DAVID W. TAYLOR NAVAL SHIP
RESEARCH AND DEVELOPMENT CENTER
Bethesda, Maryland 20084

COMPUTER CENTER
CDC LIBRARIES/NSRDC (SUBPROGRAMS)

by

David V. Sommer

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

Computation, Mathematics and Logistics Department
Departmental Report

February 1981
MAJOR DTNSRDC ORGANIZATIONAL COMPONENTS

DTNSRDC
COMMANDER 00
TECHNICAL DIRECTOR 01

OFFICER-IN-CHARGE CARDEROCK 05

SYSTEMS DEVELOPMENT DEPARTMENT 11

SHIP PERFORMANCE DEPARTMENT 15

STRUCTURES DEPARTMENT 17

SHIP ACOUSTICS DEPARTMENT 19

SHIP MATERIALS ENGINEERING DEPARTMENT 28

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PROPULSION AND AUXILIARY SYSTEMS DEPARTMENT 27

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**Report Documentation Page**

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<td>Computer Center CDC Libraries/NSRDC (Subprograms) CLIB/N is a reference manual which described most of the subprograms in library &quot;NSRDC&quot; on the CDC 6000/Cyber 74 computers at DTNSRDC. These scientific and utility routines are used primarily with Fortran (FTN, MNF or RATFOR) programs and most are coded in FTN. CLIB/N lists the routines by functional category and alphabetically with a descriptive title. All currently available machine-readable documents detailing the use of these routines are included.</td>
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**Security Classification of this Page (When Data Entered)**
DAVID W. TAYLOR
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
BETHESDA, MARYLAND 20084

COMPUTER CENTER
CDC LIBRARIES / NSRDC
(SUBPROGRAMS)

BY
DAVID V SOMMER
USER SERVICES BRANCH
CODE 1892

COMPUTATION, MATHEMATICS AND LOGISTICS DEPARTMENT
DEPARTMENTAL REPORT

FEBRUARY 1981
THROUGH REVISION 0 (FEB 1981)
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2 PROGRAM DOCUMENTATION
   HOW TO PRINT A DOCUMENT 2-1
   <INDIVIDUAL DOCUMENTS
      ARRANGED ALPHABETICALLY> 2-2 *

* - A LISTING OF THE DOCUMENTS IS NOT INCLUDED IN THIS TABLE OF
  CONTENTS (SEE PAGE 1-9). AS NEW ROUTINES ARE DEVELOPED, THEY WILL
  BE INSERTED ALPHABETICALLY INTO THIS DOCUMENT AND MAY BE PRINTED ON
  THE COMPUTER.
INTRODUCTION

THE COMPUTER CENTER MAKES AVAILABLE ON THE CDC COMPUTERS, IN ADDITION TO THE NOS/BE OPERATING SYSTEM, A WIDE VARIETY OF BOTH SCIENTIFIC AND UTILITY PROGRAMS, SUBPROGRAMES AND CATALOGUED PROCEDURES. MOST OF THE ROUTINES ARE MAINTAINED IN LIBRARIES ON PERMANENT FILES AND MAY BE INVOKED BY THE APPROPRIATE (LOADER) CONTROL CARDS.

THE CLIB-SERIES OF MANUAls CONSISTS OF THE FOLLOWING, WHICH DESCRIBE THE CONTENTS OF THE VARIOUS CDC 6000 LIBRARIES MAINTAINED BY THE COMPUTER CENTER:

- CLIB - COMPUTER CENTER CDC LIBRARIES
- CLIB/N - COMPUTER CENTER CDC LIBRARIES/NSRDC (SUBPROGRAMS)
- CLIB/P - COMPUTER CENTER CDC LIBRARIES/PROCFL (PROCEDURES)
- CLIB/U - COMPUTER CENTER CDC LIBRARIES/UTILITY (PROGRAMS)
- CLIB/M - COMPUTER CENTER CDC LIBRARIES/MNSRDC (PROGRAMS)

THIS MANUAL, CLIB/N, IS A REFERENCE MANUAL WHICH DESCRIBES MOST OF THE SUBPROGRAMS IN LIBRARY 'NSRDC'.

HOW TO USE THIS MANUAL

THE ROUTINES ARE CLASSIFIED IN ONE OR MORE FUNCTIONAL CATEGORIES (SEE PAGE 1-2 FOR A LIST OF CATEGORIES). THEY ARE LISTED, BEGINNING ON PAGE 1-5, UNDER THE VARIOUS CATEGORIES. THE INDIVIDUAL ROUTINES ARE LISTED, WITH DESCRIPTIVE TITLE, BEGINNING ON PAGE 1-B. CHAPTER 2 CONTAINS ALL CURRENTLY AVAILABLE MACHINE-READABLE DOCUMENTS DESCRIBING THE USE OF SUBPROGRAMS IN LIBRARY 'NSRDC'. DOCUMENTATION NOT IN CHAPTER 2 MAY BE OBTAINED FROM USER SERVICES, CARDEROCK, BLDG 17, ROOM 100, (202) 227-1907.

LIBRARY NSRDC

'NSRDC' IS A LIBRARY OF DTNSRDC WRITTEN AND/OR SUPPORTED SUBPROGRAMS. THESE ROUTINES ARE USED PRIMARILY WITH FTN, MNF OR R&FOR PROGRAMS AND MOST ARE CODED IN FTN.

USING THE LIBRARY

THE FOLLOWING CONTROL CARDS MAY BE USED TO ACCESS 'NSRDC' DURING THE LOADING OF A PROGRAM:

FIN. -OR- COBOL. -OR- ATTACH,LGO,MYLGO, ID=XXXX.
ATTACH,NSRDC.
LDSET,LIB=NSRDC. -OR- LIBRARY,NSRDC.
LGO.

...
### FUNCTIONAL CATEGORIES

The following functional categories are used at DTNSRDC. Those categories preceded by an asterisk (*) are local DTNSRDC categories. The other are from the VIM (CDC Users Group) list.

<table>
<thead>
<tr>
<th>Category Code</th>
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<tbody>
<tr>
<td>A0</td>
<td>Arithmetic routines</td>
</tr>
<tr>
<td>A1</td>
<td>Real Numbers</td>
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<tr>
<td>A2</td>
<td>Complex Numbers</td>
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<tr>
<td>A3</td>
<td>Decimal</td>
</tr>
<tr>
<td>A4</td>
<td>I/O Routines</td>
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<td>B0</td>
<td>Elementary Functions</td>
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<td>B1</td>
<td>Trigonometric</td>
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<td>B2</td>
<td>Hyperbolic</td>
</tr>
<tr>
<td>B3</td>
<td>Exponential and Logarithmic</td>
</tr>
<tr>
<td>B4</td>
<td>Roots and Powers</td>
</tr>
<tr>
<td>C0</td>
<td>Polynomials and Special Functions</td>
</tr>
<tr>
<td>C1</td>
<td>Evaluation of Polynomials</td>
</tr>
<tr>
<td>C2</td>
<td>Roots of Polynomials</td>
</tr>
<tr>
<td>C3</td>
<td>Evaluation of Special Functions (Non-Statistical)</td>
</tr>
<tr>
<td>C4</td>
<td>Simultaneous Non-linear Algebraic Equations</td>
</tr>
<tr>
<td>C5</td>
<td>Simultaneous Transcendental Equations</td>
</tr>
<tr>
<td>C6</td>
<td>Roots of Functions</td>
</tr>
<tr>
<td>D0</td>
<td>Operations on Functions and Solutions of Differential Equations</td>
</tr>
<tr>
<td>D1</td>
<td>Numerical Integration</td>
</tr>
<tr>
<td>D2</td>
<td>Numerical Solutions of Ordinary Differential Equations</td>
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<td>D3</td>
<td>Numerical Solutions of Partial Differential Equations</td>
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<td>D4</td>
<td>Numerical Differentiation</td>
</tr>
<tr>
<td>E0</td>
<td>Interpolation and Approximations</td>
</tr>
<tr>
<td>E1</td>
<td>Table Look-Up and Interpolation</td>
</tr>
<tr>
<td>E2</td>
<td>Curve Fitting</td>
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<tr>
<td>E3</td>
<td>Smoothing</td>
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<tr>
<td>E4</td>
<td>Minimizing or Maximizing a Function</td>
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<tr>
<td>F0</td>
<td>Operations on Matrices, Vectors &amp; Simultaneous Linear Equations</td>
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<tr>
<td>F1</td>
<td>Vector and Matrix Operations</td>
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<tr>
<td>F2</td>
<td>Eigenvalues and Eigenvectors</td>
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<tr>
<td>F3</td>
<td>Determinants</td>
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<td>Simultaneous Linear Equations</td>
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<td>G0</td>
<td>Statistical Analysis and Probability</td>
</tr>
<tr>
<td>G1</td>
<td>Data Reduction (Common Statistical Parameters)</td>
</tr>
<tr>
<td>G2</td>
<td>Correlation and Regression Analysis</td>
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<td>G3</td>
<td>Sequential Analysis</td>
</tr>
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<td>G4</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>G5</td>
<td>Time Series</td>
</tr>
<tr>
<td>G6</td>
<td>Special Functions (Includes Random Numbers and PDF's)</td>
</tr>
<tr>
<td>G7</td>
<td>Multivariate Analysis and Scale Statistics</td>
</tr>
<tr>
<td>G8</td>
<td>Non-parametric Methods and Statistical Tests</td>
</tr>
<tr>
<td>G9</td>
<td>Statistical Inference</td>
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H0 OPERATIONS RESEARCH TECHNIQUES, SIMULATION & MANAGEMENT SCIENCE
H1 LINEAR PROGRAMMING
H2 NON-LINEAR PROGRAMMING
H3 TRANSPORTATION AND NETWORK CODES
H4 SIMULATION MODELING
H5 SIMULATION MODELS
H6 CRITICAL PATH PROGRAMS
H8 AUXILIARY PROGRAMS
H9 COMBINED

I0 INPUT
I1 BINARY
I2 OCTAL
I3 DECIMAL
I4 BCD (HOLLERNITH)
I9 COMPOSITE

J0 OUTPUT
J1 BINARY
J2 OCTAL
J3 DECIMAL
J4 BCD (HOLLERNITH)
J5 PLOTTING
J7 ANALOG
J9 COMPOSITE

K0 INTERNAL INFORMATION TRANSFER
K1 EXTERNAL-TO-EXTERNAL
K2 INTERNAL-TO-INTERNAL (RELOCATION)
K3 DISK
K4 TAPE
K5 DIRECT DATA DEVICES

L0 EXECUTIVE ROUTINES
L1 ASSEMBLY
L2 COMPILING
L3 MONITORING
L4 PREPROCESSING
L5 DISASSEMBLING AND DERELATIVIZING
L6 RELATIVIZING
L7 COMPUTER LANGUAGE TRANSLATORS

M0 DATA HANDLING
M1 SORTING
M2 CONVERSION AND/OR SCALING
M3 MERGING
M4 CHARACTER MANIPULATION
M5 SEARCHING, SEEKING, LOCATING
M6 REPORT GENERATORS
M9 COMPOSITE

N0 DEBUGGING
N1 TRACING AND TRAPPING
N2 DUMPING
N3 MEMORY VERIFICATION AND SEARCHING
N4 BREAKPOINT PRINTING
*** LIST OF SUBPROGRAMS BY CATEGORY ***

The subprograms in library 'NSRDC' are listed below under their functional categories. Routines flagged with an asterisk (*) do not have machine-readable documentation. An alphabetical list, with a brief description of each routine begins on page 1-8.

A0 ARITHMETIC ROUTINES

<table>
<thead>
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B1 TRIGONOMETRIC

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C6 ROOTS OF FUNCTIONS

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<td>FRMRA2</td>
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<td>FMRAN</td>
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<tr>
<td>E5</td>
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E2 CURVE FITTING
   FFT   OPLSA   SPLFIT *
   FFT5  POLYN   SQFIT *
   GMHAS  *   RFFT
   LSQSUB  *   RFSN

E3 SMOOTHING
   SMOOTH *

E4 MINIMIZING OR MAXIMIZING A FUNCTION
   MINMAX *

F1 VECTOR AND MATRIX OPERATIONS
   MATINS

F2 EIGENVALUES AND EIGENVECTORS
   VARAH1  *   VARAH2 *

F3 DETERMINANTS
   GAUSS   MATINS

F4 SIMULTANEOUS LINEAR EQUATIONS
   BMAM  *   GAUSS   MATINS
   CGAUSS   MAM  *
   CMPINV   MAM200 *

G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)
   STUTE *

G4 ANALYSIS OF VARIANCE
   ANOVA1  *   ANOVA2 *

G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)
   IAOC   IDAYWEK   RANNUM *

10 INPUT
   FASTIN *

12 OCTAL
   OFMTDE   OFMTV

13 DECIMAL
   CRDTAB *

14 BCD (HOLLERITH)
   ICOM  *   ICOMN  *   IFMTV

J2 OCTAL
   PRTFL
J4 BCD (HOLLERITH)
   BANR  ICOMM  *
   BANR6 LINE6
   ICOM  LINE8

J5 PLOTTING
   PLOTMY  *
   PLOTMR  PLOTXY  *

K2 INTERNAL-TO-INTERNAL (RELOCATION)
   GETRA  MOVEIT
   MFETCH  MSET
   MOVECM  RCPA

M0 DATA HANDLING
   COMPSTR  MASKIT
   EQU60  SWAP

M1 SORTING
   ASORT  QSORT1  SSORT1
   ASORTMV  SSORT  SSORTL
   QSORT  SSORTF

M2 CONVERSION AND/OR SCALING
   DATCNV  IROMAN  NEWDAT
   DATFMT  ISEC  UNHEX3
   GETHOUR  JGDATE
   HEX3  JULIAN
   IHMS  MONTH

M4 CHARACTER MANIPULATION
   ADJL  IBUNP  REPLNE
   ADJR  IPAKLFT  SBYT
   ASHIFT  ISTAPE  SEMICO
   CENTER  LBYT  SETREW
   CHFILL  LEFTADJ  SHIFTA
   CHNGSEQ  MOVCHAR
   CONRT  MOVSTR
   EXPAND  MXGET  TRAILBZ
   EXPRM  PARGET  VALDAT
   EXTBIT  PUTCMA  VFILL
   EXTPRM  PUTCMA
   FBINRD  REPLAC  ZEROFL
   GETCHA  REPLACM
   GETCHR  REPLHI
   GETPRM  REPLLO

M5 SEARCHING, SEEKING, LOCATING
   AMAXE  GETCHR  LASTWDR
   AMINE  GETLIB
   FINDC  IDIGIT
   FINDW  IFINDCH
   FINDWRD  LASTC
   GETCHA  LASTCH

N0 DEBUGGING
   ALTME  ELTIME
   ELTIME  PRTIME
N2 DUMPING
   DMPA    DUMPA    DUMPFL
   DMPCPA  DUMPCPA  RECOVRD

01 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.) WARNING

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS
   AC      GETLIB    NUMEXEC
   ALTME   GODROP    NUMVAR
   BANR    HERE      OVLANME
   BANR6   IBL       PFRC
   BUFSIZE IDID      PRTFL
   ELTIME ISITCNF    REDUCE
   FTNRFL JOBNAME   ROUTERQ
   GETFIT JOBORG    TIMLEFT
   GETLFNS MEMUSED   ZPFPUT
   GETLGO MFRAME    ZRTPUT

Q3 FILE MANIPULATION
   CLUNLD   ROUTE   ZP FUNC
   REQUEST UNLOAD ZSYSEQ

Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.
PRTIME

R1 FORMAL LOGIC
   COUPLE

T4 ENGINEERING
   ARDCFT *

V1 RANDOM NUMBER GENERATORS
   RANNUM *  RNDMIZ
SUBPROGRAMS IN LIBRARY 'NSRDC' ARE LISTED ALPHABETICALLY BELOW.

AC           GET ACCOUNT NUMBER FOR THIS JOB
ADJL         LEFT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
ADJR         RIGHT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS
AIR         AIRY FUNCTION INTEGRAL
ALTIME       OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE START OF JOB (OR INTERCOM SESSION)
AMAXE        FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS MAXE)
AMINE        FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS MINE)
ANOVA1       ONE-WAY ANALYSIS OF VARIANCE WITH UNEQUAL N
ANOVA2       TWO-WAY ANALYSIS OF VARIANCE WITH EQUAL N
APOWR        EXPONENTIATION OF POWER SERIES - ONE VARIABLE
ARDCFT       PROPERITES OF U.S. STANDARD ATMOSPHERE (1962)
ASHIFT       SHIFT EACH WORD OF AN ARRAY
ASORT        FTN ALPHANUMERIC SORT
ASORTMV      SORT 2-DIMENSIONAL ARRAY USING A FAST ARRAY MOVING SUBROUTINE
BANR         PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 110 CHARACTERS LONG)
BANR6        PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 CHARACTERS LONG)
BEJY0        ZERO-ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BEJY1        FIRST ORDER BESSEL FUNCTIONS FOR REAL ARGUMENTS
BESSI        MODIFIED BESSEL FUNCTION OF THE FIRST KIND
BESSJ        BESSEL FUNCTION OF THE FIRST KIND
BESSK        MODIFIED BESSEL FUNCTION OF THE SECOND KIND
BESSY        BESSEL FUNCTION OF THE SECOND KIND
BMAN  SOLVE SYSTEM AX=B FOR BANDED SYMMETRIC MATRICES
BPOWR EXPONENTIALIZATION OF POWER SERIES IN TWO VARIABLES
BSJ  SPHERICAL BESSEL FUNCTION
BUFSIZE PRINT MESSAGE IN DAYFILE FOR EACH FILE SPECIFIED INDICATING BUFFER SIZE AND WHETHER BUFFER IS CURRENTLY AlLOCATED
CBSF   COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
CCALL EXIT PROGRAM AND EXECUTE ONE OR MORE CONTROL CARD
CEI3 COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND
CELLI COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND SECOND KIND
CENTER CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD
CFILL FILL AREA WITH ALTERNATING FIELDS OF SPECIFIED CHARACTER AND BLANKS
CGAUSS COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT BY ITERATIVE GAUSSIAN ELIMINATION
CHFILL FILL (PORTION OF) AN ARRAY WITH A CHARACTER
CHNGSEQ ALLOW COBOL4 USER TO DEFINE A COLLATING SEQUENCE
CLUNLD CLOSE AND UNLOAD A FILE
CMPINV COMPLEX MATRIX INVERSION
COMBES BESSEL FUNCTIONS FOR COMPLEX ARGUMENT AND ORDER
COMPSTR COMPARE TWO CHARACTER STRINGS
CONTRCT SQUEEZE ARRAY OF IR-FORMAT CHARACTERS TO LEFT (SEE EXPAND)
COTAN COTANGENT FUNCTION
COUPLE LOGICALLY CONNECT TWO WORDS
CRDTAB READ TABLES FOR FRMRAN AND FRMRA2 INTERPOLATION
DATCNV CONVERT DATE FORMATS (USES INTEGERS)
DATFMT CONVERT DATE FORMATS (USES CHARACTER STRINGS)
DISCOT SINGLE OR DOUBLE INTERPOLATION
DMPA CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION) (NO HEADINGS ARE PROVIDED)
DMPCPA DUMP JOB CONTROL POINT AREA
DPROOT FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL
DUMPA GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA
DUMPCPA EXPANDED DUMP OF JOB CONTROL POINT AREA
DUMPFL CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION OF
USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)
ELLI ELLIPTIC INTEGRAL
ELLIP ELLIPTIC INTEGRAL
ELTIME OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST
CALL TO ELTIME
EQU60 LOGICAL COMPARE OF TWO ARRAYS
ERROR ERROR FUNCTION
EXPAND EXPAND CHARACTER STRING INTO ARRAY OF 1R-FORMAT WORDS (SEE
CONTRCT)
EXPINT EXPONENTIAL INTEGRAL
EXPRM EXTRACT NEXT PARAMETER FROM EXECUTE CARD
EXTBIT EXTRACT BITS FROM A WORD
EXTPRM EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING
FASTIN READ AND UNPACK DATA PREPARED ON THE XDS-910 A/D CONVERSION
SYSTEM
FBINRD UNPACK AN INPUT ARRAY (N BITS PER INPUT CHARACTER INTO CDC
WORD)
FFT FAST FOURIER TRANSFORM FOR COMPLEX TABULATED FUNCTION
FFT5 FAST FOURIER TRANSFORM
FGI FORTRAN GAUSSIAN INTEGRATION
FINDC FIND PRESENCE OR ABSENCE OF SPECIFIED CHARACTER IN AN ARRAY
(USER SPECIFIES RELATIONAL OPERAND)
FINDW FIND PRESENCE OR ABSENCE OF SPECIFIED WORD IN AN ARRAY (USER
SPECIFIES RELATIONAL OPERAND)
FINDWRD FIND SPECIFIED WORD IN AN ARRAY
FNOL3 INTEGRATE SYSTEM OF ORDINARY DIFFERENTIAL EQUATIONS
FRESNEL  EVALUATE FRESNEL INTEGRALS
FRMRA3  LINEAR TABLE INTERPOLATION (ONE OR TWO INDEPENDENT VARIABLES)
FRMRA2  LINEAR TABLE INTERPOLATION (MULTIPLE INDEPENDENT VARIABLES)
FTNRFL  GET/SET CORE SIZE
GAMCAR  COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART
GAMMA   INCOMPLETE OR COMPLETE GAMMA FUNCTION
GAUSS   SIMULTANEOUS EQUATION SOLUTION WITH DETERMINANT BY ITERATIVE GAUSSIAN ELIMINATION
GETCHA  EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY
GETCHR  EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD
GETFIT  GET SPECIFIED FIT ADDRESS
GETHOUR FOR A SPECIFIED PERIOD OF TIME (UP TO 2 HR 59 MIN 59 SEC) DETERMINE WHICH HOUR IS OCCUPIED THE LONGEST
GETLFS  GET ACTUAL LOCAL FILE NAMES (FOR FTN)
GETLGO  EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD PARAMETERS
GETLIB  GET SYSTEM LIBRARY NAME FROM CODE IN CONTROL POINT AREA
GETRA  GET PROGRAM COMMUNICATION REGION (RA+0 THRU RA+77B)
GMHAS  HARMONIC ANALYSIS
GODROP ISSUE USER-SPECIFIED GO/DROP MESSAGE
HELP   COMPLEX ZEROES OF REAL OR COMPLEX POLYNOMIAL
HERE   GET TERMINAL ID FOR THIS JOB
HEX3   SQUEEZE 3-CHARACTER HEX INTO 12 BITS
HIFAC  HIGHEST COMMON FACTOR OF TWO POLYNOMIALS
IAOC   COUNT ONE-BITS IN SPECIFIED WORD
IBL    CALCULATE BEST BLOCK LENGTH (MIN TIME REQ'D FOR RANDOM ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILES
IBUNP  UNPACK 12-BIT BYTES FROM ARRAY
ICOM  INTERACTIVE COMMUNICATOR (SYMBOLIC) -- READ RESPONSE AND COMPARE WITH LIST OF VALID RESPONSES

ICOMN  INTERACTIVE COMMUNICATOR (INTEGER NUMERIC) -- READ NUMBER AND TEST TO SEE IF IN SPECIFIED RANGE

IDAYWEK  FUNCTION TO DETERMINE THE DAY OF THE WEEK FOR ANY DATE FROM 10/15/1582 THRU 02/28/4000

IDID  GET USER INITIALS (AND INTERCOM USER ID) FROM CHARGE CARD OR LOGIN

IDIGIT  CHECK FOR DIGITS IN A FIELD WITHIN A WORD

IFINDCH  FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY

IFMTV  FAST I-FORMAT DECODE OF VARIABLE LENGTH INPUT

IHMS  CONVERT SECONDS TO 'HH.MM.SS.' (SEE ISEC)

IPAKLFT  SQUEEZE LEFT AND REMOVE ZEROS (00B) AND BLANKS (55B), RETURN NUMBER OF CHARACTERS

IROMAN  CONVERT ROMAN NUMBERS TO INTEGER

ISEC  CONVERT HH.MM.SS TO SECONDS (SEE IHMS)

ISITCNF  TEST FOR CONNECTED FILE

ISTAPE  GENERATE TAPE NAME 'TAPENN'

ISUMIT  SUM ELEMENTS OF INTEGER ARRAY

JGDATE  CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (MULTI-YEAR)

JOBNAME  GET NOS/BE JOB NAME FOR THIS JOB

JOBORG  GET JOB ORIGIN (BATCH, INTERCOM, GRAPHICS, MULTI-USER)

JULIAN  CONVERT ANY GREGORIAN DATE TO A JULIAN DATE AND VICE VERSA (SINGLE YEAR)

KUTMER  INTEGRATE A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE KUTTA-MERSON FOURTH-ORDER, SINGLE-STEP METHOD

LASTCH  FIND LAST NON-BLANK CHARACTER IN ARRAY

LASTWRD  FIND LAST WORD OF ARRAY WHICH CONTAINS A NON-BLANK CONTAINS A NON-BLANK

LBYT  EXTRACT VARIABLE LENGTH BYTE
LEFTADJ  SQUEEZE LEFT AND REMOVE BLANKS AND OOB (USER MAY SUPPLY TRAILING FILL CHARACTER)
LINE6   SET PRINT FILE TO 6 LINES PER INCH
LINE8   SET PRINT FILE TO 8 LINES PER INCH
LOGGAM  LOGARITHM OF GAMMA FUNCTION FOR COMPLEX ARGUMENT
LSQSUB  GENERAL WEIGHTED LEAST SQUARES FIT
MAM     SOLVE SYMMETRIC SYSTEM OF LINEAR EQUATIONS
MAM200  SOLVE 200 SYMMETRIC LINEAR EQUATIONS
MASKIT  DYNAMIC MASK GENERATOR
MATINS  MATRIX INVERSE WITH SIMULTANEOUS EQUATION SOLUTION AND DETERMINANT
MAXE    FIND MAXIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMAXE)
MEMUSED PRINT MESSAGE IN DAYFILE GIVING FIELD LENGTH IN USE AT TIME OF CALL TO THIS ROUTINE
MFETCH  FETCH A SINGLE WORD FROM USER'S FL (SEE MSET)
MFRAME  OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM
MINE    FIND MINIMUM VALUE OF AN ARRAY (ALSO CONTAINS AMINE)
MINMAX  GENERALIZED NONLINEAR ITERATOR
MONTH   FROM A DATE (MM/DD/YY) FIND THE MONTH AND RETURN FULL SPELLING AND 3- OR 4-CHARACTER ABBREVIATION
MOVCHAR MOVE ONE CHARACTER FROM ONE STRING TO ANOTHER
MOVECM  MOVE WORDS FROM ONE AREA IN CORE TO ANOTHER
MOVEIT  MOVE AN ARRAY (MOVLEV REPLACEMENT WHICH CALLS MOVECM)
MOVSTR  MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER
MSET    SET A SINGLE WORD IN USER'S FL (SEE MFETCH)
MXGET   EXTRACT (RIGHT-JUSTIFIED, ZERO-FILLED) 0-10 6-BIT CHARACTERS FROM 60-BIT WORDS
NEWDAT  ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE
NFILL   FILL ELEMENTS 1 THRU N OF AN ARRAY WITH THE VALUES 1 THRU N, RESPECTIVELY
NFILLT  TEST AN ARRAY FOR THE PRESENCE OF THE INTEGERS 1 THRU N IN ELEMENTS 1 THRU N, RESPECTIVELY
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>NROOTS</td>
<td>Find real and complex roots of real polynomial</td>
</tr>
<tr>
<td>NUMEXEC</td>
<td>Get number of execute card parameters which were used in this execution of the program</td>
</tr>
<tr>
<td>NUMVAR</td>
<td>Determine number of arguments in call to subprogram</td>
</tr>
<tr>
<td>OFMTDE</td>
<td>Fast O-format decode</td>
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<tr>
<td>OFMTV</td>
<td>Fast O-format decode of variable length input</td>
</tr>
<tr>
<td>OPLSA</td>
<td>Orthogonal polynomial least square approximation</td>
</tr>
<tr>
<td>OVLNAME</td>
<td>Get name of file currently being executed</td>
</tr>
<tr>
<td>PARAMET</td>
<td>Get all parameters of user-supplied parameter string</td>
</tr>
<tr>
<td>PFRC</td>
<td>Supply description of permanent file function return code</td>
</tr>
<tr>
<td>PLOTMY</td>
<td>Printer plot - multiple curves</td>
</tr>
<tr>
<td>PLOTPR</td>
<td>Printer plot - multiple curves</td>
</tr>
<tr>
<td>PLOTXY</td>
<td>Printer plot - single curve</td>
</tr>
<tr>
<td>POLDIV</td>
<td>Polynomial division</td>
</tr>
<tr>
<td>POLYN</td>
<td>Least squares polynomial fit</td>
</tr>
<tr>
<td>POWR1</td>
<td>1 term in exponentiation of power series - one variable</td>
</tr>
<tr>
<td>POWR2</td>
<td>1 term in exponentiation of power series - two variables</td>
</tr>
<tr>
<td>PROD2</td>
<td>1 term in product of power series - two variables</td>
</tr>
<tr>
<td>PROOT</td>
<td>Find all roots of a real polynomial</td>
</tr>
<tr>
<td>PRTFL</td>
<td>Print current fl (or put into dayfile)</td>
</tr>
<tr>
<td>PRTIME</td>
<td>Get and print CPA, CPB, CP, PP, IO and wall clock times since last call and print user-supplied message</td>
</tr>
<tr>
<td>PSI</td>
<td>Complex PSI function</td>
</tr>
<tr>
<td>PUTCHA</td>
<td>Insert character into specified position in an array</td>
</tr>
<tr>
<td>PUTCHR</td>
<td>Insert character into specified position in a word</td>
</tr>
<tr>
<td>QSORT</td>
<td>In-core ascending sort for arrays larger than 500 words</td>
</tr>
<tr>
<td>QSORTI</td>
<td>In-core ascending sort with re-ordering of associated array (for arrays larger than 500 words)</td>
</tr>
<tr>
<td>QUADG</td>
<td>Integral by Gauss-Legendre 10-point quadrature</td>
</tr>
<tr>
<td>QUARTI</td>
<td>Real or complex roots of quartic</td>
</tr>
</tbody>
</table>
FEB 1981  CDC 6000  PAGE 1-16

RANNUM  NORMALLY DISTRIBUTED RANDOM NUMBERS
RCPA  .READ (A PORTION OF) CONTROL POINT AREA
RECOVRD  ON RECOVERY, PRINT EXCHANGE JUMP PACKAGE, RA=0 THRU RA=77B
REDUCE  REDUCE FL TO MINIMUM -OR- REQUEST ADDITIONAL FL RELATIVE TO
         START OF BLANK COMMON
REPLAC  REPLACE ONE CHARACTER WITH ANOTHER IN AN ARRAY
REPLACM REPLACE SEVERAL CHARACTERS WITH OTHER CHARACTERS
REPLHI  REPLACE ALL CHARACTERS GREATER THAN SPECIFIED CHARACTER WITH
         NEW CHARACTER
REPLL0  REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH NEW
         CHARACTER
REPLNE  REPLACE ALL CHARACTERS (EXCEPT SPECIFIED CHARACTER) WITH A
         SPECIFIED CHARACTER
REQUEST CALLABLE REQUEST COMMAND
RFFT   FAST FOURIER TRANSFORM FOR REAL TABULATED DATA
RFSN   REVERSE FAST FOURIER TRANSFORM
RNDMIZ EMULATE BASIC LANGUAGE 'RANDOMIZE' STATEMENT (CAN BE USED TO
         GUARANTEE FIRST CALL TO RANF WILL RESULT IN A DIFFERENT
         NUMBER WITH EACH EXECUTION OF A PROGRAM)
ROOTER GENERAL ROOT FINDER
ROUTE  CALLABLE ROUTE COMMAND
ROUTERC SUPPLY DESCRIPTION OF ROUTE RETURN CODE
SBYT   STORE VARIABLE LENGTH BYTE
SEMICO REPLACE DISPLAY CODE 00B WITH 77B (SEMI-OLON)
SETREW CONVERT ALPHABETIC REWIND OPTION INTO RM OPEN AND CLOSE CODES
SHIFTA SHIFT ARRAY A SPECIFIED NUMBER OF BITS (CROSSING OVER WORD
          BOUNDARIES)
SIMP   SIMPSON'S RULE INTEGRATION
SIMPUN SIMPSON'S RULE INTEGRATION - UNEQUAL INTERVALS
SKWEZL SQUEEZE LEFT AND REMOVE BLANKS AND 00B
SKWEZR SQUEEZE RIGHT AND REMOVE BLANKS AND 00B
SMOOTH LEAST SQUARES POLYNOMIAL SMOOTHING
SNCNDN JACOBIAN ELLIPTIC FUNCTION
SPLFIT SPLINE CURVE FIT
SQFIT POLYNOMIAL LEAST SQUARE FIT
SSORT FTN SHELL SORT
SSORTF FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTI FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS
SSORTL FTN LOGICAL SHELL SORT
STUTEE STUDENT'S T DISTRIBUTION
SUMIT SUM ELEMENTS OF REAL ARRAY
SWAP SWAP TWO ARRAYS
TIMLEFT DETERMINE CP (AND IO) TIME LEFT SINCE START OF BATCH JOB OR INTERCOM COMMAND
TRAILBZ CHANGE TRAILING BLANKS TO ZEROS (OOB)
UNHEX3 SPREAD 2 CHARACTERS INTO 3 HEX DIGITS
UNLOAD UNLOAD A FORTRAN FILE
VALDAT LOGICAL FUNCTION TO VALIDATE A DATE FORMAT
VALIDT VALIDATE AN ARRAY TO SEE THAT EACH ELEMENT IS ONE OF A USER-SPECIFIED LIST
VARAH EIGENVALUES AND EIGENVECTORS OF A GENERAL REAL MATRIX
VARAH2 IMPROVED ESTIMATES AND BOUNDS FOR EIGENSYSTEM OF A GENERAL REAL MATRIX
VFILL FILL AN ARRAY WITH USER-SPECIFIED WORD
WARNING FTN-CALLABLE 'WARNING' CONTROL CARD
WEKDAY DETERMINE THE DAY OF THE WEEK FOR ANY GREGORIAN DATE FROM OCTOBER 15, 1582 THRU FEBRUARY 28, 4000
XFIL FILON'S METHOD FOR INTEGRALS WITH SIN AND COS
ZBLANK CHANGE BLANKS TO OOB AND VICE VERSA
ZEROFL ZERO FIELD LENGTH (SECURITY EDT)
ZEROS REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS
ZPFPUT  PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ZPFUNC
ZPFUNC  CALLABLE PERMANENT FILE FUNCTIONS
ZRTPUT  PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ROUTE
ZSYSEQ  FORTRAN CALLABLE SYSTEM CALL
***** SUBPROGRAM DOCUMENTATION *****

THIS CHAPTER CONTAINS THE MACHINE-READABLE DOCUMENTATION FOR MANY
SUBPROGRAMS IN LIBRARY 'NSRDC'. NON-MACHINE-READABLE DOCUMENTATION FOR
OTHER ROUTINES IN THE LIBRARY IS ON FILE IN USER SERVICES, CODE 1892.1,
(202) 227-1907.

*** HOW TO PRINT A DOCUMENT ***

INDIVIDUAL DOCUMENTS MAY BE PRINTED USING:

BEGIN.DOCGET,,NSRDC,,<SUBPROG>,OUTPUT.

WHERE <SUBPROG> IS THE DESIRED DOCUMENT.

SEVERAL DOCUMENTS MAY BE PRINTED AT ONE TIME USING:

JOBNAME.
CHARGE....
BEGIN,UTILITY,,MANYDOC,NSRDC.
' 7/8/9  EOR
<SUBPROG1>
<SUBPROG2>
...
<SUBPROGN>
" 6/7/8/9  EDI
SUBROUTINE 'AC'
FUNCTION 'AC'

PURPOSE
GET ACCOUNT NUMBER FOR THIS JOB

FUNCTIONAL CATEGORIES: 00

USAGE
CALL AC (I)
IVARIABLE = AC (I)

DESCRIPTION OF PARAMETERS
AC - WILL CONTAIN ACCOUNT NUMBER (INTEGER TYPE VARIABLE)
I - WILL ALSO CONTAIN ACCOUNT NUMBER

REMARKS
'AC' MUST BE DECLARED INTEGER IN THE CALLING ROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
L71FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
THE ACCOUNT NUMBER IS TAKEN FROM CONTROL POINT AREA.

