCTAL WORDS).
F136A Q*ENTRY NAME: COTPRO
F136A R*ROUTINES CALLED: COTPRO, CDTOPRO
F136A S*Routines Called: F124A(DOTPRO).

VOLUME 2 - 9/73
**F1-15**

**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).

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**F137B**  
A*  B L BUZBEE  C-4

**F137B**  
B*COMPLEX MATRIX INVERSION

**F137B**  
C*F4  SR7600  COS

**F137B**  
D*  SW 1  LS 3  TYPE 1.1

**F137B**  
E*F4  SOURCE CARDS  98  BCD  OBJECT CARDS  41  BIN

**F137B**  
F**COMPLEX MATRIX INVERSION

**F137B**  
G*ON DISK  F4  COMPAT  WU 03/02/73  DECK 03/02/73

**F137B**  
1*FORM: CALL CATINV(A,IA,IN,R,DET)

**F137B**  
2*PURPOSE: TO INVERT A COMPLEX MATRIX USING ORDER N**2, THE

**F137B**  
3* THE ARGUMENTS ARE 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*TIMING: .009 SEC. FOR N=10.

**F137B**  
8*STORAGE: 1005 OCTAL WORDS.

**F137B**  
9*Routines Called: COTPRO(F136B), LABRT(ON THE SYSTEM).

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**VOLUME 2 - 9/73**
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* WHERE: X = REAL VECTOR
F138A J* N = NUMBER OF ELEMENTS TO BE SUMMED
F138A K* INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138A L* PURPOSE: PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138A M* N ELEMENTS FASTER THAN THE EQUIVALENT FORTRAN CODE.
F138A N* SUM = 0.0
F138A O* LENX = N*INCX
F138A P* DO 1 I = 1, LENX, INCX
F138A Q* 1 SUM = SUM + X(I)
F138A R* SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138A S* IF N IS LESS THAN 0.
F138A T* STORAGE: 25 (OCTAL) WORDS
F138A U* ROUTINES CALLED: SELF CONTAINED

F138B A* PAUL IWANCHUK C-4
F138B B*SUMVEC... A FAST SUMMATION OF VECTOR ELEMENTS
F138B C*COMPASS SR7600 CR5
F138B D* SW 1 LS 3 TYPE 1
F138B E*CMP 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* WHERE: X = REAL VECTOR
F138B J* N = NUMBER OF ELEMENTS TO BE SUMMED
F138B K* INCX = SPACING OF SUCCESSIVE ELEMENTS OF X
F138B L* PURPOSE: PROVIDE A CAPABILITY OF SUMMING A REAL VECTOR OF
F138B M* N ELEMENTS FASTER THAN THE FORTRAN EQUIVALENT CODE.
F138B N* SUM = 0.0
F138B O* LENX = N*INCX
F138B P* DO 1 I = 1, LENX, INCX
F138B Q* 1 SUM = SUM + X(I)
F138B R* SUMVEC WILL RETURN A ZERO IF N = 0, AND AN INDEFINITE
F138B S* IF N IS LESS THAN 0.
F138B T* ROUTINE NAME: SUMVEC
F138B U* ENTRY NAME: SUMVEC
F138B V* TIMING ON 7600 MACHINE:
F138B W* N = 10 N*0.72 MICROSEC: EQUIVALENT TO FORTRAN
F138B X* N = 100 N*21 MICROSEC: 2.5 TIMES FASTER THAN FORTRAN
F138B Y* N = 1000 N*15 MICROSEC: 3.5 TIMES FASTER THAN FORTRAN
F138B Z* STORAGE: 50 OCTAL WORDS.
F138B AA* ROUTINES CALLED: LIBMSG(SYSTEM).
F1AA
A* B.L. BUZBEE C-4
F1AA B*GENERATE NONSYMMETRIC MATRIX
F1AA C*F4 SR6600 SCP 3.1
F1AA D* SW 3 LS 1 TYPE 2
F1AA E*F4 SOURCE CARDS 23 BCD OBJECT CARDS 9 BIN
F1AA F*GENERATE NONSYMMETRIC MATRIX
F1AA G*CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
F1AA 1*FORM: CALL GNSM(N,M,A)
F1AA 2*PURPOSE: GENERATE A REAL NONSYMMETRIC MATRIX WITH
F1AA 3* KNOWN REAL AND/OR COMPLEX EIGENVALUES.
F1AA 4*ROUTINE NAME: GNSM
F1AA 5*ENTRY NAME: GNSM
F1AA 6*STORAGE: 82 OCTAL WORDS.
F1AA 7*SELF CONTAINED.

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

F1AC
A* B.L. BUZBEE C-4
F1AC B*GENERATE HERMITIAN MATRIX
F1AC C*F4 SR6600 SCP 3.1
F1AC D* SW 2 LS 1 TYPE 2
F1AC E*F4 SOURCE CARDS 25 BCD OBJECT CARDS 14 BIN
F1AC F*GENERATE HERMITIAN MATRIX
F1AC G*CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
F1AC 1*FORM: CALL GHM(N,M,A,B)
F1AC 2*PURPOSE: GENERATE A HERMITIAN MATRIX WITH KNOWN EIGENVALUES.
F1AC 3*ENTRY NAME: GHM
F1AC 4*ENTRY NAME: GHM
F1AC 5*STORAGE: 173 OCTAL WORDS.
F1AC 6*SELF CONTAINED.
F1AD 6*SOURCE CARDS  133 BCD  OBJECT CARDS  40 BIN
F1AD F**MATRIX*COMPLEX MATRIX*MATRIX TRANSPOSE
F1AD G*CARDS  F4 COMPAT WU 03/23/73  DECK 03/23/73
F1AD 1*FORM:  PROGRAM TRANS (FSET4, FSET6)
F1AD 2*PURPOSE:  TRANSPOSE A VERY LARGE COMPLEX MATRIX
F1AD 3* STORED BY ROWS ON FSET4.
F1AD 4*ROUTINE NAME:  TRANS
F1AD 5*ENTRY NAME:  TRANS
F1AD 6*STORAGE:  ALL OF SCM AND LCM
F1AD 7*TIMING:  SEE FULL WRITEUP
F1AD 8*ROUTINES CALLED:  BUFFEI, ECSRW, ENDFIL, IOCHEK, LOCF,
F1AD 9* SYSTEM, LSHIFT, BS4020, GETRA, IOUTIL
F1AD 10* SYSFS (ALL SYSTEM)
F1AD 11* REWINM(W301B), SETQ(Q414B), MEMORY(Q305B),
F1AD 12* SKIPR(W304B), BOI(W201B), 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 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 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.

VOLUME 2 - 9/73
F209A A* 8 L. BUZBEE T-1 67
F209A O*GENERAL REAL MATRIX EIGENVALUE ROUTINE
F209A B*MATH F2 F4 SR6600 SCOPE
F209A C* SW 1 LS 6
F209A D*F4 SOURCE CARDS 349BCDF4 OBJECT CARDS 147BIN
F209A S*GENERAL REAL*MATRIX*EIGENVALUE ROUTINE
F209A lo*ON DISK F4 COMPAT WU 04/27/67 DECK 04/27/67
F209A 11*CALLED BY F208A AND F214A, THIS ROUTINE SHOULD ONLY BE USED
F209A 12*IN CONJUNCTION WITH THOSE ROUTINES.
F209A 13*STORAGE=1981 WORDS,
F209A 14*USES=DSQRT(B410A).

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

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

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

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

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

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

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

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

VOLUME 2 - 9/73
F2.3

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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.

F221A A* B L BUZBEE C-4 G. WILLBANKS 67
F221A B*EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX
F221A C*FIV SR6600 SCP 3.1
F221A D* SW 3 LS 7 TYPE 1
F221A E*F4 SOURCE CARDS 367 BCD OBJECT CARDS 89 BIN
F221A F**EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX
F221A G*CARDS F4 COMPAT WU 04/01/70REV 2 DECK 04/01/70REV 2
F221A 1*CALL MATVEC(N,IVEC,A,E,V,IM,AL,TRAC,SUM,DET,PROD,IE) FINDS
F221A 2*THE EIGENVALUES AND EIGENVECTORS OF A COMPLEX MATRIX.
F221A 3*TIMING= .57 SEC, FOR N=10. STORAGE= 2203 (OCTAL) WORDS.
F221A 4*USES SQRT(B408A).

F222A A* B, L. BUZBEE C-4 69
F222A B*EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX
F222A C*F4 SR6600 SCP 3.1
F222A D* SW 3 LS 3 TYPE 1
F222A E*SOURCE CARDS 123 BCD OBJECT CARDS 32 BIN
F222A F**EIGENVALUES*MATRIX*SYMMETRIC*SMEVAL*STEVAL
F222A G*ON DISK F4 COMPAT WU 08/02/71REV 3 DECK08/02/71REV 2
F222A 1*FORMS CALL SMEVAL(NN,T,R,S,EPL,KE,M)
F222A 2* CALL STEVAL(NN,B,R,S,EPL,KE)
F222A 3* CALL S3DVAL(NN,T,R,S,EPL,KE,M)
F222A 4*PURPOSE: TO COMPUTE THE EIGENVALUES OF A REAL SYMMETRIC
F222A 5* MATRIX OR OF A SYMMETRIC TRIDIAGONAL MATRIX.
F222A 6*ROUTINE NAME! SMEVAL
F222A 7*ENTRY NAMES: SMEVAL, STEVAL, S3DVAL
F222A 8*STORAGE: 646 (OCTAL) WORDS
F222A 9*Routines Called: SMHHTR(F223A),DOTPRO(F124A),SQRT(B408A),
F222A 10* LABRT(N103A).

VOLUME 2 = 9/73
**F222A**

<table>
<thead>
<tr>
<th>A*</th>
<th>B, L. BUZBEE C-4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRIDIAGONALIZE REAL SYMMETRIC MATRIX</strong></td>
<td></td>
</tr>
<tr>
<td>C*F4</td>
<td>SR6600 SCP 3.1</td>
</tr>
<tr>
<td><strong>SOURCE CARDS</strong></td>
<td>103 BCD OBJECT CARDS 26 BIN</td>
</tr>
<tr>
<td><strong>MATRICES</strong></td>
<td><strong>TRIDIAGONAL</strong></td>
</tr>
<tr>
<td><strong>MATRIX</strong></td>
<td><strong>SYMMETRIC</strong></td>
</tr>
<tr>
<td><strong>SMHHTR</strong></td>
<td><strong>STHHTR</strong></td>
</tr>
<tr>
<td><strong>ON DISK</strong></td>
<td>F4 COMPAT WU 05/12/72 REV.3 DECK 05/12/72 REV.2</td>
</tr>
<tr>
<td>1<em>FORMI: CALL SMHHTR(IN</em>A,T,KE,IA)</td>
<td></td>
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<tr>
<td>2* CALL STHHTR(IN*B,T,KE)</td>
<td></td>
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<tr>
<td>3* PURPOSE: TRANSFORM A FULL SYMMETRIC MATRIX INTO A TRIDIAGONAL SYMMETRIC MATRIX.</td>
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<tr>
<td>5* ROUTINE NAME: SMHHTR</td>
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<tr>
<td>6* ENTRY NAME: SMHHTR, STHHTR</td>
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<tr>
<td>7* STORAGE: 546 (OCTAL) WORDS</td>
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<tr>
<td>8* ROUTINES CALLED: DOTPRO(F124A), LABRT(N103A), SQRT(B408A).</td>
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**F223A**

<table>
<thead>
<tr>
<th>A*</th>
<th>B, L. BUZBEE C-4</th>
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</thead>
<tbody>
<tr>
<td><strong>EIGENVALUE ROUTINE - REAL SYMMETRIC MATRIX</strong></td>
<td></td>
</tr>
<tr>
<td>C*F4</td>
<td>SR7600 CROS</td>
</tr>
<tr>
<td><strong>SOURCE CARDS</strong></td>
<td>138 BCD OBJECT CARDS 36 BIN</td>
</tr>
<tr>
<td><strong>EIGENVALUE MATRIX</strong></td>
<td><strong>SYMTHETRIC</strong></td>
</tr>
<tr>
<td><strong>SMEVAL</strong></td>
<td><strong>STEVAL</strong></td>
</tr>
<tr>
<td><strong>ON DISK</strong></td>
<td>F4 COMPAT WU 05/12/72 DECK 05/12/72</td>
</tr>
<tr>
<td>1*FORMI: CALL SMEVAL(NN,T,R,S,EPL,KE,M)</td>
<td></td>
</tr>
<tr>
<td>2* CALL STEVAL(NN,B,R,S,EPL,KE)</td>
<td></td>
</tr>
<tr>
<td>3* CALL S3DVAL(NN,T,R,S,EPL,KE,M)</td>
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</tr>
<tr>
<td>4* PURPOSE: COMPUTE THE EIGENVALUES OF A REAL SYMMETRIC MATRIX OR OF A SYMMETRIC TRIDIAGONAL MATRIX. SEE WRITEUP</td>
<td></td>
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<tr>
<td>5* FOR SMEVAL(F222A) FOR FURTHER DETAILS.</td>
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<tr>
<td>7* ROUTINE NAME: SMEVAL</td>
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<tr>
<td>8* ENTRY NAME: SMEVAL, STEVAL, S3DVAL</td>
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<tr>
<td>9* STORAGE: 732 (OCTAL) WORDS</td>
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<tr>
<td>10* TIMING: TIME FOR N = 40 IS .1 SEC.</td>
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<tr>
<td>11* ROUTINES CALLED: SMHHTR(F223B), DOTPRO(F124A), SQRT(B408A).</td>
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<tr>
<td>12* LABRT(N103A), LIBMSG(SYSTEM).</td>
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</tbody>
</table>

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**VOLUME 2 - 9/73**
F223B  A* B, L. BUZBEE  C-4
F223B  B*TRIDIAGONALIZE REAL SYMMETRIC MATRIX
F223B  C*F4  SR7600  CROS
F223B  D* SW 1  LS 3  TYPE 1
F223B  E*F4SOURCE CARDS  103  BCD  OBJECT CARDS  29  BIN
F223B  F**MATRIX*SYMMETRIC*TRIDIAGONAL*SHMHTR*STHHTR
F223B  G*ON DISK  F4  COMPAT  WU 05/12/72  DECK 5/12/72
F223B  1*FORM1 CALL SHMHTR(INA*T,KE,IA)
F223B  2* CALL STHHTR(INB*T,KE)
F223B  3*PURPOSE: TRANSFORM A FULL SYMMETRIC MATRIX INTO A
F223B  4* TRIDIAGONAL SYMMETRIC MATRIX.
F223B  5* SEE SHMHTR(F223A) FOR FURTHER DETAILS.
F223B  6*ROUTINE NAME: SHMHTR
F223B  7*ENTRY NAMES: SMHHTR, STHHTR
F223B  8*STORAGE: 565 (OCTAL) WORDS.
F223B  9*TIMING: TIME FOR N = 40 IS .1 SEC.
F223B 10*Routines Called: DOTPRO(F124B), LABRT(N103B), SQRT(B408B).

F224A  A* B, L. BUZBEE  C-4
F224A  B*EIGENVALUE-EIGENVECTOR ROUTINE FOR REAL SYMMETRIC MATRIX
F224A  C*F4  SR6600  SCP 3,1
F224A  D* SW 4  LS 3  TYPE 1
F224A  E*SOURCE CARDS  134  BCD  OBJECT CARDS  38  BIN
F224A  F**MATRIX*EIGENVALUE*EIGENVECTOR*SYMMETRIC*SMEVEV*STEVEV
F224A  G*CARDS  F4  COMPAT  WU 12/14/71REV 4  DECK 12/14/71REV 3
F224A  1*FORM1 CALL SMEVEV(NN,T*RS,VE,S,EPL*KE,M)
F224A  2* CALL STEVEV(NN,B*RS,VE,S,EPL*KE,M)
F224A  3* CALL S3DVEV(NN,T*RS,VE,S,EPL*KE,M)
F224A  4*PURPOSE: TO FIND THE EIGENVALUES AND EIGENVECTORS OF A REAL
F224A  5* SYMMETRIC MATRIX.
F224A  6*ROUTINE NAME: SMEVEV.
F224A  7*ENTRY NAMES: SMEVEV, STEVEV, S3DVEV
F224A  8*TIMING: N = 25, .36 SEC.
F224A  9*STORAGE: 757 OCTAL WORDS.
F224A 10*Routines Called: SMHHTR(F223A), PRODH(F225A), DOTPRO(F124A),
F224A 11* SQRT(B408A), LABRT(N103A).
F224B A* B. L. BUZBEE C-4 72
F224B B*EIGENVALUE-EIGENVECTOR ROUTINE FOR REAL SYMMETRIC MATRIX
F224B C*F 4 SR7600 CROS
F224B D* SW 1 LS 4 TYPE 1
F224B E*F 4 SOURCE CARDS 134 BCD OBJECT CARDS 40 BIN
F224B F**MATRIX*EIGENVALUE*EIGENVECTOR*SYMMETRIC*SMEVEV*STEVEV
F224B G*ON DISK F 4 COMPAT WU 05/12/72 DECK 05/12/72
F224B 1*FORM1 CALL SMEVEV(NN,TR,VS,SEP,KE,M)
F224B 2* CALL STEVEV(NN,BR,VS,ERL,KE,M)
F224B 3* CALL S3DVEV(NN,TR,VS,SEP,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(B4088), LABRT(N103B).

F225A A* B. L. BUZBEE C-4 69
F225A B*COMPUTE TRANSFORM WHICH TRIDIAGONALIZES A SYMMETRIC MATRIX
F225A C*F 4 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 F 4 COMPAT WU 09/20/71REV.1 DECK 09/20/71REV.1
F225A 1*FORM1 CALL PRODH(IN,A,KE,V)
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).

VOLUME 2 - 9/73
F2258 A* B, L, BUZBEE C-4
F2258 B*COMPUTE TRANSFORM WHICH TRIDIAGONALIZES A SYMMETRIC MATRIX
F2258 C*F4 SR7600 CROS
F2258 D* SW 1 LS 2 TYPE 1
F2258 E*F4 SOURCE CARDS 41 BCD OBJECT CARDS 17 BIN
F2258 F**PRODHH*TRANSFORM*TRIDIAGONAL*SYMMETRIC*MATRIX
F2258 G*ON DISK F4 COMPAT WU 05/12/72 DECK 05/12/72
F2258 1*FORM! CALL PRODHH(IN,A,T,K,E,V,IV)
F2258 2*PURPOSE: COMPUTES THE SIMILARITY TRANSFORMATION USED BY
F2258 3* SMHHTR(F223B) TO TRIDIAGONALIZE A SYMMETRIC MATRIX.
F2258 4*FOR MORE DETAILS SEE PRODHH(F225A) WRITEUP
F2258 5*ROUTINE NAME: PRODHH
F2258 6*ENTRY NAME: PRODHH
F2258 7*STORAGE: 306 OCTAL WORDS.
F2258 8*ROUTINES CALLED: DOTPRO(F124B), LABRT(N103B).

F226A A* B L BUZBEE C-4
F226A B*EIGENVALUE ROUTINE-COMPLEX HERMITIAN MATRIX
F226A C*F4 SR6600 SCP 3.1
F226A D* SW 1 LS 4 TYPE 1.1
F226A E*F4 SOURCE CARDS 150 BCD OBJECT CARDS 39 BIN
F226A F*EIGENVALUE*MATRIX*HERMITIAN
F226A G*CARDS F4 COMPAT WU 09/16/71 DECK 09/16/71
F226A 2* CALL HTEVAL(NN,B,R,A,EPL,K,E)
F226A 3* CALL H3DVAL(NN,T,R,A,EPL,K,KE,M)
F226A 4*PURPOSE: COMPUTE EIGENVALUES OF A COMPLEX HERMITIAN
F226A MATRIX. ARGUMENTS ARE IDENTICAL TO SMEVAL(F222A)
F226A 5* EXCEPT T,B,R, AND A MUST BE COMPLEX.
F226A 6* ROUTINE NAME: HMEVAL
F226A 7*ENTRY NAMES: HMEVAL, HTEVAL, H3DVAL.
F226A 8*STORAGE: 1002 OCTAL WORDS
F226A 9*ROUTINES CALLED: HMHHTR(F277A), SORT(B408A), CABS(A203A)
B. L. Buzbee

EIGENVALUE ROUTINE - COMPLEX HERMITIAN MATRIX

C=4

SR7600 CROS

SW 1 LS 4 TYPE 1.1

SOURCE CARDS 150 BCD OBJECT CARDS 41 BIN

EIGENVALUE MATRIX HERMITIAN

ON DISK F4 COMPAT WU 03/02/73 DECK 03/02/73

FORM I CALL HMEVAL (NN,T,R,A,EPL,KE,M)

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

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

PURPOSE: COMPUTE EIGENVALUES OF A COMPLEX HERMITIAN MATRIX

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

ROUTINE NAME: HMEVAL

ENTRY NAMES: HMEVAL, HTEVAL, H3DVAL

STORAGE: 1040 OCTAL WORDS

ROUTINES CALLED: HMMHTR(F227A), SQRT, CABS (ON THE SYSTEM).

TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX

C=4

SR6600 SCP 3.1

SW 1 LS 3 TYPE 1

SOURCE CARDS 118 BCD OBJECT CARDS 37 BIN

MATRIX HERMITIAN TRIDIAGONAL

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

FORM I CALL HMMHTR(IN,A,T,KE,IA)

CALL HTHHTR(IN,B,T,KE)

PURPOSE: TRANSFORM A COMPLEX HERMITIAN MATRIX INTO A TRIDIAOONAL MATRIX. ARGUMENTS ARE IDENTICAL TO SMHHTR, STHHTR (F223A) EXCEPT A, B, AND T MUST BE COMPLEX.

ROUTINE NAME: HMMHTR

ENTRY NAMES: HMMHTR, HTHHTR

STORAGE: 732 OCTAL WORDS

ROUTINES CALLED: COTPRO (F136A), LABRT (N103A)

VOLUME 2 - 9/73
F227B  A* B, L BUZBEE  C-4  73
F227B  B*TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX
F227B  C*F 4  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 HTHHTR(IN, B, T, KE)
F227B  3*PURPOSE: TRANSFORM A COMPLEX HERMITIAN MATRIX INTO A
F227B  4* TRIDIAGONAL MATRIX. ARGUMENTS ARE IDENTICAL TO
F227B  5* SMHHTR, STHHRTR(F227B) EXCEPT A, B, AND T MUST BE
F227B  6* COMPLEX.
F227B  7*ROUTINE NAME: HMMHTR
F227B  8*ENTRY NAMES: HMMHTR, HTHHTR
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*F 4  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, 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).

VOLUME 2 - 9/73
**F2-10**

**A. R. BuZBEE C-4**

**B. EIGENVALUE-EIGENVECTOR ROUTINE FOR HERMITIAN MATRIX**

**C.**

**SR7600 CROS**

**D. SW 1 LS 4 TYPE 1**

**E. SOURCE CARDS 163 BCD OBJECT CARDS 50 BIN**

**F. MATRIX*EIGENVALUE*EIGENVECTOR*HERMITIAN**

**G. ON DISK F4 COMPAT WU 04/12/72 DECK 04/12/72**

**H. CALL HMEVEV(NN,T,R,V,A,EPL,KE,M)**

**I. CALL HTEVEV(NN,B,R,V,A,EPL,KE,M)**

**J. CALL H3DVEV(NN,T,B,V,A,EPL,KE,M)**

**K. PURPOSE: FIND THE EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX. THE ARGUMENTS ARE IDENTICAL TO THOSE OF STEVEV(F224A), EXCEPT THAT T, B, R, V, AND A MUST BE COMPLEX. SEE STEVEV(F224A) WRITEUP FOR DETAILS.**

**L. ROUTINE NAME: HMEVEV**

**M. ENTRY NAMES: HMEVEV, HTEVEV, H3DVEV**

**N. STORAGE: 1234 OCTAL WORDS**

**O. ROUTINES CALLED: HMMHTR(F227A), PROHHH(F229B), COTPRO(F136A), DOTPRO(F124A), CABS(A203B), SORT(B408B).**

**F2-29 A. R. BuZBEE C-4**

**B. COMPUTE TRANSFORM TO TRIDIAGONALIZE HERMITIAN MATRIX**

**C.**

**SR6600 SCP 3.1**

**D. SW 1 LS 2 TYPE 1**

**E. SOURCE CARDS 49 BCD OBJECT CARDS 20 BIN**

**F. TRANSFORM*TRIDIAGONAL*HERMITIAN*MATRIX**

**G. CARDS F4 COMPAT WU 07/13/72 REV.1 DECK 09/16/71**

**H. CALL PROHHH(IN,A,T,KE,V,IV)**

**I. PURPOSE: COMPUTE THE SIMILARITY TRANSFORMATION USED BY HMMHTR(F227A) AND HTHHTR(F227A) TO TRIDIAGONALIZE A HERMITIAN MATRIX. THE ARGUMENTS ARE IDENTICAL TO THOSE OF PRODHM(F225A) EXCEPT THAT A, T, AND V MUST BE COMPLEX. SEE PRODHM(F225A) WRITEUP FOR DETAILS.**

**J. ROUTINE NAME: PROHHH**

**K. ENTRY NAME: PROHHH**

**L. STORAGE: 354 OCTAL WORDS.**

**M. ROUTINES CALLED: COTPRO(F136A), LABRT(N103A).**

**VOLUME 2 - 9/73**
F2298  A*       B L BUZBEE     C-4
F2298  B*COMPUTE TRANSFORM TO TRIDIAGONALIZE HERMITIAN MATRIX
F2298  C*F4     SR7600     CROS
F2298  D*       SW 1   LS 2   TYPE 1
F2298  E*F4 SOURCE CARDS 49 BCD OBJECT CARDS 20 BIN
F2298  F*TRANSFORM*TRIDIAGONAL*HERMITIAN*MATRIX
F2298  G* ON DISK F4 COMPAT WU 07/13/72REV.1 DECK 04/12/72
F2298  1*FORM1 CALL PROHHH(IN,A,T,KE,V,IV)
F2298  2*PURPOSE: COMPUTE THE SIMILARITY TRANSFORMATION USED BY
F2298  3*   HMHHTR(F227A) AND HTHHTR(F227A) TO TRIDIAGONALIZE A
F2298  4*   HERMITIAN MATRIX. THE ARGUMENTS ARE IDENTICAL TO
F2298  5*   THOSE OF PRODH(F225A) EXCEPT THAT A,T,AND V
F2298  6*   MUST BE COMPLEX. SEE PRODH(F225A) WRITEUP FOR DETAILS.
F2298  7*ROUTINE NAME: PROHHH
F2298  8*ENTRY NAME: PROHHH
F2298  9*STORAGE: 360 OCTAL WORDS.
F2298  10*ROUTINES CALLED: COTPRO(F136B), LABRT(N103B)

F230A  A*       B. L. BUZBEE   C-4
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
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(N*M,A,E,T,K)
F2AA   2*PURPOSE: COMPUTE THE SINGLE PRECISION EIGENVALUES OF A
F2AA   3*   REAL SYMMETRIC MATRIX WITH SINGLE PRECISION ELEMENTS.
F2AA   4*ROUTINE NAME: RSEVAL
F2AA   5*ENTRY NAME: RSEVAL
F2AA   6*TIMING: N=40; 2 SEC.
F2AA   7*STORAGE: 94 OCTAL WORDS.
F2AA   8*USES DTRVAL(F2AAJ) AND LABRT(N103A).
F2AB A* B, L. BUZBEE C-4 72
F2AB B*SYMMETRIC MATRIX EIGENVALUE EIGENVECTOR ROUTINE
F2AB C*F4 SR6600 SCP 3.1
F2AB D* SW 3 LS 1 TYPE 2
F2AB E*F4 SOURCE CARDS 15 BCD OBJECT CARDS 7 BIN
F2AB F**REAL*SYMMETRIC MATRIX*EIGENVALUE*EIGENVESOR ROUTINE
F2AB G*CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
F2AB 1*FORM: CALL RSEVEV(N,M,A*E,V,T,K)
F2AB 2*PURPOSE: COMPUTE THE SINGLE PRECISION EIGENVALUES AND
F2AB 3* EIGENVECTORS OF A REAL SYMMETRIC MATRIX.
F2AB 4*ROUTINE NAME: RSEVEV
F2AB 5*ENTRY NAME: RSEVEV
F2AB 6*TIMING: N=20*, 5 SEC.
F2AB 7*STORAGE: 49 OCTAL WORDS.
F2AB 8*USES: TRSEVV(F2AH).

F2AC A* B, L. BUZBEE C-4 72
F2AC B*EIGENVALUES OF A HERMITIAN MATRIX
F2AC C*F4 SR6600 SCP 3.1
F2AC D* SW 2 LS 1 TYPE 2
F2AC E*F4 SOURCE CARDS 18 BCD OBJECT CARDS 9 BIN
F2AC F**EIGENVALUES OF A*HERMITIAN MATRIX
F2AC G*CARDS F4 COMPAT WU 05/18/72 DECK 05/18/72
F2AC 1*FORM: CALL HEVAL(N,M,A*E,T,K)
F2AC 2*PURPOSE: FIND THE EIGENVALUES OF A NTH ORDER HERMITIAN
F2AC 3* MATRIX.
F2AC 4*ROUTINE NAME: HEVAL
F2AC 5*ENTRY NAME: HEVAL
F2AC 6*TIMING: N=30*, 5 SEC.
F2AC 7*STORAGE: 69 OCTAL WORDS.
F2AC 8*USES: LABRT(N1O3A) AND THEVAL(F2AK).

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

VOLUME 2 - 9/73
F2AE  A*  B. L. BUZBEE  C-4  72
F2AE  B*DOUBLE PRECISION REAL MATRIX EIGENVALUE ROUTINE
F2AE  C*F4  SR6600  SCP 3.1
F2AE  D*  SW 3  LS 1  TYPE 2
F2AE  E*F4 SOURCE CARDS  26 BCD OBJECT CARDS  12 BIN
F2AE  F**DOUBLE*PRECISION REAL*MATRIX*EIGENVALUE
F2AE  G*CARDS  F4 COMPAT WU 05/18/72  DECK 05/18/72
F2AE  HFORM1 CALL DREVAL(N,M,V,E,K)
F2AE  2*PURPOSE:  FIND THE DOUBLE PRECISION EIGENVALUES OF A
F2AE  3* REAL N BY N MATRIX WITH DOUBLE PRECISION ELEMENTS.
F2AE  4*ROUTINE NAME:  DREVAL
F2AE  5*ENTRY NAME:  DREVAL
F2AE  6*TIMING:  N=8,  2 SEC.
F2AE  7*STORAGE:  106 OCTAL WORDS.
F2AE  8*USES:  F209A AND LABRT(N103A).

F2AF  A*  B. L. BUZBEE  C-4  72
F2AF  B*DOUBLE PRECISION REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AF  C*F4  SR6600  SCP 3.1
F2AF  D*  SW 3  LS 1  TYPE 2
F2AF  E*F4 SOURCE CARDS  19 BCD OBJECT CARDS  8 BIN
F2AF  F**DOUBLE*PRECISION REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AF  G*CARDS  F4 COMPAT WU 05/18/72  DECK 05/18/72
F2AF  HFORM1 CALL DRSVAL(N,M,V,E,K)
F2AF  2*PURPOSE:  COMPUTE DOUBLE PRECISION EIGENVALUES OF A REAL
F2AF  3* SYMMETRIC MATRIX WITH DOUBLE PRECISION ELEMENTS.
F2AF  4*ROUTINE NAME:  DRSVAL
F2AF  5*ENTRY NAME:  DRSVAL
F2AF  6*TIMING:  N=30,  6 SEC.
F2AF  7*STORAGE:  58 OCTAL WORDS.
F2AF  8*USES:  DREVAL(F2A) AND LABRT(N103A).

