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COMPUTER CENTER LIBRARIES/NSRDC (SUBPROGRAMS),(U)
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Bethesda, Md. 20084

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COMPUTER CENTER LIBRARIES/NSRDC (SUBPROGRAMS)

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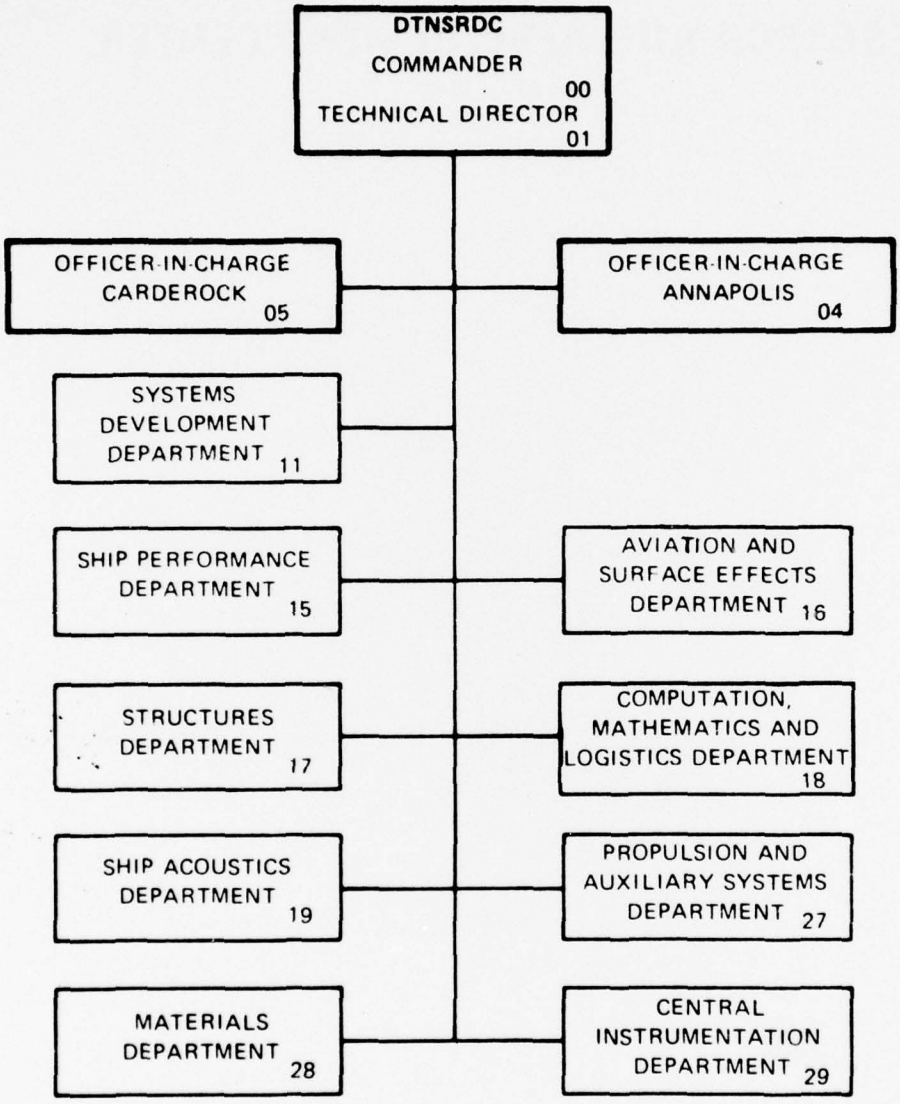
Computation, Mathematics and

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September 1977

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MAJOR DTNSRDC ORGANIZATIONAL COMPONENTS



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Computer Center Libraries/NSRDC (Subprograms), CCLIB/N, is a reference manual which describes most of the subprograms in library 'NSRDC'. These scientific and utility routines are used primarily with Fortran (FTN, MNF or RATFOR) programs and most are coded in FTN. CCLIB/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.

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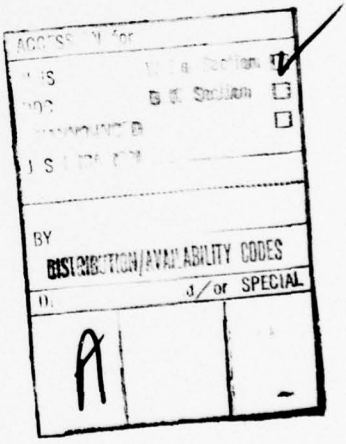
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(SUBPROGRAMS)

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COMPUTATION, MATHEMATICS AND LOGISTICS DEPARTMENT
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TABLE OF CONTENTS

1 INTRODUCTION
- HOW TO USE THIS MANUAL 1-1
- LIBRARY NSPDC 1-1
- USING THE LIBRARY 1-1
- FUNCTIONAL CATEGORIES 1-2
- LIST OF SUBPROGRAMS BY CATEGORY 1-5
- DESCRIPTIVE TITLES 1-8

2 SUBPROGRAM DOCUMENTATION

***** INTRODUCTION *****

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

THE CCLIB-SERIES OF MANUALS CONTAINS THE FOLLOWING, WHICH DESCRIBE THE CONTENTS OF THE VARIOUS LIBRARIES MAINTAINED BY THE COMPUTER CENTER:

CCLIB - COMPUTER CENTER LIBRARIES	CMLD-77-12
CCLIB/N - COMPUTER CENTER LIBRARIES/NSROC (SUBPROGRAMS)	CMLD-77-15
CCLIB/P - COMPUTER CENTER LIBRARIES/PROFIL (PROCEDURES)	CMLD-77-16
CCLIB/U - COMPUTER CENTER LIBRARIES/UTILITY (PROGRAMS)	CMLD-77-17
CCLIB/M - COMPUTER CENTER LIBRARIES/MNSROC (PROGRAMS)	

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

*** 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 1-8. CHAPTER 2 CONTAINS ALL CURRENTLY AVAILABLE MACHINE-READABLE DOCUMENTS DESCRIBING THE USE OF SUBPROGRAMS IN LIBRARY 'NSROC'. DOCUMENTATION NOT IN CHAPTER 2 MAY BE OBTAINED FROM USER SERVICES, CARDEROCK, BLDG 17, ROOM 100, (202) 227-1907.

*** LIBRARY NSROC ***

'NSROC' IS A LIBRARY OF DTNSROC WRITTEN AND/OR SUPPORTED SUBPROGRAMS. SUBROUTINES FORMERLY AVAILABLE ONLY ON TAPE CLIBRARYUP03 ARE INCLUDED. MANY SUBROUTINES HAVE NEVER BEEN PART OF ANY OTHER LIBRARY. THESE ROUTINES ARE USED PRIMARILY WITH FTN, MNF OR RATFOR PROGRAMS AND MOST ARE CODED IN FTN.