CM REQUIRED: 378

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/04/75

DATE(S) REVISED
02/27/76

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-2 AC - 1 DF 1
SUBROUTINE 'ADJL'

PURPOSE
LEFT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ADJL (A, NA, NC, NW, NWORDS)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING WORDS TO BE LEFT-ADJUSTED
  (WILL BE REPLACED BY LEFT-ADJUSTED ARRAY)
NA - NUMBER OF COMPUTER WORDS IN 'A' (DIMENSION OF 'A')
NC - OUTPUT NUMBER OF CHARACTERS
NW - OUTPUT NUMBER OF COMPUTER WORDS
  (SUBSCRIPT OF LAST NON-BLANK WORD IN 'A')
NWORDS - OUTPUT NUMBER OF WORDS IN LINE

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 147B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/24/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

06/15/76  2-3  ADJL  - 1 OF 1
SUBROUTINE 'ADJR'

PURPOSE
RIGHT ADJUST A LINE OF WORDS LEAVING ONE SPACE BETWEEN WORDS

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ADJR (A, NA, NC, NW, NWORDS)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING WORDS TO BE RIGHT-ADJUSTED
   (WILL BE REPLACED BY RIGHT-ADJUSTED ARRAY)
NA - NUMBER OF COMPUTER WORDS IN 'A' (DIMENSION OF 'A')
NC - OUTPUT POSITION OF FIRST NON-BLANK CHARACTER
NW - OUTPUT SUBSCRIPT OF FIRST NON-BLANK WORD IN 'A'
NWORDS - OUTPUT NUMBER OF WORDS IN LINE

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 157B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/24/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ALTIME'

PURPOSE

OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE START OF JOB (OR INTERCOM SESSION)

FUNCTIONAL CATEGORIES: QO NO

USAGE

CALL ALTIME (TIMES)

DESCRIPTION OF PARAMETER

TIMES - 7-WORD ARRAY TO CONTAIN THE FOLLOWING:

1 - CPA TIME IN SECONDS
2 - CPB TIME IN SECONDS
3 - CP TIME IN SECONDS (CPA+CPB)
4 - PP TIME IN SECONDS
5 - IO TIME IN SECONDS
6 - WALL CLOCK TIME (HH.MM.SS.)
7 - WALL CLOCK TIME IN SECONDS

REMARKS

NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

NONE

OTHERS

ISEC - CONVERT HH.MM.SS TO SECONDS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS

R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 60B

AUTHOR

DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/15/75

DATE(S) REVISED

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT

EDITLIB USER LIBRARY: NSRDC

08/22/77 2-5
SUBROUTINE 'ASHIFT'

PURPOSE
SHIFT EACH INDIVIDUAL WORD OF AN ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
SEE 'SHIFTA' TO SHIFT AN ENTIRE ARRAY.

USAGE
CALL ASHIFT (A, NA, NABITS)

DESCRIPTION OF PARAMETERS
A  - ARRAY, EACH WORD OF WHICH IS TO BE SHIFTED
NA - NUMBER OF WORDS IN 'A' TO BE SHIFTED
NABITS - NUMBER OF BITS TO SHIFT EACH WORD
  POSITIVE -- SHIFT LEFT CIRCULAR
  NEGATIVE -- SHIFT RIGHT WITH SIGN PROPAGATION

CM REQUIRED: 17B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ASORT'

PURPOSE
FTN ALPHANUMERIC SORT

FUNCTIONAL CATEGORIES: M1

USAGE
CALL ASORT (A, I, L, TEM, PT, COL, KEY, TRANA, KEYM)
CALL ASORT (A, I, L, TEM, PT, COL, KEY, 0, KEYM)
CALL ASORT (A, I, L, TEM, PT, COL, KEY, TRANA)
CALL ASORT (A, I, L, TEM, PT, COL, KEY)
CALL ASORT (A, I, L, TEM, PT, COL)

DESCRIPTION OF PARAMETERS
A - TWO-DIMENSIONAL ARRAY TO BE SORTED
I - NUMBER OF COLUMNS (LINES) TO BE SORTED
L - NUMBER OF ROWS (LENGTH OF LINE) PER COLUMN
TEM - TEMPORARY WORK ARRAY OF DIMENSION 'I'
PT - TEMPORARY WORK ARRAY OF DIMENSION 'I'
COL - TEMPORARY WORK ARRAY OF LENGTH 'L'
KEY - IF PRESENT, IS ARRAY OF LENGTH 'L' LISTING THE SORT KEYS:
  KEY(1)=5 IMPLIES THAT THE PRIMARY SORT KEY IS ROW 5
  KEY(2)=7 " SECONDARY " " ROW 7
  ... KEY(N)=M " " N-TH " " ROW M
  KEY(N)=0 IMPLIES THAT THE SORT ENDS AFTER N-1 SORT KEYS ARE USED
TRANA - IF PRESENT, I 63-WORD ARRAY DEFINING THE COLLATING SEQUENCE.
  IF ABSENT OR 0, DISPLAY CODE VALUES ARE USED.
  IF 0, KEYM CAN BE USED WITHOUT CHANGING THE COLLATING SEQUENCE.
KEYM - IF PRESENT, IS AN ARRAY OF LENGTH 'L' FURTHER DEFINING THE SORT KEYS. (E.G., KEYM(2) IS A MASK DEFINING WHAT BITS OF THE SECONDARY SORT KEY WILL BE USED.)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
  IABS  LOCF  SHIFT
OTHERS
  EQU60  SENT
  SSORTL

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 4746

07/01/75  2-7  ASORT - 1 OF 2
SUBROUTINE 'ASORTMV'

PURPOSE
SORT AN ARRAY TAKING ADVANTAGE OF A FAST ARRAY MOVE

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

COMPUTER
CDC 6000

REMARKS
IN ORDER TO USE 'MOVECM', ALL RELATED DATA TO BE SWAPPED
MUST BE PHYSICALLY LOCATED NEXT TO EACH OTHER, THAT IS, EACH
ROW OF 'A' CONTAINS RELATED DATA.

USAGE
CALL ASORTMV (A, NROW, NCOL, IROW, UPDOWN, TEMP, SWAP)

DESCRIPTION OF PARAMETERS

A - 2-DIMENSIONAL ARRAY TO BE SORTED
NROW - NUMBER OF ROWS IN ARRAY 'A' (FIRST DIMENSION)
NCOL - NUMBER OF COLUMNS IN ARRAY 'A' (SECOND DIMENSION)
IROW - ROW POSITION TO BE SORTED
UPDOWN - SORT ORDER DESIRED
  1LA - ASCENDING SORT
  1LD - DESCENDING SORT
TEMP - WORK ARRAY OF DIMENSION 'NROW' OR GREATER
SWAP - RETURN CODE
  0 - NO SWAPPING WAS NECESSARY
      (ARRAY ALREADY IN ORDER)
  1 - AT LEAST 1 SWAP WAS NECESSARY
  2 - UPDOWN INVALID, ASCENDING SORT ASSUMED,
      NO SWAPPING WAS NECESSARY
  3 - UPDOWN INVALID, ASCENDING SORT ASSUMED,
      AT LEAST 1 SWAP WAS NECESSARY
  4 - IROW <= 0
  5 - IROW > NROW

CM REQUIRED: 233B
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
MOVECM - MOVE AN ARRAY

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 02/01/75

DATE(S) REVISED
02/21/80 - CHANGE 'MOVLEV' TO 'MOVECM'

LOCATION OF DECKS

SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

02/25/81  2-10  ASORTMV - 2 OF 2
SUBROUTINE 'BANR'

PURPOSE
PRINT A BANNER (LETTERS ARE 10 LINES HIGH, LINES ARE 110 CHARACTERS LONG)

FUNCTIONAL CATEGORIES: J4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
UPPER CASE ONLY (A-Z 0-9 + - * / ( ) $ = SPACE , . # € ¡ " ¡ & ' ? < > @ \ , ;)

EACH BANNER REQUIRED 14 LINES (4 BLANKS, 10 FOR THE BANNER). THUS, 3 BANNERS WILL FIT ON A PAGE AT 6 LINES PER INCH: 5 AT 8 LPI.

UP TO 10 CHARACTERS MAY APPEAR IN A BANNER. THE LINES ARE 110 CHARACTERS LONG.

SEE SUBROUTINE 'BANR6'.

USAGE
CALL BANR (BANNER, IFILE, NEWPAG)

DESCRIPTION OF PARAMETERS
BANNER - 1-10 CHARACTERS TO BE PRINTED
B7700 : 2-WORD REAL ARRAY;
CDC 6000: SINGLE WORD OR ARRAY ELEMENT
IFILE - NUMBER OF FILE ON WHICH BANNER IS TO BE WRITTEN
NEWPAG - ONE OF:
ZERO - BANNER IS WRITTEN ON NEW PAGE
NON-ZERO - BANNER IS WRITTEN ON SAME PAGE

CM REQUIRED: B7700: EST 1715 WORDS; CDC 6000: 1540B

OUTPUT UNITS
UNIT # LFN/INT USE
USER SPECIFIES LISTABLE OUTPUT

EXAMPLES
PRINT THE BANNER 'HYSTERICAL' AT THE TOP OF THE NEXT PAGE ON THE PRINTER FILE:
B7700 : REAL HYS(2)/ "HYSTERICAL"/
CALL BANR (HYS, 6, 0)
CDC 6000: CALL BANR ('HYSTERICAL', 6LOUTPUT, 0)

PRINT THE BANNER '10/19/77' ON THE SAME PAGE ON FILE 9:
B7700 : REAL DAT(2)/ '10/19/77'/
CALL BANR (DAT, 9, 2)
CDC 6000: CALL BANR ('8H10/19/77', 9, 1)
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
B7700
NONE
CDC 6000
SHIFT

OTHERS
B7700
FOLDIT - FOLD LOWER CASE TO UPPER CASE
SCANCH - CHARACTER SCAN
CDC 6000
VFILL - FILL ARRAY WITH WORD

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/18/75

DATE(S) REVISED
79/07/16 - RE-WRITTEN FOR B7700
81/01/15 - CDC VERSION UPGRADED TO NOS/BE LEVEL 461

LOCATION OF DECKS
SOURCE
B7700 : *SOURCE/NSRDC/BANR
CDC 6000: UPDATE LIBRARY: NSRDCLPL, ID=CSYS

OBJECT
B7700 : *NSRDC/BANR
CDC 6000: EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'BANR6'

PURPOSE
PRINT A BANNER (LETTERS ARE 6 LINES HIGH, LINES ARE 80 CHARACTERS LONG)

FUNCTIONAL CATEGORIES: J4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
UPPER CASE ONLY (A-Z 0-9 + - * / ( ) $ = SPACE , . #
\ ! : ; " _ & ? < > @ \ - ;)

EACH BANNER REQUIRED 10 LINES (4 BLANKS, 6 FOR THE BANNER). THUS, 6 BANNERS WILL FIT ON A PAGE AT 6 LINES PER INCH:
8 AT 8 LPI.

UP TO 10 CHARACTERS MAY APPEAR IN A BANNER. THE LINES ARE 80 CHARACTERS LONG.

SEE SUBROUTINE 'BANR'.

USAGE
CALL BANR6 (BANNER, IFILE, NEWPAG)

DESCRIPTION OF PARAMETERS
BANNER - 1-10 CHARACTERS TO BE PRINTED
(B7700 : 2-WORD REAL ARRAY;
CDC 6000: SINGLE WORD OR ARRAY ELEMENT)
IFILE - NUMBER OF FILE ON WHICH BANNER IS TO BE WRITTEN
NEWPAG - ONE OF:
ZERO - BANNER IS WRITTEN ON NEW PAGE
NON-ZERO - BANNER IS WRITTEN ON SAME PAGE

CM REQUIRED: B7700: EST 1103 WORDS; CDC 6000: 1046B

OUTPUT UNITS
UNIT # LFN/INT USE
--------- ----------- -------------------------------
USER SPECIFIES LISTABLE OUTPUT

EXAMPLES
PRINT THE BANNER 'HYSTERICAL' AT THE TOP OF THE NEXT PAGE
ON THE PRINTER FILE:
B7700 : REAL HYS(2) / "HYSTERICAL"/
CALL BANR6 (HYS, 6, 0)

CDC 6000: CALL BANR6 ("HYSTERICAL", 6OUTPUT, 0)

PRINT THE BANNER '10/19/77' ON THE SAME PAGE ON FILE 9:
B7700 : REAL DAT(2) / "10/19/77"/
CALL BANR6 (DAT, 9, 2)

CDC 6000: CALL BANR6 (8H10/19/77, 9, 1)

08/13/79  2-13  BANR6 - 1 OF 2
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
B7700
NONE
CDC 6000
MOVLEV SHIFT
OTHERS
B7700
FOLDIT - FOLD LOWER CASE TO UPPER CASE
SCANCH - CHARACTER SCAN
CDC 6000
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/18/77

DATE(S) REVISED
79/07/16 - RE-WRITTEN FOR B7700

LOCATION OF DECKS
SOURCE
B7700 : *SOURCE/NSRDC/BANR6
CDC 6000: UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
B7700 : *NSRDC/BANR6
CDC 6000: EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'BESSI'

PURPOSE
  MODIFIED BESSEL FUNCTION OF THE FIRST KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
  FOR N=O, I(NU) AND I(NU+1) ARE ALWAYS COMPUTED.
  IF K-BESSEL FUNCTION IS ALSO REQUIRED, USE SUBROUTINE BESSK TO OBTAIN I- AND K-BESSEL FUNCTIONS.

USAGE
  CALL BESSI (X, FNU, N, VI)

DESCRIPTION OF PARAMETERS
  X - THE ARGUMENT (X > 0.0)
  FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. < FNU < 1.)
  N - HIGHEST ORDER IS (N+FNU)
  VI - ARRAY TO CONTAIN THE COMPUTED TABLE
  VI(1) = (E**(-X)*I0(X)), WHERE I0 IS I(0+FNU)

CM REQUIRED: 715B

METHOD
  FOR X > 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII, NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
  ABS  EXP  IABS  MAX0  SORT
  OTHERS
  GAMMA
SUBROUTINE 'BESSJ'

PURPOSE
BESSEL FUNCTION OF THE FIRST KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, J(NU) AND J(NU+1) ARE ALWAYS COMPUTED.

IF Y-BESSEL FUNCTION IS ALSO REQUIRED, USE SUBROUTINE
BESSY TO OBTAIN J- AND Y-BESSEL FUNCTIONS.

USAGE
CALL BESSJ (X, FNU, N, VJ)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU, THE FRACTIONAL PART OF THE ORDER (0. < FNU < 1.)
N - HIGHEST ORDER IS (N+FNU)
    ABS(N+1) TABLE ENTRIES ARE TO BE COMPUTED
VI - ARRAY TO CONTAIN THE COMPUTED TABLE
    (DIMENSION MUST BE AT LEAST: MAX(N+13, X+28), THE
    REST OF THE ARRAY IS WORK AREA)
    VJ(1) = JO(X), WHERE JO IS J(0+FNU)
    ETC.

CM REQUIRED: 701B

METHOD
SEE "RECURRANCE TECHNIQUES FOR THE CALCULATION OF BESSEL
FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII,
NO. 66, APRIL 1959.

FOR X > 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE
SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR
LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII,
NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS COS IABS MAX0 SIN
SORT
OTHERS
GAMMA
AUTHORS
FLORENCE F. RAGUSA AND M. GOLDSTEIN
HARVEY ABRAMSON
MARGARET FRANTZ
NEW YORK UNIVERSITY

VIM ROUTINE NYUBESS

DATE WRITTEN: BEFORE 11/65

DATE(S) REVISED
11/65 - HA
09/01/67 - MF

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3.D=H
(*DECK ?)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'BESSK'

PURPOSE
BESSEL FUNCTION OF THE SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, I(NU) AND I(NU+1) ARE ALWAYS COMPUTED.

THIS SUBROUTINE ALSO COMPUTED THE I-BESSEL FUNCTION.

USAGE
CALL BESSK (X, FNU, N, VI, VK)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT (X > 0.0)
FNU - NU. THE FRACTIONAL PART OF THE ORDER (0. ≤ FNU ≤ 1.)
N - HIGHEST ORDER IS (N+FNU)
    ABS(N)+1 TABLE ENTRIES ARE TO BE COMPUTED
VI - ARRAY TO CONTAIN THE COMPUTED TABLE
    (DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE
    REST OF THE ARRAY IS WORK AREA)
    VI(1) = (E**(-X)) IO(X), WHERE IO IS I(0+FNU)
    ETC.
VK - ARRAY TO CONTAIN THE COMPUTED K-TABLE
    (DIMENSION MUST BE AT LEAST: MAX(N+13,X+28), THE
    REST OF THE ARRAY IS WORK AREA)
    VK(1) = (E**(X)) IO(X), WHERE IO IS I(0+FNU)
    ETC.

CM REQUIRED: 530B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL
FUNCTIONS", M. GOLDShtein AND R. THALER, MTAC, VOL. XIII,
NO. 66, APRIL 1959.

FOR X > 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE
SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR
LARGE ARGUMENTS", M. GOLDShtein AND R. THALER, MTAC, VOL XII,
NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
    ALOG  EXP  IABS  MAXO  SIN
OTHERS
    BESSI
    GAMMA

12/09/77  2-19  BESSK - 1 OF 2
SUBROUTINE 'BESSY'

PURPOSE
BESSEL FUNCTION OF THE SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
FOR N=0, Y(NU) AND Y(NU+1) ARE ALWAYS COMPUTED.

THIS SUBROUTINE ALSO COMPUTES THE J-BESSEL FUNCTION.

USAGE
CALL BESSY (X, FNU, N, VU, VY)

DESCRIPTION OF PARAMETERS
X - THE ARGUMENT X > 0.0
FNU - NU, THE FRACTIONAL PART OF THE ORDER 0. < FNU < 1.
N - HIGHEST ORDER IS (N+FNU)
   ABS(N+1) TABLE ENTRIES ARE TO BE COMPUTED
VU - ARRAY TO CONTAIN THE COMPUTED TABLE
   (DIMENSION MUST BE AT LEAST: MAX(N+13, X+28), THE
    REST OF THE ARRAY IS WORK AREA)
   VU(1) = J0(X), WHERE J0 IS J(0+FNU)
   ETC.
VY - ARRAY TO CONTAIN THE COMPUTED Y-TABLE
   (DIMENSION MUST BE AT LEAST: MAX(N+13, X+28), THE
    REST OF THE ARRAY IS WORK AREA)
   VY(1) = Y0(X), WHERE Y0 IS Y(0+FNU)
   ETC.

CM REQUIRED: 452B

METHOD
SEE "RECURRENCE TECHNIQUES FOR THE CALCULATION OF BESSEL
FUNCTIONS", M. GOLDSTEIN AND R. THALER, MTAC, VOL. XIII,
NO. 66, APRIL 1959.

FOR X > 10.0, ASYMPTOTIC VALUES ARE COMPUTED USING THE
SO-CALLED PHASE AMPLITUDE METHOD. SEE "BESSEL FUNCTIONS FOR
LARGE ARGUMENTS", M. GOLDSTEIN AND R. THALER, MTAC, VOL XII.
NO. 61, JANUARY 1958.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS  COS  IABS  MAX0  SIN

OTHERS
BESSJ
GAMMA
SUBROUTINE 'BSJ'

PURPOSE
SPHERICAL BESSEL FUNCTION

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
EVALUATES THE SPHERICAL BESSEL FUNCTION J-SUB-N(X) FOR
N=-1,0,...,I BY MEANS OF A RECURSIVE RELATION AND REASONABLE
STARTING VALUES. STARTING VALUES ARE GENERATED WITHIN THE
SUBROUTINE.

USAGE
CALL BSJ(I, X, BJ)

DESCRIPTION OF PARAMETERS
I - HIGHEST ORDER DESIRED
X - SINGLE PRECISION FLOATING POINT VARIABLE
BJ - ARRAY DIMENSIONED AT LEAST I+2 FOR SOLUTIONS
   (BJ(N+2) = J-SUB-N(X))

CM REQUIRED: 432B

METHOD
A. THE VALUES ARE COMPUTED BY USING THE RECURSION FORMULA:

   J_1(X) + J_0(X) = \frac{2}{X} J_{I+1}(X)
   \frac{I-1}{I+1}

   IF X>20.5, THE RECURSION IS FORWARD.
   IF X<20.5, THE RECURSION IS BACKWARD.
   FOR VARIOUS RANGES (X<20.5), AN UPPER LIMIT, NU, IS SET.
   BJ(NU+1) IS THEN SET TO ZERO, AND THE RECURSION PROCESS
   IS EXECUTED.

B. RANGE: THE FOLLOWING DOMAINS HAVE BEEN CAREFULLY CHECKED:
   1<X<25; 1<25. ERROR IS LESS THAN \pm 5 \times 10^{-11}. POSSIBLE
   DOMAINS ARE: 0<X<25 AND 0<X<100. (CAUTION: FOR LARGER
   DOMAINS, CHECK DIMENSIONING IN THE SUBROUTINE.)
   NOTE: IF I>>X, J-SUB-I(X) IS VERY SMALL.

REFERENCES
HANDBOOK OF MATHEMATICAL FUNCTIONS, AMS 55, NATIONAL BUREAU
OF STANDARDS.

ASSOCIATION OF COMPUTING MACHINERY, "GENERATION OF SPHERICAL
BESSEL FUNCTIONS", F. J. CORBATO AND J. L. URETSKY, JULY
1959, VOL. 6, NO. 3, PP. 366-375.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
COS  SIN
OTHERS
NONE

AUTHORS
R L PEXTON - LAWRENCE RADIATION LABORATORY
D A WILBER - LAWRENCE RADIATION LABORATORY

DATE WRITTEN: 01/06/65 (RLP)

DATE(S) REVISED
11/65 (DAW)

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'BUFSIZE'

PURPOSE
PRINT MESSAGE IN DAYFILE FOR EACH FILE SPECIFIED INDICATING BUFFER SIZE AND WHETHER BUFFER IS CURRENTLY ALLOCATED.

FUNCTIONAL CATEGORIES: QO

LANGUAGE: COMPASS

REMARKS
THIS ROUTINE PICKS UP THE BUFFER SIZE (BFS) FROM WORD 4 OF THE FIT. IT ALSO DETERMINES IF THE BUFFER IS CURRENTLY ALLOCATED BY CHECKING THE BUFFER FIRST WORD ADDRESS (FWB) IN WORD 6 OF THE FIT. IT PRINTS A REPORT IN THE DAYFILE OF THE FORM:

FILE BUFFER SIZES
FILE (LFN) SIZE (OCTAL) ALLOCATED
XXXXXXXX XXXXX Y OR N

USAGE
CALLED FROM COBOL PROGRAM
ENTER BUFSIZE USING FILENAME1, FILENAM2,.....
WHERE FILENAMEX IS NAME OF FILE IN FD STATEMENT

CALLED FROM FTN PROGRAM
CALL BUFSIZE (FIT1, FIT2,.....)
WHERE FITX IS ADDRESS OF A FILE INFORMATION TABLE.

CM REQUIRED: 72B WORDS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
BRUCE D. BLACK - DTNSRDC CODE 1892.1 (CDC)

DATE WRITTEN: 04/07/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

04/10/78 2-25 BUFSIZE - 1 OF 1
SUBROUTINE 'CELLI'
SUBROUTINE 'ELLI'

PURPOSE
COMPLETE AND INCOMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND
SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CELLI IS AN ENTRY POINT IN ELLI.

WHEN ABS(PHI) ≤ PI/2, F AND E ARE ACCURATE TO AT LEAST 10
SIGNIFICANT FIGURES. AS ABS(PHI) GETS LARGE, THE ACCURACY
WILL NOT BE AS GOOD SINCE ELLI USES THE TANGENT SUBROUTINE
WHICH BECOMES LESS ACCURATE AS THE ANGLE ABS(PHI) INCREASES.

USAGE
CALL CELLI (PHI, CAY, F, E)
CALL ELLI (PHI, CAY, F, E)

DESCRIPTION OF PARAMETERS
PHI - UPPER LIMIT OF INTEGRAL
      (NOT USED BY CELLI WHICH ASSUMES PI/2)
CAY - THE PARAMETER IN THE INTEGRAL
F - OUTPUT THE ELLIPTIC INTEGRAL OF THE FIRST KIND
   (F(PHI,CAY))
E - OUTPUT THE ELLIPTIC INTEGRAL OF THE SECOND KIND
   (E(PHI,CAY))

CM REQUIRED: 457B (+ 60B FOR LABRT)

ERROR MESSAGES
IF K > 1, F AND E DO NOT EXIST. A MESSAGE IS PRINTED AND
F AND E ARE SET TO PHI.

IF K=1 AND ABS(PHI) ≥ PI/2, F DOES NOT EXIST. A MESSAGE IS
PRINTED AND F IS SET TO SIGN(PHI)*1.0E+294. E EXISTS AND IS
COMPUTED.

OUTPUT UNITS
UNIT #   LFN          USE
--------- -------- -------------------------------
      1024 2-26 OUTPUT ERROR MESSAGES PRINTED BY LABRT

02/25/81 2-26 CELLI - 1 OF 2
METHOD

WHEN $K < 1$, LANDEN'S TRANSFORMATION IS USED.

WHEN $K = 1$, $E$ IS COMPUTED BY:

$$E(\phi, 1) = N + \text{ABS}(\sin(\phi) - \sin(N\pi/2))$$

WHERE $N$ IS THE INTEGRAL PART OF $\phi \pi/(2\pi)$.

WHEN $K = 1$ AND $\text{ABS}(\phi) < \pi/2$, $F$ IS COMPUTED BY:

$$F(\phi, 1) = 0.5 \times \ln \left(\frac{1 + \sin(\phi)}{1 - \sin(\phi)}\right)$$

REFERENCE: "HANDBOOK OF MATHEMATICAL FUNCTIONS" BY M. ABRAMOWITZ AND I. A. STEGUN.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
- ABS
- AINT
- ALOG
- AMIN1
- AMOD
- ATAN
- FLOAT
- INT
- MOD
- SIGN
- SIN
- SQRT
- TAN

PART OF PROGRAM
- LABRT - PRINT ERROR MESSAGES
- OTHERS
- NONE

AUTHORS
- KARL J MELENDEZ
- DUANE HARDER
- LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C304A

DATE WRITTEN: 02/05/68

DATE(S) REVISED
- 02/69 - DH

LOCATION OF DECKS

SOURCE
- CODE 1892 (LISTING ONLY)

OBJECT
- EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'CENTER'

PURPOSE
CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
USEFUL FOR CENTERING HEADINGS ON A PAGE. FOR INSTANCE, IF 'THIS IS A HEADING' IS TO BE CENTERED FOR A 132-COLUMN WIDE PAGE, THE FOLLOWING CAN BE USED:
DIMENSION IN(2), OUT(14)
IN(1) = 1OTHIS IS A
IN(2) = 10HHEADING
CALL CENTER(IN, 2, OUT, 132)
ON RETURN, 'OUT' WILL CONTAIN 'THIS IS A HEADING' IN POSITIONS 58 THRU 74 (WORD 6, POSITION 8 THRU WORD 8, POSITION 4). POSITIONS 1-56 AND 75-132 WILL CONTAIN BLANKS.

USAGE
CALL CENTER(IN, LIN, OUT, NCHOUT)

DESCRIPTION OF PARAMETERS
IN - INPUT ARRAY CONTAINING CHARACTER STRING TO BE CENTERED (CHARACTER STRING STARTS IN POSITION 1 AND ENDS WITH LAST NON-BLANK CHARACTER)
LIN - NUMBER OF WORDS IN 'IN'
OUT - OUTPUT ARRAY IN WHICH 'IN' IS TO BE CENTERED
NCHOUT - NUMBER OF CHARACTERS IN 'OUT' WITHIN WHICH 'IN' IS TO BE CENTERED
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD MOVLEV

OTHERS
GETCHA - GET CHARACTER FROM ARRAY (CDC VERSION)
LASTCH - FIND LAST NON-BLANK IN ARRAY
MOVLEV - MOVE AN ARRAY (B7700 VERSION)
MOVSTR - MOVE A STRING (B7700 VERSION)
PUTCHA - INSERT CHARACTER INTO ARRAY (CDC VERSION)
VFILL - FILL ARRAY WITH SPECIFIED WORD

CM REQUIRED: B7700: EST 267 WORDS; CDC 6000: 145B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/19/75

DATE(S) REVISED
05/04/76
07/01/80 - CONVERT TO B7700

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/CENTER
CDC 6000: UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
B7700: *NSRDC/CENTER
CDC 6000: EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'CGAUSS'

PURPOSE
COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT
BY ITERATIVE GAUSSIAN ELIMINATION

FUNCTIONAL CATEGORIES: F4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
TO INCREASE BEYOND 10 BY 10, THE DIMENSIONS OF ARRAYS A, AA, B, BB, X, XX AND IN MUST BE CHANGED.

USAGE
COMPLEX AA(10,10), BB(10,10), XX(10,10), DET
CALL CGAUSS (N, M, AA, BB, XX, VAL2, DET, MM, NA, NX)

DESCRIPTION OF PARAMETERS
N - NUMBER OF ROWS OF AA, BB, XX (MAX: 10)
M - NUMBER OF COLUMNS OF RIGHT-HAND SIDES (MAX: 10)
AA - COMPLEX ARRAY OF COEFFICIENTS FOR SIMULTANEOUS
     EQUATIONS AA*XX=BB (MAX: 10 BY 10)
BB - COMPLEX ARRAY OF RIGHT-HAND-SIDES FOR AA*XX=BB
     (MAX: 10 BY 10)
XX - COMPLEX ARRAY OF SOLUTIONS OF AA*XX=BB
     (MAX: 10 BY NX)
VAL2 - OUTPUT THE INFINITY NORM OF THE CORRECTION
DET - OUTPUT THE COMPLEX DETERMINANT OF AA
MM - NUMBER OF ITERATIONS
     (MM=0 RETURNS THE RESULT OF THE FIRST GAUSSIAN
     ELIMINATION)
NA - DIMENSIONS OF AA AND BB AND FIRST DIMENSION OF XX
NX - SECOND DIMENSION OF XX

CM REQUIRED: 1711B

METHOD
A FIRST SOLUTION FOR XX IS OBTAINED DIRECTLY. BB-AA*XX IS
CALCULATED AS DD. THE RESIDUAL EQUATION AA*X=DD IS SOLVED
AND THE SOLUTION ADDED TO XX. THIS PROCESS CONTINUES FOR MM
CYCLES. IF MM=0, THE RESULT OF THE FIRST GAUSSIAN
ELIMINATION IS RETURNED.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
CABS
OTHERS
NONE

AUTHORS
UNIVERSITY OF MARYLAND
SUE VOIGT

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK AMCGAUS)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'CHFILL'

PURPOSE
FILL (PORTION OF) ARRAY WITH CHARACTER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
SAME CALLING SEQUENCE AS CDC 6000, EXCEPT FOR TYPE.

USAGE
CALL CHFILL (FILLCH, TO, TOPOS, NCHAR)

DESCRIPTION OF PARAMETERS
FILLCH - FILL CHARACTER (1R OR 1H OR " ")
TO - INTEGER ARRAY TO BE FILLED
TOPOS - STARTING CHARACTER POSITION IN 'TO'
(CHARACTER 1 IS LEFT-MOST CHARACTER OF TO(1))
NCHAR - NUMBER OF CHARACTERS TO BE FILLED

CM REQUIRED: 56B

EXAMPLE
TO: ********************************
AFTER CALL CHFILL (1R,, TO, 23, 7)
TO: /*///************

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
PUTCHA - INSERT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ. ZERO-FILLED)
R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ. ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/10/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

07/17/79 2-32 CHFILL - 1 OF 1
SUBROUTINE 'CHNGSEQ'

PURPOSE
ALLOW COBOL4 USER TO DEFINE HIS OWN COLLATING SEQUENCE

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
USER MUST USE THE U OPTION ON THE COBOL CALL CARD.

BINARY ZERO IS THE 64TH CHARACTER IN THE COLLATING SEQUENCE.

ROUTINE SETS TABLES AFFECTING COLLATING SEQUENCE FOR
COBOL IF TESTS, COBOL SORT, INDEX SEQ FILE SEQUENCE, ETC.

USAGE
CALL CHNGSEQ USING MYTBL.

DESCRIPTION OF PARAMETER
THE USER MUST SET UP A DATA ITEM 63 CHARACTERS IN
LENGTH CONTAINING THE CHARACTERS IN THE ORDER HE
WISHES THE COLLATING SEQUENCE TO BE. ALL 63
CHARACTERS MUST BE PRESENT.

NOTE: TO SET " INTO THE STRING, REDEFINE AND USE
MOVE QUOTE TO ......

EXAMPLE:
01 MYTBL PIC X(63) VALUE "@¢$:#&'?\-%;+,-.(!/=<ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789".
01 MYTBLA REDEFINES MYTBL.
  03 ENTR PIC X OCCURS 63 TIMES.

RECALL THAT A NON-NUMERIC LITERAL MUST CONTINUE THRU
COL 72 OF THE FIRST CARD AND THAT CONTINUATION CARD
MUST HAVE A HYPHEN IN COL 7. (EXAMPLE HERE DOESN'T
GO TO COL. 72).

PROCEDURE DIVISION.
PAR1.
  MOVE QUOTE TO ENTR (24).
  CALL CHNGSEQ USING MYTBL.

CM REQUIRED: 27B

METHOD
COLLATING SEQUENCE TABLES IN COBOL OBJECT TIME ROUTINES
ARE CHANGED.

12/09/77  2-33  CHNGSEQ - 1 OF 2
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
BRUCE D BLACK DTNSRDC 1892.1 (CDC)

DATE WRITTEN: 11/15/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

2/09/77 2-34 CHNGSEQ - 2 OF 2
SUBROUTINE 'CLUNLD'

PURPOSE
CLOSE AND UNLOAD A FILE

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS

CAUTION: FOR ICLT=1 OR 2, BE SURE BUFFERS HAVE BEEN FLUSHED BEFORE UNLOADING A PERMANENT FILE IF YOU EXPECT TO USE IT AGAIN. (I.E., CLOSE THE FILE BEFORE CALLING CLUNLD)

CAUTION: RANDOM PERMANENT FILES MUST BE CLOSED BEFORE CLUNLD IS CALLED TO INSURE THAT THE LATEST INDEX IS WRITTEN.

FORTRAN SEQUENTIAL FILES SHOULD HAVE THEIR BUFFERS FLUSHED BEFORE CALLING CLUNLD.

USAGE
CALL CLUNLD (IERR, ICLT, LFN)

DESCRIPTION OF PARAMETERS

IERR  - ERROR RETURN CODE (0=NO ERRORS)
ICLT  - TYPE OF CONTENTS OF 'LFN'
        1 - LFN CONTAINS THE ADDRESS OF A FET.
            A CLOSE-UNLOAD IS PERFORMED ON THIS FET.
        2 - LFN CONTAINS AN LFN TO BE UNLOADED.
            A DUMMY FET IS CREATED AND THE FILE UNLOADED.
        3 - LFN CONTAINS A FILE NAME OR FORTRAN LOGICAL UNIT NUMBER (I.E., ANY FILE ON THE FORTRAN PROGRAM STATEMENT). THE FIT WILL BE FOUND AND THE FILE UNLOADED.

NOTE: CLOSEM (A RECORD MANAGER ROUTINE) IS CALLED TO CLOSE THE FILE.
NOTE: A DUMMY FET IS CREATED TO UNLOAD A FILE THAT RECORD MANAGER DOESN'T KNOW HAS BEEN ATTACHED.

LFN  - CONTENTS IS DETERMINED BY 'ICLT'

CM REQUIRED: 43B
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
CLUXXX FNDFIT INDCMT IZONK ZIO

AUTHOR
C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 11/15/71

DATE(S) REVISED
06/01/72 11/20/74 02/21/75 05/75 04/76

LOCATION OF DECKS
SOURCE
CODE 1832
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'CMPINV'

PURPOSE
COMPLEX MATRIX INVERSION

FUNCTIONAL CATEGORIES: F4 A2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE REAL AND/OR IMAGINARY PARTS OF THE MATRIX 'A' MAY BE SINGULAR.

USAGE
CALL CMPINV (A, N, N1, C, ID, E, N2, INDEX)

DESCRIPTION OF PARAMETERS
A - COMPLEX INPUT MATRIX
(NOT DESTROYED BY SUBROUTINE)
N - DIMENSION OF A AND C (N X N)
N1 - NUMBER OF ROWS IN A AND C CURRENTLY FULL
C - INVERSE RESULT MATRIX
(MAY BE THE SAME AS A)
ID - RETURN CODE
1 - INVERSION SUCCESSFUL
2 - MATRIX SINGULAR
E - TEMPORARY ARRAY SOLVING N2 X N2 SYSTEM
N2 - NO SMALLER THAN N1+N1
INDEX - TEMPORARY ARRAY USED IN INVERSION (N2,3)

THE CALLING PROGRAM MUST INCLUDE:

COMPLEX A(N,N), C(N,N)
REAL E(N2,N2), INDEX(N2,3)

CM REQUIRED: 147B

METHOD
THE SYSTEM SOLVED IS THE EXPANDED MATRIX

\[
E = \begin{bmatrix}
-A & -iB \\
-iA & A
\end{bmatrix}
\]

WHERE CR IS TAKEN AS THE UPPER LEFT CORNER OF THE INVERSE
AND CI IS TAKEN AS THE LOWER LEFT CORNER OF THE INVERSE.
(LANCZOS, APPLIED ANALYSIS, P 137). THE INVERSE IS COMPUTED
BY SUBROUTINE MATINS (ALSO ON NSRDC) WHICH USES GAUSS-
JORDAN ELIMINATION. THIS METHOD FINDS AN INVERSE IF IT
EXISTS, EVEN IF REAL AND IMAGINARY PARTS OF A ARE BOTH
INDIVIDUALLY SINGULAR. IDENTIFICATION OF A SINGULAR COMPLEX
MATRIX IS RETURNED TO THE CALLING PROGRAM.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AIMAG  CMPLX  REAL
OTHERS
MATINS - MATRIX INVERSION

AUTHOR
SHARON E GOOD - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/10/71

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3,D=HY (DECKNAME: AMCMAT)
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'COMPSTR'

PURPOSE
COMPARE TWO CHARACTER STRINGS

FUNCTIONAL CATEGORIES: MO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
TEST = COMPSTR (A, FROMA, B, FROMB, NCHAR)

DESCRIPTION OF PARAMETERS
A - ARRAY CONTAINING FIRST CHARACTER STRING
FROMA - STARTING CHARACTER POSITION IN A
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A
B - ARRAY CONTAINING SECOND CHARACTER STRING
FROMB - STARTING CHARACTER POSITION IN B
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN B
NCHAR - NUMBER OF CHARACTERS TO COMPARE
COMPSTR - WILL RETURN ONE OF:
  -1. - STRING IN A IS LESS THAN STRING IN B
  0. - STRING IN A IS EQUAL TO STRING IN B
  +1. - STRING IN A IS GREATER THAN STRING IN B

CM REQUIRED: 105B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'CONTRCT'

PURPOSE
SQUEEZE ARRAY OF 1R-FORMAT CHARACTERS TO LEFT

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
SEE SUBROUTINE 'EXPAND'.