F2AG  A*  B. L. BUZBEE  C-4  72
F2AG  B*REAL SYMMETRIC MATRIX EIGENVALUE ROUTINE
F2AG  C*F4  SR6600  SCP 3.1
F2AG  D*  SW 3  LS 1  TYPE 2
F2AG  E*F4 SOURCE CARDS  20 BCD OBJECT CARDS  9 BIN
F2AG  F**REAL*SYMMETRIC MATRIX*EIGENVALUE
F2AG  G*CARDS  F4 COMPAT WU 05/18/72  DECK 05/18/72
F2AG  HFORM1 CALL TREVAL(N,T,E,T,K)
F2AG  2*PURPOSE:  COMPUTE THE SINGLE PRECISION EIGENVALUES OF A
F2AG  3* SINGLE PRECISION, REAL SYMMETRIC MATRIX USING ONLY THE
F2AG  4* UPPER OR LOWER TRIANGLE OF THE MATRIX.
F2AG  5*ROUTINE NAME:  TREVAL
F2AG  6*ENTRY NAME:  TREVAL
F2AG  7*TIMING:  N=40,  2 SEC.
F2AG  8*STORAGE:  81 OCTAL WORDS.
F2AG  9*USES:  DREVAL(F2A) 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 H*FORM1 CALL TRSEVV(N*H*B*E*V*T*K)
F2AH I*PURPOSE: COMPUTE SINGLE PRECISION EIGENVALUES AND
F2AH J* EIGENVECTORS OF A SINGLE PRECISION REAL SYMMETRIC
F2AH K* MATRIX USING ONLY THE UPPER OR LOWER TRIANGLE OF THE
F2AH L* MATRIX.
F2AH M*ROUTINE NAME: TRSEVV
F2AH N*ENTRY NAME: TRSEVV
F2AH O*TIMING: N=20, 5 SEC.
F2AH P*STORAGE: 2081 OCTAL WORDS.
F2AH Q*USES: DSGRT(B410A) 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 H*FORM1 CALL DTRVAL(N*DTR*DE,T*K)
F2AJ I*PURPOSE: COMPUTE DOUBLE PRECISION EIGENVALUES OF A DOUBLE
F2AJ J* PRECISION, REAL SYMMETRIC MATRIX USING ONLY THE UPPER
F2AJ K* OR LOWER TRIANGLE OF THE MATRIX.
F2AJ L*ROUTINE NAME: DTRVAL
F2AJ M*ENTRY NAME: DTRVAL
F2AJ N*STORAGE: 1266 OCTAL WORDS.
F2AJ O*SELF CONTAINED.
B. L. BUZBEE

B*EIGENVALUES OF A HERMITIAN MATRIX
C*F4   SR6600  SCP 3.1
D*   SW 3  LS 7  TYPE 2
E*F4 SOURCE CARDS 332  BCD  OBJECT CARDS 141  BIN
F*EIGENVALUES OF A HERMITIAN MATRIX
G*CARDS  F4  COMPAT  WU 05/18/72  DECK 05/18/72
H*FORM:  CALL THEVAL(N,B,E,T,K)
I*PURPOSE:  FIND THE EIGENVALUES OF A HERMITIAN MATRIX USING
J*ONLY THE UPPER OR LOWER TRIANGLE OF THE MATRIX.
K*ROUTINE NAME:  THEVAL
L*ENTRY NAME:  THEVAL
M*TIMING:  N=200  2 SEC.
N*STORAGE:  3561 OCTAL WORDS.
O*USES:  DSQRT(B410A) AND LABRT(N103A).

B. L. BUZBEE

B*EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX
C*F4   SR6600  SCP 3.1
D*   SW 4  LS 10  TYPE 2
E*F4 SOURCE CARDS 498  BCD  OBJECT CARDS 231  BIN
F*EIGENVALUES AND EIGENVECTORS OF A HERMITIAN MATRIX
G*CARDS  F4  COMPAT  WU 05/18/72  DECK 05/18/72
H*FORM:  CALL THEVEV(N,M,B,E,V,T,K)
I*PURPOSE:  FIND THE EIGENVALUES AND ASSOCIATED EIGEN-
J*VECTORS OF A HERMITIAN MATRIX USING ONLY THE LOWER
K*TRIANGLE OF THE MATRIX.
L*ROUTINE NAME:  THEVEV
M*ENTRY NAME:  THEVEV
N*TIMING:  N=300  6 SEC.
O*STORAGE:  6033 OCTAL WORDS.
P*USES:  LABRT(N103A) AND DSQRT(B410A).
SIMULTANEOUS LINEAR EQUATIONS AND LINEAR LEAST SQUARES

REVIEWER: B. BUZBEE, C-4

A* B. L. BUZBEE C-4 R. M. FRANK 68
B*LINEAR SYSTEM SOLVER
C*F4 SR6600 SCP 3.1
D* SW 3 LS 2 TYPE 1
E*F4 SOURCE CARDS 76 BCD OBJECT CARDS 28 BIN
F**MATRIX EQUATION SOLVER DETERMINANT EVALUATION
G*ON DISK F4 COMPAT WU 07/13/73 REV. 3 DECK 06/14/71 REV 2
1*FORM1 CALL LSS(N,M,I,A,B,D,DET)
2*PURPOSE: TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
3*ROUTINE NAME: LSS
4*ENTRY NAME: LSS
5*STORAGE: 522 (OCTAL) WORDS
6*TIMING: 0.025 SEC. FOR N=M=10.
7*Routines called: DOTPRO(F124A), LABRT(N103A).

A* B. L. BUZBEE C-4 R. M. FRANK 72
B*LINEAR SYSTEM SOLVER
C*F4 SR7600 CROS
D* SW 3 LS 3 TYPE 1
E*F4 SOURCE CARDS 81 BCD OBJECT CARDS 29 BIN
F**MATRIX EQUATION SOLVER DETERMINANT EVALUATION
G*ON DISK F4 COMPAT WU 07/13/73 REV. 1 DECK 03/17/72
1*FORM1 CALL LSS(N,M,I,A,B,D,DET)
2*PURPOSE: TO SOLVE THE NON-SINGULAR MATRIX EQUATION AX=B.
3*ROUTINE NAME: LSS
4*ENTRY NAME: LSS
5*STORAGE: 534 OCTAL WORDS
6*Routines called: DOTPRO(F124B), LABRT(N103B), LIBMSG(SYSTEM)

VOLUME 2 - 9/73
F405A A* B.L.BUZBEE C-4 R.M.FRANK 67
F405A B*GENERAL LINEAR SYSTEM SOLVER
F405A C*F4 SR6600 SCP 3,1
F405A D* SW 5 LS 2
F405A E*SOURCE CARDS 86 BCD OBJECT DECK 31 BIN
F405A F*GENERAL LINEAR SYSTEM SOLVER
F405A G*ON DISK F4 COMPAT WU 02/07/69 REV 5 DECK 11/12/68 REV 1
F405A 1*CALL GLSS(M,N,K,L,NR,AA,IA,YA,II,BA,IB,XA,IX) SOLVES THE
F405A 2*LINEAR SYSTEM AX=Y WHERE A IS AN M BY N MATRIX, M GREATER
F405A 3*THAN, EQUAL TO, OR LESS THAN N, AND WHERE A MAY BE SINGULAR
F405A 4*OR NONSINGULAR IF M=N.
F405A 5*TIMING, M=10, N=8, 2 SEC.
F405A 6*STORAGE=602 OCTAL WORDS
F405A 7*USING LABRT(N103A) DOTPRO(F124A) VECUM(F133A)

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

F406A A* B.L.BUZBEE C-4 67
F406A D**DBLE PRECISION GENERAL LINEAR SYSTEM SOLVER
F406A B**MATHEMATICS F4 F4 SR6600 SCP 3,1
F406A C* SW 1 LS 2
F406A D*F4 SOURCE CARDS 95BCDF4 OBJECT CARDS 46BIN
F406A S**DBLE PRECISION GENERAL LINEAR SYSTEM SOLVER
F406A 10*CARDS F4 COMPAT WU 11/18/68 REV 1 DECK 11/18/68 REV 2
F406A 11*CALL DGLSS(M,N,K,L,NR,AA,IA,YA,II,BA,IB,XA,IX) IS THE DOUBLE
F406A 12*PRECISION VERSION OF F405A. USAGE IS IDENTICAL TO F405A
F406A 13*EXCEPT THAT ALL FLOATING POINT ARGUMENTS MUST BE DOUBLE
F406A 14*PRECISION.
F406A 15*STORAGE=570 WORDS.
F406A 16*USES LABRT(N103A) AND DSQRT(B410A).

VOLUME 2 - 9/73
II CALL LSSS(N,M,A,B,IC) SOLVES THE SYMMETRIC LINEAR SYSTEM AX=B, WHERE A IS SYMMETRIC AND ONLY A TRIANGLE OF IT IS INPUT.
II TIMING: .01 SEC FOR N=12.
II STORAGE=372(DECIMAL) WORDS.
II 16*USES LABRT(N103A).

II CALL CLSS(N,M,A,IA,B;IB)
II N - ORDER OF THE SYSTEM M - NUMBER OF COLUMNS IN B
II A - ORIGIN OF NXN MATRIX A B - ORIGIN OF NXM MATRIX B
II IA - FIRST DIMENSION OF A AS SPECIFIED IN CALLING PROGRAM.
II IB - FIRST DIMENSION OF B AS SPECIFIED IN CALLING PROGRAM.
II STORAGE= 362(DECIMAL) WORDS.
II 19*USES LABRT(N103A).
F408B  A*  IVAN CHERRY  C-4  B.L.BUZBEE  72
F408B  B*COMPLEX LINEAR SYSTEM SOLVER
F408B  C*F4  SR7600  CROS
F408B  D*  SW  3  LS  2  TYPE 1
F408B  E*F4  SOURCE CARDS  68  BCD  OBJECT CARDS  34  BIN
F408B  F**COMPLEX* EQUATION*SOLVER
F408B  G*ON DISK  F4  COMPAT WU 10/12/72  DECK 10/12/72
F408B  1*FORM1  CALL CLSS(N,M,A,IA,B,IB)
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).

F409A  A*  B. L. BUZBEE  C-4  69
F409A  B*LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION(LU)
F409A  C*F4  SR6600  SCP 3.1
F409A  D*  SW  4  LS  3  TYPE 1
F409A  E*SOURCE CARDS  95  BCD  OBJECT CARDS  33  BIN
F409A  F**LINEAR*SYSTEM SOLVER  AND*MATRIX*FACTORIZATION
F409A  G*CARDS  F4  COMPAT WU 09/23/70REV 2  DECK 09/23/70REV 2
F409A  1*USE: CALL MATFAC(N, M, IT, A, IA, Y, IY, R, DET)
F409A  2*PURPOSE: SOLVES LINEAR SYSTEM AX=Y BY MATRIX
F409A  3*FACTORIZATION. IF IT=0, INPUT MATRIX IS FACTORED.
F409A  4* IF IT .NE. 0, ROUTINE USES INPUT FACTORS.
F409A  5* SEE WRITEUP FOR DETAILS.
F409A  6*STORAGE: 610 (OCTAL) WORDS.
F409A  7*ROUTINES CALLED: DOTPRO(F124A), LABRT(N103A).

VOLUME 2 - 9/73
Volume 2 - 9/73

**F409B**

A* B.L.BUZZEE C-4 72
F409B B*LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION(LU)
F409B C*F4 SR7600 CROS
F409B D* SW 4 LS 3 TYPE 1
F409B E*F4 SOURCE CARDS 95 BCD OBJECT CARDS 33 BIN
F409B F**LINEAR SYSTEM SOLVER AND MATRIX FACTORIZATION
F409B G*ON DISK F4 COMPAT WU 08/09/72 DECK 08/09/72
F409B H*FORM I CALL MATFAC(N*M*IT*A*IY*Y*IY*R*DET)
F409B I*PURPOSE: SOLVES LINEAR SYSTEM AX=Y BY MATRIX
F409B J* FACTORIZATION, IF IT=0, INPUT MATRIX IS FACTORED.
F409B K* IF IT *NE 0, ROUTINE USES INPUT FACTORS.
F409B L*ROUTINE NAME: MATFAC
F409B M*ENTRY NAME: MATFAC
F409B N*STORAGE: 624 OCTAL WORDS.
F409B O*ROUTINES CALLED: DOTPRO(F124A), LABRT(N103B).

**F410A**

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

**F411A**

A* B.L.BUZZEE C-4 69
F411A B*BAND MATRIX FACTORIZATION AND LINEAR SYSTEM SOLVER
F411A C*F4 SR6600 SCP 3.1
F411A D* SW 4 LS 3 TYPE 1
F411A E*F4 SOURCE CARDS 105 BCD OBJECT CARDS 34 BIN
F411A F**MATRIX BAND BANMAT SYSTEM
F411A G*CARDS F4 COMPAT WU 04/06/72REV 2 DECK 12/15/70REV 1
F411A H*FORM I CALL BANMAT(N*L1*L2*NT*IN*A*IY*Y*IY*DE*1)
F411A I*PURPOSE: SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE
F411A J*THE MATRIX HAS BAND STRUCTURE AND ONLY THE BAND IS STORED.
F411A K* THE FIRST CALL TO THE ROUTINE FACTORS THE MATRIX INTO A
F411A L*PRODUCT OF TRIANGULAR MATRICES, AND SUBSEQUENT CALLS USE
F411A M* THESE FACTORS.
F411A N*TIMING: N=81; L1=L2=9, .118 SEC WITH NT=1, AND .032 SEC
F411A O*WITH NT .NE. 1.
F411A P*STORAGE: 666 (OCTAL) WORDS.
F411A Q*ROUTINES CALLED: DOTPRO(F124A), ADDVEC(F133A)
BAND MATRIX FACTORIZATION AND LINEAR SYSTEM SOLVER

CROSS

SOURCE CARDS 105 BCD OBJECT CARDS 34 BIN

MATRIX BAND BANMAT SYSTEM

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

FORM CALL BANMAT(N,L1,L2,NT,IM,A,IA,Y,Y,DE,T)

PURPOSE: SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE

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

FIRST CALL TO THE ROUTINE FACTORS THE MATRIX INTO A

PRODUCT OF TRIANGULAR MATRICES, AND SUBSEQUENT CALLS USE

 THESE FACTORS.

TIMING: N=81, L1=L2=9, .022 SEC WITH NT=1, AND .0636 SEC

WITH NT .NE. 1.

ROUTINE NAME: BANMAT

ENTRY NAME: BANMAT

STORAGE: 666 (OCTAL) WORDS

ROUTINES CALLED: DOTPRO(F124B), ADDVEC(F133B)

TRIDIAGONAL LINEAR SYSTEM SOLVER

SRC6600 SCP 3.1

SOURCE CARDS 135 BCD OBJECT CARDS 30 BIN

TRIDIAGONAL LINEAR SYSTEM MATRIX LSS

CARDS F4 COMPAT WU 07/29/70 REV.1 DECK 07/29/70 REV.1

USE CALL TLSS(N,AA,A,I,M,B,IB,UK,DE,NT)

PURPOSE: SOLVES A SYSTEM OF LINEAR ALGEBRAIC EQUATIONS WHERE

THE MATRIX IS TRIDIAGONAL 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.

STORAGE: 601 (OCTAL) WORDS

SELF CONTAINED

VOLUME 2 - 9/73
**TRIDIAGONAL LINEAR SYSTEM SOLVER**

**Purpose:** Solves a system of linear algebraic equations where the matrix is tridiagonal 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:**

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**SYMMETRIC CONSTANT TRIDIAGONAL LINEAR SYSTEM SOLVER**

**Purpose:** Solves a tridiagonal linear system with constant diagonals.

**Timing:** 0.001 sec for N=100

**Storage:** 57 (octal) words

**Self Contained:**

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**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:**
A* MOORIS KLEIN  C-6  B. L. BUZBEE  70
B*ECS GENERAL LINEAR SYSTEM SOLVER
C*F4  SR6600  SCP 3.1
D* SW 5  LS 3  TYPE 1
E*SOURCE CARDS  122 BCD  OBJECT CARDS  39  BIN
F**ECS GENERAL LINEAR SYSTEM SOLVER
G*CARDS  F4  COMPAT  WU 09/23/70  DECK 09/23/70
H*USE:  CALL ECSGLSS(IM,IN,IK,IL,WR,AR,IR,IY,B,IB,X,JX,EPS)
J**PURPOSE:  TO SOLVE IN THE LEAST SQUARES SENSE THE GENERAL
K*LINEAR SYSTEM AX=Y WHEN C AND Y ARE STORED COLUMN-WISE IN
L*ECS.
M*STORAGE:  717 (OCTAL) WORDS.  AT LEAST IM*IN*IK WORDS

A*  B L BUZBEE  C-4  70
B*COMPLEX LINEAR SYSTEM SOLVER
C*F4  SR6600  SCP 3.1
D* SW 1  LS 3  TYPE 1.1
E*SOURCE CARDS  96 BCD  OBJECT CARDS  39  BIN
F**COMPLEX LINEAR SYSTEM SOLVER
G*CARDS  F4  COMPAT  WU 11/03/70  DECK 11/03/70
H*USE:  CALL CATFAC(N,M,IT,A*,IA,Y,IY,R,DET)
J**PURPOSE:  TO SOLVE A COMPLEX LINEAR SYSTEM, AX=Y,
K*ARgUMENTS ARE IDENTICAL TO F409A EXCEPT ALL FLOATING
L*POINT ARGUMENTS A*,Y*,R, AND DET MUST BE COMPLEX.
M*ROUTINES CALLED:  DOTPRO(F124A), LABRT(N103A), SQRT(B408A),
N*VECPROO,VECSUM(F133A), ECRD,ECWR,EXIT(SYSTEM).
F4-9

F417A A* B.L. BUZBEE C-4 70
F417A B*SOLUTION OF COMPLEX LINEAR SYSTEMS BY ITERATIVE REFINEMENT
F417A C*SRC6600 SCP 3.1
F417A D* SW 1 LS 2 TYPE 1
F417A E*F4 SOURCE CARDS 46 BCD OBJECT CARDS 23 BIN
F417A F**COMPLEX LINEAR SYSTEMS*ITERATIVE*REFINEMENT
F417A G*CARDS F4 COMPAT WU 11/04/70 DECK 11/04/70
F417A 2*WHERE ALL ARGUMENTS ARE IDENTICAL TO F410A EXCEPT FLOATING
F417A 3*POINT ARGUMENTS A,B,X,Y,R,T, AND D MUST BE COMPLEX.
F417A 4*SEE F410A FOR FURTHER INFORMATION.
F417A 5*STORAGE: 377 OCTAL WORDS.
F417A 6*Routines Called: UNPAK(A101A), CABS(A203A), DOTPRO(F124A),
F417A 7*CDOTPRO,COTPRO(F136A), CATFAC(F416A), LABRT(N103A).

F417B A* B.L. BUZBEE C-4 73
F417B B*SOLUTION OF COMPLEX LINEAR SYSTEM BY ITERATIVE REFINEMENT
F417B C*SRC7600 CROS
F417B D* SW 1 LS 2 TYPE 1
F417B E*F4 SOURCE CARDS 46 BCD OBJECT CARDS 23 BIN
F417B F**COMPLEX LINEAR SYSTEMS*ITERATIVE*REFINEMENT
F417B G*ON DISK F4 COMPAT WU 03/02/73 DECK 03/02/73
F417B 2*PURPOSE: ALL ARGUMENTS ARE IDENTICAL TO LSSIT(F410B)
F417B 3* EXCEPT FLOATING POINT ARGUMENTS A,B,X,Y,R,T, AND D MUST
F417B 4* BE COMPLEX.
F417B 5*Routine Name: CLSIT
F417B 6*ENTRY NAME: CLSIT
F417B 8*Storage: 406 octal words.
F417B 9*Routines Called: DOTPRO(F124B), CDOTPRO,COTPRO(F136B),
F417B 10* CATFAC(F416B), UNPAK,CABS,LABRT(ALL ON THE SYSTEM).

F418A A* B.L. BUZBEE C-4 71
F418A B*LU DECOMPOSITION OF DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418A C*COMPASS SR6600 SCP 3.1
F418A D* SW 5 LS 3 TYPE 1
F418A E*SOURCE CARDS 115 BCD OBJECT CARDS 5 BIN
F418A F**LU DECOMPOSITION*DIAGONALLY DOMINANT TRIDIAGONAL MATRIX
F418A G*CARDS F4 COMPAT WU 08/29/72REV 1 DECK 08/29/72REV
F418A 1*FORM: CALL FACTTD(N,B,L,B,E,P,NE)
F418A 2*PURPOSE: DECOMPOSE A DIAGONALLY DOMINANT TRIDIAGONAL
F418A 3* MATRIX A INTO A PRODUCT LU,
F418A 4*Routine Name: FACTTD
F418A 5*ENTRY Names: FACTTD
F418A 6*Storage: 34 octal words
F418A 7*Routines Called: SELF CONTAINED

VOLUME 2 - 9/73
F418B  A*  B L BUZBEE      C-4  B L BUZBEE  72
F418B  B*LU DECOMPOSITION OF DIAGONALLY DOMINANT TRIDIAGONAL MATRIX  
F418B  C*COMPASS           SR7600  CROS  
F418B  D*                  SW 5     LS 3   TYPE 1  
F418B  E*SOURCE CARDS      115 BCD  OBJECT CARDS  5  BIN  
F418B  F**LU DECOMPOSITION*DIAGONALLY DOMINANT TRIDIAGONAL MATRIX  
F418B  G*ON DISK          F4 COMPAT WU 08/29/72REV 1 DECK 08/29/72REV 1  
F418B  1*FORM: CALL FACTTD(NB, LB, EP, NE)  
F418B  2*PURPOSE: DECOMPOSE A DIAGONALLY DOMINANT TRIDIAGONAL  
F418B  3* MATRIX A INTO A PRODUCT LU.  
F418B  4*Routine NAME: FACTTD  
F418B  5*ENTRY NAMES: FACTTD  
F418B  6*STORAGE: 34 OCTAL WORDS  
F418B  7*Routines CALLED: SELF CONTAINED  

F419A  A*  B L BUZBEE      C-4  B L BUZBEE  72  
F419A  B*SOLVE DIAGONALLY DOMINANT TRIDIAGONAL LINEAR SYSTEM  
F419A  C*COMPASS           SR6600  SCP 3,1  
F419A  D*                  SW 3     LS 4   TYPE 1  
F419A  E*SOURCE CARDS      193 BCD  OBJECT CARDS  7  BIN  
F419A  F**DIAGONALLY DOMINANT*TRIDIAGONAL LINEAR SYSTEM  
F419A  G*CARDS            F4 COMPAT WU 08/29/72 DECK 08/29/72  
F419A  1*FORM: CALL SOLTD(NB, LB, Y, LY, SN)  
F419A  2*CALL SOLTD(NB, LB, Y, LY, K, M, SN)  
F419A  3*PURPOSE: SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY  
F419A  4* DOMINANT MATRIX, USING THE DECOMPOSITION FROM  
F419A  5* FACTTD(F418A)  
F419A  6*Routine NAME: SOLTD  
F419A  7*ENTRY NAMES: SOLTD, SOLTD1  
F419A  8*STORAGE: 64 OCTAL WORDS  
F419A  9*Routines CALLED: FACTTD(F418A)  

VOLUME 2 - 9/73
A* B L BUZBEE C-4 B L BUZBEE 72
B419B 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*FORM1 CALL SOLTD1(N,B,LB,Y,LY,SN)
F419B 2* CALL SOLTDM(N,B,LB,Y,LY,KY,SN)
F419B 3*PURPOSE: SOLVE A TRIDIAGONAL LINEAR SYSTEM WITH DIAGONALLY
F419B 4* DOMINANT MATRIX, USING THE DECOMPOSITION FROM
F419B 5* FACTTD(F418B).
F419B 6*ROUTINE NAME: SOLTDM
F419B 7*ENTRY NAMES: SOLTDM, SOLTD1
F419B 8*STORAGE: 64 OCTAL WORDS
F419B 9*TIMING: .1 MS FOR N=100 AND M=1
F419B 10*ROUTINES CALLED: FACTTD(F418B)

VOLUME 2 - 9/73
A* B. L. BUZBEE C-4 B. L. BUZBEE 73

B*LU DECOMPOSITION OF PERIODIC-TRIDIAGONAL MATRIX

C*F-4 SR7600 CROS

D* SW 5 LS 2 TYPE 1.1

E* SOURCE 56 CARD OBJECT 12 CARD

F*LU DECOMPOSITION PERIODIC TRIDIAGONAL MATRIX MATRIX

G*DISK F4 COMPAT WU 04/30/73 DECK 04/30/73

1*FORM: CALL DECPID (N, A, B, C, EP, NE)

2*PURPOSE: COMPUTE LU DECOMPOSITION OF A DIAGONALLY

3* DOMINANT PERIODIC-TRIDIAGONAL MATRIX

4*TIMING: N = 25, .11 MILLISEC,

5* N = 50, .21 MILLISEC.

6*ROUTE NAME: DECPID

7*ENTRY NAMES: DECPID

8*STORAGE: 207 OCTAL WORDS

9*ROUTINES CALLED: SELF CONTAINED

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

B*SOLUTION OF PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS

C*F-4 SR6600 SCP 3.1

D* SW 2 LS 2 TYPE 1.1

E* SOURCE 62 CARDS OBJECT 13 CARDS

F**PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS

G*CARDS F4 COMPAT WU 04/30/73 DECK 04/30/73

1*FORM: CALL SOLPFD (N, M, Y, LR, LC, XN)

2*PURPOSE: SOLVE A PERIODIC-TRIDIAGONAL SYSTEM OF

3* EQUATIONS.

4*ROUTE NAME: SOLPFD

5*ENTRY NAMES: SOLPFD

6*STORAGE: 232 OCTAL WORDS

7*ROUTINES CALLED: SELF CONTAINED

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

B*SOLUTION OF PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS

C*F-4 SR7600 CROS

D* SW 2 LS 2 TYPE 1.1

E* SOURCE 62 CARDS OBJECT 13 CARDS

F**PERIODIC-TRIDIAGONAL SYSTEM OF EQUATIONS

G*DISK F4 COMPAT WU 04/30/73 DECK 04/30/73

1*FORM: CALL SOLPFD (N, M, Y, LR, LC, XN)

2*PURPOSE: SOLVE A PERIODIC-TRIDIAGONAL SYSTEM OF

3* EQUATIONS.

4*TIMING: N = 25, M = 2, 29 MILLISEC

5* N = 50, M = 2, 58 MILLISEC

6*ROUTE NAME: SOLPFD

7*ENTRY NAMES: SOLPFD

8*STORAGE: 236 OCTAL WORDS

9*ROUTINES CALLED: SELF CONTAINED

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 1*FORM1 CALL RFFT(A,N)
F501A 2*PURPOSEI PERFORM THE FAST FOURIER TRANSFORM OF
F501A 3* REAL-VALUED DATA.
F501A 4*ROUTINE NAMEI RFFT
F501A 5*ENTRY NAMEI RFFT
F501A 6*STORAGEI 64 (OCTAL) WORDS
F501A 7*TIMINGI 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 CALLEDI 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*PURPOSEI PERFORM THE FAST FOURIER TRANSFORM OF
F501B 3* REAL-VALUED DATA.
F501B 4*ROUTINE NAMEI RFFT
F501B 5*ENTRY NAMEI RFFT
F501B 6*STORAGEI 64 OCTAL WORDS
F501B 7*TIMINGI 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 CALLEDI FFT2(F502B), SIN(B106B), COS(B106B).
F502A A* B.R.HUNT C-5
F502A B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
F502A C*CMPC*CMPSR6600SCP3.1
F502A D*SW3LS5TYPE1
F502A E*CMPSOURCE CARDS160BCDOBJECT CARDS8BIN
F502A F**FAST*FOURIER*TRANSFORM*COMPLEX
F502A G*CARDSF4COMPATWU09/13/72DECK09/13/72
F502A 1*FORM: CALL FFT2(A,B,N,INC)
F502A 2*PURPOSE: PERFORM THE FAST FOURIER TRANSFORM OF
F502A 3* COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
F502A 4*ROUTINE NAME: FFT2
F502A 5*ENTRY NAME: FFT2
F502A 6*TIMING: ABOUT 4.7E-6*N*LOG2(N) SECONDS FOR CDC 6600.
F502A 7* WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
F502A 8* CALL STATEMENT.
F502A 9*STORAGE: 73 OCTAL WORDS.
F502A 10*SELF CONTAINED.

F502B A* B.R.HUNT C-5
F502B B*FFT2 - FAST FOURIER TRANSFORM OF COMPLEX DATA
F502B C*CMPSR7600CROS
F502B D*SW3LS5TYPE1
F502B E*CMPSOURCE CARDS160BCDOBJECT CARDS8BIN
F502B F**FAST*FOURIER*TRANSFORM*COMPLEX
F502B G*ON DISKF4COMPATWU09/13/72DECK09/13/72
F502B 1*FORM: CALL FFT2(A,B,N,INC)
F502B 2*PURPOSE: PERFORM THE FAST FOURIER TRANSFORM OF
F502B 3* COMPLEX-VALUED DATA WITH A RADIX-2 ALGORITHM.
F502B 4*ROUTINE NAME: FFT2
F502B 5*ENTRY NAME: FFT2
F502B 6*TIMING: ABOUT 8.1E-7*N*LOG2(N) SECONDS FOR CDC 7600.
F502B 7* WHERE N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE
F502B 8* CALL STATEMENT.
F502B 9*STORAGE: 73 OCTAL WORDS.
F502B 10*SELF CONTAINED.

VOLUME 2 - 9/73
F5-3

A* B* R* HUNT C-5 72
B*RFTI - INVERSE FAST FOURIER TRANSFORM OF REAL DATA
C* CMP SR6600 SCP 3.1
D* SW 2 LS 4 TYPE 1
E* CMP SOURCE CARDS 147 BCD OBJECT CARDS 8 BIN
F** INVERSE FAST FOURIER TRANSFORM REAL
G* CARDS F4 COMPAT WU 09/13/72 DECK 09/13/72
1* FORM1 CALL RFTI(A*,N)
2* PURPOSE: PERFORM THE INVERSE FAST FOURIER TRANSFORM
3* FOR REAL-VALUED DATA.
4* ROUTINE NAME: RFTI
5* ENTRY NAME: RFTI
6* TIMING: ABOUT 2.9E-6*N*LOG2(N) SECONDS FOR CDC 6600, WHERE
7* N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE CALL
8* STATEMENT.
9* STORAGE: 74 OCTAL WORDS
10* EXTERNALS: FFT2(F502A), SIN(B106B), COS(B106B).

F5-3

A* B* R* HUNT C-5 72
B*RFTI - INVERSE FAST FOURIER TRANSFORM OF REAL DATA
C* CMP SR7600 CROS
D* SW 2 LS 5 TYPE 1
E* CMP SOURCE CARDS 147 BCD OBJECT CARDS 8 BIN
F** INVERSE FAST FOURIER TRANSFORM REAL
G* ON DISK F4 COMPAT WU 09/13/72 DECK 09/13/72
1* FORM1 CALL RFTI(A*,N)
2* PURPOSE: PERFORM THE INVERSE FAST FOURIER TRANSFORM
3* FOR REAL-VALUED DATA.
4* ROUTINE NAME: RFTI
5* ENTRY NAME: RFTI
6* TIMING: ABOUT 5.4E-7*N*LOG2(N) SECONDS FOR CDC 7600, WHERE
7* N IS AN EXACT POWER OF 2 AND IS THE SAME N IN THE CALL
8* STATEMENT.
9* STORAGE: 74 OCTAL WORDS
10* EXTERNALS: FFT2(F502B), SIN(B106B), COS(B106B).