*** USING THE LIBRARY ***

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

```
...
FTN.   -OR-   COBOL.   -OR-   ATTACH,LGO,MYLGO,ID=XXXX.
ATTACH,NSROC.
LDSET,LIB=NSROC.       -OR-   LIBRARY,NSROC.
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 (COC USERS GROUP) LIST.

- A0 ARITHMETIC ROUTINES
- A1 REAL NUMBERS
- A2 COMPLEX NUMBERS
- A3 DECIMAL
- A4 I/O ROUTINES

- B0 ELEMENTARY FUNCTIONS
- B1 TRIGONOMETRIC
- B2 HYPERBOLIC
- B3 EXPONENTIAL AND LOGARITHMIC
- B4 ROOTS AND POWERS

- C0 POLYNOMIALS AND SPECIAL FUNCTIONS
- C1 EVALUATION OF POLYNOMIALS
- C2 ROOTS OF POLYNOMIALS
- C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)
- C4 SIMULTANEOUS NON-LINEAR ALGEBRAIC EQUATIONS
- C5 SIMULTANEOUS TRANSCENDENTAL EQUATIONS
- * C6 ROOTS OF FUNCTIONS

- D0 OPERATIONS ON FUNCTIONS AND SOLUTIONS OF DIFFERENTIAL EQUATIONS
- D1 NUMERICAL INTEGRATION
- D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS
- D3 NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS
- D4 NUMERICAL DIFFERENTIATION

- E0 INTERPOLATION AND APPROXIMATIONS
- E1 TABLE LOOK-UP AND INTERPOLATION
- E2 CURVE FITTING
- E3 SMOOTHING
- E4 MINIMIZING OR MAXIMIZING A FUNCTION

- F0 OPERATIONS ON MATRICES, VECTORS & SIMULTANEOUS LINEAR EQUATIONS
- F1 VECTOR AND MATRIX OPERATIONS
- F2 EIGENVALUES AND EIGENVECTORS
- F3 DETERMINANTS
- F4 SIMULTANEOUS LINEAR EQUATIONS

- G0 STATISTICAL ANALYSIS AND PROBABILITY
- G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)
- G2 CORRELATION AND REGRESSION ANALYSIS
- G3 SEQUENTIAL ANALYSIS
- G4 ANALYSIS OF VARIANCE
- G5 TIME SERIES
- G6 SPECIAL FUNCTIONS (INCLUDES RANDOM NUMBERS AND PDF'S)
- * G7 MULTIVARIATE ANALYSIS AND SCALE STATISTICS
- * G8 NON-PARAMETRIC METHODS AND STATISTICAL TESTS
- * G9 STATISTICAL INFERENCE

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 (HOLLERITH)
I9 COMPOSITE

J0 OUTPUT
J1 BINARY
J2 OCTAL
J3 DECIMAL
J4 BCD (HOLLERITH)
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 DISASSEMBLY 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

O0 SIMULATION OF COMPUTERS AND DATA PROCESSORS (INTERPRETERS)
O1 OFF-LINE EQUIPMENT (LISTERS, REPRODUCERS, ETC.)
O3 COMPUTERS
O4 PSEUDO-COMPUTERS
O5 SOFTWARE SIMULATION OF PERIPHERALS
O9 COMPOSITE

P0 DIAGNOSTICS (HARDWARE MALFUNCTION)

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS
Q1 CLEAR/RESET
Q2 CHECKSUM ACCUMULATION AND CORRECTION
Q3 REWIND, TAPE MARK, LOAD CARDS, LOAD TAPE PROGRAMS, ETC.
Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.
Q5 REPORT GENERATOR SUBROUTINES
Q6 PROGRAM DOCUMENTATION: FLOW CHARTS, DOCUMENT, STANDARDIZATION
Q7 PROGRAM LIBRARY UTILITIES

R0 LOGIC AND SYMBOLIC
R1 FORMAL LOGIC
R2 SYMBOL MANIPULATION
R3 LIST AND STRING PROCESSING

S INFORMATION RETRIEVAL

APPLICATIONS AND APPLICATION-ORIENTED PROGRAMS
PHYSICS (INCLUDING NUCLEAR)
T2 CHEMISTRY
T3 OTHER PHYSICAL SCIENCES (GEOLOGY, ASTRONOMY, ETC.)
T4 ENGINEERING
T5 BUSINESS DATA PROCESSING
T6 MANUFACTURING (NON-DATA) PROCESSING AND PROCESS CONTROL
T7 MATHEMATICS AND APPLIED MATHEMATICS
T8 SOCIAL AND BEHAVIORAL SCIENCES AND PSYCHOLOGY
T9 BIOLOGICAL SCIENCES
T10 REGIONAL SCIENCES (GEOGRAPHY, URBAN PLANNING)
T11 COMPUTER ASSISTED INSTRUCTION

U0 LINGUISTICS AND LANGUAGES

V0 GENERAL PURPOSE UTILITY SUBROUTINES
V1 RANDOM NUMBER GENERATORS
V2 COMBINATORIAL GENERATORS: PERMUTATIONS, COMBINATIONS & SUBSETS
* V3 STANDARD AND SPECIAL PROBLEMS

X0 DATA REDUCTION
X1 RE-FORMATTING, DECOMMUTATION, ERROR DIAGNOSIS
X2 EDITING
X3 CALIBRATION
X4 EVALUATION
X5 ANALYSIS (TIME-SERIES ANALYSIS)
X6 SIMULATION (GENERATE TEST DATA FOR DATA REDUCTION SYSTEM)

Y0 INSTALLATION MODIFICATION
Y1 INSTALLATION MODIFICATION LIBRARY
Y2 NEWPL TAPE OF INSTALLATION MODIFICATIONS

Z0 ALL OTHERS

*** LIST OF SUBPROGRAMS BY CATEGORY ***

THE SUBPROGRAMS IN LIBRARY 'NSRDC' ARE LISTED BELOW UNDER THEIR FUNCTIONAL CATEGORIES. AN ALPHABETICAL LIST, WITH A BRIEF DESCRIPTION OF EACH ROUTINE BEGINS ON PAGE 1-8.

A0 ARITHMETIC ROUTINES

ICOMN	XOR	

A1 REAL NUMBERS

ISUMIT	NFILL	SUMIT

A2 COMPLEX NUMBERS

CMPINV	HELP	PSI

B1 TRIGONOMETRIC

COTAN		

B4 ROOTS AND POWERS

DPROOT	PROOT	

C1 EVALUATION OF POLYNOMIALS

APOWR	HIFAC	POWR1	PROD2	
BPOWR	POLDIV	POWR2		

C2 ROOTS OF POLYNOMIALS

DPROOT	HELP	NROOTS	PROOT	QUART

C3 EVALUATION OF SPECIAL FUNCTIONS (NON-STATISTICAL)

AT	BESSJ	CBSF	ELLIP	FRESNEL	PSI
BEJY0	BESSK	CEI3	ERF	GAMCAR	SNCNDN
BEJY1	BESSY	COMBES	ERROR	GAMMA	
BESSI	BSJ	ELLI	EXPINT	LOGGAM	

C6 ROOTS OF FUNCTIONS

ROOTER					

D1 NUMERICAL INTEGRATION

FGI	FNOL3	QUADG	SIMP	SIMPUN	XFIL

D2 NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

FNOL3	KUTMER				

E1 TABLE LOOK-UP AND INTERPOLATION

CROTAB	DISCOT	FRMRAN	FRMRA2		

E2 CURVE FITTING

FFT	GMHAS	OPLSA	RFFT	SPLFIT	
FFT5	LSQSUB	POLYN	RFSN	SQFIT	

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 CMPINV MAM MATINS
CGAUSS GAUSS MAM200

G1 DATA REDUCTION (COMMON STATISTICAL PARAMETERS)
STUTEE

G4 ANALYSIS OF VARIANCE
ANOVA1 ANOVA2

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

I0 INPUT
FASTIN

I2 OCTAL
OFMTDE OFMTV

I3 DECIMAL
CRDTAB

I4 BCD (HOLLERITH)
ICOM ICOMN IFMTV

I9 COMPOSITE
RECOVRD

J2 OCTAL
PRTFL

J4 BCD (HOLLERITH)
BANR ICOM ICOMN LINE6 LINE8 PRTIME

J5 PLOTTING
PLOTMY PLOTPR PLOTXY

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

M0 DATA HANDLING

COMPSTR	EQU60	MASKIT			

M1 SORTING

ASORT	QSORT	SSORT	SSORTI		
ASORTMV	QSORT1	SSORTF	SSORTL		

M2 CONVERSION AND/OR SCALING

GETHOUR	IROMAN	JGDATE	MONTH	WEKDAY	
IHMS	ISEC	JULIAN	NEWDAT		

M4 CHARACTER MANIPULATION

ADJL	EXPRM	IBUNP	PUTCHA	SBYT	TRAILBZ
ADJR	EXTBIT	IPAKLFT	PUTCHR	SEMICO	VALDAT
ASHIFT	EXTPRM	ISTAPE	REPLAC	SENT	VFILL
CENTER	FBINRD	LBYT	REPLACM	SETREW	ZBLANK
CHFILL	GETCHA	LEFTADJ	REPLHI	SHIFTA	ZEROES
CONTRCT	GETCHR	MOVSTR	REPLLO	SKWEZL	ZEROFL
EXPAND	GETPRM	PARGET	REPLNE	SKWEZR	ZEROS

M5 SEARCHING, SEEKING, LOCATING

AMAXE	FINDW	GETCHR	LASTC	MINE	VALIDT
AMINE	FINDWRD	IDIGIT	LASTWRD	NFILLT	
FINDC	GETCHA	IFINDCH	MAXE	NUMVAR	

N0 DEBUGGING

ALTIME	ELTIME	PRTIME

N2 DUMPING

DMPA	DMPFIT	DUMPCPA	DUMPFL
DMPCPA	DUMPA	DUMPFIT	RECOVRD

Q0 SERVICE OR HOUSEKEEPING, PROGRAMMING AIDS

AC	FTNRFL	HERE	JOBORG	PFRC	ZPFPJT
ALTIME	GETFIT	IDID	MACHINE	PRTFL	ZRTPJT
CPU467	GETLFNS	ISITCNF	NUMEXEC	REDUCE	
ELTIME	GODROP	JOBNAME	OVLNAME	SKPSTAT	

Q3 FILE MANIPULATION

REQUEST	ROUTE	SKPFIL	UNLOAD	ZPFUNC	ZSYSEQ

Q4 INTERNAL HOUSEKEEPING, SAVE, RESTORE, ETC.

NUMVAR	PRTIME

R1 FORMAL LOGIC

COUPLE	XOR

T4 ENGINEERING

ARDCFT

V1 RANDOM NUMBER GENERATORS

RANNUM

*** DESCRIPTIVE TITLES ***

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
AI	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 MOVLEV
BANR	PRINT A BANNER (PAGE)
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	EXPONENTIATION OF POWER SERIES IN TWO VARIABLES

BSJ	SPHERICAL BESSEL FUNCTION
CBSF	COMPLEX BESSEL FUNCTION FOR LARGE ARGUMENT
CEI3	COMPLETE ELLIPTIC INTEGRAL OF THE THIRD KIND
CENTER	CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD
CGAUSS	COMPLEX SOLUTION OF SIMULTANEOUS EQUATIONS AND DETERMINANT BY ITERATIVE GAUSSIAN ELIMINTAION
CHFILL	FILL (PORTION OF) AN ARRAY WITH A CHARACTER
CMPINV	COMPLEX MATRIX INVERSION
COMBES	BESSEL FUNCTIONS FOR COMPLEX ARGUMENT AND ORDER
COMPSTR	COMPARE TWO CHARACTER STRINGS
CONTRCT	SQUEEZE ARRAY OF 1R-FORMAT CHARACTERS TO LEFT (SEE EXPAND)
COTAN	COTANGENT FUNCTION
COUPLE	LOGICALLY CONNECT TWO WORDS
CRDTAB	READ TABLES FOR FRMRAN AND FRMRA2 INTERPOLATION
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
DMPFIT	SHORT DUMP OF FTN OR RM FILE INFORMATION TABLE (FIT)
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
DUMPFIT	DETAILED DUMP OF FTN OR RM FILE INFORMATION TABLE (FIT)
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 2 ARRAYS)
ERF	ERROR FUNCTION
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
FRMRAN	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
GETLFNS	GET ACTUAL LOCAL FILE NAMES (FOR FTN)
GETPRM	GET ALL PARAMETERS ON EXECUTE CARD
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
HIFAC	HIGHEST COMMON FACTOR OF TWO POLYNOMIALS
IAOC	COUNT ONE-BITS IN SPECIFIED WORD
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
IFINOCH	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
LASTC	FIND LAST NON-BLANK CHARACTER IN ARRAY
LASTWRD	FIND LAST WORD OF APRAY WHICH CONTAINS A NON-BLANK CONTAINS A NON-BLANK
LBYT	EXTRACT VARIABLE LENGTH BYTE
LEFTADJ	SQUEEZE LEFT AND REMOVE BLANKS AND 00B (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)
MFETCH	FETCH A SINGLE WORD FROM USER'S FL (SEE MSET)
MFX	OBTAIN THE MAINFRAME ON WHICH THE PROGRAM IS RUNNING
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
MOVSTR	MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER
MSET	SET A SINGLE WORD IN USER'S FL (SEE MFETCH)
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
NROOTS	REAL AND COMPLEX ROOTS OF REAL POLYNOMIAL
NUMEXEC	GET NUMBER OF EXECUTE CARD PARAMETERS WHICH WERE USED IN THIS EXECUTION OF THE PROGRAM
NUMVAR	DETERMINE NUMBER OF ARGUMENTS IN CALL TO SUBPROGRAM
OFMTDF	FAST O-FORMAT DECODE
OFMTV	FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT
OPLSA	ORTHOGONAL POLYNOMIAL LEAST SQUARE APPROXIMATION
OVLNAME	GET NAME OF FILE CURRENTLY BEING EXECUTED
PARGET	GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING
PFRC	SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE
PLOTMY	PRINTER PLOT - MULTIPLE CURVES
PLOTPR	PRINTER PLOT - MULTIPLE CURVES
PLOTXY	PRINTER PLOT - SINGLE CURVE
POLDIV	POLYNOMIAL DIVISION
POLYN	LEAST SQUARES POLYNOMIAL FIT
POWP1	1 TERM IN EXPONENTIATION OF POWER SERIES - ONE VARIABLE
POWP2	1 TERM IN EXPONENTIATION OF POWER SERIES - TWO VARIABLES
PROD2	1 TERM IN PRODUCT OF POWER SERIES - TWO VARIABLES

PROOT	FIND ALL ROOTS OF A REAL PLOYNOMIAL
PRTFL	PRINT CURPENT FL (OR PUT INTO DAYFILE)
PRTIME	GET AND PRINT CPA, CPB, CP, PP, IO AND WALL CLOCK TIMES SINCE LAST CALL AND PRINT USER-SUPPLIED MESSAGE
PSI	COMPLEX PSI FUNCTION
PUTCHA	INSERT CHARACTER INTO SPECIFIED POSITION IN AN ARRAY
PUTCHR	INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD
QSORT	IN-CORE ASCENDING SORT FOR ARRAYS LARGER THAN 500 WORDS
QSORT1	IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY (FOR ARRAYS LARGER THAN 500 WORDS)
QUADG	INTEGRAL BY GAUSS-LEGENDRE 10-POINT QUADRATURE
QUART	REAL OR COMPLEX ROOTS OF QUARTIC
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
REPLLO	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
ROOTER	GENERAL ROOT FINDER
ROUTE	CALLABLE ROUTE COMMAND
SBYT	STORE VARIABLE LENGTH BYTE

SEMICO	REPLACE DISPLAY CODE 00B WITH 77B (SEMI-COLON)
SENT	MOVE WORDS FROM ONE ARRAY TO ANOTHER, FORWARD OR BACKWARD
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
TRAILBZ	CHANGE TRAILING BLANKS TO ZEROS (00B)
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
VARAH1	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
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
XOR	EXCLUSIVE-OR FUNCTION
ZBLANK	CHANGE BLANKS TO 00B AND VICE VERSA
ZEROES	REPLACE BLANKS WITH (DISPLAY CODE) ZEROS, MULTIPLE FIELDS
ZEROFL	ZERO FIELD LENGTH (SECURITY EOJ)
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 'NSROC'. NON-MACHINE-READABLE DOCUMENTATION FOR OTHER ROUTINES IN THE LIBRARY IS ON FILE IN USER SERVICES, CODE 1892.1, (202) 227-1907.

INDIVIDUAL DOCUMENTS MAY BE PRINTED USING:

```
BEGIN,UTILITY,,PROGDOC,NSROC,,<SUBPROG>,OUTPUT.
```

WHERE <SUBPROG> IS THE DESIRED DOCUMENT.

SEVERAL DOCUMENTS MAY BE PRINTED AT ONE TIME USING:

```
JOBNAME.
CHARGE,....
BEGIN,UTILITY,,MANYDOC,NSROC.
'   7/8/9      EOR
<SUBPROG1>
<SUBPROG2>
   ...
<SUBPROGN>
"   6/7/8/9    EOF
```

```
SUBROUTINE 'AC'
FUNCTION   'AC'

PURPOSE
   GET ACCOUNT NUMBER FOR THIS JOB

FUNCTIONAL CATEGORY:    Q0

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: 37B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

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   02/27/76

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

SUBROUTINE 'ADJL'

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

FUNCTIONAL CATEGORY: 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: 1478

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 'ADJR'

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

FUNCTIONAL CATEGORY: 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: 1578

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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 CATEGORY:    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
```

SUBROUTINE 'ASHIFT'

PURPOSE
   SHIFT EACH WORD OF AN ARRAY

FUNCTIONAL CATEGORY: M4

USAGE
   CALL ASHIFT (A, NA, NABITS)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE SHIFTED
   NA   - NUMBER OF WORDS IN 'A' TO BE SHIFTED
   NBITS - NUMBER OF BITS TO SHIFT

REMARKS
   ALL ARGUMENTS ARE TYPE 'INTEGER'

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 178

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 CATEGORY:    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: 474B
```

```
AUTHOR
   C FLINK - KPS - NWL

DATE WRITTEN: 03/08/71

DATE(S) REVISED
   06/23/72 - C FLINK

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

```
SUBROUTINE 'ASORTMV'

PURPOSE
   SORT 2-DIMENSIONAL ARRAY USING MOVLEV

FUNCTIONAL CATEGORY:    M1

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

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

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOVLEV
   OTHERS
      NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1658

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

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DATE(S) REVISED

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

SUBROUTINE 'BANR'

PURPOSE
   PRINT A BANNER (PAGE)

FUNCTIONAL CATEGORY: J4

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 02/18/75

DATE(S) REVISED

USAGE
   CALL BANR (DUMMY, IOUT, NEWPAGE)

DESCRIPTION OF PARAMETERS
   DUMMY   - 1-10 CHARACTERS TO BE PRINTED
             (LEFT-JUSTIFIED, BLANK- OR ZERO-FILLED)
   IOUT   - NUMBER OF FILE ON WHICH BANNER IS TO BE WRITTEN
   NEWPAGE - IF ARGUMENT IS NON-ZERO, BANNER IS WRITTEN ON
             SAME PAGE
             IF ARGUMENT IS ZERO OR MISSING, BANNER IS WRITTEN
             ON A NEW PAGE

REMARKS
   ONLY 3 BANNERS WILL FIT ON A PAGE.

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

LANGUAGE: FORTRAN IV

CM REQUIRED: 1540B

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

SUBROUTINE 'BSJ'

PURPOSE
SPHERICAL BESSEL FUNCTION

FUNCTIONAL CATEGORY: 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:

$$J_{I-1}(X) + J_{I+1}(X) = \frac{2I+1}{X} J_I(X)$$

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; I≤25. ERROR IS LESS THAN ±5X10**-11. POSSIBLE DOMAINS ARE: 0≤I<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:   CLIBRARYUP03
   OBJECT
      EDITLIB USER LIBRARY:   NSROO
```

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SUBROUTINE 'CENTER'

PURPOSE
   CENTER A CHARACTER STRING WITHIN AN OUTPUT FIELD

FUNCTIONAL CATEGORY:    M4

USAGE
   CALL CENTER (IN, LIN, OUT, NOUTC, WORK)

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
   NOUTC  - NUMBER OF CHARACTERS IN 'OUT' WITHIN WHICH
            'IN' IS TO BE CENTERED
   WORK   - WORK ARRAY WHOSE DIMENSION IS THE LARGER OF
            A) 10 TIMES LIN
            B) NOUTC + 10

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), WORK(142)
      IN(1) = 10HTHIS IS A
      IN(2) = 10HHEADING
      CALL CENTER (IN, 2, OUT, 132, WORK)
   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.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOD        MOVLEV     SHIFT
   OTHERS
      VFILL - FILL ARRAY WITH SPECIFIED WORD

ARITHMETIC STATEMENT FUNCTIONS
   FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
      R11FMT     R12FMT     R13FMT     R14FMT     R15FMT
      R16FMT     R17FMT     R18FMT     R19FMT     R110FMT

LANGUAGE: FORTRAN IV

CM REQUIRED: 333B
```

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 05/19/75

DATE(S) REVISED

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

```
SUBROUTINE 'CHFILL'

PURPOSE
   FILL (PORTION OF) ARRAY WITH CHARACTER

FUNCTIONAL CATEGORY:    M4

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   NONE

USAGE
   CALL CHFILL (ICHAR, TO, ITO, LEN)

DESCRIPTION OF PARAMETERS
   ICHAR - FILL CHARACTER (1R OR 1H OR " ")
   TO    - ARRAY TO BE FILLED
   ITO   - STARTING CHARACTER IN 'TO'
           (CHARACTER 1 IS LEFT-MOST CHARACTER OF TO(1))
   LEN   - 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
```

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: 1478

METHOD
THE SYSTEM SOLVED IS THE EXPANDED MATRIX

$$E = \begin{pmatrix} AR & -AI \\ AI & AR \end{pmatrix}$$

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 CATEGORY:    M0

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(1))
   B       - ARRAY CONTAINING SECOND CHARACTER STRING
   FROMB   - STARTING CHARACTER POSITION IN B
             (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN B(1))
   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: 1058

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 CATEGORY:    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
   [illegible] 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
```

SUBROUTINE 'COUPLE'

PURPOSE
LOGICALLY CONNECT (PORTIONS OF) TWO WORDS

FUNCTIONAL CATEGORY: 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	(0)
	1 - AND THE FIELDS	(M.A)
	2 - AND THE COMPLEMENT OF A TO B	(M.A*)
	3 - NUMBER OF ONE IN THE LAST FIELD	(M)
	4 - AND THE COMPLEMENT OF B TO A	(M*.A)
	5 - SUBSTITUTE FIELD OF A INTO B	(A)
	6 - EXCLUSIVE OR	
	7 - OR	(M+A)
	8 - AND COMPLEMENTS	(A*.B*)
	9 - IDENTITY	(B=A)
	10 - SUBSTITUTE COMPLEMENT OF A INTO B	(A*)
	11 - OR THE COMPLEMENT OF A TO B	(M+A*)
	12 - COMPLEMENT OF B	(M*)
	13 - OR A TO THE COMPLEMENT OF B	(A+M*)
	14 - OR THE COMPLEMENTS OF A AND B	(A*+M*)
	15 - PUT ONES INTO BWORD FIELD	(1)
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

AUTHOR
   NWL

DATE WRITTEN:

DATE(S) REVISED

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

```
SUBROUTINE 'CPU467'
FUNCTION   'CPU467'

PURPOSE
   OBTAIN THE MACHINE THE PROGRAM IS RUNNING ON

FUNCTIONAL CATEGORY:    Q0

USAGE
   CALL CPU467 (ICPU)
   VARIABLE = CPU467 (ICPU)

DESCRIPTION OF PARAMETER
   ICPU - WILL RETURN THE MACHINE THE PROGRAM IS RUNNING ON
          (LEFT-ADJ, ZERO-FILLED)
          (WILL RETURN ONE OF 4L6700, 4L6600, 4L6400)
          (WHEN USED AS A FUNCTION, 'VARIABLE' AND 'CPU467'
          MUST BE OF THE SAME TYPE)

REMARKS
   NONE

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

ARITHMETIC STATEMENT FUNCTIONS
   L38FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 258

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/18/75

DATE(S) REVISED
   03/22/76 - MAKE FUNCTION AS WELL AS SUBROUTINE

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSRDCPL,ID=CSYS
   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 CATEGORY: 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 OR 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
      EQJ60   - LOGICAL ARRAY COMPARE
      MFETCH - READ WORD IN USER'S FL

LANGUAGE: FORTRAN IV

OUTPUT UNIT

UNIT #	LFN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 3153

AUTHOR
   DAVID V SOMMER - DTNSROC CODE 1892.2

DATA WRITTEN: 06/14/76

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY: NSROCPL,ID=CSYS
   OBJECT
      EDITLB USER LIBRARY: NSROC

SUBROUTINE 'DMPCPA'