USAGE
CALL CONTRCT (A, B, NCHAR)

DESCRIPTION OF PARAMETERS
A - INPUT ARRAY WHOSE ELEMENTS EACH CONTAIN ONE CHARACTER IN THE RIGHT-MOST 6 BITS (1R FORMAT)
B - OUTPUT ARRAY WHOSE ELEMENTS WILL EACH CONTAIN 10 CHARACTERS FROM ARRAY A (ANY LEFT-OVER BITS OF THE LAST WORD USED IN ARRAY B WILL BE CLEARED TO 0B)
NCHAR - NUMBER OF CHARACTERS IN ARRAY A

CM REQUIRED: 55B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MASK MOD
OTHERS
PUTCHA - INSERT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NWORD - COMPUTE SUBSCRIPT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

04/05/77 2-40 CONTRCT - 1 OF 1
SUBROUTINE 'COUPLE'

PURPOSE
LOGICALLY CONNECT (PORTIONS OF) TWO WORDS

FUNCTIONAL CATEGORIES: R1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL COUPLE (FL, AWORD, AB, BWORD, BB, LC, IOAC)

DESCRIPTION OF PARAMETERS
FL - NUMBER OF BITS TO PROCESS
AWORD - FIRST WORD (FROM)
AB - STARTING BIT POSITION IN AWORD
BWORD - SECOND WORD (TO)
BB - STARTING BIT POSITION IN BWORD
LC - CODE FOR LOGICAL CONNECTIVE DESIRED
   0 - PUT ZEROS INTO BWORD FIELD
   1 - AND THE FIELDS
   2 - AND THE COMPLEMENT OF A TO B
   3 - NUMBER OF ONE IN THE LAST FIELD
   4 - AND THE COMPLEMENT OF B TO A
   5 - SUBSTITUTE FIELD OF A INTO B
   6 - EXCLUSIVE OR
   7 - OR
   8 - AND COMPLEMENTS
   9 - IDENTITY
  10 - SUBSTITUTE COMPLEMENT OF A INTO B
  11 - OR THE COMPLEMENT OF A TO B
  12 - COMPLEMENT OF B
  13 - OR A TO THE COMPLEMENT OF B
  14 - OR THE COMPLEMENTS OF A AND B
  15 - PUT ONES INTO BWORD FIELD
IOAC - OUTPUT NUMBER OF ONE-BITS FOR LC=3

CM REQUIRED: 224B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
   IAOC - COUNT ONE BITS IN A WORD
   MASKIT - MULTIPLE-FIELD MASK GENERATOR
SUBROUTINE 'DATCNV'

PURPOSE
CONVERT DATE FORMATS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
MAY BE USED FOR ANY GREGORIAN DATE FROM OCT 15, 1582 THRU
FEB 28, 4000.

USEFUL IS DETERMINING THE ELAPSED NUMBER OF DAYS BETWEEN TWO
CALENDAR DATES.

MAY BE USED TO FIND THE DATE SO MANY DAYS FROM A GIVEN DATE.

IF THE DATE IS RETAINED IN A DATA BASE IN THE RELATIVE-DAY
FORM, IT CAN BE USED IN MANY COMPUTATIONS AND CONVERTED FOR
PRINTOUT WITHOUT THE NEED TO WORRY ABOUT LEAP YEARS AND
CHANGE OF CENTURY.

USAGE
CALL DATCNV (ITYPE, IYR, IMO, IDYMO, IDYRD, IDYYR, IDYWK);

DESCRIPTION OF PARAMETERS
ITYPE - TYPE OF CONVERSION DESIRED
  1 - IN: IYR IMO IDYMO
         OUT: IDYRD IDYYR IDYWK
  2 - IN: IYR IDYYR
         OUT: IMO IDYMO IDYRD IDYWK
  3 - IN: IDYRD
         OUT: IYR IMO IDYMO IDYYR IDYWK
IYR - YEAR (E.G., 1979)
IMO - MONTH (1 TO 12)
IDYMO - DAY-OF-MONTH (1 TO 31)
IDYRD - RELATIVE DAY
        (RETURNS -1 IF ITYPE IS OUT OF RANGE)
IDYYR - DAY-OF-YEAR (1 TO 366)
IDYWK - DAY-OF-WEEK (0 TO 6, SUN IS 0)

CM REQUIRED: CDC: 165B B7700: EST 154 WORDS
EXAMPLES

1. CONVERT JULY 11, 1979 TO THE OTHER FORMS:
   CALL DATCNV (1, 1979, 7, 11, IDYRD, IDYYR, IDYWK)
   RETURNS IDYRD=2444066 IDYYR=192 IDYWK=3 (WEDNESDAY)

2. CONVERT DAY 192 OF 1979 TO THE OTHER FORMS:
   CALL DATCNV (2, 1979, IMO, IDYMO, IDYRD, 192, IDYWK)
   RETURNS IMO=7 IDYMO=11 IDYRD=2444066 IDYWK=3

3. CONVERT RELATIVE DAY 2444066 TO OTHER FORMS:
   CALL DATCNV (3, IYR, IMO, IDYMO, 2444066, IDYYR, IDYWK)
   RETURNS IYR=1979 IMO=7 IDYMO=11 IDYYR=192 IDYWK=3

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
JGDATE - JULIAN-GREGORIAN CONVERTER (MULTI-YEAR)
JULIAN - JULIAN-GREGORIAN CONVERTER (SINGLE YEAR)
WEKDAY - FIND DAY-OF-WEEK

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/11/79

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
CDC 6000: UPDATE LIBRARY: NSRDCPL,ID=CSYS
B7700 : *SOURCE/NSRDC/DATCNV

OBJECT
CDC 6000: EDITLIB USER LIBRARY: NSRDC
B7700 : *NSRDC/DATCNV
SUBROUTINE 'DATFMT'

PURPOSE
DATE FORMAT CONVERSION

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
FOR CDC, ALL PARAMETERS ARE SIMPLE INTEGER VARIABLES.
FOR B7700, 'OLD' AND 'NEW' ARE 2-WORD REAL ARRAYS.

USAGE
CALL DATFMT (FMTOLD, FMTNEW, OLD, NEW)

DESCRIPTION OF PARAMETERS
FMTOLD - INPUT FORMAT (OLD) -- ONE OF
1 - 'MM/DD/YY'
2 - 'MM/DD/YY'
3 - 'MMDDYY'
-1 - 'YY/MM/DD'
-2 - 'YY/MM/DD'
-3 - 'YYMMDD'
FMTNEW - OUTPUT FORMAT (NEW)
(SAME VALUES AS FMTOLD)
OLD - DATE TO BE CONVERTED
(SEE REMARKS)
NEW - WILL CONTAIN CONVERTED DATE
(SEE REMARKS)

CM REQUIRED: B7700: CORE: EST 252 WORDS: STACK: EST 4 WORDS
CDC : 146B

EXAMPLE
CHANGE MMDDYY TO YY/MM/DD:
B7700---
REAL OLD(2)/ '072579'
REAL NEW(2)
CALL DATFMT (3, -1, OLD, NEW)
NEW WILL CONTAIN: '79/07/25'.
CDC 6000---
INTEGER FMTOLD, FMTNEW, OLD, NEW
DATA OLD/ "072579"/
CALL DATFMT (3, -1, OLD, NEW)
NEW WILL CONTAIN: "79/07/25".
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
B7700: ABS
CDC : AND OR SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS (CDC 6000)
FAST R-FORMAT DECODE (RIGHT-ADJ., ZERO-FILLED)
R21FMT R22FMT R23FMT R24FMT R25FMT
R27FMT R28FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: B7700: 08/08/79
CDC : 02/22/80

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/DATFMT
CDC : UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
B7700: *NSRDC/DATFMT
CDC : EDITLIB USER LIBRARY: NSRDC

02/22/80 2-46 DATFMT - 2 DF 2
SUBROUTINE 'DISCOT'

PURPOSE
SINGLE OR DOUBLE INTERPOLATION

FUNCTIONAL CATEGORIES: E1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
GIVEN A FUNCTION WITH TWO INDEPENDENT VARIABLES, X AND Z, THIS SUBROUTINE PERFORMS KX- AND KZ-ORDER INTERPOLATION TO CALCULATE THE DEPENDENT VARIABLE. ALL SINGLE-LINE FUNCTIONS ARE READ IN AS 2 SEPARATE ARRAYS AND ALL MULTI-LINE FUNCTIONS ARE READ IN AS 3 SEPARATE ARRAYS.

WHEN TABULATING DISCONTINUOUS FUNCTIONS, THERE MUST ALWAYS BE K+1 POINTS ABOVE AND BELOW THE DISCONTINUITY IN ORDER TO GET PROPER INTERPOLATION.

WHEN TABULATING ARRAYS FOR THIS SUBROUTINE, BOTH INDEPENDENT VARIABLES MUST BE IN ASCENDING ORDER.

IN SOME ENGINEERING PROGRAMS WITH MANY TABLES, IT IS QUITE DESIRABLE TO READ IN ONE ARRAY OF X'S THAT COULD BE USED FOR ALL LINES OF A MULTI-LINE FUNCTION OR DIFFERENT FORMULA. THIS NOT ONLY SAVES MUCH TIME IN PREPARING TABULAR DATA, BUT CAN ALSO SAVE MANY LOCATIONS PREVIOUSLY USED WHEN EVERY Y-COORDINATE HAD TO HAVE A CORRESPONDING X-COORDINATE. SEE EXAMPLES.

ANOTHER FEATURE IS THE POSSIBILITY OF A MULTI-LINE FUNCTION WITH NO EXTRAPOLATION ABOVE THE TOP LINE. SEE EXAMPLES.

USAGE
CALL DISCOT (X, Z, TABX, TABY, TABZ, NC, NY, NZ, Y)

DESCRIPTION OF PARAMETERS
X - X-ARGUMENT
Z - Z-ARGUMENT
(MAY BE SAME AS X ON SINGLE LINES)
TABX - ARRAY OF X'S
TABY - ARRAY OF Y'S
TABZ - ARRAY OF Z'S
NC - CONTROL WORD (+HTU):
+ IMPLIES NX = NY/NZ
- IMPLIES NX = NY
H=0 - EXTRAPOLATE WHEN Z>ZMAX
  =1 - NO EXTRAPOLATION ABOVE ZMAX
T=1 TO 7 - DEGREE INTERPOLATION IN X DIRECTION
U=1 TO 7 - DEGREE INTERPOLATION IN Z DIRECTION
NY - NUMBER OF POINTS IN Y ARRAY
NZ - NUMBER OF POINTS IN Z ARRAY
Y - OUTPUT DEPENDENT VARIABLE

CM REQUIRED: 520B
EXAMPLES

1) GIVEN $Y = F(X)$, $K_X = 3$

PROGRAM SAMPL1 (TAPE7, ...)
DIMENSION TABX(50), TABY(50)
10 READ (7, 1) (TABX(I), TABY(I), I=1,50)
READ (7, 1) X
1 FORMAT (8E9.5)
CALL DISCOT (X, X, TABX, TABY, TABY, -30, 50, 0, Y)
...

2) GIVEN $Y = F(X,Z)$, $K_X = 7$, $K_Z = 3$ $N_X \neq E. N_Y$

PROGRAM SAMPL2 (TAPE7, ...)
DIMENSION TABX(80), TABY(800), TABZ(10)
10 READ (7, 1) TABX
READ (7, 1) TABY
READ (7, 1) TABZ
READ (7, 1) X, Z
1 FORMAT (8E9.5)
CALL DISCOT (X, Z, TABX, TABY, TABZ, 73, 800, 10, Y)
...

3) GIVEN $Y = F(X,Z)$, $K_X = 7$, $K_Z = 3$ $N_X = N_Y$

PROGRAM SAMPL3 (TAPE7, ...)
DIMENSION TABX(800), TABY(800), TABZ(10)
10 READ (7, 1) TABX
READ (7, 1) TABY
READ (7, 1) TABZ
READ (7, 1) X, Z
1 FORMAT (8E9.5)
CALL DISCOT (X, Z, TABX, TABY, TABZ, -73, 800, 10, Y)
...

4) GIVEN $Y = F(X,Z)$, $K_X = 7$, $K_Z = 3$ $N_X = N_Y$

NO EXTRAPOLATION ABOVE $Z_{-MAX}$

SAME AS EXAMPLE 3 WITH 6TH PARAMETER OF CALL TO DISCOT
EQUAL TO -173.

METHOD

LAGRANGE'S INTERPOLATION FORMULA IS USED IN BOTH THE X AND Z DIRECTION. SEE "METHODS IN NUMERICAL ANALYSIS" BY
NIELSEN.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
PART OF PROGRAM
DISSER (102B)
LAGRAN (64B)
UNS (31B)
OTHERS
NONE

AUTHOR
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ALLISON DIVISION
GENERAL MOTORS CORPORATION

SHARE NUMBER 1129

DATE WRITTEN: 05/12/61

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK AQALL1)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'DMPA'

PURPOSE
CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION
OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)
(NO HEADINGS ARE PROVIDED)

FUNCTIONAL CATEGORIES: N2

USAGE
CALL DMPA (FWA, N, INIT)
CALL DMPA (FWA, N)

DESCRIPTION OF PARAMETERS
FWA - FIRST WORD ADDRESS OF AREA TO DUMP
     (E.G., LOCF (ARRAY))
N - NUMBER OF WORDS TO DUMP
INIT - STARTING WORD ADDRESS TO BE PRINTED
     (IF OMITTED, 0 IS USED)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
EQU60 - LOGICAL ARRAY COMPARE
MFETCH - READ WORD IN USER'S FL

LANGUAGE: FORTRAN IV

OUTPUT UNIT
UNIT # LFN USE
-------- -------- ------------
OUTPUT LISTABLE OUTPUT

CM REQUIRED: 315B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 06/14/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLB USER LIBRARY: NSRDC
SUBROUTINE 'DMPCPA'

PURPOSE
  DUMP JOB CONTROL POINT AREA

FUNCTIONAL CATEGORIES: N2

USAGE
  CALL DMPCPA

REMARKS
  OCTAL AND CHARACTER DUMP

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
  DATE TIME
  OTHERS
    RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
  NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS

<table>
<thead>
<tr>
<th>UNIT</th>
<th>LFN</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OUTPUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LISTABLE OUTPUT</td>
</tr>
</tbody>
</table>

CM REQUIRED: 324B

AUTHOR
  DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/29/75

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
  UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT
  EDITLIB USER LIBRARY: NSRDC

08/22/77  2-51  DMPCPL - 1 OF 1
SUBROUTINE 'DPROOT'

PURPOSE
FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL

FUNCTIONAL CATEGORIES: C2 B4

LANGUAGE: FORTRAN IV

REMARKS
THE POLYNOMIAL HAS THE FORM:
\[ A_1 + A_2 x + \ldots + A_{n+1} x^n = 0 \]

USAGE
CALL DPROOT (N, A, U, V, H, B, C, CONV, NPLUS2)

DESCRIPTION OF PARAMETERS
N - DEGREE OF THE POLYNOMIAL TO BE SOLVED
A - DOUBLE PRECISION ARRAY (DIMENSIONED N+2) CONTAINING
    THE COEFFICIENTS IN THE ORDER INDICATED ABOVE
U - DOUBLE PRECISION ARRAY (DIMENSIONED N+2) WHICH WILL
    CONTAIN THE REAL PARTS OF THE ROOTS
V - DOUBLE PRECISION ARRAY (DIMENSIONED N+2) WHICH WILL
    CONTAIN THE IMAGINARY PARTS OF THE ROOTS
H, B, C - DOUBLE PRECISION WORK ARRAYS (EACH DIMENSIONED N+2)
CONV - CONVERGENCE CRITERION. INITIALLY SET BY DPROOT TO
        1.0D-35 (FAR BELOW THE ACTUAL STARTING CONVERGENCE
        CRITERION OF 5.0D-20 (CDC 6600). IF THE POLYNOMIAL
        HAS NOT CONVERGED AFTER A PRESCRIBED NUMBER OF
        TRIES, THE CONVERGENCE CRITERION IS RELAXED. IF,
        UPON EXIT FROM DPROOT, CONV IS NOT 1.0D-35, THE
        CONVERGENCE CRITERION HAS BEEN RELAXED TO THE
        NUMBER GIVEN. (CONV IS DOUBLE PRECISION.)
NPLUS2 - MUST BE SET TO N+2

CM REQUIRED: 1153B

METHOD
THE ROUTINE CONVERGES SIMULTANEOUSLY TOWARD A LINEAR FACTOR
AND A QUADRATIC FACTOR BY NEWTON'S AND BAIRSTOW'S METHODS,
RESPECTIVELY. WHEN A ROOT IS FOUND BY ONE METHOD, ITERATION
CONTINUES WITH BOTH METHODS USING THEIR MOST RECENT GUESSES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
DABS  DSIGN  SQRT
OTHERS
NONE

07/25/77  2-52  DPROOT - 1 OF 2
SUBROUTINE 'DUMPA'

PURPOSE
GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA

FUNCTIONAL CATEGORIES: N2

USAGE
CALL DUMPA (AREA, NWORDS, NAME)

DESCRIPTION OF PARAMETERS
AREA - START OF AREA TO BE DUMPED
NWORDS - NUMBER OF WORDS TO DUMP
NAME - 1-10 CHARACTER IDENTIFICATION OF START OF AREA
       (E.G., 1OHMYAREA(1))
       (WILL BE PRINTED IN HEADING LINE)

REMARKS
LINES CONTAIN 4 WORDS EACH. IF A LINE IS THE SAME AS THE
PREVIOUS LINE, IT IS NOT PRINTED (UNLESS IT IS THE LAST
LINE).

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
COMPL
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS
UNIT #   LFN USE
OUTPUT   LISTABLE OUTPUT

CM REQUIRED: 257B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/06/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-54 DUMPA - 1 OF 1
SUBROUTINE 'DUMPCPA'

PURPOSE
EXPANDED DUMP OF JOB CONTROL POINT AREA

FUNCTIONAL CATEGORIES: N2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
EACH FIELD IS PRINTED SEPARATELY.
PRINTOUT IS AT 8 LINES PER INCH AND IS RESTORED TO 6 LINES PER INCH BEFORE RETURN.

USAGE
CALL DUMPCPA

CM REQUIRED: 5072B

OUTPUT UNITS

<table>
<thead>
<tr>
<th>UNIT</th>
<th>LFN</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT</td>
<td>LISTABLE OUTPUT</td>
<td></td>
</tr>
</tbody>
</table>

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE AND DATE OR SHIFT TIME

OTHERS
- EXTBIT - EXTRACT BITS FROM A WORD
- GETLIB - GET STSYSTEM LIBRARY NAME
- IPAKLFT - SQUEEZE LEFT, REMOVE BLANKS AND OOB
- RCPA - READ CONTROL POINT AREA
- UNHEX3 - CONVERT 2-CHARACTER CODE TO 3 HEX DIGITS
- VFIIL - FILL ARRAY WITH WORD

ARITHMETIC STATEMENT FUNCTIONS

FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
L71FMT

FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
R1FMT R11FMT R16FMT R19FMT R110FMT
R21FMT R23FMT R25FMT R27FMT R29FMT
R31FMT R32FMT R34FMT R35FMT R36FMT
R36FMT R41FMT R45FMT R65FMT R71FMT
AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/30/75

DATE(S) REVISED
02/27/76
01/25/78 - UPGRADE TO NOS/BE LEVEL 454
11/28/78 - UPGRADE TO NOS/BE LEVEL 461
02/05/81 - UPGRADE TO NOS/BE LEVEL 508

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'DUMPFL'

PURPOSE
CALLABLE OCTAL AND CHARACTER DUMP OF SPECIFIED PORTION
OF USER'S FIELD LENGTH (FL) (BY ACTUAL LOCATION)

FUNCTIONAL CATEGORIES: N2

USAGE
CALL DUMPFL
CALL DUMPFL (LWA)
CALL DUMPFL (FWA, LWA)

DESCRIPTION OF PARAMETERS
FWA - FIRST WORD ADDRESS OF AREA TO DUMP
(SET TO ZERO IF ANY OF THE FOLLOWING:
1) FWA OMITTED;
2) FWA LESS THAN ZERO;
3) FWA GREATER THAN FL;
4) FWA GREATER THAN LWA)

LWA - LAST WORD ADDRESS OF AREA TO DUMP
(SET TO FL IF ONE OF THE FOLLOWING:
1) LWA OMITTED;
2) LWA LESS THAN OR EQUAL TO ZERO;
3) LWA GREATER THAN FL;
4) FWA GREATER THAN LWA)

REMARKS
1) WHEN CALLED WITHOUT AN ARGUMENT LIST, THE FTN CARD
FOR THE CALLING PROGRAM MUST HAVE THE 'Z' PARAMETER.
2) DUMP IS AT 8 LINES PER INCH ON PRINTERS WHICH WILL PRINT
AT THAT DENSITY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
LOCF

OTHERS
EQUI60 - LOGICAL ARRAY COMPARE
FTNRFL - GET CURRENT FL
MFETCH - READ WORD IN USER'S FL

LANGUAGE: FORTRAN IV

OUTPUT UNITS
UNIT #   LFN   USE
--------- ----- ------------
OUTPUT    LISTABLE OUTPUT

CM REQUIRED: 401B
AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 03/12/76

DATE(S) REVISED
06/14/76

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLB USER LIBRARY: NSRDC

06/14/76 2-56  DUMPFL - 2 OF 2
SUBROUTINE 'ELLI'
SUBROUTINE 'CELLI'

PURPOSE
INCOMPLETE AND COMPLETE ELLIPTIC INTEGRALS OF THE FIRST AND
SECOND KIND

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CELLI IS AN ENTRY POINT IN ELLI.

WHEN ABS(PHI) < PI/2, F AND E ARE ACCURATE TO AT LEAST 10
SIGNIFICANT FIGURES. AS ABS(PHI) GETS LARGE, THE ACCURACY
WILL NOT BE AS GOOD SINCE ELLI USES THE TANGENT SUBROUTINE
WHICH BECOMES LESS ACCURATE AS THE ANGLE ABS(PHI) INCREASES.

USAGE
CALL ELLI (PHI, CAY, F, E)
CALL CELLI (PHI, CAY, F, E)

DESCRIPTION OF PARAMETERS
PHI - UPPER LIMIT OF INTEGRAL
   (NOT USED BY CELLI WHICH ASSUMES PI/2)
CAY - THE PARAMETER IN THE INTEGRAL
F - OUTPUT THE ELLIPTIC INTEGRAL OF THE FIRST KIND
   (F(PHI,CAY))
E - OUTPUT THE ELLIPTIC INTEGRAL OF THE SECOND KIND
   (E(PHI,CAY))

CM REQUIRED: 457B (+ 60B FOR LABRT)

ERROR MESSAGES
IF K > 1, F AND E DO NOT EXIST. A MESSAGE IS PRINTED AND
F AND E ARE SET TO PHI.

IF K=1 AND ABS(PHI) > PI/2, F DOES NOT EXIST. A MESSAGE IS
PRINTED AND F IS SET TO SIGN(PHI)*1.0E+294. E EXISTS AND IS
COMPUTED.

OUTPUT UNITS

UNIT # LFN USE
---------------------------
OUTPUT ERROR MESSAGES PRINTED BY LABRT
METHOD
WHEN K<1, LANDEN'S TRANSFORMATION IS USED.

WHEN K=1, E IS COMPUTED BY:
\[ E(\phi, 1) = N + \text{ABS} \left( \sin(\phi) \right) - \sin(N \cdot \pi / 2) \]
WHERE N IS THE INTEGRAL PART OF PHI*(2/PI).

WHEN K=1 AND ABS(\phi) < \pi/2, F IS COMPUTED BY:
\[ F(\phi, 1) = .5 \cdot \ln \left( \frac{1 + \sin(\phi)}{1 - \sin(\phi)} \right) \]
REFERENCE: "HANDBOOK OF MATHEMATICAL FUNCTIONS" BY M. ABRAMOWITZ AND I. A. STEGUN.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS AINT ALOG AMIN AMOD
ATAN FLOAT INT MOD SIGN
SIN SQRT TAN
PART OF LANGUAGE
LABRT - PRINT ERROR MESSAGES
OTHERS
NONE

AUTHORS
KARL J MELENDEZ
DUANE HARDER
LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C304A

DATE WRITTEN: 02/05/68
DATE(S) REVISED
02/69 - DH

LOCATION OF DECKS
SOURCE
CODE 1892 (LISTING ONLY) (*DECK ?)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ELTIME'

PURPOSE
OBTAIN CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL

FUNCTIONAL CATEGORIES: QO
LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL ELTIME (TIMES)

DESCRIPTION OF PARAMETER
TIMES - 7-WORD REAL ARRAY TO CONTAIN THE FOLLOWING:
1 - CPA TIME IN SECONDS
2 - CPB TIME IN SECONDS
3 - CP TIME IN SECONDS (CPA+CPB)
4 - PP TIME IN SECONDS
5 - IO TIME IN SECONDS
6 - WALL CLOCK TIME (HH.MM.SS.)
7 - WALL CLOCK TIME IN SECONDS

CM REQUIRED: 111B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
IHMS - CONVERT SECONDS TO 'HH.MM.SS.'
ISEC - CONVERT HH.MM.SS TO SECONDS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 12/15/75

DATE(S) REVISED
10/31/77 - ADJUST FOR MIDNIGHT

LOCATION OF DEcks
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'EQU60'

PURPOSE
   LOGICAL COMPARE (OF 2 ARRAYS)

FUNCTIONAL CATEGORIES: MO

USAGE
   TEST = EQU60 (A, B, N)
   TFST = EQU60 (A, B)

DESCRIPTION OF PARAMETERS
   A, B - COMPARE (ARRAY) A WITH (ARRAY) B
   N - NUMBER OF WORDS TO COMPARE
       (IF OMITTED, N=1)
   EQU60 - WILL RETURN ONE OF:
       -1. IF A .LT. B (DISPLAY CODE)
       0. IF A .EQ. B (DISPLAY CODE)
       +1. IF A .GT. B (DISPLAY CODE)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
       NONE
   OTHERS
       NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 24B

AUTHOR
   C. FLINK - NWL - KPS

DATE WRITTEN: 12/08/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
       UPDATE LIBRARY: NSRDCPL,ID=CSYS (*DECK COMPAB)
   OBJECT
       EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'EXPAND'

PURPOSE
EXPAND CHARACTER STRING INTO ARRAY OF 1R-FORMAT WORDS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
SEE SUBROUTINE 'CONTRCT'.

USAGE
CALL EXPAND (A, B, NCHAR)

DESCRIPTION OF PARAMETERS
A - INPUT ARRAY CONTAINING THE CHARACTER STRING
B - OUTPUT ARRAY WHOSE ELEMENTS WILL EACH CONTAIN ONE CHARACTER FROM ARRAY A IN 1R FORMAT
NCHAR - NUMBER OF CHARACTERS IN ARRAY A

CM REQUIRED: 40B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - GET CHARACTER FROM ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/04/77

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'EXPRM'

PURPOSE
EXTRACT PARAMETER FROM CONTROL CARD

FUNCTIONAL CATEGORIES:  M4

LANGUAGE:  FORTRAN IV EXTENDED

REMARKS
ON EACH CALL, THE NEXT PARAMETER IS PASSED FROM RA+70B
TO WORD(S) IAD, LEFT JUSTIFIED, ZERO-FILLED. ONCE A
TERMINATOR IS ENCOUNTERED OR THE END OF A CARD IS REACHED,
ZERO IS RETURNED.

IF CALLED WITH THE SECOND ARGUMENT, RETURNED IN ICC WILL BE
A CODE INDICATING THE TYPE OF THE SEPARATOR FOUND FOLLOWING
THE PARAMETER RETURNED IN IAD.

USAGE
CALL EXPRM (IAD)
CALL EXPRM (IAD, ICC)

DESCRIPTION OF PARAMETERS
IAD - WILL CONTAIN THE NEXT PARAMETER FROM THE CONTROL CARD.
      IF TERMINATOR OR END OF CARD, 0 IS RETURNED.
ICC - IF PRESENT, WILL CONTAIN A CODE INDICATING THE TYPE OF
      SEPARATOR ENCOUNTERED
DEC  OCT  SEPARATOR
  1  1   ,
  2  2   =
  3  3   /
  4  4   (
  5  5   +
  6  6   -
  7  7   BLANK
  8 10B  :
 14 16B OTHER
 15 17B  . OR ) (TERMINATOR)

CM REQUIRED: \3358

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
  LOCF  SHIFT
  OTHERS
  MFETCH - FETCH WORD IN USER'S FL
SUBROUTINE 'EXTBIT'

PURPOSE
  EXTRACT BITS FROM A WORD

FUNCTIONAL CATEGORIES: M4

USAGE
  CALL EXTBIT (ISTART, NBITS, IN, IOUT, IRC)

DESCRIPTION OF PARAMETERS
  ISTART - FIRST/ONLY BIT TO EXTRACT
            (BITS ARE NUMBERED 59-0)
  NBITS  - NUMBER OF BITS TO EXTRACT (1-60)
  IN     - INPUT WORD FROM WHICH BITS ARE TO BE EXTRACTED
  OUT    - OUTPUT ARRAY OF DIMENSION NBITS
  IRC    - RETURN CODE
            0 - NO ERROR
            1 - ISTART OUT OF RANGE (MUST BE 0-59)
            2 - NBITS OUT OF RANGE (MUST BE 1-60)
            3 - BOTH ISTART AND NBITS OUT OF RANGE

REMARKS
  IF NBITS GOES PAST THE END OF THE WORD, EXTBIT WILL FILL
  WITH ZEROS. THERE IS NO CHECK FOR THIS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
    MAXO    MINO    MASK    SHIFT
  OTHERS
    NONE

ARITHMETIC STATEMENT FUNCTIONS
  NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 44B

AUTHOR
  DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/09/75

DATE(S) REVISED

LOCATION OF DECKS
  SOURCE
    UPDATE LIBRARY: NSRDCPL, ID=CSYS
  OBJECT
    EDITLIB USER LIBRARY: NSRDC

08/22/77  2-66  EXTBIT - 1 OF 1
SUBROUTINE 'EXTPRM'

PURPOSE
EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORIES: M4

USAGE
CALL EXTPRM (IAREA, LAREA, IPARM, ISEP)
CALL EXTPRM (IAREA, LAREA, IPARM)
CALL EXTPRM (0, LAREA)
CALL EXTPRM (0)

DESCRIPTION OF PARAMETERS
IAREA - IN - ARRAY CONTAINING PARAMETER STRING
LAREA - IN - NUMBER OF WORDS IN 'IAREA'
OUT - FIRST AND SECOND FORMS OF CALL ONLY:
  0 IF END OF 'IAREA' REACHED
THIRD FORM OF CALL:
  INITIALIZE FOR THIS MANY WORDS
FOURTH FORM OF CALL (OMITTED):
  INITIALIZE FOR 16 WORDS
BECAUSE 'LAREA' IS BOTH AN INPUT AND OUTPUT ARGUMENT, IT MUST ALWAYS BE USED AS A VARIABLE, NEVER AS AN EXPLICIT INTEGER.)
IPARM - OUT - NEXT PARAMETER, LEFT-JUSTIFIED, ZERO-FILLED
ISEP - OUT - IF PRESENT, CODE INDICATING TYPE OF SEPARATOR FOUND FOLLOWING THE PARAMETER RETURNED IN 'IPARM' (COMPATIBLE WITH SCOPE 3.3 AND 3.4)
DEC OCT SEPARATOR
  1 01 .
  2 02 =
  3 03 /
  4 04 (}
  5 05 +
  6 06 -
  7 07 BLANK
  8 10 :
  14 16 OTHER
  15 17 . OR ) (TERMINATOR)

REMARKS
THE SUBROUTINE IS PRE-INITIALIZED FOR PROCESSING THE FIRST USER PARAMETER STRING. IF A SECOND STRING IS TO BE PROCESSED, THE SUBROUTINE MUST BE RE-INITIALIZED USING EITHER THE THIRD OR FOURTH FORM OF THE CALL.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
MINO
SHIFT
OTHERS
NONE
ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV
CM REQUIRED: 464B

AUTHORS
C FLINK - KPS NWL
D V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 06/73 - CF

DATE(S) REVISED
04/11/74 - DVS - ORIGINAL SUBROUTINE 'EXPRM' MODIFIED TO
ACCEPT USER-SUPPLIED PARAMETER STRING

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

12/15/75 2-68 EXTPRM - 2 OF 2
SUBROUTINE 'FBINRD'

PURPOSE
UNPACK AN INPUT ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL FBINRD (BW, NUMB, IN, OUT)

DESCRIPTION OF PARAMETERS
BW - BITS-_PER-WORD TO BE EXTRACTED
NUMB - NUMBER OF BW-BIT OUTPUT WORDS DESIRED
        DIMENSION OF IN IS ((NUMB*BW)+59)/60
        DIMENSION OF OUT IS NUMB
IN  - INPUT ARRAY
OUT  - OUTPUT ARRAY

CM REQUIRED: 35B

METHOD
THE BW EXTRACTED BITS ARE RIGHT JUSTIFIED WITH LEADING
ZEROS IN OUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
A. CINCOTTA - DTNSRDC CODE 1892.3

DATE WRITTEN: 03/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'FFT'

PURPOSE
FAST FOURIER TRANSFORM FOR COMPLEX TABULATED FUNCTION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THIS ROUTINE ALSO COMPUTES THE INVERSE FOURIER TRANSFORM.
WITH SLIGHT MODIFICATIONS OF THE RESULTING TRANSFORM, TWO
REAL TABULATED FUNCTIONS MAY BE TRANSFORMED SIMULTANEOUSLY.

FOR REAL, ONE-DIMENSIONAL DATA, SEE RFFT OR RFSN.

USAGE
CALL FFT (A, M, INV, S, IFSET, IFERR)

DESCRIPTION OF PARAMETERS
A - THE ARRAY CONTAINING A COMPLEX TABULATED FUNCTION OF
UP TO 3 DIMENSIONS TO BE TRANSFORMED. 'A' CONTAINS
CONSECUTIVE COMPLEX PAIRS OF DATA. FOR THE ARRAY
A(I,J,K), THE ELEMENT WITH SUBSCRIPT (I,J,K) IS
STORED WITH THE REAL PART IN SUBSCRIPT
2*((K*Ni*N2)+
(J*Nlj
+ I) + 1,
AND THE IMAGINARY PART IN THE
FOLLOWING CELL. N1 AND N2 ARE COMPUTED AS 2**M(1)
AND 2**M(2), RESPECTIVELY. NOTE THAT 'I' VARIES
MOST RAPIDLY, K LEAST RAPIDLY.
ON OUTPUT, 'A' CONTAINS THE FOURIER TRANSFORM.
M - A 3-CELL ARRAY WHICH CONTAINS THE MINIMUM INTEGER
WHICH IS GE THE LOG-BASE-2 OF THE DIMENSIONS OF 'A'.
INV - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
S - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
IFSET - COMPUTATION FLAG
= 0 -- SET UP TABLES IN INV AND S
= 1 -- SET UP TABLES AND COMPUTE FOURIER TRANSFORM
=-1 -- SET UP TABLES AND COMPUTE INVERSE FOURIER
TRANSFORM
= 2 -- COMPUTE FOURIER TRANSFORM ASSUMING TABLES
EXIST
=-2 -- COMPUTE INVERSE FOURIER TRANSFORM ASSUMING
TABLES EXIST
IFERR - RETURN CODE
= 0 -- NORMAL COMPLETION
<>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: 3 < M(L) < 20, WHERE L IS THE SUBSCRIPT OF THE
LARGEST ELEMENT IN M. DATA DIMENSIONS MUST BE POWERS
OF 2. IF DATA DIMENSIONS ARE < 2**M(L), THE
REMAINING LOCATIONS MUST BE SET TO ZERO OR ANY
APPROPRIATE CONSTANT.

CM REQUIRED: 1510B
METHOD

This subroutine is based on an algorithm proposed by Cooley and Tukey and is well documented in Reference 1. Basically, the algorithm decomposes the transformation into product of several elementary transformations followed by a reordering of subscripts of the result.

A method exists for transforming 2 real data sets simultaneously with an elementary transformation on the resulting answers to separate the transforms. This procedure is documented in Reference 2.

Two other routines RFFT and RFSN accomplish the fast Fourier transform and inverse transform, respectively, of one-dimensional data. These routines use a modification of the Cooley-Tukey process and are faster than processing a complex array with a zero imaginary component.