VOLUME 2 - 9/73
F5-4

F5AA A* B. HUNT C-5 72
F5AA B*FFT FAST FOURIER TRANSFORM FOR COMPLEX 3 DIMENSIONAL DATA.
F5AA C*F4 SR6600 SCP 3.1
F5AA D* SW 4 LS 7 TYPE 2
F5AA E*F4 SOURCE CARDS 319 BCD OBJECT CARDS 60 BIN
F5AA F**FAST*FOURIER*TRANSFORM*COMPLEX*3 DIMENSIONAL
F5AA G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
F5AA H*FORM1 CALL FFT(A,M,INV,S,IFSET,IFERR)
F5AA I*PURPOSE: COMPUTE THE FOURIER TRANSFORM OF COMPLEX
F5AA J* THREE-DIMENSIONAL DATA.
F5AA K*NOTE: C DIVISION RECOMMENDS THE USE OF FFT2(F502A)
F5AA L* IN PLACE OF THIS ROUTINE.
F5AA M*ROUTINE NAME: FFT
F5AA N*ENTRY NAME: FFT
F5AA O*STORAGE: 1541 OCTAL WORDS
F5AA P*TIMING: APPROXIMATELY 2.3*10**5*N*LOG2(N) SECONDS, WHERE
F5AA Q* N REPRESENTS THE TOTAL NUMBER OF COMPLEX ELEMENTS IN A.
F5AA R*ROUTINES USED: SQRT(B408A), SIN(B106A), COS(B106A).

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F5AB A* B.R. HUNT C-5 72
F5AB B*RFSN FAST INVERSE FOURIER TRANSFORM
F5AB C*F4 SR6600 SCP 3.1
F5AB D* SW 3 LS 2 TYPE 2
F5AB E*F4 SOURCE CARDS 65 BCD OBJECT CARDS 18 BIN
F5AB F**FAST*INVERSE*FOURIER*TRANSFORM
F5AB G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
F5AB H*FORM1 CALL RFSN(A,M,INV,S,IFERR)
F5AB I*PURPOSE: COMPUTE THE REAL INVERSE FOURIER TRANSFORM
F5AB J*NOTE: C DIVISION RECOMMENDS USE OF RFTI(F503A)
F5AB K* IN PLACE OF THIS ROUTINE.
F5AB L*ROUTINE NAME: RFSN
F5AB M*ENTRY NAME: RFSN
F5AB N*STORAGE: 347 OCTAL WORDS
F5AB O*TIMING: 1.2*10**5*N*LOG2(N) SECONDS,
F5AB P*TIMING: 1.2*10**5*N*LOG2(N) SECONDS,
F5AB Q*ROUTINES CALLED: FFT(F5AA), SIN(B106A), COS(B106A).
DESCRIPTIVE STATISTICS

REVIEWER: R. LOHRDING, C-5

A* B HUNT C-5
B* MODERN POWER SPECTRAL ESTIMATION
C* F4 SR6600 SCP 3-1
D* SW 4 LS 5 TYPE 1
E* SOURCE CARDS 200 BCD OBJECT CARDS 52 BIN
F** MODERN POWER SPECTRAL ESTIMATION
G101A 1G* CARDS F4 COMPAT WU 07/13/72REV. 1 DECK 08/12/68
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).
DISTRIBUTION FUNCTIONS AND THEIR INVERSE

REVIEWER: R. LOHRDING, C-5

A* LARA BAKER ENG-DO KEN LYONS 69
B*FISHE 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 F*FISHER F*TEST
G*CARDs F*COMPAT WU 08/01/69 DECK 08/01/69
H*USAGE: P*FISHE (NUMDEG, IDENDG, 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 1* FORM1 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 1* FORM1 CALL SPCTRL(X, ACX, PSX, T, NX, NM, NF, DELTA, TITLE,
G601B 2* IA, IWIN, IDF, IP)
G601B 3* PURPOSE: COMPUTE THE AUTOCOVARIANCE FUNCTION AND POWER
G601B 4* SPECTRUM OF A TIME SERIES.
G601B 5* ROUTINE NAME: SPCTRL
G601B 6* ENTRY NAME: SPCTRL
G601B 7* STORAGE: 501 (OCTAL) WORDS PLUS NX*NM*NF*MAX(NM, NF) WORDS
G601B 8* RESERVED IN THE CALLING PROGRAM FOR ARRAYS
G601B 9* X, ACX, PSX, AND T,
G601B 10* ROUTINES CALLED: ACFCN(G602B), WINDOW(G603B),
G601B 11* PWRSPCT(G604B), PLOJB(J562B).
G602A
A* B.R.HUNT C-5 B.R.HUNT 72
G602A B= AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602A C=F4 SR6600 SCP 3.1
G602A D* SW 3 LS 1 TYPE 1
G602A E= SOURCE CARDS 32 BCD OBJECT CARDS 12 BIN
G602A F** AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602A G*CARDS F4 COMPAT WU 10/04/72 DECK 10/04/72
G602A 1*FORMI CALL ACFCN(X,ACX,N,M,IOPT,XM,XVAR)
G602A 2* PURPOSE: COMPUTE THE AUTOCOVARIANCE FUNCTION OF A
G602A 3* TIME SERIES.
G602A 4* ROUTINE NAME: ACFCN
G602A 5* ENTRY NAME: ACFCN
G602A 6* STORAGE: 202 (OCTAL) WORDS PLUS N*M WORDS RESERVED
G602A 7* IN THE CALLING PROGRAM FOR ARRAYS X AND ACX.
G602A 8* ROUTINES CALLED: SELF CONTAINED.

G602B
A* B.R.HUNT C-5 B.R.HUNT 72
G602B B= AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602B C=F4 SR6600 CROS
G602B D* SW 3 LS 1 TYPE 1
G602B E= SOURCE CARDS 32 BCD OBJECT CARDS 12 BIN
G602B F** AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G602B G* ON DISK F4 COMPAT WU 10/04/72 DECK 10/04/72
G602B 1* FORMI CALL ACFCN(X,ACX,N,M,IOPT,XM,XVAR)
G602B 2* PURPOSE: COMPUTE THE AUTOCOVARIANCE FUNCTION OF A
G602B 3* TIME SERIES.
G602B 4* ROUTINE NAME: ACFCN
G602B 5* ENTRY NAME: ACFCN
G602B 6* STORAGE: 206 (OCTAL) WORDS PLUS N*M WORDS RESERVED
G602B 7* IN THE CALLING PROGRAM FOR ARRAYS X AND ACX.
G602B 8* ROUTINES CALLED: SELF CONTAINED.

G603A
A* B.R.HUNT C-5 B.R.HUNT 72
G603A B= LAG-WINDOW GENERATOR
G603A C=F4 SR6600 SCP 3.1
G603A D* F4 SW 2 LS 2 TYPE 1
G603A E= SOURCE CARDS 39 BCD OBJECT CARDS 18 BIN
G603A F** LAG-WINDOW GENERATOR
G603A G* CARDS F4 COMPAT WU 10/04/72 DECK 10/04/72
G603A 1* FORMI CALL WINDOW(ACX,N,IOPT,M,IDF)
G603A 2* PURPOSE: MODIFY A RAW AUTOCOVARIANCE/AUTOCORRELATION
G603A 3* FUNCTION BY MULTIPLYING IT BY A SPECIFIED
G603A 4* LAG-WINDOW,
G603A 5* ROUTINE NAME: WINDOW
G603A 6* ENTRY NAME: WINDOW
G603A 7* STORAGE: 317 (OCTAL) WORDS PLUS M WORDS RESERVED IN THE
G603A 8* CALLING PROGRAM FOR ARRAY ACX.
G603A 9* ROUTINES CALLED: COS(8106A)
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<tr>
<th>G603B</th>
<th>A*</th>
<th>B.R.HUNT</th>
<th>C-5</th>
<th>B.R.HUNT</th>
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<td>B*LAG-WINDOW GENERATOR</td>
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<td>G603B</td>
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<td>E*SOURCE CARDS 39</td>
<td>BCD</td>
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<td>F**LAG-WINDOW GENERATOR</td>
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<tr>
<td>G603B</td>
<td>G*ON DISK</td>
<td>F4</td>
<td>COMPAT</td>
<td>WU 10/04/72</td>
<td>DECK 10/04/72</td>
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<td>2*PURPOSE: MODIFY A RAW AUTOCOVARIANCE/AUTOCORRELATION</td>
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<td>G603B</td>
<td>3* FUNCTION BY MULTIPLYING IT BY A SPECIFIED</td>
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<td>G603B</td>
<td>4* LAG-WINDOW.</td>
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<td>5*ROUTINE NAME: WINDOW</td>
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<td>6*ENTRY NAME: WINDOW</td>
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<td>8* CALLING PROGRAM FOR ARRAY ACX.</td>
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<td>G603B</td>
<td>9*ROUTINES CALLED: COS(B106B)</td>
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<tr>
<td>G604A</td>
<td>G*CARDS</td>
<td>F4</td>
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<td>DECK 10/04/72</td>
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<td>G604A</td>
<td>1*FORM1 CALL PWRSPCT(ACX,M,PSX,NF,DELTA)</td>
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<td>2*PURPOSE: COMPUTE THE POWER SPECTRUM OF A TIME SERIES</td>
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<td>3* FROM AN AUTOCOVARIANCE/AUTOCORRELATION FUNCTION</td>
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<td>4* OF THE SERIES.</td>
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<td>5*ROUTINE NAME: PWRSPCT</td>
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<td>7*STORAGE: 73 (OCTAL) WORDS PLUS M+NF WORDS RESERVED</td>
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<td>8* IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.</td>
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<td>9*ROUTINES CALLED: COS(B106A)</td>
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G64B  A*  B.R. HUNT  C-5  B.R. HUNT  72
G64B  B*POWER SPECTRUM COMPUTATION
G64B  C*F4  SR7600  CROS
G64B  D*  SW 2  LS 1  TYPE 1
G64B  E*SOURCE CARDS  10  BCD  OBJECT CARDS  7  BIN
G64B  F**POWER SPECTRUM COMPUTATION
G64B  G*ON DISK  F4  COMPAT  WU  10/04/72  DECK 10/04/72
G64B  H*FORM1  CALL PWRSPCT(ACX,M,PSX,NF,DELTA)
G64B  I*PURPOSE: COMPUTE THE POWER SPECTRUM OF A TIME SERIES
G64B  J*  FROM AN AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G64B  K*  OF THE SERIES,
G64B  L*ROUTINE NAME: PWRSPCT
G64B  M*ENTRY NAME: PWRSPCT
G64B  N*STORAGE: 76 (OCTAL) WORDS PLUS M*NF WORDS RESERVED
G64B  O*IN THE CALLING PROGRAM FOR ARRAYS ACX AND PSX.
G64B  P*ROUTINES CALLED: COS(B106B)

G6AA  A*  E. K. HODSON  J-14  71
G6AA  B*AIDS - AUTO NUMERICAL FILTERING WITH CONVERGENCE TESTS
G6AA  C*F4  SR6600  SCP 3.1
G6AA  D*  SW 51  LS 9  TYPE 2
G6AA  E*F4  SOURCE CARDS  448  BCD  OBJECT CARDS  99  BIN
G6AA  F**AIDS-AUTO-NUMERICAL-FILTERING
G6AA  G*CARDS  F4  COMPAT  WU  10/04/71  DECK 10/04/71
G6AA  H*FORM1  CALL AIDS(Y,YS,N,FRE,FRAT,NPAS,IHSF,R1,R2,DT,IPRI)
G6AA  I*PURPOSE: SMOOTH RANDOM NOISE OUT OF SET OF POINTS.
G6AA  J*ROUTINE NAME: AIDS
G6AA  K*ENTRY NAME: AIDS
G6AA  L*STORAGE: 2631 OCTAL WORDS
G6AA  M*ROUTINES CALLED: SQRT(B409A),ALOG(B305A),EXP(B306A)
G801A  A*  R.M.FRANK  C-4  R.LOHRSING  72
G801A  B*RANDOM NUMBER GENERATOR
G801A  C*SR6600  SCP 3.1
G801A  D* SW 2  LS 1  TYPE 1
G801A  E*CMP SOURCE CARDS  41  BCD  OBJECT CARDS  5  BIN
G801A  F**RANDOM*NUMBER*GENERATOR
G801A  G*ON DISK  F4  COMPAT  WU 08/29/72  DECK 08/29/72
G801A  1*FORM  Y = RANDOM(DUMMY)
G801A  2* CALL RANDST(R)
G801A  3* CALL RANDSV(R)
G801A  4* CALL RANVECT(X,N)
G801A  5*PURPOSE: GENERATES A RANDOM SEQUENCE OF FLOATING POINT
G801A  6* NUMBERS ON THE OPEN INTERVAL (0,1). RANDOM PRODUCES
G801A  7* A SINGLE RANDOM NUMBER. RANVECT RETURNS N RANDOM
G801A  8* NUMBERS INTO X ARRAY. PROVISION IS MADE FOR SAVING THE
G801A  9* GENERATING NUMBER AND FOR RESTARTING.
G801A  10*ROUTINE NAME: RANDOM
G801A  11*ENTRY NAMES: RANDOM,RANDST,RANDSV,RANVECT
G801A  12*STORAGE:  23 OCTAL WORDS
G801A  13*SELF CONTAINED.

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

3. IF X.EQ.0, THE NEXT NUMBER IN THE SEQUENCE IS RETURNED.

4. IF X.LT.0, THE LAST PREVIOUSLY GENERATED RANDOM NUMBER (OR THE SEED IF NO RANDOM NUMBER HAS BEEN GENERATED) IS RETURNED.

5. IF X.GT.0, X IS STORED (WITH EXPONENT 1717 (OCTAL)) TO BE USED AS THE SEED OF A NEW SEQUENCE. NOTE X.GT.0 OPTION DIFFERS FROM THAT IN APPENDIX C OF FORTRAN REF.

6. ROUTINE NAME: RANF

7. ENTRY NAME: RANF

8. STORAGE: 14 OCTAL WORDS.

9. SELF CONTAINED.
CRITICAL PATH PROGRAMS

REVIEWER: J. NEERGAARD, C-7

(THESE CATEGORY WILL NOT BE USED FOR FUTURE PROGRAMS)

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

REVIEWER: J. MOORE, C-2

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

VOLUME 2 - 9/73
INPUT/OUTPUT WITH CONVERSION OR INTERPRETATION
**REVIEWER: R.M. FRANK, C-4**

**J1-1**

<table>
<thead>
<tr>
<th>J1AA</th>
<th>A*</th>
<th>P. SEEGER</th>
<th>P-11</th>
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</table>
**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 02/10/73 REV 1 DECK 02/10/73 REV 1** |
**J1AA** | **H** | **FORM 1 CALL ADV COLOR CONVRT DGA DLCH DLCV DLGLG DLGLN DLNLG** |
**J1AA** | **I** | **DLNLN DRV EMPTY EXH EXL EXPIM FRAME GXA GYA LINCNT NORIM** |
**J1AA** | **J** | **PLOT PLT SBLIN SLOG SETPLT SLLIN SLOG SRLIN SRLOG STB** |
**J1AA** | **K** | **STLIN STLOG SWEEP TCP TCR TSP TSPV WLCH WLCV ZETABAS** |
**J1AA** | **L** | **PURPOSE: A VERSION OF BASIC, GENERAL, AND LARGE-CHARACTER** |
**J1AA** | **M** | **PLOT ROUTINES (SEE J506A) WHICH CALLS ZETA PLOTTER ROUTINES** |
**J1AA** | **N** | **INSTEAD OF GENERATING 4020 COMMANDS, INCLUSION WITH ANY** |
**J1AA** | **O** | **FILM PLOT PRODUCING PROGRAM CAUSES ZETA PLOTTER OUTPUT WITH** |
**J1AA** | **P** | **NO CHANGES IN PROGRAM. SEE WRITEUP FOR RESTRICTIONS** |
**J1AA** | **Q** | **STORAGE: 2563 (OCTAL) WORDS (10611 WITH W8ZETA)** |
**J1AA** | **R** | **EXTERNALS: CALLOG CJEG ZETAF (COMMON) ENDFIL JOBNAME OUTPTC** |
**J1AA** | **S** | **SYSTEM AXS LINE BLKDATA BLLOT OUTBUF PLT ZSYMBOL ZPLOTS** |
**J1AA** | **T** | **WHERE (PERMFILE W8ZETA, OR PERMFILE ZETABIN)** |

**VOLUME 2 - 9/73**
FORMATTED I/O

REVIEWER: J. MOORE, C-2

A* BARTBARA 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 0 BCD OBJECT CARDS 0 BIN
F**CHANGE FORTRAN P SCALE FACTORS ON OUTPUT FORMATS
G*ON DISK F4 COMPAT WU 07/03/72 DECK NONE
I*FORM CALL PSSCALE(I)
2*PURPOSE: IF I.NE.0, INCREASE P SCALE FACTOR ON E AND D
3* FORMATS BY ONE. IF I.EQ.0, PRINT E AND D FORMATS AS IS.
4*ROUTINE NAME: PSSCALE
5*ENTRY NAMES: PSSCALE, PFACTOR
6*STORAGE: 5 OCTAL WORDS
7*SELF CONTAINED.

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

VOLUME 2 - 9/73
J506A  A* GENE WILLBANKS  C-2  R. M. FRANK  67
J506A  B*ADVANCE FILM
J506A  C*COMPASS  SR6600  SCP 3,1
J506A  D* SW 19  LS 1  TYPE 1
J506A  E*SOURCE CARDS  40  BCD OBJECT CARDS  5  BIN
J506A  F**FILM*ADV*LINCNT*EMPTY*SETPLT*SC4020*PLOT*CDC 284
J506A  G*ON DISK  F4  COMPAT  WU 02/16/70  REV 6  DECK 06/26/69  REV 3
J506A  1*CALL NAME: ADV,EMPTY,LINCNT,SETPLT
J506A  2*PURPOSE: TO MANIPULATE FILM ON THE CDC 284 AND THE SC 4020
J506A  3*STORAGE: 26 OCTAL
J506A  4*Routines called: BS4020

J506B  A* JERRY MELENDEZ  C-4  E WILLBANKS  71
J506B  B*ADVANCE FRAME* SET LINCOUNT* SET PLOT* EMPTY FILM BUFFER
J506B  C*COMP 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*LINCOUNT*EMPTY*FILM*BUFFER
J506B  G*ON DISK  F4  COMPAT  WU 08/04/71  DECK  NONE
J506B  1*FORM: CALL ADV(N)
J506B  2*  CALL LINCNT(N)
J506B  3*  CALL GLINCNT(N*NAME)
J506B  4*  CALL SLINCNT(N,NAME)
J506B  5*  CALL SETPLT(NAME)
J506B  6*  CALL EMPTY
J506B  7*PURPOSE: UTILITY FILM SUBROUTINES, USED TO SET UP THE FILM
J506B  8* ENVIRONMENT, ADVANCE FRAMES, AND TO EMPTY THE SMALL CORE
J506B  9* FILM BUFFER
J506B  10*ROUTINE NAME: ADV
J506B  11*ENTRY NAMES: ADV, LINCNT, GLINCNT, SLINCNT, SETPLT, EMPTY
J506B  12*STORAGE: 66 OCTAL WORDS OF SCM
J506B  13*SCM EXTERNALS: RQTA, (ON THE SYSTEM)
J506B  14*Routines called: BS4020, GETBA, SYSTEM.
J506B  15* ABNORMAL (ALL ON THE SYSTEM).

VOLUME 2 - 9/73
J507A  A* R. M. FRANK  C-4  GENE WILLBANKS 67
J507A  B*SET EXPOSURE LIGHT OR HEAVY
J507A  C*COMPASS  SR6600  SCP. 3.1
J507A  D*  SW 1  LS 1
J507A  E*SOURCE CARDS i9  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 EXH. REDUCES EXPOSURE ON 4020 TO PROVIDE LIGHTER THAN
J507A  3*NORMAL IMAGE. SEE J506A WRITEUP FOR FULL DETAILS.
J507A  4*STORAGE - 12 WORDS
J507A  5*SELF CONTAINED.

J508A  A* V. GARDINER  C-4  G. WILLBANKS 67
J508A  B*STANDARDIZED PLOT
J508A  C*F4  SR6600  SCP 3.1
J508A  D*  SW 1  LS 2  TYPE 1
J508A  E*SOURCE CARDS 43  BCD OBJECT CARDS 17  BIN
J508A  F**STANDARDIZED*PLOT*ROUTINE
J508A  G*ON DISK  F4  COMPAT WU 04/26/72REV3  DECK 04/26/72REV2
J508A  2*PURPOSE: CREATE A BOX WITH A GRID AND PROVIDE A
J508A  3* STANDARIZED 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*RUTINES CALLED: MAXV(F115A),MINV(F115A),ASCL(J510A),
J508A  13* ADV(J506A),DLNLN(J529A),DLNLG(J530A),DLGLG(J530A),
J508A  14* DLGLN(J530A),SLLIN(J533A),SLLLOG(J540A),SRLIN(J535A),
J508A  15* SBLLOG(J540A),PLOT(J541A),DGA(J528A).

VOLUME 2 - 9/73
J5-3

J5088 A* V. GARDINER C-4 G. WILLBANKS 72
J5088 B*STANDARDIZED PLOT
J5088 C*F4 SR7600 CROS
J5088 D* SW 1 LS 2 TYPE 1
J5088 E*SOURCE CARDS 43 BCD OBJECT CARDS 17 BIN
J5088 F**STANDARDIZED PLOT*RUTINE
J5088 G*ON DISK F4 COMPAT WU 04/26/72 DECK 04/26/72
J5088 1*FORM: CALL SPLOT(IOP,N,X,Y,ICHAR,ICON)
J5088 2*PURPOSE: CREATE A BOX WITH A GRID AND PROVIDE A
J5088 3* STANDARDIZED PLOT
J5088 4* IOP DEFINES TYPE OF GRID.
J5088 5* N POINTS ARE PLOTTED USING DATA FROM TABLES OF X AND Y
J5088 6* ICHAR DEFINES THE PLOTTING CHARACTER TO BE USED.
J5088 7* IF ICON NOT ZERO CONSECUTIVE POINTS WILL BE CONNECTED
J5088 8* BY VECTORS. SEE ADV(J506A) FOR COMPREHENSIVE DESCRIPTION.
J5088 9*STORAGE: 266 OCTAL WORDS
J5088 10*Routine Name: SPLOT
J5088 11*Entry Name: SPLOT
J5088 12*Routines Called: MAXV(F115A),MINV(F115A),ASCL((J5108),
J5088 13* ADV(J506B),DLNLN(J528B),DNLG(J530B),DLGLG(J530B),
J5088 14* DLGLN(J530B),SLLIN(J533B),SLOG(J540B),SBLIN(J535B),
J5088 15* SBLIN(J540B),PLOT(J5418),DGA(J5288).

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

VOLUME 2 - 9/73
1. **AUTOMATIC GRAPH SCALING**
   - **SOURCE CARDS**: 102
   - **OBJECT CARDS**: 18
   - **DISK**: 03/24/72
   - **FORM**: CALL ASCL(MIN, ZMIN, ZMAX, MAJOR, MINOR, K)
   - **PURPOSE**: Determines values to assign to graph boundaries, the number of major and minor intervals to draw, and the format to use in placing a numerical scale along a boundary using SC4020 scaling routines. See ASCL(J510A) for further details.

2. **POLAR COORDINATE GRAPH USING THE 4020**
   - **SOURCE CARDS**: 147
   - **OBJECT CARDS**: 40
   - **DISK**: 03/29/73
   - **FORM**: CALL POLAR(N, R, THETA, ICHAR, ICON, GRID, IXC, IYC, IR)
   - **PURPOSE**: Draws a polar coordinate graph of a set of points. More than one set of points can be plotted on the same polar grid.

3. **POLAR COORDINATE USING THE 4020**
   - **SOURCE CARDS**: 147
   - **OBJECT CARDS**: 40
   - **DISK**: 03/29/73
   - **FORM**: CALL POLAR(N, R, THETA, ICHAR, ICON, GRID, IXC, IYC, IR)
   - **PURPOSE**: Draws a polar coordinate graph of a set of points. More than one set of points can be plotted on the same polar grid.
J5128  A*  V. GARDINER  C-4  R. FRANK  73
J5128  B*POLAR COORDINATE GRAPH USING THE 4020
J5128  C*F-4  SR7600  CR0S  4020
J5128  D*  SW  4  LS  4  TYPE 1.1
J5128  E*SOURCE CARDS  147  BCD  OBJECT CARDS  41  BIN
J5128  F**POLAR*COORDINATE*GRAPH*4020
J5128  G*ON DISK  F4  COMPAT  WU 03/29/73  DECK 03/29/73
J5128  1*FORM:  CALL POLAR(N,R,THETA,ICARO,ICON,IGRID,IIXC,ITYC,IR)
J5128  2*PURPOSE:  DRAW A POLAR COORDINATE GRAPH OF A SET OF POINTS
J5128  3*  USING THE 4020, MORE THAN ONE SET OF POINTS
J5128  4*  CAN BE PLOTTED ON THE SAME POLAR GRID.
J5128  5*ROUTINE NAME:  POLAR
J5128  6*ENTRY NAME:  POLAR
J5128  7*STORAGE:  1005 OCTAL WORDS
J5128  8*ROUTINES CALLED:  THIS PROGRAM USES BASIC SET OF 4020
J5128  9*  SUBROUTINES.  SEE J506A WRITEUP.

J513A  A*  R.M.FRANK  C-4  V.GARDINER  67
J513A  B*STEREOSCOPIC PROJECTION WITH THE SC4020 FILM PLOTTER.
J513A  C*F4  SR6600  SCP 3.1
J513A  D*  SW 10  LS 4  TYPE 1
J513A  E*SOURCE CARDS  193  BCD  OBJECT CARDS  408  BIN
J513A  F**STEREOSCOPIC*PROJECTION*SC4020
J513A  G*ON DISK  F4  COMPAT  WU 04/05/72REV1  DECK 05/26/67
J513A  1*FORM:  CALL STEREO(I,EYES,IXY,DV,A,SF,FW,F,N,X,M,
J513A  2*  Y,MZ,ICHAR,ICON)
J513A  3*PURPOSE:  PRODUCE STEREOSCOPIC PROJECTIONS OF A SET OF
J513A  4*  POINTS IN SPACE OR CAN BE USED ALSO FOR SINGLE
J513A  5*  (MONOCULAR) PROJECTIONS.
J513A  6*  OUTPUT IS ON SC4020 FILM.
J513A  7*ROUTINE NAME:  STEREO
J513A  8*ENTRY NAME:  STEREO
J513A  9*STORAGE:  562  OCTAL WORDS
J513A  10*ROUTINES CALLED:  BASIC 4020 ROUTINES.  SEE ADV(J506A) WRITEUP.

J514A  A*  R.M.FRANK  C-4  GENE WILLBANKS  67
J514A  B*EXPAND OR RETURN IMAGE SIZE TO NORMAL
J514A  C*COMPASS  SR6600  SCP 3.1
J514A  D*  SW 1  LS 1  TYPE 1
J514A  E*SOURCE CARDS  22  BCD  OBJECT CARDS  4  BIN
J514A  F**EXPAND OR*RETURN*IMAGE*SIZE TO*NORMAL
J514A  G*ON DISK  F4  COMPAT  WU 08/19/70REV3  DECK 01/17/69REV2
J514A  1*USE:  CALL EXPIIM PROVIDES FOR LARGER IMAGE AND THUS BUTTED
J514A  2*FRAMES, ON THE SC 4020.  NO EFFECT ON CDC 284.
J514A  3*USE:  CALL NORMR RETURNS IMAGE SIZE TO NORMAL, ALLOWING A GAP
J514A  4*BETWEEN FRAMES.
J514A  5*STORAGE:  15 (OCTAL) WORDS.
J514A  6*SELF CONTAINED.
A* PLOT A POINT
J516A B*PLOTTING J5 COMPASS SR6600 SCOPE
J516A C* SW 1 LS 1
J516A D*COMPASS SOURCE DECK 15RCD3.1 OBJECT DECK 4BIN
J516A E*PLOT*A*POINT
J516A 10*ON DISK F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
J516A 11*CALL PLT(IX,IY,ICHAR). THE CHARACTER SPECIFIED BY ICHAR IS
J516A 12*PLOTTED AT POINT (IX,IY). SEE J506A WRITEUP FOR DETAILS.
J516A 13*STORAGE - 6 WORDS
J516A 14*SELF CONTAINED.

A* DRAW VECTOR
J517A B*PLOTTING J5 COMPASS SR6600 SCP 3.1
J517A C* SW 1 LS 2
J517A D*COMPASS SOURCE DECK 84BCD3.1 OBJECT DECK 5BIN
J517A E*DRAW*VECTOR
J517A 10*ON DISK F4 COMPAT WU 11/14/68 REV 2 DECK 11/14/68 REV 2
J517A 11*CALL DRV(IX1,IY1,IX2,IY2). A STRAIGHT LINE VECTOR WILL BE
J517A 12*DRAWN FROM POSITION (IX1,IY1) TO (IX2,IY2). FOR FULL
J517A 13*DESCRIPTION SEE J506A WRITEUP.
J517A 14*STORAGE - 36 WORDS
J517A 15*SELF CONTAINED.

A* GENERATE X OR Y AXIS
J518A B*GENERATE X OR Y AXIS
J518A C*COMPASS SR6600 SCP 3.1
J518A D* SW 1 LS 1
J518A E*SOURCE CARDS 42 BCD OBJECT CARDS 5 BIN
J518A F*GENERATE*X OR*Y*AXIS
J518A G*ON DISK F4 COMPAT WU 01/17/69REV2 DECK 01/17/69REV2
J518A 1*CALL GXA(IX1,IX2,IY1). DRAWS X AXIS FROM (IX1,IY1) TO (IX2,IY1).
J518A 2*CALL GYA(IY1,IY2,IX1). DRAWS Y AXIS FROM (IY1,IX1) TO (IY2,IX1).
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 TCP(IIX, IY, NC, BCD). THE NC CHARACTERS LOCATED STARTING
J520A 12*AT RCD ARE TYPED ON FILM STARTING AT LOC (IIX, 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 387BCD3,1 OBJECT DECK 20BIN
J521A S**TYPE*CURRENT*POINT
J521A 10*ON DISK F4 COMPAT WU 07/12/68 REV DECK 07/12/68 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 - 238 WORDS
J521A 15*SELF CONTAINED.

J522A A* GENE WILLBANKS T-1 67
J522A O*TYPE SPECIFIED POINT VERTICALLY
J522A B*PLOTTING J5 COMPASS SR6600 SCOPE
J522A C* SW 1 LS 2
J522A D*COMPASS SOURCE DECK 73BCD3,1 OBJECT DECK 5BIN
J522A S**TYPE SPECIFIED POINT*VERTICALLY
J522A 10*ON DISK F4 COMPAT WU 04/15/68 REV DECK 04/15/68 REV
J522A 11*CALL TSPV(IIX, IY, NC, BCD), THE NC CHARACTERS FROM STORAGE BCD
J522A 12*ARE TYPED VERTICALLY FROM TOP TO BOTTOM STARTING AT (IIX, IY).
J522A 13*SEE J506A WRITEUP FOR MORE DETAILS.
J522A 14*STORAGE - 37 WORDS
J522A 15*USES TSP(J520A).

VOLUME 2 = 9/73
J523A  A*  R.M.FRANK  C-4  GENE WILLBANKS  67
J523A  B*DRAW FRAME
J523A  C*COMPASS  SR6600  SCP.3.1
J523A  D*  SW 1 LS 1
J523A  E*SOURCE CARDS  36  BCD OBJECT DECK  4 BIN
J523A  F**DRAW FRAME
J523A  G*ON DISK  F4 COMPAT  WU 01/17/69 REV.2 DECK 04/15/68 REV.1
J523A  1*CALL FRAME(IXL.IXR.IYT.IYB). A BORDER IS DRAWN CONNECTING
J523A  2*THE BOUNDARIES SPECIFIED, SEE J506A WRITEUP FOR MORE DETAIL.
J523A  3*STORAGE - 18 WORDS.
J523A  4*USES GXAQAYA(J518A).

