

The IBM logo consists of the letters "IBM" in a bold, white, sans-serif font, set against a solid black rectangular background.

**Systems Reference Library**

**Catalog of Programs for  
IBM 704-709-7040-7044-7090 and 7094  
Data Processing Systems**

This Catalog contains a complete listing of all programs (Type I, II, III and IV) available for the IBM 704-709-7040-7044-7090 and 7094 Data Processing Systems. It obsoletes all previous editions of the "Catalog of Programs for IBM Data Processing Systems", Form No. C20-8090 and its supplements.

This Catalog contains the following sections:

1. Introduction and instructions on how to use the catalogs and how to order programs.
2. A list of new programs (if applicable).
3. A list of corrections and revisions to announced programs (if applicable).
4. A Keyword-in-Context (KWIC) Index.
5. Abstracts of all available programs.
6. A list of deletions (if applicable).

## TABLE OF CONTENTS

Introduction .....	iii	Abstracts of Available Programs Section	
Types of Programs .....	iii	"A" .....	011
Customer Organizations .....	iii	0704 Data Processing System .....	012
How to Order Programs .....	iii	0709 Data Processing System .....	012
Keyword-in-Context Index .....	iv	7040 Data Processing System .....	013
Words Prevented from Indexing .....	iv	7090 Data Processing System .....	015
Program Classification Codes .....	v	Abstracts of Available Programs Section	
Using the Catalog .....	vii	"B" .....	019
New Entries .....	vii	0704 Data Processing System .....	019
Program Corrections and Revisions .....	viii	0709 Data Processing System .....	047
Deleted Programs .....	viii	7040 Data Processing System .....	056
List of New Entries .....	ix	7090 Data Processing System .....	057
Keyword-in-Context (KWIC) Index .....	001	7094 Data Processing System .....	087

INTRODUCTION

Beginning with this issue, individual Catalogs are being made available by machine system families. Separate publications of the Catalog should greatly increase the utility and efficiency of ordering and obtaining programs for IBM Data Processing Systems. The Catalogs for the systems listed below, with their form numbers, are currently available from IBM Branch Offices:

<u>Title</u>	<u>Form Number</u>
Catalog of Programs for IBM 305 and 650 Data Processing Systems	C20-1600
Catalog of Programs for IBM 1401, 1420, 1440, and 1460 Data Processing Systems	C20-1601
Catalog of Programs for IBM 705, 1410, 7010, 7070, 7072, 7074, 7080, 7740, and 7750 Data Processing Systems	C20-1602
Catalog of Programs for IBM 1620 and 1710 Data Processing Systems	C20-1603
Catalog of Programs for IBM 704, 709, 7040, 7044, 7090, and 7094 Data Processing Systems	C20-1604

This Catalog contains a complete listing of all programs available for the IBM 704, 709, 7040, 7044, 7090, and 7094 Data Processing Systems. It obsoletes all previous editions of the "Catalog of Programs for IBM Data Processing Systems" and its supplements. Individually updated supplemental issues of all Catalogs will be published by the same machine families listed above and can be obtained from IBM Branch Offices as they are published.

To assist you further in using this Catalog, the abstracts are listed by file number in numeric and alphabetical sequence. When you have determined the file number of a particular program, you can easily locate the abstract by means of the sequential arrangement. These procedures are described in detail in the section entitled, "Using the Catalog."

TYPES OF PROGRAMS

The IBM Program Information Department distributes two types of programs:

Type I

Programming Systems are conceived and developed by IBM as an integral part of the data processing system for which they are written.

Type II

Application Programs are carefully selected solutions by IBM of data processing problems. They are supported by well-planned documentation and tested procedures.

Both types of programs are maintained by IBM and modifications will be supplied automatically to all users of specific programs by the Program Information Department. Abstracts for Type I and Type II programs are contained in the "A" Section of this Catalog.

The Program Distribution Center distributes two types of programs:

Type III

IBM-Contributed Programs are contributed voluntarily by IBM employees to aid the programming and systems community.

Type IV

Customer-Contributed Programs are valuable aids to the programming and systems community supplied by members of customer organizations and individual users of IBM Data Processing Systems.

IBM serves solely as the distribution agent for Type III and Type IV programs. Abstracts for Type III and Type IV programs are contained in the "B" Section of this Catalog.

CUSTOMER ORGANIZATIONS

Customer organizations take part in the exchange of programming and systems information.

The SHARE Organization coordinates the effective use of IBM Data Processing Systems through exchange of programming and application information, thereby seeking to reduce redundant programming effort. Programs written by SHARE members provide meaningful solutions to many data processing problems encountered in using IBM 704, 709, 7040/44, 7090, and 7094 Data Processing Systems and future versions of these systems.

HOW TO ORDER PROGRAMS

Domestic Customers

Section A - Abstracts of Available Programs (Types I and II)

Programs listed in this section should be ordered through your local IBM Branch Office. Please use the "IBM Program Request Card," available from your IBM Branch Office.

Section B - Abstracts of Available Programs (Types III and IV)

Programs listed in this section should be ordered from:

Program Distribution Center  
 Post Office Box 790  
 White Plains, New York

Please use the "General Program Request Card" available from your IBM Branch Office. Program materials should not be requested directly from the authors. Members of SHARE may use the "Program Order Card (PDC) Users Organizations."

Program tapes will be duplicated at 556 characters per inch unless a different density is specified by the requestor. Be sure to check the abstract for the exact number of tapes to be submitted when requesting a tape program.

IBM World Trade Users

World Trade Users should order programs by contacting their IBM Representative.

KEYWORD-IN-CONTEXT INDEX

The Keyword-in-Context Index lists available programs arranged alphabetically by the keywords in the program titles. There is an index entry for each significant keyword in the title. Certain words are not accepted as indexing words but will be printed as part of the title. The complete "Stop List" of words not accepted for indexing is included under the heading "Words Prevented from Indexing."

This KWIC Index was prepared by highlighting each keyword of the title in the context of words on either side of it and aligning the keywords of all titles alphabetically in a vertical column. The example below will illustrate the operation.

Notice that the # sign always precedes the first word of the title. A title that is longer than 59 characters will show only the characters that fall on either side of the keyword being highlighted, up to the limits of one line. The complete title may be found in the Abstract section. The slash (/) is used in place of parentheses. The # placed two spaces in front of the first word indicates that the entry is the second part of a two-line title.

WORDS PREVENTED FROM INDEXING

For the purpose of this index the following words are considered to be too general to be useful for retrieval purposes and are therefore prevented from indexing. This list may be modified as needed to make the index more useful. Note that hyphenated words are treated as one index word, with only the first word being significant.

A	FUNCTION	PACKAGE
AN	FUNCTIONS	POINT
AND	GENERAL	PRECISION
APPLIED	GENERATOR	PREPARED
ARITHMETIC	GENERATORS	PROGRAM
AS	I	PROGRAMMING
AT	IBM	PROGRAMS
AUTOMATIC	IF	ROOT
BY	II	ROUTINE
CALCULATION	III	SOLUTION
CALCULATIONS	IN	SUBROUTINE
CHECK	IS	SUBROUTINES
COMPLEX	ITSELF	SYSTEM
COMPUTER	METHOD	SYSTEMS
DATA	OF	THE
EQUATION	ON	TO
FOR	ONE	WITH
FROM	OR	

TITLE

SYSTEM FILE NO.

#32K FORTRAN PROGRAMMING SYSTEM FOR 709/7090	0709	FD-062
EGER ARITHMETIC FOR FORTRAN PROGRAMS #SEPTUPLE PRECISION INT I/O PACKAGE FOR 709 FORTRAN.	0709	1415MWSEPT
#WDPC BUFFERED	0709	0978WDIOF
E #INTERRUPT FORTRAN-LOADING TO COPY MEMORY ON TO TAP	0709	1164MWFOTO
PRECISION RATIONAL FRACTION PACKAGE	#SEPTUPLE	0709 1416MW7PFR
#INTEGER & RATIONAL FRACTION POLYNOMIAL MANIPULATION PACKAGE	0709	1413MWPOLY
#A FREE FORMAT INPUT ROUTINE	0709	1432MWCNV
04 AND 709/90 #FREQUENCY DISTRIBUTION ANALYSIS ON THE 7	0709	1400UCFD
YNOMIAL MANIPULATION#FULL WORD BINARY INTEGER COEFFICIENT POL	0709	1412MWFBPY
TED #GENERALIZED INTERNAL SORT -FORTRAN ORIEN	0709	1249WDSORT
#GENERALIZED MERGE	0709	SM-067



## PROGRAM CLASSIFICATION CODES

Included below is a complete listing of classification codes for all types of programs and for each system included in this Catalog. The Programming Systems (Type I) and Application Programs (Type II) abstracts appear in the "A" Section of this Catalog; the IBM-Contributed Programs (Type III) and Customer-Contributed Programs (Type IV) appear in the "B" Section of this Catalog.

In addition to assisting you in locating the abstract of each program, this list should prove useful in classifying programs written by IBM or customer personnel and contributed to the program libraries.

### Programming Systems Type I

/AD/ Autochart  
/AT/ Automatic Test  
/AU/ Autocoder  
/CB/ Cobol - Common Bus. Oriented Language  
/CT/ Commercial Translator  
/CV/ Conversion Programs  
/DN/ Diagnostic Programs  
/FO/ Fortran - Formula Translation  
(Example: 0709 F0-062)  
/IO/ Input/Output  
/LM/ Library Material  
/MI/ Miscellaneous  
/PR/ Processor - Includes AU, CB, I/O, etc.  
/RG/ Report Generators  
/SI/ Simulator Programs  
/SM/ Sort/Merge (Example: 0709 SM-067)  
/SP/ Symbolic Assembly Programs  
/SV/ Supervisory Systems  
/UT/ Utility Programs

### Application Programs Type II

#### Cross Industry Group

/CA/ Statistical Applications  
/CC/ Process Control  
/CM/ Mathematical Applications  
/CN/ Numerical Control Applications  
/CO/ Operations Research  
/CP/ Critical Path Scheduling  
/CR/ Information Retrieval  
/CS/ Simulators  
/CX/ Other

#### Distribution Industries

/DP/ Publishing  
/DR/ Retail  
/DW/ Wholesale  
/DX/ Other

#### Engineering

/EC/ Civil Engineering  
/EE/ Electrical Engineering  
/EH/ Chemical Engineering  
/EM/ Mechanical Engineering  
/EN/ Nuclear Codes  
/EO/ Optics  
/EX/ Other

#### Finance Industry

/FB/ Banking  
/FF/ Finance Companies  
/FI/ Brokerage and Investment  
/FX/ Other

#### Federal Government

/GF/ Government, Federal

#### Insurance

/IB/ Blue Cross and Blue Shield  
/IF/ Fire and Casualty  
/IL/ Life  
/IX/ Other

#### Manufacturing

/MA/ Aerospace  
/MD/ Drug, Food, Chemical Products  
/ME/ Electrical and Machinery  
/MF/ Fabrication and Primary Metals  
/MP/ Petroleum and Industrial Chemicals  
/MR/ Transportation Equipment  
/MT/ Textiles and Paper  
/MX/ Other

#### Service Industries

/SC/ Communication  
/ST/ Transportation  
/SU/ Utilities  
/SX/ Other

#### Universities and Government

/UC/ Colleges and Universities  
/UG/ Government, State and Local  
/UH/ Hospital and Medical  
/US/ Secondary Schools  
/UX/ Other

#### Exploratory

/XP/ Mathematics and Applications

## Type III and Type IV Programs

- A. Arithmetic Routines
  - 1. Real Numbers
  - 2. Complex Numbers
  - 3. Decimal
- B. Elementary Functions
  - 1. Trigonometric
  - 2. Hyperbolic
  - 3. Exponential and Logarithmic
  - 4. Roots and Powers
- C. Polynomials & Special Functions
  - 1. Evaluation of Polynomials
  - 2. Roots of Polynomials
  - 3. Evaluation of Special Functions
  - 4. Simultaneous Non-Linear Algebraic Equations
  - 5. Simultaneous Transcendental Equations of Differential Equations
- D. Operations on Functions and Solutions of Differential Equations
  - 1. Numerical Integration
  - 2. Numerical Solutions of Ordinary Differential Equations
  - 3. Numerical Solutions of Partial Differential Equations
  - 4. Numerical Differentiation
- E. Interpolation and Approximations
  - 1. Table Look-up and Interpolation
  - 2. Curve Fitting
  - 3. Smoothing
- F. Operations on Matrices, Vectors and Simultaneous Linear Equations
  - 1. Matrix Operations
  - 2. Eigenvalues and Eigenvectors
  - 3. Determinants
  - 4. Simultaneous Linear Equations
- G. Statistical Analysis & Probability
  - 1. Data Reduction
  - 2. Correlation-Regression Analysis
  - 3. Sequential Analysis
  - 4. Analysis of Variance
- H. Operations Research, Linear Programming Simulation, Scientific Management Gaming and Game-like Models
  - 1. Linear Programming
  - 2. General & Job-Shop Simulators
  - 3. Games and Game-like Models
  - 4. Game Theory
  - 5. General Problem Solvers
  - 6. Schedulers and Scientific Management
- I. Input
  - 1. Binary
  - 2. Octal
  - 3. Decimal
  - 4. BCD (Hollerith)
  - 9. Composite (Combination of any of the above)
- J. Output
  - 1. Binary
  - 2. Octal
  - 3. Decimal
  - 4. BCD (Hollerith)
  - 5. Plotting
  - 9. Composite
- K. Internal Information Transfer
  - 1. Drum
  - 2. Relocation
  - 3. Disk
  - 4. Tape
  - 5. Direct Data Devices
- L. Executive Routines
  - 1. Assembly
  - 2. Compiling
  - 3. Monitoring
  - 4. Preprocessing
  - 5. Disassembly and De-relativizing
  - 6. Relativizing
  - 7. Computer Language to Computer Language Translators
- M. Data Handling
  - 1. Sorting
  - 2. Conversion and/or Scaling
  - 3. Merging
  - 4. Character Manipulation (Linguistic)