REFERENCES


SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
   COS   IABS   MAX0   SIN   SORT
OTHERS
   NONE

AUTHORS
   WES RICE
   DUANE HARDER
   LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C329A

DATE WRITTEN: 07/16/68

DATE(S) REVISED
   02/69 - DH

LOCATION OF DECKS
SOURCE
   UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3.D=HY
   (*DECK LASC329)

OBJECT
   EDL16 USER LIBRARY: NSRDC
SUBROUTINE 'FFT5'

PURPOSE
   FAST FOURIER TRANSFORM

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   CALL FFT5 (F, NPTS, KOMPLX)

DESCRIPTION OF PARAMETERS
   F   - (COMPLEX) ARRAY TO BE TRANSFORMED
       (IF 'F' IS REAL, THE VALUES MUST BE STORED IN
       CONTIGUOUS CORE LOCATIONS)
   NPTS - NUMBER OF WORDS IN 'F' TO BE TRANSFORMED.
       MUST BE POWER OF 2 AND LE 8192.
       TO COMPUTE THE INVERSE TRANSFORM, NPTS MUST
       BE NEGATIVE.
   KOMPLX - ONE OF:
       0 - DATA IN 'F' IS REAL
       1 - DATA IN 'F' IS COMPLEX

CM REQUIRED: 4521B (FFT5) (+ 2308 FOR IRVING)

METHOD
   SEE CMD-25-71

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
       COS      FLOAT      IABS
   PART OF PROGRAM
       IRVING
   OTHERS
       NONE

AUTHORS
   W. H. HAILE
   GEORGE GLUCK

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
       TAPE LABELLED CLIBRARYUPD3 (DECK: AMFFTS)
   OBJECT
       EDITLIB USER LIBRARY: NSRDC

06/09/77  2-72  FFT5  -  1 OF  1
SUBROUTINE 'FINDC'

PURPOSE
FIND PRESENCE OR ABSENCE OF SPECIFIED CHARACTER IN AN ARRAY
(USER SPECIFIES RELATIONAL OPERAND)

FUNCTIONAL CATEGORIES: M5

USAGE
CALL FINDC (A, NA, CHAR, NC, NW, REL, FIRSTCH)
CALL FINDC (A, NA, CHAR, NC, NW, REL)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
CHAR - CHARACTER TO BE SEARCHED FOR ACCORDING TO 'REL'
       (LEFT-ADJ, BLANK- OR ZERO-FILLED -OR- RIGHT-ADJ, ZERO-FILLED)
NC - OUTPUT POSITION OF FIRST CHARACTER (RELATIVE TO START OF 'A') WHICH SATISFIES THE RELATION 'REL' -OR-
       0 - CONDITION IS NOT SATISFIED -OR-
       -1 - 'REL' IS INVALID
       -2 - 'FIRSTCH' GT 10*NA
NW - OUTPUT SUBSCRIPT OF WORD CONTAINING POSITION 'NC' -OR-
       0 - CONDITION IS NOT SATISFIED -OR-
       -1 - 'REL' IS INVALID
       -2 - 'FIRSTCH' GT 10*NA
REL - RELATIONAL OPERAND
       "EQ" - FIND FIRST CHARACTER IN 'A' EQUAL TO 'CHAR'
       "NE" - FIND FIRST CHARACTER IN 'A' NOT EQUAL TO 'CHAR'
       "LT" - FIND FIRST CHARACTER IN 'A' LESS THAN 'CHAR'
       "LE" - FIND FIRST CHARACTER IN 'A' LESS THAN OR EQUAL TO 'CHAR'
       "GT" - FIND FIRST CHARACTER IN 'A' GREATER THAN 'CHAR'
       "GE" - FIND FIRST CHARACTER IN 'A' GREATER THAN OR EQUAL TO 'CHAR'
FIRSTCH - FIRST CHARACTER TO BE SEARCHED (OPTIONAL)
       (DEFAULT: 1)
       IF FIRSTCH < 1, DEFAULT IS USED.

REMARKS
NONE
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOC
OTHERS
GETCHA - GET CHARACTER FROM ARRAY

ARITHMETIC STATEMENT FUNCTIONS
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
L21FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV
CM REQUIRED: 261B

AUTHORS
DAVID V SOMMER - DTNSRDC CODE 1892.2
PETE ROTH - DTNSRDC CODE 1720.3

DATA WRITTEN: 04/20/76
DATE(S) REVISED
07/22/76 - PR/DVS - ADD PARAMETER 'FIRSTCH'

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

07/26/76 2-74 FINDC - 2 OF 2
SUBROUTINE 'FINDW'

PURPOSE
FIND PRESENCE OR ABSENCE OF SPECIFIED WORD IN AN ARRAY
(USER SPECIFIES RELATIONAL OPERAND)

FUNCTIONAL CATEGORIES: M5

USAGE
CALL FINDW (A, NA, W, NW, REL)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
W - WORD TO BE TESTED FOR ACCORDING TO 'REL'
NW - OUTPUT POSITION (SUBSCRIPT) OF FIRST WORD IN 'A'
    WHICH SATISFIES THE RELATION 'REL' -OR-
    0 - CONDITION IS NOT SATISFIED -OR-
    -1 - 'REL' IS INVALID
REL - RELATIONAL OPERAND
"EQ" - FIND FIRST WORD IN 'A' WHICH IS EQUAL TO 'W'
"NE" - FIND FIRST WORD IN 'A' WHICH IS NOT EQUAL TO 'W'
"LT" - FIND FIRST WORD IN 'A' WHICH IS LESS THAN 'W'
"LE" - FIND FIRST WORD IN 'A' WHICH IS LESS THAN OR
    EQUAL TO 'W'
"GT" - FIND FIRST WORD IN 'A' WHICH IS GREATER THAN 'W'
"GE" - FIND FIRST WORD IN 'A' WHICH IS GREATER THAN
    OR EQUAL TO 'W'

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 201B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/20/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-75

FINDW - 1 OF 1
SUBROUTINE 'FINDWRD'
SUBROUTINE 'FINDWR'

PURPOSE
FIND SPECIFIED WORD IN AN ARRAY

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV

USAGE
CALL FINDWRD (A, NA, WORD, NWORD)
CALL FINDWR (A, NA, WORD, NWORD)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
WORD - WORD TO BE SEARCHED FOR
NWORD - OUTPUT SUBSCRIPT OF FIRST OCCURRENCE OF WORD
IN 'A' (IF NO MATCH, ZERO (0) IS RETURNED)

REMARKS
ON CDC 6000, USE 'FINDWRD'. ON BURROUGHS B7700, USE
'FINDWR'. A CDC 6000 PROGRAM USING 'FINDWRD' NEED NOT
CHANGE WHN MOVING TO THE B7700, SINCE NAMES ARE TRUNCATED
TO 6 CHARACTERS AUTOMATICALLY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

CM REQUIRED: B7700: EST 48 WORDS
            CDC : 40B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 07/08/74

DATE(S) REVISED
05/07/79 - MOVE TO BURROUGHS B7700

LOCATION OF DECKS
SOURCE
  B7700: *SOURCE/NSRDC/FINDWR
         CDC : UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
  B7700: *NSRDC/FINDWR
         CDC : EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'FRESNEL'

PURPOSE
EVALUATE FRESNEL INTEGRALS

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS

\[
C(x) = \int_0^x \cos((\pi/2)u^2) \, du
\]

\[
S(x) = \int_0^x \sin((\pi/2)u^2) \, du
\]

RELATIVE ERROR < 2.0E-10.

USAGE

CALL FRESNEL (X, C, S)

DESCRIPTION OF PARAMETERS

X - REAL INPUT PARAMETER
C - REAL OUTPUT PARAMETER (C(X))
S - REAL OUTPUT PARAMETER (S(X))

CM REQUIRED: 271B

METHOD
TRUNCATED CHEBYSHEV SERIES

REFERENCE


SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
ABS AINT COS FLOAT SIN

OTHERS
NONE

AUTHOR
R BULIRSCH - UNIVERSITY OF CALIFORNIA AT SAN DIEGO

DATE WRITTEN: 01/68

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
TAPE LABELLED: CLIBRARYUPD3
OBJECT
EDITLIB USER LIBRARY: NSRDC

07/22/77  2-77  FRESNEL - 1 OF 1
SUBROUTINE 'FTNRFL'

PURPOSE
GET/SET CORE SIZE

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL FTNRFL (IFL)

DESCRIPTION OF PARAMETER
IFL - INTEGER FIELD LENGTH DESIRED.
IF THE VALUE OF IFL IS ZERO (0), THE FL IS NOT CHANGED
BUT THE PRESENT FIELD LENGTH IS RETURNED IN IFL.

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS
CM REQUIRED: 20B

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 12/18/70
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77  2-78  FTRJRFL  1 OF 1
FUNCTION 'GAMCAR'

PURPOSE

COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS

HAS BEEN CHECKED FOR CX = A + BI, 0<A<20, 0<B<20.
RELATIVE ERROR IS < 2*10**-10.

USAGE

COMPLEX CX, CY, GAMCAR

CY = 'GAMCAR (CX)

DESCRIPTION OF PARAMETERS

CX - COMPLEX VARIABLE WITH POSITIVE REAL PART
CY - COMPLEX SOLUTION

CM REQUIRED: 233B

METHOD

GAMCAR(Z+1) = (Z+5.5)**(Z+1/2) * E**-(Z+5.5) * SQRT(2*PI) * (CONSTANT + SUM (I=1,6) (CI/Z+I))

WHERE CONSTANT = 1.00000 00001 78
C(1) = 76.18009 17294 06
C(2) = -86.50532 03271 12
C(3) = 24.01409 82222 3
C(4) = -1.23173 95161 4
C(5) = 0.00120 85800 3
C(6) = -0.00000 53638 2

REFERENCES


HANDBOOK OF MATHEMATICAL FUNCTIONS, NATIONAL BUREAU OF STANDARDS, APPLIED MATHEMATICS SERIES NO. 55.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

CEXP CLOG

OTHERS

NONE

07/18/77

2-79 GAMCAR - 1 OF 2
FUNCTION 'GAMMA'

PURPOSE
INCOMPLETE GAMMA FUNCTION

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS
COMPUTES GAMMA (A, X) UNDER THE FOLLOWING RESTRICTIONS:
1) X >= 0.
2) WHEN X = 0, A IS NOT A NON-POSITIVE INTEGER.

USAGE
Y = GAMMA (A, X)

DESCRIPTION OF PARAMETERS
A - FLOATING POINT NUMBER
X - >= 0 (X=0 FOR COMPLETE GAMMA FUNCTION)

CM REQUIRED: 557B (INCLUDES GAMNEG/GCHEB/GFRAC/GSERIES)

REFERENCE
C. E. FROBERG, RATIONAL CHEBYCHEV APPROXIMATION OF ELEMENTARY FUNCTIONS, BIT. VOL. 1, P. 256, 1961.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS ALOG SQRT

PART OF PROGRAM
GAMNEG - COMPUTES GAMMA(A,X) WHEN A IS NEGATIVE INTEGER (DUE TO THE REPRESENTATION OF NUMBERS IN THE 6600, IF A=-N+-E, WHERE E<1.0E-10, THEN A IS TAKEN TO BE A NEGATIVE INTEGER)
GCHEB - COMPUTES BY A RATIONAL CHEBYSHEV APPROXIMATION (GAMMA(A))
GFRAC - COMPUTES THE CONTINUES FUNCTION FOR GAMMA(A,X)
GSERIES - COMPUTES SUM (N=0,INF) ((-X)**N)/((A+N)N)

OTHERS
NONE

AUTHOR
HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: 05/15/66

DATE(S) REVISED
05/67

LOCATION OF DECKS
SOURCE CODE 1892.1
OBJECT NSRDC

07/17/80 2-81 GAMMA - 1 OF 1
SUBROUTINE 'GAUSS'

PURPOSE
GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING FOR SOLVING
A\*X=B WHERE B MAY BE A SYSTEM OF M RIGHT-HAND SIDES

FUNCTIONAL CATEGORIES: F4 F3

LANGUAGE: FORTRAN IV

REMARKS
IF A-INVERSE IS DESIRED: AX=\*B IN! WILL YIELD
THE SOLUTION TO AX=B AS WELL AS THE INVERSE.

IF MM=0, XX CONTAINS RESULT OF FIRST GAUSSIAN ELIMINATION.

USAGE
CALL GAUSS (N, M, AA, BB, XX, VAL2, DET, MM)

DESCRIPTION OF PARAMETERS
N - SIZE OF MATRIX AA
M - NUMBER OF COLUMNS IN BB (<=51)
    (NUMBER OF RIGHT-HAND SIDES)
AA - MATRIX (51X51)
BB - RIGHT HAND SIDE(S) (51X51)
XX - SOLUTION VECTORS (51X51)
VAL2 - FINAL MAXIMUM ROW SUM OF RESIDUALS
    (INFINITY-NORM OF RESIDUAL)
DET - DETERMINANT
MM - NUMBER OF ITERATIONS ON RESIDUALS
    INPUT - MAXIMUM NUMBER TO BE PERMITTED
    OUTPUT - NUMBER ACTUALLY DONE

CM REQUIRED: 17714B

REFERENCE:
WILKINSON, J. H., ROUNING ERRORS IN ALGEBRAIC PROCESSES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS
OTHERS
NONE

AUTHORS
ROBERT MARGOLIS - UNIVERSITY OF MARYLAND
SUSAN VOIGHT - DTNSRDC

DATE WRITTEN: 1971

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TYPE LABELLED: CLIBRARYUPD3 (DECKNAME: AMGAU2)
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/19/77 2-82 GAUSS - 1 OF 1
SUBROUTINE 'GETCHA'
FUNCTION 'GETCHA'

PURPOSE
EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY

FUNCTIONAL CATEGORIES: M4 M5

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL GETCHA (ARRAY, NPOS, ICHAR)
VARIABLE = GETCHA (ARRAY, NPOS, ICHAR)

DESCRIPTION OF PARAMETERS
ARRAY - ARRAY FROM WHICH CHARACTER IS TO BE EXTRACTED
NPOS - POSITION OF CHARACTER TO BE EXTRACTED
       (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN
        ARRAY)
ICHAR - WILL CONTAIN THE EXTRACTED CHARACTER IN 1R FORMAT
        (RIGHT-ADJ, ZERO-FILLED)
GETCHA - WHEN USED AS A FUNCTION, GETCHA WILL CONTAIN THE
        SAME AS ICHAR AND MUST BE DECLARED INTEGER IN THE
        CALLING PROGRAM

CM REQUIRED: 52B

REMARKS
SIMILAR TO FUNCTION 'GETCHC' ON THE BURROUGHS B7700.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD  SHIFT
OTHERS  NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/16/76

DATE(S) REVISED
08/01/79 - DOCUMENT MODIFIED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY:  NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY:  NSRDC

08/01/79  2-83  GETCHA - 1 OF 1
SUBROUTINE 'GETCHR'
FUNCTION 'GETCHR'

PURPOSE
EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORIES: M4 M5

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL GETCHR (WORD, NPOS, ICHAR)
VARIABLE = GETCHR (WORD, NPOS, ICHAR)

DESCRIPTION OF PARAMETERS
WORD - WORD FROM WHICH CHARACTER IS TO BE EXTRACTED
NPOS - POSITION OF CHARACTER TO BE EXTRACTED
 (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN WORD)
ICHAR - WILL CONTAIN THE EXTRACTED CHARACTER IN 1H FORMAT
 (LEFT-ADJ, BLANK-FILLED)
GETCHR - WHEN USED AS A FUNCTION, GETCHR WILL CONTAIN THE
 SAME AS ICHAR AND MUST BE DECLARED INTEGER IN THE
 CALLING PROGRAM

CR REQUIRED: 43B

REMARKS
GETCHA ON THE BURROUGHS B7700 IS SIMILAR BUT EXTRACTS
FROM AN ARRAY.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

AUTHOR
FROM BIMED PACKAGE

DATE WRITTEN: 03/16/76
1975 - DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE(S) REVISED
08/01/79 - DOCUMENT MODIFIED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

2-84
GETCHR - 1 OF 1
SUBROUTINE 'GETFIT'

PURPOSE
GET SPECIFIED FIT ADDRESS

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL GETFIT (LFN, ADDR)

DESCRIPTION OF PARAMETERS
LFN - LOCAL FILE NAME
(LEFT-JUSTIFIED, ZERO-FILLED)
(E.G., 5LTAPE1)
ADDR - WILL CONTAIN THE FIT ADDRESS

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: COMPASS

CM REQUIRED: 25B

AUTHOR
ANTHONY CINCOTTA - NSRDC CODE 1892.3

DATE WRITTEN: 03/20/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'GETHOUR'

PURPOSE
FOR A SPECIFIED PERIOD OF TIME (UP TO 2 HR 59 MIN 59 SEC)
DETERMINE WHICH HOUR IS OCCUPIED THE LONGEST

FUNCTIONAL CATEGORIES: M2

USAGE
CALL GETHOUR (FROM, TO, HOUR)

DESCRIPTION OF PARAMETERS
FROM - STARTING TIME ('HH.MM.SS ', 'HH.MM.SS' OR
     'HH.MM.SS')
TO - STOPPING TIME (SAME FORMAT AS 'FROM')
HOUR - WILL CONTAIN AN INTEGER HOUR
      0 - TIME PERIOD TOO LONG TO DETERMINE HOUR
      N - MOST/ALL TIME IS IN THE HOUR N-1 TO N
      (E.G., HOUR=8 MEANS MOST/ALL TIME IS IN
      THE HOUR 7-8)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
!SEC - CONVERT HH.MM.SS TO SECONDS

ARITHMETIC STATEMENT FUNCTIONS
I21FMT - FAST I-FORMAT DECODE
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
THE HOURS IN FROM (HF) AND TO (HT) ARE COMPARED.
IF EQUAL, HOUR IS SET TO HT+1.
IF THE DIFFERENCE IS 1, THE AMOUNT OF TIME SPENT IN EACH
HOUR IS COMPARED AND THE HOUR IS SET TO THE LARGER+1.
IF AN EQUAL AMOUNT OF TIME IS SPENT IN EACH HOUR, HOUR IS
SET TO HT+1.
IF THE DIFFERENCE IS 2, HOUR IS SET TO THE MIDDLE HOUR+1.

CM REQUIRED: 121B
SUBROUTINE 'GETLFNS'

PURPOSE
GET ACTUAL LOCAL FILE NAMES (FOR FTN)

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
USEFUL ONLY IN FTN PROGRAMS (WHICH ALLOW FILE NAME
REPLACEMENT IN THE 'LGO' CARD).

USAGE
CALL GETLFNS (LFNS, NLFN)
CALL GETLFNS (LFNS)

DESCRIPTION OF PARAMETERS
LFNS - ARRAY DIMENSIONED AT LEAST 1 GREATER THAN NUMBER OF
FILES (INCLUDING EQUATED FILES) ON FTN PROGRAM
STATEMENT
(LFNS(NLFN) WILL BE SET TO 0)
NLFN - IF PRESENT, WILL RETURN NUMBER OF FILE NAMES + 1
('SUBSCRIPT OF FINAL ZERO-WORD IN ARRAY LFNS)

CM REQUIRED: 33B

EXAMPLES
PROGRAM SAMPLE (INPUT,OUTPUT,TAPE1,TAPE5=INPUT,TAPE6=OUTPUT)
DIMENSION LFN(6)
CALL GETLFNS (LFN, NLFN)

EXECUTE CARD: LGO.
AFTER CALL: LGO,,OUT,TAPE2.
LFN(1) = 5LINPUT LFN(1) = 5LINPUT
LFN(2) = 6LOUTPUT LFN(2) = 3LOUT
LFN(3) = 5LTAPE1 LFN(3) = 5LTAPE2
LFN(4) = 5LINPUT LFN(4) = 5LINPUT
LFN(5) = 6LOUTPUT LFN(5) = 3LOUT
LFN(6) = 0 LFN(6) = 0
NLFN = 6 NLFN = 6

METHOD
FILE NAMES FROM PROGRAM CARD ARE IN RA+2 ON. EACH HAS A
POINTER TO ITS FIT. THE FIRST WORD OF EACH FIT IS THE
ACTUAL FILE NAME. THE LIST, STARTING IN RA+2, ENDS IN A
WORD OF ZEROS.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND LOCF
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L71FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R38FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 12/30/74

DATE(S) REVISED
12/29/75
10/20/77 - REWRITE TO REDUCE CM REQUIREMENT AND ELIMINATE
SPECIAL FUNCTION CALL

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CS\S
OBJECT
EDITLIB USER LIBRARY: NSRDC

10/26/77

2-89

GETLFNS - 2 OF 2
SUBROUTINE 'GETLGO'

PURPOSE
EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD PARAMETERS

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL GETLGO (LGO, NLGO)

DESCRIPTION OF PARAMETERS
LGO - ARRAY TO CONTAIN EXECUTE CARD PARAMETERS
LGO(1) CONTAINS EXECUTE NAME
LGO(2)-LGN(NLGO) CONTAIN FIRST 10 CHARACTERS
OF EACH PARAMETER (0 MEANS PARAMETER OMITTED)
NLGO - NUMBER OF WORDS OF LGO FILLED

CM REQUIRED: 36B

METHOD
PARAMETERS ARE EXTRACTED FROM RA+70B THRU RA+77B.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
EXPRM - GET NEXT PARAMETER FROM EXECUTE CARD

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/01/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'GETLIB'

PURPOSE
GET SYSTEM LIBRARY NAME FROM CODE IN CONTROL POINT AREA

FUNCTIONAL CATEGORIES: M5 SO Q0

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
THIS ROUTINE MUST BE REVERIFIED EACH TIME THE NOS/BE SYSTEM CHANGES.

USAGE
INTEGER GETLIB
LIB = GETLIB (WHICH)

DESCRIPTION OF PARAMETERS
WHICH - CONTAINS A 1-CHARACTER CODE FOR THE LIBRARY
(THIS IS IN CONTROL POINT AREA + 055B THRU 057B)
GETLIB - WILL CONTAIN ONE OF:
-1 -- 'WHICH' WAS INVALID
0 -- END OF THE LIBRARY LIST
<LIB> -- A SYSTEM LIBRARY NAME (1-7 CHARACTERS)
<BLANKS> -- THE USER LIBRARY NAME IS IN CPA+056B OR 057B

CM REQUIRED: 44B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/24/80

DATE(S) REVISED
02/06/81 - REMOVE RUN2P3 AND RE-ARRANGE

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'GETRA'

PURPOSE
GET FIRST 100B WORDS OF USER'S FL

FUNCTIONAL CATEGORIES: K2

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
NONE

USAGE
CALL GETRA (RA)

DESCRIPTION OF PARAMETER
RA - 64-WORD ARRAY TO HOLD FIRST 100B WORDS OF FL

CM REQUIRED: 7B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/03/73

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'GODROP'

PURPOSE
CREATE GO/DROP MESSAGE AND PROCESS RESPONSE

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NOT DESIGNED FOR BATCH JOBS.

IN INTERCOM, WILL GENERATE MESSAGE AT THE TERMINAL, NOT AT THE CENTRAL SITE CONSOLE.

WHEN USED WITH NO ARGUMENT LIST, THE 'Z' PARAMETER MUST BE USED ON THE FTN CARD.

USAGE
CALL GODROP (MESSAGE)
CALL GODROP

DESCRIPTION OF PARAMETER
MESSAGE - IF USED, CONTENTS WILL BE DISPLAYED (SHOULD BE A ZERO-BYTE TERMINATED FIELD)
IF OMITTED, THE MESSAGE IS TAKEN FROM RA+70B THRU RA+77B AND PREFIXED WITH 'GO/DROP- '. THE MESSAGE MAY BE INSERTED BY
'CALL PUTRA (MESSAGE, 70B, 76B)'

CM REQUIRED: 142B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF REMARK
OTHERS
 MFETCH - READ A WORD IN USER'S FL
 MSET - SET WORD IN USER'S FL

AUTHOR
C FLICK - KPS NWL

DATE WRITTEN: 06/73

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

08/01/77  2-93  GODROP - 1 OF
SUBROUTINE 'HELP'

PURPOSE
COMPLEX ROOTS OF A REAL OR COMPLEX POLYNOMIAL

FUNCTIONAL CATEGORIES: C2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
CALCULATES THE ROOTS OF THE COMPLEX POLYNOMIAL
FN(Z) = A(N)*Z**(N) + A(N-1)*Z**(N-1) + ... + A(1)*Z + A(0)
WHERE A(I) (I=0,1,...,N) ARE PSEUDO-COMPLEX COEFFICIENTS.

USAGE
CALL HELP (N, A, ROOT, TAU, ETAI, MI)

DESCRIPTION OF PARAMETERS
N - DEGREE OF POLYNOMIAL
(DESTROYED BY HELP)
A - ARRAY OF N+1 COEFFICIENTS (SEE NOTE)
(DESTROYED BY HELP)
ROOT - ARRAY TO CONTAIN THE N ROOTS (SEE NOTE)
TAU - THE TOLERANCE TO BE PRESCRIBED FOR FN(ROOT(I))
(ROOT(I) WOULD BE CONSIDERED AS A ROOT WHEN
ABS(FN(ROOT(I))) <= TAU
IN THE SCALE OF THE SYSTEM OF COORDINATES
CONSIDERED AT THE MOMENT)
ETAI - INDICATOR ARRAY
ETAI(I)=+1 -- ABS(FN(ZI)) <= TAU
= 0 -- DID NOT FIND A NEW CIRCLE
=-1 -- INCREMENTING THE ROOT BY NU DID NOT
CHANGE THE ROOT (BECAUSE OF MACHINE
LIMITS)
MI - INDICATOR VECTOR

NOTE: ARRAYS 'A' AND 'ROOT' ARE 2-DIMENSIONAL REAL ARRAYS
A(N+1,2), ROOT(N,2), WHERE A(1,1), ROOT(I,1) ARE THE
REAL PARTS AND A(1,2), ROOT(I,2) ARE THE IMAGINARY
PARTS.

CM REQUIRED: 1471B

METHOD
THE METHOD OF D. H. LEHMER (JOURNAL ACM, 1961, VOL 8,
P. 151) IS USED.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS        SIN            SQRT
PART OF PROGRAM
ANSWER (437B)
ANULUS (117B)
COMADD (13B)
COMMUL (14B)
DIVIDE (52B)
FUNC (53B)
OVRLAP (214B)
OTHERS
NONE

AUTHORS
ADEL S. ABDELGAWAD
G. MIEDEL
DEUTSCHES RECHENZENTRUM

SHARE PROGRAM NUMBER 3400

DATE WRITTEN: 11/64

DATE(S) REVISED
11/18/65 - GM

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK ZFHELP)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'HERE'
FUNCTION 'HERE'

PURPOSE
GET TERMINAL ID FOR THIS JOB

FUNCTIONAL CATEGORIES: QO

USAGE
CALL HERE (I)
VARIABLE = HERE (I)

DESCRIPTION OF PARAMETERS
I - WILL CONTAIN THE TERMINAL ID, LEFT-JUSTIFIED,
ZERO-FILLED (ILC = CENTRAL SITE)
WHEN USED AS A FUNCTION, 'HERE' WILL CONTAIN THE SAME AS 'I'. 'VARIABLE' AND 'HERE' MUST BE OF THE SAME TYPE.

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND SHIFT
OTHERS
RCPA - READ CONTROL POINT AREA
UNHEX3 - CONVERT 2-CHAR DISPLAY CODE TO 3-CHAR HEX

ARITHMETIC STATEMENT FUNCTIONS
L25FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV EXTENDED

METHOD
THE TERMINAL ID IS TAKEN FROM CONTROL POINT AREA.
IF THIS FIELD IS ZERO, IT IS A CENTRAL SITE JOB. IN THIS CASE, ILC IS RETURNED.

CM REQUIRED: 31B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/05/75

DATE(S) REVISED
10/01/78 - CHANGE FOR 3-CHARACTER TERMINAL ID

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'HEX3'

PURPOSE
SQUEEZE 3-CHARACTER HEX INTO 12 BITS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'HEX3' IS AN INTEGER FUNCTION.
WRITTEN TO CHANGE USER-SUPPLIED 3-CHARACTER HEX TERMINAL ID
TO THE FORM NEEDED BY THE CALLABLE ROUTE.

USAGE
I = HEX3 (HEXVAL)

DESCRIPTION OF PARAMETERS
HEXVAL - INPUT HEX VALUE (E.G., 3LF04)
HEX3 - OUTPUT IN FIRST 2 CHARACTERS (E.G., 2L!D)

CM REQUIRED: 60B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
R11FMT R12FMT R13FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'IAOC'

PURPOSE
COUNT ONE-BITS IN SPECIFIED WORD

FUNCTIONAL CATEGORIES: G6

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
NONE

USAGE
N = IAOC (I)

DESCRIPTION OF PARAMETERS
I - WORD TO BE PROCESSED
IAOC - NUMBER OF ONE-BITS

CM REQUIRED: 2B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE:
NONE
OTHERS:
NONE

AUTHOR
FROM NWL

DATE WRITTEN:

DATE(S) REvised:

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT

EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'IBL'
FUNCTION 'IBL'

PURPOSE
CALCULATE BEST BLOCK LENGTH (MIN TIME REQ'D FOR RANDOM
ACCESS AND MINIMUM BUFFER SIZE) FOR INDEX SEQUENTIAL FILES

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV

REMARKS
THIS SUBROUTINE CALCULATES BEST BLOCK LENGTHS FOR INDEX SEQ
FILES BASED ON EITHER VALUES ESTABLISHED IN A FIT OR A SIX
WORD TABLE. IF INPUT IS A FIT, THIS ROUTINE WILL SET FIT
FIELDS MBL AND IBL TO THE VALUE IT CALCULATES. A SHORT
(5 LINE) REPORT CAN BE PRINTED DEPENDING ON THE VALUE OF
THE SECOND PARAMETER PASSED TO IBL.

SEVERAL ASSUMPTIONS ARE MADE IN DERIVING THE FORMULA THIS
SUBROUTINE USES. AMONG THESE ARE:

1. GENERAL INDEX-SEQ PROCESSING IS ASSUMED.
   IF THE FILE IS PROCESSED RANDOMLY ONLY, FILE ORGANIZA-
   TIONS OTHER THAN INDEX-SEQ PROVIDE BETTER PERFORMANCE.
   IF THE FILE IS ACCESSED HEAVILY SEQUENTIALLY THIS
   CALCULATION MAY NOT PROVIDE THE OPTIMUM SIZE.

2. EQUAL LENGTH DATA AND INDEX BLOCKS ARE ASSUMED TO ALLOW
   SHARING OF BUFFER AREAS.

3. BLOCK SIZE SHOULD BE OF MINIMAL LENGTH WHICH ALLOWS THE
   FILE TO BE FILLED TO CAPACITY INCLUDING PADDING.

4. BUFFER SPACE IS KEPT NEARLY MINIMAL AND RANDOM ACCESS
   TIME IS KEPT NEARLY MINIMAL.

THE ROUTINE IS BASED ON AN ARTICLE PUBLISHED IN CONTROL

THE ROUTINE CANNOT BE USED IF RESULTING BLOCK LENGTH IS
SMALLER THAN MAX REC LENGTH. IT SHOULD NOT BE USED IF
RECORD TRUNCATION RESULTS IN EXCESSIVE PADDING IN THE
DATA BLOCKS.

THE TIMINGS IN THE OUTPUT REPORT ARE BASED ON THE
ASSUMPTION OF:

ACCESS TIME (POSITION + LATENCY) = 30 MS
TRANSFER TIME = 1 MS/PRU
CP TIME TO PROCESS THE REQUEST = 1 MS

SO TOTAL TIME = 1 + (NO. INDEX LEVELS)*(30+NPRUS)
USAGE

FORTRAN CALLING SEQUENCES
CALL IBL (FIT, IFLAG)
IBLKSZ = IBL (FIT, IFLAG)

COBOL CALLING SEQUENCE
ENTER IBL USING FIT, IFLAG.

FIT - FILE INFORMATION TABLE -OR-
A SIX-WORD INTEGER ARRAY CONTAINING:
  FLM MAX RECORDS IN THE FILE
  RL AVERAGE RECORD LENGTH
  KL KEY LENGTH
  IP INDEX PADDING PERCENT
  DP DATA PADDING PERCENT
  MRL MAX RECORD LENGTH

IFLAG - PRINTOUT FLAG
  "Y" - PRINT 5-LINE REPORT
  OTHER - DO NOT PRINT

IBL - WHEN USED AS A FORTRAN FUNCTION, IBL RETURNS
THE COMPUTED BLOCK SIZE

CM REQUIRED: 363B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
  IFETCH STOREF
OTHERS
  NONE

AUTHOR
ACQUIRED FROM AUTHOR OF CDC PSI ARTICLE
MODIFIED BY BRUCE D. BLACK - DTNSRDC CODE 1892.1 (ICDC)

DATE WRITTEN: 04/03/78

DATE(S) REVISED
04/03/78 - ADD OPTION TO TURN OFF PRINT OF REPORT

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'IBUNP'

PURPOSE
UNPACK 12-BIT BYTES FROM ARRAY

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
NONE

USAGE
CALL IBUNP (A1, A2, N)

DESCRIPTION OF PARAMETERS
A1 - INPUT ARRAY FROM WHICH BYTES ARE UNPACKED
A2 - OUTPUT ARRAY INTO WHICH BYTES ARE PLACED, 1 BYTE PER WORD, RIGHT JUSTIFIED, WITH LEADING ZEROS
N - NUMBER OF CDC WORDS TO UNPACK
   DIMENSION OF A1 IS N
   DIMENSION OF A2 IS 5*N

CM REQUIRED: 12B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
FROM NWL

DATE WRITTEN:

DATE(S) REVISED:

LOCATION OF DECKS
SOURCE

UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/23/77  2-101  IBUNP - 1 OF 1
FUNCTION 'IDAYWEK'

PURPOSE
Determine the day of the week for any date from 10/15/1582 thru 02/28/4000

FUNCTIONAL CATEGORIES: G6

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
IDAY = IDAYWEK (IDATE, ICENT)
IDAY = IDAYWEK (IDATE)

DESCRIPTION OF PARAMETERS
IDATE - Date to be processed ('MM/DD/YY' or 'MM/DD/YY' or 'MM/DD/YY')
        (If IDATE = 0, today's date will be used; IDATE will be set to today's date 'MM/DD/YY')

ICENT - Century (e.g., 1900)
        If omitted, 1900 is assumed.

IDAYWEK - Will contain the day of the week in a-format (e.g., 'SUNDAY')

CM REQUIRED: 104B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE AND DATE LOCF SHIFT
OTHERS
WEKDAY - Determine day of week

ARITHMETIC STATEMENT FUNCTIONS
FAST I-FORMAT DECODE
  I21FMT  I24FMT  I27FMT
FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
  L11FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/06/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'IDID'
FUNCTION 'IDID'

PURPOSE
GET USER INITIALS (AND INTERCOM USER ID) FROM CHARGE CARD
OR LOGIN

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
IF USER INITIALS AND USER ID ARE EQUAL, IT IS A BATCH JOB.

USAGE
CALL IDID (ID, IUSERID)
CALL IDID (ID)
IID = IDID (ID, IUSERID)
IID = IDID (ID)

DESCRIPTION OF PARAMETERS
ID - WILL CONTAIN 4-CHARACTER USER INITIALS FROM
    CHARGE CARD OR START OF LOGIN
IUSERID - WILL CONTAIN 4-CHARACTER USER INITIALS FROM
    CHARGE CARD OR UP TO 10-CHARACTER USER ID
    FROM LOGIN
    (IF ID = IUSERID, IT IS A BATCH JOB)
    WHEN USED AS A FUNCTION, THE CONTENTS OF ID IS ALSO RETURNED
    AS THE FUNCTION VALUE.

CM REQUIRED: 27B

METHOD
THE ID IS TAKEN FROM THE CONTROL POINT AREA.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
L41FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/28/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

11/27/79 2-103 IDID - 1 OF 1
FUNCTION 'IDIGIT'

PURPOSE
CHECK FOR DIGITS IN A FIELD WITHIN A WORD

FUNCTIONAL CATEGORIES: M5

USAGE
IDIGIT (I, ISTART, ISTOP)
IDIGIT (I, ISTART)
IDIGIT (I)

DESCRIPTION OF PARAMETERS
I - WORD TO BE ANALYZED
ISTART - STARTING POSITION OF FIELD TO BE CHECKED
(1-10, DEFAULT: 1)
ISTOP - STOP POSITION OF FIELD TO BE CHECKED
(1-10, DEFAULT: 10)
(TeSting will stop if 00B encountered)

REMARKS
THE VALUE RETURNED IS ONE OF THE FOLLOWING:
-11 - ERROR - ISTOP < ISTART
-N - ERROR - START NON-DIGIT FOUND IN POSITION N
0 - ALL POSITIONS IN FIELD ARE DIGITS
+N - 00B FOUND IN POSITION N
ALL PRECEDING CHARACTERS ARE DIGITS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
MAXO
MIND
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 76B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/13/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-104 IDIGIT - 1 OF 1
SUBROUTINE 'IFINDCH'
FUNCTION 'IFINDCH'

PURPOSE
FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV

USAGE
CALL IFINDCH (A, NA, CHAR, NC, NW)
NC = IFINDCH (A, NA, CHAR, NC, NW)
NC = IFINDCH (A, NA, CHAR)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SEARCHED
NA - NUMBER OF WORDS IN 'A' TO BE SEARCHED
CHAR - CHARACTER TO BE SEARCHED FOR (IR FORMAT)
NC - OUTPUT POSITION OF FIRST OCCURRENCE OF CHAR IN 'A'
     (IF NO MATCH, ZERO (0) IS RETURNED)
NW - OUTPUT SUBSCRIPT OF WORD IN 'A' CONTAINING CHAR
     (IF NO MATCH, NW IS SET TO NA)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
    LOCF
    OTHERS
    GETCHA - GET CHARACTER FROM ARRAY

CM REQUIRED: 100B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892 2

DATE WRITTEN: 04/20/76

DATE(S) REVISED
11/02/76 - CHANGE TO FUNCTION AND SUBROUTINE

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'IFMTV'

PURPOSE
FAST I-FORMAT DECODE OF VARIABLE LENGTH INPUT (UNSIGNED, POSITIVE INTEGER)

FUNCTIONAL CATEGORIES: 14

USAGE
IFMTV (I)

DESCRIPTION OF PARAMETER
I - SINGLE WORD CONTAINING NUMBER TO BE DECODED:
1-10 DIGITS, LEFT-JUSTIFIED, ZERO-PADDED:
A NON-DIGIT EMBEDDED IN THE FIELD WILL RETURN -1
(EG. 3L987 WILL RETURN THE INTEGER 987;
6L97654 WILL RETURN -1 (EMBEDDED BLANK))

REMARKS
USEFUL IN DECODING INTGERS PASSED AS ARGUMENTS IN THE EXECUTE STATEMENT FOR A FTN PROGRAM.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

LANGUAGE: FORTRAN IV EXTENDED
CM REQUIRED: 27B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/74
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'IHMS'

PURPOSE
CONVERT SECONDS TO ' HH.MM.SS.'