J524A  A*  GENE WILLBANKS  T-1  67
J524A  B*STORE WORD IN BUFFER
J524A  C*PILOTING J5 COMPASS  SR6600  SCOPE
J524A  D*SW 1 LS 1
J524A  E*SOURCE CARDS  BCD 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  1*CALL STB(WORD), THE WORD AT LOCATION #WORD# IS STORED
J524A  2*IN THE BUFFER, SEE J506A WRITEUP FOR DETAILS.
J524A  3*STORAGE - 4 WORDS
J524A  4*SELF CONTAINED.

J526A  A*  G. WILLBANKS  T-1  67
J526A  B*CONVERT TO 4020 COORDINATE
J526A  C*PILOTING J5  F4  SR6600  SCOPE
J526A  D*SW 1 LS 1
J526A  E*SOURCE CARDS  BCD 1  OBJECT DECK 7 BIN
J526A  F**CONVERT TO 4020 COORDINATE
J526A  1*CALL CONVRT(Z1,Z2,Z2,Z1,IIZ2) WHERE Z = A FLOATING POINT
J526A  2*NUMBER, Z1 AND Z2 ARE FLOATING POINT VALUES ASSIGNED TO THE
J526A  3*BOUNDARIES IIZ1 AND IIZ2 RESPECTIVELY AND THE RESULT IS IN IZ.
J526A  4*FOR ADDITIONAL DETAILS SEE J506A WRITEUP.
J526A  5*STORAGE - 63 WORDS
J526A  6*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 58CD F4 OBJECT CARDS 48 BIN
J527A S*TEST COORDINATE FOR RANGE
J527A T*ON DISK F4 COMPAT WU 05/12/67 DECK 04/20/67
J527A 11*CALL TCR(I7). COORDINATE I7 IS TESTED TO INSURE IT LIES
J527A 12*INSIDE 4020 LIMITS. SEE J506A FOR ADDITIONAL DETAILS.
J527A 13*STORAGE - 18 WORDS
J527A 14*SELF CONTAINED.

J528A A* GENE WILLBANKS T-1 67
J528A O*DEFINE GRAPH AREA
J528A B*PLOTTING J5 COMPASS SR6600 SCOPE
J528A C* SW 1 LS 2
J528A D*COMPASS SOURCE DECK 51BCD 31 OBJECT CARDS 6 BIN
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(IXL,IXR,ITY,IBY,XT,XYR,ITY,IBY). IXL,IXR,ITY,IBY ARE
J528A 12*THE 4020 COORDINATES FOR LEFT, RIGHT, TOP, AND BOTTOM
J528A 13*BOUNDARIES RESPECTIVELY. XL, XR, YT, AND YB ARE FLOATING PT
J528A 14*VALUES ASSIGNED TO RESPECTIVE BOUNDARIES. SEE J506A WRITEUP
J528A 15*FOR ADDITIONAL DETAILS.
J528A 16*STORAGE - 22 WORDS
J528A 17*USES TCR(J527A), NAME COMMON CJE07(8 WORDS).

J529A A* R.M. FRANK C-4 GENE WILLBANKS 67
J529A B*DRAW LINEAR-LINEAR GRID
J529A C*F4 SR6600 SCP. 3,1
J529A D* SW 1 LS 1
J529A E*SOURCE CARDS 18 BCD OBJECT CARDS 9 8 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), GY(J518A), NAME COMMON CJE07(R WORDS).
**J530A**

A#  R. M. FRANK  C-4  Verna Gardiner 67

B# DRAW COMBINATION OF LINEAR AND LOG GRIDS

C# F4  SR6600  SCP  3.1

D#  SW 1  LS 2  TYPE 1

E# SOURCE CARDS  79  BCD  OBJECT CARDS  25  BIN

F# DRAW COMBINATION OF LINEAR AND LOG GRIDS

G# ON DISK  F4  COMPAT  WU 06/04/71 REV 6  DECK 06/04/71 REV 6

J530A  CALL DLNLG(NX) DRAWS A GRID LINEAR IN X AT NX INTERVALS

J530A  AND LOG IN Y. Y MUST BE THE RESULT OF ALOG10. OVER 25

J530A  DECADES CAUSES ERROR MESSAGE AND EXIT.

J530A  CALL DLGLG. A GRID OF UP TO 25 DECADES EACH IS DRAWN

J530A  IN X AND Y.

J530A  CALL DLGLN(NY). A GRID IS DRAWN, LOG IN X AND LINEAR

J530A  IN Y AT NY INTERVALS. X IS LIMITED TO 25 DECADES.

SEE J506B WRITEUP FOR FURTHER INFORMATION.

STORAGE - 441 (OCTAL) WORDS.

USES GXA(J518A), GYA(J518A), DLNLG(J529A).

NAME COMMON CJEO7(8 WORDS).

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**J530B**

A#  R. M. FRANK  C-4  Verna Gardiner 72

B# DRAW COMBINATION OF LINEAR AND LOG GRIDS

C# F4  SR7600  CROS

D#  SW 1  LS 3  TYPE 1

E# SOURCE CARDS  79  BCD  OBJECT CARDS  25  BIN

F# DRAW COMBINATION OF LINEAR AND LOG GRIDS

G# ON DISK  F4  COMPAT  WU 08/09/72  DECK 08/09/72

FORM: CALL DLNLG(NX) DRAWS A GRID LINEAR IN X AT NX

INTERVALS AND LOG IN Y. Y MUST BE THE RESULT OF

ALOG10. OVER 25 DECADES CAUSES ERROR MESSAGE AND

EXIT.

CALL DLGLG. A GRID OF UP TO 25 DECADES EACH IS

DRAWN IN X AND Y.

CALL DLGLN(NY). A GRID IS DRAWN, LOG IN X AND

LINEAR IN Y AT NY INTERVALS. X IS LIMITED TO

25 DECADES. SEE J506B WRITEUP FOR FURTHER

INFORMATION.

NAME COMMON DLNLG.

ENTRY NAMES: DLNLG, DLGLG, DLGLN

STORAGE - 447 OCTAL WORDS.

USES GXA(J518A), GYA(J518A), DLNLG(J529A).

NAME COMMON CJEO7(8 WORDS).

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VOLUME 2 - 9/73
J533A A*  Verna Gardner  C-4
J533A B*Scale left side linearly
J533A C*F4  SR6600  SCOPE 3,1
J533A D*  SW 1  LS 1  TYPE 1
J533A E*F4 source cards  30  BCD  Object cards  15  Bin
J533A F**Scale left side linearly
J533A G*On disk  F4  COMPAT  WU 08/02/71REV 1  DECK 08/02/71REV
J533A 1*Format call SLLIN(NY,K)
J533A 2*The left side of a grid is scaled at NY intervals accord-
J533A 3*ing to a format specified by K.  See J506A WRITEUP for
J533A 4*more details.
J533A 5*Routine name: SLLIN
J533A 6*Entry name: SLLIN
J533A 7*Storage: 205 (Octal) Words.
J533A 8*Routines used: TSP(J520A)*Name common CJE07(8 Words).
J533A 9*  (On the system).

J533B A*  Verna Gardner  C-4
J533B B*Scale left side linearly
J533B C*F4  SR7600  CROS
J533B D*  SW 1  LS 2  TYPE 1
J533B E*F4 source cards  30  BCD  Object cards  14  Bin
J533B F**Scale left side linearly
J533B G*On disk  F4  COMPAT  WU 07/27/72  DECK 07/27/72
J533B 1*Format call SLLIN(NY,K)
J533B 2*Purpose: The left side of a grid is scaled at NY
J533B 3*intervals according to a format specified by K.
J533B 4*Routine name: SLLIN
J533B 5*Entry name: SLLIN
J533B 6*Storage: 205 (Octal) Words.
J533B 7*Routines used: TSP(J520B)*Name common CJE07(8 Words).
J533B 8*  (On the system).

J534A A*  Gene Willranks  T-1
J534A B*Plotting right side of graph linearly
J534A C*F4  SR6600  Scope
J534A D*F4  Source deck  33BCDF4  Object cards  16BIN
J534A S**Scale right linearly
J534A 10*On disk  F4  COMPAT  WU 02/27/68 REV  DECK 02/27/68 REV
J534A 11*Call SRLL(NY,K), the right side of a grid is scaled at NY
J534A 12*Intervals according to a format specified by K.  For more
J534A 13*Details see J506A WRITEUP.
J534A 14*Storage - 170 Words
J534A 15*Uses TSP(J520A),TCP(J521A)*Name common CJE07(8 Words).

Volume 2 - 9/73
J535A  A*  R. M. FRANK  C-4  GENE WILLBANKS  67
J535A  B*SCALE TOP OR BOTTOM OF GRAPH LINEARLY
J535A  C*F4  SR6600  SCP.  3.1
J535A  D*  SW 1  LS 1
J535A  E*SOURCE CARDS 42  BCD OBJECT CARDS 18  BIN
J535A  F**SCALE*TOP OR*BOTTOM OF*GRAPH*LINEARLY
J535A  G*ON DISK  F4  COMPAT WU 02/12/69 REV 3 DECK 02/12/69 REV 3
J535A  2*INTERVALS ACCORDING TO A FORMAT K.
J535A  3*CALL STLIN(NX,K). A NUMERIC SCALE IS TYPED ALONG THE TOP OF
J535A  4*THE GRID AT NX INTERVALS ACCORDING TO FORMAT K. FOR MORE
J535A  5*DETAILED EXPLANATION SEE J506A WRITEUP.
J535A  6*STORAGE - 314 (OCTAL) WORDS.
J535A  7*USES TSP(J520A), NAME COMMON CJE07(8 WORDS).

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 3 DECK 02/21/73 REV 3
J540A  1*CALL SBLOG, A LOG SCALE IS TYPED ALONG THE BOTTOM BOUNDARY.
J540A  2*CALL SLLOG, A LOG SCALE IS TYPED ON THE LEFT BOUNDARY.
J540A  3*CALL SRLOG, A LOG SCALE IS TYPED IN ALONG THE RIGHT BOUNDARY.
J540A  4*CALL STLOG, A LOG SCALE IS TYPED ALONG THE TOP BOUNDARY.
J540A  5*FOR MORE DETAIL SEE J506A WRITEUP.
J540A  6*STORAGE - 375 OCTAL WORDS
J540A  7*Routine NAME: SBLOG
J540A  8*ENTRY NAMES: SBLOG, SLLOG, SRLOG, STLOG
J540A  9*Routines Called: TSP(J520A).
J540A  10* NAME COMMON CJE07(10 OCTAL WORDS)
J540B  A*  V. GARDINER  C-4  R.M. FRANK  73
J540B  B*SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY
J540B  C*F*  SR7600  CROS
J540B  D*  SW 1  LS 2  TYPE 1
J540B  E*SOURCE CARDS  72  BCD  OBJECT CARDS  19  BIN
J540B  F**LOGARITHMIC SCALE*GRAPH BOUNDARY
J540B  G*ON DISK  F4  COMPAT  WU  02/21/73  DECK 02/21/73
J540B  1*CALL SBLOG, A LOG SCALE IS TYPED ALONG THE BOTTOM BOUNDARY.
J540B  2*CALL SLLOG, A LOG SCALE IS TYPED ON THE LEFT BOUNDARY.
J540B  3*CALL SRLOG, A LOG SCALE IS TYPED ALONG THE RIGHT BOUNDARY.
J540B  4*CALL STLOG, A LOG SCALE IS TYPED ALONG THE TOP BOUNDARY.
J540B  5*FOR MORE DETAIL SEE J506B WRITEUP.
J540B  6*STORAGE = 374 OCTAL WORDS
J540B  7*ROUTINE NAME:  SBLOG
J540B  8*ENTRY NAMES:  SBLOG, SLLOG, SRLOG, STLOG
J540B  9*ROUTINES CALLED:  TSP(J520B).
J540B  10*  NAME COMMON CJEO7(10 OCTAL WORDS)

J541A  A*  GENE WILLRANKS  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  2*BY ICHAR IS PLOTTED N TIMES AT POINTS DERIVED FROM TABLES OF
J541A  3*X AND Y STORED AT INTERVALS OF MX AND MY. IF ICON IS NOT ZERO
J541A  4*SUCCESSIVE POINTS ARE CONNECTED BY VECTORS. SEE J506A FOR
J541A  5*MORE DETAILED WRITEUP.
J541A  6*STORAGE = 119 WORDS
J541A  7*USES CONVRT(J526A), TCP(J527A), PLT(J516A), DRV(J517A)* NAME
J541A  8*COMMON CJEO7(8 WORDS).

VOLUME 2  -  9/73
A* WRITE LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
B* SOURCE CARDS 312 BCD OBJECT CARDS 20 BIN
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* CALL WLCH(IX, IY, NC, BCD, ISIZE). THE NC CHARACTERS LOCATED AT
I* BCD ARE PRINTED STARTING AT (IX, IY). THE SIZE OF THE
J* CHARACTERS IS CONTROLLED BY ISIZE FROM 1 TO 6.
K* CALLWLCH(IX, IY, NC, BCD, ISIZE). THE NC CHARACTERS LOCATED AT
L* BCD ARE PRINTED OVERSIZE STARTING AT (IX, IY). THE SIZE IS
M* CONTROLLED BY ISIZE. SEE J506A WRITEUP FOR FULL DETAILS.
N* STORAGE - 222 WORDS
O* SELF CONTAINED.
J544A A* V. GARDINER C-4 68
J544A B*CALCOMP STANDARDIZED PLOT
J544A C*F4 SR6600 SCOPE 3.1
J544A D* SW 27 LS 2 TYPE 1
J544A E*SOURCE CARDS 70 BCD OBJECT CARDS 20 BIN
J544A F**CALCOMP PLOT
J544A G* CARDS F4 COMPAT WU 01/03/73 REV 2 DECK 01/06/69 REV 1
J544A 1*FORM: CALL PLOTZ(X, Y, N, I, LIN, ISYM, B, XA, YA, ITITLE, N TITLE, LABELX, NLBLX, LABELY, NLBLY)
J544A 2* PURPOSE: CREATE A BOX WITH TIC MARKS ON ALL SIDES.
J544A 3* LEFT AND BOTTOM AXES ARE LABELLED. TITLE IS
J544A 4* WRITTEN AT TOP OF GRAPH. VALUES OF X AND Y ARE
J544A 5* PLOTTED.
J544A 6* NOTE: THE J544 WRITEUP ALSO DESCRIBES MANY OF THE
J544A 7* CALCOMP ROUTINES.
J544A 8* ROUTINE NAME: PLOTZ
J544A 9* ENTRY NAME: PLOTZ
J544A 10* STORAGE: 321 OCTAL WORDS
J544A 11* ROUTINES CALLED: SCALE(J546A), AXIS(J547A), LINE(J548A), PLTJ(J549A), SYMBOL(J559A).

J545A A* R. M. FRANK C-4 68
J545A B*CALCOMP NUMBER LABELING
J545A C* PLOTTING J5 F4 SR6600 SCOPE
J545A D* F4 SOURCE CARDS 43BCDF4 OBJECT CARDS 14BIN
J545A S**CALCOMP LABEL
J545A 10* CARDS F4 COMPAT WU 09/12/68 DECK 09/12/68
J545A 11* CALL NUMBER (X, Y, HT, BCD, TH, NS)
J545A 12* SEE WRITEUP FOR J544A FOR FULL DETAILS.
J545A 13* USES SYMBOL(J559A) AND ALOG10(B305A)
J545A 14* STORAGE 250(8) WORDS

J546A A* ROBERT M FRANK C-4 68
J546A B* GENERATE SCALE FOR AXIS
J546A C* PLOTTING J5 F4 SR6600 SCOPE
J546A D* F4 SOURCE CARDS 96BCDF4 OBJECT CARDS 22BIN
J546A S* CALCOMP SCALE
J546A 10* CARDS F4 COMPAT WU 08/19/68 08/19/68
J546A 11* CALL SCALE (X, F, D, A, N, I)
J546A 12* SEE WRITEUP FOR J544A FOR FULL DETAILS.
J546A 13* USES ALOG10(B305A)
J546A 14* STORAGE 371(8) WORDS.
J547A  A*  V.GARDINER  C-4  R.M.FRANK  68
J547A  B*GENERATE AND LABEL AXIS ON CALCOMP
J547A  C*SR6600  SCP  3.1
J547A  D*SW 1  LS 4  TYPE 1
J547A  E*SOURCE CARDS  144  BCD  OBJECT CARDS  42  BIN
J547A  F*CALCOMP AXIS
J547A  G*CARDS F4 COMPAT WU 01/03/73REV 2 DECK 01/03/73REV 1
J547A  1*FORM: CALL AXIS (X,Y,TITLE,N,A,DEG,F,D,LOG)
J547A  2*PURPOSE: GENERATE AND LABEL AXIS ON CALCOMP
J547A  3*SEE PLOTZ(J544A) WRITEUP FOR FULL DETAILS.
J547A  4*ROUTINE NAME: AXIS
J547A  5*ENTRY NAME: AXIS
J547A  6*STORAGE: 1040 OCTAL WORDS
J547A  7*ROUTINES CALLED: NUMBER(J544A),PLTZ(J545A),SINCOS(R106A),
J547A  8* AND SYMBOL(J559A).

J548A  A*  ROBERT M FRANK  C-4  68
J548A  B*PLOT SYMBOL AND DRAW LINE THROUGH SUCCESSIVE DATA POINTS
J548A  C*PLOTTING JS F4 SR6600 SCOPE
J548A  D*SOURCE CARDS 52BCDF4 OBJECT CARDS 15BIN
J548A  E*CALCOMP GRAPH
J548A  F*CARDS F4 COMPAT WU 08/19/68 DECK 08/19/68
J548A  10*CARDS F4 COMPAT WU 08/19/68 DECK 08/19/68
J548A  11*CALL LINE (X,Fx,Dx,N,Y,SYMBOL,WHERE(J559A),ALOG10(8305A),
J548A  12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J548A  13*USES PLTZ(J549A), WHERE(J554A), SYMBOL(J559A), ALG10(8305A),
J548A  14*SQRT(8408A).
J548A  15*STORAGE 1340(8) WORDS.

VOLUME 2 - 9/73
J549A A* ROBERT M FRANK C-4
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 S**CALCOMP*TAPE*PEN
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
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 108IN
J550A S**CALCOMP*TAPE
J550A 10*CARDS F4 COMPAT WU 08/19/68 DECK 08/19/68
J550A 11*CALL PLOTS ( LT )
J550A 12*SEE WRITEUP FOR J544A FOR FULL DETAILS.
J550A 13*USES BLOCK (J551A)
J550A 14*STORAGE 22(8) WORDS.

J551A A* R. M. FRANK C-4
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 148IN
J551A S**CALCOMP*BLOCK
J551A 10*CARDS F4 COMPAT WU 08/19/68 DECK 08/19/68
J551A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J551A 12*USES TAPWRI(J552A) AND STORE(J553A).
J551A 13*STORAGE 173(8) WORDS.

J552A A* R. M. FRANK C-4
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 118IN
J552A S**CALCOMP*TAPE*WRITE
J552A 10*CARDS F4 COMPAT WU 09/12/68 DECK 09/12/68
J552A 11*CALCOMP EXCLUSIVE INTERNAL SUBROUTINE
J552A 12*STORAGE 114(8) WORDS
J552A 13*CALLS UNLODE. GETEQLN

VOLUME 2 - 9/73
**CALCOMP EXCLUSIVE INTERNAL SUBROUTINE**

**ROUTINE NAME:** TAPWRI

**STORAGE:** 32 OCTAL WORDS

**CALCOMP*TAPE*WRITE*PLOTTING ON DISK F4 COMPAT WU 11/15/72 DECK 11/15/72**

**SOURCE CARDS 9 RCD OBJECT CARDS 5 BIN**

**PACK COMMANDS FOR TAPE**

**CALCOMP EXCLUSIVE INTERNAL SUBROUTINE**

**USES TAPwR1(J552A) AND ENCODE(J558A).**

**STORAGE 41 (8) WORDS**

**CURRENT PLOTTER POSITION**

**CALCOMP*PEN*POSITION**

**STORAGE 23 (8) WORDS**

**SCALING FACTOR FOR SUBSEQUENT PLOTTING**

**STORAGE 13 (8) WORDS**

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**VOLUME 2 - 9/73**
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*SOURCE CARDS  9B0CDF4  OBJECT CARDS  48IN
J556A  E*CALCOMP*ORIGIN*CHANGE
J556A  F*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*SOURCE CARDS  22BCD0BJECT CARDS  3BIN
J558A  E*CALCOMP*TAPE*PACKING
J558A  F*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*SOURCE CARDS  389RCD  OBJECT CARDS  23BIN
J559A  E*CALCOMP*LABEL
J559A  F*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 03/13/69 REV 1 DECK 03/13/69 REV 1

**J560A**

1* CALL CONTOUR(X, NNX, Y, NNY, Z, NZX, NZY, NC, ZMN, ZMX, DLY, ZC, DMPX, J560A)

**J560A**

2* DMPY, IGRO, TITLE, XTITLE, YTITLE, 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.

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**J561A**

A* R. M. FRANK C-4 68

**J561A**

B* PRIVATE SUBROUTINE FOR CONTOUR

**J561A**

C* PLOTZ F4 SR6600 SCP 3.1

**J561A**

D* SW 1 LS 2

**J561A**

E* SOURCE CARDS 61 BCD OBJECT CARDS 24 BIN

**J561A**

F**CONTOUT*PLOTTING*CALCOMP

**J561A**

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

**J561A**

1* 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.

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**J562A**

A* V. GARONIN 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 02/14/73 REV.9 DECK 04/24/72 REV.7

**J562A**

1* FORM: CALL PLOJB(X, Y, NPTS, INC, LIN, NSYM, C, XAA, YAA,

**J562A**

2* LABELZ, NXL, LABELX, NXL, LABELY, NYL,

**J562A**

3* PURPOSE: PLOTS VALUES OF X, Y TABLE ON FILM WITH LABELLING

**J562A**

4* OF AXES AND TITLE.

**J562A**

5* ROUTINE NAME: PLOJB

**J562A**

6* ENTRY NAME: PLOJB

**J562A**

7* STORAGE 1021 (OCTAL) WORDS

**J562A**

8* ROUTINES CALLED:

**J562A**

- MAXV(F115A)
- MINV(F115A)
- ADV(J566A)
- ASCL(J510A)
- PLT(J516A)
- DRV(J517A)
- TSP(J520A)
- TSPV(J522A)
- FRAME(J523A)
- CONVRT(J526A)
- DLNLN(J529A)
- DLGLG(J530A)
- DLGLN(J530A)
- SLLN(J533A)
- SBLIN(J535A)
- SBLLOG(J540A)
- SLLLOG(J540A)
- DLCH(J567A)
- DGA(J528A)

**J562A**

ALL ON DISK.

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**VOLUME 2 - 9/73**
A* V. GARDINER  C-4     R FRANK  72
B*STANDARDIZED PLOT ON FILM
C*F4  SR7600 CROS
D*   SW 10    LS 3    TYPE 1
E*SOURCE CARDS  118 BCD  OBJECT CARDS  44 BIN
F**FILM*PLOT
G*ON DISK   F4 COMPAT  WI 02/14/73REV 1 DECK 04/24/72
H*FORM:  CALL PLOJB(X,Y,NPTS,INC,LIN,NSYM,C,XAA,YAA,
I*   LABELZ,NXL,LABELX,NXL,LARELY,NYL)
J*PURPOSE:  PLOTS VALUES OF X,Y TABLE ON FILM WITH LABELLING
K*OF AXES AND TITLE.
L*ROUTINE NAME:  PLOJB
M*ENTRY NAME:  PLOJB
N*STORAGE 1030 (OCTAL) WORDS
O*Routines Called:  MAXV(F115B), MINV(F115B), ADV(J506B),
P*ASCL(J510R), PLT(J516B), DRV(J517B), TSP(J520R),
Q*TSPV(J522B), FRAME(J523B), CONVRT(J526B), DLNLN(J529B),
R*DLGLG(J530R), DLGLN(J530B), DLNLG(J530B), SLLIN(J533B),
S*SRLIN(J535B), SBLIN(J540B), SLLOG(J540B), DLCH(J567B),
T*DGJ(J568B), ALL ON DISK.

A* R. M. FRANK  C-4     J. BORING  68
B*CONTOUR PLOTTING WITH FILM OUTPUT
C*F4  SR6600 SCP.3.1
D*   SW 6    LS 3    TYPE 1
E*SOURCE CARDS  91 BCD  OBJECT CARDS  39 BIN
F**CONTOUR*PLOTTING*FILM
G*ON DISK   F4 COMPAT  WI 07/22/70REV 4 DECK 07/22/70REV 3
H*USE:  CALL CONTRJB(X,NNX,Y,NNY,Z,NZX,NZY,NC,ZMN,ZMX,DLZ,ZC,
I*   DMPX,DMPY,IGRD,ITITLE,NTITLE,XLABEL,NXLB,YLEBL,NLB)
J*PURPOSE: PRODUCES A CONTOUR PLOT WITH LABELS ON FILM.
K*STORAGE 754 (OCTAL) WORDS.
L*USES TRICJB(J564A),PLOJB(J562A),ADV(J506A),DLCH(J567A),
M*DRV(J517B),PLT(J516A),TCP(J521A)
J563B

A* R. M. FRANK C-4 R. M. FRANK 72
B*CONTOUR PLOTTING WITH FILM OUTPUT
C*F4 SR7600 CROSS
D* SW 6 LS 3 TYPE 1
E*SOURCE CARDS 91 BCD OBJECT CARDS 40 BIN
F*CONTOUR*PLOTTING*FILM
G*ON DISK F4 COMPAT WU 08/09/72 DECK 08/09/72
H*FORM: CALL CONTRJB(X,NNX,Y,NNY,Z,NZX,NZY,NC,ZMN,ZMX,DLZ,LC)
I*DMX,DMPY,IGRD,ITITLE,XTITLE,YLABEL,YNLBL)
J*PURPOSE: PRODUCE A CONTOUR PLOT WITH LABELS ON FILM.
K*ROUTINE NAME: CONTRJB
L*ENTRY NAME: CONTRJB
M*STORAGE 764 (OCTAL) WORDS.
N*ROUTINES CALLED: TRICJB(J564B), PLOJB(J562B), ADV(J568B),
O*DLCH(J567B), DRV(J517), PLT(J516B), TCP(J521B)

J564A

A* R. M. FRANK C-4 J. BORING 68
B*PRIVATE SUBROUTINE FOR CONTRJB(J563A)
C*F4 SR600 SCP, 3.1
D* SW 1 LS 1 TYPE 1
E*SOURCE CARDS 57 BCD OBJECT CARDS 21 BIN
F*CONTOUR*PLOTTING*FILM
G*ON DISK F4 COMPAT WU 09/19/69REV 2 DECK 09/19/69REV 1
H*CALL TRICJB(X,Y,DY,NOC,ZPLAN,ZNZ,ZNZ)
I*PRIVATE SUBROUTINE FOR CONTRJB
J*STORAGE 454 WORDS
K*CALLS PLOJB(J562A), TCP(J521A)

J565A

A* K J MELENDEZ C-4 69
B*DOUBLE BUFFER FILM OUTPUT
C*COMPASS SR600 SCP 3.1
D* WU 2 LS 5 TYPE 1
E*SOURCE CARDS 269 BCD OBJECT CARDS 14 BIN
F*DOUBLE BUFFER BS4020*SC4020*FILM*PLOT
G*CARDS CMP WU 10/06/69REV 2 DECK 10/06/69REV 2
H*J565A IS A VERSION OF BS4020 WHICH USES A DOUBLE BUFFER
I*SCHEME TO DECREASE RUNNING TIME WHEN HAVING LARGE AMOUNTS OF
J*FILM OUTPUT. ALTHOUGH BS4020 IS NOT CALLED DIRECTLY BY THE
K*USER, HE MUST SUBMIT THE DECK FOR J565A AS PART OF HIS JOB
L*IF HE DESIRES TO USE THIS FASTER VERSION. WHEN THIS ROUTINE
M*IS USED, ONE MUST FALL EMTY BEFORE TERMINATING EXECUTION.
N*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,IM,JM,FL,WR)
J566A  2*STORAGE 1241 WORDS
J566A  3*USES-J523A(FRAME), J520A(TSP), J528A(DGA), J541A(PLT).
J566A  4*AND J506A(ADV).

J567A  A* R. M. FRANK  C-4  69
J567A  B*DRAW LARGE CHARACTERS
J567A  C*4  SR6600  SCP 3.1
J567A  D*  SW 5  LS 3  TYPE 1
J567A  E*SOURCE CARDS  151  BCD  OBJECT CARDS  71  BIN
J567A  F**WRITE*LARGE*CHARACTERS HORIZONTALLY OR VERTICALLY
J567A  G*ON DISK  F4  COMPAT  WU 04/28/70  REV. 2  DECK 06/13/69
J567A  1*CALL NAME: DLCH(I,X,Y,NC,BCD,ISIZE) DLCV(I,X,Y,NC,BCD,ISIZE)
J567A  2*PURPOSE: TO DRAW LARGE CHARACTERS HORIZONTALLY OR VERTICALLY
J567A  3*STORAGE: 272 OCTAL
J567A  4*Routines Called: EMPTY(J506A), STB(J524A)
J567A  5*BS4020(ON THE SYSTEM).

J569A  *(FLASH) DELETED FROM THE LIBRARY-SEE CCF: PIM-2:003

J569A  A* JERRY MELENDEZ  C-4  R FRANK  69
J569A  B*COLOR
J569A  C*4  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*ROUTE NAME: COLOR
J569A  5*ENTRY NAME: COLOR
J569A  6*STORAGE: 102 OCTAL WORDS
J569A  7*Routines Called: STB(J524A)
J5-24

A* JERRY MELENDEZ C-4 R FRANK 72
J569B B*COLOR SR7600 CROS
J569B C*F4
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 WU 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 SCP3.1 FILM
J570A D* SW 3 LS 1 TYPE 1
J570A E*SOURCE CARDS 21 BCD OBJECT CARDS 7 BIN
J570A F**SWEEPS*RECTANGULAR *BACKGROUND ON *COLOR *FILM
J570A G*CARDS F4 COMPAT WU 09/07/72REV 1 DECK 09/07/72REV 1
J570A 1*FORM: CALL SWEEP (IX1*IXY1*IX2*IXY2)
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: 67 OCTAL WORDS
J570A 7*ROUTINES CALLED: GXA*GYA(J518A)

VOLUME 2 - 9/73
J571A B*PLOT ROUTINE FOR LINE PRINTER
J571B B*PLOT ROUTINE FOR LINE PRINTER

**A** SRC6600 SCP 3.1
J571A D* SW 13 LS 8 TYPE 1
J571A E*F4 SOURCE CARDS 339 RCD OBJECT CARDS 104 BIN
J571A F*F4 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).

J571A A* SRC6600 SCP 3.1
J571A B*PLOT ROUTINE FOR LINE PRINTER
J571A C*F4 SRC6600 SCP 3.1
J571A D* SW 13 LS 8 TYPE 1
J571A E*F4 SOURCE CARDS 344 BCD OBJECT CARDS 105 BIN
J571A F*F4 PLOSB*PLOT*GRAPH
J571A G*CARDS F4 COMPAT WU 09/01/72REV.1 DECK 09/01/72REV.1
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: 12236 OCTAL WORDS.
J571A 8*ROUTINES CALLED: MAXV(F115R), MINV(F115R), ASCL(J510A),
J571A 9* PUT(M403B), FETCH(M403B), LIBMSG(SYSTEM).