PURPOSE
   DUMP JOB CONTROL POINT AREA

FUNCTIONAL CATEGORY: 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

UNIT #	LEN	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 3248

AUTHOR
   DAVID V SOMMER - DTNSROC CODE 1892.2

DATE WRITTEN: 12/29/75

DATE(S) REVISED

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

```
SUBROUTINE 'DMPFIT'

PURPOSE
   SHORT DUMP OF FTN OR RM FILE INFORMATION TABLE (FIT)

FUNCTIONAL CATEGORY:    N2

USAGE
   CALL DMPFIT (FIT, RM)
   CALL DMPFIT (FIT)

DESCRIPTION OF PARAMETERS
   FIT - RM FIT ARRAY -OR-
         FTN FILE NAME (L-FORMAT) OR INTEGER FORTRAN
         LOGICAL UNIT NUMBER)
   RM  - IF OMITTED OR RM=0, FIT IS FOR FTN FILE.
         IF RM≠0, FIT IS RM FIT ARRAY.

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF       MOVLEV    SHIFT
   OTHERS
      ISTAPE  - CHANGE INTEGER N TO 'TAPEN'
      MFETCH  - READ WORD IN USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
   FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
      L61FMT
      L71FMT
   FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
      R21FMT    R23FMT    R25FMT    R27FMT    R29FMT
      R38FMT

LANGUAGE: FORTRAN IV

OUTPUT UNITS
   FORTRAN    LOCAL
   LOGICAL    FILE
   U_N_I_I   _NAME__   ------------------USE------------------
             OUTPUT    LISTABLE OUTPUT

CM REQUIRED: 2338

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/04/75

DATE(S) REVISED
   04/21/76

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

SUBROUTINE 'DPROOT'

PURPOSE
FIND ALL ROOTS OF A REAL DOUBLE PRECISION POLYNOMIAL

FUNCTIONAL CATEGORY: 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: 11538

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

AUTHOR
   HARVEY ABRAMSON - NEW YORK UNIVERSITY

DATE WRITTEN: 01/66

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED: CLIBRARYUPD3
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'DUMPA'

PURPOSE
GIVE OCTAL AND CHARACTER DUMP OF USER-SPECIFIED AREA

FUNCTIONAL CATEGORY: 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., 10HMYAREA(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 #	LEN	USE
OUTPUT		LISTABLE OUTPUT

CM REQUIRED: 2578

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

SUBROUTINE 'DUMPCPA'

PURPOSE
   EXPANDED DUMP OF JOB CONTROL POINT AREA

FUNCTIONAL CATEGORY: N2

USAGE
   CALL DUMPCPA

REMARKS
   EACH FIELD IS PRINTED SEPARATELY

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      DATE   SHIFT   TIME
   OTHERS
      EXTBIT - EXTRACT BITS FROM A WORD
      PAKLFT - SQUEEZE LEFT, REMOVE BLANKS AND 00B
      RCPA   - READ CONTROL POINT AREA
      VFILL   - 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   R16FMT   R19FMT   R110FMT
      R21FMT   R23FMT   R25FMT   R27FMT
      R31FMT   R32FMT   R34FMT   R35FMT   R36FMT
      R38FMT
      R41FMT   R45FMT
      R65FMT
      R71FMT

LANGUAGE: FORTRAN IV

OUTPUT UNITS

UNIT #	LEN	USE
OUTPUT		LISTABLE OUTPUT

CM REQUIRED: 4444B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/30/75

DATE(S) REVISED
   02/27/76

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

SUBROUTINE 'DUMPFIT'

PURPOSE
   DETAILED DUMP OF FTN OR RM FILE INFORMATION TABLE (FIT)

FUNCTIONAL CATEGORY: N2

USAGE
   CALL DUMPFIT (FIT, RM)
   CALL DUMPFIT (FIT)

DESCRIPTION OF PARAMETERS
   FIT - RM FIT ARRAY -OR-
         FTN FILE NAME (L-FORMAT) OR INTEGER FORTRAN
         LOGICAL UNIT NUMBER
   RM - IF OMITTED OR RM=0, FIT IS FOR FTN FILE.
         IF RM≠0, FIT IS RM FIT ARRAY.

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF   MOVLEV   SHIFT
   OTHERS
      ISTAPE - CHANGE INTEGER N TO 'TAPEN'
      MFETCH - READ WORD IN USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
   FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
      L61FMT   L71FMT
   FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
      R11FMT   R15FMT   R17FMT   R21FMT   R23FMT
      R25FMT   R27FMT   R29FMT   R35FMT   R38FMT
      R41FMT   R47FMT   R51FMT   R56FMT   R65FMT

LANGUAGE: FORTRAN IV

OUTPUT UNITS

FORTRAN LOGICAL UNIT	FILE NAME	USE
	OUTPUT	LISTABLE OUTPUT

CM REQUIRED: 3162B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 11/04/75

DATE(S) REVISED
   04/21/76

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 CATEGORY: N2

USAGE
   CALL DUMPFL   ** SEE REMARK 1
   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
      EQU60   - 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

```
SUBROUTINE 'ELTIME'

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

FUNCTIONAL CATEGORY:    QO  NO
   LAST CALL

USAGE
   CALL ELTIME (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
      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)

LANGUAGE: FORTRAN IV

CM REQUIRED: 105B

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
```

```
FUNCTION   'EQU60'

PURPOSE
   LOGICAL COMPARE (OF 2 ARRAYS)

FUNCTIONAL CATEGORY:    M0

USAGE
   TEST = EQU60 (A, B, N)
   TEST = 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 CATEGORY: 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 CATEGORY: 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

AUTHOR
C FLINK - KPS - NWL

DATE WRITTEN: 06/73

DATE(S) REVISED

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

```
SUBROUTINE 'EXTBIT'

PURPOSE
   EXTRACT BITS FROM A WORD

FUNCTIONAL CATEGORY:     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
      MAX0      MIN0      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
```

SUBROUTINE 'EXTPRM'

PURPOSE
EXTRACT NEXT PARAMETER FROM USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORY: 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
MIN0
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

```
SUBROUTINE 'FBINRD'

PURPOSE
   UNPACK AN INPUT ARRAY

FUNCTIONAL CATEGORY:    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 'FFT5'

PURPOSE
FAST FOURIER TRANSFORM

FUNCTIONAL CATEGORY: 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: 45218 (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: AMFFT5)
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'FINDC'

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

FUNCTIONAL CATEGORY: 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 FRSTCH < 1, DEFAULT IS USED.

REMARKS
NONE

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   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
```

```
SUBROUTINE 'FINDW'

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

FUNCTIONAL CATEGORY:    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: 2018

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
```

SUBROUTINE 'FINDWRD'

PURPOSE
   FIND SPECIFIED WORD IN AN ARRAY

FUNCTIONAL CATEGORY: M5

USAGE
   CALL FINDWRD (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
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 40B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 07/08/74

DATE(S) REVISED

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

SUBROUTINE 'FRESNEL'

PURPOSE
   EVALUATE FRESNEL INTEGRALS

FUNCTIONAL CATEGORY: C3

LANGUAGE: FORTRAN IV

REMARKS

   C(X) = INTEGRAL (FROM 0 TO X) COS((PI/2)U**2)DU

   S(X) = INTEGRAL (FROM 0 TO X) SIN((PI/2)U**2)DU

   RELATIVE ERROR < 2.E-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: 2718

METHOD
   TRUNCATED CHEBYSHEV SERIES

REFERENCE
   BULRISCH, R., "NUMERICAL CALCULATION OF THE SINE, COSINE AND
   FRESNEL INTEGRALS", NUMERISCHE MATHEMATIK, 9, 1967, PP.
   380-385.

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: NSROC

SUBROUTINE 'FTNRFL'

PURPOSE
   GET/SET CORE SIZE

FUNCTIONAL CATEGORY: 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: NSROCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

FUNCTION 'GAMCAR'

PURPOSE
COMPLEX GAMMA FUNCTION OF A COMPLEX ARGUMENT HAVING POSITIVE REAL PART

FUNCTIONAL CATEGORY: 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: 2338

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
C. LANCZOS, NUMERICAL ANALYSIS, SIAM SERIES B, VOL I, PP. 86-96, 1964.

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

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

DATE WRITTEN: 12/16/64  (RLP)

DATE(S) REVISED
   08/65   (DAW)

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED:   CLIBRARYUPD3
   OBJECT
      NSRDC
```

```
FUNCTION   'GAMMA'

PURPOSE
   INCOMPLETE GAMMA FUNCTION

FUNCTIONAL CATEGORY:    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-NEGATIVE INTEGER.

USAGE
   Y = GAMMA (A, X)

DESCRIPTION OF PARAMETERS
   A - INTEGER ≥ 0
   X - ≥ 0   (X=0 FOR COMPLETE GAMMA FUNCTION)

CM REQUIRED: 5573  (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
      TAPE LABELLED:   CLIBRARYUPD3
   OBJECT
      NSRDC
```

```
SUBROUTINE 'GAUSS'

PURPOSE
   GAUSSIAN ELIMINATION WITH PARTIAL PIVOTING FOR SOLVING
   AX=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: ANX=(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., ROUNDING 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
      TAPE LABELLED:   CLIBRARYUPD3  (DECKNAME: AMGAU2)
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

```
SUBROUTINE 'GETCHA'
FUNCTION   'GETCHA'

PURPOSE
   EXTRACT CHARACTER FROM SPECIFIED POSITION IN AN ARRAY

FUNCTIONAL CATEGORIES:  M4  M5

USAGE
   CALL GETCHA (A, N, CH)
   VARIABLE = GETCHA (A, N, CH)

DESCRIPTION OF PARAMETERS
   A  - ARRAY FROM WHICH CHARACTER IS TO BE EXTRACTED
   N  - POSITION OF CHARACTER TO BE EXTRACTED
        (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A(1))
   CH - WILL CONTAIN THE EXTRACTED CHARACTER IN 1R FORMAT
        (WHEN USED AS A FUNCTION, GETCHA WILL CONTAIN THE SAME
        AS CH)

REMARKS
   NONE

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

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 528

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
```

```
SUBROUTINE 'GETCHR'
FUNCTION   'GETCHR'

PURPOSE
   EXTRACT CHARACTER FROM SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORIES:  M4  M5

USAGE
   CALL GETCHR (A, N, CH)
   VARIABLE = GETCHR (A, N, CH)

DESCRIPTION OF PARAMETERS
   A  - WORD FROM WHICH CHARACTER IS TO BE EXTRACTED
   N  - POSITION OF CHARACTER TO BE EXTRACTED
        (POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A)
   CH - WILL CONTAIN THE EXTRACTED CHARACTER IN 1H FORMAT
        (WHEN USED AS A FUNCTION, GETCHR WILL CONTAIN THE SAME
        AS CH)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 43B

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
```

```
SUBROUTINE 'GETFIT'

PURPOSE
   GET SPECIFIED FIT ADDRESS

FUNCTIONAL CATEGORY:    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 - NSROC 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 CATEGORY:    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
      ISEC    - 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: 1218
```

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 07/23/76

DATE(S) REVISED
   11/16/76

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

```
SUBROUTINE 'GETLFNS'

PURPOSE
   GET ACTUAL LOCAL FILE NAMES (FOR FTN)

FUNCTIONAL CATEGORY:    Q0

USAGE
   CALL GETLFNS (LFN, NLFN)
   CALL GETLFNS (LFN)

DESCRIPTION OF PARAMETERS
   LFN  - ARRAY DIMENSIONED AT LEAST 1 GREATER THAN
          NUMBER OF FILES ON FTN PROGRAM STATEMENT
          (ARRAY(NLFN) WILL BE SET TO 0)
   NLFN - IF PRESENT, WILL RETURN NUMBER OF FILE NAMES + 1

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

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   MFETCH - GET WORD IN USER'S F.

LANGUAGE: FORTRAN IV

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.

EXAMPLES
   PROGRAM SAMPLE (INPUT, OUTPUT, TAPE1)
   DIMENSION LFN(4)
   CALL GETLFNS (LFN, NLFN)
      ...

   EXECUTE CARD:     LGO.                LGO,,OUT,TAPE6.
   AFTER CALL:       LFN(1) = 5LINPUT    LFN(1) = 5LINPUT
                     LFN(2) = 6LOUTPUT   LFN(2) = 3LOUT
                     LFN(3) = 5LTAPE1    LFN(3) = 5LTAPE6
                     LFN(4) = 0          LFN(4) = 0

                     NLFN   = 4          NLFN   = 4

CM REQUIRED: 54B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 12/30/74

DATE(S) REVISED
   12/29/75

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