FUNCTIONAL CATEGORIES: M2

USAGE
IHMS (ISEC)

DESCRIPTION OF PARAMETER
ISEC - TIME (IN SECONDS) TO BE CONVERTED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
OR SHIFT
OTHERS
NONE

CM REQUIRED: 44B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/08/74

DATE(S) REVISED

07/16/76

2-107

IHMS - 1 OF 1
FUNCTION 'IPAKLFT'

PURPOSE
SQUEEZE LEFT AND REMOVE ZEROS (00B) AND BLANKS (55B), RETURN
NUMBER OF CHARACTERS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
IF ANY BLANKS OR ZEROS WERE REMOVED, THE ARRAY IS PADDED
WITH TRAILING ZEROS

USAGE
NCHAR = IPAKLFT (A)
NCHAR = IPAKLFT (4, NA)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
NA - NUMBER OF WORDS TO BE PROCESSED
     (OMITTED = 1)
IPAKLFT - NUMBER OF NON-BLANK (NON-ZERO) CHARACTERS AFTER
     PROCESSING

CM REQUIRED: 107B

EXAMPLE
DIMENSION A(3)
DATA A/"THIS IS A SAMPLE FIELD"/
NCHAR = IPAKLFT (A, 3)

AFTER EXECUTION: 'A' = 18L'THISISASAMPLEFIELD'. IPAKLFT = 18

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
GETCH4 - GET A CHARACTER
PUTCH4 - PUT A CHARACTER

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/25/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'IROMAN'

PURPOSE
CONVERT ROMAN NUMBERS TO INTEGER

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

REMARKS
VALIDITY OF THE ROMAN NUMBER IS NOT CHECKED. INVALID ROMAN NUMERALS ARE IGNORED. ROMAN NUMBER ENDS WHEN FIRST BLANK OR OOB IS ENCOUNTERED.

USAGE
IVAR = IROMAN (NUMBER)

DESCRIPTION OF PARAMETERS
IROMAN - WILL CONTAIN INTEGER EQUIVALENT OF SUPPLIED ROMAN NUMBER
NUMBER - ROMAN NUMBER TO BE CONVERTED

CM REQUIRED: 1316

EXAMPLES
MCMLXXVI WILL RETURN THE INTEGER 1976
1
1
1
1
1
ETC.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
GETCHA - EXTRACT CHARACTER FROM AN ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/02/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'ISEC'
PURPOSE
   CONVERT HH.MM.SS TO SECONDS
FUNCTIONAL CATEGORIES:  M2
USAGE
   ISEC (ITIME)
DESCRIPTION OF PARAMETER
   ITIME - TIME TO BE CONVERTED (MAY BE 'HH.MM.SS.', 'HH.MM.SS.', OR 'HH.MM.SS')
REMARKS
   NONE
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE AND SHIFT
   OTHERS
   NONE
ARITHMETIC STATEMENT FUNCTIONS
   FAST I-FORMAT DECODE
      I21FMT  I24FMT  I27FMT
   FAST L-FORMAT DECODE (LEFT-ADJ. ZERO-FILLED)
      L11FMT
CM REQUIRED: 40B
AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2
DATE WRITTEN: 05/01/74
DATE(S) REVISED
LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL.ID=CSYS
      OBJECT
      EDITLIB USER LIBRARY: NSRDC
FUNCTION 'ISITCNF'
PURPOSE
SEE IF SPECIFIED FILE IS CONNECTED
FUNCTIONAL CATEGORIES: Q0
USAGE
ISITCNF (I)
DESCRIPTION OF PARAMETER
I - FILE TO BE CHECKED (EG, 5LTape)
REMARKS
THE FILE BEING TESTED MUST BE OPENED BEFORE USING THIS FUNCTION. FOR FORTRAN LFN'S, THIS IS ACCOMPLISHED BY ANY I/O OPERATION OR CALL CONNEC OR CALL DISCON.

THE VALUE RETURNED WILL BE ONE OF:
+1 - FILE IS CONNECTED
0 - FILE IS NOT CONNECTED
-1 - ERROR - FILE NOT FOUND
-2 - ERROR - I = 0

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
MFETCH - GET SPECIFIED WORD IN USER'S FIELD LENGTH

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

METHOD
BIT 44 OF WORD 10 (11TH WORD) OF FIT IS EXTRACTED.

CM REQUIRED: 54B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/02/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77
2-111
ISITCNF - 1 OF 1
FUNCTION 'ISTAPE'

PURPOSE
GENERATE TAPE NAME 'TAPEN11'

FUNCTIONAL CATEGORIES: M4

USAGE
NAME = ISTAPE (NN)

DESCRIPTION OF PARAMETERS
NAME - RESULTANT DISPLAY CODE NAME 'TAPENN'
(LEFT-JUSTIFIED, ZERO-FILLED)
(5LTAPEN OR 6LTAPEN)
NN - FORTRAN LOGICAL UNIT NUMBER

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 CP COMPASS
CM REQUIRED: 23B

AUTHOR
NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'ISUMIT'

PURPOSE
SUM ELEMENTS OF INTEGER ARRAY

FUNCTIONAL CATEGORIES: A1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
ITOTAL = ISUMIT (IARRAY, N)

DESCRIPTION OF PARAMETERS
ISUMIT - WILL CONTAIN IARRAY(1)+IARRAY(2)+...+IARRAY(N)
IARRAY - ARRAY TO BE SUMMED
N - NUMBER OF ELEMENTS OF IARRAY TO BE SUMMED

CM REQUIRED: 16B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/23/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77  2-113  ISUMIT - 1 OF :
SUBROUTINE 'JGDATE'

PURPOSE
CONVERT ANY GREGORIAN DATE TO A RELATIVE JULIAN DATE OR VICE VERSA (FOR MULTI-YEAR COMPUTATIONS)

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
JG=1 IS VALID FOR ANY GREGORIAN DATE PRODUCING A RELATIVE JULIAN DATE GREATER THAN ZERO.

THIS SUBROUTINE IS USEFUL IN DETERMINING THE ELAPSED NUMBER OF DAYS BETWEEN ANY TWO CALENDAR DATES. IT CAN ALSO BE USED TO FIND THE CALENDAR DATE SO MANY DAYS FROM ANY GIVEN DATE.

THE RELATIVE JULIAN DATE CORRESPONDING TO A GREGORIAN DATE HAS MEANING TO THIS SUBROUTINE ONLY. IT REPRESENTS THE NUMBER OF DAYS SINCE 1/24/4713 (EXTRAPOLATING THE GREGORIAN CALENDAR).

SEE ALSO SUBROUTINE 'JULIAN' FOR DAY-OF-YEAR DETERMINATION.

USAGE
CALL JGDATE (JG, JD, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
JG - DIRECTION OF CONVERSION
  1 - GREGORIAN TO RELATIVE JULIAN
  2 - RELATIVE JULIAN TO GREGORIAN
JD - RELATIVE JULIAN DATE (OUT IF JG=1, IN IF JG=2)
IGY - GREGORIAN YEAR (EG, 1975) (IN IF JG=1, OUT IF JG=2)
IGM - GREGORIAN MONTH (1-12) (IN IF JG=1, OUT IF JG=2)
IGD - GREGORIAN DAY (1-31) (IN IF JG=1, OUT IF JG=2)

CM REQUIRED: B7700: CORE: EST 96 WORDS; STACK: EST 3 WORDS
CDC : 71B
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

METHOD

AUTHOR
?

DATE WRITTEN: 1968 OR EARLIER

DATE(S) REVISED
03/01/79 - IMPLEMENT ON B7700

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/JGDATE
CDC : UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
B7700: *NSRDC/JGDATE
CDC : EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'JOBNAME'
FUNCTION 'JOBNAME'

PURPOSE
GET SYSTEM JOB NAME FOR THIS JOB

FUNCTIONAL CATEGORIES: QO

USAGE
CALL JOBNAME (I)
VARIABLE = JOBNAME (I)

DESCRIPTION OF PARAMETERS
JOBNAME - WILL CONTAIN JOB NAME, LEFT-JUSTIFIED,
   ZERO-FILLED (WHEN USED AS FUNCTION)
I - WILL CONTAIN JOB NAME, LEFT-JUSTIFIED,
   ZERO-FILLED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

METHOD
THE JOB NAME IS TAKEN FROM THE FIRST 7 CHARACTERS OF
CONTROL POINT AREA + 25B

CM REQUIRED: 25B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/04/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'JOBORG'
SUBROUTINE 'JOBORG'

PURPOSE
DETERMINE JOB ORIGIN

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
IVAR = JOBORG (I, IA)
IVAR = JOBORG (I)
CALL JOBORG (I, IA)
CALL JOBORG (I)

DESCRIPTION OF PARAMETERS
I - WILL CONTAIN ONE OF THE FOLLOWING:
   1 - IF CALLING JOB IS A BATCH JOB
   2 - FOR REAL TIME JOB
   3 - FOR GRAPHICS JOB
   4 - FOR MULTI-USER JOB
   5 - FOR INTERCOM

IA - IF SPECIFIED, WILL CONTAIN: 'BATCH', 'REAL TIME',
     'GRAPHICS', 'MULTI-USER', OR 'INTERCOM', ACCORDING
     TO THE VALUE OF 'I'.

IF USED AS A FUNCTION, 'JOBORG' WILL RETURN THE SAME VALUE
AS 'I'.

CM REQUIRED: 35B

METHOD
THE INFORMATION IS TAKEN FROM THE CONTROL POINT AREA.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND
OTHERS
RCPA - READ CONTROL POINT AREA

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/07/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-117 JOBORG - 1 OF 1
SUBROUTINE 'JULIAN'

PURPOSE
CONVERT ANY GREGORIAN DATE TO A JULIAN DAY-OF-YEAR OR VICE
VERSA (FOR SINGLE YEAR COMPUTATIONS ONLY)

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS
BURROUGHS B7700
CDC 6000

REMARKS
THE PARAMETER 'IGY' IS ALWAYS INPUT.

IF JG=1 AND (GM<1 OR GM>12 OR GD<1 OR GD>31),
THEN JD IS SET TO ZERO (0).

IF JG=2 AND (JD<1 OR JD>366), THEN GM IS SET TO ZERO (0).

IF JG IS NOT 1 OR 2, THEN JD AND GM ARE SET TO ZERO (0).

SEE ALSO SUBROUTINE 'UGDATE' FOR MULTI-YEAR COMPUTATIONS.

USAGE
CALL JULIAN (JG, JD, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
JG - DIRECTION OF CONVERSION
1 - GREGORIAN TO JULIAN
2 - JULIAN TO GREGORIAN

JD - JULIAN DAY-OF-YEAR (1-366)

IGY - GREGORIAN YEAR (E.G., 1968, ALWAYS INPUT)

IGM - GREGORIAN MONTH (1-12)

IGD - GREGORIAN DAY (1-31)

CM REQUIRED: B7700: CORE: EST 144 WORDS; STACK: EST 5 WORDS
CDC : 137B
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1968

DATE(S) REVISED
04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS
06/21/76
01/11/78
03/01/79 - IMPLEMENTED ON B7700

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/JULIAN
CDC : UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
B7700: *NSRDC/JULIAN
CDC : EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'KUTMER'

PURPOSE
INTEGRATE A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS USING THE KUTTA-MERSON FOURTH-ORDER, SINGLE-STEP Method

FUNCTIONAL CATEGORIES: D2

USAGE
CALL KUTMER (N, T, Y, EPS, H, FIRST, HCX, A)

DESCRIPTION OF PARAMETERS
N - NUMBER OF EQUATIONS (I.E., THE NUMBER OF COMPONENTS IN Y-BAR
T - THE INDEPENDENT VARIABLE, T
Y - THE ARRAY OF DEPENDENT VARIABLES, Y-BAR
EPS - THE RELATIVE ERROR CRITERION FOR EACH STEP, TO BE USED FOR THOSE COMPONENTS OF Y-BAR WHICH ARE GREATER THAN A IN ABSOLUTE VALUE
H - THE INTEGRATION INTERVAL, H
FIRST - WILL HAVE ONE OF THE FOLLOWING SETTINGS:
0 - WHEN KUTMER IS ENTERED FOR THE FIRST TIME, OR IS RE-ENTERED WITH A CHANGED INTERVAL <H>. WHEN KUTMER IS SO ENTERED, <FIRST> IS RESET BY KUTMER TO 1.
1 - WHEN KUTMER IS RE-ENTERED WITH THE SAME INTERVAL <H>, TO CONTINUE AN INTEGRATION SEQUENCE. UNDER THESE CIRCUMSTANCES, KUTMER WILL NOT RESET <FIRST>.
2 - WHEN KUTMER CANNOT MEET THE SPECIFIED ERROR CRITERIA EVEN WHEN THE INTEGRATION STEP HAS BEEN REDUCED TO H/128. KUTMER WILL RESET <FIRST> TO 2 AND PRINT A STATEMENT INDICATING THAT THE ERROR CRITERION COULD NOT BE MET. THEN KUTMER WILL RETURN CONTROL TO THE CALLING PROGRAM.

HCX - IS SET UP BY KUTMER BEFORE EACH RETURN TO THE CALLING PROGRAM. THIS WILL CONTAIN THE MINIMUM STEP SIZE USED DURING THE INTEGRATION OVER THE INTERVAL <H>.

A - AN ABSOLUTE ERROR CRITERION TO BE USED FOR ANY COMPONENT OF Y-BAR WHENEVER IT BECOMES SMALLER IN ABSOLUTE VALUE THAN <A>.


A SUBROUTINE FOR EVALUATING F-BAR(T, Y-BAR) WITH A CALL OF THE FORM
REMARKS

THIS ROUTINE WILL INTEGRATE A SYSTEM OF FIRST-ORDER DIFFERENTIAL EQUATIONS OF THE FORM

\[ \frac{d\vec{y}}{dt} = \vec{f}(t, \vec{y}) \]

GIVEN A SET OF INITIAL CONDITIONS \( t, \vec{y}(t) \), \( t_0 \), \( 0 \) AN INTERVAL H AND A SUBROUTINE FOR EVALUATING \( \vec{f}(t, \vec{y}) \) FOR SPECIFIED VALUES OF \( t \) AND \( \vec{y} \).

THE DIMENSIONS OF THE ARRAYS FOR STORING INTERMEDIATE VALUES OF THE VECTORS \( \vec{f} \) AND \( \vec{y} \) ARE PRESENTLY SET TO 10. THIS CAN BE READILY CHANGED BY CHANGING THE DIMENSION STATEMENT AT THE BEGINNING OF THE SUBROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

ABS

OTHERS

DAUX - USER-SUPPLIED SUBROUTINE TO EVALUATE \( \vec{f} \)

LANGUAGE: FORTRAN IV

METHOD


OUTPUT UNITS

UNIT # LFN USE

OUTPUT ERROR MESSAGE

CM REQUIRED: 335B

AUTHOR

E. CUTHILL - DTNSRDC CODE 1805

DATE WRITTEN: 10/29/64 (FORTRAN VERSION)

DATE(S) REVISED

LOCATION OF DECKS

SOURCE

TAPE LABELLED: CLIBRARYUPD3.D=HY

OBJECT

EDITLIB USER LIBRARY: NSRDC

05/12/76 2-121 KUTMER - 2 OF 2
FUNCTION 'LASTC'

PURPOSE
  DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK
  (NON-ZERO (OOB))

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
  THE WORD IN 'A' WHICH CONTAINING THE LAST NON-BLANK (NON-
  ZERO) CHARACTER IS \( (\text{LASTC}(A,N)+9)/10 \)

USAGE
  \text{LASTC}(A)
  \text{LASTC}(A, N)

DESCRIPTION OF PARAMETERS
  A - ARRAY TO BE SCANNED
  N - NUMBER OF WORDS IN 'A' TO BE PROCESSED
  \text{LASTC} - WILL CONTAIN THE NUMBER OF CHARACTERS IN 'A'
  EXCLUDING TRAILING BLANKS (ZEROS)

CM REQUIRED: 64B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
  LOCF SHIFT
  OTHERS
  NONE

AUTHOR
  DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/06/76

DATE(S) REVISED
  07/25/77 - MAKE PARAMETER 'N' OPTIONAL

LOCATION OF DECKS
  SOURCE
    UPDATE LIBRARY: NSRDCPL.ID=CSYS
  OBJECT
    EDITLIB USER LIBRARY: NSRDC
FUNCTION 'LASTCH'

PURPOSE
DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE WORD IN 'A' WHICH CONTAINS THE LAST NON-BLANK CHARACTER
IS (LASTCH(A,N)+9)/10 (CDC) OR (LASTCH(A,N)+5)/6 (B7700).

USAGE
LASTCH (A, NCHAR)

DESCRIPTION OF PARAMETERS
A     - ARRAY TO BE SCANNED
NCHAR - NUMBER OF CHARACTERS IN 'A' TO BE PROCESSED
LASTCH - WILL CONTAIN THE NUMBER OF CHARACTERS IN 'A'
         EXCLUDING TRAILING BLANKS

CM REQUIRED: 71B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND MOD
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 02/13/79

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
CDC : UPDATE LIBRARY: NSRDCPL,ID=CSYS
B7700: PF: (CSYS) SOURCE/NSRDC/LASTCH

OBJECT
CDC : ETLIB USER LIBRARY: NSRDC
B7700: *NSRDC/LASTCH
FUNCTION 'LASTWRD'

PURPOSE
Determine subscript of last word of array which contains a non-blank

FUNCTIONAL CATEGORIES: M5

USAGE
LASTWRD (A, N)

DESCRIPTION OF PARAMETERS
LASTWRD - will contain subscript of last word of array which contains a non-blank (and non-00)
A - array to be scanned
N - number of words in 'A' to be processed

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
LASTC - find last non-blank/non-00 character in array

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 22B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 03/15/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'LBYT'

PURPOSE
   EXTRACT VARIABLE LENGTH BYTE

FUNCTIONAL CATEGORIES: M4

USAGE
   VARIABLE = LBYT (N, LENGTH, FROM)

DESCRIPTION OF PARAMETERS
   VARIABLE - LOCATION INTO WHICH THE EXTRACTED BYTE IS STORED RIGHT-JUSTIFIED
   N       - STARTING BIT POSITION OF THE BYTE TO BE EXTRACTED. BITS ARE NUMBERED 1-60 FROM RIGHT TO LEFT.
   LENGTH  - LENGTH OF THE BYTE (NUMBER OF BITS)
   FROM    - WORD FROM WHICH THE BYTE IS TO BE EXTRACTED

REMARKS
   EXTRACTS A BYTE OF ANY LENGTH (1-60 BITS) FROM A 60-BIT WORD. THE EXTRACTED BYTE IS THEN STORED RIGHT-JUSTIFIED INTO ANOTHER 60-BIT WORD.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   NONE

EXAMPLE
   STARTING AT THE TWELFTH BIT FROM THE RIGHT OF A WORD, A FOUR-BIT BYTE WILL BE EXTRACTED FROM THE VARIABLE <TAKE> AND STORED IN VARIABLE <ISTORE> IN BIT PLACES 1-4.

   TAKE = 1111 2222 3333 4476 5555B
   ISTORE = LBYT (12, 4, TAKE)

RESULTS IN
   ISTORE = 0000 0000 0000 0000 0016B

   NOTE: BIT POSITIONS 12-15 OF <TAKE> ARE 1 1 1 0.

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 16B

AUTHOR
   FROM CDC KRONOS SYSTEM

DATE WRITTEN:

DATE(S) REVISED:

LOCATION OF DECKS
   SOURCE
   OBJECT

UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT LIBRARY: NSRDC

09/22/77  2:125  LBYT - 1 OF 1
SUBROUTINE 'LEFTADJ'

PURPOSE
SQUEEZE LEFT AND REMOVE BLANKS AND 00B (USER MAY SUPPLY TRAILING FILL CHARACTER)

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE LAST NON-BLANK CHARACTER POSITION AND WORD ARE RETURNED.

USAGE
CALL LEFTADJ (A, NA, LASTC, NW, FILL)
CALL LEFTADJ (A, NA, LASTC, NW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE LEFT JUSTIFIED
NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
LASTC - WILL RETURN THE LAST CHARACTER POSITION WHICH IS NON-BLANK/NON-00B (LEFT-MOST CHARACTER POSITION IS 1)
       (IF ARRAY CONTAINS ONLY BLANKS AND/OR 00B, LASTC IS SET TO 0)
NW - WILL RETURN SUBSCRIPT OF WORD CONTAINING LAST NON-BLANK/NON-00B CHARACTER
       (IF LASTC=0, THEN NW IS SET TO 0)
FILL - OPTIONAL FILL CHARACTER FOR EACH CHARACTER POSITION AFTER LASTC (USE 1R OR 1H FORMAT)
       (IF OMITTED, FILL CHARACTER IS 00B)

CM REQUIRED: 117B

EXAMPLE
DIMENSION A(4)
CONTENTS OF A: 12345 67890 ABCDEFGHIJ
CALL LEFTADJ (A, 4, LASTC, NW)
CONTENTS OF A: 1234567890ABCDEFGHIJ
LASTC IS 20; NW = 2
CALL LEFTADJ (A, 4, LASTC, NW, 1R/)
CONTENTS OF A: 1234567890ABCDEFGHIJ///////////////////////////////////////////////////////
LASTC AND NW ARE THE SAME
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
GETCHA - EXTRACT ONE CHARACTER FROM AN ARRAY
PUTCHA - INSERT ONE CHARACTER INTO AN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
R11FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/02/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'LINE6'

PURPOSE
SET PRINT FILE TO 6 LINES PER INCH

FUNCTIONAL CATEGORIES: J4

USAGE
CALL LINE6 (IOUT)

DESCRIPTION OF PARAMETER
IOUT - OUTPUT UNIT NUMBER (1-99) OR NAME (1-7 CHARACTERS,
LEFT-JUSTIFIED, ZERO-FILLED)

REMARKS
USER SHOULD PRINT HIS NEXT LINE AT THE TOP OF THE NEXT PAGE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNIT
UNIT #   LFN    USE
--------- ------- -----------------------------
IOUT      ------- LISTABLE OUTPUT FILE

CM REQUIRED: 20B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/11/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

06/11/76  2-128  LINE6 - 1 OF 1
SUBROUTINE 'LINE8'

PURPOSE
SET PRINT FILE TO 8 LINES PER INCH

FUNCTIONAL CATEGORIES: J4

USAGE
CALL LINE8 (IOUT)

DESCRIPTION OF PARAMETER
IOUT - OUTPUT UNIT NUMBER (1-99) OR NAME (1-7 CHARACTERS, LEFT-JUSTIFIED, ZERO-FILLED)

REMARKS
USER SHOULD PRINT HIS NEXT LINE AT THE TOP OF THE NEXT PAGE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNIT
UNIT #   LFN   USE
--------   -----   -------------------------------
IOUT       ------- LISTABLE OUTPUT FILE

CM REQUIRED: 20B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/11/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'MACHINE'

PURPOSE
RETURN 4-WORD SYSTEM HEADING

USAGE
CALL MACHINE (ARRAY)

DESCRIPTION OF PARAMETER
ARRAY - 4-ELEMENT ARRAY WHICH WILL CONTAIN THE SYSTEM

FUNCTIONAL CATEGORIES: Q0
HEADING
(E.G., 'NSRDC 6600 NOS/BE 1.2 1+1980330 ')

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: COMPASS
CM REQUIRED: 25B

AUTHOR
NSRDC CODE 1892.3

DATE WRITTEN: 04/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
CODE 1892.3
OBJECT
EDITLIB SYSTEM LIBRARY: NSRDC
FUNCTION 'MASKIT'

PURPOSE
   DYNAMIC MASK GENERATOR

FUNCTIONAL CATEGORIES: MO

USAGE
   MSK = MASKIT (FL1, BIT1, FL2, BIT2, ..., FLN, BITN)

DESCRIPTION OF PARAMETERS
   FL - NUMBER OF BITS
   BIT - STARTING BIT ADDRESS
   BIT ADDRESSES ARE THE RELEVANT POWER OF 2.
   I.E., 59, 58, 57, ..., 2, 1, 0

REMARKS
   MASKIT GENERATES AS ITS FUNCTIONAL VALUE A WORD WITH 'N'
   FIELDS OF BITS SET, EACH FIELD 'FL' BITS LONG, AND STARTING
   AT BIT ADDRESS 'BIT'.

EXAMPLE: TO GENERATE THE MASK
   111000111111111101110000000100010000001111110000011111
   USE THE FOLLOWING:
   MSK = MASKIT (3,59, 11,53, 3,41, 1,29, 1,25, 6,17, 6,5)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
   NONE
   OTHERS
   NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 16B

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 07/70

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
   UPDATE LIBRARY: NSRDCPL.ID=CSYS
   OBJECT
   EDITLIB USER LIBRARY: NSRDC

08 22/77  2-131  MASKIT - 1 OF 1
SUBROUTINE 'MATINS'

PURPOSE
   MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF SIMULTANEOUS
   EQUATIONS AND DETERMINANT

FUNCTIONAL CATEGORIES: F4 F1 F3

LANGUAGE: FORTRAN IV

COMPUTERS
   CDC 6000
   BURROUGHS B7700

REMARKS
   TESTS FOR LOSS OF DIGITS DUE TO SUBTRACTION.
   TO SCALE THE DETERMINANT, ROUTINE MUST BE RECOMPILED TO OMIT
   INTERNAL 'DETERM = 1.' IN THIS CASE, PARAMETER 'DETERM' IS
   THE INPUT SCALING FACTOR AS WELL AS THE OUTPUT DETERMINANT.

USAGE
   CALL MATINS (A, NR, N1, B, NC, M1, DETERM, ID, INDEX)

DESCRIPTION OF PARAMETERS
   A   - INPUT MATRIX (NR X NR)
         (WILL BE REPLACED BY INVERSE OF 'A')
   NR  - REFERS TO CALLING PROGRAM DIMENSIONS:
         # ROWS IN 'A': # COLUMNS IN 'A':
         # ROWS IN 'B': # ROWS IN 'INDEX'
   N1  - ORDER OF 'A'
         (ACTUAL SIZE OF 'A' BEING USED)
   B   - COLUMN VECTORS
         (WILL BE REPLACED BY CORRESPONDING SOLUTION
          VECTORS)
   NC  - REFERS TO CALLING PROGRAM DIMENSIONS:
         # COLUMNS IN 'B'
   M1  - NUMBER OF ACTUAL COLUMN VECTORS IN 'B'
         (MAY BE 0)
   DETERM - OUTPUT DETERMINANT
   ID   - OUTPUT CODE
         1 - INVERSE SUCCESSFUL
         2 - MATRIX 'A' SINGULAR
   INDEX - WORKING STORAGE ARRAY OF DIMENSION (NR X 3)

NOTE: N1 <= NR: M1 <= NC

CM REQUIRED: CDC 6000: 356B
               B7700: EST 286 WORDS

METHOD
   PIVOT METHOD - GAUSS-JORDAN
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS
OTHERS
NONE

AUTHORS
ANF402 FROM SHARE
SHARON E GOOD - DTNSRDC CODE 1892.1
C R NEWMAN - NOL

DATE WRITTEN: 11/71

DATE(S) REVISED
07/26/77 - ADD CRN CODING (SEG)

LOCATION OF DECKS
SOURCE
CDC 6000: TAPE LABELLED: CLIBRARYUPD3
B7700 : *SOURCE/NSRDC/MATINS

OBJECT
CDC 6000: EDITLIB USER LIBRARY: NSRDC
B7700 : *NSRDC/MATINS
SUBROUTINE 'MAXE'
FUNCTION 'MAXE'
FUNCTION 'AMAXE'

PURPOSE
FIND MAXIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORIES: M5

USAGE
CALL MAXE (ARRAY, ISIZE, AMAXV)

MAXV = MAXE (IARRAY, ISIZE)
AMAXV = AMAXE (ARRAY, ISIZE)

DESCRIPTION OF PARAMETERS
ARRAY - REAL ARRAY TO BE PROCESSED
IARRAY - INTEGER ARRAY TO BE PROCESSED
ISIZE - LENGTH OF ARRAY/IARRAY
AMAXV - REAL MAXIMUM RETURNED IN SUBROUTINE

REMARKS
FUNCTION MAXE HAS INTEGER INPUT AND OUTPUT.
FUNCTION AMAXE HAS REAL INPUT AND OUTPUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS
CM REQUIRED: 14B

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 11/22/70
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77
2-134
MAXE - 1 OF 1
SUBROUTINE 'MEMUSED'

PURPOSE
PRINT MESSAGE IN DAYFILE GIVING FIELD LENGTH IN USE AT TIME OF CALL TO THIS ROUTINE

FUNCTIONAL CATEGORIES: QO

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
THIS ROUTINE ISSUES A MEMORY MACRO REQUEST TO DETERMINE FIELD LENGTH AND PRINTS A MESSAGE IN THE DAYFILE OF THE FORM:

FIELD LENGTH IN USE (OCTAL) = XXXXXX

IT MIGHT BE OF INTEREST TO USERS WITH PROGRAMS WHICH MANAGE FIELD LENGTH DYNAMICALLY ABOVE THAT SHOWN IN THE NORMAL LOAD MAP (SUCH AS FILE BUFFER SPACE IN COBOL PROGRAMS).

USAGE
CALLED FROM COBOL PROGRAM
ENTER MEMUSED.

CALLED FROM FTN PROGRAM
CALL MEMUSED

CM REQUIRED: 30B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE

OTHERS
NONE

AUTHOR
BRUCE D. BLACK - DTNSRDC CODE 1892.1 (CDC)

DATE WRITTEN: 04/07/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

04/10/'78  2-135  MEMUSED - 1 OF 1
FUNCTION 'MFETCH'

PURPOSE
   FETCH A SINGLE WORD (BY ABSOLUTE ADDRESS) FROM USER'S FL

FUNCTIONAL CATEGORIES: K2

USAGE
   MFETCH (ADDR)

DESCRIPTION OF PARAMETER
   ADDR - ADDRESS IN USER'S FL TO BE FETCHED

REMARKS
   'MFETCH' IS AN ENTRY POINT IN 'CMDRCT'.
   NO ERROR CHECKING IS DONE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 11B (INCLUDES 'MSET')

AUTHOR
   ? - NWL

DATE WRITTEN:

DATE(S) REVISED:

LOCATION OF DECKS
SOURCE
   UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
   EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'MFRAME'

PURPOSE

OBTAIN THE MACHINE AND MAINFRAME RUNNING THE PROGRAM

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS

BURROUGHS B7700

CDC 6000

REMARKS

NONE

USAGE

CALL MFRAME (CPU, MF)

DESCRIPTION OF PARAMETER

CPU - WILL RETURN MACHINE ON WHICH THE PROGRAM IS RUNNING

(LEFT-ADJ, BLANK-FILLED)

(WILL RETURN ONE OF:

"6700", "6600", "6400", "CY74", "B7700")

MF - WILL RETURN MAINFRAME ON WHICH THE PROGRAM IS RUNNING

(LEFT-ADJ, BLANK-FILLED)

(WILL RETURN ONE OF:

"MFA", "MFB", "MFC", "MFD", "MFZ")

CM REQUIRED: CDC : 76B

B7700: EST 41 WORDS

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

AND OR SHIFT

OTHERS

MACHINE - GET SYSTEM MACHINE INFORMATION

ARITHMETIC STATEMENT FUNCTIONS

A38FMT0 - FAST A-FORMAT DECODE (LEFT-ADJ, BLANK-FILLED)

(INSERT 0 AFTER 3RD CHARACTER)

AUTHOR

DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/15/79

DATE(S) REVISED

08/15/80 - ADD "CY74" FOR CYBER 74

LOCATION OF DECKS

SOURCE

CDC : UPDATE LIBRARY: NSRDCPL.ID=CSYS

B7700: *SOURCE/NSRDC/MFRAME

OBJECT

CDC : EDITLIB USER LIBRARY: NSRDC

B7700: *NSRDC/MFRAME

12.11/80  2:137  MFRAME - 1 OF 1
SUBROUTINE 'MINE'
FUNCTION 'MINE'
FUNCTION 'AMINE'

PURPOSE
    FIND MINIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORIES: M5

USAGE
    CALL MINE (ARRAY, ISIZE, AMINV)
    
    MINV = MINE (ARRAY, ISIZE)
    AMINV = AMINE (ARRAY, ISIZE)

DESCRIPTION OF PARAMETERS
    ARRAY - REAL ARRAY TO BE PROCESSED
    ISIZE - LENGTH OF ARRAY/ARRAY
    AMINV - REAL MINIMUM RETURNED IN SUBROUTINE

REMARKS
    FUNCTION MINE HAS INTEGER INPUT AND OUTPUT.
    FUNCTION AMINE HAS REAL INPUT AND OUTPUT.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
    PART OF LANGUAGE
      NONE
    OTHERS
      NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 14B

AUTHOR
    C FLINK - KPS NWL

DATE WRITTEN: 11/22/70

DATE(S) REVISED

LOCATION OF DECKS
    SOURCE
      UPDATE LIBRARY: NSRDCPL, ID=CSYS
      OBJECT
        EDITLIB USER LIBRARY: NSRDC

08/22/77  2-138  MINE - 1 OF 1
SUBROUTINE 'MONTH'

PURPOSE
FROM A DATE (MM/DD/YY) FIND THE MONTH AND RETURN FULL SPELLING AND 3- OR 4-CHARACTER ABBREVIATION

FUNCTIONAL CATEGORIES: M2

USAGE
CALL MONTH (DATE, MONTH, MM)

DESCRIPTION OF PARAMETERS
DATE - DATE TO BE PROCESSED ('MM/DD/YY ', 'MM/DD/YY' OR 'MM/DD/YY')
IMONTH - WILL CONTAIN THE MONTH (COMPLETE SPELLING)
MM - WILL CONTAIN THE MONTH (3- OR 4-CHARACTER ABBREVIATION)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
I21FMT - FAST I-FORMAT DECODE
L11FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 63B

AUTHOR
DAVID V SMOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/21/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

07/21/76
SUBROUTINE 'MOVCHAR'

PURPOSE
MOVE ONE CHARACTER FROM ONE STRING TO ANOTHER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL MOVCHAR (FROM, FROM COL, TO, TO COL)

DESCRIPTION OF PARAMETERS
FROM - ARRAY CONTAINING STRING FROM WHICH THE CHARACTER
       IS TO BE EXTRACTED
FROM COL - POSITION OF CHARACTER IN FROM
           (1 IS LEFTMOST POSITION)
TO - ARRAY TO WHICH THE CHARACTER IS TO BE MOVED
TO COL - POSITION OF CHARACTER IN TO
           (1 IS LEFTMOST POSITION)

CW REQUIRED: 35B

EXAMPLE
BEFORE: FROM=THIS IS A CHARACTER STRING.
TO =THIS IS ANOTHER STRING
CALL MOVSTR (FROM, 27, TO, 23)
AFTER : TO =THIS IS ANOTHER STRING.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE AND MOD OR SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/14/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

11/14/77  2-140  MOVCHAR - 1 OF 1
SUBROUTINE 'MOVECM'

PURPOSE
MOVE WORDS FROM ONE AREA IN CORE TO ANOTHER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 CP COMPASS

REMARKS
'MOVECM' IS ABOUT 20 PERCENT FASTER THAN THE FTN-SUPPLIED
'MOVLEV'. IT MOVES 4 WORDS AT A TIME (INSTEAD OF 2) AND
DOES NOT REQUIRE AT LEAST ONE CM WORD BETWEEN THE SENDING
AND RECEIVING FIELDS.

AT SPEED, 'MOVECM' MOVES ABOUT 2 WORDS PER MICROSECOND.

USAGE
CALL MOVECM (FWA, LWA, NEW FWA)

DESCRIPTION OF PARAMETERS
FWA - FIRST WORD ADDRESS OF SENDING FIELD
LWA - LAST WORD ADDRESS OF SENDING FIELD
NEW FWA - FIRST WORD ADDRESS OF RECEIVING FIELD

(MOVE MEMORY WORDS BEGINNING AT FWA AND ENDING AT LWA
TO A BLOCK STARTING AT NEW FWA.)

CM REQUIRED: 206

EXAMPLE
MOVE ARRAY 'A' TO ARRAY 'B':
....
DIMENSION A(100), B(100)
....
CALL MOVECM (A(1), A(100), B(1))
....