- N. Debugging
  - 1. Tracing - Trapping
  - 2. Dumping
  - 3. Memory Verification & Searching
  - 4. Breakpoint Printing
- O. Simulation of Computers and Data Processors; Interpreters
  - 1. Off-line Equipment
  - 3. Computers
  - 4. Pseudo-computers
  - 9. Other or composite
- P. Diagnostics
- Q. Service or Housekeeping; Programming Aides
  - 1. Clear/Reset Programs
  - 2. Check Sum Accumulation and Correction
  - 3. Rewind, Tape Mark, Load Cards, Load Tape, etc.
  - 4. Internal Housekeeping; Save, Restore, etc.
  - 5. Report Generator Subroutines
- R. Logical and Symbolic
  - 1. Formal Logic
  - 2. Symbol Manipulation
- S. Information Retrieval
- T. Applications and Application-Oriented Programs
  - 1. Physics (Including Nuclear)
  - 2. Chemistry
  - 3. Other Physical Sciences
  - 4. Engineering
  - 5. Business Data Processing
  - 6. Manufacturing (non-data) Processing, Process Control
  - 7. Mathematics and Applied Mathematics
  - 8. Social and Behavioral Sciences and Psychology
  - 9. Biological Sciences
- U. Linguistics and Languages
- V. General Purpose Utility Subroutines
  - 1. Random Number Generators
  - 2. Combinational Generator Permutations, Combinations, and Subsets
- Z. All Others

## USING THE CATALOG

To locate a program, begin by thinking of the significant words describing the desired program. Then look in the KWIC, Keyword-in-Context, Index for the keyword entry. The reference code adjacent to the title will then direct you to the corresponding program abstract. The reference code is set up as follows:

<u>System</u>	<u>File No.</u>
0709	FO-062
0709	1415 MWSEPT
0709	SM-067

The number of the IBM System for which the program is written.	The IBM Library code for filing and ordering a program.
--	---

Now, refer back to the illustration in the section entitled, "Keyword-in-Context Index." The three file numbers indicated above appear on the 1st, 2nd, and the last lines respectively of the illustration.

As you can see, there are two kinds of file numbers: The first consists of two alphabetical characters and three numeric characters separated by a dash. The section entitled "Classification Codes" indicates that these reference numbers are Type I or II programs; their abstracts are located in the "A" Section of this Catalog.

The second division of file numbers consists of a combination of six, nine or ten alphanumeric characters. These characters indicate a Type III or IV program; their abstracts are located in the "B" Section of this Catalog.

When you have found the correct section of "Abstracts of Available Programs," look for the code printed at the upper left of the abstract. These codes are listed in numeric and alphabetical sequence - for instance, 0709 FO-062 is listed before 0709 SM-067 in the "A" Abstract Section; similarly, 0709 1415 MWSEPT is listed before 0709 1432 MWCAIV in the "B" Abstract Section of this Catalog.

Each abstract describes the relevant program in enough detail to help you determine if the program will meet your requirement.

## NEW ENTRIES

This section of the Catalog appears before the KWIC Index and provides a list of new programs added since the March edition of the Supplement to the Catalog of Programs for IBM Data Processing Systems, Form Number N20-0003-8.

The new programs are divided into two groups: Section A for Type I and II Programs; and Section B for Type III and IV. Programs are listed by file number and title. Also given is the page of this Catalog on which the abstract for each program appears.

#### PROGRAM CORRECTIONS AND REVISIONS

Corrections and revisions to Type III (IBM Field-Contributed) and Type IV (Customer-Contributed) programs are listed in a special table preceding the KWIC Index.

This information is provided under six headings:

Program number; date of correction; number of cards revised; number of paper tapes revised; pages of documentation revised; sections of the program abstract that have been revised.

If a user has received the program data prior to the date indicated and would like to receive the corrections indicated, he must re-order the program. See the section entitled "How to Order Programs - Section B."

Corrections and revisions to Type I (Programming Systems) and Type II (Application Programs) can be obtained through your IBM Branch Office.

#### DELETED PROGRAMS

This section contains a list of programs that have been removed since the March edition of the Supplement to the Catalog of Programs for IBM Data Processing Systems Form No. N20-0003-8. These programs are listed in sequence by machine system and file number.

Included in the listing is an alphabetical heading, "Reason for Removal." This letter refers to a key that indicates the specific reason for removing the program from the Catalog.

##### Alphabetical Key to Reason for Removal

- A - This program has been deleted because of low use.
- B - This program has been placed in the SHARE inactive files.
- C - This program has been deleted due to limited usefulness.
- D - This program is obsolete and replaced by file number:\_\_\_\_\_.

Programs deleted by the letter "D" are followed by a file number code. This code is the file number of the program that replaces the deleted program. An abstract for the replacement program may be found in the Abstracts of Available Programs Section of this Catalog.

# Programs Added to the 7040 and 7090 Library Since the March 1964 Supplement

## New Entries—Section A

FILE NUMBER	TITLE	PAGE
<u>7040 NEW ENTRIES</u>		
7040-CO-08X	7040/7044 LINEAR PROGRAMMING SYSTEM	13
<u>7090 NEW ENTRIES</u>		
7090-FO-062	32K FORTRAN PROGRAMMING SYSTEM FOR 709/7090	16
7090-UT-145	7090/7094 HYPERTAPE UTILITY PROGRAMS /INDEPENDENT VERSION/.	18

## New Entries—Section B

FILE NUMBER	TITLE	PAGE
<u>7090 NEW ENTRIES</u>		
NUCL56	CCC-3 SHIELDING PROGRAM PACKAGE CCC-3 /14-2 AND 14-3/	60
NUCL57	NUCY DEVELOPMENT OF A GENERAL METHOD OF EXPLICIT SOLUTION TO NUCLIDE CHAIN EQUATIONS	60
NUCL58	CCC1 - KERNEL INTEGRATION CODE - CALCULATED SOURCES	60
NUCL59	CCC2 - KERNEL INTEGRATION CODE- INPUT SOURCES	61
NUCL60	WED	61
NUCL61	W-DSN	61
NUCL62	MURGATROYD ANALYSIS OF THE KINETICS OF THE MSRE	61
NUCL63	RATRAP	61
NUCL64	CCC-4 /SHIELDING PROGRAM PACKAGE/ 15-2	61
ZOXY0002	CLUSTERING PROGRAM	61
3001RSROKT	ROCKET - OMNIBUS CALCULATOR KINEMATICS OF TRAJECTORIES	83



TITLE SYSTEM FILE NO.