J571A A* V. GARDINER C=4 R.M. FRANK 69
J571A B*POLAR3D (CALCcomp)
J571A C*F4 SRC6600 SCP 3.1
J571A D* SW 4 LS 2 TYPE 1
J571A E*SOURCE CARDS 112 RCD OBJECT CARDS 48 BIN
J571A F*F4 PLOSB*PLOT*GRAPH
J571A G*CARDS F4 COMPAT WU 10/10/69REV.1 DECK 10/10/69REV.1
J571A 1*CALC POLAR3D(THETA,R,NTH,NR,F,NTHF,THX,THY,X,Y,TITLE,NTITLE)
J571A 2*PURPOSE: PLOTS THE MATRIX F IN 3-DIMENSIONS VS. R AND THETA.
J571A 3*STORAGE: 1113 (OCTAL) WORDS.
J571A 4*ROUTINES CALLED: SIN(B106A),MAXV(F115A),MAXM(F116A),
J571A 5*ADV(J506A),EXH(J507A),TSP(J520A),CONVRT(J526A),PLOJR(J562A),
J571A 6*DLCH(J567A).

J572A A* R. M. FRANK C=4 VOLUME 2 9/73
J572A B*POLAR3D (CALCcomp)
J572A C*F4 SRC6600 SCP 3.1
J572A D* SW 4 LS 2 TYPE 1
J572A E*SOURCE CARDS 112 RCD OBJECT CARDS 48 BIN
J572A F*F4 PLOSB*PLOT*GRAPH
J572A G*CARDS F4 COMPAT WU 10/10/69REV.1 DECK 10/10/69REV.1
J572A 1*CALC 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).
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 RCD 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 PD# IN LARGE LETTERS ON MICRO-
J573A FILM (SC-4020).
J573A 4*PRNSRD IS NORMALLY USED TO IDENTIFY THE BEGINNING AND END
J573A OF SECRET INFORMATION OUTPUT ON THE SC-4020. THE SUBROUTINE
J573A ADVANCES THE FILM BEFORE PRINTING. IT DOES NOT ADVANCE THE
J573A FILM AFTER PRINTING. TAPE FILM IS REQUIRED AS AN
J573A ARGUMENT ON THE PROGRAM CARD.
J573A 9*TILING IS UNDER TWO SECONDS OF CP TIME.
J573A 10*STORAGE: 163 OCTAL WORDS.

J573A A* V. GARDINER C-4 R. FRANK 69
J573A B*FILM ERROR BAR PLOTTER
J573A C*F4 SR6600 SCP 3.1 SC-4020
J573A D* SW 8 LS 4 TYPE 1
J573A E*SOURCE CARDS 131 RCD OBJECT CARDS 49 BIN
J573A F**FILM*ERROR*BAR*PLOTTER
J573A G*CARDS F4 COMPAT WU 08/11/72 REV 3 DECK 08/11/72 REV 3
J573A 1*USE: CALL ERRBAR(X,Y,NPTS,INC,YPOS,YMIN,INCERR,LIN,NSYM,C,
J573A 2*XAA,YAA,LABELZ,NXL, LABELX,NXL,LABELY,NYL)
J573A 3*PURPOSE: TO PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN
J573A X,Y TABLE, INCLUDING LABELING OF AXES AND TITLE, ON THE FILM
J573A 5*PLOTTER.
J573A 6*STORAGE: 1131 OCTAL WORDS
J573A 7*Routines Called:
J573A 8* MAXV(F115A), MINV(F115A), ADV(J506A), EXH(J507A),
J573A 9* EXL(J507A), ASCL(J510A), PLT(J516A), DRV(J517A),
J573A 10* TSP(J520A), TSPV(J522A), FRAME(J523A), CONVRT(J526A).
J573A 11* DGA(J528A), DLNLN(J529A), DLGLG(J530A), DLGLN(J530A),
J573A 12*DLNLG(J530A), SLLIN(J533A), SBLIN(J535A), SBLD(J540A),
J573A 13*SRNLG(J540A), DLCH(J567A).

VOLUME 2 - 9/73
ERRBAR - FILM ERROR BAR PLOTTER

SOURCE CARDS 131 BIN
OBJECT CARDS 49 BIN

PURPOSE: PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN X,Y TABLE, INCLUDING LABELING OF AXES AND TITLE, ON THE FILM PLOTTER.

ROUTINE NAME: ERRBAR
ENTRY NAME: ERRBAR
STORAGE: 1140 OCTAL WORDS

ROUTINES CALLED: MAXV(F115B), MINV(F115B), ADV(J506B), EXH(J507B), EXL(J507B), ASCL(J510B), PLT(J516B), DRV(J517B), TSP(J520B), TSPV(J522B), FRAME(J523B), CONVRT(J526B), DGA(J528B), DLNLN(J529B), DLGLG(J530B), DLGLN(J530B), DLBLIN(J533B), SBLIN(J535B), SBLLOG(J540B), DLBLG(J540B), DLCH(J567B).
A* R. M. FRANK C-4
B*CALCOMP ERROR BAR PLOTTER
C*SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 132 BCD OBJECT CARDS 36 BIN
F**CALCOMP ERROR BAR PLOTTER
G**ON DISK F4 COMPAT WU 06/28/72 DECK 06/28/72
H*FORM: CALL EROBAR(x, y, NPTS, INC, YPOS, YMIN, INCERR, J, NSYM, B)
I* PURPOSE: PLOT VALUES WITH OR WITHOUT ERROR BARS IN AN X, Y TABLE, INCLUDING LABELING OF AXES AND TITLE ON THE CALCOMP PLOTTER. SEE EROBAR(J575A) FOR FURTHER DETAILS.
J*ROUTINE NAME: EROBAR
K*ENTRY NAME: EROBAR
L*STORAGE: 716 OCTAL WORDS
M*Routines Called: SCALE(J546R), AXIS(J547B), LINE(J548B), PLTZ(J549B), SYMBOL(J559B).

A* R. M. FRANK C-4
B*PLOTS MATRIX IN 3-DIMENSION VS R AND THETA FOR CALCOMP
C*SR6600 SCP 3.1 CALCOMP
D* SW 3 LS 2 TYPE 1
E*SOURCE CARDS 110 BCD OBJECT CARDS 48 BIN
F**PLOT CALCOMP 3-D
G**CARDS F4 COMPAT WU 09/30/69 DECK 09/30/69
H*CALL NAME: POL3DCC(THETA, R, NTH, NR, F, NTHF, THX, THY, X, Y, TITLE)
I* PURPOSE: PLOTS THE MATRIX F IN 3-DIMENSION VS R AND THETA FOR THE CALCOMP.
J*STORAGE: 19164 (OCTAL) WORDS.
K*Routines Called: ATAN(B104A) - SIN(B106A) - MAXV(F115A), MAXM(F116A), LINE(J548A), PLTZ(J549A), SYMBOL(J559A).

A* R. M. FRANK C-4
B*THIS IS A PRIVATE SUBROUTINE TO BE USED WITH POL3DCC
C*SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E*SOURCE CARDS 49 BCD OBJECT CARDS 13 BIN
F**CALCOMP
G**CARDS F4 COMPAT WU 09/30/69 DECK 09/30/69
H*CALL NAME: CALL SCALED(ARRAY, FIRSTV, DELTAV, AXLE, NPTS, INC, AMN, AMX)
I* PURPOSE: TO ESTABLISH FIRST VALUE AND INCREMENT FOR LINE ROUTINE WHEN USING POL3DCC.
J*STORAGE: 207 (OCTAL) WORDS.
K*Routines Called: ATAN2(B104A) - ALOG(B305A) - ALOG10(B305A).
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 10/14/69 REV 1 DECK 10/14/69 REV 1
J578A 1*CALL NAME POLCON(X,NNX,Y,NNY,Z,NZ,X,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), SG(B106A),
J578A 6*SIN(B106A), MAXV(F115A), MINV(F115A), MAXM(F116A),
J578A 7*MAXM(F116A), ADV(J506A), EXH(J507A), EXL(J507A), DRV(J517A),
J578A 8*PLOJB(J562A), DLCH(J567A), TRIPOL(J579A), CIRCA(J580A).

J579A A* R. M. FRANK C-4 69
J579A B*PRIVATE SUBROUTINE FOR POLCON(J578A)
J579A C*F4 SR6600 SCP 3.1
J579A D* SW 1 LS 1 TYPE 1
J579A E*SOURCE CARDS 61 BCD OBJECT CARDS 23 BIN
J579A F**CONTOUR PLOTTING FILM
J579A G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
J579A 1*CALL TRIPOL(X,Y,DX,DY,NOC,ZPLAN,XZ,ZV,ZY)
J579A 2*PRIVATE SUBROUTINE FOR POLCON
J579A 3*STORAGE 74 (OCTAL) WORDS.
J579A 4*USES CDG(B106A), SG(B106A), PLOJB(J562A).

J580A A* R. M. FRANK C-4 69
J580A B*ROUTINE TO DRAW CIRCLES ON SC4020
J580A C*F4 SR6600 SCP 3.1
J580A D* SW 1 LS 1 TYPE 1
J580A E*SOURCE CARDS 41 BCD OBJECT CARDS 12 BIN
J580A F**DRAW CIRCLES ON SC4020
J580A G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
J580A 1*CALL CIRCA(IXC,IYC,IR)
J580A 2*DRAWS A CIRCLE CENTERED AT IXC, IYC WITH RADIUS IR.
J580A 3*IJC, 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).

VOLUME 2 - 9/73
J581A  A* R. M. FRANK C-4
J581A  B* DRAWS A CIRCLE, ARC, OR SPIRAL ON THE CALCOMP
J581A  C* F4      SR6600 SCP 3.1 CALCOMP
J581A  D*        SW 2 LS 1 TYPE 1
J581A  E* SOURCE CARDS 52 BCD OBJECT CARDS 14 BIN
J581A  F** PLOT* CALCOMP
J581A  G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
J581A  1* CALL NAME: CALL CIRCL(XPAGE,YPAGE,T0,T1,F0,F1,D1)
J581A  2* PURPOSE: TO DRAW, STARTING AT A GIVEN POINT, AN ARCH WHICH
J581A  3* MAY BE EXTENDED TO FORM A CIRCLE OR SPIRAL.
J581A  4* STORAGE: 232 (OCTAL) WORDS.
J581A  5* ROUTINES CALLED: COS(B106A), SIN(B106A), PLTZ(J549A),
J581A  6* WHERE(J554A).

J582A  A* R. M. FRANK C-4
J582A  B* DRAWS DASHED LINES CONNECTING DATA POINTS ON THE CALCOMP
J582A  C* F4      SR6600 SCP 3.1 CALCOMP
J582A  D*        SW 2 LS 1 TYPE 1
J582A  E* SOURCE CARDS 76 BCD OBJECT CARDS 15 BIN
J582A  F** PLOT* CALCOMP
J582A  G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
J582A  1* CALL NAME: DASHL(XARRAY,YARRAY,CNPTS,INC)
J582A  2* PURPOSE: TO DRAW DASHED LINES CONNECTING A SERIES OF DATA
J582A  3* POINTS.
J582A  4* STORAGE: 310 (OCTAL) WORDS.
J582A  5* ROUTINES CALLED: SQRT(B408A), PLTZ(J549A), WHERE(J554A).

J583A  A* R. M. FRANK C-4
J583A  B* DRAWS A DASHED LINE TO A SPECIFIED POINT ON THE CALCOMP
J583A  C* F4      SR6600 SCP 3.1 CALCOMP
J583A  D*        SW 2 LS 1 TYPE 1
J583A  E* SOURCE CARDS 53 BCD OBJECT CARDS 9 BIN
J583A  F** PLOT* CALCOMP
J583A  G* CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69
J583A  1* CALL NAME: DASHP(XPAGE,YPAGE,DASH)
J583A  2* PURPOSE: TO DRAW A DASHED LINE FROM THE PEN'S PRESENT
J583A  3* POSITION TO A SPECIFIED POINT
J583A  4* STORAGE: 124 (OCTAL) WORDS
J583A  5* ROUTINES CALLED: SQRT(B408A), PLTZ(J549A), WHERE(J554A).
A* F. M. FRANK C-4

B*DESTRA W 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

J585A 1*CALL NAME: ELIPS(XPAGE,YPAGE,RMAJ,RMIN,ANGLE,TH0,THF,IPEN)

J585A 2*PURPOSE: TO DRAW AN ELLIPSE OR ELLIPTICAL ARC.

J585A 3*STORAGE: 303 (OCTAL) WORDS.

J585A 4*ROUTINES CALLED: COS(B106A), SIN(B106A), SQRT(B408A),

J585A 5*PLTZ(J549A)*WHERE(J554A).

J586A A* R. M. FRANK C-4

J586A B*DESTRA W A CURVE THROUGH THREE POINTS ON THE CALCOMP

J586A C*F4 SR6600 SCP 3.1 CALCOMP

J586A D* SW 2 LS 2 TYPE 1

J586A E*SOURCE CARDS 61 BCD OBJECT CARDS 17 BIN

J586A F**PLOT*CALCOMP

J586A G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69

J586A 1*CALL NAME: CALL FIT(XPAGE1,YPAGE1,XPAGE2,YPAGE2,XPAGE3,

J586A 2*YPAGE3)

J586A 3*PURPOSE: TO DRAW A SEMI-HYPERBOLIC CURVE THROUGH THREE

J586A 4*POINTS.

J586A 5*STORAGE: 421 (OCTAL) WORDS

J586A 6**Routines CALLED: ATAN(B104A), COS(B106A), SQRT(B408A),

J586A 7*PLTZ(J549A), WHERE(J554A), SOLUT(J589A).

J586A A* R. M. FRANK C-4

J586A B*DESTRA W A LINEAR GRID ON THE CALCOMP

J586A C*F4 SR6600 SCP 3.1 CALCOMP

J586A D* SW 2 LS 1 TYPE 1

J586A E*SOURCE CARDS 36 BCD OBJECT CARDS 9 BIN

J586A F**PLOT*CALCOMP

J586A G*CARDS F4 COMPAT WU 09/26/69 DECK 09/26/69

J586A 1*CALL NAME: CALL GRID(XPAGE,YPAGE,DELTAX,DELTAY,NXSP,NYSP)

J586A 2*PURPOSE: TO DRAW A LINEAR GRID.

J586A 3*STORAGE: 114 (OCTAL) WORDS.

J586A 4*ROUTINES CALLED: PLTZ(J549A).

VOLUME 2 - 9/73
B*Draws an equilateral polygon on the Calcomp
C*F4 SR6600 SCP 3.1 CALCOMP
D* SW 2 LS 1 TYPE 1
E*Source cards 31 BCD Object cards 11 BIN
F*Plot*Calcomp
G*Cards F4 COMPAT WU 09/26/69 DECK 09/26/69
J587A

J587A

J588A

J588A

J589A

J589A

J589A
A* R M FRANK C-4 70
B*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
H*CALL NAME: CART3D(X,Y,NX,NY,F,NF,FO,THX,THY,S0,U,V,TITLE,
I*NTITLE)
J*PURPOSE: MAKE AN ISOMETRIC 3-DIMENSIONAL PLOT OF F VS X*Y
K*ON THE 4020
L*STORAGE: 1514 (OCTAL) WORDS.
M*ROUTINES CALLED: ATAN2(B104A), CDG(B106A), SDG(B106A),
N*MAXV(F115A), MINV(F115A), MAXM(F116A), MINM(F116A), ADV(J506A),
O*EXH(J507A), EXL(J507A), CONVRT(J526A), PLOJB(J562A), DLCH(J567A),
P*DLCV(J567A).

A* K. J. MELENDEZ C-4 70
B*FILM EDIT
C*F4 SR6600 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
H*USE: CALL EDITFF(IFLG,JMAX,IN,OUT,NFRM).
I*PURPOSE: TO EDIT A FILM FILE IN TERMS OF FRAMES.
J*STORAGE: 3323 (OCTAL) WORDS.
K*ROUTINES CALLED: SHIFN(M401A).
A* MELVIN L. PRUEITT TD-4 R. FRANK

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*LINES*REMOVAL*COLOR
J592A G*CARDS F4 COMPAT WU 02/16/73REV.1 DECK 02/16/73REV.1
J592A 1*FORM: CALL PICTURE (F,X,Y,NX,NY,NX,D,XW,YW,XVIEW,YVIEW,
J592A 2* ZVIEW,BA,RF,SC,LHIDE,LBOX,LINE,CLR)
J592A 3*PURPOSE: PRODUCE 3-D PLOTS IN PERSPECTIVE WITH HIDDEN
J592A 4* LINES OPTIONALLY REMOVED AND WITH THE OPTION TO
J592A 5* PRODUCE COLOR PLOTS.
J592A 6*Routine NAME: PICTURE
J592A 7*ENTRY NAMES: PICTURE
J592A 8*STORAGE: 5516 OCTAL WORDS
J592A 9*Routines CALLED: ATAN2(B104A), COS(B106A), SIN(B106A),
J592A 10* ADV(J506A), TSP(J520A), CONVRT(J526A), DGA(J528A),
J592A 11* PLOT(J541A), WLCH(J542A), COLOR(J569A), ACGOER(SYSTEM),
J592A 12* OUTPTS(SYSTEM).
J592A 13*OTHER EXTERNALS: INSECT
J593A A* JERRY MELENDEZ C-4
J593B B*WRITE FILM HEADER
J593B C*SR6600 SCP 3.1
J593B D* SW 2 LS 6 TYPE 1
J593B E*SRC CARDS 272 BCD OBJECT CARDS 18 BIN
J593B F*WRITE FILM HEADER
J593B G*CARDS F4 COMPAT WU 06/17/71 DECK 06/17/71
J593B 1*FORM: CALL WFH(N*STRING)
J593B 2*ARGUMENTS: N = NUMBER OF WORDS IN THE ARRAY STRING
J593B 3* STRING= ARRAY CONTAINING N WORDS OF DISPLAY CODE CHAR.
J593B 4*PURPOSE: THE N WORDS OF DISPLAY CODE CHARACTERS IN STRING
J593B 5* ARE WRITTEN AS N FRAMES ON FILM USING $ SIGNS
J593B 6*STORAGE: 300 OCTAL WORDS.
J593B 7* TIMING: 21 MS PER WORD.
J593B 8*EXTERNALS: BS4020(SYSTEM).

J594A A* JOHN SAVAGE ENG-6
J594B B*XHATCH TO HATCH RECTANGULAR AREAS ON FILM
J594B C*SR6600 SCP 3.1 SC-4020
J594B D* SW 2 LS 2 TYPE 1
J594B E*SRC CARDS 45 BCD OBJECT CARDS 15 BIN
J594B F*XHATCH=VECTOR=GENERATOR FOR HATCHING FILM
J594B G*CARDS F4 COMPAT WU 06/08/71 DECK 06/08/71
J594B 1*FORM: CALL XHATCH(IX1, II1, IX2, IY2, INC)
J594B 2*PURPOSE: FILL A SPECIFIED RECTANGULAR AREA ON A FILM PLOT
J594B 3* WITH SLOPING PARALLEL VECTORS. VECTOR SLOPE AND
J594B 4* SPACING CAN BE SPECIFIED.
J594B 5*TIMING: CP TIME USED BY DEMONSTRATION PROGRAM CALLING THIS
J594B 6* SUBROUTINE TO CROSSHATCH 30 RECTANGLES WITH VARIOUS
J594B 7* PATTERNS: 2.384 SECONDS ON 6600, 2.750 SECONDS ON
J594B 8* 7600.
J594B 9*ROUTINE NAME: XHATCH
J594B 10*ENTRY NAME: XHATCH
J594B 11*STORAGE: 236 (OCTAL) WORDS.
J594B 12*ROUTINES CALLED: DRV(J517A).
J5-36

A*  JOHN SAVAGE  ENG-6  71
B* XHATCH TO HATCH RECTANGULAR AREAS ON FILM.
C*F4  SR7600  CROS  SC-4020
D*  SW 2  LS 2  TYPE 1
E*F* 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(IIX1*YY1*IX2*YY2*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  71
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(W105B), RQTA (BS4020), BS4020
9*  (ALL ON THE SYSTEM).

VOLUME 2 - 9/73
A* V. GARDINER C-4

B*FILM PLOT ON NORMAL PROBABILITY PAPER

D* SW 6 LS 5 TYPE 1

E*F4 SOURCE CARDS 178 RCD OBJECT CARDS 56 BIN

F**FILM*PLOT*NORMAL PROBABILITY PAPER

G*CARDS F4 COMPAT WU 06/01/72 DECK 06/01/72

1*FORM: CALL PLOPR(X*Y*NPTS*INC*LIN*NSYM*C*XAA*YAA*

LABELZ*NZL*LABELX*NXL*LARELY*NYL)

2* PURPOSE: PLOTS VALUES OF X,Y TABLES ON FILM USING THE

FORMAT OF NORMAL PROBABILITY PAPER WITH LABELLING OF

AXES AND TITLE.

6* ROUTINE NAME: PLOPR

7* ENTRY NAME: PLOPR

8* STORAGE: 1216 OCTAL WORDS.

9* ROUTINES CALLED: ADV(J506A), ALOG10(B305A), ASCL(J510A),

CONVRT(J526A), DGA(J528A), DLCH(J567A), DFCV(J567A),

DLGLG(J530A), DLGLN(J530A), DNLG(J530A), DNLN(J530A),

DRV(J517A), EXH(J507A), EXL(J507A), FRAME(J523A),

GXA(J518A), GYA(J518A), MAXV(F115A), MINV(F115A),

PLT(J516A), SBLIN(J535A), SBLG(J540A), SLLIN(J533A),

SLLUG(J540A), TSP(J520A), ALL ON DISK.

VOLUME 2 = 9/73
**CONTOR PLOTTING OF ARBITRARILY SPACED DATA POINTS**

**SOURCE CARDS** 376 BCD

**OBJECT CARDS** 123 BIN

**FUNCTION**

\[ z = f(x, y) \], WHERE THE \((x, y)\) PAIRS ARE PERMITTED TO BE IRREGULARLY SPACED.

**STORAGE:** 3775 OCTAL WORDS (EXCLUSIVE OF STORAGE WHICH MUST BE ASSIGNED BY USER)

**ROUTINES CALLED:** MINV(F115A), MAXV(F115A), PLOJB(J562A), ATAN(B104A), SQRT(B408A).
A# V GARDINER C-4 R MITCHELL T-6 73

**B**PHISTF, HISTOGRAM PLOT ROUTINE

**C**F4 SR7600 CROS MICROFILM

**D** SW 7 LS 2 TYPE 1

**E**SOURCE CARDS 69 RCD OBJECT CARDS 27 BIN

**F**HISTOGRAM PLOT ROUTINE

**G**CARDS F4 COMPAT WU 02/08/73 DECK 02/08/73

**H**FORM: CALL PHISTF(X,Y,NPTS,INC,YB,YT,NYSM,XINC,XAA,YAA,

**I**2* LBLX,LBY,NX,LBY,NY)

**J**Purpose: PLOT VERTICAL HISTOGRAMS ON FILM.

**K**Routine Name: PHISTF

**L**ENTRY NAME: PHISTF

**M**Storage: 514 OCTAL WORDS

**N**Routines Called: PLOTM(J599A)

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A# V GARDINER C-4 R MITCHELL T-6 73

**B**PHISTF, HISTOGRAM PLOT ROUTINE

**C**F4 SR7600 CROS MICROFILM

**D** SW 7 LS 2 TYPE 1

**E**SOURCE CARDS 69 RCD OBJECT CARDS 28 BIN

**F**HISTOGRAM PLOT ROUTINE

**G**ON DISK F4 COMPAT WU 02/08/73 DECK 02/08/73

**H**FORM: CALL PHISTF(X,Y,NPTS,INC,YB,YT,NYSM,XINC,XAA,YAA,

**I**2* LBLX,LBY,NX,LBY,NY)

**J**Purpose: PLOT VERTICAL HISTOGRAMS ON FILM.

**K**Routine Name: PHISTF

**L**Entry Name: PHISTF

**M**Storage: 524 OCTAL WORDS

**N**Routines Called: PLOTM(J599B)
VOLUME 2 - 9/73
A* R. L. ELLIOT  TD=5 R. FRANK  72
B* M2C - THE MAGEE MOVIE CODE
C* F4 CMP MP7600 CROS REQUIRES MICROFILM
D* SW 48 LS 0 TYPE 2
E* NO CARDS
F* M2C MAGEE MOVIE
G* PERMFILE WU 02/12/73 REV. 2 DECK NONE
1* FORM: MAIN PROGRAM
2* PURPOSE: MAKE MOVIES FROM DATA GIVEN ON TAPE. SEE PAGE 4
3* OF WRITEUP FOR OTHER USES.

A* R. M. FRANK C-4
B* CONVERT CALCOMP FILE TO MUX FREE FILE
C* F4 MP6600 SCP 3.1
D* SW 1 LS 4 TYPE 2
E* SOURCE 114 CARDS OBJECT 34 CARDS
F* CALCOMP MUX
G* CARDS F4 COMPAT WU 07/05/73 DECK 07/05/73
1* FORM: MAIN PROGRAM
2* PURPOSE: READ CALTAPE FILE WHICH CONTAINS CALCOMP
3* INSTRUCTIONS AND CREATE MUXTAPE FILE WHICH CONTAINS
4* ON-LINE CALCOMP INSTRUCTIONS.
5* CALTAPE MUST BE REWOUND BEFORE ENTERING THIS
6* PROGRAM. CALTAPE AND MUXTAPE FILENAMES MAY BE CHANGED
7* BY USING THE FILENAME REPLACEMENT FEATURE OF THE LOADER.
8* THE STORAGE AVAILABLE FOR CREATING BUFFER SPACE FOR
9* MUXTAPE IS CALCULATED BY THE PROGRAM. STORAGE MAY BE
10* INCREASED BY INCREASING THE FIELD LENGTH ON THE JOB CARD
11* AND USING SC=* TO PREVENT AUTOMATIC FIELD LENGTH
12* REDUCTION BY THE SYSTEM.
13* PROGRAM CARD: PROGRAM CALCVT (CALTAPE=100*MUXTAPE=100,
14* OUTPUT)
15* ROUTINE NAME: CALCVT
16* ENTRY NAME: CALCVT
17* STORAGE: AT LEAST 16300 OCTAL WORDS
18* ROUTINES CALLED: PUT/FETCH(M403)*CPAREA(Q401).
19* LOCF(SYSTEM), LENGTH(SYSTEM)
J601 A

V. GARDINER C-4 R FRANK 73

J601 B

DRAW LINEAR-LINEAR TIC MARKS ON FILM.

J601 C

SR6600 SCP 3.1

J601 D

SW 1 LS 1 TYPE 1,1

J601 E

SOURCE CARDS 29 BCD OBJECT CARDS 12 BIN

J601 F

**FILE** TIC MARKS

J601 G

CARDS F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1

J601 H

1*FORM: CALL DLNLNTM (NX,NY)

J601 I

2*PURPOSE: DLNLNTM draws a frame around the area specified

J601 J

3* in the last call to DGA(J528). It draws a linear-linear grid of tic marks, dividing the

J601 K

5* frame into a specified number of intervals.

J601 L

6* NX = number of intervals in which the X axis

J601 M

7* is divided, NX GT 0.

J601 N

8* NY = number of intervals in which the Y axis

J601 O

9* is divided, NY GT 0.

J601 P

10*Routine Name: DLNLNTM

J601 Q

11*Entry Name: DLNLNTM

J601 R

12*Storage: 152 OCTAL WORDS

J601 S

13*Routines Called: GXA(J518A), GYA(J518A), DRV(J517A),

J601 T

14* Name Common CJE07(10 OCTAL WORDS).

J601 A

V. GARDINER C-4 R FRANK 73

J601 B

DRAW LINEAR-LINEAR TIC MARKS ON FILM.

J601 C

SR6600 SCP 3.1

J601 D

SW 1 LS 1 TYPE 1,1

J601 E

SOURCE CARDS 29 BCD OBJECT CARDS 12 BIN

J601 F

**FILE** TIC MARKS

J601 G

CARDS F4 COMPAT WU 05/08/73 REV.1 DECK 05/08/73 REV.1

J601 H

1*FORM: CALL DLNLNTM (NX,NY)

J601 I

2*PURPOSE: DLNLNTM draws a frame around the area specified

J601 J

3* in the last call to DGA(J528). It draws a linear-linear grid of tic marks, dividing the

J601 K

5* frame into a specified number of intervals.

J601 L

6* NX = number of intervals in which the X axis

J601 M

7* is divided, NX GT 0.

J601 N

8* NY = number of intervals in which the Y axis

J601 O

9* is divided, NY GT 0.

J601 P

10*Routine Name: DLNLNTM

J601 Q

11*Entry Name: DLNLNTM

J601 R

12*Storage: 152 OCTAL WORDS

J601 S

13*Routines Called: GXA(J518A), GYA(J518A), DRV(J517A),

J601 T

14* Name Common CJE07(10 OCTAL WORDS).
**Call DLNLGTM (NX) Linear X vs Log Y**

**Call DLGLNTM (NY) Log X vs Linear Y**

**Call DLGLGTM**

**Purpose:** Draw grid of tic marks as determined by

**Purpose:** A log axis is limited to 25 decades,

**Purpose:** A linear grid divides the axis into NX or NY intervals.

**Routine Name:** DLNLGTM

**Entry Names:** DLNLGTM, DLGLNTM, DLGLGTM

**Storage:** 524 (octal) words

**Routines Called:** GXA(J518A), GYA(J518A), DLNLNTM(J601A), DRV(J517A), NAME COMMON CJE07(10 octal words).
A* V. GARDINER C-4 R. FRANK 73

B*POLAR COORDINATE GRAPH FOR CALCOMP

C*F-4 SR6600 SCP3.1 CALCOMP

D* SW 4 LS 4 TYPE 1

E*SOURCE CARDS 124 BCD OBJECT CARDS 42 BIN

F**POLAR COORDINATE GRAPH CALCOMP

G*CARDS F4 COMPAT WU 03/01/73 DECK 03/01/73

H*FORM CALL POLCC(N,R,THETA,ICHA,ICON,

I*GRID, XC,YC, XR,TITLE, NC)

J*PURPOSE: DRAW A POLAR COORDINATE GRAPH OF A SET OF

K*POINTS ON THE CALCOMP WITH A TITLE.

L*ROUTINE NAME: POLCC

M*ENTRY NAME: POLCC

N*STORAGE: 1032 OCTAL WORDS

O*Routines Called: PLTZ(J549A), NUMBER(J545A), CIRCL(J581A),

P*SVECTOR(J559A), SCALE(J546A), LINE(J548A).

A* V. GARDINER C-4 R. FRANK 73

B*POLAR COORDINATE GRAPH FOR CALCOMP

C*F-4 SR7600 CROS CALCOMP

D* SW 4 LS 3 TYPE 1

E*SOURCE CARDS 124 BCD OBJECT CARDS 42 BIN

F**POLAR COORDINATE GRAPH CALCOMP

G*ON DISK F4 COMPAT WU 03/01/73 DECK 03/01/73

H*FORM CALL POLCC(N,R,THETA,ICHA,ICON,

I*GRID, XC,YC, XR,TITLE, NC)

J*PURPOSE: DRAW A POLAR COORDINATE GRAPH OF A SET OF

K*POINTS ON THE CALCOMP WITH A TITLE.