METHOD
WORDS ARE MOVED 4 AT A TIME, UNLESS FEWER THAN 4 REMAIN TO
BE MOVED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

AUTHOR
EXTRACTED FROM 'NETED', THE TEXT EDITOR FROM ED FOURT OF
LAWRENCE BERKLEY LABS

DATE WRITTEN:

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

10/27/77 2-141 MOVECM: 1 OF
SUBROUTINE 'MOVEIT'

PURPOSE
MOVELEV REPLACEMENT WHICH CALLS MOVECM

FUNCTIONAL CATEGORIES: K2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

REMARKS
AT NOS/BE LEVEL 461, THE FTN SUBROUTINE 'MOVLEV' USES
CMM, WHICH CAN CAUSE PROBLEMS WITH PROGRAMS MOVING INTO
PROGRAM-EXTENDED FL. SUBROUTINE 'MOVECM' IS A MUCH FASTER
ROUTINE WHICH DOES NOT USE CMM, HOWEVER, IT HAS A DIFFERENT
CALLING SEQUENCE. 'MOVEIT' IS A TRANSITIONAL SUBROUTINE.
IT HAS THE SAME CALLING SEQUENCE AS 'MOVLEV' BUT CALLS
'MOVECM'. IT TAKES A LITTLE LONGER TO EXECUTE THE MOVE
BECAUSE IT INVOLVES TWO (2) CALLS, BUT THE CALLING SEQUENCE
MAY BE MOVE MEANINGFUL AND EASIER TO USE.

USAGE
CALL MOVEIT (FROM, TO, NWORDS)

DESCRIPTION OF PARAMETERS
FROM - ARRAY TO BE MOVED
TO - RECEIVING ARRAY
NWORDS - NUMBER OF WORDS TO BE MOVED

CM REQUIRED: 20B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
MOVECM - MOVE AN ARRAY 4 WORDS AT A TIME

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/16/79

DATE ISI REVISED
07/15/80 - MOVE TO NSRDC

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'MOVSTR'

PURPOSE
MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL MOVSTR (FROM, IFROM, TO, ITO, LEN, IRC)
CALL MOVSTR (FROM, IFROM, TO, ITO, LEN)

DESCRIPTION OF PARAMETERS
FROM - ARRAY FROM WHICH STRING IS TO BE EXTRACTED
IFROM - STARTING POSITION OF STRING TO BE EXTRACTED
  (POSITION 1 IS LEFT-MOST CHARACTER OF FROM(1))
TO - ARRAY TO RECEIVE THE STRING
ITO - STARTING POSITION TO INSERT THE STRING
  (POSITION 1 IS LEFT-MOST CHARACTER ON TO(1))
LEN - NUMBER OF CHARACTERS IN STRING TO BE MOVED
IRC - OPTIONAL ERROR RETURN CODE
  0 - NO ERROR, STRING MOVED
  1 - IFROM LE 0
  2 - ITO LE 0
  3 - LEN LE 0

CM REQUIRED: 71B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
  AND LOCF MOD OR SHIFT
  NONE

EXAMPLE
  FROM: ABCDEFGHIJKLMNOPQRSTUVWXYZ  TO: ***************
  AFTER CALL MOVSTR (FROM, 5, TO, 12, 4, IRC)
  FROM: ABCDEFGHIJKLMNOPQRSTUVWXYZ  TO: **********EFGH*****
  IRC : 0

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/04/76

DATE(S) REVISED
04/04/77 - MAKE IRC OPTIONAL

LOCATION OF DECKS
SOURCE
  UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
  EDITLIB USER LIBRARY: NSRDC

04/04/77  2-143  MOVSTR - 1 OF 1
SUBROUTINE 'MSET'

PURPOSE
SET A SINGLE WORD (BY ABSOLUTE ADDRESS) IN USER'S FL

FUNCTIONAL CATEGORIES: K2

USAGE
CALL MSET (ADDR, NEW)

DESCRIPTION OF PARAMETERS
ADDR - ADDRESS IN USER'S FL TO BE SET
NEW - WORD TO BE PUT INTO 'ADDR'

REMARKS
'MSET' IS AN ENTRY POINT IN 'CMDRCT'.
NO ERROR CHECKING IS DONE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

LANGUAGE: CDC 6000 COMPASS
CM REQUIRED: 11B (INCLUDES 'MFETCH')

AUTHOR
? - NWL:

DATE WRITTEN:

DATE(S) REVISED:

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'MXGET'

PURPOSE
  EXTRACT (RIGHT-JUSTIFIED, ZERO-FILLED) 0-10 6-BIT
  CHARACTERS FROM 60-BIT WORDS

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
  CDC 6000

REMARKS
  NONE

USAGE
  MXGET (WORD, START, NCHAR)

DESCRIPTION OF PARAMETERS
  WORD - WORD FROM WHICH CHARACTERS ARE TO BE EXTRACTED
  START - STARTING CHARACTER
           (LEFT-MOST CHARACTER IS POSITION 1)
  NCHAR - NUMBER OF CHARACTERS TO EXTRACT (0-10)
  MXGET - WILL CONTAIN ONE OF:
           -1 -- START OR NCHAR OR START-NCHAR INVALID
           0 -- IF NCHAR IS 0
           XXX -- EXTRACTED CHARACTER STRING, R-FORMAT

CM REQUIRED: 26B

EXAMPLES
  1) EXTRACT CHARACTERS 3-7 FROM A WORD CONTAINING
     'ABCDEFGHIJ':
     DATA WORD/ "ABCDEFGHIJ"/
     . . .
     ICHARS = MXGET (WORD, 3, 5)
     ICHARS WILL CONTAIN 'CDEFGH' (0000 0000 0003 0405 0607B)
  2) EXTRACT 'THIS' FROM 'THISSTRING':
     DATA IWORD/ "THISSTRING"/
     . . .
     IF (MXGET(IWORD, 1, 4) .EQ. 4RTHIS) . . .

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
  AND SHIFT
  OTHERS
    NONE

10/17/79 2-145 MXGET - 1 OF 2
SUBROUTINE 'NEWDAT'

PURPOSE
ADD/SUBTRACT SPECIFIED NUMBER OF DAYS TO/FROM A GIVEN DATE

FUNCTIONAL CATEGORIES: M2

USAGE
CALL NEWDAT (FMT, OLD, NEW, OCENT, NCENT, ADD)

DESCRIPTION OF PARAMETERS
FMT - FORMAT OF DATE (INTEGER)
1 - 'MM/DD/YY'
2 - 'MM/DD/YY'
OLD - OLD DATE (MM/DD/YY)
NEW - NEW DATE
OCENT - OLD CENTURY (E.G., INTEGER 1900)
NCENT - NEW CENTURY (E.G., INTEGER 1900)
ADD - NUMBER OF DAYS TO ADD
(NEGATIVE TO SUBTRACT)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
JGDATE - JULIAN/GREGORIAN DATE CONVERTER (MULTI-YEAR)

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 156B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 1968

DATE(S) REVISED
02/73 - CONVERT TO SCOPE 3.3

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

06/18/76  2-147  NEWDAT - 1 OF 1
SUBROUTINE 'NFILL'

PURPOSE
FILL ELEMENTS 1 THRU N OF AN ARRAY WITH THE VALUES 1 THRU N, RESPECTIVELY

FUNCTIONAL CATEGORIES: A1

USAGE
CALL NFILL (A, N)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE FILLED
N - NUMBER OF ELEMENTS TO BE FILLED

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 CP COMPASS
CM REQUIRED: 6B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 08/09/76
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'NFILLT'
SUBROUTINE 'NFILLT'

PURPOSE
TEST AN ARRAY FOR THE PRESENCE OF THE INTEGERS 1 THRU N IN ELEMENTS 1 THRU N, RESPECTIVELY

FUNCTIONAL CATEGORIES: M5

USAGE
ISUB = NFILLT (A, N, I)
CALL NFILLT (A, N, I)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SCANNED
N - NUMBER OF ELEMENTS TO TEST
I = 0 - A(1) THRU A(N) CONTAIN 1 THRU N
>0 - A(I) IS FIRST ELEMENT TO FAIL TEST
NFILLT - IF USED AS A FUNCTION, WILL RETURN THE SAME VALUE AS 'I'

REMARKS
A SUGGESTED USE OF THIS ROUTINE IS IN CONJUNCTION WITH ONE OF THE SORTING ROUTINES TO DETERMINE IF THE ARRAY BEING SORTED WAS ALREADY IN ORDER.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 40B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 08/19/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

09/19/77 2-149 NFILLT - 1 OF 1
SUBROUTINE 'NUMEXEC'

PURPOSE
GET NUMBER OF EXECUTE CARD PARAMETERS WHICH WERE USED IN
THIS EXECUTION OF THE PROGRAM

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL NUMEXEC (NEXEC)

DESCRIPTION OF PARAMETER
NEXEC - WILL RETURN THE NUMBER OF EXECUTE CARD PARAMETERS

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
M FETCH - GET SPECIFIED WORD OF USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
R3BFMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

METHOD
THE NUMBER OF PARAMETERS IS IN THE RIGHTMOST 18 BITS OF
WORD RA+52 (64B) IN THE USER'S FL.

CM REQUIRED: 16B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/15/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CSYSNSRDCPL; P.F. NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'NUMVAR'

PURPOSE
GET THE NUMBER OF ARGUMENTS THAT WERE PASSED TO THE ROUTINE WHICH CALLED NUMVAR

FUNCTIONAL CATEGORIES: QO

LANGUAGE: CDC 6000 CP COMPASS

COMPUTERS
CDC 6000

REMARKS
WHEN USED, IT SHOULD PRECEDE OTHER EXECUTABLE STATEMENTS IN THE SUBPROGRAM TO INSURE THAT THE REGISTERS HAVE NOT BEEN DESTROYED.

USAGE
CALL NUMVAR (NARGS)

DESCRIPTION OF PARAMETER
NARGS - WILL CONTAIN THE NUMBER OF ARGS IN THE ROUTINE WHICH CALLED NUMVAR

CM REQUIRED: 5B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

AUTHOR
MIKE CHERNICK

DATE WRITTEN: UNKNOWN

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'OFMTDE'

PURPOSE
FAST O-FORMAT DECODE

FUNCTIONAL CATEGORIES: 12

USAGE
VARIABLE = OFMTDE (IWORD, ISTART, NCHAR)

DESCRIPTION OF PARAMETERS
VARIABLE - WILL CONTAIN THE RESULT RIGHT-JUSTIFIED
OR -1 IF NON-OCTAL DIGIT FOUND
OR -2 IF ISTART IS OUT OF RANGE
OR -3 IF ISTART+NCHAR GREATER THAN 10.
(IF VARIABLE IS INTEGER, OFMTDE MUST BE DECLARED
INTEGER IN THE CALLING PROGRAM)
IWORD - WORD FROM WHICH THE FIELD WILL BE EXTRACTED
ISTART - FIRST CHARACTER POSITION OF FIELD WITHIN IWORD
(1-10)
NCHAR - NUMBER OF CHARATERS IN FIELD (1-10)
(ISTART+NCHAR MUST BE LESS THAN 11)

EXAMPLE
VARIABLE = OFMTDE (10L1234567654, 6, 3) WILL PRODUCE
VARIABLE = 0000 0000 0000 0000 0676B
VARIABLE = OFMTDE (5L123.4, 3, 3) WILL PRODUCE
VARIABLE = 7777 7777 7777 7777 7776B
VARIABLE = OFMTDE (IWORD, 0, 5) WILL PRODUCE
VARIABLE = 7777 7777 7777 7775B
VARIABLE = OFMTDE (IWORD, 3, 8) WILL PRODUCE
VARIABLE = 7777 7777 7777 7777 7774B

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE SHIFT

LANGUAGE: FORTRAN IV

CM REQUIRED: 76B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/24/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-152 OFMTDE - 1 OF 1
FUNCTION 'OFMTV'

PURPOSE
FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT

FUNCTIONAL CATEGORIES: 12

USAGE
VARIABLE = OFMTV (I)

DESCRIPTION OF PARAMETERS
VARIABLE - WILL CONTAIN THE RESULT RIGHT-JUSTIFIED
OR -1 IF A NON-OCTAL DIGIT FOUND.
IF VARIABLE IS INTEGER, OFMTV MUST BE
DECLARED INTEGER IN THE CALLING PROGRAM.
I - WORD OF OCTAL DIGITS ENDING WITH AN OCTAL
00B. (EG, 3L123, 9L123456701)

EXAMPLE
VARIABLE = OFMTV (5L12345) WILL RETURN
VARIABLE = 0000 0000 0000 0001 2345B

VARIABLE = OFMTV (1L+)
WILL RETURN
VARIABLE = 7777 7777 7777 7777 7776B

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 35B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/24/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'OPLSA'

PURPOSE
ORTHOGONAL POLYNOMIAL LEAST SQUARE APPROXIMATION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE APPROXIMATING POLYNOMIAL IS
\[ C_1 + C_2 x + C_3 x^2 + \ldots + C_{M+1} x^M \]
FOR MORE THAN 9TH DEGREE OR MORE THAN 30 DATA POINTS, THE
SOURCE PROGRAM MUST BE REDIMENSIONED.

USAGE
CALL OPLSA (N, W, X, F, M, D, A, C)

DESCRIPTION OF PARAMETERS
N - NUMBER OF DATA POINTS (MAX: 30)
W - ARRAY OF N WEIGHTS
X - ARRAY OF N DATA POINTS
F - ARRAY OF N FUNCTION VALUES
M - DESIRED DEGREE OF POLYNOMIAL (MAX: 9)
D - OUTPUT ARRAY OF COEFFICIENTS OF POLYNOMIALS \(D_{j}(x)\)
     (DIMENSION: 10,N)
A - OUTPUT ARRAY OF COEFFICIENTS OF \(D_{j}(x)\)'S OF LEAST
     SQUARE POLYNOMIALS (DIMENSION: M+1)
C - ARRAY TO CONTAIN COEFFICIENTS OF RESULTING LEAST SQUARE
     POLYNOMIAL (SEE REMARKS) (DIMENSION: M+1)

CM REQUIRED: 755B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHORS
UNIVERSITY OF MARYLAND
S VOIGT

DATE WRITTEN: 1971
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3.D=HY
(*DECK AMOPLSA)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'OVLNAME'

PURPOSE
GET NAME OF FILE CURRENTLY BEING EXECUTED

FUNCTIONAL CATEGORIES: Q0

USAGE
CALL OVLNAME (I)

DESCRIPTION OF PARAMETER
I - WILL CONTAIN THE LOCAL FILE NAME CURRENTLY BEING
   EXECUTED

REMARKS
'I' MAY BE USED AS THE FIRST ARGUMENT IN 'CALL OVERLAY'

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

METHOD
THE FILE NAME IS EXTRACTED FROM BITS 59-18 OF WORD
RA+64B IN THE USER'S FIELD LENGTH

CM REQUIRED: 3

AUTHOR
? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CSYSNSRDCPL: P.F. NSRDCPL, ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

2-155  OVLNAME - 1 OF 1
SUBROUTINE 'PARGET'

PURPOSE
GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORIES: M4

USAGE
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP, RSEP, LSEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP, RSEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM, ISEP)
CALL PARGET (IAREA, LAREA, IPARAM, NPARAM)

DESCRIPTION OF PARAMETERS
IAREA - AREA CONTAINING PARAMETER LIST TO BE EXTRACTED
LAREA - NUMBER OF WORDS IN 'IAREA' (16 MAX)
IPARAM - ARRAY TO CONTAIN PARAMETERS
(If it is not known whether the parameter list in IAREA contains a terminator (', ' OR ')') or not, then IPARAM, ISEP, LSEP and RSEP should be dimensioned at least 10 times LAREA. This will allow for the worst possible case (IAREA ALL BLANKS.)
NPARAM - WILL BE NUMBER OF PARAMETERS FOUND
ISEP - IF PRESENT, ARRAY TO CONTAIN A CODE IDENTIFYING THE SEPARATOR FOUND FOLLOWING THE CORRESPONDING PARAMETER
DEC OCT SEPARATOR
1 1 :
2 2 :
3 3 /
4 4 ()
5 5 +
6 6 -
7 7 BLANK
8 10B :
14 16B OTHER
15 17B , OR ) (TERMINATOR)
RSEP - IF PRESENT, ARRAY TO CONTAIN THE SEPARATOR FOUND (IR FORMAT)
LSEP - IF PRESENT, ARRAY TO CONTAIN THE SEPARATOR FOUND (IL FORMAT)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
EXTPRM - EXTRACT THE NEXT PARAMETER

ARITHMETIC STATEMENT FUNCTIONS
NONE

CM REQUIRED: 1066

06/24 76 2-156 PARGET - 1 OF 2
SUBROUTINE 'PFRC'

PURPOSE
SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE DESCRIPTIONS ARE THOSE FOUND IN THE "NOS/BE VERSION 1 REFERENCE MANUAL" (G0493600 III) ON PAGE 83.

USAGE
CALL PFRC (IRC, A)

DESCRIPTION OF PARAMETERS
IRC - RETURN CODE FROM THE PERMANENT FILE FUNCTION
A - 5-WORD ARRAY WHICH WILL CONTAIN THE DESCRIPTION OF THE SUPPLIED 'IRC'
( IF 'IRC' IS INVALID, 'UNKNOWN RETURN CODE' IS RETURNED)

CM REQUIRED: 1075B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOVEIT
OTHERS:
NONE

AUTHOR
DAVID V SOMMER - DINSRDC CODE 1892.2

DATE WRITTEN: 05/18/76

DATE(S) REVISED
02 14 77 - UPDATE FOR NOS/BE 1.0
07 15 80 - UPDATE FOR NOS/BE 1.4 (LEVEL 508)

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL. ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'PLOTPR'

PURPOSE
PRODUCE PRINTER PLOTS WHICH MAY HAVE:
1) ANY NUMBER OF PLOTS PER RUN
2) ANY NUMBER OF VALUES FOR THE INDEPENDENT VARIABLE
3) UP TO 9 DEPENDENT VARIABLES PER PLOT.

FUNCTIONAL CATEGORIES: J5

LANGUAGE: FORTRAN IV

USAGE
COMMON /PLO/ NRUN, NPILOT, ITP(6), IY(6), ITX(6),
NUMPAG, MAXSCA, SCA(10), FROM(10)

CALL INITPLO
C SET ANY SPECIAL VALUES IN COMMON /PLO/ AFTER 'CALL INITPLO'

C WRITE DATA FOR THE PLOT
DO 5 I=1,NPILOT
5 WRITE (NFILE) VARIND(1), VARDEP(1), ..., VARDEP(1)

CALL PLOTPR (NFILE, NUMVAR, IVAR)

DESCRIPTION OF PARAMETERS
NFILE - FORTRAN LOGICAL UNIT NUMBER OF FILE CONTAINING
THE DATA VALUES, INDEPENDENT FOLLOWED BY DEPENDENT

NUMVAR - NUMBER OF VARIABLES (UP TO 10)
(TOTAL: INDEPENDENT + DEPENDENT)

IVAR - 10-WORD ARRAY WITH ALPHANUMERIC NAMES FOR THE
VARIABLES WHICH WILL APPEAR ON THE PLOT

ADDITIONAL INFORMATION IS PROVIDED THRU LABELLED COMMON
BLOCK /PLO/

NRUN - NUMBER OF THIS RUN (DEFAULT: 1)
NPILOT - NUMBER OF PLOT (DEFAULT: 1)
ITP - PAGE TITLE (DEFAULT: BLANK)
ITY - Y TITLE (DEFAULT: BLANK)
ITX - X TITLE (DEFAULT: BLANK)
(TITLE ARRAYS ARE 6 WORDS EACH OF UP TO 6
CHARACTERS PER WORD - 666 FORMAT)

NUMPAG - NUMBER OF DOUBLE PAGES TO SPREAD THE PLOT
OVER (NO MORE THAN 100 POINTS PER PAGE)
(DEFAULT: 1)

MAXSCA - SCALING OPTION
1 - OPTIMUM SCALING IS CALCULATED FOR EACH
VARIABLE (DEFAULT)
2 - PLOT ALL DEPENDENT VARIABLES ON THE
SAME SCALE
(IF THE PROGRAMMER SCALES ANY OF THE
DEPENDENT VARIABLES, THIS OPTION IS DEFAULTED)
SCA AND FROM -

ARRAYS CONTAINING THE INCREMENTS AND THE
STARTING VALUES FOR EACH VARIABLE.
IF ONE OF THESE ARRAYS IS USED FOR A VARIABLE,
BOTH MUST BE USED.
IF THERE ARE MORE THAN 101 VALUES FOR THE
INDEPENDENT VARIABLE, THOSE VALUES MUST HAVE A
CONSTANT INCREMENT AND THE SCALING IS ALWAYS
BASED ON THAT INCREMENT.
(DEFAULT: OPTIMUM SCALE AND STARTING VALUE
ARE CALCULATED FOR EACH VARIABLE)

REMEMBER TO PUT 'TAPENFILE' INTO PROGRAM STATEMENT OF THE
MAIN PROGRAM.

CM REQUIRED: 1202B

REMARKS
A CALL TO 'INITPLO' WILL SET THE DEFAULT VALUES.

THE MINIMUM SIZE OF A GRID IS 101 X 101 POINTS (THIS IS
1-1/2 COMPUTER PAGES). IF MORE THAN 101 VALUES FOR THE
INDEPENDENT VARIABLE ARE GIVEN, THE REQUIRED INTEGRAL
NUMBER OF 100-POINT GRIDS ARE AUTOMATICALLY JOINED TOGETHER.

THE NAME AND VALUES OF THE INDEPENDENT VARIABLE (AND
X TITLE) ARE GIVEN IN THE LEFT MARGIN. THE NAMES, SCALES
AND PLOTTING CHARACTERS (A-I) FOR THE DEPENDENT VARIABLES
ARE GIVEN AT THE TOP OF THE PAGE WITH THE PAGE TITLE AND
Y TITLE ABOVE THEM.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
ABS ALOG10 AMAX1 AMIN1 AND
COMPL EOF OR REWIND SHIFT
OTHERS
DRAWGD (221B CM)
INITGD ( 47B CM)
INITPLO ( 21B CM)

AUTHOR
ADAPTED FROM MIMIC BY ANN BANDURSKI - NSRDC CODE 1833

DATE WRITTEN: 05/22/72

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3
+DECK AMPLOTP)

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'POLYN'

PURPOSE
LEAST SQUARES POLYNOMIAL FIT

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV

REMARKS
FIT AN N-TH DEGREE POLYNOMIAL TO SETS OF POINTS (X(I), Y(I), Z(I), ...), WHERE X IS THE INDEPENDENT VARIABLE IN EACH CASE, (I=1,2,...,N).
P(X) = A(0) + A(1)*X + A(2)*X**2 + ... + A(N)*X**N

USAGE
CALL POLYN (ND, NP, NC, X, Y, NAPT, WORKA, V, SUM)

DESCRIPTION OF PARAMETERS
ND - DEGREE OF POLYNOMIAL (N)
NP - NUMBER OF POINTS IN SET OF OBSERVATIONS (X(I), Y(I), Z(I), ...)
NC - NUMBER OF CURVES TO BE FITTED (E.G., Y, Z, ...)
X - ARRAY CONTAINING THE INDEPENDENT VARIABLE
Y - ARRAY CONTAINING THE DEPENDENT VARIABLE(S)
    MUST BE DIMENSIONED AT LEAST NP TIMES NC.
    Y(1), Y(2), ... MUST BE CONTIGUOUS IN MEMORY.
    Z(1) NEED NOT FOLLOW Y(N) IMMEDIATELY.
NAPT - NUMBER OF LOCATIONS BETWEEN SETS OF DATA
    Y, Z, ... (NUMBER OF WORDS BETWEEN Y(1) AND
    Z(1)). ALL SETS Y, Z, ... MUST BE EQUALLY SPACED.
WORKA - WORK ARRAY USED IN MATRIX SOLUTION OF THE (ND+1)
    SETS OF LINEAR EQUATIONS. MUST BE DIMENSIONED
    AT LEAST (ND+1)**2.
V - OUTPUT ARRAY USED IN MATRIX SOLUTION FOR VECTOR.
    MUST BE DIMENSIONED AT LEAST (ND+1) TIMES NC.
    V(1), ..., V(ND+1) WILL CONTAIN COEFFICIENTS
    A(0), ..., A(N) OF THE FIRST CURVE.
SUM - WORK ARRAY FOR SUMS OF POWERS OF X.
    MUST BE DIMENSIONED AT LEAST (2*ND+1).

CM REQUIRED: 2338 (+ 1706 FOR ENXEN)

METHOD
LEAST SQUARES - MINIMIZING SUM OF SQUARES OF DEVIATIONS FROM
    AVERAGE.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
PART OF PROGRAM
ENXEN
OTHERS
NONE

AUTHOR
J. N. BROOKS  (SHARE ROUTINE NUMBER 848)

DATE WRITTEN: 01/29/60

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED CLIBRARYUPD:
  (*DECK ARPLN1)

OBJECT
EDITLIB USER LIBRARY:  NSRDC

:0/31'77  2-162  POLYN  -  2 OF  2
SUBROUTINE 'PROOT'  

PURPOSE  
FIND ALL ROOTS OF A REAL POLYNOMIAL  

FUNCTIONAL CATEGORIES: C2 B4  

LANGUAGE: FORTRAN IV  

REMARKS  
THE POLYNOMIAL HAS THE FORM:  
\[ A_1 x + A_2 x^2 + \ldots + A_{N+1} x^{N+1} = 0 \]  

USAGE  
CALL PROOT (N, A, U, V, H, B, C, CONV, NPLUS2)  

DESCRIPTION OF PARAMETERS  
N - DEGREE OF THE POLYNOMIAL TO BE SOLVED  
A - ARRAY (DIMENSIONED N+2) CONTAINING THE COEFFICIENTS IN THE ORDER INDICATED ABOVE  
U - ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE REAL PARTS OF THE ROOTS  
V - ARRAY (DIMENSIONED N+2) WHICH WILL CONTAIN THE IMAGINARY PARTS OF THE ROOTS  
H, B, C - WORK ARRAYS (EACH DIMENSIONED N+2)  
CONV - CONVERGENCE CRITERION. INITIALLY SET BY PROOT TO 1.0E-35 (FAR BELOW THE ACTUAL STARTING CONVERGENCE CRITERION OF 5.0E-20 (CDC 6600)). IF THE POLYNOMIAL HAS NOT CONVERGED AFTER A PRESCRIBED NUMBER OF TRIES, THE CONVERGENCE CRITERION IS RELAXED. IF, UPON EXIT FROM PROOT, CONV IS NOT 1.0E-35, THE CONVERGENCE CRITERION HAS BEEN RELAXED TO THE NUMBER GIVEN.  
NPLUS2 - MUST BE SET TO N+2  

CM REQUIRED: 463B  

METHOD  
THE ROUTINE CONVERGES SIMULTANEOUSLY TOWARD A LINEAR FACTOR AND A QUADRATIC FACTOR BY NEWTON'S AND BAIRSTOW'S METHODS, RESPECTIVELY. WHEN A ROOT IS FOUND BY ONE METHOD, ITERATION CONTINUES WITH BOTH METHODS USING THEIR MOST RECENT GUESSES.  

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED  
PART OF LANGUAGE  
ABS SIGN SQRT  
OTHERS  
NONE  

07/25/77  2-163  PROOT - 1 OF 2
AUTHORS
MIRIAM SHAPIRO
HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: UNKNOWN - ADAPTED FROM LOS ALAMOS ROUTINE
LA-PROOT BY T. L. VORDAN (MS)

DATE(S) REVISED
11/65 - CONVERTED TO CDC 6600 (HA)

LOCATION OF DECKS
SOURCE
TAPE LABELLED: CLIBRARYUPD3

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'PRTFL'

PURPOSE
PRINT CURRENT FL (OR PUT INTO DAYFILE)

FUNCTIONAL CATEGORIES: Q0 J2

USAGE
CALL PRTFL (IOUT)

DESCRIPTION OF PARAMETER
IOUT - FORTRAN LOGICAL UNIT NUMBER
(0=PUT INTO DAYFILE; N=WRITE ON TAPEN)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
REMARK
OTHERS
FTNRFIL - GET CURRENT FL

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 50B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/16/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-165 PRTFL - 1 OF 1
SUBROUTINE 'PRTIME'

PURPOSE
GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES
SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE

FUNCTIONAL CATEGORIES: Q4 J4 NO

USAGE
CALL PRTIME (IOUNIT, TIMES, MSG)
CALL PRTIME (IOUNIT, TIMES, 0)

DESCRIPTION OF PARAMETERS
IOUNIT - OUTPUT UNIT FOR PRINTED LINE
          (EITHER FORTRAN LOGICAL UNIT NUMBER (1-99) OR
          1- TO 7-CHARACTER LOCAL FILE NAME, LEFT-ADJ.
          ZERO-FILLED (E.G., 6LOUTPUT))
TIMES - 7-WORD ARRAY TO CONTAIN THE FOLLOWING:
          1 - ELAPSED CPA TIME IN SECONDS
          2 - ELAPSED CPB TIME IN SECONDS
          3 - ELAPSED CP TIME IN SECONDS (CPA+CPB)
          4 - ELAPSED PP TIME IN SECONDS
          5 - ELAPSED IO TIME IN SECONDS
          6 - ELAPSED WALL CLOCK TIME ( HH.MM.SS.)
          7 - ELAPSED WALL CLOCK TIME IN SECONDS
MSG - 5-WORD MESSAGE TO BE PRINTED
          (IF SUPPLIED AS HOLLERITH CONSTANT, MAY BE FEWER
          THAN 5 WORDS. SEE EXAMPLE BELOW)
          (IF MSG(1) IS 0 (OR 1L0 OR 1H0), HEADINGS, BUT NOT
          TIMES, WILL BE PRINTED.)

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
ELTIME - GET ELAPSED TIME SINCE LAST CALL
FINDCHR - FIND FIRST OCCURRENCE OF CHARACTER IN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

OUTPUT UNITS
UNIT # LFN USE
-------- ------- ------
USER SPECIFIES... LISTABLE OUTPUT

CM REQUIRED: 1028

06/22/77 2-166 PRTIME - 1 OF 2
EXAMPLE

PROGRAM TEST (OUTPUT=128, .......
REAL TIMES(7)
C GET INITIAL TIMES AND PRINT HEADING
   CALL PRTIME (6LOUTPUT, TIMES, 0)
   .......
C GET ELAPSED TIMES AND PRINT WITH MESSAGE
   CALL PRTIME (6LOUTPUT, TIMES, "TEST NUMBER 1")
   .......
C NEW HEADINGS ARE NOT NEEDED, SO CALL ELTIME DIRECTLY
   CALL ELTIME (TIMES)
   .......
C GET ELAPSED TIMES AND PRINT WITH MESSAGE
   CALL PRTIME (6LOUTPUT, TIMES, "TEST NUMBER 2")
   .......
END

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/20/76
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
   UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
   EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'PUTCHA'
FUNCTION 'PUTCHA'

PURPOSE
    INSERT CHARACTER INTO SPECIFIED POSITION IN AN ARRAY

FUNCTIONAL CATEGORIES: M4

USAGE
    CALL PUTCHA (A, N, CH)
    VARIABLE = PUTCHA (A, N, CH)

DESCRIPTION OF PARAMETERS
    A - ARRAY INTO WHICH CHARACTER IS TO BE INSERTED
    N - POSITION AT WHICH CHARACTER IS TO BE INSERTED
        (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A(1))
    CH - CHARACTER TO BE INSERTED (IN IR FORMAT)
        (WHEN USED AS A FUNCTION, PUTCHA WILL CONTAIN THE WORD
         IN 'A' WHICH WAS CHANGED)

REMARKS
    'PUTCHA' IS AN ENTRY POINT IN 'GETCHA'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
    PART OF LANGUAGE
        SHIFT
    OTHERS
        NONE

ARITHMETIC STATEMENT FUNCTIONS
    NONE

LANGUAGE: FORTRAN IV

CM: REQUIRED: 52B (UNLESS GETCHA IS ALSO CALLED)

AUTHOR
    DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/16/76

DATE(S) REVISED

LOCATION OF DECKS
    SOURCE
        UPDATE LIBRARY: NSRDCPL.ID=CSYS
        OBJECT
            EDITLIB USER LIBRARY: NSRDC

08/22/77  2-168  PUTCHA - 1 DF 1
SUBROUTINE 'PUTCHR'
FUNCTION 'PUTCHR'

PURPOSE
INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORIES: M4

USAGE
CALL PUTCHR (A, N, CH)
VARIABLE = PUTCHR (A, N, CH)

DESCRIPTION OF PARAMETERS
A - WORD INTO WHICH CHARACTER IS TO BE INSERTED
N - POSITION AT WHICH CHARACTER IS TO BE INSERTED
(PRESENT 1 IS LEFT-MOST 6-BIT CHARACTER IN A)
CH - CHARACTER TO BE INSERTED (IN 'H FORMAT)
(WHEN USED AS A FUNCTION, PUTCHR WILL CONTAIN THE SAME
AS 'A')

REMARKS
'PUTCHR' IS AN ENTRY POINT IN 'GETCHR'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 43B (UNLESS GETCHR IS ALSO CALLED)

AUTHOR
FROM BIMED PACKAGE

DATE WRITTEN:

DATE(S) REVISED
1975 - DAVID V SOMMER - DTNSRDC CODE 1892.2

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77
2-169
PUTCHR - 1 OF 1
SUBROUTINE 'QSORT'

PURPOSE
IN-CORE ASCENDING SORT FOR REAL ARRAYS LARGER THAN 500 WORDS

FUNCTIONAL CATEGORIES: MI

LANGUAGE: FORTRAN IV

USAGE
CALL QSORT (A, I)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED INTO ASCENDING ORDER
I - NUMBER OF WORDS IN 'A' TO BE SORTED

REMARKS
'QSORT' IS THE MOST EFFICIENT SORT AVAILABLE (AS OF DATE
BELOW) FOR THE SORTING IN CORE OF ARRAYS LARGER THAN 500
WORDS.

THIS ROUTINE IS A TRANSLATION OF ALGORITHM 402, COMM. ACM.
NOV. 1970.

IF THE JOB ABORTS WITH THE MESSAGE "ABORT IN QSORT WITH
MN=<MN>'., CHECK IF MN EXCEEDS KL (CURRENTLY KL=46).
IF SO, THE VALUE OF KL AND THE DIMENSION OF ARRAY K MUST BE
SET HIGHER (TRY DOUBLING IT).
ON THE B7700:
THE SUBROUTINE MUST BE CHANGED AND RECOMPILED.
ON THE CDC:
WRITE A DUMMY SUBROUTINE TO SET KL AND THE DIMENSION OF K
GREATER.

THIS SUBROUTINE MIGHT HAVE THE FORM:

SUBROUTINE DUMMY
COMMON /QSORT/ KL, K(<NEW>)
KL = <NEW>
RETURN
END

A CALL TO THIS SUBROUTINE MUST OCCUR BEFORE ANY CALL TO
QSORT; THE BEST PLACE BEING ONE OF THE FIRST STATEMENTS
IN THE MAIN PROGRAM.

CM REQUIRED: B7700: 312 + 65B COMMON
CDC : 232B + 57B COMMON

ERROR MESSAGE
ABORT IN QSORT WITH MN=<MN>
SEE REMARKS.
<table>
<thead>
<tr>
<th>OUTPUT UNIT (B7700)</th>
<th>UNIT #</th>
<th>INTNAME</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FILE6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERROR MESSAGE</th>
</tr>
</thead>
</table>

**SUBROUTINE AND FUNCTION PROGRMS REQUIRED**

- **PART OF LANGUAGE**
  - DISPLA (CDC)

- **OTHERS**
  - ZABORT - NON-EXISTENT ROUTINE TO FOREC ABORT

**AUTHORS**

- C. FLINK - KPS NWL
- DTNSRDC CODE 1892

**DATE WRITTEN**

- 11/25/70 - CF

**DATE(S) REVISED**

- 01/30/81 - DVS - ADD DAYFILE ERROR MESSAGE
  - CHANGE ABORT PROCESS
- 02/17/81 - DVS - CONVERT TO B7700

**LOCATION OF DECKS**

**SOURCE**

- B7700: *SOURCE/NSRDC/QSORT1
- CDC: UPDATE LIBRARY: NSRDCPL,ID=CSYS

**OBJECT**

- B7700: *NSRDC/QSORT1
- CDC: EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'QSORT1'

PURPOSE
IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY
(FOREAL ARRAYS LARGER THAN 500 WORDS)

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

USAGE
CALL QSORT1 (A, I, T)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED INTO ASCENDING ORDER
I - NUMBER OF WORDS IN 'A' TO BE SORTED
T - ASSOCIATED ARRAY TO BE REORDERED

REMARKS
'QSORT1' IS THE MOST EFFICIENT SORT AVAILABLE (AS OF DATE
BELOW) FOR THE SORTING IN CORE OF ARRAYS LARGER THAN 500
WORDS.

THIS ROUTINE IS A TRANSLATION OF ALGORITHM 402, COMM. ACM
NOV. 1970.

IF THE ARRAY 'T' IS NOT NEEDED, USE 'QSORT'.

IF THE JOB ABORTS WITH THE MESSAGE "ABORT IN QSORT1 WITH
MN=<MN>", CHECK IF MN EXCEEDS KL (CURRENTLY KL=46).
IF SO, THE VALUE OF KL AND THE DIMENSION OF ARRAY K MUST BE
SET HIGHER (TRY DOUBLING IT).
ON THE B7700:
THE SUBROUTINE MUST BE CHANGED AND RECOMPILED.
ON THE CDC:
WRITE A DUMMY SUBROUTINE TO SET KL AND THE DIMENSION OF K
GREATER.

THIS SUBROUTINE MIGHT HAVE THE FORM:

SUBROUTINE DUMMY
COMMON /QSORT/ KL, K(<NEW>)
KL = <NEW>
RETURN
END

A CALL TO THIS SUBROUTINE MUST OCCUR BEFORE ANY CALL TO
QSORT1: THE BEST PLACE BEING ONE OF THE FIRST STATEMENTS
IN THE MAIN PROGRAM.