#DETERMINANT EVALUATING SUBROUTINE 0704 0355GMDTR  
 NORMAL PROBABILITY EVALUATION #BIVARIATE 0704 1323LABVN  
 #DETERMINANT EVALUATION 0704 0110GDEV1  
 PROGRAM FOR SYSTEMS EVALUATION #A GENERAL 0704 1244ANC001  
 #DETERMINANT EVALUATION AND ROOT EXTRACTION 0704 0514NA0299  
 #GENERAL INTEGRAL EVALUATOR 0704 0825JPIIT  
 #DETERMINANT EVALUATOR FOR NEARLY TRIANGULAR MATRICES 0704 0635RWDET  
 #DETERMINANT EVALUATOR FORTRAN SUBROUTINE 0704 0635RWDET  
 #EXPLICIT SOLUTION OF THE GENERAL CUBIC EQUATION 0704 1028GCO01  
 #FLOATING POINT EXPONENTIAL 0704 1209WEXZF  
 #EXPONENTIAL INTEGRAL 0704 0753HLEXP  
 #EXPONENTIAL INTEGRAL ROUTINE. #DOUBLE PRECISION 0704 0931PKFXPD  
 #EXTENDED RANGE COMPLEX ARITHMETIC PACKAGE 0704 06C9CAC034  
 EVALUATION AND ROOT EXTRACTION #DETERMINANT 0704 0514NA0299  
 #EXTREMUM OF UNIMODAL FUNCTIONS OF ONE VARIABLE 0704 0878BEMFX  
 #THE SYSTEM 0704 0352GPF501  
 #ANALYZING SYSTEM FAILURE DATA 0704 1059WLFALL  
 #FAP ASSEMBLY PROGRAM FOR 0704 1193AFFAP  
 SYMMETRIC MATRIX - FI #EIGENVALUES AND EIGENVECTORS 0704 0474NLMXEM  
 #SKIPS ONE FILE ON A DECIMAL TAPE AND PUNCHES 0704 1144NC146  
 #READS THE FINAL SORTED BIBLIOGRAPHY TAPE FROM NC 1 0704 1144NC144  
 #READS THE FINAL SORTED TAPE FROM NC 139 0704 1144NC140  
 #GENERAL ROOT FINDER FORTRAN SUBROUTINE 0704 0635RWGRT  
 #FIRN 0704 0704NUCL60  
 #KNIC SORT PROGRAM FIRST PART 0704 0914NCKSP1  
 -DIMENSIONAL SPHERE FIT #LEAST SQUARE N 0704 1387ANE211  
 #CHEBYSHEV LINE FIT 0704 1265ANE210  
 LEGENDRE POLYNOMIAL FIT #ARGONNE LEAST SQUARE 0704 0424ANE201  
 T SQUARE POLYNOMIAL FIT #FORTRAN II/LEAS 0704 0772ANE206  
 ONAL FUNCTION CURVE FITTING #LEAST SQUARES RATIO 0704 0859GSL165  
 T SQUARE POLYNOMIAL FITTING #A GENERAL PROGRAM FOR LEAS 0704 1264ANE209  
 UED FRACTIONS CURVE FITTING AND INTERPOLATION #CONTIN 0704 0858G55412  
 #GENERAL LEAST SQUARES FITTING PROCEDURE #A GE 0704 1076ANE208  
 #LEAST SQUARES CURVE FITTING ROUTINE #GENERAL 0704 0775WGL15C  
 #OLYMPIAN #FITTING TO SELECTED TERMS OF A GENERAL P 0704 1077G0003  
 #FIXED POINT LOGARITHM 0704 0466RL0178  
 #FIXED POINT PSEUDO RANDOM NUMBER GENERATOR 0704 0373BSRN  
 #MURA FIXED POINT RUNGE-KUTTA 0704 0891MURKY4  
 #MURA FIXED POINT RUNGE-KUTTA 0704 0280MURKY1  
 #FLOAT A FRACTION 0704 0743ORFLOT  
 FUNCTION GENERATOR, #AUTO- AND CROSS-CORRELATION 0704 0577WAC2F  
 LOG-EXTENDED RANGE #FITTING BINARY ARITH. #NGRMLIZED 0704 0370R0139  
 #FLOATING NATURAL LOGARITHM 0704 0069LAS260  
 IC SINE AND COSINE #FLOATING POINT #HYPERBOL 0704 0417PFC5H1  
 #FLOATING POINT /N/ VARIATE PROBABILITY I 0704 0794RWNPF3  
 #DOUBLE PRECISION #FLOATING POINT CARD INPUT 0704 0650WRWREAD  
 #FLOATING POINT COMPLEX ARITHMETICS 0704 0417PFSAC1  
 #FLOATING POINT DOUBLE PRECISION ARITHMETIC 0704 0417PFSAC1  
 #DOUBLE PRECISION #FLOATING POINT EXPONENTIAL ROUTINE. 0704 0931PKFXPD  
 TA INTEGRATION #FLOATING POINT GILL METHOD FOR RUNGE-KUT 0704 1209WEXZF  
 #FLOATING POINT OPTIMIZED RUNGE KUTTA 0704 1147CRKOP  
 TA INTEGRATION #FLOATING PT. COWELL /2ND SUM/, RUNGE-KUT 0704 0775RWDE6F  
 #704-SAP #FLOATING-PT. TRAP MATRIX DIAGONALIZATION 0704 0705MHOI2  
 CAPACITATED NETWORK FLOW PROGRAM # 0704 0511MICNF1  
 SPORTATION PROBLEM, #LOW- OR HUNGARIAN METHOD #THE TRAN 0704 0464IBTFL  
 #FN II SINE-COSINE INTEGRAL SUBROUTINE 0704 0848ARCS11  
 #FGCASTING BY ECONOMETRIC SYSTEMS 0704 0963IBPFES  
 #FGCASTING BY ECONOMETRIC SYSTEMS 0704 0963IBPFES  
 #FORMAT TREES PROGRAM 0704 1277BS1LDC  
 RAMMING SUBROUTINE, #FORTRAN CODED #LINEAR PROG 0704 1281RSM5UB  
 #FORTRAN DECIMAL TO BINARY CONVERSION. 0704 1274RF0100  
 #FORTRAN II 0704 1505RP1228  
 #FORTRAN II BINOMIAL COEFFICIENT SUBROUTINE 0704 0918MEPYRS  
 #ARCTAN A/B, #FORTRAN II VERSION, SAP CODED 0704 0603WH0055  
 #FORTRAN INPUT/OUTPUT PACKAGE 0704 1134ELF10P  
 NUBESI PROGRAM FOR #FORTRAN LIBRARY #MODIFIED 0704 0477PFBES1  
 #FORTRAN LINEAR PROGRAMMING CODE 0704 0408CFE01  
 ONE #FORTRAN MATHEMATICAL PROGRAMMING SYSTEM 0704 0863RSM001  
 #32K #FORTRAN PROGRAMMING SYSTEM 0704 F0-039  
 #GENERAL LEAST SQUARES #FORTRAN SUBPROGRAM #GE 0704 0635RWGSLQ  
 #GENERAL LEAST SQUARES #FORTRAN SUBROUTINE #DE 0704 0635RWGRT  
 TERMINANT EVALUATOR #FORTRAN SUBROUTINE #DE 0704 0635RWDET  
 #FORTRAN SUBROUTINE HOW 0704 1321BCHOW  
 #FORTRAN 2 #EIGENVALUE-EIGENVECTOR SUBPROG 0704 0592NUMLEV  
 #FORTRAN 2 INTEGRATION SUBROUTINE 0704 0539GLGAU2  
 #SECOND, THIRD, AND FOURTH ORDER RUNGE-KUTTA INTEGRATION 0704 1233AAINT1  
 #FLOAT A FRACTION 0704 0743ORFLOT  
 #CONTINUED FRACTIONS CURVE FITTING AND INTERPOLATION 0704 0858G55412  
 #INCOMPLETE GAMMA FUNCTION 0704 0516LAS862  
 TAPE WRITER PROGRAM #GAUSS APPROXIMANT GENERATOR 0704 1048JPGIN  
 #GEMDA-RENUPAK #BASIC 0704 1278BS1WDC  
 #GENERAL-ORTHONORMALIZING SUBROUTINE 0704 0704NUCL59  
 #GENERALIZED DISTRIBUTION PROBLEM 0704 0850BSRTH  
 #SOLUTION OF GENERALIZED DISTRIBUTION PROBLEM 0704 1355MUMMT  
 #TO GENERATE GUTTMAN SCALES FOR A SET OF ITEMS 0704 1337BCGUTS  
 #GENERATE MATRICES TO BE SOLVED BY NU TPL 0704 1110NGUGN1  
 #704 PROGRAM TO GENERATE 1401 T/P PROC. ON OUTPUT TAPES 0704 1231TVPTRP  
 #FLOATING POINT GILL METHOD FOR RUNGE-KUTTA INTEGRATION 0704 0419RWDE4F  
 #MUR DYANA - DYNAMICS ANALYZER - PROGRAMM 0704 1189GMDYAN  
 #MUR DYANA DYNAMICS ANALYZER-PROGRAMMER 0704 0930GGMGD  
 #TO GENERATE GUTTMAN SCALES FOR A SET OF ITEMS. 0704 1337BCGUTS  
 #HAFAVER 0704 0704NUCL15  
 #HARMONIC ANALYSIS SUBROUTINE 0704 0121GMHAS1  
 #HATCHET FOR IBM 704 0704 0704NUCL64  
 #HECTIC 0704 0704NUCL17  
 #HERESY 2 HETEROGENEUS REACTOR CALCULATION 0704 0704NUCL54  
 #HERESY 2 HETEROGENEUS REACTOR CALCULATION METHOD 0704 0704NUCL54  
 #HOLLERITH NUMBER #INCREMENT COL 0704 0843ORICBH  
 #FORTRAN SUBROUTINE #HUNGARIAN METHOD #THE TRANSPORTATIO 0704 1321BCHOW  
 #HYDRODYNAMICS CALCULATIONS 0704 0704NUCL61  
 #HYPERBOLIC SINE AND COSINE, FLOATING POINT 0704 0417PFC5H1  
 #I-ALL SOLUTIONS #MATHEMATICAL 0704 1092RSMIAS  
 #SYSTEM IMMEDIATELY MAKING PROGRAMMING LANGUAGE 0704 1096TVMSPL  
 #EASY, COMPLETE AND INCOMPLETE #ELLIPTIC INT 0704 0977ALEPT  
 #INCOMPLETE GAMMA FUNCTION 0704 0516LAS862  
 #INCREMENT COLUMN BINARY IMAGE OF HOLLERITH 0704 0843ORICBH  
 #INDEX TAPE #READS THE 0704 1144NC145  
 #INDEXING POWDER PATTERNS 0704 0704NUCL19  
 #SELECTI 0704 1372OLS01  
 #INFORMATION PROCESSING LANGUAGE V INTERP 0704 1006R5IPL5  
 #DOUBLE PRECISION 0704 0650WRWREAD  
 #INPUT 0704 0937TERCONV  
 #INPUT EDITOR FOR MULTIPLE REGRESSION COEFFICIENTS 0704 0745SCIEMR  