L*ROUTINE NAME: POLCC

M*ENTRY NAME: POLCC

N*STORAGE: 1036 OCTAL WORDS

O*Routines Called: PLTZ(J549B), NUMBER(J545B), CIRCL(J581B),

P*SVECTOR(J559B), SCALE(J546B), LINE(J548B).
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
1* FORM: CALL BARPLOT (X1, X2, Y1, Y2, SPACING, ANGLE)
2* PURPOSE: DRAW SCALED RECTANGLE AND SHADE IT. SCALING
3* IS ESTABLISHED BY PRIOR CALL TO PLOJB(J562) OR
4* ROUTINE NAME: BARPLOT
5* ENTRY NAMES: BARPLOT
6* STORAGE: 467 OCTAL WORDS
7* ROUTINES CALLED: PLOTM(J599)

A* R.M. FRANK C-4 R.M. FRANK  73
B* DRAW AND SHADE RECTANGLE ON FILM
C* F4 SR7600 CROS MICROFILM
D* SW 4 LS 3 TYPE 1,1
E* SOURCE 88 CARDS OBJECT 25 CARDS
F** MICROFILM RECTANGLE
G* DISK F4 COMPAT WU 06/11/73 DECK 06/11/73
1* FORM: CALL BARPLOT (X1, X2, Y1, Y2, SPACING, ANGLE)
2* PURPOSE: DRAW SCALED RECTANGLE AND SHADE IT. SCALING
3* IS ESTABLISHED BY PRIOR CALL TO PLOJB(J562) OR
4* ROUTINE NAME: BARPLOT
5* ENTRY NAMES: BARPLOT
6* STORAGE: 475 OCTAL WORDS
7* ROUTINES CALLED: PLOTM(J599)
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 I/O
K101B G*ON DISK F4 COMPAT WU 10/10/72REV 1 DECK 10/10/72REV 1
K101B 1*FORM1 CALL IRANR(N,LCMV,NWORDS,NSECT, IWAIT)
K101B 2* CALL IRANW(N,LCMV,NWORDS,NSECT, IWAIT)
K101B 3* CALL IRANRE(N,NLCM,NWORDS,NSECT, IWAIT)
K101B 4* CALL IRANWE(N,NLCM,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(K101B).
K101B 10*ROUTINE NAME: IRANRW
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 I/O
K102B G*ON DISK F4 COMPAT WU 10/10/72REV 1 DECK 10/10/72REV 1
K102B 1*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 READS NWORDS FROM SECTOR NSECT OF
K102B 6* FILESET FS WITH RQT INTO LCM VARIABLE LCMV OR WORD NLCM,
K102B 7* IRANW/IRANWE WRITES NWORDS FROM LCMV OR WORD NLCM OF LCM
K102B 8* INTO FILESET FS AT SECTOR NSECT. THIS IS FASTER THAN
K102B 9* RANRW(K101B).
K102B 10*ROUTINE NAME: IRAN
K102B 11*ENTRY NAMES: IRANR,IRANW,IRANRE,IRANWE
K102B 12*STORAGE: 44 OCTAL WORDS
K102B 13*SELF CONTAINED.

VOLUME 2 - 9/73
K103B *(RANRWE) DELETED FROM LIBRARY-NOW COMBINED WITH K101B.

K104B *(IRANE) DELETED FROM LIBRARY-NOW COMBINED WITH K102B.
K201A A* LARA BAKER ENG-DO 69
K201A B*MOVEMC MOVES AN ARRAY IN MAIN CORE THROUGH ECS
K201A C*FORTRAN IV SR6600 SCP 3.1
K201A D* SW 3 LS 1 TYPE 1
K201A E*SOURCE DECK 25 BCD OBJECT CARDS 10 BIN
K201A F**ECS*MOVEMC
K201A G*CARDS F4 COMPAT WU 08/01/69 DECK 08/01/69
K201A 1*CALL MOVEMC(IFROM, ITO, NWDS, IECS, NECS)
K201A 2*PURPOSE TO MOVE AN ARRAY FROM ONE LOCATION IN MAIN MEMORY
K201A 3*TO ANOTHER LOCATION IN MAIN MEMORY,
K201A 4*TIMING SEE ATTACHED GRAPH,
K201A 5*STORAGE 143 (OCTAL) WORDS,
K201A 6*USES ECRD, ECWR (ON THE SYSTEM)

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

VOLUME 2 = 9/73
K203A A* LARA BAKER ENG-DO 69
K203A B*ECR READS ONE WORD FROM ECS
K203A C*COMPASS SR6600 SCP 3.1
K203A D* SW 2 LS 1 TYPE 1
K203A E*SOURCE CARDS 13 BCD OBJECT CARDS 4 BIN
K203A F**ECS*ECR*READ
K203A G*CARDS F4 COMPAT WU 08/01/69 DECK 08/01/69
K203A 1*USAGE: ANS = ECR (LOCE)
K203A 2*PURPOSE: TO READ ONE WORD FROM EXTENDED CORE STORAGE AND
K203A 3*RETURN THE CONTENTS OF THAT WORD AS THE RESULT OF THE
K203A 4*FUNCTION CALL.
K203A 5*TIMING: 15.0 MICROSECONDS
K203A 6*STORAGE: 7 WORDS
K203A 7*SELF CONTAINED.

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

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

VOLUME 2 - 9/73
K204B  A  LARA BAKER  C-4  J MOORE  C-2  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).

K204B  A*  D, PLAISTED  C-4  J MOORE  C-2  72
K204B  B*QUICK EXCHANGE OF TWO SCM ARRAYS
K204B  C*COMPASS  SR7600  CROS
K204B  D*  SW 2  LS 2  TYPE 2
K204B  E*SOURCE CARDS  85  BCD  OBJECT CARDS  5  BIN
K204B  F**VECTOR*SCM VECTOR*VECTOR EXCHANGE*QEXCH
K204B  G*CARDS  F4  COMPAT  WU 09/18/72  DECK 09/18/72
K204B  1*FORM: CALL QEXCH(A,B,N,M,K)
K204B  2*PURPOSE: QUICK EXCHANGE OF TWO SCM ARRAYS
K204B  3*ROUTINE NAME: QEXCH
K204B  4*ENTRY NAME: QEXCH
K204B  5*STORAGE: 26 OCTAL WORDS
K204B  6*ROUTINES CALLED: SELF CONTAINED

K204B  A*  D, PLAISTED  C-4  J MOORE  C-2  72
K204B  B*QUICK MOVE OF AN ARRAY IN SCM
K204B  C*COMPASS  SR7600  CROS
K204B  D*  SW 2  LS 2  TYPE 2
K204B  E*SOURCE CARDS  87  BCD  OBJECT CARDS  5  BIN
K204B  F**VECTOR
K204B  G*CARDS  F4  COMPAT  WU 09/18/72  DECK 09/18/72
K204B  1*FORM: CALL QMOVE(A,B,N,M,K)
K204B  2*FUNCTION: QUICK MOVE OF AN ARRAY IN SCM
K204B  3*ROUTINE NAME: QMOVE
K204B  4*ENTRY NAME: QMOVE
K204B  5*STORAGE: 27 OCTAL WORDS
K204B  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
B*COPY,COPYF,COPYR - COPY PORTIONS OF FILESETS
C*CMP  SR7600  CROS
D*  SW 3  LS 0  TYPE 1
E*  BCD  0  BIN
F**COPY,COPYF,COPYR - COPY PORTIONS OF FILESETS
G*ON DISK  F4  COMPAT  WU 07/12/71  DECK NONE
1*FORM1 CALL COPY(I,O)
2* CALL COPYF(I,O,NF)
3* CALL COPYR(I,O,NR)
4*PURPOSE: COPY DATA FROM FILESET I TO FILESET O, STARTING
5* AT CURRENT FILESET POSITIONS; COPY COPIES TO EOI.
6* COPYF COPIES NF FILES OR TO EOI; COPYR COPIES NR RECORDS
7* OR TO EOI.
8*ROUTINE NAME: COPY
9*ENTRY NAMES: COPY, COPYF, COPYR
10*STORAGE: 145B WORDS OF SCM.
11*ROUTINES CALLED: GETBA, OPEN, WAITR, SYSTEM, ABNORML,
12* (ALL ON SYSTEM).
13*OTHER SCM EXTERNALS: IOGEN, BUFF.

**K303B**

A*  EMILY WILLBANKS  C-2  71
B*CPYSF - COPY SHIFTED FILE FOR SINGLE SPACED LISTING
C*FIV  SR7600  CROS
D*  SW 3  LS 0  TYPE 1
E*  BCD  0  BIN
F**CPYSF,COPY*SHIFTED FILE
G*ON DISK  F4  COMPAT  WU 06/22/71  DECK NONE
1*FORM1 CALL CPYSF(I,O,N,P)
2*PURPOSE: COPY N FILES OF FILESET I (CONTAINING BCD CHAR-
3* ACTERS) TO FILESET O, INSERTING A BLANK AS THE FIRST CHAR-
4* ACTER OF EACH RECORD. IF FILESET O HAS FILM OR SFILM ACTIVE
5* DISPOSITION, IT WILL BE WRITTEN IN 402Q COMMAND FORMAT.
6*ENTRY NAMES: CPYSF
7*ROUTINE NAME: CPYSF
8*STORAGE: 2618 WORDS,
9*ROUTINES CALLED: EOI, IFENDF, INPUTC, LENGTH, MARG, OUTPTC,
10* (ALL ON SYSTEM).
**ULCR - USER LIBRARY CONTROL ROUTINE**

**ENTRY NAME**: ULCR

**ROUTINE NAME**: GETBA (ON SYSTEM)

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**COPYFF - COPY FORTRAN FILE**

**ENTRY NAME**: COPYFF

**ROUTINES CALLED**: EOD, IFENDF, INPUTC, LENGTH, NARG, OUTPTC, (ALL ON SYSTEM)

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**FORM: CALL ULCR(I;L)**

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

**SUITABLE FOR LIBRARY L ON SLOAD OR SLDGO CONTROL CARDS.**

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

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

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

**ROUTINE NAME**: COPYFF

**ENTRY NAMES**: COPYFF

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

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VOLUME 2 - 9/73
K306B A* FRED SCHILLING C-2
K306B B*COPYL - UPDATE LIBRARY OF BINARY DECKS
K306B C*F4 COMPASS SR7600 CROS
K306B D* SW 14 LS 0 TYPE 1
K306B E*SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
K306B F**COPYL*UPDATE*LIBRARY OF*BINARY DECKS
K306B G*ON DISK F4 COMPAT WU 05/10/72REV.1 DECK NONE
K306B 1*FORM: CALL COPYL(OLDBL,CHANGE,NEWBL,ORDER,OUT,CK)
K306B 2*PURPOSE: MAINTAIN AND REARRANGE A LIBRARY OF BINARY DECKS.
K306B 3*TIMING: LARGE LCM BUFFERS ARE NEEDED TO ACHIEVE SPEED.
K306B 4*Routine NAME: COPYL
K306B 5*ENTRY NAMES: COPYL, REPLACE, BREAKUP, DFILE, SUM
K306B 6*STORAGE: 4206 OCTAL WORDS OF SCM, PLUS BLANK COMMON.
K306B 7*USES ONE WORD OF BLANK COMMON FOR EACH RECORD OF MERGE FILE,
K306B 8* PLUS ONE WORD FOR EACH DECK NAME IN THE CONTROL CARD LIST
K306B 9* PLUS TWO.
K306B 10*ROUTINES CALLED: ABNORMAL, ACGOER, ADDRQT, COPYF, COPYR
K306B 11* FETCH, IFENDF, MEMLEN, OPEN, OUTPB, OUTPCT, PUTIT, RDBUF,
K306B 12* REWIND, SHIFN, SKIPF, SKIPR (ON THE SYSTEM).

K307B A* J. NORRIS C-2
K307B B*CKSUM - ADD OR VERIFY CHECKSUMS.
K307B C*F4 SR7600 CROS
K307B D* SW 4 LS 0 TYPE 1.2
K307B E* SOURCE 0 C-2 OBJECT 0 C-2
K307B F**CKSUM*CHECKSUM
K307B G*ON DISK F4 COMPAT WU 06/15/73REV.1 DECK NONE
K307B 1*FORM: CALL CKSUM(IN,OUT,NF,TYPE)
K307B 2*PURPOSE: CALCULATE AND VERIFY CHECKSUMS
K307B 3*Routine NAME: CKSUM
K307B 4*ENTRY NAME: CKSUM
K307B 5*STORAGE: 1630 OCTAL WORDS SCM AND 16000 OCTAL WORDS OF LCM
K307B 6*ROUTINES CALLED: RDBUF(Q417B), WTBUF(Q417B), SKIPR(W364B),
K307B 7* CKSUM2(K310B), LCROLOT/LCROLIN(Q306B),
K307B 8* MEMREQ/MEMREL/MEMLEN(Q3G5B), OPEN(W115B),
K307B 9* MESSAGE(Q116B), SHIFN(M401B), SYSFS(W116B),
K307B 10* GETQ(Q414B), ENDFIL, OUTPB, ABNORML, ACGOER, LAFST
K307B 11* (ALL ON SYSTEM).
K3088 A* EMILY WILLBANKS C-2 J NORRIS 73
K3088 B*COPYRS = COPY ONE SEQUENTIAL RECORD TO RANDOM FILESET
K3088 C*COMPASS SR7600 CROS
K3088 D* SW 3 LS 0 TYPE 1.2
K3088 E* SOURCE 0 C-2 OBJECT 0 C-2
K3088 F**COPY*RANDOM*SEQUENTIAL
K3088 G*ON DISK F4 COMPAT WU 06/13/73 REV.1 DECK NONE
K3088 1*FORM I 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), COPYBFS(W404B),
K3088 15*OTHER SCM EXTERNALS: IOGEN(SYSTEM)
K3088 16*LCM BLOCK NAMES: MALCM, RANSEQ

K3098 A* EMILY WILLBANKS C-2 J NORRIS 73
K3098 B*COPYRS - COPY RANDOM FILESET TO ONE SEQUENTIAL RECORD
K3098 C*COMPASS SR7600 CROS
K3098 D* SW 3 LS 0 TYPE 1.2
K3098 E* SOURCE 0 C-2 OBJECT 0 C-2
K3098 F**COPY*RANDOM*SEQUENTIAL
K3098 G*ON DISK F4 COMPAT WU 06/13/73 REV.1 DECK NONE
K3098 1*FORM I 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* LCMREL(Q306B), COPYBFS(W404B),
K3098 15*OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)
K3098 16*LCM BLOCK NAMES: MALCM, RANSEQ

VOLUME 2 - 9/73
**K3-5**

**A** J. NORRIS C-2 J. NORRIS 73

**K310B** BACKSUM2 - 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

K501A A* B. L. BUZBEE C-4 JAN NORRIS 72
K501A B*READ(WRITE) A 7094 BINARY TAPE
K501A C*F4 SR6600 SCP 3.1
K501A D* SW 1 LS 2 TYPE 1
K501A E*F4 SOURCE CARDS 32 BCD OBJECT CARDS 24 BIN
K501A F**READ(WRITE) A 7094 BINARY TAPE
K501A G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
K501A 1*FORM: CALL WRIT94(A,NW,NT)
K501A 2* CALL READ94(A,NW,NT)
K501A 3*PURPOSE: WRITES BITS 56 THRU 21 OF WORDS A(1) THRU (NW)
K501A 4* ON TO 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(I) 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

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

VOLUME 2 - 9/73
**K503A**

A* JAMES F. BEM C-4 J. NORRIS 73

B*CROS76 - READ 7600-FORMAT TAPE ON 6600

C*F4=CMP MP6600

D* SW 5 LS 0 TYPE 1.2

E*F4=CMP SOURCE 0 BCD OBJECT CARDS 0 BIN

F**MAGNETIC TAPE CONVERSION

G*PERMFILE F4 COMPAT WU 03/13/73 DECK NONE

I*CONTROL CARD FORM:

2* ASSIGN AB, CROS76.

3* COPY(CROS76, CROS)

4* RETURN(CROS76)

5* ASSIGN MT, TAPEIN(PUL, XX, . . . , SMB)

6* ASSIGN MT, TAPEOUT(

7* CROS(BIN, TAPEIN, TAPEOUT, OUTPUT)

8*PURPOSE: CONVERT 7600-FORMAT TAPE TO 6600-FORMAT TAPE

9*ROUTINE NAME: CROS76

10*STORAGE: 16000 OCTAL WORDS FOR BCD OUTPUT. VARIABLE

11* FOR BINARY. SEE WRITEUP.

12*SELF CONTAINED

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**K5AA**

A* DUANE HARDER C-4 J. NORRIS 70

B*TSUB

C*COMPASS MP7600 CROS

D* SW 2 LS 3 TYPE 2

E*SOURCE CARDS 75 BCD OBJECT CARDS 9 BIN

F**TSUB

G*CARDS CMP WU 09/28/72 DECK 09/28/72

I*FORM: MAIN PROGRAM

2*PURPOSE: TSUB IS A MAIN PROGRAM WHICH RUNS ON CROS. TSUB

3* READS A FILESET CALLED TAPE1 WHICH CONTAINS BCD CODED

4* INFORMATION IN BINARY FORM, CONVERTS THIS TO CARD

5* IMAGES, AND WRITES THEM TO THE FILESET CALLED TAPE2.

6* THE FILESETS TAPE1 AND TAPE2 MUST BE OPENED PRIOR TO

7* EXECUTING TSUB, ALL DATA ON TAPE1 IS CONVERTED.

8*ROUTINE NAME: TSUB

9*ENTRY NAME: TSUB

10*STORAGE: 1157 OCTAL WORDS

11*ROUTINES CALLED: SELF CONTAINED

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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 F**UT01*PAPER*TAPE*CARD*GE
K6AA G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
K6AA 1*FORM: MAIN PROGRAM
K6AA 2*PURPOSE: CONVERTS A RUNNING GE FORTRAN PROGRAM ON PAPER
K6AA 3* TAPE TO 6600 RUN FORTRAN FORMAT. REQUIRES CONTROL
K6AA 4* CARD: REQUEST TAPE PP, UD.
K6AA 5*ROUTINE NAME: UT01
K6AA 6*ENTRY NAMES: UT01, FILL, WRITE, BUF, GTNX, NEWLINE
K6AA 7*STORAGE: 42,300 OCTAL WORDS,
K6AA 8*SELF CONTAINED.

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

VOLUME 2 - 9/73
L3 CLEAN

E.G., TIDY.

REVIEWER: A. SOLEM, C-4

L301A A* A SOLEM C-4 72
L301A B* TIDY - RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301A C*F4 MP6600 SCP 3.1
L301A D* SW 15 LS 44 TYPE 1
L301A E*6600 SOURCE DECK = TAPE NO. LC65010 OBJECT DECK 1583 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 1*6600 CONTROL CARD FORM:
L301A 2* TIDY(INPUT,PUNCH,OUTPUT,TAPE20,TAPE21)
L301A 3*PURPOSE: RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301A 4*ROUTINE NAME: TIDY
L301A 5*ENTRY NAME: TIDY
L301A 6*STORAGE: 57000 OCTAL WORDS
L301A 7*ROUTINES CALLED: SELF CONTAINED

L301B A* A SOLEM C-4 72
L301B B* TIDY - RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS
L301B C*F4 MP7600 CROS
L301B D* SW 15 LS 44 TYPE 1
L301B E*7600 SOURCE DECK = TAPE NO. LE242100 OBJECT DECK 809 BIN
L301B F**TIDY*RENUMBER AND *EDIT*FORTRAN*SOURCE PROGRAMS
L301B G*ON DISK F4 COMPAT WU 08/29/72 DECK 08/29/72
L301B 1*7600 CONTROL CARD FORM:
L301B 2* TIDY(INPUT,PUNCH,OUTPUT,TAPE20,TAPE21)
L301B 3*PURPOSE: RENUMBER, EDIT, AND TIDY FORTRAN SOURCE PROGRAMS.
L301B 4*ROUTINE NAME: TIDY
L301B 5*ENTRY NAME: TIDY
L301B 6*STORAGE: 46000 OCTAL WORDS
L301B 7*ROUTINES CALLED: IOCHECK(SYSTEM)
UPDATE

E.g., UPDATE, COPYL

REVIEWER: F. Mcgirr, C-4

L401A *(CREATE) DELETED FROM THE LIBRARY

L402A *(PREEDIT) DELETED FROM THE LIBRARY

L403A *(EDIT2) DELETED FROM THE LIBRARY

L404A *(EDIT) DELETED FROM THE LIBRARY

L405A *(AFWL) DELETED FROM THE LIBRARY

L407A A* ANN SOLEM C-2
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
1 Turbort MAIN PROGRAM
2 PURPOSE: MOLL-FIXUP IS A SET OF TWO PROGRAMS USED TO
3 MAINTAIN A LIBRARY OF SYMBOLIC AND BINARY
4 INFORMATION. MOLL IS USED TO UPDATE SOURCE CARDS.
5 FIXUP IS USED TO UPDATE BINARY FILES.
6 ROUTINE NAMES: MOLL, FIXUP
DATA HANDLING
SORTING

REVIEWER: P. IWANCHUK, 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  2*PURPOSE: TO SORT, ALGEBRAICALLY, A TABLE (X) OF INTEGER
M101A  3*STORE Normalized FLOATING POINT NUMBERS AND TO ORDER UP TO 7
M101A  4*TABLES (Y), OF DEPENDENT NUMBERS ON THE X SORT.
M101A  5*STORAGE: 275 (OCTAL) WORDS. SORT TIME=58*N**1.29 MICROSECS.
M101A  6*Routines Called: LOCF (ON THE SYSTEM).

STANLEY HALL       P-12

M115A  A*       ROGER STUTZ       T-2
M115A  B*ORDER1, ORDER2
M115A  C*F4       SR6600       SCP 3.1
M115A  D*       SW 3       LS 2       TYPE 1
M115A  E*SOURCE CARDS       72 BCD       OBJECT CARDS       17 BIN
M115A  F**SORT2 ECS
M115A  G*CARDS       F4 COMPAT       WU 08/13/70       DECK 08/13/70
M115A  1*USE: CALL SORT2(N,L,X,X,IC,JJ,*,Y,*,Y,*)
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: ECRD, ECWR (ON THE SYSTEM).

VOLUME 2 - 9/73
PART 4

M117A A*  PAUL IWANCHUK  C-4  P. IWANCHUK  72
M117A B*SORT2 - TWO LEVEL EXTENDED SORT ROUTINE
M117A C*F4  SR6600  SCP 3.1
M117A D*  SW 3  LS 2  TYPE 1.1
M117A E*F4 SOURCE CARDS  44 BCD OBJECT CARDS 12 BIN
M117A F**SORT2*SORTING* TWO LEVEL EXTENDED SORT
M117A G*CARDS  F4 COMPAT WU 06/14/73 REV 2 DECK 06/14/73 REV 1
M117A H*FORM:  CALL SORT2(N, IY1, INC1, IY2, INC2, IT, M)
M117A I* PURPOSE: OBTAIN THE SORTING ORDER FOR TWO TABLES IY1 AND IY2.
M117A J* IY2 IS USED TO DETERMINE THE ORDERING ONLY OF ELEMENTS
M117A K* OF IY1 WHICH ARE IDENTICAL. OTHERWISE, THE ORDERING
M117A L* IS BASED ON THE ELEMENTS OF IY1.
M117A M* ROUTINE NAME: SORT2
M117A N*ENTRY NAME: SORT2
M117A O* STORAGE: 207 (OCTAL) WORDS
M117A P*SELF CONTAINED

VOLUME 2 - 9/73
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,XBAS,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 TO XBAR AND MFLAG = 0, OR I IS SET SO THAT ABS(X(I)).
M118A 4* I = LT,XBAR,LT,ABS(X(I+1)) AND MFLAG = 1, IF XBAR IS NOT WITHIN THE RANGE OF THE TABLE X RETURN IS WITH MFLAG = 2.
M118A 5*ROUTINE NAME: SEARCH
M118A 6*ENTRY NAME: SEARCH
M118A 7*STORAGE: 207 OCTAL WORDS.
M118A 8*ROUTINES CALLED: LABRT(N103A).

M119A A* LARA BAKER TD-7 P. IWANCHUK 72
M119A B*ESEARCH - A BINARY SEARCH THROUGH EXTENDED CORE STORAGE
M119A C**F4 CMP SR6600 SCP 3.1
M119A D* SW 2 LS 1 TYPE 1
M119A E*SOURCE CARDS 27 BCD OBJECT CARDS 10 BIN
M119A F**ESEARCH*ECS
M119A G*CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
M119A 1*FORM: CALL ESEARCH(XBAR,XBAS,N;I,MFLAG,INC)
M119A 2*PURPOSE: TO RAPIDLY SEARCH AN ARRAY OF MONOTONICALLY 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).
A * R.F. THOMAS T-5

- ALPHABETIC SORT FILE

C *FORTRAN IV SR6600 SCP 3.1 ECS

D * SW 4 LS 10 TYPE 2

E *SOURCE CARDS 553 BCD OBJECT CARDS 131 BIN

F **ALPHABETIC SORT FILE

G *CARDS F4 COMPAT WU 08/07/69 DECK 08/07/69

1 *CALL SORT(INP,OUT,TMPSTO,LREC,LTMP,NT,NC,MXEC)

2 *SORT READS FILE #INP# AND SORTS THE RECORDS ALPHABETICALLY.

3 *WRITING THE SORTED RECORDS ON FILE #OUT#.

4 *OCCUPIES 3014 (OCTAL) WORDS.

5 *THE PACKAGE INCLUDES 6 FORTRAN SUBROUTINES, WHICH IN ADDITION

6 TO SORT HAVE THE NAMES #CORSET#, #RSRT#, #MERGE#, #LEN1#, 

7 AND #LEN2#. THE FOLLOWING STANDARD LIBRARY SUBROUTINES ARE

8 *USED: CPAREA(Q401A), SHIFT(M401A), ECWR, ECRD, AND LENGTH.
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. Iwanachuk, C-4

**M2aa** *(UT01) has been redesignated K6AA.*

**M2ab** *(UT02) has been redesignated K6AB.*

**M2ac** *(UT03) has been redesignated K6AC.*

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**M2ad**

| A* | B.L. Buzbee | C-4 | P. Iwanachuk | 72 |

**B** convert 6600(7094) Floating Pt. to 7094(6600) FL, PT.

**C** F4 SRT6600 SCP 3.1

**D** SW 1 LS 1 TYPE 2

**E** F4 source cards 7 BCD object cards 6 BIN

**F** F4 CARDS F4 COMPAT WU 09/22/72 DECK 09/22/72

**G** 1* FORM: Y = F66F94(X)

**H** 2* X = F94F66(Y)

**I** 3* PURPOSE: F66F94 converts the 60 bit 6600 FL, PT. number

**J** 4* IN X INTO A 36 BIT 7094 FL, PT. NUMBER STORED IN

**K** 5* BITS 56 THRU 21 OF Y.

**L** 6* F94F66 IS THE CONVERSE OF THE ABOVE.

**M** 7* ROUTINE NAME: F66F94

**N** 8* ENTRY NAMES: F66F94, F94F66

**O** 9* STORAGE: 53 OCTAL WORDS.

**P** 10* SELF CONTAINED.

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**Volume 2 - 9/73**
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).

VOLUME 2 - 9/73
BIT OR CHARACTER MANIPULATION
E.G., SHIFT, PUT, FETCH.

REVIEWER: P. IWANCHUK, C-4

M401A  A* B.L. BUZBEE C-4  J.D. KERSHNER 67
M401A  B*SHIFT
M401A  C*COMPASS SR0600 SCP 3.1
M401A  D* SW 1 LS 1
M401A  E*COMPASS SOURCE CARDS 30 HCD 4 BIN
M401A  F**SHIFT AND SHIFT
M401A  G*ON DISK F4 COMPAT WU 01/24/69 REV 3 DECK 01/02/69 REV 2
M401A  I*CALL SHIFT(IN,OUT,NBITS) WHERE IN IS THE WORD TO BE
M401A  2*SHIFTED, OUT IS THE SHIFTED RESULT NBITS IS THE NUMBER
M401A  3*OF BITS TO BE SHIFTED LEFT OR RIGHT, NBITS POSITIVE
M401A  4*INDICATES A RIGHT SHIFT, NEGATIVE A LEFT SHIFT
M401A  5*SIGN EXTENSION AND END AROUND ARE ZEROED OUT
M401A  6*CALL SHIFT(A,B,N) WHERE A IS THE WORD TO BE SHIFTED, B IS THE
M401A  7*RESULT, AND N IS THE NUMBER OF BITS TO SHIFT, N POSITIVE
M401A  8*PRODUCES LEFT SHIFT(END AROUND), N NEGATIVE PRODUCES RIGHT
M401A  9*SHIFT(END-OFF WITH SIGN EXTENSION).
M401A  10*STORAGE 13 WORDS
M401A  11*THIS ROUTINE IS SELF CONTAINED

VOLUME 2 - 9/73
R. FRANK

C-4

P. IWANCHUK

69

M403A

B*PUTS AND FETCHES CHARACTERS

M403A

C*COMPASS

SR6600

SCP 3.1

M403A

D*SW 1  LS 1  TYPE 1.1

M403A

E*SOURCE CARDS

43

BCD

OBJECT CARDS

6

BIN

M403A

F*PUT*FETCH*CHARACTER

M403A

G*DISK

F4 COMPAT WU 05/25/73 REV.3 DECK 05/12/70 REV.2

M403A

1*FORM

CALL PUT (N,X,Y)

M403A

2* WHERE

N = NTH CHARACTER OF ARRAY X.

M403A

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

M403A

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

M403A

5* CALL FETCH(N,X,Y)

M403A

6* WHERE

N = NTH CHARACTER OF ARRAY X.

M403A

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

M403A

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

M403A

9* PURPOSE:

PUT A CHARACTER INTO NTH CHARACTER OF AN ARRAY

M403A

10* OR FETCH THE NTH CHARACTER FROM AN ARRAY OF

M403A

11* 10 CHARACTER WORDS,

M403A

12* AND STORE IT RIGHT ADJUSTED INTO A WORD.

M403A

13*Routine Name: PUT

M403A

14*ENTRY NAMES: PUT, FETCH

M403A

15*STORAGE: 42 (OCTAL) WORDS

M403A

16*SELF CONTAINED

VOLUME 2 - 9/73
A*  L. RUDSINSKI  C-4  R FRANK  72
B*MOVE STRING OF CHARACTERS FROM X TO Y
C*COMPASS  SR6600  SCP 3.1
D*  SW 2  LS 6  TYPE 1
E*SOURCE CARDS  132 BCD OBJECT CARDS  8 BIN
F**CHARACTER *STRING
G*CARDS  F4  COMPAT WU 05/26/72REV.3 DECK 05/26/72REV.3
1*FORM1 CALL PUTIT(X,JCH1,JCH2,Y,K1)
2*PURPOSE1 MOVE CHARACTERS JCH1 THRU JCH2 FROM ARRAY X TO
3*  ARRAY Y AT POSITION K1.
4*ROUTINE NAME1 PUTIT
5*ENTRY NAME1 PUTIT
6*STORAGE1 102 OCTAL WORDS
7*Routines CALLED1 PUT(M403A)

A*  L. RUDSINSKI  C-4  R, FRANK  72
B*MOVE STRING OF CHARACTERS FROM X TO Y
C*COMPASS  SR7600  CROS
D*  SW 2  LS 6  TYPE 1
E*SOURCE CARDS  132 BCD OBJECT CARDS  8 BIN
F**CHARACTER *STRING
G*ON DISK  F4  COMPAT WU 05/26/72REV.1 DECK05/26/72REV.1
1*FORM1 CALL PUTIT(X,JCH1,JCH2,Y,K1)
2*PURPOSE1 MOVE CHARACTERS JCH1 THRU JCH2 FROM ARRAY X TO
3*  ARRAY Y AT POSITION K1.
4*ROUTINE NAME1 PUTIT
5*ENTRY NAME1 PUTIT
6*STORAGE1 102 (OCTAL) WORDS
7*Routines CALLED1 PUT(M403A)

A*  JENNIE BORING  C-4  69
B*GETIT
C*FORTRAN  IV  SR6600  SCP 3.1
D*  SW 2  LS 1  TYPE 1
E*SOURCE CARDS  18 BCD OBJECT CARDS  7 BIN
F**GETIT
G*CARDS  F4  COMPAT WU 08/14/69 DECK 08/14/69
1*USAGE1 CALL GETIT(X,JCH1,JCH2,Y) WHERE1 X= AN ARRAY,
2*PURPOSE1 TO STORE A STRING OF CHARACTERS (MAX. LENGTH 10)
3*OF AN ARRAY INTO A VARIABLE,
4*STORAGE1 76 (OCTAL) WORDS
5*USES1 ASHIFT(M406A), SHIFT(M401A).