```
SUBROUTINE 'GETLGO'

PURPOSE
   EXTRACT FIRST 10 CHARACTERS OF ALL EXECUTE CARD
   PARAMETERS

FUNCTIONAL CATEGORY:    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
```

SUBROUTINE 'GETRA'

PURPOSE
   GET FIRST 100B WORDS OF USER'S FL

FUNCTIONAL CATEGORY: 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: 78

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 CATEGORY: QQ

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+703 THRU
             RA+776B AND PREFIXED WITH 'GO/DROP- '. THE
             MESSAGE MAY BE INSERTED BY
                'CALL PUTRA (MESSAGE, 70B, 76B)'

CM REQUIRED: 1423

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

```
SUBROUTINE 'HERE'
FUNCTION   'HERE'

PURPOSE
   GET TERMINAL ID FOR THIS JOB

FUNCTIONAL CATEGORY:    Q0

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

DESCRIPTION OF PARAMETERS
   I - WILL CONTAIN THE TERMINAL ID, LEFT-JUSTIFIED,
       ZERO-FILLED (1LC = 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

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

LANGUAGE: FORTRAN IV

METHOD
   THE TERMINAL ID IS TAKEN FROM CONTROL POINT AREA.
   IF THIS FIELD IS ZERO, IT IS A CENTRAL SITE JOB.  IN THIS
   CASE, 1LC IS RETURNED.

CM REQUIRED: 31B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 12/05/75

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 CATEGORY: 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 'IBUNP'

PURPOSE
   UNPACK 12-BIT BYTES FROM ARRAY

FUNCTIONAL CATEGORY:    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
```

```
FUNCTION   'IDAYWEK'

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

FUNCTIONAL CATEGORY:    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: 1048

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 CATEGORY:    Q0

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 OF 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: 278

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
```

```
FUNCTION   'IDIGIT'

PURPOSE
   CHECK FOR DIGITS IN A FIELD WITHIN A WORD

FUNCTIONAL CATEGORY:    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
      MAX0
      MIN0
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 76B

AUTHOR
   DAVID V SOMMER - NSROC CODE 1892.2

DATE WRITTEN: 05/13/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      UPDATE LIBRARY:   NSROCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSROC
```

```
SUBROUTINE 'IFINDCH'
FUNCTION   'IFINDCH'

PURPOSE
   FIND FIRST OCCURRENCE OF SPECIFIED CHARACTER IN ARRAY

FUNCTIONAL CATEGORY:    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 (1R 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

FUNCTIONAL CATEGORY: I4

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;
6_9 7654 WILL RETURN -1 (EMBEDDED BLANK))

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
SHIFT
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 61B

AUTHOR
DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 10/74

DATE(S) REVISED

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

FUNCTION 'IHMS'

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

FUNCTIONAL CATEGORY: 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

```
FUNCTION   'IPAKLFT'

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

FUNCTIONAL CATEGORY:    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 (A, 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: 1078

EXAMPLE
   DIMENSION A(3)
   DATA A/ "THIS  IS   A SAMPLE FIELD"/
   NCHAR = IPAKLFT (A, 3)
   ...
   AFTER EXECUTION: 'A' = 18LTHISISASAMPLEFIELD, IPAKLFT = 18

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      GETCHA  - GET A CHARACTER
      PUTCHA  - 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 CATEGORY:     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 00B 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: 1318

EXAMPLES
   MCMLXXVI    WILL RETURN THE INTEGER   1976
   I             "     "    "     "      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 CATEGORY:    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 CATEGORY: Q0

USAGE
   ISITCNF (I)

DESCRIPTION OF PARAMETER
   I - FILE TO BE CHECKED (EG, 5LTAPE1)

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

```
FUNCTION   'ISTAPE'

PURPOSE
   GENERATE TAPE NAME 'TAPENN'

FUNCTIONAL CATEGORY:     M4

USAGE
   NAME = ISTAPE (NN)

DESCRIPTION OF PARAMETERS
   NAME - RESULTANT DISPLAY CODE NAME 'TAPENN'
          (LEFT-JUSTIFIED, ZERO-FILLED)
          (5LTAPEN OR 6LTAPENN)
   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: 238

AUTHOR
   NWL

DATE WRITTEN: ?

DATE(S) REVISED

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

AD-A045 835 DAVID W TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CE--ETC F/G 9/2
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```
FUNCTION   'ISUMIT'

PURPOSE
   SUM ELEMENTS OF INTEGER ARRAY

FUNCTIONAL CATEGORY:     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
```

SUBROUTINE 'JGDATE'

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

FUNCTIONAL CATEGORY: M2

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

DESCRIPTION OF PARAMETERS

JG	- DIRECTION OF CONVERSION 1 - GREGORIAN TO JULIAN 2 - JULIAN TO GREGORIAN	
JD	- 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)

REMARKS
JG=1 IS VALID FOR ANY GREGORIAN DATE PRODUCING A 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.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

METHOD
SEE COMM. OF THE ACM, VOL. 11, NO. 10, OCT 1968, PAGE 657.

CM REQUIRED: 71B

AUTHOR
?

DATE WRITTEN: ?

DATE(S) REVISED

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

```
SUBROUTINE 'JOBNAME'
FUNCTION   'JOBNAME'

PURPOSE
   GET SCOPE JOB NAME FOR THIS JOB

FUNCTIONAL CATEGORY:    Q0

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 CATEGORY:    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
```

SUBROUTINE 'JULIAN'

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

FUNCTIONAL CATEGORY: M2

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 (EG, 1968)
IGM - GREGORIAN MONTH (1-12)
IGD - GREGORIAN DAY (1-31)

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).

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
MOD
OTHERS
NONE

ARITHMETIC STATEMENT FUNCTIONS
NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1638

AUTHOR
DAVID V SOMMER - NSROC CODE 1892.2

DATE WRITTEN: 1968

DATE(S) REVISED
04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS
06/21/76

LOCATION OF DECKS
SOURCE
UPDATE LIBRARY: NSROCPL,ID=CSYS
OBJECT
EDITLIB USER LIBRARY: NSROC

SUBROUTINE 'KUTMER'

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

FUNCTIONAL CATEGORY: 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 MIMINUM STEP SIZE USED DURING THE INTEGRATION OVER THE INTERVAL <H>.
A - AN ABSOLUTE ERROR CRITERION TO BE USED FOR ANY COMPOMENT OF Y-BAR WHENEVER IS BECOMES SMALLER IN ABSOLUTE VALUE THAN <A>.

ON ENTRY, <T> AND THE ARRAY <Y> CONTAIN VALUES OF THE INDEPENDENT AND THE DEPENDENT VARIABLES, RESPECTIVELY, AT THE BEGINNING OF THE INTERVAL OF INTEGRATION. ON RETURN, PROVIDED THE ERROR CRITERION HAS BEEN MET, I.E., <FIRST> HAS NOT BEEN RESET TO 2, <T> AND <Y> CONTAIN VALUES OF T AND Y-BAR AT THE END VALUES OF THE INTEGRATION INTERVAL OF <H>.

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

CALL DAUX (T, Y, F)

MUST BE SUPPLIED. HERE <T> AND THE ARRAY <Y> REFER TO T AND Y-BAR, RESPECTIVELY, AND THE ARRAY <F> SHOULD CONTAIN, ON RETURN FROM THIS SUBROUTINE, THE VECTOR F-BAR (T, Y-BAR).

REMARKS

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

$$\frac{d\bar{Y}}{dT} = \bar{F}(T,\bar{Y})$$

GIVEN A SET OF INITIAL CONDITIONS T_0, $\bar{Y}(T_0)$, AN INTERVAL H AND A SUBROUTINE FOR EVALUATING F-BAR(T,Y-BAR) FOR SPECIFIED VALUES OF T AND Y-BAR.

THE DIMENSIONS OF THE ARRAYS FOR STORING INTERMEDIATE VALUES OF THE VECTORS F-BAR AND Y-BAR 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 F-BAR

LANGUAGE: FORTRAN IV

METHOD

THE KUTTA-MERSON METHOD OF INTEGRATING A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS IS USED. THIS IS A FOURTH-ORDER, SINGLE-STEP METHOD WHICH PROVIDES A CONVENIENT TECHNIQUE FOR AUTOMATIC INTERVAL ADJUSTMENT (C.F., E. FOX, "NUMERICAL SOLUTION OF ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS", ADDISON-WESLEY, READING, MASS., 1962, P. 24). THE ROUTINE IS BASICALLY A TRANSLATION INTO FORTRAN OF ALGOL ALGORITHM 218 PUBLISHED IN "COMMUNICATIONS OF THE ACM", DEC. 1963.

OUTPUT UNITS

UNIT #	LEN	USE
	OUTPUT	ERROR MESSAGE

CM REQUIRED: 3358

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

FUNCTION 'LASTC'

PURPOSE
   DETERMINE NUMBER OF CHARACTERS THRU LAST NON-BLANK
   (NON-ZERO (008))

FUNCTIONAL CATEGORY: M5

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   THE WORD IN 'A' WHICH CONTAINS THE LAST NON-BLANK (NON-
   ZERO) CHARACTER IS (LASTC(A,N)+9)/10

USAGE
   LASTC (A)
   LASTC (A, N)

DESCRIPTION OF PARAMETERS
   A   - ARRAY TO BE SCANNED
   N   - NUMBER OF WORDS IN 'A' TO BE PROCESSED
   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 'LASTWRD'

PURPOSE
   DETERMINE SUBSCRIPT OF LAST WORD OF ARRAY WHICH
   CONTAINS A NON-BLANK

FUNCTIONAL CATEGORY: M5

USAGE
   LASTWRD (A, N)

DESCRIPTION OF PARAMETERS
   LASTWRD - WILL CONTAIN SUBSCRIPT OF LAST WORD OF ARRAY WHICH
             CONTAINS A NON-BLANK (AND NON-00B)
   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-00B CHARACTER IN ARRAY

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 22B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1832.2

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 CATEGORY:    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
      UPDATE LIBRARY:   NSROCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY:   NSROC
```

SUBROUTINE 'LEFTADJ'

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

FUNCTIONAL CATEGORY: 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 CATEGORY: 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 #	LEN	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 'LINE8'

PURPOSE
   SET PRINT FILE TO 8 LINES PER INCH

FUNCTIONAL CATEGORY: 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

```
FUNCTION   'MASKIT'

PURPOSE
   DYNAMIC MASK GENERATOR

FUNCTIONAL CATEGORY:    MD

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
   1110001111111111101110000000001000100000001111110000000111111
    7  0  7  7  7  6  7  0  0  0  4  2  0  0  7  7  0  0  7  7

   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
```

SUBROUTINE 'MATINS'