 #SIMULATES INPUT PLYBOARD OF BASIC 650 0704 0460CE650W

TITLE SYSTEM FILE NO.

#INPUT-OUTPUT SYSTEM 0704 0261GMICS1  
 #SIMULATES THE 709 INPUT/OUTPUT ON THE 7040/44. 0704 1382NC10SM  
 #FORTRAN INPUT/OUTPUT PACKAGE 0704 1134ELF10P  
 #TRACE INSTRUCTION ALTERATION 0704 1079NDTIA  
 #INSTRUCTION ANALYSER FOR 7040/44 0704 1305PEA0AN  
 #INTEGR PROGRAMMING 1 0704 0969PKIP01  
 #INTEGR PROGRAMMING 1 0704 0969PKIP01  
 #INTEGR PROGRAMMING 2 0704 0970PKIP02  
 #INTEGR PROGRAMMING 3 0704 0971PKIP03  
 #INTEGR PROGRAMMING 2 0704 0970PKIP02  
 #EXPONENTIAL INTEGRAL #FLOATING POINT /N/ 0704 0794RWNPF3  
 #EXPONENTIAL INTEGRAL 0704 0753HLEXP  
 #ARES-1 A RESONANCE INTEGRAL CODE 0704 0704NUCL56  
 #DIATOMIC MOLECULAR INTEGRAL PROGRAM 0704 0849NIDIAI  
 #FN II SINE-COSINE INTEGRAL SUBROUTINE 0704 0848ARCS11  
 #ELLIPTIC INTEGRAL, COMPLETE AND INCOMPLETE 0704 0977ALEPT  
 #HOD FOR RUNGE-KUTTA INTEGRATION #FLOATING POINT GILL MET 0704 0491RWDE4F  
 #RANGE-KUTTA INTEGRATION #FLOATING PT. COWELL /2ND 0704 0775RWDE6F  
 #ORDER RUNGE-KUTTA INTEGRATION #SECOND, THIRD, AND FOURTH 0704 1233AAINT1  
 #NUMERICAL INTEGRATION BY MIDPOINT PROCEDURE 0704 1017ANO107  
 #NUMERICAL INTEGRATION OF UNEQUALY SPACED POINTS 0704 1577UR005  
 #FORTRAN 2 INTEGRATION SUBROUTINE 0704 0539GLGAU2  
 #INTEGRATION WITH CONTROLLED ERROR 0704 1232AAIC4E  
 #GENERAL INTEGRAL EVALUATOR 0704 0825JPIIT  
 S CURVE FITTING AND INTERPOLATION #CONTINUED FRACTION 0704 0858G55412  
 #LAGRANGE INTERPOLATION 0704 10355CLAGR  
 #DOUBLE INTERPOLATION 0704 0355GMDTAB  
 #TABLE INTERPOLATION 0704 0355GMDTAB  
 #SINGLE OR DOUBLE INTERPOLATION SUBROUTINE 0704 1129AALL1  
 #IN & TABLE LOOKUP, INTERPOLATION SUBROUTINE #TABLE READ 0704 0659GUTLUJ  
 #INTERPRETER FOR 650 DOUBLE PRECISION PROGRAMS 0704 0583BEL1  
 #INTERPRETIVE SYSTEM #INFORMATION PR 0704 1006R5IPL5  
 #SOLUTION OF MATRIX EQUATION AX-B USING INTERVAL ARITH 0704 0880IBSME1  
 #INTERVAL-HALVING METHOD #IT 0704 0327GMITR2  
 #INVERSE, REAL 0704 0223CLM1W2  
 #MATRIX INVERSION 0704 0058UAINV1  
 #MATRIX INVERSION #A GENERAL PROGRAM 0704 1079NDTIA  
 #MATRIX INVERSION BY PARTITIONING 0704 0324NYDM03  
 #MATRIX INVERSION WITH SOLUTION OF LINEAR EQUATIONS 0704 0664ANF402  
 #TO GENERATE GUTTMAN SCALES FOR A SET OF ITEMS. 0704 1337BCGUTS  
 #MESTEIN ITERATION 0704 1234AAWE62  
 #ITERATION SUBROUTINE, INTERVAL-HALVING METHOD 0704 0327GMITR2  
 #ITERATION SUBROUTINE 0704 0355GMDTAB  
 #J0/AN0 Y0/X0 #BESSEL FUNCTIONS 0704 0833RWJY1  
 #J1/X1 AND Y1/X1 #BESSEL FUNCTION 0704 0704NUCL58  
 #KEY WORD IN CONTEXT 0704 0844PKKWC  
 #READS THE SORTED KEY WORDS FROM NC 139 0704 1144NC141  
 #PROGRAM TO SORT THE KEY WORDS FROM NC138 0704 1144NC139  
 #INT OPTIMIZED RUNGE KUTTA #FLOATING POINT 0704 1147CRKOP  
 #MODIFIED PK #KNIC PROGRAM /SDA 884/ 0704 1144NC138  
 #KNIC REPORT FOR PRINTING OR PUNCHING 0704 0913MCRFP  
 #KNIC SORT PROGRAM FIRST PART 0704 0914NCKSP1  
 #KNIC SORT PROGRAM SECOND PART 0704 0914NCKSP2  
 #LAGRANGE INTERPOLATION 0704 10355CLAGR  
 #SYSTEM IMMEDIATELY MAKING PROGRAMMING LANGUAGE EASY 0704 1096TVMSPL  
 #INTERPRETIVE SYSTEM #INF 0704 1006R5IPL5  
 #LATIN SQUARES ANALYSIS OF VARIANCE 0704 0776WAV5F  
 #GENERAL LEAST SQUARE CURVE FITTING ROUTINE 0704 0775WGL5C  
 #ARGONNE LEAST SQUARE LEGENDRE POLYNOMIAL FIT 0704 0424ANE201  
 #GENERAL PROGRAM FOR LEAST SQUARE POLYNOMIAL FITTING #A 0704 1387ANE211  
 #LEAST SQUARE POLYNOMIAL FIT #FORTRAN II/ 0704 0772ANE206  
 #LEAST SQUARES 0704 0837ORNL5  
 #LEAST SQUARES ESTIMATION OF NONLINEAR PARAMETERS 0704 1428DP2135  
 #LEAST SQUARES FITTING PROCEDURE 0704 1076ANE208  
 #GENERAL LEAST SQUARES FORTRAN SUBPROGRAM 0704 0635RWGL5Q  
 #LEAST SQUARES PROCEDURE 0704 0533CF0091  
 #LEAST SQUARES RATIONAL FUNCTION CURVE FITTING 0704 0859GSL165  
 #LEAST SQUARES SOL. OF SIMULTANEOUS EQUATIONS 0704 0146CLLS03  
 #LEGENDRE POLYNOMIAL FIT #A 0704 0424ANE201  
 #RECORD VARIABLE LENGTH- MIXED MODE #READ TA 0704 1297RF101  
 #STUDENTS T AT .05 LEVEL 0704 0837CRTO05  
 #LEVEL &/OR SWITCHING CIRCUIT #CDM 0704 1104PKIN4  
 #MODIFIED NUBESI PROGRAM FOR FORTRAN LIBRARY 0704 0777PFBES1  
 #A 1401 PROGRAM TO MAINTAIN THE SHARE LIBRARY ABSTRACTS 0704 1165PNSL1B  
 #SET SENSE LIGHTS 0704 0654MCHF  
 #CHEBYSHEV LINE FIT 0704 1265ANE210  
 #MATRIX INVERSION #MATRIX INVERSI 0704 0664ANF402  
 #LINEAR MATRIX EQUATION SOLVER 0704 0635RWMTS  
 #LINEAR PROGRAMMING SYSTEM 0704 1018RSLP51  
 #LINEAR PROGRAMMING #MACHINE 0704 0789IBML01  
 #FORTRAN LINEAR PROGRAMMING CODE 0704 0848CEPFL  
 #COMPREHENSIVE LINEAR PROGRAMMING ON THE 0704 0818CESCLR  
 #LINEAR PROGRAMMING SUBROUTINE, FORTRAN CODE 0704 1281RSM5UB  
 #LINEAR PROGRAMMING SUBROUTINE 0704 0523SCM5H  
 #LINEAR PROGRAMMING WITH UPPER BOUNDS ON VARIABLES 0704 0973R5P01  
 #LIST, 1401 #SHA 0704 1224UCSCUL  
 #GENERAL PROGRAM LCADER 0704 0844MEGPI1  
 #OCTAL, DCD LOADER # 0704 0073UADB01  
 #SIX CARD UPPER LOADER 0704 1183GDCOR1  
 #ON-LINE LOADER FOR COL. BIN. ABS. AND TSF. CARDS 0704 1012ORCL  
 #LINEAR PROGRAMMING #MACHINE LOADING PROBLEM OF LINEAR PROGRAMMING 0704 0789IBML01  
 #SELF LOADING TAPE WRITING ROUTINE 0704 1781WH0042  
 #SELF LOADING TAPE WRITING ROUTINE 0704 0781WH0043  
 #LOG-EXTENDED RANGE FLOATING BINARY ARITH 0704 0370R0133  
 #FLOATING NATURAL LOGARITHM 0704 0069LAS820  
 #FIXED POINT LOGARITHM 0704 0466RL0178  
 #GENERAL LOGICAL CORE SORT SUBROUTINE FOR 32K704 0704 1054BSSEAC  
 #RANDOM TABLE LOOKUP SUBROUTINE 0704 05513CDEV2  
 #INTERPOLATION SUBROUTINE #TA 0704 0659GUTLUJ  
 #709 TO SCROLL 704 INPUT CONVERTER #H 0704 0937TERCONV  
 #MACHINE LOADING PROBLEM OF LINEAR PROGRAMMING 0704 0789IBML01  
 #MAD TRANSLATOR AND ASSOCIATED SUBROUTINE 0704 1101UMMAD  
 #MADTRAN 0704 1291UMMTR  
 #MAIN REGRESSION PROGRAM 0704 0822TVREM  
 #A 1401 PROGRAM TO MAINTAIN THE SHARE LIBRARY ABSTRACTS 0704 1165PNSL1B  
 #SYSTEM IMMEDIATELY MAKING PROGRAMMING LANGUAGE EASY 0704 1096TVMSPL  
 #HANDLING ROUTINE 0704 0688KTRM1  
 #FORTRAN MATHEMATICAL PROGRAMMING SYSTEM ONE 0704 0863RSM001  
 #MATHEMATICAL PROGRAMMING SYSTEM I-ALL SO 0704 1092RSMIAS  
 #EIGENVALUES OF REAL MATRICES #REAL 0704 0635RWGSLQ  
 #DETERMINANT EVALUATOR FOR NEARLY TRIANGULAR MATRICES 0704 0635RWDET  
 #EIGENVALUES AND EIGENVECTOR OF REAL SYMMETRIC MATRICES 0704 1029ANF203  
 #GENERATE MATRICES TO BE SOLVED BY NU TPL 0704 1110NGUGN1  
 #REAL SYMMETRIC MATRIX #MULTIPLY RE 0704 0273CLMMP2  
 #EIGENVALUES AND VECTORS OF A REAL, SYMMETRIC MATRIX 0704 0460IMH011