CM REQUIRED: B7700: 362 + 65B COMMON
CDC : 220B + 57B COMMON
OUTPUT UNIT (B7700)

UNIT # INTNAME USE
------ -------- ---------------
FILE6 ERROR MESSAGE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
DISPLA (CDC)
OTHERS
ZABORT - NON-EXISTENT ROUTINE TO FOREC ABORT

AUTHORS
C FLINK - KPS NWL
DTNSRDC CODE 1892

DATE WRITTEN: 11/30/70

DATE(S) REVISED
01/30/81 - DVS - ADD DAYFILE ERROR MESSAGE
- CHANGE ABORT PROCESS
02/17/81 - DVS - CONVERT TO B7700

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/QSORT1
CDC: UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
B7700: *NSRDC/QSORT1
CDC: EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'QUADG'

PURPOSE
INTEGRAL BY GAUSS-LEGENDRE 10-POINT QUADRATURE

FUNCTIONAL CATEGORIES: D1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
APPROXIMATES
INTEGRAL F(X) DX = \text{SUM of WI F((XU-XL)/2 + ZI))}
WHERE WI ARE WEIGHT FACTORS
ZI ARE ROOTS OF LEGENDRE POLYNOMIAL
INTEGRAL IS FROM XL TO XU.

USAGE
CALL QUADG (XL, XU, FNC, Y)

DESCRIPTION OF PARAMETERS
XL - LOWER LIMIT OF INTEGRATION
XU - UPPER LIMIT OF INTEGRATION
FNC - THE EXTERNAL FUNCTION FOR EVALUATING THE INTEGRAND
FNC MUST BE DECLARED EXTERNAL IN THE ROUTINE CALLING QUADG.

METHOD
LET A = .5*(XU+XL)
B = XU - XL
THEN, SINCE THE ZI'S ARE SYMMETRIC ABOUT ZERO,
Y = B*SUM-FROM-0-TO-4((WI/2)*(FNC(A+(ZI/2)*B) + FNC(A-(ZI/2)*B))

REFERENCE
"APPLIED NUMERICAL METHODS" BY B. CARNAHAN, H. LUTHER
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
SUSAN VOIGT - DTNSRDC CODE 1892

DATE WRITTEN: 09/71
DATE(S) REVISED

LOCATION OF DECKS

SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY
(*DECK AMQUADG)

OBJECT
EDITLIB USER LIBRARY: NSRDC

12/06/77
2-175
QUADG - 2 OF 2
SUBROUTINE 'RCPA'

PURPOSE
READ (A PORTION OF) CONTROL POINT AREA

FUNCTIONAL CATEGORIES: K2

USAGE
CALL RCPA (ISTART, NWORDS, AREA)

DESCRIPTION OF PARAMETERS
ISTART - STARTING WORD IN CONTROL POINT AREA
NWORDS - NUMBER OF WORDS TO READ
AREA - ARRAY TO HOLD THE SPECIFIED WORDS
(ARRAY(2) THRU AREA(NWORDS+1))

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 43B

AUTHOR
MIKE GOLDEN - DTNSRDC CODE 1844
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/75

DATE(S) REVISED
12/03/75

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'RECOVRD'

PURPOSE
ON RECOVERY, PRINT EXCHANGE JUMP PACKAGE, RA+0 THRU RA+77B
AND ENDRUN INDICATOR

FUNCTIONAL CATEGORIES: N2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE

EXTERNAL RECOVRD

CALL RECOVR (RECOVRD, 77B, 0)

-- OR --

EXTERNAL ANY

CALL RECOVR (ANY, 77B, 0)

SUBROUTINE ANY (EXCHJP, ENDRUN, RAO)

DIMENSION EXCHJP(17)

CALL RECOVRD (EXCHJP, ENDRUN, RAO)

DESCRIPTION OF PARAMETERS
EXCHJP - 17-WORD ARRAY TO HOLD EXCHANGE JUMP PACKAGE
ENDRUN - ENDRUN INDICATOR (WILL HAVE MEANING ONLY IF SECOND
FORM OF USAGE IS USED AND IF ENDRUN IS SET BEFORE
THE CALL TO RECOVRD)
RAO - RA+0 POINTER (NOT USED BY THIS SUBROUTINE)

CM REQUIRED: 6016

OUTPUT UNITS

USE

OUTPUT LISTABLE OUTPUT

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

SHIFT

OTHERS
GETRA - GET RA+0 THRU RA+77B
SUBROUTINE 'REDUCE'

PURPOSE
REDUCE FL TO MINIMUM OR REQUEST ADDITIONAL FL RELATIVE TO
START OF BLANK COMMON

FUNCTIONAL CATEGORIES: QO

USAGE
CALL REDUCE - REDUCE TO FIRST WORD OF BLANK COMMON
CALL REDUCE (I) - ADJUST TO 'I' WORDS AFTER START OF BLANK
COMMON

DESCRIPTION OF PARAMETER
I - IF PRESENT, NUMBER OF WORDS PAST START OF BLANK COMMON

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
SHIFT

OTHERS
MFETCH - GET SPECIFIED WORD IN USER'S FL
MSET - SET SPECIFIED WORD IN USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 36B (PLUS 1 IN BLANK COMMON)

AUTHOR
? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CSYSNSRDCPL: P.F. NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77  2-179  REDUCE - 1 OF 1
SUBROUTINE 'REPLAC'

PURPOSE
REPLACE ONE CHARACTER BY ANOTHER IN AN ARRAY

FUNCTIONAL CATEGORIES: M4

USAGE
CALL REPLAC (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
OLD - OLD CHARACTER (IR FORMAT)
NEW - NEW CHARACTER (IR FORMAT)

REMARKS
ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
PART OF LANGUAGE
   SHIFT
   OTHERS
   NONE

ARITHMETIC STATEMENT FUNCTIONS
L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 57B

AUTHOR
   DAVID \ SOMMER - D1NSTDC CODE 1892.2

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
   UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
   EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'REPLACM'

PURPOSE
    REPLACE OLD CHARACTERS WITH NEW CHARACTERS

FUNCTIONAL CATEGORIES: M4

USAGE
    CALL REPLACM (A, NA, OLD, NEW, NCH)

DESCRIPTION OF PARAMETERS
    A    - ARRAY TO BE PROCESSED
    NA   - NUMBER OF WORDS IN 'A' TO BE PROCESSED
    OLD  - ARRAY OF OLD CHARACTERS (IR FORMAT)
    NEW  - ARRAY OF CORRESPONDING NEW CHARACTERS (IR FORMAT)
    NCH  - NUMBER OF CHANGE PAIRS (DIMENSION OF 'OLD' AND 'NEW')

REMARKS
    ALL ARGUMENTS ARE TYPE 'INTEGER'.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
    PART OF LANGUAGE
      SHIFT
    OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
    L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
    R11OFMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 73B

AUTHOR
    DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/21/75

DATE(S) REVISED

LOCATION OF DECKS
    SOURCE
      UPDATE LIBRARY: NSRDCPL.ID=CSYS
      OBJECT
        EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'REPLHI'

PURPOSE
REPLACE ALL CHARACTERS GREATER THAN SPECIFIED CHARACTER WITH
NEW CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
CALL REPLHI (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
A         - ARRAY TO BE PROCESSED
NA        - NUMBER OF WORDS IN 'A' TO BE PROCESSED
OLD       - OLD CHARACTER (1R FORMAT)
NEW       - NEW CHARACTER (1R FORMAT)

REMARKS
ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L91FMT     - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R11OFMT    - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV
CM REQUIRED: 60B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/26/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08 22/77
2-1B2
REPLHI - 1 OF 1
SUBROUTINE 'REPLLO'

PURPOSE
REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH NEW CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
CALL REPLLO (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
OLD - OLD CHARACTER (IR FORMAT)
NEW - NEW CHARACTER (IR FORMAT)

REMARKS
ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 60B

AUTHOR:
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/26/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'REPLNE'

PURPOSE
REPLACE ALL CHARACTERS (EXCEPT SPECIFIED CHARACTER) WITH A SPECIFIED CHARACTER

FUNCTIONAL CATEGORIES: M4

USAGE
CALL REPLNE (A, NA, OLD, NEW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
NA - NUMBER OF WORDS IN 'A' TO BE PROCESSED
OLD - OLD CHARACTER (1R FORMAT)
NEW - NEW CHARACTER (1R FORMAT)

REMARKS
ALL PARAMETERS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTIONS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L91FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
R11OFMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 57B

AUTHOR
DAVID V SOMMER - DTNSTDC CODE 1892.2

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-184  REPLNE - 1 OF 1
SUBROUTINE 'REQUEST'

PURPOSE
Callable REQUEST function

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
Assignment of equipment may be requested from a running central processor program by the request subroutine, which has the effect of a request card.

For further information, call Mike Chernick
(202) 227-1683 or IDS 150-1683 or AutoVon 287-1683

USAGE
CALL REQUEST (IRC, LFN, ICODE, SN);
CALL REQUEST (IRC, LFN, ICODE);
CALL REQUEST (IRC, LFN);

DESCRIPTION OF PARAMETERS
IRC - output: right-justified system-generated error return code
IRC=0 - request was successful

LFN - contents determined by ICODE
If ICODE is non-zero, LFN is a 1-7 character local file name, left-justified, zero- or blank-filled (e.g., 5LTape7).
If ICODE is zero (or missing), LFN is an array constructed as described in NOS/BE Reference Manual, Page 7-42 on.

ICODE - determines contents of LFN and effect of request
ICODE 0 or missing - LFN is an array containing parameters for request macro
ICODE = "*Q", 2H*Q or 2L*Q - LFN is 1-7 character local file name and request has effect of request,LFN,*Q.
ICODE anything else - LFN is 1-7 character local file name and request has the effect of request,LFN,*PF.

SN - optional SN (*PF only) when used, is 1-7 character user device set name (has effect of request,LFN,*PF,SN=SETNAME.)

CM REQUIRED: 125B

EXAMPLES
REQUEST,TAPE1,*PF. BECOMES
CALL REQUEST (IRC, 5LTape1, 1)

REQUEST,TAPE2,*Q. BECOMES
CALL REQUEST (IRC, 5LTape2, "*Q")

REQUEST,TAPE3,*PF,SN=MYSET1. BECOMES
CALL REQUEST (IRC, "TAPE3", "*PF", "MYSET1")

08/22/77 2-185 REQUEST - 1 OF 2
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF SHIFT
OTHERS IZONK NUMVAR ZPFMAC

AUTHORS
JAMES BLACK, MIKE CHERNICK - DTNSRDC CODE 1832
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/26/71

DATE(S) REVISED
01/10/75 - V3.5 - MC
01/27/77 - DVS - ADD *Q
03/24/77 - DVS - ADD SN

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

03’25 77 2-186 REQUEST - 2 OF 2
SUBROUTINE 'RFFT'

PURPOSE
FAST FOURIER TRANSFORM OF A REAL TABULATED FUNCTION

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL RFFT (A, M, INV, S, IFERR)

DESCRIPTION OF PARAMETERS
A - THE ARRAY CONTAINING A REAL TABULATED ONE-
DIMENSIONAL FUNCTION. 'A' MUST BE DIMENSIONED AS
A POWER OF 2 AND REQUIRES 4 ADDITIONAL LOCATIONS
BEYOND THE LENGTH OF THE DATA. TOTAL DIMENSION FOR
'A' IS 2**(M+1)+4.

ON OUTPUT 'A' CONTAINS THE FOURIER TRANSFORM. A(1)
AND A(2) CONTAIN, RESPECTIVELY, THE REAL AND
IMAGINARY ZERO-CYCLE COMPONENTS; A(3) AND A(4)
CONTAIN THE FUNDAMENTAL FREQUENCY COMPONENTS, ETC.

M - ONE LESS THAN THE SMALLEST INTEGER BASE 2 LOGARITHM
THAT HAS AN ANTILOG WHICH WILL CONTAIN ALL THE
ELEMENTS TO BE TRANSFORMED. FOR EXAMPLE, IF THE
ARRAY TO BE TRANSFORMED CONTAINS 28 POINTS, M MUST
BE SET TO 4.

INV - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'
S - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'

IFERR - ERROR RETURN CODE
= 0 -- NORMAL COMPLETION
<>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: 3 ≤ M ≤ 20. THIS IS BASED ON AN ARRAY WHICH HAS A
LENGTH THAT CAN BE EXPRESSED AS A POWER OF 2. IF THE
DATA OCCUPIES LESS SPACE THAN 2**(M+1), THE REMAINING
LOCATIONS MUST BE SET TO ZERO OR ANOTHER APPROPRIATE
CONSTANT.

CM REQUIRED: 320B
METHOD

This operation makes use of the separable properties of the Fourier coefficients of the real and imaginary components of the complex vector. This is almost a special case of the dual use of the Cooley-Tukey algorithm described in Reference 2. References to this method can be found in Reference 3 also.

In brief, a scaled version of the first portion of the real array is placed in the real component of the vector, while a scaled version of the second portion of the array is placed in the complex component. The algorithm is performed in normal fashion on the complex array. The coefficients for the real array are obtained by properly combining and reordering the Fourier coefficients from the complex processing.

REFERENCES


SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

COS

FLOAT

SIN

OTHERS

FFT - Fast Fourier Transform of a complex tab fcn

AUTHORS

Wes Rice

Duane Harder

Los Alamos Scientific Laboratory

VIM ROUTINE LASL C330A

DATE WRITTEN: 07/24/68

DATE(S) REvised

02/69 - DH

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY ON TAPE LABELED: CLIBRARYUPD3.D=HY

(*DECK LASC330)

OBJECT

EDITLIB USER LIBRARY: NSRDC

12.06.77

2-188

RFFT - 2 OF 2
SUBROUTINE 'RFSN'

PURPOSE
INVERSE FAST FOURIER TRANSFORM

FUNCTIONAL CATEGORIES: E2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL RFSN (A, M, INV, S, IFERR)

DESCRIPTION OF PARAMETERS


ON OUTPUT 'A' CONTAINS THE INVERSE FOURIER TRANSFORM.

M - ONE LESS THAN THE SMALLEST INTEGER BASE 2 LOGARITHM THAT HAS AN ANTILOG WHICH WILL CONTAIN ALL THE ELEMENTS TO BE TRANSFORMED. FOR EXAMPLE, IF THE ARRAY TO BE TRANSFORMED CONTAINS 28 POINTS, M IS SET TO 4. THIS RESULT WOULD REQUIRE 17 PAIRS OF COEFFICIENTS.

INV - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'

S - SCRATCH ARRAY REQUIRING 1/8 THE DIMENSION OF 'A'

IFERR - ERROR RETURN CODE
= 0 -- NORMAL COMPLETION
<>0 -- ERRORS IN SUBROUTINE ARGUMENTS

NOTE: 3 < M < 20. ALL COEFFICIENTS MUST BE DEFINED: THEREFORE ALL 2**(M+1) REAL AND IMAGINARY COEFFICIENTS MUST BE SET TO APPROPRIATE VALUES.

CM REQUIRED: 3078
METHOD


REFERENCES


SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE

COS     SIN

OTHERS

FFT - FAST FOURIER TRANSFORM OF A COMPLEX TAB FCN

AUTHORS

WES RICE
DUANE HARDER
LOS ALAMOS SCIENTIFIC LABORATORY

VIM ROUTINE LASL C331A

DATE WRITTEN: 08/07/68

DATE(S) REVISED

02/69 - DH

LOCATION OF DECKS

SOURCE

UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3,D=HY (*DECK LASC331)

OBJECT

EDITLIB USER LIBRARY: NSRDC
FUNCTION 'RNDMIZ'

PURPOSE
EMULATE BASIC LANGUAGE 'RANDOMIZE' STATEMENT (CAN BE USED TO GUARANTEE FIRST CALL TO RANF WILL RESULT IN A DIFFERENT NUMBER WITH EACH EXECUTION OF A PROGRAM)

FUNCTIONAL CATEGORIES: V1

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
\[ R = \text{RNDMIZ}(N) \]

DESCRIPTION OF PARAMETERS
- \( N \) - DUMMY ARGUMENT - IGNORED
- \( \text{RNDMIZ} \) - WILL RETURN A RANDOM NUMBER SIMILAR TO THAT OBTAINED BY RANF

CM REQUIRED: 23B

METHOD
THE RANF SEED IS CHANGED USING THE CURRENT CP TIME (FRACTIONAL PART ONLY)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
- INT RANF SECOND
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/08/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
- UPDATE LIBRARY: NSRDCPL, ID=CSYS
- OBJECT
- EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ROUTE'

PURPOSE
CALLABLE ROUTE COMMAND

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED AND CDC 6000 COMPASS

REMARKS
THE FILE TO BE ROUTED MUST BE ON A QUEUE DEVICE.

THE CALLING PROGRAM MUST CLOSE THE FILE BEFORE 'ROUTE' IS CALLED. AN FTN SEQUENTIAL FILE (WRITE, PRINT, PUNCH) MAY BE "CLOSED" BY ISSUING A 'REWIND N' BEFORE THE CALL TO 'ROUTE'. IF THE FILE IS NOT CLOSED, THE FINAL BUFFER MAY NOT BE ROUTED.

USAGE
CALL ROUTE (IRC, IPRMS, NW)
CALL ROUTE (IRC, IPRMS)

DESCRIPTION OF PARAMETERS
IRC - ERROR RETURN CODE
NOS:'BE-GENERATED
DEC OCT MEANING
--- --- -----------------------------------------------
 1 001 INVALID LFN - DSP
 2 002 CANNOT ROUTE NON-ALLOCATABLE EQUIPMENT
 3 003 CANNOT ROUTE PERMANENT FILE
 4 004 NO PERMISSION TO ROUTE THIS FILE
 5 005 ROUTE TO INPUT NOT IMMEDIATE - IGNORED
 6 006 IMMEDIATE ROUTING - NO FILE - IGNORED
 7 007 INVALID DISPOSITION CODE - ROUTING IGNORED
 8 010 INVALID FID - ROUTING IGNORED
 9 011 DSP ABORTED BY SYSTEM
10 012 DSP PARAMETER OUTSIDE FL
11 013 PRIORITY SPECIFICATION IGNORED
12 014 E1200 SPECIFIED - INTERCOM USED (DSP)
13 015 E1200 SPECIFIED - INTERCOM USED (DSP)
14 016 CANNOT ROUTE INPUT FILE
15 017 DSP COMPLETE BIT ALREADY SET
16 020 FILE ON DISMOUNTABLE DEVICE - ROUTING IGNORED
17 021 TID NOT ALPHANUMERIC - ROUTING IGNORED
18 022 FORMS CODE NOT ALPHANUMERIC - ROUTING IGNORED
19 023 INVALID LINK TYPE - ROUTING IGNORED (DSP)
20 024 FILE NOT ON QUEUE DEVICE - ROUTING IGNORED
21 025 PRE-DAYFILE LFN AND NO DC=IN - ROUTE IGNORED
22 026 PRE-DAYFILE FILE NOT FOUND - ROUTE IGNORED
### IPRMS - Parameters for Route

(Unused fields must be set to zero)

<table>
<thead>
<tr>
<th>IPRMS</th>
<th>Contents</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LFN</td>
<td>1-7 char, left**</td>
</tr>
<tr>
<td>2</td>
<td>DC</td>
<td>0 for default - or - 2-char disposition code, left**</td>
</tr>
<tr>
<td>3</td>
<td>TID</td>
<td>0 - or - 1LC - route to central site - or - 3-char terminal ID, left** - or - 4LHERE - route to this terminal</td>
</tr>
<tr>
<td>4</td>
<td>FID</td>
<td>1-7 char file ID - or - 1L* - or - 1-5 char file ID, preceded by * (all left**)</td>
</tr>
<tr>
<td>5</td>
<td>DEF</td>
<td>0 - or - 3LDEF - to defer routing until end-of-job</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Non-zero to return the job name in this word</td>
</tr>
<tr>
<td>7</td>
<td>FC</td>
<td>0 - or - 2-char forms code, left**</td>
</tr>
<tr>
<td>8</td>
<td>EC</td>
<td>0 - use default for print: 2LB4, 2LB6, 2LA6, 2LA9 for punch: 2LSB, 5LB0COL, 3L026, 3L029, 5LASCII</td>
</tr>
<tr>
<td>9</td>
<td>IC</td>
<td>One of: 0 or 3LDIS - display code 5LASCII - ASCII 3LBIN - binary</td>
</tr>
<tr>
<td>10</td>
<td>STID</td>
<td>3-char station (site) ID, left**</td>
</tr>
<tr>
<td>11</td>
<td>PRI</td>
<td>Priority for interactively routed output file being routed to the routing terminal - 1-4 digit octal value (0000B-7777B) for all other files - 0</td>
</tr>
<tr>
<td>12</td>
<td>REP</td>
<td>Repeat count (0-31 (37B))</td>
</tr>
<tr>
<td>13</td>
<td>NCD</td>
<td>0 - or - 1 - no complementary dayfile (valid only if IPRMS(5)=3LDEF)</td>
</tr>
</tbody>
</table>

** left=left-justified, blank or zero padded

NW - Number of last element in IPRMS (optional)

(if omitted, NW=13)

CM required: 347B
EXAMPLES

1) ASSUME THE PROGRAM HAS WRITTEN FILE 'TAPE7' TO BE PRINTED AT CENTRAL SITE:

```
INTEGER IPRMS(13)
IPRMS(1) = 5LTAPE7
IPRMS(2) = 2LPR
IPRMS(3) = 1LC
IPRMS(4) = 1L*
```

REWIND 7
CALL ROUTE (IRC, IPRMS, 4)

THIS WILL SIMULATE: ROUTE.TAPE7,DC=PR,TID=C,FID=*

2) A PROGRAM WISHES TO PUNCH FILE 'PUNCH' AT REMOTE TERMINAL 'O11' AT END OF JOB:

```
INTEGER IPRMS(13)
IPRMS(1) = 2LPUNCH
IPRMS(2) = 2LPU
IPRMS(3) = 3LO11
IPRMS(4) = 1L*
IPRMS(5) = 3LDEF
IPRMS(6) = 1
```

CALL ROUTE (IRC, IPRMS, 6)
IF (IRC .EQ. 0) PRINT 1, IPRMS(6)
1 FORMAT (' TAPE7 WILL BE PRINTED WITH JOB NAME " A7)'

THIS WILL SIMULATE: ROUTE.PUNCH,DC=PU,TID=O11,FID=*,DEF.

3) A PROGRAM CREATES A 'JOB' ON FILE 'TAPE99' TO BE SUBMITTED TO THE SAME INPUT QUEUE AS THE CREATING JOB:

```
INTEGER IPRMS(13)
IPRMS(1) = 6LTAPE99
IPRMS(2) = 2LIN
IPRMS(3) = 4LHERE
```

WRITE (99, 1)
99 FORMAT ('JOBCARD" / "CHARGE CARD" / "....")
REWIND 99
CALL ROUTE (IRC, IPRMS, 3)

THIS WILL SIMULATE: ROUTE.TAPE99,DC=IN,TID.
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND LOC.F MAXD MIND MOVLEV
OR SHIFT
OTHERS
BZFill - CHANGE BLANKS TO OOB
HEX3 - CONVERT 3-DIGIT HEX TO 2-CHAR
TRAILBZ - CHANGE TRAILING BLANKS TO OOB
ZSYSEQ - CALL THE SYSTEM

ARITHMETIC STATEMENT FUNCTIONS
FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
  L1FMT L21FMT L31FMT L52FMT L71FMT
FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
  R1BFMT R21FMT

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/08/75

DATE(S) REVISED
01/24/77 - ADD REP PARAMETER, CHANGE PRI DESCRIPTION
11/30/77 - ADD NCD PARAMETER
10/01/78 - CHANGE TO 3-CHARACTER TID

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ROUTERC'

PURPOSE
SUPPLY DESCRIPTION OF ROUTE RETURN CODE

FUNCTIONAL CATEGORIES: Q0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
THE DESCRIPTIONS ARE THOSE FOUND IN THE "NOS/BE VERSION 1 REFERENCE MANUAL" (60493800 H) ON PAGE 7-82.

USAGE
CALL ROUTERC (IRC, A)

DESCRIPTION OF PARAMETERS
IRC - RETURN CODE FROM SUBROUTINE 'ROUTE'
A - 5-WORD ARRAY WHICH WILL CONTAIN THE DESCRIPTION OF THE SUPPLIED 'IRC'
(IF 'IRC' IS INVALID, 'UNKNOWN RETURN CODE' IS RETURNED)

CM REQUIRED: 625B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
MOVEIT - MOVE AN ARRAY

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/15/77
DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'SBYT'
FUNCTION 'SBYT'

PURPOSE
STORE VARIABLE LENGTH BYTE

FUNCTIONAL CATEGORIES: M4

USAGE
CALL SBYT (N, LENGTH, INTO, FROM)
-OR-
VARIABLE = SBYT (N, LENGTH, INTO, FROM)

DESCRIPTION OF PARAMETERS
N - BEGINNING BIT POSITION IN WORD <INTO> WHERE THE BYTE WILL BE PLACED. BITS ARE NUMBERED FROM 1 TO 60 FROM RIGHT TO LEFT.
LENGTH - LENGTH OF THE BYTE IN BITS. THIS LENGTH STARTS WITH THE RIGHTMOST BIT OF <FROM>.
INTO - WORD INTO WHICH THE BYTE WILL BE PLACED.
FROM - WORD FROM WHICH THE BYTE WILL BE TAKEN FROM THE LOW ORDER BITS.

NOTE: IN THE SECOND Form, <VARIABLE> AND <INTO> WILL CONTAIN THE SAME VALUE. THUS, THEY MAY HAVE THE SAME VARIABLE NAME.

NOTE: BITS 1 THRU <LENGTH> OF WORD <FROM> ARE PLACED INTO BITS <N> THRU (N+LENGTH-1) OF <INTO>.

REMARKS
STORES A 1 TO 60-BIT BYTE FROM ONE WORD INTO ANY POSITION IN A SECOND WORD WITHOUT DISTURBING THE REMAINING PART OF THAT WORD.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
NONE

EXAMPLE
I = 7777 1111 2222 5555 4444B
J = 3333 2222 1111 5555 4436B
AA = SBYT (37, 6, I, J)

RESULTS IN
AA = 7777 1136 2222 5555 4444B
I = 7777 1136 2222 5555 4444B

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 20B

AUTHOR: FROM CDC KRONOS SYSTEM

DATE WRITTEN:

LOCATION OF DECKS
SOURCE: UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT: EDITLIB USER LIBRARY: NSRDC

08/22/77 2-197 SBYT - 1 OF 1
SUBROUTINE 'SEMICO'

PURPOSE
   REPLACE DISPLAY CODE 00B WITH 77B (SEMI-COLON)

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL SEMICO (IA, I)

DESCRIPTION OF PARAMETERS
   IA - (ARRAY) TO BE PROCESSED
   I - NUMBER OF WORDS IN 'IA' TO BE PROCESSED

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
   SHIFT
   OTHERS
   NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 37B

AUTHOR
   ? - NWL

DATE WRITTEN: ?

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSRDCPL.ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

08/22/77  2-198  SEMICO - 1 OF 1
SUBROUTINE 'SETREW'

PURPOSE
CONVERT REWIND OPTION INTO RM OPEN AND CLOSE CODES

FUNCTIONAL CATEGORIES: M4

USAGE
CALL SETREW (REW, OPEN, CLOSE, NOE)
CALL SETREW (REW, OPEN, CLOSE)

DESCRIPTION OF PARAMETERS
REW  - INPUT REWIND OPTION. ONE OF:
A  - OPEN=NOREWIND; CLOSE=REWIND
B  - OPEN=REWIND; CLOSE=NOREWIND
E  - OPEN=POSITION BEFORE END-OF-INFORMATION;
    CLOSE=NOREWIND
EN  - OPEN=POSITION BEFORE EO I; CLOSE=NOREWIND
ER  - OPEN=POSITION BEFORE EO I; CLOSE=REWIND
EU  - OPEN=POSITION BEFORE EO I; CLOSE=UNLOAD
R  - OPEN=REWIND; CLOSE=REWIND
U  - OPEN=REWIND; CLOSE=REWIND AND UNLOAD
OTHER - OPEN=NOREWIND; CLOSE=NOREWIND
(ANY WORDS BEGINNING WITH THESE LETTERS WILL
PRODUCE THE SAME RESULTS. ONLY THE FIRST 1
OR 2 LETTERS ARE RETURNED IN L-FORMAT)
OPEN - WILL CONTAIN OPEN REWIND OPTION (1LE, 1LN, 1LR)
CLOSE - WILL CONTAIN CLOSE REWIND OPTION (1LN, 1LR, 1LU)
NOE - OMITTED OR 0 - ALLOW ALL VALUES OF REW
OTHER - DO NOT ALLOW 'E' VALUES OF REW

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
OTHERS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 113B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/29/75

DATE(S) REVISED
01/29/76
01/11/76 - ADD 'NOE' PARAMETER

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'SHIFTA'

PURPOSE

SHIFT WHOLE ARRAY SPECIFIED NUMBER OF BITS (CROSSING OVER WORD BOUNDARIES)

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS

SEE 'ASHIFT' FOR SHIFTING INDIVIDUAL WORDS OF AN ARRAY.

USAGE

CALL SHIFTA (A, B, N, NBITS)

DESCRIPTION OF PARAMETERS

A - INPUT ARRAY OF DIMENSION 'N'
B - OUTPUT ARRAY OF DIMENSION 'N+1'
(MAY NOT BE SAME AS 'A')
N - NUMBER OF WORDS TO BE PROCESSED
NBITS - NUMBER OF BITS TO SHIFT
<0 - SHIFT TO LEFT
   (LEFTMOST BITS LOST, TRAILING BITS SET TO 0, B(N1 NOT DEFINED)
   =0 - JUST MOVE (B(N1) IS SET TO 0)
  >0 - SHIFT TO RIGHT
   (LEADING AND TRAILING BITS SET TO 0)

CM REQUIRED: 116B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 04/26/74

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
FUNCTION 'SIMPUN'

PURPOSE
SIMPSON'S RULE INTEGRATION - EQUAL OR UNEQUAL INTERVALS

FUNCTIONAL CATEGORIES: D1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
VALUE = SIMPUN (X, Y, N)

DESCRIPTION OF PARAMETERS
X - ARRAY OF MONOTONE X-VALUES
Y - ARRAY OR CORRESPONDING Y-VALUES
N - NUMBER OF VALUES

CM REQUIRED: 1026

ERROR MESSAGE
L=XXXXX, X=X.XXXXXX E+YY, X NOT MONOTONE STOP
SELF-EXPLANATORY

METHOD
THE INTEGRAL FROM X1 TO XN OF YDX IS EVALUATED BY FITTING
PARABOLAS TO SUCCESSIVE INTERVALS AND INTEGRATING OVER
THE INTERVALS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHORS
WERNER FRANK
SHARON E GOOD - DTNSRDC CODE 1892.1

DATE WRITTEN:

DATE(S): REVISED
06/29/58 - SEG

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY ON TAPE LABELLED: CLIBRARYUPD3
(*DECK AMSIUF)

OBJECT
EDIT-LIB USER LIBRARY: NSRDC

10'18'77 2-201 SIMPUN - 1 OF 1
SUBROUTINE 'SKWEZL'

PURPOSE
SQUEEZE LEFT AND REMOVE BLANKS AND OOB

FUNCTIONAL CATEGORIES: M4

USAGE
CALL SKWEZL (A, NA, NC, NW)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE SQUEEZED
    (WILL BE REPLACED BY SQUEEZED ARRAY)
NA - NUMBER OF WORDS TO BE SQUEEZED
NC - OUTPUT NUMBER OF CHARACTERS IN SQUEEZED ARRAY
NW - OUTPUT NUMBER OF WORDS IN SQUEEZED ARRAY

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE

OTHERS
GETCHA - EXTRACT CHARACTER FROM ARRAY
PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 111B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/19/76

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE ‘SKWEZR’

PURPOSE
  SQUEEZE RIGHT AND REMOVE BLANKS AND OOB

FUNCTIONAL CATEGORIES: M4

USAGE
  CALL SKWEZR (A, NA, NC, NW)

DESCRIPTION OF PARAMETERS
  A  - ARRAY TO BE SQUEEZED
       (WILL BE REPLACED BY SQUEEZED ARRAY)
  NA - NUMBER OF WORDS TO BE SQUEEZED
  NC - OUTPUT POSITION OF FIRST NON-ZERO CHARACTERS IN
       SQUEEZED ARRAY (POSITION 1 IS LEFTMOST CHARACTER IN
       A(1))
  NW - OUTPUT SUBSCRIPT OF FIRST NON-ZERO WORD

REMARKS
  NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
  PART OF LANGUAGE
    NONE
  OTHERS
    GETCHA - EXTRACT CHARACTER FROM ARRAY
    PUTCHA - PUT CHARACTER INTO ARRAY

ARITHMETIC STATEMENT FUNCTIONS
  NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 115B

AUTHOR
  DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/19/76

DATE(S) REVISED

LOCATION OF DECKS
  SOURCE
    UPDATE LIBRARY: NSRDCPL.ID=CSYS
  OBJECT
    EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'SNCNDN'

PURPOSE

EVALUATE THE THREE JACOBIAN ELLIPTIC FUNCTIONS

FUNCTIONAL CATEGORIES: C3

LANGUAGE: FORTRAN IV

REMARKS

IF CM=0 AND ABS(X) > (2K/PI)*6.87E10, WHERE K IS THE QUARTER
PERIOD OF SN, THE ERROR MESSAGE
SNCNDN ARGUMENT X TOO LARGE. X=
IS PRINTED ON FILE 'OUTPUT'.

USAGE

CALL SNCNDN (X, CM, SN, CN, DN)

DESCRIPTION OF PARAMETERS

X  - INPUT PARAMETER
CM  - INPUT PARAMETER
SN  - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF SN(X,K)
CN  - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF CN(X,K)
DN  - OUTPUT PARAMETER - WILL CONTAIN THE VALUE OF DN(X,K)

CM REQUIRED: 310B

OUTPUT UNITS

UNIT #  LFN  USE
--------  ------  -------------------------------
OUTPUT     ERROR MESSAGE (SEE REMARKS)

METHOD

GAUSS TRANSFORMATION

REFERENCE

BULIRSCH, R, "NUMERICAL CALCULATIONS OF ELLIPTIC INTEGRALS
AND ELLIPTIC FUNCTIONS", NUMERISCHE MATHEMATIK, 7, 1965,
PP. 78-90

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED

PART OF LANGUAGE
ABS  EXP  SIGN  SIN  SQRT
OTHERS
NONE

AUTHOR

R BULIRSCH

DATE WRITTEN: 01/68

DATE(S) REVISED

LOCATION OF DECKS

SOURCE
CODE 1892.1
OBJECT
EDITLIB USER LIBRARY: NSRDC

01/25/81  2-204  SNCNDN - 1 OF 1
SUBROUTINE 'SSORT'

PURPOSE
FTN-CALLABLE SHELL SORT FOR REAL ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
CALL SSORT (A, I, T)
CALL SSORT (A, I)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED
I - NUMBER OF ELEMENTS TO BE SORTED
T - IF PRESENT, AN ASSOCIATED ARRAY RE-ORDERED TO MAINTAIN
1 TO 1 CORRESPONDENCE WITH THE ELEMENTS OF ARRAY 'A'

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 116B

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 12/07/70

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

03/07/79 2-205 SSORT - 1 OF 1
SUBROUTINE 'SSORTF'

PURPOSE
FTN-CALLABLE SHELL SORT FOR TWO-DIMENSIONAL REAL ARRAYS

FUNCTIONAL CATEGORIES: M1

LANGUAGE: FORTRAN IV

REMARKS
THIS ROUTINE IS INEFFICIENT IF M .GT. 10.

USAGE
CALL SSORTF (A, TEMP, M, N, I)
CALL SSORTF (A, TEMP, M, N)

DESCRIPTION OF PARAMETERS
A - REAL ARRAY TO BE SORTED
TEMP - TEMPORARY ARRAY OF DIMENSION M USED IN THE SORT
M - NUMBER OF WORDS PER ITEM
N - NUMBER OF ITEMS PER ARRAY
(DIMENSION OF A IS A(M,N))
I - IF PRESENT, NUMBER FROM 1 TO M SPECIFYING ON WHICH
   WORD OF AN ITEM TO SORT.
   IF OMITTED, I=1.

CM REQUIRED: 117B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF, SHIFT
OTHERS
MOVECM - MOVE AN ARRAY

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 01/10/71

DATE(S) REVISED
11/23/76 - DVS - DTNSRDC - CHANGE SUBROUTINE SENT TO MOVLEV
02/21/80 - DVS - DTNSRDC - CHANGE MOVLEV TO MOVECM

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

02/21/80 2-206 SSORTF - 1 OF 1
SUBROUTINE 'SSORTI'

PURPOSE
FTN-CALLABLE SHELL SORT FOR TWO-DIMENSIONAL INTEGER ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
CALL SSORTI (A, TEMP, M, N, I)
CALL SSORTI (A, TEMP, M, N)

DESCRIPTION OF PARAMETERS
A - INTEGER ARRAY TO BE SORTED
TEMP - TEMPORARY ARRAY OF DIMENSION M USED IN THE SORT
M - NUMBER OF WORDS PER ITEM
N - NUMBER OF ITEMS PER ARRAY
DIMENSION OF A IS A(M,N)
I - IF PRESENT, NUMBER FROM 1 TO M SPECIFYING ON WHICH WORD OF AN ITEM THE ARRAY IS TO BE SORTED.
    IF ABSENT, THE ARRAY WILL BE SORTED ON THE FIRST WORD (I=1).