PURPOSE
   MATRIX INVERSION WITH ACCOMPANYING SOLUTION OF SIMULTANEOUS
   EQUATIONS AND DETERMINANT

FUNCTIONAL CATEGORIES: F4 F1 F3

LANGUAGE: FORTRAN IV

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: 3568

METHOD
   PIVOT METHOD - GAUSS-JORDAN

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      ABS
   OTHERS
      NONE

```
AUTHOR
   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
      TAPE LABELLED:   CLIBRARY.UPD3
   OBJECT
      EDITLIB USER LIBRARY:   NSRDC
```

```
SUBROUTINE 'MAXE'
FUNCTION   'MAXE'
FUNCTION   'AMAXE'

PURPOSE
   FIND MAXIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORY:    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: 148

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
```

FUNCTION 'MFETCH'

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

FUNCTIONAL CATEGORY: 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 USSER LIBRARY: NSRDC

```
SUBROUTINE 'MFX'
FUNCTION 'MFX'

PURPOSE
   OBTAIN THE MAINFRAME THE PROGRAM IS RUNNING ON

USAGE
   CALL MFX (ICPU)
   VARIABLE = MFX (ICPU)

DESCRIPTION OF PARAMETER
   ICPU - WILL RETURN MACHINE ON WHICH THE PROGRAM IS RUNNING
          (LEFT-ADJ, ZERO-FILLED)
          (WILL RETURN ONE OF 4L6700, 4L6600, 4L6400)
   MF   - WILL RETURN MAINFRAME ON WHICH MACHINE IS RUNNING
          (LEFT-ADJ, ZERO-FILLED)
          (WILL RETURN ONE OF 3LMFA, 3LMFB, 3LMFC)

REMARKS
   NONE

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

ARITHMETIC STATEMENT FUNCTIONS
   L38FMT - FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 46B

AUTHOR
   DAVID V SOMMER - NSRDC CODE 1892.2

DATE WRITTEN: 04/18/75

DATE(S) REVISED
   03/22/76 - MAKE FUNCTION AS WELL AS SUBROUTINE
   08/24/77 - CHANGE NAME FROM CPU467 TO MFX
              RETURN MFA/MBA/MFC AS THE FUNCTION VALUE

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

```
SUBROUTINE 'MINE'
FUNCTION   'MINE'
FUNCTION   'AMINE'

PURPOSE
   FIND MINIMUM VALUE OF AN ARRAY

FUNCTIONAL CATEGORY:    M5

USAGE
   CALL MINE (ARRAY, ISIZE, AMINV)

   MINV  =  MINE (IARRAY, ISIZE)
   AMINV = AMINE ( ARRAY, ISIZE)

DESCRIPTION OF PARAMETERS
   ARRAY  - REAL ARRAY TO BE PROCESSED
   IARRAY - INTEGER ARRAY TO BE PROCESSED
   ISIZE  - LENGTH OF ARRAY/IARRAY
   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
```

```
SUBROUTINE 'MONTH'

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

FUNCTIONAL CATEGORY:    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 SHOMMER - 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
```

```
SUBROUTINE 'MOVSTR'

PURPOSE
   MOVE A STRING OF CHARACTERS FROM ONE ARRAY TO ANOTHER

FUNCTIONAL CATEGORY:     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: 718

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      AND       LOCF      MOD       OR        SHIFT
   OTHERS
      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
```

SUBROUTINE 'MSET'

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

FUNCTIONAL CATEGORY: K2

USAGE
   CALL MSET (ADDR, NEW)

DESCRIPTION OF PARAMETERS
   ADDR - ADDSESS 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

SUBROUTINE 'NEWDAT'

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

FUNCTIONAL CATEGORY: 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

SUBROUTINE 'NFILL'

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

FUNCTIONAL CATEGORY: 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 CATEGORY:    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
```

SUBROUTINE 'NUMEXEC'

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

FUNCTIONAL CATEGORY: 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
      MFETCH - GET SPECIFIED WORD OF USER'S FL

ARITHMETIC STATEMENT FUNCTIONS
   R38FMT - 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 - NSROC CODE 1892.2

DATE WRITTEN: 04/15/75

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED   CSYSNSROCPL;   P.F. NSROCPL,ID=CSYS
   OBJECT
      EDITLIB USER LIBRARY: NSROC

```
FUNCTION   'OFMTDE'

PURPOSE
   FAST O-FORMAT DECODE

FUNCTIONAL CATEGORY:    I2

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 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
```

FUNCTION 'OFMTV'

PURPOSE
FAST O-FORMAT DECODE OF VARIABLE LENGTH INPUT

FUNCTIONAL CATEGORY: I2

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
003. (EG, 3L123, 3L123456701)

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 'OVLNAME'

PURPOSE
   GET NAME OF FILE CURRENTLY BEING EXECUTED

FUNCTIONAL CATEGORY: 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+643 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

SUBROUTINE 'PARGET'

PURPOSE
GET ALL PARAMETERS OF USER-SUPPLIED PARAMETER STRING

FUNCTIONAL CATEGORY: 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 (1R FORMAT)

LSEP - IF PRESENT, ARRAY TO CONTAIN THE SEPARATOR FOUND (1L FORMAT)

REMARKS
NONE

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

ARITHMETIC STATEMENT FUNCTIONS
NONE

CM REQUIRED: 1068

AUTHOR
   DAVID V SOMMER - CODE 1892.2

DATE WRITTEN: 04/11/74

DATE(S) REVISED
   11/18/75 - NAME CHANGED FROM GETPAR TO PARGET TO AVOID
              CONFLICT WITH SYSIO ROUTINE OF SAME NAME
   06/24/76 - PROCESSING OF OPTIONAL PARAMETERS MODIFIED

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

SUBROUTINE 'PFRC'

PURPOSE
   SUPPLY DESCRIPTION OF PERMANENT FILE FUNCTION RETURN CODE

FUNCTIONAL CATEGORY: QQ

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   THE DESCRIPTIONS ARE THOSE FOUND IN THE SCOPE REFERENCE
   MANUAL (60307200 G) ON PAGE 5-20.

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: 722B

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOVLEV
   OTHERS
      NONE

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 05/18/76

DATE(S) REVISED
   02/14/77 - UPDATE FOR NOS/BE 1.0

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 CATEGORY:    J5

USAGE
   COMMON /PLO/ NRUN, NPLOT, ITP(6), ITY(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,NOPTS
 5 WRITE (NFILE) VARIND(I), VARDEP1(I), ..., VARDEPN(I)
      ...
   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
            (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)
      NPLOT  - 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 - 6A6 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.

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	(2218 CM)
INITGD	(478 CM)
INITPLO	(218 CM)

LANGUAGE: FORTRAN IV

CM REQUIRED: 12028

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

OBJECT

EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'POLYN'

PURPOSE
LEAST SQUARES POLYNOMIAL FIT

FUNCTIONAL CATEGORY: E2

LANGUAGE: FORTRAN

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).
PN(X) = A(0) + A(1)*X + A(2)*X**2 + ... + A(N)*X**N

USAGE
CALL POLYN (ND, NP, NC, X, Y, NAPT, A, 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 DEPENDENT VARIABLE
Y	- ARRAY CONTAINING THE INDEPENDENT VARIABLE(S) MUST BE DIMENSIONED AT LEAST (NC,ND+1). 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(N) AND Z(1).) ALL SETS Y, Z, ... MUST BE EQUALLY SPACED.
A	- WORK ARRAY USED IN MATRIX SOLUTION OF THE (ND+1) SETS OF LINEAR EQUATIONS. MUST BE DIMENSIONED AT LEAST (ND+1,ND+1).
V	- OUTPUT ARRAY USED IN MATRIX SOLUTION FOR VECTOR. MUST BE DIMENSIONED AT LEAST (NC,ND+1).
SUM	- WORK ARRAY FOR SUMS OF POWERS OF X. MUST BE DIMENSIONED AT LEAST (2*ND+1).

CM REQUIRED: 233B (+ 170B 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

DATE WRITTEN: 01/29/60

DATE(S) REVISED

LOCATION OF DECKS
   SOURCE
      TAPE LABELLED CLIBRARYUPD3 (DECK: ARPLN1)
   OBJECT
      EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'PROOT'

PURPOSE
FIND ALL ROOTS OF A REAL POLYNOMIAL

FUNCTIONAL CATEGORY: 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 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 (COC 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: 4638

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

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: CLIBRARYUP03
   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
      FTNRFL - GET CURRENT FL

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 508

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
```

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 N0

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: 102B

```
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 CATEGORY:    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 1R 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
```

SUBROUTINE 'PUTCHR'
FUNCTION 'PUTCHR'

PURPOSE
INSERT CHARACTER INTO SPECIFIED POSITION IN A WORD

FUNCTIONAL CATEGORY: 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
(POSITION 1 IS LEFT-MOST 6-BIT CHARACTER IN A)
CH - CHARACTER TO BE INSERTED (IN 1H 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

SUBROUTINE 'QSORT'

PURPOSE
   IN-CORE ASCENDING SORT FOR ARRAYS LARGER THAN 500 WORDS

FUNCTIONAL CATEGORY: M1

USAGE
   CALL QSORT (A, I)

DESCRIPTION OF PARAMETERS
   A - 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 'P' COUNTER IN QSORT, CHECK IF
   MN EXCEEDS KL. IF SO, WRITE DUMMY SUBROUTINE TO SET KL
   AND THE DIMENTION OF K GREATER.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 216B + 57B COMMON

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 11/25/70

DATE(S) REVISED

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

SUBROUTINE 'QSORT1'

PURPOSE
   IN-CORE ASCENDING SORT WITH RE-ORDERING OF ASSOCIATED ARRAY
   (FOR ARRAYS LARGER THAN 500 WORDS)

FUNCTIONAL CATEGORY: M1

USAGE
   CALL QSORT1 (A, I, T)

DESCRIPTION OF PARAMETERS
   A - 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 'P' CONTER IN QSORT1, CHECK IF
   MN EXCEEDS KL. IF SO, WRITE DUMMY SUBROUTINE TO SET KL
   AND THE DIMENSION OF K GREATER.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 2668 + 578 COMMON

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 11/30/70

DATE(S) REVISED

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

```
SUBROUTINE 'RCPA'

PURPOSE
   READ (A PORTION OF) CONTROL POINT AREA

FUNCTIONAL CATEGORY:    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
            (AREA(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:  J9  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, RA0)
   DIMENSION EXCHJP(17)
   CALL RECOVRD (EXCHJP, ENDRUN, RA0)
     ...