TITLE	SYSTEM FILE NO.	TITLE	SYSTEM FILE NO.
#SEQUENTIAL CIRCUIT PROBLEM SOLVING	0704 1103PKSEQ	AND DEFLECTIONS IN THICK, CURVED PLATES	#TCUP STRESSES 0704 0704NUCL53
#TIME SERIES DECOMPOSITION AND ADJUSTMENT	0704 0526VTSDA	E. RATION #SECOND, THIRD, AND FOURTH ORDER RUNGE-KUTTA INTE	0704 1233AINTI
#TIME SERIES DECOMPOSITION AND ADJUSTMENT	0704 0861ERTSDA	#THREE DIMENSIONAL LEAST SQUARES PROCEDUR	0704 0533CF0G91
UTTMAN SCALES FOR A SET OF ITEMS. #TO GENERATE G	0704 1337BCGUTS	#TIME SERIES DECOMPOSITION AND ADJUSTMENT	0704 0526VTSDA
#SET SENSE LIGHTS	0704 0654AMCHKF	#TIME SERIES DECOMPOSITION AND ADJUSTMENT	0704 0861ERTSDA
#SETCOM/COMBOS	0704 13078CCOMB	TO BE SOLVED BY NU TPL1 #GENERATE MATRICES	0704 1101UNGEN1
#SHARE ASSEMBLER	0704 1224UCSCUL	#TRACE INSTRUCTION ALTERATION	0704 1079NOTIA
#SHARE CATALOG UPDATER, LISTER, 1401	0704 1165PNSLIB	A REARRANGEMENT AND TRANSFORMATION #DAT	0704 1324VORTR
#DOUBLE PRECISION SIGN COMPATIBILITY #A 1401 PROG	0704 0417PFCF1	#MAD TRANSLATOR AND ASSOCIATED SUBROUTINES	0704 1101UMHAD
#SIMPLE CORRELATION PROGRAM	0704 13920SCOR4	#TRANSPORTATION CODE	0704 0464IBTFL
#SIMULATE BASIC 650 COMPUTER WITH 704	0704 0480CE650S	AN METHOD #THE TRANSPORTATION PROBLEM, FLOW- OR HUNGARI	0704 0705MHI02
#SIMULATES INPUT PULGBOARD OF BASIC 650	0704 0480CE650M	04-SAP FLOATING-PT. TRAP MATRIX DIAGONALIZATION--	0704 1277BS1DC
#SIMULATES THE 709 INPUT/OUTPUT ON THE 70	0704 1355ACDEP1	#FORMAT TREES PROGRAM	0704 1276BS1DC
#ANALOG SIMULATOR	0704 09625QSIHQ	ITHM #BUILD TREES PROGRAM USING MODIFIED MOORE ALGOR	0704 0635RWDET
#SIMULTANEOUS EQUATIONS SOLVER	0704 0116CLSM2	VALUATOR FOR NEARLY TRIANGULAR MATRICES #DETERMINANT E	0704 0635RWTRI
#SIMULTANEOUS EQUATIONS COMPLEX	0704 0116CLLS03	#NEARLY TRIANGULARIZATION OF A MATRIX SUBROUTINE	0704 0878BEMSD1
#NON-LINEAR SIMULTANEOUS EQUATIONS, REAL	0704 0273CLSM6	IMATION FROM DOUBLY TRUNCATION SAMPLES	0704 1008IBCTR
#SIMULTANEOUS EQUATIONS SUBROUTINE	0704 0356GMS1HQ	#CMBEYSHEV TRUNCATION SYSTEM	0704 1012ORCBL
#SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATI	0704 1043JPSRCH	COL. BIN. ABS. AND TSF. CARDS #ON-LINE LOADER FOR	0704 0574CS1UKS
#SIMULTANEOUS REAL EQUATIONS, DETERMINANT	0704 0116CLSM61	H AND DIFFERENTIATE UNEQUALLY SPACED DATA POINTS	0704 1033CLSDM3
ORD ANALYSIS OF TWO SIMULTANEOUS RECORDS OF A--	0704 0574CS1UKS	ICAL INTEGRATION OF UNEQUALLY SPACED POINTS	0704 1157TU9005
#DOUBLE PRECISION SIGN-COS ROUTINE #WAVE REC	0704 0929LODPS	#EXTREMUM OF UNIMODAL FUNCTIONS OF ONE VARIABLE	0704 0878BEMIMX
#HYPERBOLIC SINE AND COSINE, FLOATING POINT	0704 0417PFC5H1	#SHARE CATALOG UPDATER, LISTER, 1401	0704 1224UCSCUL
#FN II SINE-COSINE INTEGRAL SUBROUTINE	0704 0884ARCS11	AR PROGRAMMING WITH UPPER BOUNDS ON VARIABLES	0704 0973RSBPO1
#SINGLE OR DOUBLE INTERPOLATION SUBROUTIN	0704 1183GDCOR1	#SIX CARD UPPER LOADER	0704 1183GDCOR1
#SINGLE-VALUED ARCTANGENT ROUTINE	0704 0355GMATN1	ATRIX EQUATION AX-B USING INTERVAL ARITH #SOLUTION OF M	0704 08801BSM1
#SIX CARD UPPER LOADER	0704 1144NC146	BUILD TREES PROGRAM USING MODIFIED MOORE ALGORITHM	0704 1276BS1DC
#SKIPS ONE FILE ON A DECIMAL TAPE AND PUN	0704 0331CLSM03	PROCESSING LANGUAGE V INTERPRETIVE SYSTEM #INFORMATION	0704 1006RS1PL5
#SMOOTH AND DIFFERENTIATE UNEQUALLY SPACE	0704 0704NUCL34	AL FUNCTIONS OF ONE VARIABLE #EXTREMUM OF UNIMOD	0704 0878BEMIMX
#SNG	0704 0116CLLS03	#READ TAPE RECORD #VARIABLE LENGTH- MIXED MODE	0704 1297RF101
#LEAST SQUARES SOL. OF SIMULTANEOUS EQUATIONS	0704 1092RSMIAS	ITH UPPER BOUNDS ON VARIABLES #LINEAR PROGRAMMING W	0704 0973RSBPO1
AMMING SYSTEM I-ALL SOLUTIONS #MATHEMATICAL PROGR	0704 1101UNGEN1	FOR A FUNCTION OF N VARIABLES #MINIMIZATION ROUTINE	0704 0804RMMIN
RATE MATRICES TO BE SOLVED BY NU TPL1 #GENE	0704 0825JDEPQ	ONE-WAY ANALYSIS OF VARIANCE #DISTRIBUTION-FREE	0704 1345PQKAV
FERENTIAL EQUATIONS SOLVER #DIF	0704 09625QSIHQ	GENERAL ANALYSIS OF VARIANCE	0704 0776RWA4V4F
ULTANEOUS EQUATIONS SOLVER #SIM	0704 0635RWMA1S	SQUARES ANALYSIS OF VARIANCE #LATIN	0704 0776RWA4V5F
EAR MATRIX EQUATION SOLVER #LIN	0704 1041120M1	#ANALYSIS OF VARIANCE	0704 0421AANVA
#ZERO, MINIMUM SOLVER	0704 1043JPSRCH	#FLOATING POINT #N/ VARIATE PROBABILITY INTEGRAL	0704 0794RWNPF3F
FERENTIAL EQUATIONS SOLVER #SIMULTANEOUS PARTIAL DIF	0704 1103PKSEQ	#EIGENVALUES AND VECTORS OF A REAL, SYMMETRIC MATRIX	0704 0460MHI011
IAL CIRCUIT PROBLEM SOLVING #SEQUENT	0704 1386ANM101	E WRITER PROGRAM GE VERSION #BASIC TAP	0704 1278BS1TWC
#ALGEBRAIC SORT	0704 3008ZSORT	TAN A/B, FORTRAN II VERSION, SAP CODED	0704 0603WH0055
#PERT SORT PROGRAM	0704 0914NCKSP2	#VIPP SORTER.	0704 0926TAVIPS
#KWIC SORT PROGRAM FIRST PART	0704 1054BSSEAC	ERTIES OF STEAM AND WATER #THERMODYNAMIC PROP	0704 0574CS1UKS
#KWIC SORT PROGRAM SECOND PART	0704 1144NC139	RECORDS OF A-- #WAVE RECORD ANALYSIS OF TWO SIMULTANEOUS	0704 1234AAKEG2
ENERAL LOGICAL CORE SORT SUBROUTINE FOR 32K704	0704 1144NC145	#KEY WORD IN CONTEXT	0704 0884PKKWC
#PROGRAM TO SORT THE KEY WORDS FROM NC138	0704 1144NC143	EADS THE SORTED KEY WORDS FROM NC 139	0704 1144NC141
#READS THE SORTED AUTHOR CROSS INDEX TAPE	0704 1144NC144	RAM TO SORT THE KEY WORDS FROM NC138	0704 1144NC139
#READS THE SORTED BIBLIOGRAPHY TAPE FROM NC 142	0704 1144NC141	#BASIC TAPE WRITER PROGRAM GE VERSION	0704 1278BS1TWC
#READS THE FINAL SORTED BIBLIOGRAPHY TAPE FROM NC 139	0704 1144NC140	#SELF LOADING TAPE WRITING ROUTINE	0704 1278BS1TWC
#READS THE SORTED KEY WORDS FROM NC 139	0704 0926TAVIPS	#FUNCTIONS JO/X/ AND YO/X/	0704 0781WH0042
#READS THE FINAL SORTED TAPE FROM NC 139	0704 1144NC142	FUNCTION J1/X/ AND Y1/X/	0704 0833RWB1Y0
#VIPP SORTER.	0704 0331CLSDM3	FUNCTIONS OF ORDER ZERO	0704 0833RWB1Y1
#SORTS THE BIBLIOGRAPHY TAPE FROM NC 138	0704 1157TU9005	#ZERO, MINIMUM SOLVER	0704 1041JZPM2
ERENTIATE UNEQUALLY SPACED DATA POINTS #SMOOTH AND DIFF	0704 0897APOS11	#ZEROS OF A POLYNOMIAL IN DOUBLE PRECISIO	0704 0766ANC203
RATION OF UNEQUALLY SPACED POINTS #NUMERICAL INTEG	0704 1387ANE211	#ZOOM	0704 0704NUCL50
#POWER DENSITY SPECTRUM #LEAST S	0704 0775RWGLSC		
SQUARE N-DIMENSIONAL SPHERE FIT	0704 0424ANE201		
#GENERAL LEAST SQUARE CURVE FITTING ROUTINE	0704 1387ANE211		
#ARGONNE LEAST SQUARE LEGENDRE POLYNOMIAL FIT	0704 0772ANE206		
#LEAST SQUARE N-DIMENSIONAL SPHERE FIT	0704 1264ANE209		
#LEAST SQUARE POLYNOMIAL FIT /FORTRAN 11/	0704 0837ORNLLS		
L PROGRAM FOR LEAST SQUARE POLYNOMIAL FITTING #A GENERA	0704 0776RWA4V5F		
#NON-LINEAR LEAST SQUARES	0704 1076ANE208		
#LATIN SQUARES ANALYSIS OF VARIANCE	0704 0635RWGLSQ		
#LEAST SQUARES ESTIMATION OF NONLINEAR PARAMETE	0704 0533CF0091		
#A GENERAL LEAST SQUARES FITTING PROCEDURE	0704 0859GSL165		
#GENERAL LEAST SQUARES FORTRAN SUBPROGRAM	0704 0116CLLS03		
E DIMENSIONAL LEAST SQUARES PROCEDURE. #THRE	0704 11871BTFEQ2		
#LEAST SQUARES RATIONAL FUNCTION CURVE FITTING	0704 0704NUCL16		
#LEAST SQUARES SOL. OF SIMULTANEOUS EQUATIONS	0704 0428GSS1PR		
-RUBIN EQUATIONS OF STATE-- #BENEDICT-WEBB	0704 0477TERMPR2		
#STDY-3	0704 0420CSDS01		
NAMIC PROPERTIES OF STEAM AND WATER #THLRMODY	0704 0704NUCL53		
#STEPWISE MULTIPLE REGRESSION PROCEDURE	0704 0837ORT005		
#DUMP STORA, CORE, DRUM, AND TAPES	0704 1058WLREL1		
#TCUP STRESSES AND DEFLECTIONS IN THICK, CURVE	0704 0592NUHLEV		
#STUDENTS T AT .05 LEVEL	0704 0635RWGLSQ		
ION FOR RELIABILITY STUDIES #MULTI-PURPOSE ESTIMAT	0704 0705MHI013		
ENVALUE-EIGENVECTOR SUBPROGRAM #FORTRAN 2 EIG	0704 0775RWDE6F		
AST SQUARES FORTRAN SUBPROGRAM #GENERAL LE	0704 1409GSTSM		
#704-FORTRAN II SUBPROGRAM FOR MATRIX-- #FLOAT	0704 1104PKM1N4		
ING PT. CONWELL /2ND SUM/, RUNGE-KUTTA INTEGRATION	0704 0116CLREL		
#TASMIN SUPPORT PACKAGE #COMPUTATION OF	0704 0273CLMMP2		
A MIN 2 LEVEL G/DOR SWITCHING CIRCUIT	0704 1029ANF203		
#RELATIVIZE SYMBOLIC DECK	0704 1385ANF202		
OSTMULTIPLY REAL BY SYMETRIC REAL MATRIX #EIGENVALUES AND E	0704 1385ANF202		
IGENVECTORS OF REAL SYMMETRIC MATRICES #EIGENVALUES AND EIG	0704 0460MHI011		
ENVECTORS OF A REAL SYMMETRIC MATRIX #EIGENVALUES AND EIG	0704 0474NUMXEW		
ENVECTORS OF A REAL SYMMETRIC MATRIX #EIGENVALUES AND EIG	0704 0837ORT005		
VECTORS OF A REAL, SYMMETRIC MATRIX #EIGENVALU	0704 1231TVTPPR		
ES AND EIGENVECTORS SYMMETRIC MATRIX - FI #EIGENVALU	0704 0355GMTA81		
#STUDENTS T AT .05 LEVEL	0704 0551CSDEV2		
AM TO GENERATE 1401 T/P PROG. ON OUTPUT TAPES #704 PROGR	0704 0659GCTLUI		
#TABLE INTERPOLATION	0704 0659GCTLUI		
#RANDOM TABLE LOOKUP SUBROUTINE	0704 1144NC145		
#TABLE READ IN & TABLE LOOKUP, INTERPOLATION SUBROUTINE	0704 1165PNSLIB		
ION SUBROUTINE #TABLE READ IN & TABLE LOOKUP, INTERPOLAT	0704 1144NC146		
AUTHOR CROSS INDEX TAPE #READS THE SORTED	0704 1144NC142		
# ON TAPE	0704 1144NC140		
E FILE ON A DECIMAL TAPE AND PUNCHES #SKIPS ON	0704 1144NC143		
TS THE BIBLIOGRAPHY TAPE FROM NC 138 #SOR	0704 1144NC144		
DS THE FINAL SORTED TAPE FROM NC 139 #REA	0704 0685GKFWR1		
SORTED BIBLIOGRAPHY TAPE FROM NC 142 #READS THE	0704 1297RF101		
SORTED BIBLIOGRAPHY TAPE FROM NC 142 #READS THE FINAL	0704 1278BS1TWC		
#TAPE MANEUVERING ROUTINE.	0704 0781WH0043		
#READ TAPE RECORD #VARIABLE LENGTH- MIXED MODE	0704 0781WH0042		
#BASIC TAPE WRITER PROGRAM GE VERSION	0704 0420CSDS01		
#SELF LOADING TAPE WRITING ROUTINE	0704 1231TVTPPR		
#SELF LOADING TAPE WRITING ROUTINE	0704 1409GSTSM		
GE, CORE, DRUM, AND TAPES #DUMP STORA	0704 1408GTSMM		
T/P PROG. ON OUTPUT TAPES #704 PROGRAM TO GENERATE 1401	0704 0704NUCL53		
#TASMIN SUPPORT PACKAGE	0704 1077GCO003		
#TASMIN SYSTEM	0704 0428GSS1PR		
CURVED PLATES #TCUP STRESSES AND DEFLECTIONS IN THICK,			
FITTING TO SELECTED TERMS OF A GENERAL POLYNOMIAL			
TER #THERMODYNAMIC PROPERTIES OF STEAM AND WA			