VOLUME 2  -  9/73
M4-4

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 4 (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* VERN A GARDINER C-4 72
M411B B* NONES AND IPARITY RETURN NUMBER OF ONES OR PARITY
M411B C* CMP SR7600 CROS
M411B D* SW 2 LS 1 TYPE 1
M411B E* CMP SOURCE CARDS 20 BCD OBJECT CARDS 4 BIN
M411B F** NONES IPARITY
M411B G* ON DISK F4 COMPAT WU 03/02/72 DECK 03/02/72
M411B 1* FORM: N = NONES(WORD)
M411B 2* I = IPARITY(WORD)
M411B 3* PURPOSE: NONES RETURNS NUMBER OF ONES IN WORD, IPARITY
M411B 4* RETURNS 1 IF NUMBER OF ONES IN WORD IS ODD OR 0 IF
M411B 5* NUMBER OF ONES IS EVEN.
M411B 6* ROUTINE NAME: NONES
M411B 7* ENTRY POINTS: NONES, IPARITY
M411B 8* STORAGE: 12 (OCTAL) WORDS.
M411B 9* SELF CONTAINED.

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

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

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 3.1 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.6
M413A 4* IF NBITSGE0, LEFT SHIFT CIRCULAR,
M413A 5* IF NBITSLT0, 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.24
M413B 4* IF NBITSGE0, LEFT SHIFT CIRCULAR,
M413B 5* IF NBITSLT0, 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

VOLUME 2 - 9/73
TRACING OR TRAPPING

E.g., LabRT. Also includes some interrupt handling (see Q2).

Reviewer: A. Solem, C-4

N103A A* Paul Harper T-1 67
N103A O*Los Alamos Aborter and Message Printer
N103A B*Math SR Errors N1 F4 SR6600 Scope
N103A C* SW 2 LS 1
N103A D*F4 Source Cards 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,LHOL,INT) WHERE ISW AND INT ARE NAMES OF
N103A 12*Fortran IV Integers AND LHOL IS THE NAME OF 50 Hollerith
N103A 13*Characters. Prints messages under format(1H0,9X,5A10,3X,06),
N103A 14*Sets line count, and causes job termination according to ISW
N103A 15*Settings. Used with math subroutines for error messages
N103A 16*And/or job termination.
N103A 17*Self-Contained. 73 words Storage.

N105A A* James T. Koch C-2 69
N105A B*Mode Errors Processed by Programmer (MEPBp)
N105A C*Cmp SR6600 SCP 3,1
N105A D* SW 3 LS 1 TYPE 1
N105A E*Source Cards 43 BCD Object Cards 4 BIN
N105A F*Mode*Error*MEPBp
N105A G*On Disk F4 CompAt WU 10/30/69 Deck 10/30/69
N105A 1*Call Name: MEPBP(IA)
N105A 2*Purpose: Allows the object program to process mode errors.
N105A 3*Storage: 15 (Octal) Words.
N105A 4*Routines Called: PP Routine (On Disk).
N106B A* JERRY MELENDEZ C-4
N106B B*ENTER AN INTERRUPT ADDRESS
N106B C*CMP SR7600 CROS
N106B D* SW 4 LS 0 TYPE 1
N106B E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
N106B F**ENTER INTERRUPT ADDRESS
N106B G*ON DISK F4 COMPAT WU 08/04/71 DECK NONE
N106B 1*FORM: CALL ENTRH (IADD)
N106B 2* CALL ENTR (IADD)
N106B 3* CALL ENTRTM (IADD)
N106B 4*PURPOSE: TO ENTER INTERRUPT ADDRESSES IN USER MONITOR.
N106B 5*ROUTINE NAME: ENTR
N106B 6*ENTRY NAMES: ENTRH, ENTR, ENTRTM
N106B 7*STORAGE: 34 OCTAL WORDS OF SCM.
N106B 8*SELF CONTAINED.

N107B A* JERRY MELENDEZ C-4
N107B B*RETURN FROM AN INTERRUPT STATE
N107B C*CMP SR7600 CROS
N107B D* SW 2 LS 0 TYPE 1
N107B E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
N107B F**RETURN FROM AN INTERRUPT STATE
N107B G*ON DISK F4 COMPAT WU 08/04/71 DECK NONE
N107B 1*FORM: CALL RETNH
N107B 2* CALL RETNS
N107B 3* CALL RETNTM
N107B 4* CALL RETND
N107B 5*PURPOSE: RETURN THE JOB TO ITS PREVIOUS OPERATING STATE.
N107B 6*ROUTINE NAME: RETN
N107B 7*ENTRY NAMES: RETNH, RETNS, RETNTM, RETND.
N107B 8*STORAGE: 30 OCTAL WORDS OF SCM.
N107B 9*SELF CONTAINED.
N1-3

ANN SOLEM  C-4  71
B*XIT,XITFIX AND XITSAVE - HANDLE TASK ABORT
C*F4  SR7600  CROS
D*  SW 4  LS 0  TYPE 1.2
E*F4 SOURCE CARDS 0  C-2 OBJECT CARDS 0  C-2
F**XIT*HANDLE*TASK*ABORT*SOFTWARE*interrupt
G*ON DISK  F4 COMPAT  WU 03/14/73 REV 1 DECK NONE
H*FORM1: CALL XIT(LOC)
I*  CALL XITFIX(KJST,IP,IPSD)
J*  CALL XITSAVE(LOC,LOOP)
K*  CALL XIT(LOC,LOOP)
L*PURPOSE: XIT ALLOWS A TASK TO CONTINUE RUNNING AFTER A
M* TASK ABORT HAS BEEN REQUESTED. TRANSFERRING
N* CONTROL TO LOC.
O* XITFIX RETURNS INFORMATION REGARDING THE LAST
P* TASK ABORT AND TURNS OFF THE ERROR FLAG.
Q* XITSAVE AND XIT SAVE AND RESTORE AN EXIT, SO THAT
R* A DIFFERENT EXIT CAN BE ESTABLISHED.
S*ROUTINE NAME: XIT
T*ENTRY NAMES: XIT, XITFIX, XITSAVE
U*STORAGE: 266 (OCTAL) WORDS OF SCM
V*ROUTINES CALLED: ENTR(N106), GETSPK(Q413), SETSPK(Q413),
W*RETN(N107), REMARK(Q116), ABORT(N203), OUTPTS(SYSTEM)

JERRY MELENDEZ  C-4  71
B*END INTERRUPT REQUEST
C*CMP  SR7600  CROS
D*  SW 2  LS 0  TYPE 1
E*CMP SOURCE CARDS 0  BCD 0  BIN
F**END*INTERUPT REQUEST
G*ON DISK  F4 COMPAT  WU 08/05/71 DECK NONE
H*FORM1: CALL ENDH
I*  CALL ENDS
J*  CALL ENDTM
K*  CALL ENDD
L*PURPOSE: TO END THE OUTSTANDING INTERRUPT REQUEST(S) OF A
M* GIVEN TYPE.
N*ROUTINE NAME: ENDS
O*ENTRY NAMES: ENDH, ENDS, ENDTM, ENDD
P*STORAGE: 33 OCTAL WORDS OF SCM.
Q*SELF CONTAINED

VOLUME 2 - 9/73
DUMPING

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

REVIEWER: A. SOLEM, C-4

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

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

VOLUME 2 - 9/73
N204A A* BARRA BACON C-2
N204A O*DUMP CENTRAL MEMORY LOCATIONS
N204A B*DUMPING N2 FORTRAN COMPASS SR6600 SCOPE
N204A C* SW 2 LS 2
N204A D*FORTRAN, COMPASS CARDS 738CDBINARY CARDS 28BIN
N204A S*DUMPING
N204A 10*ON DISK F4 COMPAT WU 05/09/68 REV DECK 05/09/68 REV
N204A 11*CALL DUMPA (FWA, LWA, M)
N204A 12*DUMPS CENTRAL MEMORY FROM LOCATION RA+FWA TO
N204A 13*LOCATION RA+FWA IN FORMAT M.
N204A 14*STORAGE = 430 OCTAL WORDS
N204A 15*Routines Called: SYSTEM, OUTPTC, SIOS, C4020, BS4020, XRCL,
N204A 16*(ON THE SYSTEM)

N205A A* B L BUZBEE C-4
N205A O*SELECTIVE DUMPING OF A CDC 6600 LOGICAL I/O UNIT
N205A B*DEBUGGING N2 F4 SR6600 SCOPE
N205A C* SW 4 LS 1
N205A D*F4 SOURCE CARDS 220CDBF4 OBJECT CARDS 20BIN
N205A S*SELECTIVE DUMPING OF A CDC 6600 LOGICAL I/O UNIT
N205A 10*CARDS F4 COMPAT WU 10/01/68 DECK 10/01/68
N205A 11*CALL TAPDMP (NT, ML, NF1, NR1, NS1, N2, MD, A, ML) DUMPS RECORDS N1
N205A 12*THRU N2 OF FILE NF ON UNIT NT. STORAGE = 220 WORDS. USES
N205A 13*PDUMP AND LENGTH(ON THE SYSTEM)

N207B A* EMILY WILLBANKS C-2 A, SOLEM
N207B B*DUMP BLOCK NAME
N207B C*CMP BLOCK NAME SR7600 CROS
N207B D* SW 2 LS 0 TYPE 1
N207B E*NO CARDS
N207B F**DMPBN*DUMP BLOCK NAME
N207B G*ON DISK F4 COMPAT WU 10/19/72 DECK NONE
N207B 1*FORM1 CALL DMPBN (BN, FWA, LWA, FORMAT, TYPE, FS0)
N207B 2* DMPBN (BN, LWA)
N207B 3*PURPOSE: DUMP PORTION OF SCM OR LCM NAMED BLOCK
N207B 4* ONTO A FILESET ACCORDING TO A FORMAT.
N207B 5*Routine Name: DMPBN
N207B 6*ENTRY NAMES: DMPBN
N207B 7*SCM-LCM BLOCK NAMES: MALCM OR MASCM AND
N207B 8* BLOCK NAME GIVEN AS ARGUMENT (SCM or LCM)
N207B 9*STORAGE: 146 OCTAL WORDS OF SCM
N207B 10*Routines Called: MEMREQ, MEMLEN, MEMREL (ALL ON THE SYSTEM)

VOLUME 2 - 9/73
N208B A* EMILY WILLBANKS C-2 71
N208B B*DMPPK, DMPXX, DMPXPG - DISPLAY EXCHANGE PACKAGE
N208B C*F4 SR7600 CROS
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*FORM: CALL DMPPK(FSO,PACK)
N208B 2* CALL DMPXX(FSO,PACK,NTASK,NAME)
N208B 3* CALL DMPXPG(FSO)
N208B A* 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*CMR 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*FORM: 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*,DUMP+,PDUMP
N209B 8*STORAGE: 2048 WORDS OF SCM.
N209B 9*ROUTINES CALLED: STOP, OUTPTC, GENDMP (ALL ON SYSTEM).
A*  EMILY WILLBANKS  C-2  71
B*DUMPA, DUMPL = DUMP ABSOLUTE SCM OR LCM MEMORY LOCATIONS
C*CMP  SR7600  CROS
D*  SW 2  LS 0  TYPE 1
E*  0  BCD  0  BIN
F**DUMPA*DUMPL*DUMP*SCM AND LCM*MEMORY
G*ON DISK  F4  COMPAT  WU 06/28/71  DECK  NONE
H*FORM: CALL DUMPA(FWA,LWA,M)
I*CALL DUMPL(FWA,LWA,M)
J*PURPOSE: DUMP SCM OR LCM MEMORY LOCATIONS RA+FWA THRU
K*RA+LWA IN FORMAT M.
L*ROUTINE NAME: DUMPA
M*ENTRY NAMES: DUMPA, DUMPL
N*STORAGE: 22B WORDS OF SCM.
O*Routines called: GENNOC (ON THE SYSTEM)

A*  LARRY RUDSINSKI  C-4  71
B*DMPXI AND DMPX = PRINT THE EXCHANGE PACKAGE
C*CMP  SR7600  CROS
D*  SW 2  LS 0  TYPE 1
E*  0  BCD  0  BIN
F**CMP SOURCE CARDS 0  BCD  OBJECT CARDS 0  BIN
G*ON DISK  F4  COMPAT  WU 08/26/71  DECK  NONE
H*FORM: CALL DMPXI(LOC)
I*CALL DMPX
J*PURPOSE: DMPX PRINTS THE EXCHANGE PACKAGE AT THE TIME
K*OF THE CALL. DMPXI Initializes DMPX.
L*ROUTINE NAME: DMPXI
M*ENTRY NAMES: DMPX, DMPX
N*STORAGE: 60 OCTAL WORDS OF SCM.
O*Routines called: ENTRH(N1068), SETHPK(Q4138), SETHPK(Q4138),
P*DMPPK(N2088), RETNH(N1078), ENDH(N1098),
Q* (ALL ON THE SYSTEM).
N212B A* J. NORRIS C-4 A. SOLEM 13
N212B B**DUMP MEMORY TO ANY FILESET WITH SPECIFIED RA AND FORMAT
N212B C*CMP SH/600 CRUS
N212B D* SW 4 LS 0 TYPE 1,2
N212B E* SOURCE UTILPL4 C-2 OBJECT 0 C-2
N212B F**DUMP
N212B G*DISK F4 COMPAT WU 06/12/73 DECK NONE
N212B 1*FORM: CALL DMP(FWA,LWA,FORMAT,TYPE,FSO,RA)
N212B 2* CALL DMP(LWA)
N212B 3*PURPOSE: DUMP CONTENTS OF SCM OR LCM IN AN INDICATED
N212B 4* FORMAT INTO A FILESET. THE DUMP MAY BE RELATIVE TO AN
N212B 5* ADDRESS OTHER THAN THE USER'S RA.
N212B 6*ROUTINE NAME: DMP
N212B 7*ENTRY NAMES: DMP, DMP+
N212B 8*STORAGE: 77 OCTAL WORDS OF SCM
N212B 9*ROUTINES CALLED: GENDMP, OUTPUTCION SYSTEM.)
04 PSEUDO-COMPUTERS

SIMULATION OF THEORETICAL OR PSEUDO-COMPUTERS.

REVIEWER: J. NEERGAARD, C-7

04AA A  *   GEORGE SWAIN   MP-3  69
04AA B  *HACK- AN INTERPRETIVE SYSTEM WITH PRECISION AND UNITS
04AA C  *FORTRAN IV  MP6600  SCP 3.1
04AA D  *   SW 5  LS 24  TYPE 2
04AA E  *SOURCE CARDS  1330 BCD  OBJECT CARDS  257 BIN
04AA F  **INTERPRETER*SYSTEM*PRECISION*UNITS*USER*DEFINED OPERATIONS
04AA G  *CARDS  F4 COMPAT WU 06/02/67  DECK 06/02/69
04AA 1  THIS PROGRAM FORMS AN INTERPRETIVE SYSTEM WHICH ALLOWS THE
04AA 2  USER TO ASSOCIATE PRECISION AND UNITS WITH VARIABLES AND
04AA 3  WHICH OFFERS THE USER SEVERAL AIDS IN DEVELOPING HIS OWN
04AA 4  *PROBLEM-ORIENTED LANGUAGE FOR SHORT PROBLEMS, LANGUAGE
04AA 5  *FEATURES INCLUDE USER-DEFINED OPERATIONS AND SUBROUTINES,
04AA 6  *LOOPING, CONDITIONAL BRANCHING, AND UNLIMITED NAME LENGTH.
04AA 7  *TIMING- VARIES WITH USE, ROUGHLY 0.5 SEC/OUTPUT PAGE,
04AA 8  *COMPILER FIELD LENGTH 52K OCTAL, OBJECT TIME FIELD LENGTH
04AA 9  *43400 OCTAL.

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  8*TIMING Q1 COMPASS SR6600 SCOPE
Q102A  8*C SW 2 LS 2
Q102A  D*COMPASS SOURCE CARDS 99BCDCOMPASS OBJECT CARDS 78IN
Q102A  S*CLOCK*TIMING
Q102A  10*ON DISK F4 COMPAT WU 04/15/68 REV 04/15/68 REV
Q102A  11*CALL CLOCK(X)
Q102A  12*RESULTS IN X CONTAINING THE FLOATING POINT VALUE OF THE
Q102A  13*TIME CLOCK IN MINUTES PLUS HUNDRED OF MINUTES
Q102A  14*STORAGE 61 OCTAL WORDS.
Q102A  15*THIS ROUTINE USE THE PP ROUTINE DCL;

Q105A  A* JIM CLARK C-2  67
Q105A  0*CLOCK ROUTINE
Q105A  8*SERVICE Q1 COMPASS SR6600 SCOPE
Q105A  8*C SW 2 LS 1
Q105A  D*COMPASS SOURCE CARDS 35BCDCOMPASS OBJECT CARDS 58IN
Q105A  S*CLOCK
Q105A  10*ON DISK F4 COMPAT WU 04/17/68 REV DECK 04/17/68 REV
Q105A  11*CALL CLOCK(Y)
Q105A  12*RESULTS IN Y CONTAINING THE TIME OF DAY (IN DISPLAY CODE),
Q105A  13*IN THE FORM HH.MM,SS, WHERE HH IS THE NUMBER OF HOURS,
Q105A  14*MM IS THE NUMBER OF MINUTES, AND SS IS THE NUMBER OF SECONDS
Q105A  15*STORAGE 30 OCTAL WORDS.
Q105A  16*USES PP ROUTINE DCL.
Q106A  A* JIM CLARK   C-2   67  
Q106A  0*DATE ROUTINE  
Q106A  B*SERVICE   Q1   COMPASS   SR6600   SCOPE  
Q106A  C*   SW 2   LS 1  
Q106A  D*COMPASS SOURCE CARDS  28BCDCOMPASS OBJECT CARDS  4BIN  
Q106A  S**DATE  
Q106A  10*ON DISK  F4   COMPAT  WU 04/17/68 REV  DECK 04/17/68 REV  
Q106A  11*CALL DATE(Y)  
Q106A  12*RESULTS IN Y CONTAINING THE DATE(IN DISPLAY CODE), IN THE  
Q106A  13*FORM MMDDYY WHERE MM IS THE MONTH, DD IS THE DAY, AND YY IS  
Q106A  14*THE YEAR  
Q106A  15*STORAGE 24 OCTAL WORDS.  
Q106A  16*USES PP ROUTINE DCL.  

Q107A  A* JIM CLARK   C-2   67  
Q107A  0*DATE ROUTINE  
Q107A  B*SERVICE   Q1   COMPASS   SR6600   SCOPE  
Q107A  C*   SW 2   LS 1  
Q107A  D*COMPASS SOURCE CARDS  35BCDCOMPASS OBJECT CARDS  5BIN  
Q107A  S**DATE  
Q107A  10*ON DISK  F4   COMPAT  WU 04/17/68 REV  DECK 04/17/68 REV  
Q107A  11*CALL DATE1(X)  
Q107A  12*RESULTS IN X CONTAINING THE DATE(IN DISPLAY CODE), IN THE  
Q107A  13*FORM MM/DD/YY WHERE MM IS THE MONTH, DD IS THE DAY, AND  
Q107A  14*YY IS THE YEAR  
Q107A  15*STORAGE 30 OCTAL WORDS.  
Q107A  16*USE PP ROUTINE DCL.  

Q110A  A* ANN SOLEM   C-2   JIM CLARK   70  
Q110A  8*SECOND - ELAPSED CP TIME FOR THIS JOB  
Q110A  C*CP   SR6600   SCP 3.1  
Q110A  D*   SW 2   LS 1   TYPE 1  
Q110A  E*   0   BCD OBJECT CARDS  0   BIN  
Q110A  F**SECOND*TIME*CP*TIMER  
Q110A  G*ON DISK  WU 03/12/70  DECK NONE  
Q110A  1*CALL NAME: CALL SECOND(CP)  
Q110A  2*PURPOSE: TO OBTAIN THE ELAPSED CENTRAL PROCESSOR TIME FOR  
Q110A  3*THIS JOB, IN SECONDS TO THE NEAREST THOUSANDTH OF A SECOND.  
Q110A  4*STORAGE: 24 OCTAL WORDS  
Q110A  5*SELF CONTAINED.  

VOLUME 2 - 9/73
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
H CALL NAME CALL TIME MESSAGE
I PURPOSE TO ENTER A MESSAGE OF 34 CHARACTERS OR LESS IN THE
J DAYFILE PRECEDED BY THE CHARACTERS TIME STRING MUST BE
K TERMINATED BY A ZERO BYTE (12-BITS).
L STORAGE 23 (OCTAL) WORDS.
M 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
H CALL NAME CALL REMARK MESSAGE
I PURPOSE TO ENTER A MESSAGE OF 40 CHARACTERS OR LESS IN THE
J DAYFILE THE CHARACTER STRING MUST BE TERMINATED BY A ZERO
K BYTE (12-BITS).
L STORAGE 22 (OCTAL) WORDS.
M SELF CONTAINED

A* ANN SOLEM C-2 70
B* DISPLAY 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
H CALL NAME CALL DISPLAY MESSAGE VALUE
I PURPOSE TO DISPLAY IN THE DAYFILE A MESSAGE OF 16 CHAR-
JACTERS OR LESS AND A VALUE THE VALUE WILL BE TREATED AS
K FLOATING POINT OR INTEGER.
L STORAGE 247 (OCTAL) WORDS.
M SELF CONTAINED.
ANN SOLEM C-2 DAVE SCHULTZ 70

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

EMILY WILLBANKS C-2 71

Q115A A* CLOCK, DATE AND SECOND ROUTINE
Q115A B* CMP SR7600 CROS
Q115A D* SW 3 LS 0 TYPE 1
Q115A E* 0 BCD 0 BIN
Q115A F**CLOCK*DATE AND SECOND
Q115A G*ON DISK F4 COMPAT WU 06/16/71 DECK NONE
Q115A 1*FORM: CALL CLOCK (C1) CALL CLOCK1 (C2)
Q115A 2* CALL SECOND(S)
Q115A 3* CALL DATE(D1) CALL DATE1 (D2)
Q115A 4* PURPOSE: TO GIVE TIMES AND DATE TO USER,
Q115A 5* C1=TIME OF DAY IN MINUTES (FLOAT PT)
Q115A 6* C2=TIME OF DAY IN DISPLAY CODE 8HHR,MI,SE WHERE HR=HOURS,
Q115A 7* MI=MINUTES, SE=SECONDS
Q115A 8* S=ELAPSED CP (REAL) TIME IN SECONDS (FLOAT PT)
Q115A 9* D1=DATE IN DISPLAY CODE 6HMMDDYY
Q115A 10* D2=DATE IN DISPLAY CODE 8HMM/DD/YY
Q115A 11* WHERE MM=MONTH, DD=DAY, YY=YEAR
Q115A 12* ROUTINE NAME: CLOCKF
Q115A 13* ENTRY NAMES: CLOCK, CLOCK1, DATE, DATE1, SECOND
Q115A 14* STORAGE: 103B WORDS
Q115A 15* SELF CONTAINED.
Q116B  A*  N. NAGY  C-2  J. MELENDEZ C-4  71
Q116B  B*REMARK: TIME - SEND REMARK TO DAYFILE
Q116B  C*CMP       SR7600  CROS
Q116B  D*          SW 3  LS 0  TYPE 1
Q116B  E*          0 BCD 0 BIN
Q116B  F**REMARK*TIME*MESSAGE*DAYFILE
Q116B  G*ON DISK  F4 COMPAT WU 11/21/72 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: GETBAO, 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)

VOLUME 2 - 9/73
Q1198 A* JAN NORRIS C-4 J MELENDIZ 13
Q1198 B*COPY DAYFILE TO GIVEN FILESET
Q1198 C*F4 SR7600 CRUS
Q1198 D* SW 3 LS 0 TYPE 1.2
Q1198 E* SOURCE OLULP4 C-4 OBJECT 0 C-4
Q1198 F**DAYFILE
Q1198 G*DISK F4 COMPAT WU 07/16/73 DECK NONE
Q1198 I*FORM: CALL COPYDF (FSNAME)
Q1198 2*PURPOSE: COPY THE JOB DAYFILE TO THE FILESET = FSNAME=
Q1198 3*ROUTINE NAME: COPYDF
Q1198 4*ENTRY NAMES: COPYDF
Q1198 5*STORAGE: 224 OCTAL WORDS OF SCM
Q1198 6*ROUTINES CALLED: CLOSER(114B),LENGTH(W204B),REMARK(Q116B),
Q1198 7* SYSF(S116B),AUDRQT,UPNAME,FLUSHDF,INPUTC,NARG,
Q1198 8* OUTPIC (ALL ON SYSTEM)

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

REVIEWER: J. MELENDEZ, C-4

*(SKFILE) HAS BEEN REDESIGNATED W110A.

*(RELEASE) HAS BEEN REDESIGNATED W111A.

*(UNLODE) HAS BEEN REDESIGNATED W112A.

*(OPEN,CLOSE) HAS BEEN REDESIGNATED W113A.

EMILY WILLBANKS C-2 J MELENDEZ 72

EMORY

FORM: CALL MEMREQ(NWDS,TYPE,BN1,BN2,PR)

CALL MEMREL(NWDS,TYPE,BN1,BN2,PR)

CALL MEMLEN(L,TYPE,BN)

MEMREQ REQUESTS NWDS FOR NAMED BLOCK BN1 FROM

MEMREL RELEASES NWDS FROM BN1

TO BN2 IN LCM OR SCM(TYPE), PR SUPPRESSES DAYFILE

MEMLEN OBTAINS IN L THE LENGTH OF

BLOCK NAME BN IN LCM OR SCM.

ROUTINE NAME: MEMORY

ENTRY NAMES: MEMREQ,MEMREL,MEMLEN

STORAGE: 161 (OCTAL) WORDS OF SCM

ROUTINES CALLED: SELF CONTAINED

VOLUME 2 - 9/73
Q3-2

A* FRANK MCGIRT C-4 J. MELENDEZ 72
B* ASAP- AUTOMATED STORAGE ALLOCATION PROGRAM
C* SR6600 SCP 3.1
D* SOURCE CARDS 24 BCD OBJECT CARDS 148 BIN
E* DYNAMIC ALLOCATION
F* CARDS F4 COMPAT WU 08/29/72 DECK 08/29/72
G* COMPLETE INSTRUCTIONS FOR USE ARE GIVEN IN K-1-4620.
H* AN INTERNAL K-1 DOCUMENT WHICH IS ATTACHED TO THIS
I* WRITEUP, INCLUDING A SAMPLE PROBLEM UTILIZING ALL THE
J* ASAP FEATURES.
K* Q3AA IS A PACKAGE OF SUBROUTINES WHICH CAN BE
L* USED TO ASSIGN STORAGE AND DEFINE INTEGER POINTERS FOR
M* USE WITH DYNAMIC STORAGE ALLOCATION PROGRAMMING
N* TECHNIQUES.
O* SEE K-1-4620 OR ALLEN S. KENNEDY, #POINTR, A
P* DYNAMIC STORAGE ALLOCATION PROGRAM, # ARGONNE NATIONAL
R* ROUTINE NAME: ASAP
S* ROUTINE NAME: ASAP
T* STORAGE: 1420 OCTAL CELLS.
Q4
GET AND SET JOB-RELATED INFORMATION

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

REVIEWER: J. MELENDEZ, C-4

Q401A
A* C. BOGENHOLM C-2 J. MELENDEZ 67
Q401A B*CPAREA
Q401A C*COMPASS SR6600 SCP 3.1
Q401A D* SW 4 LS 1 TYPE 1.1
Q401A E*SOURCE CARDS 25 BCD OBJECT CARDS 4 BIN
Q401A F*CONTROL POINT
Q401A G*ON DISK F4 COMPAT WU 04/17/73 REV 6 DECK 04/01/70 REV 2
Q401A I*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: CP, 145 SEC, PP 2.028 SEC.
Q401A 11* ROUTINES CALLED: THIS PROGRAM USES PP ROUTINE CPA WHICH IS
Q401A 12* ON SYSTEM.

Q402A
A* B. BACON C-2 J. MELENDEZ C-4 67
Q402A B*OBTAIN JOB NAME
Q402A C*CMP SR6600 SCP 3.1
Q402A D* SW 1 LS 0 TYPE 1.2
Q402A D*E* SOURCE 29 C-2 OBJECT 4 C-2
Q402A F*JOB NAME
Q402A G*DISK F4 COMPAT WU 05/01/73 REV 2 DECK NONE
Q402A 1*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)
Q4-2

Q405A *(TIDY) HAS BEEN REDESIGNATED L301A.

Q405B *(TIDY) HAS BEEN REDESIGNATED L301B.

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

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

VOLUME 2 - 9/73
**Q4-3**

**JENNIE BORING** C-4 R.M. FRANK 70

**Q408A** B*READ/WRITEx 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*FILE

**Q408A** G*CARDS F4 COMPAT WU 06/15/70 DECK 06/15/70

**Q408A** 1*USEI 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)

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**Q409A** J. BORING C-4 70

**Q409A** B*DATA TRANSFER FROM ECS TO FILE AND VICE VERSA

**Q409A** C*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*USEI CALL ECSBUF1(FWA,LFN,NOWDS,SCRATCH)

**Q409A** 2* CALL ECSBUF2(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),

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**Q410A** 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*USEI 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 BUFFER FULL

C*CMP SR660 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

1*USE: CALL BUF(NOWDS,FN)

2* CALL RDBUF(A,FN,LEN)

3* CALL WRTBUF(A,FN,LEN)

4*PURPOSE: ALLOWS USER TO READ OR WRITE A BUFFER FULL (BINARY

5*PARITY) IN CONTRAST TO THE LOGICAL RECORD FACILITY THAT

6*FORTRAN PROVIDES.

7*STORAGE: 106 (OCTAL) WORDS,

8*ROUTINES CALLED: OPEN,CLOSE(Q304A).

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**Q413B**

A* JERRY MELENDEZ C-4

B*GET AND SET EXCHANGE PACKAGE

C*CMP SR760 SCP 0

D* SW 3 LS 4 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

1*FORM: CALL GETN PK(IPAK)

2* CALL SETN PK(IPAK)

3* CALL GETDPK(IPAK)

4* CALL SETDPK(IPAK)

5* CALL GETTMPK(IPAK)

6* CALL SETTMPK(IPAK)

7* CALL GETSPK(IPAK)

8* CALL SETSPK(IPAK)

9* CALL GETHPK(IPAK)

10* CALL SETHPK(IPAK)

11* IPAK = ARRAY OF DIMENSION AT LEAST 16,

12*PURPOSE: GET OR SET THE EXCHANGE PACKAGES WHICH ARE KEPT BY

13* USER MONITOR FOR EACH OF THE OPERATING STATES.

14*ROUTINE NAME: PACKAGE

15*ENTRY NAMES: GETN PK GETDPK, GETTMPK, GETSPK, GETHPK,

16* GETEPK, SETN PK, SETDPK, SETTMPK, SETSPK, SETHPK

17*STORAGE: 65 OCTAL WORDS OF SCM,

18*SELF CONTAINED.
A* JERRY MELENDEZ C-4  71
B*SETQ, GETQ - SET AND GET JOB RELATED QUANTITIES
C*CMP  SR7600  CROS
D*SW 10  LS 0  TYPE 1,2
E*CMP SOURCE CARDS 0 BCD OBJECT CARDS 0 BIN
F**SETQ*GETQ*SET AND*GET*JOB RELATED*QUANTITIES
G*ON DISK F4 COMPAT WU 05/09/73 REV.2 DECK NONE
1*FORM1 CALL SETQ(KEY,OP)
2* CALL GETQ(KEY)
3* PURPOSE: SET OR GET JOB-RELATED QUANTITIES LOCATED IN
4* SPECIAL USER MONITOR CELLS.
5*TIMING: SETQ - 70 - 120 MS, GETQ - 65 MS
6*ROUTINE NAME: SETQ
7*ENTRY NAMES: SETQ, GETQ
8*STORAGE: 236 OCTAL WORDS OF SCM.
9*SELF CONTAINED.