REMARKS
THIS ROUTINE IS INEFFICIENT IF M .GT. 10.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
    LOCF    SHIFT
OTHERS
    MOVECM - MOVE AN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 141B

AUTHOR
    C FLINK - KPS NWL
    ALBAN P GASS - NWL
    DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/10/71

DATE(S) REvised
03/10/74 - APG - CHANGE FROM REAL TO INTEGER
06/09/76 - DVS - CHANGE SUBROUTINE SENT TO MOVELEV
02/21/80 - DVS - CHANGE SUBROUTINE MOVELEV TO MOVECM

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'SSORTL'

PURPOSE
    FTN-CALLABLE LOGICAL SHELL SORT FOR CHARACTER ARRAYS

FUNCTIONAL CATEGORIES: M1

USAGE
    CALL SSORTL (A, I, M, T)
    CALL SSORTL (A, I, M)

DESCRIPTION OF PARAMETERS
A - CHARACTER ARRAY TO BE SORTED
I - NUMBER OF ELEMENTS IN ARRAY 'A' TO BE SORTED
M - MASK WORD WITH THE RELEVANT BITS SET
T - IF PRESENT, ASSOCIATED ARRAY, RE-ORDERED SUCH THAT
    A(I) STILL RELATES TO T(I)

REMARKS
    NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
    PART OF LANGUAGE
        LOCF
        SHIFT
    OTHERS
        EQU60

ARITHMETIC STATEMENT FUNCTIONS
    NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 114B

AUTHOR
    C FLINK - KPS NWL

DATE WRITTEN: 12/03/70

DATE(S) REVISED

LOCATION OF DECKS
    SOURCE
        UPDATE LIBRARY: NSRDCPL.ID=CSYS
    OBJECT
        EDITLIB USER LIBRARY: NSRDC
FUNCTION 'SUMIT'

PURPOSE
SUM ELEMENTS OF REAL ARRAY

FUNCTIONAL CATEGORIES: A1

LANGUAGE: FORTRAN IV

REMARKS
NONE

USAGE
ITOTAL = SUMIT (ARRAY, N)

DESCRIPTION OF PARAMETERS
SUMIT - WILL CONTAIN ARRAY(1)+ARRAY(2)+...+ARRAY(N)
ARRAY - ARRAY TO BE SUMMED
N - NUMBER OF ELEMENTS OF ARRAY TO BE SUMMED

CM REQUIRED: 16B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/23/76

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'SWAP'

PURPOSE
SWAP TWO ARRAYS

FUNCTIONAL CATEGORIES: K2

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000
BURROUGHS B7700

REMARKS
NONE

USAGE
CALL SWAP (A, B, NWORDS)

DESCRIPTION OF PARAMETERS
A, B - ARRAYS TO BE SWAPPED (REAL OR INTEGER ON B7700)
NWORDS - NUMBER OF WORDS TO BE SWAPPED

CM REQUIRED: B7700: 136 WORDS
CDC : 168 WORDS

EXAMPLE
PROGRAM TEST (OUTPUT=128)
INTEGER A(10), B(10)
DATA A/ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10/
DATA B/ 10, 9, 6, 7, 6, 5, 4, 3, 2, 1/
CALL SWAP (A, B, 10)
C ARRAY A NOW CONTAINS 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
C ARRAY B NOW CONTAINS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
...

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/12/80

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

01/06/81 2-210 SWAP - 1 OF 1
SUBROUTINE 'TIMLEFT'

PURPOSE
DETERMINE CP (AND IO) TIME LEFT SINCE START OF BATCH JOB
OR INTERCOM COMMAND

FUNCTIONAL CATEGORIES: QO

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL TIMLEFT (CP, XIO)
CALL TIMLEFT (CP)

DESCRIPTION OF PARAMETERS
CP - WILL CONTAIN CP TIME REMAINING
XIO - IF PRESENT, WILL CONTAIN IO TIME REMAINING
 IF NEGATIVE, THE SYSTEM IS NOT TESTING IO TIME.
 THE TOTAL IO TIME USED IS ABS(XIO).)

CM REQUIRED: 658

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND FLOAT SHIFT
OTHERS
RCPA - READ CONTROL POINT AREA

ARITHMETIC STATEMENT FUNCTIONS
 R65FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/27/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'TRAILBZ'

PURPOSE
CHANGE TRAILING BLANKS TO ZEROS (00B)

FUNCTIONAL CATEGORIES: M4

USAGE
CALL TRAILBZ (A, N)
CALL TRAILBZ (A, N, NW)
CALL TRAILBZ (A, N, NW, NC)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
N - NUMBER OF WORDS OF 'A' TO BE PROCESSED
NW - NUMBER OF LAST NON-BLANK WORD OF 'A'
   (0 LE NW LE N)
   (NW=0 MEANS ALL OF 'A' IS BLANK)
NC - POSITION OF LAST NON-BLANK CHARACTER OF A(NW)
   (0 LE NC LE 10)
   (NC=0 MEANS ALL OF 'A' IS BLANK)

REMARKS
00B IS TREATED AS A BLANK.

THIS SUBROUTINE IS USEFUL WHEN Generating MESSAGES FOR
PRINTING IN THE DAYFILE USING 'CALL REMARK'. AFTER
A MESSAGE IS GENERATED WITH AN ENCODE, A CALL TO 'TRAILBZ'
WILL REMOVE ANY TRAILING BLANKS. THIS WILL RESULT IN
THE SHORTEST POSSIBLE MESSAGE. THIS IS PARTICULARLY
DESIRABLE FOR PROGRAMS WHICH ARE RUN FROM TELETYPewriter,
SINCE TRAILING BLANKS ARE NOT SUPPRESSED FOR DAYFILE
MESSAGES.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
LOCF
MASK
SHIFT

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1226

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/08/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
TAPE LABELLED CSYSNSRDCPL: P.F. NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

08/22/77 2-212 TRAILBZ - 1 OF 1
FUNCTION 'UNHEX3'

PURPOSE
SPREAD 2 CHARACTERS INTO 3 HEX DIGITS

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'UNHEX3' IS AN INTEGER FUNCTION.

WRITTEN TO CHANGE 2-CHARACTER INTERNAL TERMINAL ID INTO
3-CHARACTER (HEX) TERMINAL ID

USAGE
I = UNHEX3 (INTTID)

DESCRIPTION OF PARAMETERS
INTTID - INPUT INTERNAL TID (E.G., 2L@D)
UNHEX3 - OUTPUT IN FIRST 3 CHARACTERS (E.G., 3LF04)

CM REQUIRED: 43B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/78

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'UNLOAD'

PURPOSE
UNLOAD A FORTRAN FILE

FUNCTIONAL CATEGORIES: Q3

USAGE
CALL UNLOAD (IOUNIT)

DESCRIPTION OF PARAMETER
IOUNIT - FORTRAN LOGICAL UNIT NUMBER

REMARKS
THE FILE TO BE UNLOADED MUST BE LISTED IN THE FORTRAN PROGRAM STATEMENT. FOR NON-STANDARD FILES, SEE 'CLUNLD'. FORTRAN SEQUENTIAL FILES SHOULD HAVE THEIR BUFFERS FLUSHED BY ISSUING A REWIND BEFORE CALLING THIS ROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
CLU>XX - UNLOAD A FILE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 21B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 03/07/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

01 30:51
2-214
UNLOAD - 1 OF 1
FUNCTION 'VALDAT'

PURPOSE
LOGICAL FUNCTION TO VALIDATE A DATE FORMAT

FUNCTIONAL CATEGORIES: M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
'VALDAT' MUST BE DECLARED LOGICAL IN THE CALLING PROGRAM.

UPON RETURN, IF THE FORMAT WAS VALID, THE DATE IS RETURNED AS 'MM/DD/YY'.

USAGE
VALDAT (DATE)

DESCRIPTION OF PARAMETERS
DATE - DATE TO BE ANALYZED
(IF FORMAT OK, RETURNED AS 'MM/DD/YY')
VALDAT - WILL CONTAIN
.TRUE. - DATE FORMAT WAS OK
.FALSE. - DATE FORMAT WAS NOT OK

CM REQUIRED: 162B

METHOD
DATE FORMAT IS VALIDATED BY THE FOLLOWING CHECKS:
EXACTLY 2 SLASHES
SLASHES SEPARATED BY 1 OR 2 CHARACTERS
SLASHES NOT IN POSITIONS 1, 9 OR 10
MONTH CONTAINS 1 OR 2 DIGITS (LEADING BLANKS OK)
DAY CONTAINS 1 OR 2 DIGITS (LEADING BLANKS OK)
YEAR CONTAINS 2 DIGITS
VALDAT RETURNS IF ANY CHECK FAILS.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND OR SHIFT
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/26/77

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC

07/26'77 2-215 VALDAT - 1 OF 1
SUBROUTINE 'VALIDT'

PURPOSE
VALIDATE ARRAY 'A' TO SEE THAT EACH ELEMENT IS ONE OF THOSE OF ARRAY 'V'

FUNCTIONAL CATEGORIES: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
NONE

USAGE
CALL VALIDT (A, NA, V, NV, VALID)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE VALIDATED
NA - NUMBER OF ELEMENTS OF 'A' TO BE TESTED
V - ARRAY OF VALID ELEMENTS
NV - NUMBER OF ELEMENTS IN 'V'
VALID - LOGICAL OUTPUT CODE
   TRUE - ALL ELEMENTS OF 'A' ARE VALID
   FALSE - AT LEAST 1 ELEMENT OF 'A' IS INVALID

CM REQUIRED: 54B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
   NONE
OTHERS
   NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 10/72

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
   UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
   EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'VFILL'

PURPOSE
FILL AN ARRAY WITH USER-SPECIFIED WORD

FUNCTIONAL CATEGORIES: M4

LANGUAGE: CDC 6000 COMPASS
B7700 FORTRAN IV

COMPUTERS: BURROUGHS B7700
CDC 6000

REMARKS
NONE

USAGE
CALL VFILL (WORD, A, NA)

DESCRIPTION OF PARAMETERS
WORD - WORD TO BE PUT INTO ARRAY 'A'
A - ARRAY TO RECEIVE 'WORD'
NA - NUMBER OF WORDS IN 'A' TO BE SET TO 'WORD'

CM REQUIRED: ?B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 02/10/71

DATE(S) REVISED
??/??/74 - DAVID V SOMMER - DINSRDC CODE 1892.2
(NAME CHANGED FROM 'MOVE' TO 'VFILL')
05/01/79 - MOVE TO BURROUGHS B7700
(CHANGE TO FORTRAN - DVS)

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/VFILL
CDC : UPDATE LIBRARY: NSRDCPL, ID=CSYS

OBJECT
B7700: *NSRDC/VFILL
CDC : EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'WARNING'

PURPOSE
   FTN-CALLABLE 'WARNING' CONTROL CARD

FUNCTIONAL CATEGORIES: 01

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
   CDC 6000

REMARKS
   NONE

USAGE
   CALL WARNING (BANNER, OUTFILE)

DESCRIPTION OF PARAMETERS
   BANNER - BANNER REQUEST. ONE OF:
       "FOUO" - FOR OFFICIAL USE ONLY
       "OFFICIAL" - FOR OFFICIAL USE ONLY
       "PRIVACY" - PERSONAL DATA PRIVACY ACT OF 1974
       "CONFIDENTIAL" - CONFIDENTIAL
       "SECRET" - SECRET

   NOTE: ONLY THE FIRST 7 CHARACTERS ARE TESTED.

   OUTFILE - FORTRAN LOGICAL UNIT NUMBER OF THE OUTPUT FILE

CM REQUIRED: 1735B

OUTPUT DESCRIPTION
   ONE BANNER PAGE WITH THE REQUESTED BANNER.

OUTPUT UNITS
   UNIT #  LFN USE
   -------- --------
   USER SPECIFIES LISTABLE OUTPUT
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
AND
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
L71FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 09/19/79

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL,ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'WEKDAY'

PURPOSE
DETERMINE THE DAY OF THE WEEK FOR ANY GREGORIAN DATE FROM
OCTOBER 15, 1582 THRU FEBRUARY 28, 4000

FUNCTIONAL CATEGORIES: M2

LANGUAGE: FORTRAN IV

COMPUTERS: BURROUGHS B7700. CDC 6000

REMARKS
DATES FROM JANUARY 1, 1582 THRU OCTOBER 14, 1582 AND
AFTER FEBRUARY 28, 4000 THRU DECEMBER 31, 4000 ARE NOT
VALIDATED.

USAGE
CALL WEKDAY (IERR, IDAY, IGY, IGM, IGD)

DESCRIPTION OF PARAMETERS
IERR - RETURN CODE
  0 - NO ERROR
  1 - AT LEAST ONE OF IGY, IGM, IGD OUT OF RANGE
IDAY - WILL CONTAIN DAY-OF-WEEK
  0 (SUNDAY) THRU 6 (SATURDAY)
IGY - GREGORIAN YEAR (EG, 1975)
IGM - GREGORIAN MONTH (1-12)
IGD - GREGORIAN DAY (1-31)

CM REQUIRED: EST 123 WORDS (B7700): 102B (CDC)

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD
OTHERS
NONE

METHOD
SEE IBM PROGRAM DESCRIPTION 360D 03.1.004

AUTHOR
RICHARD CONNER - IBM

DATE WRITTEN: 10/15/66

DATE(S) REVISED
04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS
04/25/79 - IMPLEMENTED ON BURROUGHS B7700 - DVS

LOCATION OF DECKS
SOURCE
B7700: *SOURCE/NSRDC/WEKDAY
CDC : UPDATE LIBRARY: NSRDCPL.UD=CSYS

OBJECT
B7700: *NSRDC/WEKDAY
CDC : EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ZBLANK'

PURPOSE
   CHANGE BLANKS TO 00B AND VICE VERSA

FUNCTIONAL CATEGORIES: M4

USAGE
   CALL ZBLANK (A, NA)

DESCRIPTION OF PARAMETERS
   A - START OF AREA TO BE PROCESSED
   NA - NUMBER OF WORDS TO BE PROCESSED

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
   AND
   OTHERS
   NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 46B

AUTHOR
   J. P. - KPS - NWL

DATE WRITTEN: 1973

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
   UPDATE LIBRARY: NSRDCPL.ID=CSYS
   OBJECT
   EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ZEROFL'

PURPOSE
    ZERO FIELD LENGTH (SECURITY EOJ)

FUNCTIONAL CATEGORIES: M4

USAGE
    CALL ZEROFL

REMARKS
    'ZEROFL' ZEROS THE JOB'S FIELD LENGTH ABOVE 77B AND ENDS
    THE JOB WITHOUT DAYFILE MESSAGES.
    THE INTENDED USE IS AS THE TERMINATION ROUTINE, CALLED BY
    REPRIEVE, WHENEVER A UTILITY PROGRAM HAS WITHIN ITS FIELD
    LENGTH DATA THAT SHOULD NOT APPEAR IN A USER'S DUMP.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
    PART OF LANGUAGE
        NONE
    OTHERS
        NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 21B

AUTHOR
    C FLINK - KP NWL

DATE WRITTEN: 08/73

DATE(S) REVISED

LOCATION OF DECKS
    SOURCE
        UPDATE LIBRARY: NSRDCPL,ID=CSYS
    OBJECT
        EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ZEROS'
SUBROUTINE 'ZEROES'

PURPOSE
REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS

FUNCTIONAL CATEGORIES: M4

USAGE
CALL ZEROS (A, S1, L1, S2, L2, .... SN, LN)
CALL ZEROES (A, S1, L1, S2, L2, .... SN, LN)

DESCRIPTION OF PARAMETERS
A - ARRAY TO BE PROCESSED
S - STARTING BYTE OF A FIELD
L - NUMBER OF BYTES IN THIS FIELD TO PROCESS
(UP TO 31 PAIRS OF S1,L1)

REMARKS
'ZEROS' WILL REPLACE BLANKS WITH ZEROS UP TO THE 1ST
NON-BLANK CHARACTER IN A GIVEN FIELD.
IF THE 1ST NON-BLANK CHARACTER IS MINUS (-), THEN THAT
CHARACTER POSITION IS REPLACES WITH A ZERO AND THE 1ST
CHARACTER IN THE FIELD IS REPLACED WITH A MINUS (-).

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 55B

AUTHOR
T HERRING - KPS NWL

DATE WRITTEN: 12/09/70

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ZPFPUT'

PURPOSE
PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ZPFUNC

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
CDC 6000

USAGE
CALL ZPFPUT (IPRMS, NW)
CALL ZPFPUT (IPRMS, NW, LFN, PFN, ID, TK, RD, EX, MD, CN, MR, AC, CY, RP, XR, LC, RW, SN, VSN, FO, ST, UV, RB)

FOR EXAMPLE:
CALL ZPFPUT (IPRMS, 0)
CALL ZPFPUT (IPRMS, 1, LFN)
CALL ZPFPUT (IPRMS, 5, LFN, PFN)
CALL ZPFPUT (IPRMS, 6, LFN, PFN, ID)

CALL ZPFPUT (IPRMS, 13, LFN, PFN, ID, TK, RD, EX, MD, CN, MR, AC)

CALL ZPFPUT (IPRMS, 24, LFN, PFN, ID, TK, RD, EX, MD, CN, MR, AC, CY, RP, XR, LC, RW, SN, VSN, FO, ST, UV, RB)

DESCRIPTION OF PARAMETERS
IPRMS - ARRAY (MAXIMUM REQUIRED DIMENSION 24) TO BE DEFINED
NW - 0 - SET ALL 24 WORDS TO ZERO
       1 THRU 24 - DEFINE NW PARAMETERS FROM THE FOLLOWING
LFN - LOCAL FILE NAME (1-7 CHARACTERS)
PFN - 4-WORD PERMANENT FILE NAME
ID - 1-9 CHARACTERS
TK - TURNKEY PASSWORD (1-9 CHARACTERS)
RD - READ PASSWORD (1-9 CHARACTERS)
EX - EXTEND PASSWORD (1-9 CHARACTERS)
MD - MODIFY PASSWORD (1-9 CHARACTERS)
CN - CONTROL PASSWORD (1-9 CHARACTERS)
MR - MULTIPLE-READ (0 OR NOT)
AC - ACCOUNT NUMBER (10 CHARACTERS, LAST IS NUMERIC)
CY - CYCLE (INTEGER -999 TO -1, 1 TO 999)
RP - RETENTION PERIOD (0-999)
XR - READ-ONLY PASSWORD (1-9 CHARACTERS)
LC - LOWEST CYCLE (0 OR NOT)
RW - MULTI-READ, SINGLE WRITE (0 OR NOT)
SN - SETNAME (1-7 CHARACTERS)
VSN - VOLUME SERIAL NUMBER (1-6 CHARACTERS, LEFT-JUSTIFIED), RESERVED FOR FUTURE.
FO - FILE ORGANIZATION (2-CHARACTERS)
ST - STATION ID (MULTI-FRAME), RESERVED FOR FUTURE.
UV - UNIVERSAL PASSWORD (1-9 CHARACTERS)
RB - PURGE RB CONFLICTS (0 OR NOT)

NOTE: ALL VARIABLES ARE TYPE INTEGER. CHARACTER DATA IS LEFT-JUSTIFIED AND MAY BE ZERO- OR BLANK-PADDED. TO CLEAR (OR OMIT) A SPECIFIC PARAMETER, USE 0.

CM REQUIRED: 144B

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MIND
OTHERS
NONE

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/13/76

DATE REvised
01/26/76
03/23/80 - UPGRADE TO LEVEL 508 (UV AND RB ADDED)

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL, ID=CSYS
OBJECT
EDILIB USER LIBRARY: NSRDC

CP 30 61 2-225 ZPPPUT - 2 OF 2
SUBROUTINE 'ZPFUNC'

PURPOSE
   CALLABLE PERMANENT FILE FUNCTIONS

FUNCTIONAL CATEGORIES: Q3

LANGUAGE: FORTRAN IV EXTENDED

COMPUTERS
   CDC 6000

USAGE
   CALL ZPFUNC (IRC, IPRMS, NW)

DESCRIPTION OF PARAMETERS
IRC - INPUT: PERMANENT FILE FUNCTION DESIRED
   1 - ATTACH (10B)
   2 - CATALOG (20B)
   3 - EXTEND (30B)
   4 - PURGE (40B)
   5 - RENAME (50B)
   6 - PERM (60B)
   24 - ALTER

   IF THE VALUE IN PARENTHESES IS USED, THE 2- OR 3-LINE SYSTEM MESSAGE WILL APPEAR IN THE
   DAYFILE.

OUTPUT: ERROR RETURN CODE
   (EITHER ZPFUNC- OR NOS/BE-GENERATED)

ZPFUNC-GENERATED
IRC MEANING
--- --------
-1IRC HAD ILLEGAL INPUT VALUE
-2LAST CHARACTER OF AC IS NOT DISPLAY CODE NUMERIC

NOS/BE-GENERATED: SEE NEXT PAGE
<table>
<thead>
<tr>
<th>DEC</th>
<th>OCT</th>
<th>COMND</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>000</td>
<td>ALL</td>
<td>FUNCTION SUCCESSFUL</td>
</tr>
<tr>
<td>1</td>
<td>001</td>
<td>PFN/ID</td>
<td>ERROR</td>
</tr>
<tr>
<td>2</td>
<td>002</td>
<td>A,P</td>
<td>LFN ALREADY IN USE</td>
</tr>
<tr>
<td>3</td>
<td>003</td>
<td>CEPR</td>
<td>UNKNOWN LFN</td>
</tr>
<tr>
<td>4</td>
<td>004</td>
<td>C</td>
<td>TOO MANY CYCLES (5 MAX)</td>
</tr>
<tr>
<td>5</td>
<td>005</td>
<td>C,E</td>
<td>PF CATALOG FULL</td>
</tr>
<tr>
<td>6</td>
<td>006</td>
<td></td>
<td>NO LFN OR PFN</td>
</tr>
<tr>
<td>8</td>
<td>010</td>
<td>C,E</td>
<td>LATEST INDEX NOT WRITTEN</td>
</tr>
<tr>
<td>9</td>
<td>011</td>
<td>C</td>
<td>FILE NOT ON A PF DEVICE</td>
</tr>
<tr>
<td>10</td>
<td>012</td>
<td>A</td>
<td>FILE NOT CATALOGED; SN=(SETNAME)</td>
</tr>
<tr>
<td>11</td>
<td>013</td>
<td>A</td>
<td>ARCHIVE RETRIEVAL ABORTED</td>
</tr>
<tr>
<td>12</td>
<td>014</td>
<td>C,R</td>
<td>BAD LPF COMMUNICATION</td>
</tr>
<tr>
<td>13</td>
<td>015</td>
<td>C</td>
<td>CY LIMIT REACHED (999 MAX)</td>
</tr>
<tr>
<td>14</td>
<td>016</td>
<td>C</td>
<td>PF DIRECTORY FULL</td>
</tr>
<tr>
<td>15</td>
<td>017</td>
<td>CEPR</td>
<td>FUNCTION ATTEMPTED ON A NON-PERMANENT FILE</td>
</tr>
<tr>
<td>16</td>
<td>020</td>
<td>FCN</td>
<td>ATTEMPTED ON NON-LOCAL FILE</td>
</tr>
<tr>
<td>17</td>
<td>021</td>
<td>A</td>
<td>IMPROPER ARCHIVE RETRIEVAL CALL</td>
</tr>
<tr>
<td>18</td>
<td>022</td>
<td>C</td>
<td>FILE NEVER ASSIGN TO A DEVICE</td>
</tr>
<tr>
<td>19</td>
<td>023</td>
<td>A</td>
<td>CYCLE INCOMPLETE OR DUMPED</td>
</tr>
<tr>
<td>20</td>
<td>024</td>
<td>A</td>
<td>FILE ALREADY ATTACHED</td>
</tr>
<tr>
<td>21</td>
<td>025</td>
<td>A</td>
<td>FILE Archived</td>
</tr>
<tr>
<td>22</td>
<td>026</td>
<td>A</td>
<td>ILLEGAL CHARACTER IN FDB PARAM</td>
</tr>
<tr>
<td>23</td>
<td>027</td>
<td>C</td>
<td>ILLEGAL LFN</td>
</tr>
<tr>
<td>24</td>
<td>030</td>
<td>A</td>
<td>FILE DUMPED</td>
</tr>
<tr>
<td>25</td>
<td>031</td>
<td>A</td>
<td>ILLEGAL FUNCTION CODE</td>
</tr>
<tr>
<td>26</td>
<td>032</td>
<td>P</td>
<td>PURGE ATTEMPT IGNORED; USE RB PARAMETER</td>
</tr>
<tr>
<td>27</td>
<td>033</td>
<td></td>
<td>ALTER NEEDS EXCLUSIVE ACCESS</td>
</tr>
<tr>
<td>28</td>
<td>034</td>
<td>C</td>
<td>FDB IS TOO LARGE</td>
</tr>
<tr>
<td>29</td>
<td>035</td>
<td>A</td>
<td>FILE ALREADY IN SYSTEM</td>
</tr>
<tr>
<td>30</td>
<td>036</td>
<td>A</td>
<td>NO APF SPACE</td>
</tr>
<tr>
<td>31</td>
<td>037</td>
<td>C</td>
<td>PERMISSION CONFLICTS</td>
</tr>
<tr>
<td>32</td>
<td>040</td>
<td>C</td>
<td>ILLEGAL SETNAME SPECIFIED</td>
</tr>
<tr>
<td>33</td>
<td>041</td>
<td>C</td>
<td>DEVICE NOT MOUNTED AT CTL POINT</td>
</tr>
<tr>
<td>34</td>
<td>042</td>
<td>A,P</td>
<td>RBT CHAIN TOO LARGE FOR PFC</td>
</tr>
<tr>
<td>35</td>
<td>043</td>
<td>A,P</td>
<td>FILE RESIDES ON UNAVAILABLE DEVICE</td>
</tr>
<tr>
<td>36</td>
<td>044</td>
<td>A,P</td>
<td>FILE NOT AVAILABLE</td>
</tr>
<tr>
<td>50</td>
<td>070</td>
<td>A</td>
<td>PFM STOPPED BY SYSTEM</td>
</tr>
<tr>
<td>57</td>
<td>071</td>
<td>C</td>
<td>INCORRECT PERMISSION</td>
</tr>
<tr>
<td>58</td>
<td>072</td>
<td>A,P</td>
<td>FILE DEFINITION BLOCK ADDRESS INVALID (NOT RETURNED TO FDB)</td>
</tr>
<tr>
<td>59</td>
<td>073</td>
<td></td>
<td>I/O ERROR ON PFD/PFC READ/WRITE</td>
</tr>
</tbody>
</table>

* - ALWAYS CAUSES ABNORMAL JOB TERMINATION
**IPRMS - PARAMETERS FOR PF FUNCTION**
(UNUSED FIELDS MUST BE SET TO ZERO)

<table>
<thead>
<tr>
<th>IPRMS</th>
<th>CONTENTS</th>
<th>FUNCTIONS</th>
<th>FORMAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LFN</td>
<td>ALL</td>
<td>1-7 CHAR, LEFT*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(IF 0, 1ST 7 CHAR OF PFN ARE USED (A,C,P))</td>
</tr>
<tr>
<td>2-5</td>
<td>PFN</td>
<td>A,C,P,R</td>
<td>1-40 CHAR, LEFT</td>
</tr>
<tr>
<td>6</td>
<td>ID</td>
<td>A,C,P,R</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>7</td>
<td>TK</td>
<td><strong>,</strong>*</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>8</td>
<td>RD</td>
<td><strong>,</strong>*</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>9</td>
<td>EX</td>
<td><strong>,</strong>*</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>10</td>
<td>MD</td>
<td><strong>,</strong>*</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>11</td>
<td>CN</td>
<td><strong>,</strong>*</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>12</td>
<td>MR</td>
<td>A,C</td>
<td>0 OR NOT</td>
</tr>
<tr>
<td>13</td>
<td>AC</td>
<td>C,R**,***</td>
<td>10 CHAR (LAST 3 NUMERIC)</td>
</tr>
<tr>
<td>14</td>
<td>CY</td>
<td>A,C,P,R</td>
<td>INTEGER (1-999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NEGATIVE TO RETURN VALUE</td>
</tr>
<tr>
<td>15</td>
<td>RP</td>
<td>C,R</td>
<td>INTEGER (0-999)</td>
</tr>
<tr>
<td>16</td>
<td>XR</td>
<td>C,R**,***</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>17</td>
<td>LC</td>
<td>A,P</td>
<td>0 OR NOT</td>
</tr>
<tr>
<td>18</td>
<td>RW</td>
<td>A,C</td>
<td>0 OR NOT</td>
</tr>
<tr>
<td>19</td>
<td>SN</td>
<td>A,P</td>
<td>1-7 CHAR, LEFT</td>
</tr>
<tr>
<td>20</td>
<td>VSN</td>
<td></td>
<td>VOLUME SERIAL NUMBER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(RESERVED FOR FUTURE)</td>
</tr>
<tr>
<td>21</td>
<td>FO</td>
<td>C</td>
<td>2-CHAR, LEFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(DA, IS, AK)</td>
</tr>
<tr>
<td>22</td>
<td>ST</td>
<td></td>
<td>STATION ID (MULTI-FRAME)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(RESERVED FOR FUTURE)</td>
</tr>
<tr>
<td>23</td>
<td>UV</td>
<td>A,P</td>
<td>1-9 CHAR, LEFT</td>
</tr>
<tr>
<td>24</td>
<td>RB</td>
<td>P</td>
<td>0 OR NOT</td>
</tr>
</tbody>
</table>

A=ATTACH: C=CATALOG: P=PURGE: R=RENAME

* LEFT=LEFT-JUSTIFIED, BLANK OR ZERO PADDED
** FOR L.P., INTERPRETED AS SUBMITTED PASSWORD
*** FOR C, USED AS BOTH DEFINITION AND SUBMITTED PW
**** FOR R, WHEN SET TO 1, THE PASSWORD IS CLEARED
***** FOR C, WHEN OMITTED, AC IS TAKEN FROM CHARGE CARD OR LOGIN

NW - NUMBER OF LAST FILLED ELEMENT IN IPRMS (OPTIONAL)

REMARKS
NONE
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
    AND
    SHIFT
OTHERS
    IZPFBTZ
    IZRTGZR
    NUMVAR
    ZPFMAC
    ZPFPSW

CM REQUIRED: 423B

AUTHOR
    C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 01/75

DATE(S) REVISED
    05/75  01/02/76
    09/23/80 - DVS - UPGRADE TO LEVEL 508 (ADD UV AND RB)

LANGUAGE: FORTRAN IV EXTENDED

FUNCTIONAL CATEGORIES: Q3

LOCATION OF DECKS
SOURCE
    UPDATE LIBRARY: NSRDCPL,ID=CSYS
OBJECT
    EDITION LIB USER LIBRARY: NSRDC
EXAMPLE

PROGRAM TEST (INPUT, OUTPUT, TAPE5=INPUT, TAPE6=OUTPUT)
DIMENSION IPRMS(13)
DATA LFN / 6LMYFILE/
DATA ID / 4LXXXX/
DATA IPFNI, IPFN2/ 10HPERMANENTF, 3LILE/
DATA IAC / 10H9876543210/ << SEE NOTE BELOW
DATA IPW / 8LPASSWORD/

DO 10 I=1,13
10 IPRMS(I) = 0
IPRMS(1) = LFN
IPRMS(2) = IPFN1
IPRMS(3) = IPFN2
IPRMS(6) = ID
IPRMS(7) = IPW
IPRMS(13) = IAC << SEE NOTE BELOW
IRC = 2
CALL ZPFUNC (IRC, IPRMS, 13)
IF (IRC .NE. 0) WRITE (6, 20) IRC, IRC
20 FORMAT ('ERROR - IRC=', 03, 'B = ', 17)

STOP
END

THIS PROGRAM IS EQUIVALENT IN EFFECT TO THE FOLLOWING CONTROL CARDS:

CATALOG(MYFILE,PERMANENTFILE,ID=XXXX,AC=9876543210,
PW=PASSWORD)

FOR A NEW CYCLE OF AN EXISTING FILE; OR

CATALOG(MYFILE,PERMANENTFILE,ID=XXXX,AC=9876543210,
TK=PASSWORD)

FOR THE CREATION OF A NEW FILE.

NOTE: IF THESE TWO LINES ARE OMITTED (THAT IS, AC IS ZERO), AC WILL BE TAKEN FROM THE BATCH CHARGE CARD OR THE INTERCOM LOGIN.
SUBROUTINE 'ZRTPUT'

PURPOSE
PUT USER-SPECIFIED PARAMETERS INTO ARRAY FOR LATER CALL TO ROUTE

FUNCTIONAL CATEGORIES: QO

USAGE
CALL ZRTPUT (IPRMS, NW)
CALL ZRTPUT (IPRMS, NW, LFN, DC, TID, FID, DEF, RETJOB, FC, EC, IC, STID, PRI, REP)

FOR EXAMPLE:
CALL ZRTPUT (IPRMS, 0)
CALL ZRTPUT (IPRMS, 1, LFN)
CALL ZRTPUT (IPRMS, 2, LFN, DC)
CALL ZRTPUT (IPRMS, 13, LFN, DC, TID, FID, DEF, RETJOB, FC, EC, IC, STID, PRI, REP, NCD)

DESCRIPTION OF PARAMETERS
IPRMS - ARRAY (MAXIMUM REQUIRED DIMENSION 13) TO BE DEFINED
NW - 0 - SET ALL 13 WORDS TO ZERO
     1 THRU 12 - DEFINE NW PARAMETERS FROM THE FOLLOWING
LFN - LOCAL FILE NAME (1-7 CHARACTERS)
DC - DISPOSITION CODE (2 CHARACTERS)
TID - TERMINAL IDENTIFICATION
     1LC - CENTRAL SITE
     2-CHARACTER TERMINAL ID
     4LHERE - ROUTE TO THIS TERMINAL
FID - FILE IDENTIFICATION
     1L* - OR - 1-5 CHARACTER FILE ID, PRECEDED BY *
DEF - 3LDEF - DEFER ROUTE UNTIL END OF JOB
RETJOB - NON-ZERO TO RETURN JOB NAME IN THIS WORD
FC - FORMS CODE (2 CHARACTERS)
EC - EXTERNAL CHARACTERISTICS
     FOR PRINT:
     2LB4, 2LB6, 2LA6, 2LA9
     FOR PUNCH:
     2LSB, 5LBOCOL, 3L026, 3L029, 5LASCII
IC - INTERNAL CHARACTERISTICS
     0 OR 3LDIS - DISPLAY CODE
     5LASCII - ASCII
     3LBIN - BINARY
STID - 3-CHARACTER STATION ID
PRI - PRIORITY (TO ROUTING TERMINAL ONLY)
     (0000B-7777B)
     ALL OTHERS USE 0
REP - REPEAT COUNT (0-31 (37B))
NCD - 0 - OR - 1 - NO COMPLEMENTARY DAYFILE
     (VALID ONLY IF IPRMS(5)=3LDEF)

NOTE: ALL VARIABLES ARE TYPE INTEGER. CHARACTER DATA IS LEFT-JUSTIFIED AND ZERO-PADDED.
TO CLEAR (OR OMIT) A SPECIFIC PARAMETER, USE 0.

11/30/77  2-231  ZRTPUT - 1 OF 2
REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MINO
MOVLEV
OTHERS
NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 102B

AUTHOR
DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 01/19/76

DATE(S) REVISED
01/24/77 - ADD REP PARAMETER
11/30/77 - ADD NCD PARAMETER

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS

OBJECT
EDITLIB USER LIBRARY: NSRDC
SUBROUTINE 'ZSYSEQ'

PURPOSE
FORTRAN CALLABLE SYSTEM CALL

FUNCTIONAL CATEGORIES: Q3

USAGE
CALL ZSYSEQ (I)

DESCRIPTION OF PARAMETER
I - THE CONTENTS OF I ARE PUT INTO X6 BEFORE THE SYSTEM IS CALLED

EXAMPLE
CALL SYSTEM ROUTINE DSP WITH PARAMETERS CONTAINED IN 'A':
CALL ZSYSEQ (4LDSPF .OR. LOCF(A))

NOTE: THE P AFTER DSP IS THE RECALL BIT. IF NO RECALL REQUIRED, THEN:
CALL ZSYSEQ (3LDSP .OR. LOCF(A))

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
SYS=

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 4B

AUTHOR
C M CHERNICK - DTNSRDC CODE 1832

DATE WRITTEN: 04/07/75

DATE(S) REVISED

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSRDCPL.ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSRDC
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2. DEPARTMENTAL REPORTS, A SEMIFORMAL SERIES, CONTAIN INFORMATION OF A PRELIMINARY, TEMPORARY, OR PROPRIETARY NATURE OR OF LIMITED INTEREST OR SIGNIFICANCE. THEY CARRY A DEPARTMENTAL ALPHANUMERICAL IDENTIFICATION.

3. TECHNICAL MEMORANDA, AN INFORMAL SERIES, CONTAIN TECHNICAL DOCUMENTATION OF LIMITED USE AND INTEREST. THEY ARE PRIMARILY WORKING PAPERS INTENDED FOR INTERNAL USE. THEY CARRY AN IDENTIFYING NUMBER WHICH INDICATES THEIR TYPE AND THE NUMERICAL CODE OF THE ORIGINATING DEPARTMENT. ANY DISTRIBUTION OUTSIDE DTNSRDC MUST BE APPROVED BY THE HEAD OF THE ORIGINATING DEPARTMENT ON A CASE-BY-CASE BASIS.