# 7040/7044 KWIC Index

TITLE	SYSTEM FILE NO.	TITLE	SYSTEM FILE NO.
#ROOTS OF POLYNOMIAL WITH REAL COEFFICIENTS	0709 0927MAPOLY		
#DIAGNAL MODEL PCRTFGLIO ANALYSIS	0709 1452UMDPA		
#PRECISION SUBROUTINE	0709 1438EIPREC		
#PRINT CONTROL FOR REPORT GENERATION	0709 1038WRPCRG		
RAN OUTPUT	0709 1118URPLOT	#BCOL, ARTHRUZ, HLOCT	7040 1543HSB00L
#TAPE TO PRINTER/PUNCH SIMULATOR	0709 0651WDTPS	#BASIC ASSEMBLY PROGRAM 7040/7044	7040 SP-136
#NORMAL PROBABILITY - ORDINATE AND AREA	0709 1001NAB6G0	#BASIC ASSEMBLY PROGRAM 7040/7044	7040 SP-136
#INVERSE NORMAL PROBABILITY FUNCTIONS	0709 0G2NAB610	#BCOL, ARTHRUZ, HLOCT	7040 1543HSB00L
VARIABLE INFORMATION PROCESSING PACKAGE	#W 0709 1135BWWIPP	BROUTINE FOR SAVING CHAIN TAPES	#MAP SU 7040 1596BPABIL
LENG WITH ARBITRARY PROFIT FUNCTIONS	#SCHEU 0709 10861BAPF	#COMIT SYSTEM FOR THE 7040/7044	7040 1566MICOM1
#GENERAL PURPOSE ANALYSIS OF VARIANCE PROGRAM	0709 0933NOANAV	M 7040/44 #CCOMMERCIAL CONVERSION ROUTINE FOR THE IB	7040 1595XYZPCC
GRAM #GENERAL PURPOSE DATA INPUT AND/OR CONVERSION PRO	0709 1257ATVFRD	#COMMERCIAL CONVERSION ROUTINE FOR THE IBM 7040/44	7040 1595XYZPCC
#COMIT-GENERAL PURPOSE LANGUAGE FOR SYMBOL MANIPULATION	0709 1198MICOMT	#SHARE INTERNAL FORTRAN TRANSLATOR FOR 7040/44	7040 1410ROSFT1
#EIGENVALUES BY THE QR TRANSFORM	0709 1063GEQUDE	#BODL, ARTHRUZ, HLOCT	7040 1543HSB00L
#SEPTUPLE PRECISION RATIONAL FRACTION PACKAGE	0709 3006EIGRE1	#SHARE INTERNAL FORTRAN TRANSLATOR FOR 7040/44	7040 1410ROSFT1
N PACKAGE #INTEGER C RATIONAL FRACTION POLYNOMIAL MANIPULATIO	0709 1498BQRANI	#7040/7044 LINEAR PROGRAMMING SYSTEM	7040 CO-08X
OF POLYNOMIAL WITH REAL COEFFICIENTS	0709 1416MWPFR	#MAP SUBROUTINE FOR SAVING CHAIN TAPES	7040 1596BPABIL
ZED VARIABLE LENGTH RECORD SORT FOR 709/7090	0709 1413MWPOLY	#7040/7044 OPERATING SYSTEM	7040 PR-150
ITH AUTOMATIC ERROR RECOVERY #PKG. FOR ASYNCRONOUS I-O W	0709 1159MDSORT	#7040/7044 8K OPERATING SYSTEM	7040 PR-154
#RELOCATABLE BINARY LOADER	0709 13065IOP	#MAP SUBROUTINE FOR SAVING CHAIN TAPES	7040 1596BPABIL
#RELOCATING BINARY LOADER, LOWER	0709 0563SE9RBL	#SHARE INTERNAL FORTRAN TRANSLATOR FOR 70	7040 1410ROSFT1
#RELOCATING BINARY LOADER, UPPER	0709 0563SE9URL	/44 #SIMULATION OF THE IBM 709/90 ON THE 7040	7040 1519DCC570
#PRINT CONTROL FOR REPORT GENERATION	0709 1038WRPCRG	#650 SIMULATOR PROGRAM OF THE 7094	7040 S1-141
#RANI - RESPONSE ANALYSIS PROGRAM	0709 1498BQRANI	NE FOR SAVING CHAIN TAPES	#MAP SUBROUTI 7040 1596BPABIL
#RESTART PROGRAM FOR MD SORT	0709 1160MDSRST	RE INTERNAL FORTRAN TRANSLATOR FOR 7040/44	#SHA 7040 1410ROSFT1
#ROOTS OF A POLYNOMIAL /RTSCH/	0709 1514YRST1	#UTILITY PROGRAMS FOR THE 7040/7044	7040 UT-142
#ROOTS OF POLYNOMIAL WITH REAL COEFFICIENT	0709 0927MAPOLY	#650 SIMULATOR FOR 7040/7044	7040 S1-141
TS #SELF-LOADING ROW BINARY TO COLUMN BINARY CONVERTER	0709 0808GDRCC1	E IBM 709/90 ON THE 7040/44	#SIMULATION OF TH 7040 1519DCC570
ING POINT OPTIMIZED RUNGE-KUTTA INTEGRATION	0709 1170ATRKSJ	TRAN TRANSLATR FOR 7040/44	#SHARE INTERNAL FOR 7040 1410ROSFT1
IRAN FLOATING POINT RUNGE-KUTTA INTEGRATION	0709 1171ATRKS3	ROUTINE FOR THE IBM 7040/44	#COMMERCIAL CONVERSION 7040 1595XYZPCC
NS #SCHEDULING WITH ARBITRARY PROFIT FUNCTIO	0709 10861BAPF	OMIT SYSTEM FOR THE 7040/7044	#C 7040 1566MICOM1
SE ONE #SCOPE AND MERT - EXTENSIONS TO PERT. PHA	0709 1599RHS1M1	#650 SIMULATOR FOR 7040/7044	7040 S1-141
OSITION #SEASONAL ANALYSIS AND TIME SERIES DECOMP	0709 1310UCTSDA	TY PROGRAMS FOR THE 704C/7044	#UTILI 7040 UT-142
R CONVERTER #SELF-LOADING ROW BINARY TO COLUMN BINARY	0709 0808GDRCC1	IC ASSEMBLY PROGRAM 7040/7044	#BAS 7040 SP-136
R FORTRAN PROGRAMS #SEPTUPLE PRECISION INTEGER ARITHMETIC FO	0709 1415MSEPT	#7C40/7044 LINEAR PROGRAMMING SYSTEM	7040 CO-08X
KAGE #SEPTUPLE PRECISION RATIONAL FRACTION PAC	0709 1416MWPFR	7040/7044 OPERATING SYSTEM	7040 PR-150
PROGRAM TAPE USING SERIAL NUMBERS #UPDATE SYMBOLIC	0709 1009MDSERI	#7040/7044 8K OPERATING SYSTEM	7040 PR-154
L ANALYSIS AND TIME SERIES DECOMPOSITION #SEASON	0709 1310UCTSDA	MULATION OF THE IBM 709/90 ON THE 7040/44	#SIMULA 7040 1519DCC570
ION #SHADOW IV SYSTEM	0709 1401MWSHDW	TION PROGRAM OF THE 7094	7040 1589EOPFAE
RSION #SHARE OPERATING SYSTEM - IB MONITOR VERS	0709 PR-063	#7040/7044 8K OPERATING SYSTEM	7040 PR-154
PE TO PRINTER/PUNCH SIMULATOR	0709 PR-064		
#CARD TO TAPE SIMULATOR	0709 1303F5650S		
TRAN INPUT #SINGLE PRECISION TO DOUBLE PRECISION FOR	0709 0651WDTPS		
#LINEAR EQUATION SOLVER OF BAND MATRICES	0709 0605WDC1S		
#JJO0 SORT	0709 1201NRD1CV		
TART PROGRAM FOR MD SORT	0709 0990RML4F		
ENERALIZED INTERNAL SORT -FORTRAN ORIENTED	0709 1562NAJJO0		
IABLE LENGTH RECORD SORT FOR 709/7090	#RES 0709 1160MDSRST		
#SORT 709	#G 0709 1249MDSORT		
#LEAST SQUARES CURVE-FITTING ROUTINE	0709 1159MDSORT		
#A LEAST SQUARES ITERATION	0709 SM-066		
#SQUOZE TAPE EDITOR	0709 0860RWCF		
BESSEL FUNCTIONS Y SUB K TIMES Z AND #ALL ORDERS OF THE	0709 0934NDLSQ		
F BESSEL FUNCTION J SUB K TIMES Z OR I #ALL ORDERS O	0709 1000SEDT1		
O CONVERSION OF 704 SURGE/	0709 0985RWBFBF		
URPOSE LANGUAGE FOR SYMBOL MANIPULATION #COMIT-GENERAL P	0709 0984RWBFB7F		
RS #UPDATE SYMBOLIC PROGRAM TAPE USING SERIAL NUMBE	0709 1063GEQUDE		
ERIPHERAL EQUIPMENT SYMBOLIC TRANSLATOR #P	0709 1063GEQUDE		
O COPY MEMORY ON TO TAPE #INTERRUPT FORTRAN-LOADING T	0709 1198MICOMT		
#FORTRAN CARD OR TAPE /ROW AND/OR COLUMN BINARY/ LOADER	0709 1009MDSERI		
#TAPE COMPARE FOR THE 709	0709 0961PPPEST		
#TAPE DUMP	0709 1164MFCOT0		
#TAPE DUPLICATE AND COMPARE	0709 1163MWRCTC		
#SQUOZE TAPE EDITOR	0709 0502RLTC09		
#CARD TO TAPE SIMULATOR	0709 1280RLO350		
TE SYMBOLIC PROGRAM TAPE USING SERIAL NUMBERS	0709 0887PPDAC		
#TESTING HYPOTHESIS ROUTINE #UPDA	0709 1000RSEDT1		
#TESTING HYPOTHESIS ROUTINE	0709 0605WDC1S		
#PRINTER PLOT BCD TEXT GENERATOR FOR FORTRAN OUTPUT	0709 0651WDTPS		
#LMSC THERMAL NETWORK ANALYZER PROGRAM..	0709 1009MDSERI		
ASONAL ANALYSIS AND TIME SERIES DECOMPOSITION	0709 1258UWFTH		
L FUNCTIONS Y SUB K TIMES Z AND #ALL ORDERS OF THE BESSE	0709 1258UW TH		
EL FUNCTION J SUB K TIMES Z OR I #ALL ORDERS OF BESS	0709 1118URPLOT		
ENVALUES BY THE QR TRANSFORM #E1	0709 1295MLTHAN		
EQUIPMENT SYMBOLIC TRANSLATOR #PERIPHERAL	0709 1310UCTSDA		
PROGRAMMING SYSTEM TWO #MATHEMATICAL	0709 0985RWBFBF		
L NUMBERS #UPDATE SYMBLIC PROGRAM TAPE USING SERIA	0709 0984RWBFB7F		
TING BINARY LCADER, UPPER #RELOCA	0709 3006EIGRE1		
#ABSOLUTE BINARY UPPER LOADER ONE CARD	0709 1063GEQUDE		
MBOLIC PROGRAM TAPE USING SERIAL NUMBERS	0709 1198MICOMT		
#UTILITIES	0709 1009MDSERI		
#VARIABLE INFORMATION PROCESSING PACKAGE	0709 UT-068		
#GENERALIZED VARIABLE LENGTH RECCRD SORT FOR 709/7090	0709 1135BWWIPP		
#VARIABLE PRECISION ARITHMETIC PACKAGE	0709 1159MDSORT		
NT OF A MATRIX WITH VARIABLE PRECISION INTEGRAL ENTRIES#ADJOI	0709 1293TEVPAP		
PURPOSE ANALYSIS OF VARIANCE PROGRAM #GENERAL	0709 1474TEMADI		
INE #A VERBAL - DIGITAL INTEGER CONVERSION ROUT	0709 0933NOANAV		
SYSTEM - IB MONITOR VERSION #SHARE OPERATING	0709 1419MWDVIC		
STEM -SHARE MONITOR #SHARE OPERATING SY	0709 PR-064		
N.#WPC BUFFERED I/O PACKAGE FOR 709 FORTRA	0709 PR-064		
AL MANIPULATION#FULL WORD BINARY INTEGER COEFFICIENT POLYNOMI	0709 0979WDIOF		
#HOLLERITH WCRD GENERATOR	0709 1412MWF8PY		
HE BESSEL FUNCTIONS Y SUB K TIMES Z AND #ALL ORDERS OF T	0709 1219WDHDLR		
TIONS Y SUB K TIMES Z AND #ALL ORDERS OF THE BESSEL FUNC	0709 0985RWBFBF		
CTION J SUB K TIMES Z OR I #ALL ORDERS OF BESSEL FUN	0709 0985RWBFB8F		