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)
   RA0    - RA+0 POINTER (NOT USED BY THIS SUBROUTINE)

CM REQUIRED: 601B

OUTPUT UNITS
     LFN                              USE
   -------   ------------------------------------------------
   OUTPUT    LISTABLE OUTPUT

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      GETRA   - GET RA+0 THRU RA+77B
```

AUTHOR

DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 06/19/74

DATE(S) REVISED

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

SUBROUTINE 'REDUCE'

PURPOSE
   REDUCE FL TO MINIMUM OR REQUEST ADDITIONAL FL RELATIVE TO
   START OF BLANK COMMON

FUNCTIONAL CATEGORY: QQ

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: 368 (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

SUBROUTINE 'REPLAC'

PURPOSE
   REPLACE ONE CHARACTER BY ANOTHER IN AN ARRAY

FUNCTIONAL CATEGORY: 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 (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)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 578

AUTHOR
   DAVID V SOMMER - DTNSDC 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 CATEGORY:    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 (1R FORMAT)
   NEW - ARRAY OF CORRESPONDING NEW CHARACTERS (1R 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)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 738

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 CATEGORY: 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)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 608

AUTHOR
   DAVID W 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 'REPLLO'

PURPOSE
   REPLACE ALL CHARACTERS LESS THAN SPECIFIED CHARACTER WITH
   NEW CHARACTER

FUNCTIONAL CATEGORY: 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 (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)
   R11DFMT - 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 CATEGORY: 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)
   R110FMT - FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)

LANGUAGE: FORTRAN IV

CM REQUIRED: 57B

AUTHOR
   DAVID V SOMMER - DTNSDC CODE 1892.2

DATE(S) REVISED

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

```
SUBROUTINE 'REQUEST'

PURPOSE
   CALLABLE REQUEST FUNCTION

FUNCTIONAL CATEGORY:    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 SCOPE-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 SCOPE REFERENCE
                MANUAL, PAGE 12-23 ON.
   ICODE    - DETERMINES CONTENTS OF LFN AND EFFECT OF REQUEST
              ICODE 0 OR MISSING    - LFN IS AN ARRAY CONTAINING
                PARAMETERS FOR REQUEST MACRO
              ICODE = "*0", 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: 1258

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")
```

```
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
```

SUBROUTINE 'ROUTE'

PURPOSE
CALLABLE ROUTE COMMAND

FUNCTIONAL CATEGORY: 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. A 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
SCOPE-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	RESERVED
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

IPRMS	CONTENTS	FORMAT
1	LFN	1-7 CHAR, LEFT**
2	OC	0 FOR DEFAULT -OR- 2-CHAR DISPOSITION CODE, LEFT**
3	TID	0 -OR- 1LC - ROUTE TO CENTRAL SITE -OR- 2-CHAR TERMINAL ID, LEFT** -OR- 4LHERE - ROUTE TO THIS TERMINAL
4	FID	1-7 CHAR FILE ID -OR- 1L* -OR- 1-5 CHAR FILE ID, PRECEDED BY * (ALL LEFT**)
5	DEF	0 -OR- 3LDEF - TO DEFER ROUTING UNTIL END-OF-JOB
6		NON-ZERO TO RETURN THE JOB NAME IN THIS WORD
7	FC	0 -OR- 2-CHAR FORMS CODE, LEFT**
8	EC	0 - USE DEFAULT FOR PRINT: 2LB4, 2LB6, 2LA6, 2LA9 FOR PUNCH: 2LSB, 5L80COL, 3L026, 3L029, 5LASCII
9	IC	ONE OF: 0 OR 3LDIS - DISPLAY CODE 5LASCII - ASCII 3LBIN - BINARY
10	STID	3-CHAR STATION ID, LEFT**
11	PRI	PRIORITY FOR INTERACTIVELY ROUTED OUTPUT FILE BEING ROUTED TO THE ROUTING TERMINAL - 1-4 DIGIT OCTAL VALUE (00008-77778) FOR ALL OTHER FILES - 0
12	REP	REPEAT COUNT (0-31 (378))

** LEFT=LEFT-JUSTIFIED, BLANK OR ZERO PADDED

NW - NUMBER OF LAST ELEMENT IN IPRMS (OPTIONAL)
(IF OMITTED, NW=12)

CM REQUIRED: 3418

EXAMPLES

ASSUME THE PROGRAM HAS WRITTEN FILE 'TAPE7' TO BE PRINTED AT CENTRAL SITE:

```
      ...
      INTEGER IPRMS(12)
      ...
      IPRMS(1) = 5LTAPE7
      IPRMS(2) = 2LPR
      IPRMS(3) = 1LC
      IPRMS(4) = 1L*
      ...
      REWIND 7
      CALL ROUTE (IRC, IPRMS, 4)
      ...
```

THIS WILL SIMULATE THE FOLLOWING ROUTE COMMAND:

```
ROUTE,TAPE7,DC=PR,TID=C,FID=*.
```

A PROGRAM WISHES TO PUNCH FILE 'PUNCH' AT REMOTE TERMINAL 'AE' AT END OF JOB:

```
      ...
      INTEGER IPRMS(12)
      ...
      IPRMS(1) = 5LPUNCH
      IPRMS(2) = 2LPU
      IPRMS(3) = 2LAE
      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 THE FOLLOWING ROUTE COMMAND:

```
ROUTE,PUNCH,DC=PU,TID=AE,FID=*,DEF.
```

A PROGRAM CREATES A 'JOB' ON FILE 'TAPE99' TO BE SUBMITTED TO THE SAME INPUT QUEUE AS THE CREATING JOB:

```
      ...
      INTEGER IPRMS(12)
      ...
      IPRMS(1) = 6LTAPE99
      IPRMS(2) = 2LIN
      IPRMS(3) = 4LHERE
      ...
      WRITE (99, 1)
   99 FORMAT ("JOBCARD" / "CHARGE CARD" / "....")
      CALL ROUTE (IRC, IPRMS, 3)
```

THIS WILL SIMULATE THE FOLLOWING ROUTE COMMAND:

```
ROUTE,TAPE99,DC=IN,TID.
```

```
SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      LOCF       MAX0       MIN0       MOVLEV     SHIFT
   PART OF PROGRAM
      NONE
   OTHERS
      BZFILL  - CHANGE BLANKS TO 00B
      HERE    - GET TERMINAL IS FOR THIS JOB
      TRAILBZ - CHANGE TRAILING BLANKS TO 00B
      ZSYSEQ  - CALL THE SYSTEM

ARITHMETIC STATEMENT FUNCTIONS
   FAST L-FORMAT DECODE (LEFT-ADJ, ZERO-FILLED)
      L11FMT     L21FMT     L31FMT     L52FMT     L71FMT
   FAST R-FORMAT DECODE (RIGHT-ADJ, ZERO-FILLED)
      R18FMT     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

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

```
SUBROUTINE 'SBYT'
FUNCTION   'SBYT'

PURPOSE
   STORE VARIABLE LENGTH BYTE

FUNCTIONAL CATEGORY:    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
```

```
SUBROUTINE 'SEMICO'

PURPOSE
   REPLACE DISPLAY CODE 003 WITH 77B (SEMI-COLON)

FUNCTIONAL CATEGORY:    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
   ? - NRL

DATE WRITTEN: ?

DATE(S) REVISED

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

```
SUBROUTINE 'SETREW'

PURPOSE
   CONVERT REWIND OPTION INTO RM OPEN AND CLOSE CODES

FUNCTIONAL CATEGORY:    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 EOI; CLOSE=NOREWIND
           ER     - OPEN=POSITION BEFORE EOI; CLOSE=REWIND
           EU     - OPEN=POSITION BEFORE EOI; 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 ARRAY SPECIFIED NUMBER OF BITS (CROSSING OVER WORD
   BOUNDARIES)

FUNCTIONAL CATEGORY:     M4

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(N+1) NOT DEFINED)
             =0 - JUST MOVE (B(N+1) IS SET TO 0)
             >0 - SHIFT TO RIGHT
                  (LEADING AND TRAILING BITS SET TO 0)

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1168

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
```

SUBROUTINE 'SKWEZL'

PURPOSE
SQUEEZE LEFT AND REMOVE BLANKS AND 00B

FUNCTIONAL CATEGORY: 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: 1113

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 00B

FUNCTIONAL CATEGORY: 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 CATEGORY: 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: 3108

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
TAPE LABELLED: CLIBRARYUPD3
OBJECT
EDITLIB USER LIBRARY: NSRDC

SUBROUTINE 'SSORT'

PURPOSE
   FTN SHELL SORT

FUNCTIONAL CATEGORY: M1

USAGE
   CALL SSORT (A, I, T)
   CALL SSORT (A, I)

DESCRIPTION OF PARAMETERS
   A - ARRAY TO BE SORTED
   I - NMBER 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: 1168

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

SUBROUTINE 'SSORTF'

PURPOSE
   FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS

FUNCTIONAL CATEGORY: 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   - 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: 1178

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

AUTHOR
   C FLINK - KPS NWL

DATE WRITTEN: 01/10/71

DATE(S) REVISED
   11/23/76 - DVS - DTNSRDC - CHANGE SUBROUTINE SENT TO MOVLEV

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

SUBROUTINE 'SSORTI'

PURPOSE
   FTN CALLABLE SHELL SORT FOR TWO-DIMENSIONAL ARRAYS

FUNCTIONAL CATEGORY: M1

USAGE
   CALL SSORTI (A, TEMP, M, N, I)
   CALL SSORTI (A, TEMP, M, N)

DESCRIPTION OF PARAMETERS
   A   - 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   MOVLEV   SHIFT
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 153B

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 MOVLEV

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

SUBROUTINE 'SSORTL'

PURPOSE
   FTN LOGICAL SHELL SORT

FUNCTIONAL CATEGORY: M1

USAGE
   CALL SSORTL (A, I, M, T)
   CALL SSORTL (A, I, M)

DESCRIPTION OF PARAMETERS
   A - 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(K) STILL RELATES TO T(K)

REMARKS
   NONE

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

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 1148

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 CATEGORY:     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: 168

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 'TRAILBZ'

PURPOSE
   CHANGE TRAILING BLANKS TO ZEROS (00B)

FUNCTIONAL CATEGORY: 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 TELETYPE,
   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: 1228

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

SUBROUTINE 'UNLOAD'

PURPOSE
   UNLOAD A FORTRAN FILE

FUNCTIONAL CATEGORY: Q4

USAGE
   CALL UNLOAD (IOUNIT)

DESCRIPTION OF PARAMETER
   IOUNIT - FORTRAN LOGICAL UNIT NUMBER

REMARKS
   FORTRAN SEQUENTIAL FILES SHOULD HAVE THEIR BUFFERS FLUSHED
   ISSUING A REWIND BEFORE CALLING THIS ROUTINE.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      CLUXXX - UNLOAD A FILE (CALLS SEVERAL OTHERS)
               (WRITTEN BY C M CHERNICK)