A* EMILY WILLBANKS C-2  71
B*SLITE*SLITET - SET AND TEST SENSE LIGHTS
C*CMP  SR7600  CROS
D*SW 3  LS 0  TYPE 1
E* 0 BCD 0 BIN
F**SLITE*SLITET - SET AND TEST SENSE LIGHTS
G*ON DISK F4 COMPAT WU 07/19/71 DECK NONE
1*FORM1 CALL SLITE(I)
2* CALL SLITET(I,J)
3* PURPOSE: SLITE(I) TURNS ON SENSE LIGHT I WHERE I.LE.I.LE.60.
4* SLITE(0) TURNS OFF ALL LIGHTS.
5* SLITET(I,J) TESTS AND TURNS OFF LIGHT I, SETTING J=1 IF
6* LIGHT WAS ON, J=2 IF OFF.
7* ROUTINE NAME: SLITE
8*ENTRY NAMES: SLITE, SLITET
9*STORAGE: 41B WORDS OF SCM.
Q416B E* SW 3 LS 0 TYPE 1
Q416B F** SSYSWCH*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 SSWSWCH(I,J)
Q416B 5* PURPOSE: ONSWCH TURNS ON SENSE SWITCH I, WHERE 1.LE.I.LE.60.
Q416B 6* OFFSWCH TURNS OFF SWITCH I.
Q416B 7* COMPSW SWITCHES SWITCH I.
Q416B 8* SSWSWCH TESTS AND TURNS OFF SWITCH I, SETTING J=1
Q416B 9* IF SWITCH I WAS ON, J=2 IF OFF.
Q416B 10* ROUTINE NAME! SSWSWCH
Q416B 11* ENTRY NAMES! SSWSWCH, ONSWCH, OFFSWCH, COMPSW
Q416B 12* STORAGE! 66B WORDS OF SCMS.
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 SQL
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 REV1 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  J. MELENDEZ, C-4 72
Q418A  B*OBTAIN MACHINE NUMBER OF COMPUTER
Q418A  C*F4 SR6600 SCP 3.1
Q418A  D* SW 1  LS 0  TYPE 1.2
Q418A  E* SOURCE 4 C-2  OBJECT 0 C-2
Q418A  F**MACHINE NUMBER
Q418A  G*DISK F4 COMPAT WU 04/20/73  DECK NONE
Q418A  1*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

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

REVIEWER: SEE SUBMITTER FOR PARTICULAR #T# ROUTINE
<table>
<thead>
<tr>
<th>TIA8</th>
<th>PHYSICS (INCLUDING NUCLEAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1A8</td>
<td>A* CHARLES WILSON C-7</td>
</tr>
<tr>
<td></td>
<td>FRED CORNWELL 69</td>
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<tr>
<td>T1A8</td>
<td>B* TACS1 TRANSPORT AND CHARGE STORAGE DEVICE ANALYSIS CODE</td>
</tr>
<tr>
<td>T1A8</td>
<td>C* F4 6600 SCP 3,1</td>
</tr>
<tr>
<td>T1A8</td>
<td>D* SW 37 LS 72 TYPE 2</td>
</tr>
<tr>
<td>T1A8</td>
<td>E* SOURCE CARDS 3421 BCD</td>
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<tr>
<td>T1A8</td>
<td>F** TACS1 TRANSPORT AND CHARGE STORAGE DEVICE ANALYSIS CODE</td>
</tr>
<tr>
<td>T1A8</td>
<td>G* CARDS F4 COMPAT WU 12/08/69 DECK 12/08/69</td>
</tr>
<tr>
<td>T1A8</td>
<td>1* USES THE FOLLOWING SUBROUTINES: ADV(J506A), CONVRT(J526A),</td>
</tr>
<tr>
<td>T1A8</td>
<td>ERF(C310A), GYA(J518A), PLOT(J541A), SORT1(M101A),</td>
</tr>
<tr>
<td>T1A8</td>
<td>SPLIT(J508A), TCP(J521A), TSP(J520A), WLC(J542A), WLCV(J542A).</td>
</tr>
</tbody>
</table>

VOLUME 2 - 9/73
T4-1

T4 ENGINEERING

T4AA A* LUKE NEY J-7
T4AA B*CBSIII - BEAM FRAME SYSTEM ANALYZER
T4AA C*F4 CMP MPF600 SCP 3,1SC4020
T4AA D* SW 33 LS 0 TYPE 2
T4AA E*F4 CMP SOURCE CARDS NONE OBJECT CARDS NONE
T4AA F**CBSIII BEAM FRAME SYSTEM ANALYZER
T4AA G*ON TAPE F4 COMPAT WU 07/28/71 DECK NONE
T4AA 1*FORM 1 MAIN PROGRAM
T4AA 2*PURPOSE BEAM FRAME SYSTEM ANALYZER PROGRAM
T4AA 3* 100 BRANCH 101 BRANCH INTERSECTION POINT CAPACITY
T4AA 4*TIMING MAXIMUM IS 5 MINUTES
T4AA 5*ROUTINE NAME CBSIII
T4AA 6*STORAGE 15600 OCTAL WORDS CENTRAL MEMORY
T4AA 7* AND 607000 OCTAL WORDS ECS
T4AA 8*ROUTINES CALLED ADV(J506A), SPLT(J508A), PLOT(J541A),
T4AA 9* WLCH AND WLCV(J542A), SIN AND COS(B106A),
T4AA 10* ECWR, ECRD, LOC 3 (ALL ON SYSTEM)
T4AA 11*NOTE 1 BINARY AVAILABLE ON MAGNETIC TAPES LC996L00
T4AA 12* OR LB797L00
T4AA 13* CBSIII HAS THE FOLLOWING PROGRAM CARD
T4AA 14* PROGRAM CBS3(INPUT, OUTPUT, FILM, TAPE7, TAPE8)

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

VOLUME 2 - 9/73
ASSEMBLY

E.g., COMPASS.

REVIEWER: J. MOORE, C-2

U101A *(FTN) HAS BEEN REDESIGNATED U2AA.

U102A *(LAGENT) HAS BEEN REDESIGNATED U1AA.

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

E.G., RUN.

REVIEWER: J. MOORE, C-2

U2AA A* BARBARA BACON C-2 J. MOORE 72
U2AA B*FTN-FORTRAN EXTENDED LANGUAGE
U2AA C*CMP MP6600 SCP 3.1
U2AA D* SW 24 LS 0 TYPE 2
U2AA E*SOURCE CARDS NONE OBJECT CARDS NONE
U2AA F**FTN*FORTRAN*EXTENDED*COMPILER
U2AA G*ON DISK F4 COMPAT WU 02/22/72 DECK NONE
U2AA 1*FORM1 MAIN PROGRAM
U2AA 2*PURPOSE FTN, FORTRAN EXTENDED, IS A FORTRAN COMPILER ON
U2AA 3* THE SYSTEM; CALLABLE VIA CONTROL CARDS.
U2AA 4*ROUTINE NAME FTN
U2AA 5*STORAGE 50000 (OCTAL) WORDS
U2AA 6*SELF CONTAINED.
(WILL NOT BE USED FOR FUTURE PROGRAMS)
V102A *(RANDOM) HAS BEEN REDESIGNATED G801A.

V103A *(RANF) HAS BEEN REDESIGNATED G802A.
V201A *(MESSNI) HAS BEEN REDESIGNATED Q803A.
ACCESS

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

REVIEWER: J. NORRIS, C-2

W104B A* J. NORRIS C-4 J. NORRIS C-4
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 VPL/4 C-2 OBJECT 0 C-2
W104B F**RENAME=ROUT
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, RQT.
W104B 9* (ALL ON SYSTEM)

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

VOLUME 2 - 9/73
W106B  A*   R. STUTZ     TD-3
W106B  B*FORQTS   CREATE RQT FOR FILESET
W106B  C*SR7600     CROS
W106B  D*   SW 2  LS 2  TYPE 1
W106B  E*CMPL SOURCE CARDS  49  BCD  OBJECT CARDS  4  BIN
W106B  F*FORQTS*CREATE*RQT FOR*FILESET
W106B  G*ON DISK  F4  COMPAT  WU 05/15/72REV.1  DECK 05/15/72REV.1
W106B  H*FORM:  CALL FORQTS(FS,ARRAY)
W106B  I*PURPOSE:  CREATE I/O REQUEST TABLE(RQT) IN 20-WORD ARRAY
W106B  J*ENTRY NAME:  FORQTS
W106B  K*STORAGE:  12 (OCTAL) WORDS.
W106B  L*SELF CONTAINED.

W108B  A*   NICK NAGY     C-2     J. NORRIS
W108B  B*CREVER
W108B  C*F 4   CMP  SR7600  CROS
W108B  D*   SW 3  LS 0  TYPE 1.2
W108B  E*NO CARDS
W108B  F*CREVER
W108B  G*ON DISK  F4  COMPAT  WU 05/03/73REV.1  DECK  NONE
W108B  H*FORM:  CALL GETQ(4LCCF,ICCD)
W108B  I*CALL SETQ(36,ICCD)
W108B  J*CALL SETQ(37,PW)
W108B  K*CALL CREVER(FS,CL,OAC,O,NF,MT,MTB,FSL)
W108B  L*PURPOSE:  STAGE TAPE AND RESTORE RESIDENT FILESETS
W108B  M*ROUTINE NAME:  CREVER
W108B  N*ENTRY NAME:  CREVER
W108B  O*STORAGE:  105 OCTAL WORDS OF SEM. (NOTE THAT CKSUM(K307B)
W108B  P*REQUIRES 10000 OCTAL WORDS OF LCM FROM THE FREE POOL
W108B  Q*AND/OR RALCM.)
W108B  R*ROUTINES CALLED:  GETQ(Q414B), XIT(N108B), RDBUF(Q417B),
W108B  S*SKIPF(W302B), SETQ(Q414B), CREATE(L401B), ABORT(N203B)
W108B  T*REWIN(W301B), OPEN(Q304B), CKSUM(K307B),
W108B  U*MEMLEN(Q305B), MESSAGE(Q116B) AFSEX, ADDRQT, RENAME,
W108B  V*ENDFIL, CLOSERS, (ALL ON SYSTEM).

VOLUME 2 - 9/73
W1098 A* FRED SCHILLING C-2 J. NORRIS 72
W1098 B*OPERM
W1098 C*F4 CMP SR7600 CROS
W1098 D* SW 2 LS 0 TYPE 1
W1098 E*NO CARDS
W1098 F**OPERM
W1098 G*ON DISK F4 COMPAT WU 05/12/72 DECK NONE
W1098 I*FORM: CALL OPERM(FS,GAC, PW,FSI,BUF)
W1098 2*PURPOSE: TEST FILESET FOR EMPTY
W1098 3*ROUTINE NAME: OPERM
W1098 4*ENTRY NAME: OPERM
W1098 5*STORAGE: 367 OCTAL WORDS SCM
W1098 6*Routines Called: GETQ(Q414B), SETQ(Q414B), RDBUF(Q417B)
W1098 7*REWIND(W310B), OPERM1, OPERM2, OPEN, ABNORML(ALL ON
W1098 8*THE SYSTEM).

W110A A* D. HARDER C-4 JAN NORRIS 72
W110A B*SKPFIL OR SKFILE TO SKIP FILES
W110A C*CMP SR6600 SCP 3.1
W110A D* SW 3 LS 4 TYPE 1
W110A E*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 H*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).
Programming Procedure: Release

**Purpose:**
Rewind and unload a tape during execution so that a continuation tape can be used. N is either a logical tape number or a left adjusted Hollerith literal.

**Routine Name:**
UNLODE

**Entry Name:**
UNLODE

**Storage:**
52 octal words.

**Self Contained:**
Yes.

---

Unit: SCHULTZ, D.E. C-2

Date: JAN NORRIS 72

---

Volume 2 - 9/73
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
1*FORM: CALL OPEN(KODE,NAME)
2* CALL CLOSE(KODE,NAME)
3*PURPOSE: KODE IS A FUNCTION CODE FROM SCOPE 3.1 MANUAL.
4* SUGGESTED VALUES FOR KODE ON OPEN ARE 122B FOR BINARY
5* AND 120B FOR BCD. SUGGESTED VALUES ON CLOSE ARE 132B
6* FOR BINARY AND 130B FOR BCD. NAME EITHER A LOGICAL UNIT
7* NUMBER OR A LEFT ADJUSTED HOLLERITH LITERAL. I.E.,
8* ROUTINE NAME
9*ROUTINE NAME: OPEN
10*ENTRY NAMES: OPEN, CLOSE
11*STORAGE: 51 OCTAL WORDS
12*SELF CONTAINED.

A* N. NAGY C-2 J. NORRIS 73
B*CLOSE AND REWIND FILESET
C*COMPAS 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
1*FORM: CALL CLOSER (FSET)
2*PURPOSE: CLOSE AND REWIND THE FILESET
3*ROUTINE NAME: CLOSER
4*ENTRY NAME: CLOSER
5*STORAGE: 71 (OCTAL) WORDS
6*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
H*FORM: CALL OPEN(FS,TYPE,BUF,USE,OAC,PW,SCT,ADISP,DEV)
I*PURPOSE: MAKE A FILESET AVAILABLE TO A JOB, SET
J*FILESET PARAMETERS, AND ESTABLISH BUFFERS.
K* FS=FILESET NAME (REQUIRED)
L* TYPE=2LS,2LSR,2LRT, OR 2LRR
M* BUF=LCM BUFFER LENGTH
N* USE=1LR OR 2LRW
O* OAC=OWNER ACCESS CODE
P* PW=PASSWORD
Q* SCT=SECTOR LIMIT
R* ADISP=3LPR,4LPCHB,5LPCHD,5LPCH80,4LTAPE
S* 4LFILM,5LSFILM,4LNONE,3UNOT - IN TABLE FORM,
T* DEV=5LDISKA,5LDISKB, OR 5LDISKC
U*ROUTINE NAME: OPEN
V*ENTRY NAME: OPEN
W*STORAGE: 502 OCTAL WORDS OF SCM
X*ROUTINES CALLED: GETBA, SYSFS (ON SYSTEM)

A* JAN NORRIS C-2 J 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
H*FORM: CALL SYSFS(INAME,ONAME)
I*PURPOSE: CHECK INAME TO SEE IF IT IS A LEGAL FILESET
J* NAME OR INTEGER 1-99. IF IT IS AN INTEGER N, CONVERT
K* IT TO FSETN, THE PROPERLY FORMATTED NAME IS RETURNED
L* IN ONAME. IF INAME IS NOT A LEGAL FILESET NAME OR
M* NUMBER, -1 IS RETURNED.
N*ROUTINE NAME: SYSFS
O*ENTRY NAME: SYSFS
P*STORAGE: 34 OCTAL WORDS OF SCM
Q*ROUTINES CALLED: SELF CONTAINED

VOLUME 2 - 9/73
W17B A# JAN NORRIS C-4 JAN NORRIS 13
W17B B*ACTIVE FILESET RELEASE = RELEASE BUFFER, INITIATE OUTPUT
W17B C*CMP SR7600 GROS
W17B D* SW 5 LS 0 TYPE 1.2
W17B E* SOURCE 0 ULUPL4 C-2 OBJECT 0 C-2
W17B F**AFSREL*ACTIVE*FILESET*RELEASE*BUFFER*DISPOSITION
W17B G*DISK F4 COMPAT WU 07/06/73 DECK NONE
W17B 1*FORM: CALL AFSREL(FS,ADISP,ITAPE,RENAME)
W17B 2*PURPOSE: INITIATE OUTPUT PROCESSING OF AN ACTIVE
W17B 3* FILESET BEFORE JOB COMPLETION AND RELEASE UNNEEDED
W17B 4* LCM AND DISK SPACE.
W17B 5* FS = NAME OF FILESET TO BE RELEASED (REQUIRED).
W17B 6* ADISP = TABLE OF DISPOSITIONS.
W17B 7* ITAPE = POSTSTAGE PARAMETERS (MODE,DENSITY,FILES,LABEL).
W17B 8* RENAMEF = NEW FILESET NAME.
W17B 9*ROUTINE NAME: AFSREL
W17B 10*ENTRY NAMES: AFSREL
W17B 11*STORAGE: 665 OCIAL WORDS OF SCM
W17B 12*ROUTINES CALLED: SYSFS(W116B),GETBA,BS4020 (ON SYSTEM)
W17B 13*OTHER EXTERNAL: ROTA.
*CREATE A FILESET OR MODIFY RESIDENT FILESET PARAMETERS*

**SOURCE** UNDLPL4 C=4 OBJECT 0 C=4

**Reason**
- **FS**=FILESET NAME
- **CL**=CLASSIFICATION
- **TYPE**=2LS,2LSR,2LRT,ONZLR0,OPW=OWNER PASSWORD
- **REL**=RELEASE DATE
- **RDISP**=TABLE OF DISPOSITIONS
- **ITAPE**=PRESTAGE PARAMETERS(MODE,DENSITY,FILES,LABEL)
- **RWU**=TABLE OF READ/WRITE USERS AND PASSWORDS
- **SCT**=TABLE OF READ ONLY USERS AND PASSWORDS
- **DEV**=DEVICE
- **DROP**=TABLE OF USERS TO BE DROPPED
- **RENAME**=NEW FILESET NAME
- **ROUTINE NAME**=CHEMOD
- **STORAGE**=1754 OCTAL WORDS OF SCM
- **Routines Called**=SYSFS(W1168), GETBA(SYSTEM)
GET INFORMATION ON STATUS OF I/O

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

REVIEWER: J. NORRIS, C-2

---

A*          EMILY WILLBANKS C-2
B*BOI - BEGINNING OF INFORMATION TEST
C*CMP   SR7600 CROS
D*     SW 3 LS 0 TYPE 1
E*     0 BIN 0 BCD
F**BOI*I/O STATUS
G*ON DISK F4 COMPAT WU 06/28/71 DECK NONE
**FORM1 Y=BOI(N)
2*PURPOSE: FUNCTION TO DETERMINE STATUS (BOI) OF I/O ON
3* UNIT N, RETURNS NON-ZERO IF FILESET POSITIONED AT BOI.
4* ==0 IF FILESET NOT POSITIONED AT BOI.
5*ROUTINE NAME: BOI
6*ENTRY NAME: BOI
7*STORAGE: 44 OCTAL WORDS OF SCM.
8*ROUTINES CALLED: GETBA, OPEN, WAITR, SYSTEM, ABNORML.
9* (ALL ON SYSTEM).

---

A*          EMILY WILLBANKS C-2
B*EOI - END OF INFORMATION TEST
C*CMP   SR7600 CROS
D*     SW 3 LS 0 TYPE 1
E*     0 BIN 0 BCD
F**EOI*I/O STATUS
G*ON DISK F4 COMPAT WU 06/28/71 DECK NONE
**FORM1 Y=EOI(N)
2*PURPOSE: FUNCTION TO DETERMINE STATUS (EOI) OF I/O ON
3* UNIT N, RETURNS NON-ZERO IF EOI STATUS =0 IF
4* NO EOI STATUS.
5*ROUTINE NAME: EOI
6*ENTRY NAME: EOI
7*STORAGE: 16B WORDS OF SCM.
8*ROUTINES CALLED: GETBA, WAITR, SYSTEM, ABNORML, (ALL
9* ON SYSTEM).

---

VOLUME 2 = 9/73
**IOCHECK - DETERMINE STATUS OF I/O REQUEST**

- **Purpose:** Function to determine status (EOF, EOI) of I/O on unit.
- **ITIME** can be set to amount of time waited if
- **Routine Name:** IOCHECK
- **Entry Name:** IOCHECK
- **Storage:** 2048 words of SCM
- **Routines Called:** SYSTEM, ABNORML, GETBA, WAITR

**LENGTH - AMOUNT OF DATA TRANSFERRED BY INPUT OPERATION**

- **Routine Name:** LENGTH
- **Entry Name:** LENGTH
- **Storage:** 13 (OCTAL) WORDS
- **Routines Called:** FORMF(W208B)

**GETADD - GET ADDRESS OF RQT FOR A FILESET**

- **Routine Name:** GETADD
- **Entry Name:** GETADD
- **Storage:** 13 (OCTAL) WORDS
- **Routines Called:** FORMF(W208B)
W2068 6*IDONE, IDONEQ, ISTATUS
W2068 G*ON DISK F4 COMPAT WU 10/10/72REV 1 DECK 10/10/72REV 1
W2068 1*FORM I = IDONE(N)
W2068 2* I = IDONEQ(RQT)
W2068 3* I = ISTATUS(RQT)
W2068 4*PURPOSE: IDONE/IDONEQ FUNCTION RETURNS STATUS OF I/O FOR
W2068 5* FILESET N OR FOR FILESET IN REQUEST TABLE RQT* = 1 FOR
W2068 6* I/O COMPLETE. =0 OTHERWISE. ISTATUS FUNCTION RETURNS
W2068 7* THE I/O STATUS AS IS OF THE INDICATED FS. IDONE IS
W2068 8* SLOWER THAN IDONEQ OR ISTATUS.
W2068 9*ROUTINE NAME: IDONE
W2068 10*ENTRY NAMES: IDONE, IDONEQ, ISTATUS
W2068 11*STORAGE: 13 OCTAL WORDS.
W2068 12*Routines called: GETBA(ON THE SYSTEM).

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

W2088 6*FORMF = CONVERT UNIT NUMBER TO FILESET NAME
W2088 G*CMP SOURCE CARDS 57 BCD OBJECT CARDS 4 BIN
W2088 F*FORMF UNIT NUMBER FILESET NAME
W2088 G*CARDS F4 COMPAT WU 10/14/71 DECK 10/14/71
W2088 1*FORM F = FORMF(N)
W2088 2*PURPOSE: GIVEN INTEGER UNIT NUMBER N, RETURN
W2088 3* ALPHANUMERIC FILESET NAME SLFSETN.
W2088 4*ROUTINE NAME: FORMF
W2088 5*ENTRY NAME: FORMF
W2088 6*STORAGE: 16 (OCTAL) WORDS.
W2088 7*SELF CONTAINED.

W2098 *(IDONEQ) DELETED FROM LIBRARY—NOW COMBINED WITH W2068.
A. NAGY  C-2  J. NORRIS  73

B. CHECK FOR UNRECOVERED PARITY ERRORS ON MAG TAPE INPUT

C. 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. FORM 1  CALL PARITY(FSNAME, N)

I. PURPOSE I CHECK FOR EXISTENCE OF AN UNRECOVERED PARITY ERROR WHEN A FILESET WAS STAGED IN FROM MAGNETIC TAPE.

J. ROUTINE NAME I PARITY

K. ENTRY NAME I PARITY

L. STORAGE 70 (OCTAL) WORDS

M. ROUTINES CALLED I MESSAGE(Q116), SYSFS (ON SYSTEM)
W3

POSITIONING

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

REVIEWER: J. NORRIS, C-2

W301B

<table>
<thead>
<tr>
<th>A*</th>
<th>EMILY WILLBANKS C-2 71</th>
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<tr>
<td>B*</td>
<td>REWIND</td>
</tr>
<tr>
<td>C*</td>
<td>CMP</td>
</tr>
<tr>
<td>D*</td>
<td>SW 2 LS 0 TYPE 1</td>
</tr>
<tr>
<td>E*</td>
<td>0 BCD 0 BIN</td>
</tr>
<tr>
<td>F**</td>
<td>REWIND REWINM</td>
</tr>
<tr>
<td>G*</td>
<td>ON DISK F4 COMPAT WU 06/22/71 DECK NONE</td>
</tr>
<tr>
<td>I*</td>
<td>FORM CALL REWIND(FS)</td>
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<tr>
<td>2*</td>
<td>PURPOSE REWIN FILESET FS.</td>
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<tr>
<td>3*</td>
<td>ROUTINE NAME REWINM</td>
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<td>4*</td>
<td>ENTRY NAMES REWINM, REWIN</td>
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<td>5*</td>
<td>STORAGE 33B WORDS OF SCM</td>
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<td>6*</td>
<td>ROUTINES CALLED GETBA, SYSTEM, ABNORMAL, OPEN.</td>
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<tr>
<td>7*</td>
<td>WAITR (ALL ON SYSTEM)</td>
</tr>
<tr>
<td>8*</td>
<td>OTHER SCM EXTERNALS IOGEN (ON SYSTEM)</td>
</tr>
</tbody>
</table>

W302B

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

VOLUME 2 - 9/73
A* EMILY WILLBANKS C-2 71
B*SKIP - SKIP TO END-OF-INFORMATION
C*CMP SR7600 CROS
D* SW 2 LS 0 TYPE 1
E* 0 BCD 0 BIN
F*SKIP*EOI
G*ON DISK F4 COMPAT WU 06/22/71 DECK NONE
1*FORMI CALL SKIPI(FS)
2*PURPOSE: POSITION FILESET FS AT END-OF-INFORMATION
3*ROUTINE NAME: SKIPI
4*ENTRY NAME: SKIPI
5*STORAGE: 128 WORDS OF SCM.
6*OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)
7*Routines Called: SKIPX (ON SYSTEM)

A* EMILY WILLBANKS C-2 71
B*SKIPR - SKIP RECORDS FORWARD OR BACKWARD
C*CMP SR7600 CROS
D* SW 2 LS 0 TYPE 1
E* 0 BCD 0 BIN
F*SKIPR
G*ON DISK F4 COMPAT WU 06/22/71 DECK NONE
1*FORMI CALL SKIPR(FS,N)
2*PURPOSE: SKIP N RECORDS FORWARD OR BACKWARD ON FILESET FS.
3*ROUTINE NAME: SKIPR
4*ENTRY NAMES: SKIPX, SKIPR
5*STORAGE: 512 WORDS OF SCM.
6*OTHER SCM EXTERNALS: IOGEN (ON SYSTEM)
7*Routines Called: SYSTEM, ABNORML, GETBA, OPEN.
8* WAITR(ALL ON SYSTEM).

VOLUME 2 - 9/73
W3-3

W3-3 A* J. NORRIS C-2 J. NORRIS 73
W3-3 B*BACKSPACE ONE OR MORE RECORDS
W3-3 C*CMP SR7600 CROS
W3-3 D* SW 1 LS 0 TYPE 1.2
W3-3 E* SOURCE OLDPL4 C-2 OBJECT 0 C-2
W3-3 F**BACKSPACE
W3-3 G*DISK F4 COMPAT WU 07/09/73 DECK NONE
W3-3 1*FORM1 CALL BKSP(FS+N)
W3-3 2* CALL BKSP(FS)
W3-3 3* BACKSPACE I
W3-3 4*PURPOSE: BACKSPACE A FILESET ONE OR MORE RECORDS
W3-3 5* FS = FILESET NAME(LEFT-JUSTIFY, ZERO-FILL)
W3-3 6* OR INTEGER M, 1-99, TO BE CONVERTED TO FSETM
W3-3 7* N = INTEGER NUMBER OF RECORDS TO BACKSPACE OVER
W3-3 8* I = INTEGER UNIT NUMBER OR INTEGER VARIABLE WHOSE
W3-3 9* VALUE IS FILESET NAME OR UNIT NUMBER.
W3-3 10*ROUTINE NAME: BACKSP
W3-3 11*ENTRY NAMES: BACKSP,BKSP
W3-3 12*STORAGE: 27 OCTAL WORDS OF SCM
W3-3 13*ROUTINES CALLED: SKIPX(W304B)

VOLUME 2 = 9/73
GET INFORMATION ON FILE

DUMP FILE, CATALOG, DIRL, CRSREF.

REVIEWER: J. NORRIS, C-2

A* RON KRANTZ C-2 71
B*DIRL - LIST DIRECTORY OF RANDOM LIBRARY FILESET
C*SR7600 CROS
D* SW 2 LS 0 TYPE 1
E* 0 BCD 0 BIN
F*DIRL - LIST DIRECTORY OF RANDOM LIBRARY FILESET
G*ON DISK W4 COMPAT WU 06/22/71 DECK NONE
1*FORM: CALL DIRL(D=O)
2*PURPOSE: LIST DIRECTORY OF RANDOM LIBRARY FILESET D ONTO
3* OUTPUT FILESET O.
4*Routine NAME: DIRL
5*ENTRY NAME: DIRL
6*STORAGE: 5,300B WORDS OF SCM, 10,000B WORDS OF LCM.
7*RoutineS CALLED: GETBA(ON SYSTEM).

A* EMILY WILLBANKS C-2 J. NORRIS 71
B*DMPFS - DUMP CONTENTS OF FILESET
C*SR7600 CROS
D* SW 3 LS 3 TYPE 1
E*SOURCE CARDS 110 BCD OBJECT CARDS 37 BIN
F*DMPFS - DUMP CONTENTS OF FILESET
G*ON DISK W4 COMPAT WU 11/01/72REV.1 DECK 11/01/72REV.1
1*FORM: CALL DMPFS(FS,NWDS,NR,NF,FORMAT,IF,IR,F50)
2*PURPOSE: PRINT THE CONTENTS OF FILESET FS, STARTING AT
3* ITS CURRENT POSITION, ON FILESET F50 IN THE SPECIFIED
4* FORMAT(=FORMAT,IF,IR). NWDS WORDS PER RECORD AND NR
5* RECORDS PER FILE ARE PRINTED FOR NF FILES, IF NWDS=0,
6* EACH RECORD OF NF FILES IS CATALOGED. IF NWDS=0 AND
7* NF.LT.0; EACH FILE OF THE FILESET IS CATALOGED.
8*Routine NAME: DMPFS
9*ENTRY NAME: DMPFS
10*STORAGE: 714 (OCTAL) WORDS OF SCM
11*RoutineS CALLED: NARG, SKIPF, BOI, OUTPTC, DREAD1,
12*DREADR (ALL ON SYSTEM).

VOLUME 2 - 9/73
**COPYBFS**

- **FUNCTION**: DETERMINE OPTIMUM RANDOM AND SEQUENTIAL BUFFERS
- **SOURCE**: C-2
- **OBJECT**: C-2

**COPYBFS**

- **PURPOSE**: GIVEN AMOUNT OF FREE LICM AND SIZE OF MALCM,
  DETERMINE THE OPTIMUM SIZES FOR RANDOM AND SEQUENTIAL BUFFERS AND ROLL OUT MALCM TO PROVIDE ROOM.

**ROUTINE NAME**: COPYBFS

**ENTRY NAME**: COPYBFS

**STORAGE**: 66 OCTAL WORDS

**ROUTES CALLED**: LCROLOT(Q306B) ON SYSTEM

**VOLUME 2 - 9/73**
Z (NOT USED FOR NEW PROGRAMS)
**Purpose:** Analyze Fortran source decks and produce a directory of all statement numbers and variable names used in the source.

**Routine Name:** INDEX

**Entry Name:** INDEX

**Storage:** 45000 octal words central memory and

and 46000 to 303000 octal words ECS.

---

*(NEXTDAY) has been redesignated Q1AA.*

*(F66F94) has been redesignated M2AD.*

*(DISI94) has been redesignated M2AE.*

*(WRIT94) has been redesignated M501A.*
Z107A *(WR94FBT) HAS BEEN REDESIGNATED K502A.

Z1AA *(ASAP) HAS BEEN REDESIGNATED Q3AA.
PART III

INDEXES
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. "C600 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.
<table>
<thead>
<tr>
<th>PROGRAM NAME</th>
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<th>7600 RESIDENCE</th>
<th>6600 RESIDENCE</th>
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INDEX 1 - 24
PROGRAM NAME

VOLUME 2 - 9/73
INDEX2 - NEWSLETTERS

SUBJECT INDEX THRU CCF:PIM-2:030

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

Argonne Code Center Library, 30
EISPACK Mathematics Library, 18
IMSL Mathematics Library, 27


Disposition of Cancelled Newsletters:

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