TITLE	SYSTEM FILE NO.	TITLE	SYSTEM FILE NO.
SNAPKIN AND SNAPKIN A	# 7090 NUCL49	TPUT ROUTINE	#CHARACTRON MICROFILM RECORDED PRINTED OU 7090 1567AMXPTP
EDR TRANSIENTS WITH A	#ZORCH - THE ANALYSIS OF SIMULAT 7090 7090NUCL29	SONAL ANALYSIS WITH	CHARTS #ADDITIVE SEA 7090 14640UCAB5
#FORTRAN TANGENT OF A	COMPLEX ARGUMENT 7090 1312EOTANZ		#CHEBYSEV POLYNOMIAL APPROXIMATION 7090 1260SDUCHEB
N GAMMA FUNCTION OF A	COMPLEX ARGUMENT #FORTRA 7090 1314EODGAMA		#CLOGUOD 7090 7090NUCL05
AMS	#A FAP CODED SUBPROGRAM 7090 1396MITMR		#CLUSTERING PROGRAM 7090 1328SCTRICO
NUCY DEVELOPMENT OF A	GENERAL METHOD OF EXPLICIT SOLUTION # 7090 1395MITME		#SOTRC-DENNIS ME 7090 1328SCTRICO
#ZERC OF A GIVEN FUNCTION BETWEEN TWO POINTS	/SP/ 7090 1584TYJCPD		#PRODUCI FORM 7090 1379KSMFOR
#ZERO OF A GIVEN FUNCTION BETWEEN TWO POINTS	/SP/ 7090 1584TYJCPD		#S SUB 4 CYLIND 7090 7090NUCL18
# OF A LINEAR DECISION RULE	7090 1597B7C04		#DATABSS /DATA ASSEMBLY/ SECTION 7090 1250SDMSS
COMPARE A WORD WITH A LIST OF WORDS	#IG INDEX - TO 7090 1471IGINDX		#LCC1 - 7090 NUCL58
#COEFFICIENTS OF A REAL POLYNOMIAL FROM ITS ZEROS	7090 1471IGINDX		#DCCB - A TWO DIMENSIONAL 7090 7090NUCL30
WITH #DOB - A TWO DIMENSIONAL REACTOR DIFFUSION CODE	7090 1544RNSIMS		#LCC2 - 7090 NUCL59
AND SENSES BITS OF A WORD OR ARRAY	#SETS 7090 1568NUMSEM		#ARES-1 /A 7090 NUCL43
INDEX - TO COMPARE A WORD WITH A LIST OF WORDS	#IG 7090 1471IGINDX		#FAP CODED SUBPROGRAM 7090 1396MITMR
#SIMULATE A 32K 704 ON A 65K 7090	7090 1597B7C04		#FAP CODED SUBPROGRAM 7090 1396MITMR
MULATE A 32K 704 ON A 65K 7090	#SI 7090 1597B7C04		#FAP CODED-7090 7090 1588NUMSEM
#ABSOLUTE BINARY OCTAL LOADER UPPER	7090 1404NSAUBL		ADVANCED SHIELD CODES 7090 NUCL55
E PRECISION PRODUCT ACCUMULATION OF SINGLE PRECISION	#DOUBL 7090 148CTYCLAP		POINT TRAP /7090 FAP CODED/ 7090 1464UCAB5
ATURE TO PRESCRIBED ACCURACY	#ROMBERG QUADR 7090 148TYVQUAD		ADVANCED SHIELD CODES 7090 NUCL55
#APWRC-GAMIC /GAM	#ADAMS-MOULTON, RUNGE-KUTTA INTEGRATOR 7090 1354JPMARK		TION AND WORK FORCE CCEFFICIENT#COMPUTE THE AGGREGATE PRODUC 7090 1576XYZAPW
TO SAVE INFORMATION AFTER /FPT/	#SYSTEMS ROUTINE 7090 1582TYFPCT		#CCEFFICIENTS AND DOUBLE PRECISION INPUT 7090 1364GC0013
FICIENT#COMPUTE THE AGGREGATE PRODUCTION AND WORK FORCE COEF	7090 1576XYZAPW		#CCEFFICIENTS OF A REAL POLYNOMIAL FROM I 7090 1471IGINDX
#AIM-6	7090 7090NUCL03		TS ZEROS #COEFFICIENTS OF A REAL POLYNOMIAL FROM I 7090 1471IGINDX
#AIFIRE	7090 7090NUCL02		RT SORT SYSTEM-BCD TO #CCLUMN BINARY SYMBOLIC SUBROUTINE LOADER 7090 1258NUCKSS
#AIREK 3	7090 7090NUCL04		#CCMBIN-A COMBINATORIAL PROGRAM 7090 1357PMCOMB
#AIREK-11	7090 7090NUCL04		#COMBIN-A COMBINATORIAL PROGRAM 7090 1357PMCOMB
#AL TANT, TABLE LOOK-UP AND INTERPOLATIO	7090 1439ALTAIN		NS #COMBIN- A COMBINATORIAL PROGRAM 7090 1504TYMXMN
#BGOLEAN ALGEBRA MINIMIZER	7090 1197LLBAM		SSING PACKAGE #COMFORT II - INPUT-OUTPUT AND DATA PROCE 7090 1546NIDPK
#GENERAL PURPOSE ALGEBRAIC COMPILER	7090 1418MIMAD		#IG INDEX - TO COMPARE A WORD WITH A LIST OF WORDS 7090 1471IGINDX
#A GENERAL PURPOSE ALGEBRAIC COMPILER	7090 1308MIMAD		RAMMED TRANSMISSION CCTRL #SIMULATION OF THE IBM 7750 PRG 7090 1331PKMAP
#SHARE ALGOL 60 TRANSLATOR	7090 1426CRAL		TERGER ARITHMETIC C CONV. ROUTINE #FORTRAN FULL BINARY IN 7090 1378MFWBIN
LEXIBLE DECIMAL AND ALPHABETIC INPUT ROUTINE	#IG DECIN - F 7090 1469JGDECN		TEM-BCD TO COLLATOR CONVERSION #FORTRAN II CALLABLE SORT SYS 7090 1559RKRGEN
ANALYSIS OF SIMULATED TRANSIENTS WITH A	#MURKIN 7090 1356MURKIN		RAY #CPYCHN - COPY AND MERGE CHAIN LINKS PRODUCED BY T 7090 1472ZIGPCPN
#ZORCH - THE ANALYSIS OF THE KINETICS OF THE MSRE	7090 7090NUCL29		H - INTENSITY DATA CORRECTION #PROGRAM FOR X 7090 1342ERPLA
#MURKIN ANALYSIS OF THE KINETICS OF THE MSRE	7090 7090NUCL29		UCED BY THE #ERRC CUNT STORAGE #CYCHN - COPY AND MERGE CHAIN LINKS PROD 7090 1472ZIGPCPN
WEIGHTED REGRESSION ANALYSIS PROGRAM	7090 1336TJWRAP		AM #CRystallographic FOURIER SUMMATION PROGR 7090 1344ERFR2
NOV CYCLE STABILITY ANALYSIS PROGRAM	#LIAPU 7090 1575XYZLCS		NUMBERS #CUBE ROOT FOR DOUBLE PRECISION FLOATING 7090 1552YQBR
#CAN CYLINDER ANALYSIS PROGRAM	7090 1598NHCAN		NUMBERS #CUBE ROOT FOR SINGLE PRECISION FLOATING 7090 1364GC0013
#REGRESSION ANALYSIS PROGRAM	7090 1289SDSNAP		SION SOLUTIONENERAL CUBIC WITH REAL #EXPLICIT DOUBLE PRECI 7090 1364GC0012
#ADDITIVE SEASONAL ANALYSIS WITH CHARTS	7090 1464UCAB5		YBURN #CURE-3 TAPE VERSION FOR 7090/794 7090 NUCL37
PROGRAMMING OUTPUT ANALYZER #HARVARD MULTIPLE-PAT	7090 1549HUESA		CURVES #CUTTING STOCK I 7090 1485PGLSS1
H ENGLISH SYNTACTIC ANALYZER #PROGRAM	7090 1343ERSCO		LIAPUNOV CYCLE STABILITY ANALYSIS PROGRAM 7090 1575XYZLCS
FOR CALCULATION OF ANGLE SETTINGS	7090 1426SOUMAP		#CYLINDER ANALYSIS 7090 1325MHCAN
IONAL #AN APPROXIMATE SOLUTION TO THE MULTI-DIMENS	7090 1260SDMCHP		#CAN CYLINDER ANALYSIS PROGRAM 7090 1598NHCAN
CHEBYSEV POLYNOMIAL APPROXIMATION	7090 NUCL53		OMPOSITION CODE #DATABSS /DATA ASSEMBLY/ SECTION OF LP DEC 7090 1250SDMSS
#APWRC /GROSS SECTION LIBRARY/	7090 NUCL48		N CODE WITH #DOB - A TWO DIMENSIONAL REACTOR DIFFUSIO 7090 7090NUCL30
#APWRC-CELCOR	7090 NUCL36		IG DECIN - FLEXIBLE DECIMAL AND ALPHABETIC INPUT ROUTINE 7090 1469JGDECN
#APWRC-GAMIC /GAM ADAPTED TO APWRC/	7090 NUCL35		#DECRD, DECIMAL READ 7090 1349NAB986
#APWRC-SYBURN	7090 NUCL54		INPUT ROUTINE #IG DECIN - FLEXIBLE DECIMAL AND ALPHABETIC 7090 1469JGDECN
ICO /GAM ADAPTED TO APWRC-02	7090 NUCL36		# OF A LINEAR DECISION RULE 7090 1576XYZAPW
ATAN-FLOATING POINT ARCTANGENT SUBROUTINE	#APWRC-GAM 7090 1539BCATAN		COMPOSITION #DECOMP /SOL- OBTAINING/ SECTION OF LP DE 7090 1251SDMCOM
UNCTION FOR COMPLEX ARGUMENT	#LOG OF THE GAMMA F 7090 1398NULGAM		NING/ SECTION OF LP DECOMPOSITION CODE #DECOMP /SGL- OBTAI 7090 1251SDMCOM
CTION OF A COMPLEX ARGUMENT	#FORTRAN GAMMA FU 7090 1314EODGAMA		FUNCTION OF COMPLEX DEGREE AND REAL #FORTRAN LEGENRE 7090 1316EOLEGN
ANGENT OF A COMPLEX ARGUMENT	#FORTRAN T 7090 1312EOTANZ		# SIMPLIFIED SPACE DEPENDENT KINETICS MODEL 7090 7090NUCL29
F COMPLEX ORDER AND ARGUMENT	#FORTRAN Bessel FUNCTIONS 0 7090 1312EOTANZ		G MANUAL AND SYSTEM DESCRIPTION #VECTAN - PROGRAMMIN 7090 1460CAZ218
F COMPLEX ORDER AND ARGUMENT	#HANKEL FUNCTION 0 7090 1489NBSHNK		IT SOLUTION #NUCY DEVELOPMENT OF A GENERAL METHOD OF EXPLI 7090 1360GC0009
S BITS OF A WORD OR ARRAY	#SETS AND SENSE 7090 1568NUMSEM		INE # DEVIATION ONE #OFACT-DOUBLE PRECISION FACTORIAL SUBROUT 7090 1518BCDFCT
ROUTINE TO FLIP AN ARRAY	#SU 7090 1254NUFLIP		DIMENSIONAL REACTOR DIFFUSION CODE WITH #DOB - A TWO 7090 7090NUCL30
#ASSEMBLY ROUTINE OF 1401 SPS PROGRAMS	7090 3002LRIAR		#THREE DIMENSIONAL LEAST SQUARE FIT 7090 1346M3DL3
#GENERALIZED ASSEMBLY SYSTEM	7090 1506RSAS1		#DOB - A TWO DIMENSIONAL REACTOR DIFFUSION CODE WITH 7090 7090NUCL30
#DATABSS /DATA ASSEMBLY/ SECTION OF LP DECOMPOSITION CO	7090 1250SDMSS		#DIRECT SEARCH MINIMIZATION 7090 1259APMNS
#EVALUATES ASYMPTOTIC SERIES FOR NBS HF13	7090 1491NBS5P		#FAP DISASSEMBLY PROGRAM 7090 1587CAFPD1
E #U.S. STANDARD ATMOSPHERE, 1962	7090 1539BCATAN		#MULTICOMPONENT DISTILLATION PROGRAM 7090 1471MLHFSS
TER SELF-CONSISTENT ATOMIC FIELD #HARTREE-FOCK-SLA	7090 1507LFAF2		ARY CARDS #DK01-DUMP CARD ON-LINE LOADER FOR ROW BIN 7090 1512DFDK01
LLY WEIGHTED MOVING AVERAGES#FORECASTING SALES BY EXPONENTIAL	7090 1550NAGNA		/ & POISSON TERM IN DCUBLE PRECISION #GAMMA /A/X/ GAMMA /A 7090 1565N5DP2
OF VARIANCES #BART, SUBROUTINE FOR TESTING HOMOGENEITY	7090 1463LABART		# SQUARE ROOT FOR DCUBLE PRECISION FLOATING NUMBERS 7090 1554TYDSQT
D FLOATING POINT TO BCD #FIXED AN 7090 1431SIANT	7090 1287NUTPD		#CUBE ROOT FOR DOUBLE PRECISION FLOATING NUMBERS 7090 1593TYDRT
A FAP SUBPROGRAM TO BE USED BY FAP PROGRAMS	7090 1239BEP1P		# COEFFICIENTS AND DOUBLE PRECISION PRODUCT ACCUMULATION OF 7090 1480TYDLP
GUMENT #FORTRAN BESSEL FUNCTIONS OF COMPLEX ORDER AND AR	7090 1315E0BESL		TH REAL #EXPLICIT DOUBLE PRECISION SOLUTION OF 7090 1365GC0014
OF A GIVEN FUNCTION BETWEEN TWO POINTS	#ZERO 7090 1584TYJCPD		TH REAL #EXPLICIT DCUBLE PRECISION SOLUTION OF 7090 1365GC0013
OF A GIVEN FUNCTION BETWEEN TWO POINTS	/SP/ #ZERO 7090 1583TYJCPM		# TAPE DUMP #POST MORTEN DUMP ROUTINE #FAP FOR FORTRANS BKSP TA 7090 1288NUP05
ON-FORTRAN PRG #BIDIRECTIONAL STEPWISE MULTIPLE REGRESSI	7090 1333SCBSMR		ETRIC MATRICES #EIGENVALUE-EIGENVECTOR ROUTINE REAL SYMM 7090 1588NUMLEM
LINE LOADER FOR ROW BINARY CARDS	#DK00-ONE CARD ON-		ETRIC MATRICES #EIGENVALUE-EIGENVECTOR ROUTINE REAL SYMM 7090 1375NUMLEM
#TRANSMIT BINARY INFORMATION ON TAPE	7090 1424NUTRAN		#EIGENVALUES OF AN HERMITIAN MATRIX 7090 1325DREGNH
NE #FORTRAN FULL BINARY INTERGER ARITHMETIC & CONV. ROUTI	7090 1378MFWBIN		7090 1456NMLG4
#ABSOLUTE BINARY OCTAL LOADER UPPER	7090 1404NSAUBL		#EIGENVALUES OF REAL MATRICES 7090 1373NULIG3
#COLUMN BINARY SYMBOLIC SUBROUTINE LOADER	7090 1258NUCKSS		RVARD MULTIPLE-PATH ENGLISH SYNTACTIC ANALYZER #HA 7090 1549HUC16
#SETS AND SENSES BITS OF A WORD OR ARRAY	7090 1568NUMSEM		UTINE LOCATIONS AND ENTRIES AT #LOADING MAP OF SUBRO 7090 7090NUCL28
#FAP FOR FORTRANS BKSP TAPE, REW TAPE, WRITE E-O-F	7090 1288NUP05		#EQUIPOISE 3 7090 NUCL56
OUTPUT SUBROUTINE, BUFFERED AND TRAPPED #TAPE INPUT	7090 1318B5INOT		#EQUIPOISE 3-A 7090 NUCL64
#FORTRAN BUFFERED INPUT/OUTPUT HOLLERITH	7090 1318B5IHOT		#ERROR COUNT STORAGE 7090 1528BCFPIT
N #BUFFERED INPUT/OUTPUT PACKAGE FOR FORTRA	7090 7090NUCL30		#INVERSE ERROR FUNCTION 7090 1528NBSERF
TICALITY SEARCH AND BURNOUT OPTIONS #CCL1 - KERNEL	7090 NUCL58		#DOUBLE PRECISION ERROR FUNCTION SUBROUTINE 7090 1565NBSCFE
#ROCKET OMITBUS CALCULATOR KINEMATICS OF TRAJECTORIES	7090 3001RSROKT		
E #FORTRAN II CALLABLE SORT SYSTEM-GET AND FILE ROUTIN	7090 1559RKRGEN		
#FORTRAN II CALLABLE SORT SYSTEM	7090 1557GRST		
VERSION #FORTRAN II CALLABLE SORT SYSTEM-BCD TO COLLATOR CON	7090 1598NHCAN		
#CAN CYLINDER ANALYSIS PROGRAM	7090 1598NHCAN		
#STORAGE TO CARD HOLLERITH MODIFIED	7090 1369N5SCHM		
#DK00-ONE CARD ON-LINE LOADER FOR ROW BINARY CARDS	7090 1512DFDK00		
TP/ADER FOR ROW BINARY CARDS	#DK00-ONE CARD ON-LINE LO 7090 1512DFDK00		
LING PROGRAM PACKAGE CCC-3 /14-2 AND 14-3/ #CCC-3 SHIELD	7090 NUCL56		
4-2 AND 14-3/	7090 NUCL56		
ED SOURCES	#CCC-4 /SHIELDING PROGRAM PACKAGE/ 15-2 7090 NUCL64		
URCES	#CC1 - KERNEL INTEGRATION CODE - CALCULA 7090 NUCL58		
YLINDRICAL GEOMETRY CELL CODE #S SUB 4 C	7090 NUCL59		
# TO NUCLIDE CHAIN EQUATIONS	7090 7090NUCL18		
HN - COPY AND MERGE CHAIN LINKS PRODUCED BY THE #CPYC	7090 1472IGPCPN		
#CHARACTER HANDLING ROUTINE GENERATOR	7090 1529BCKMER		