LANGUAGE: FORTRAN IV

CM REQUIRED: 21B

AUTHOR
   DAVID V SOMMER - NSRDC 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

```
FUNCTION   'VALDAT'

PURPOSE
   LOGICAL FUNCTION TO VALIDATE A DATE FORMAT

FUNCTIONAL CATEGORY:    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: 1623

METHOD
   DATE FORMAT IS VALIDATED BY THE FOLLOWING CHECKS:
      EXACTLY 2 SLASHES
      SLASHES SEPARATED BY 1 OR 2 CHARACTERS
      SLASHES NOT IN POSITIONS 1, 3 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
```

```
SUBROUTINE 'VALIDT'

PURPOSE
   VALIDATE ARRAY 'A' TO SEE THAT EACH ELEMENT IS ONE OF THOSE
   OF ARRAY 'V'

FUNCTIONAL CATEGORY:    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 CATEGORY: M4

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'

REMARKS
NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
PART OF LANGUAGE
NONE
OTHERS
NONE

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: ?B

AUTHOR
C FLINK - KPS NWL

DATE WRITTEN: 02/10/71

DATE(S) REVISED
1974 - DAVID V SOMMER - DTNSRDC CODE 1892.2
(NAME CHANGED FROM 'MOVE' TO 'VFILL')

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 CATEGORY:    M2

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)

REMARKS
   DATES FROM JANUARY 1, 1582 THRU OCTOBER 14, 1582 AND
   AFTER FEBRUARY 28, 4000 THRU DECEMBER 31, 4000 ARE NOT
   VALIDATED.

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MOD
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

METHOD
   SEE IBM PROGRAM DESCRIPTION  3600 03.1.004

CM REQUIRED: 102B

AUTHOR
   RICHARD CONNER - IBM

DATE WRITTEN: 10/15/66

DATE(S) REVISED
   04/26/73 - REWRITTEN IN FORTRAN FOR CDC 6000 - DVS

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

```
FUNCTION    'XOR'

PURPOSE
   EXCLUSIVE OR

FUNCTIONAL CATEGORY:     R1  A0

LANGUAGE: FORTRAN IV EXTENDED

REMARKS
   SIMULATES I .XOR. J

USAGE
   K = XOR (I, J)

DESCRIPTION OF PARAMETERS
   I,J      - SIMPLE VARIABLES TO BE XOR'ED TOGETHER
   XOR      - (INTEGER) WILL RETURN THE RESULT OF I .XOR. J

CM REQUIRED: 14B

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

METHOD
   XOR = (I  .AND.  .NOT. J)  .OR.  (.NOT. I  .AND.  J)

AUTHOR

DATE WRITTEN: 06/23/77

DATE(S) REVISED

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

SUBROUTINE 'ZBLANK'

PURPOSE
   CHANGE BLANKS TO 00B AND VICE VERSA

FUNCTIONAL CATEGORY: 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 CATEGORY: 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 CATEGORY:    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
       (BYTE COUNT BEGINS WITH 1 FOR THE LEFTMOST BYTE IN 'A')
   L - NUMBER OF BYTES IN THIS FIELD TO PROCESS

       (UP TO 31 PAIRS OF SI,LI)

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 REPACED 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 CATEGORY:    Q0

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, VS, FO, ST)

   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, 22, LFN, PFN, ID, TK, RD, EX, MD, CN,
                MR, AC, CY, RP, XR, LC, RW, SN, VS, FO, ST)

DESCRIPTION OF PARAMETERS
   IPRMS - ARRAY (MAXIMUM REQUIRED DIMENSION 22) TO BE DEFINED
   NW    - 0 - SET ALL 22 WORDS TO ZERO
           1 THRU 22 - 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 (INTEGER 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)
   VS    - VOLUME SERIAL NUMBER (1-7 CHARACTERS,
           LEFT-JUSTIFIED).  RESERVED FOR FUTURE.
   FO    - FILE ORGANIZATION (2-CHARACTERS)
   ST    - STATION ID (MULTI-FRAME)
           RESERVED FOR FUTURE.
   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.
```

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MIN0   MOVLEV
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV

CM REQUIRED: 142B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATE WRITTEN: 01/13/76

DATE(S) REVISED
   01/20/76

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

SUBROUTINE 'ZPFUNC'

PURPOSE
CALLABLE PERMANENT FILE FUNCTIONS

USAGE
CALL ZPFUNC (IRC, IPRMS, NW)

DESCRIPTION OF PARAMETERS
IRC - INPUT: PERMANENT FILE FUNCTION DESIRED
1 - ATTACH
2 - CATALOG
3 - EXTEND
4 - PURGE
5 - RENAME
6 - PERM
OUTPUT: ERROR RETURN CODE
(EITHER ZPFUNC- OR SCOPE-GENERATED)

ZPFUNC-GENERATED

IRC	MEANING
-1	IRC HAD ILLEGAL INPUT VALUE
-2	LAST CHARACTER OF AC IS NOT DISPLAY CODE NUMERIC

SCOPE-GENERATED

DEC	OCT	COMND	MEANING
0	000	ALL	FUNCTION SUCCESSFUL
1	001		ID ERROR
2	002	A,P	LFN ALREADY IN USE
3	003	DEPR	UNKNOWN LFN
4	004	C	TOO MANY CYCLES (5 MAX)
5	005	C,E	PF CATALOG FULL
6	006		NO LFN OR PFN
8	010	C,E	LATEST INDEX NOT WRITTEN
9	011	C	FILE NOT ON A PF DEVICE
10	012	A	FILE NOT IN SYSTEM
11	013	A	ARCHIVE RETRIEVAL ABORTED
12	014	C,R	INVALID CYCLE NUMBER
13	015	C	CY LIMIT REACHED (999 MAX)
14	016	C	PF DIRECTORY FULL
15	017	DEPR	FUNCTION ATTEMPTED ON A NON-PERMANENT FILE
16	020		FCN ATTEMPTED ON NON-LOCAL FILE
18	022	C	FILE NEVER ASSIGN TO A DEVICE
19	023	A	CYCLE INCOMPLETE OR DUMPED
20	024	A	FILE ALREADY ATTACHED
21	025	A	FILE UNAVAILABLE
23	027		ILLEGAL LFN
24	030	A	FILE DUMPED
27	033		ALTER NEEDS EXCLUSIVE ACCESS
29	035	C	FILE ALREADY IN SYSTEM
56	070		PFM STOPPED BY SYSTEM
57	071		SECURITY VIOLATION
58	072		FILE DEFINITION BLOCK ADDRESS

IPRMS - PARAMETERS FOR PF FUNCTION

IPRMS	CONTENTS	FUNCTIONS	FORMAT
1	LFN	ALL	1-7 CHAR, LEFT* (IF 0, 1ST 7 CHAR OF PFN ARE USED (A,C,P)
2-5	PFN	A,C,P,R	1-40 CHAR, LEFT
6	ID	A,C,P,R	1-9 CHAR, LEFT
7	TK	**,***	1-9 CHAR, LEFT
8	RD	**,***	1-9 CHAR, LEFT
9	EX	**,***	1-9 CHAR, LEFT
10	MD	**,***	1-9 CHAR, LEFT
11	CN	**,***	1-9 CHAR, LEFT
12	MR	A,C	0 OR NOT
13	AC	C,R****	10 CHAR (LAST IS NUMERIC
14	CY	A,C,P,R	INTEGER (1-999) NEGATIVE TO RETURN VALUE
15	RP	C,R	INTEGER (0-999)
16	XR	C,R ***	1-9 CHAR, LEFT
17	LC	A,P	0 OR NOT
18	RW	A,C	0 OR NOT
19	SN	A,P	1-7 CHAR, LEFT
20	VS		VOLUME SERIAL NUMBER (RESERVED FOR FUTURE)
21	FO	C	2-CHAR, LEFT (DA, IS, AK)
22	ST		STATION ID (MULTI-FRAME) (RESERVED FOR FUTURE)

A=ATTACH; C=CATALOG; P=PURGE; R=RENAME;

* LEFT=LEFT-JUSTIFIED, BLANK OR ZERO PADDED

** FOR A,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
      IZRT9ZR
      NUMVAR
      ZPFMAC
      ZPFPSW

CM REQUIRED: 445B

AUTHOR
   C M CHERNICK - NSRDC CODE 1832

DATE WRITTEN: 01/75

DATE(S) REVISED
   05/75   01/02/76

LANGUAGE: FORTRAN IV EXTENDED

FUNCTIONAL CATEGORY: Q3

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

EXAMPLE

```
      PROGRAM TEST (INPUT, OUTPUT, TAPE5=INPUT, TAPE6=OUTPUT
      DIMENSION IPRMS(22)
      DATA LFN    / 6LMYFILE/
      DATA ID     / 4LCXXX/
      DATA IPFN1, IPFN2/ 10HPERMANENTF, 3LILE/
      DATA IAC    / 10H9876543210/           (SEE NOTE BELOW)
      DATA IPW    / 8LPASSWORD/

         . . .

      DO 10 I=1,22
   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
      NW  = 13
      CALL ZPFUNC (IRC, IPRMS, NW)
      IF (IRC .NE. 0) WRITE (6, 20) IRC, IRC
   20 FORMAT (*0ERROR - IRC=* I7, * OR * 03, *B*)

         . . .

      STOP
      END
```

THIS PROGRAM IS EQUIVALENT IN EFFECT TO THE FOLLOWING CONTROL CARDS:

```
CATALOG(MYFILE,PERMANENTFILE,ID=CXXX,AC=9876543210,
        PW=PASSWORD)
```

FOR A NEW CYCLE OF AN EXISTING FILE:

```
CATALOG(MYFILE,PERMANENTFILE,ID=CXXX,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 CATEGORY:    Q0

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, 12, LFN, DC, TID, FID, DEF, RETJOB, FC,
                EC, IC, STID, PRI, REP)

DESCRIPTION OF PARAMETERS
   IPRMS  - ARRAY (MAXIMUM REQUIRED DIMENSION 12) TO BE DEFINED
   NW     - 0 - SET ALL 12 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, 5L80COL, 3L026, 3L029, 5LASCII
   IC     - INTERNAL CHARACTERISTICS
            0 OR 3LDIS - DISPLAY CODE
            5LASCII    - ASCII
            3LBIN      - BINARY
   STID   - 3-CHARACTER STATION ID (RESERVED FOR FUTURE)
   PRI    - PRIORITY (TO ROUTING TERMINAL ONLY)
            (0000B-7777B)
            ALL OTHERS USE 0
   REP    - REPEAT COUNT (0-31 (37B))
   NOTE: ALL VARIABLES ARE TYPE INTEGER.  CHARACTER DATA IS
         LEFT-JUSTIFIED AND ZERO-PADDED.
         TO CLEAR (OR OMIT) A SPECIFIC PARAMETER, USE 0.

REMARKS
   NONE
```

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      MIN0   MOVLEV
   OTHERS
      NONE

ARITHMETIC STATEMENT FUNCTIONS
   NONE

LANGUAGE: FORTRAN IV EXTENDED

CM REQUIRED: 76B

AUTHOR
   DAVID V SOMMER - DTNSRDC CODE 1892.2

DATA WRITTEN: 01/19/76

DATE(S) REVISED
   01/24/77 - ADD REP PARAMETER

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

SUBROUTINE 'ZSYSEQ'

PURPOSE
   FORTRAN CALLABLE SYSTEM CALL

FUNCTIONAL CATEGORY: 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 (4LDSPP+LOCF(A))

   NOTE: THE P AFTER DSP IS THE RECALL BIT. IF NO RECALL
         REQUIRED, THEN:

            CALL ZSYSEQ (3LDSP+LOCF(1))

REMARKS
   NONE

SUBROUTINE AND FUNCTION SUBPROGRAMS REQUIRED
   PART OF LANGUAGE
      NONE
   OTHERS
      SYS=

LANGUAGE: CDC 6000 COMPASS

CM REQUIRED: 48

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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