TITLE	SYSTEM FILE NO.	TITLE	SYSTEM FILE NO. PA
#PRODUCT FORM LINEAR PROGRAMMING CODE	7090 1379RSMFOR	#JOLD PLOTTING SYSTEM	7090 1566LRJOLD
#LINEAR PROGRAMMING OUTPUT ANALYZER	7090 1521ERLPOA	#SORT ROUTINE /FLOA	7090 1376BFFIND
#LINEAR PROGRAMMING SYSTEM -SUCCESSOR TO SCROL	7090 1300IKLP90	#ZERO OF A GIVEN F	7090 1584TJPCPD
UNION BETWEEN TWO POINTS	7090 1531BCGNLNL	#ZERO OF A GIVEN F	7090 1583TJPCPM
UNION BETWEEN TWO POINTS /SP/	7090 1471GINDX	#POLISSON TERM IN DOUBLE PRECISION	7090 1299URGHAM2
#LINEAR SURFACE MINIMIZATION ROUTINE	7090 1459GDFICM	#GAMMA /A/ /X/ GAMMA /A/ /	7090 1260S0CHHEB
#REGRET, COMPARISON OF SEVERAL REGRESSION LINES	7090 1462LAREGR	#CHEBYSYEV POLYNOMIAL APPROXIMATION	7090 1478TJPLGM
#COMPARE A WORD WITH A LIST OF WORDS	7090 1472IGPCPN	#POLYNOMIAL FROM ITS ZEROS	7090 1570NUNLINT
#BIG INDEX - TO COORDINATE INPUT-OUTPUT LIST SIMULATOR FOR THE 7090	7090 12538BSFIC	#LAGRANGE POLYNOMIAL INTERPOLATION	7090 1526BCEPRP
#IQ MOD LOADER	7090 1211IQMDLD	#PCRTFOLIO SELECTION PROGRAM	7090 1516MIERR1
#SOS PROGRAM LOADER	7090 12291QCS0S	#POST MORTEM	7090 13484WNP4F
SYMBOLIC SUBROUTINE LOADER	7090 1285NUCB5S	#POST MORTEM DUMP ROUTINE	7090 1423LUMUKAP
OO-ONE CARD ON-LINE LOADER FOR ROW BINARY CARDS	7090 1512DFDK00	#PREP	7090 1481TYRNDG
SOLUTE BINARY OCTAL LOADER UPPER	7090 1404NSABOL	MBERG QUADRATURE TO PRESCRIBED ACCURACY	7090 1563ALCRIS
#LOADING MAP OF SUBROUTINE LOCATIONS AND ENTRIES AT	7090 14685IMAP	REGRESSION-FORTRAN PRG #BIDIRECTIONAL STEPWISE MULTIPLE	7090 1569NUPQWR
#GAUSSIAN OR LOGATTO INTEGRATION SUBROUTINE	7090 1334JPJAL	CTION FOR OBTAINING PRIMES	7090 1568NUNCL33
G MAP OF SUBROUTINE LOCATIONS AND ENTRIES AT	7090 14685IMAP	MICROFILM RECORDED PRINTED OUTPUT ROUTINE	7090 1333CSBMSR
#LOG OF THE GAMMA FUNCTION FOR COMPLEX ARGUMENT	7090 1398NULGAM	#MATH ERROR PRINTOUT	7090 1496BCNEXP
ATING POINT NATURAL LOGARITHM	7090 1535BCL0G4	#DOUBLE-PRECISION PROBABILITY INTEGRALS	7090 1526BCEPRP
#AL TAINT, TABLE LOOK-UP AND INTERPOLATION	7090 1439ALTAINT	G POINT /N/ VARIATE PROBABILITY INTEGRAL	7090 1516MIERR1
#TABLE LOOKUP SUBROUTINE, TLU	7090 1351NA9987	# TRANSPORTATION PROBLEM	7090 1364RWN4P
TAINING/ SECTION OF LP DECOMPOSITION	7090 1251SMOUCM	TRAVELING SALESMAN PROBLEM PROGRAM	7090 1423LUMUKAP
SSEMBLY/ SECTION OF LP DECOMPOSITION CODE	7090 12505MDASS	#TRANSPORTATION PROBLEM WITH FEW SHIPPERS	7090 1481TYRNDG
#INPUT/OUTPUT MACROS FOR FAP PROGRAMMING	7090 1476SC3MB8	PUT-OUTPUT ANC DATA PROCESSING PACKAGE	7090 1422UNUMPT
#CRITICAL PATH AND MANUSCHEDULING	7090 1453R0B001	#7090/7094 IBSYS PROCESSOR	7090 1546NMRI3
CRAN - PROGRAMMING MANUAL AND SYSTEM DESCRIPTION	7090 1460CA2218	OD MERGE CHAIN LINKS PRODUCED BY THE	7090 1472IGPCPN
#CONTOUR MAP OF FUNCTION	7090 1331PKMAP	#DOUBLE PRECISION PRODUCT ACCUMULATION OF SINGLE PRECISION	7090 1481TYRNDG
#LOADING MAP OF SUBROUTINE LOCATIONS AND ENTRIES AT	7090 14685IMAP	MPUTE THE AGGREGATE PRODUCTION AND WORK FORCE COEFFICIENT#CO	7090 1379RSMFOR
#FORTRAN LIBRARY MAPPER	7090 1326PNLMAP	#PROGRAM-TABULAR DISPLAY PROGRAM	7090 1576XZAPM
#MATH ERROR PRINTOUT	7090 1526BCEPRP	ION OF THE IBM 7750 PROGRAMMED TRANSMISSION CONTROL #SIMULAT	7090 1417MLHFSS
EIGENVALUES OF REAL MATRICES	7090 1373NUEIG3	#GRADIENT PROJECTION METHOD FOR NONLINEAR PROGRAM	7090 1399SDCP90
ENVALUES OF COMPLEX MATRICES	7090 1530BUEIG4	#GAUSSIAN PSEUDO RANDOM NUMBER GENERATOR	7090 1471YRNDG
TINE REAL SYMMETRIC MATRICES	7090 1588NUELEF	#GENERAL PURPOSE ALGEBRAIC COMPILER	7090 1418MIMAD
TINE REAL SYMMETRIC MATRICES	7090 1375NMLEW	#A GENERAL PURPOSE ALGEBRAIC COMPILER	7090 1308MIWAC
UES OF AN HERMITIAN MATRIX	7090 1325DREGHN	#GENERAL PURPOSE PLOTTING SUBROUTINE	7090 1495SUMPLT
#MATRIX INVERSION /FORTRAN/	7090 1533BCINTV	#GENERAL PURPOSE SYSTEMS SIMULATOR II	7090 CS-13X
SIMULANEOUS COMPLEX MATRIX INVERSION AND SOLUTION OF LINEAR EQUATIONS	7090 1459GDFICM	#GENERAL PURPOSE SYSTEMS SIMULATOR	7090 CS-05X
#FLOATING POINT MATRIX MULTIPLICATION	7090 3011PNLAMI	#ROMBERG QUADRATURE TO PRESCRIBED ACCURACY	7090 1481TYRNDG
MONITOR	7090 14335IMHPY	M #QUICKIE	7090 NUCLS0
#COMBINED MAXIMIZING, MINIMIZING OPERATIONS	7090 1504TYMXMN	ZERO AND STANDARD	7090 1461BARNG
ERATOR NORMAL WITH MEAN ZERO AND STANDARD	7090 1360GC0009	#RANDOM NUMBER GENERATOR NORMAL WITH MEAN	7090 1360GC0009
#WORK MEASUREMENT SAMPLING	7090 1593XYZWOM	#GAUSSIAN PSEUDO RANDOM NUMBER GENERATOR UNIFORM ON 0 TO	7090 1395GC0008
#COPY - COPY AND MERGE CHAIN LINKS PRODUCED BY THE UNIVERSITY OF MICHIGAN EXEC. SYSTEM FOR IBM 709-7090	7090 1472IGPCPN	#RANDOM NUMBER GENERATOR	7090 1479YRNDG
E #CHARACTRON MICROFILM RECORDED PRINTED OUTPUT ROUTINE	7090 1567AMXTP	OUT OCTAL DATA FROM ROM FOR REINITIALIZATION#PROGRAM TO READ	7090 NUCL63
#DIRECT SEARCH MINIMIZATION	7090 1259APMINS	AD IN OCTAL DATA TO ROM FOR REINITIALIZATION #PROGRAM TO RE	7090 1362G0010
#LINEAR SURFACE MINIMIZATION ROUTINE	7090 1551NUSCOP	- A TWO DIMENSIONAL REACTOR DIFFUSION CODE WITH	7090 7090NUNCL30
#BOCLEAN ALGEBRA MINIMIZER	7090 1197L89AM	#DECRD, DECIMAL READ	7090 1349NA8596
OMBINED MAXIMIZING, MINIMIZING OPERATIONS	7090 1504TYMXMN	ZATION #PROGRAM TO READ OCTAL DATA TO ROM FOR REINITI	7090 1362GCC011
PORT/	7090 7090NUNCL27	ALIZATION#PROGRAM TO READ OCTAL DATA FROM ROM FOR REINITI	7090 1284MUTPB
#IQ MOD LOADER	7090 1211IQMDLD	COMPLEX DEGREE AND REAL	7090 1316E0LEGN
DEPENDENT KINETICS MDEL	7090 7090NUNCL29	OF NERVAL CUBIC WITH REAL	7090 1364GCC013
E TO CARD HOLLERITH MODIFIED	7090 1369HSSGHH	OF NERVAL CUBIC WITH REAL	7090 1363GCC012
#DIATOMIC MOLECULAR INTEGRAL PROGRAM	7090 1591BCCIAT	OF NERVAL CUBIC WITH REAL	7090 1440TYDAPL
SE WITH IBM FORTRAN	7090 1497BEMAF2	#EIGENVALUES OF REAL MATRICES	7090 1373NUEIG3
#ONE PHASE MONITOR SYSTEM	7090 10946SY653	#COEFFICIENTS OF A REAL POLYNOMIAL FROM ITS ZEROS	7090 1478TYRNDG
#FORTRAN II POST MORTEM	7090 1353MIFPM	EIGENVECTOR ROUTINE	7090 1588NMLEW
#POST MORTEM DUMP ROUTINE	7090 1563ALCRIS	OF REAL SYMMETRIC MATRICES	7090 1375NMLEW
ONENTIALY WEIGHTED MOVING AVERAGES#FORECASTING SALES BY EXP	7090 1571XYZFRS	HARACTRON MICROFILM RECORDED PRINTED OUTPUT ROUTINE	7090 1567AMXTP
ATE SOLUTION TO THE MULTI-DIMENSIONAL	7090 NUCL62	#WEIGHTED REGRESSION ANALYSIS PROGRAM	7090 1367JWRAP
#MULTICOMPONENT DISTILLATION PROGRAM	7090 1423UMUMAP	#REGRESSION ANALYSIS PROGRAM	7090 1289SDSNAP
#MULTIPLE K-STATISTICS	7090 1579GRDST	S #LEAST SQUARES REGRESSION FIT TO SUM OF TWO EXPONENTIAL	7090 1477TYEL52
#HARVARD MULTIPLE-PATH ENGLISH SYNTACTIC ANALYZER	7090 1548UMXRM	MPARISON OF SEVERAL REGRESSION LINES	7090 1462LAREGR
ATING POINT MATRIX MULTIPLICATION	7090 1333CSBMR	NE GAUSS-NON LINEAR REGRESSION SUBROUTINE	7090 1513BCNML
HE MSRE	7090 1549HUESA	L STEPWISE MULTIPLE REGRESSION-FORTRAN PRG	7090 1333CSBMSR
#FLOATING POINT NATURAL LOGARITHM	7090 1494CHK0MD	L DATA FROM ROM FOR REINITIALIZATION#PROGRAM TO READ OCTA	7090 1462LAREGR
#SIMPLIFIED SPACE	7090 7090NUNCL29	TAL DATA TO ROM FOR REINITIALIZATION #PROGRAM TO READ IN OC	7090 1362GCC011
#EVALUATES AS	7090 1491NBSSP	#SREAD, REREAD	7090 1467SIRD11
#NETWORK AUTO PLOT /NAP/	7090 1493NBSPZPK	GRAM EVALUATION AND REVIEW TECHNIQUE/	7090 NUCL43
#RANDOM NORMAL NUMBER GENERATOR SUBPROGRAM	7090 1550NAG26HA	FORTRAN BSXP TAPE, REW TAPE, WRITE E-O-F	7090 1380PCPERT
#RANDOM NORMAL NUMBER GENERATOR NORMAL WITH MEAN ZERO AND STANDARD	7090 1360GC0009	#ROOTS OF RICATTIDIFF EQUATIONS	7090 1228NUPOS
#RANDOM NORMAL NUMBER GENERATOR UNIFORM ON 0 TO 1	7090 1395GC0008	A INTEGRATION	7090 1502NSSTAU
OUND FLOATING-POINT NUMBERS	7090 1479TYRNDG	F TRAJECTORIES	7090 3010ASBBJ1
PRECISION FLOATING NUMBERS	7090 1553TYDRAT	#ROCKET - OMIBUS CALCULATOR KINEMATICS O	7090 3001RSR0KT
PRECISION FLOATING NUMBERS	7090 1552TYQRAT	#ROOTS OF RICATTIDIFF EQUATIONS	7090 1481TYRNDG
PRECISION FLOATING NUMBERS	7090 1554TYDSQT	#RGUND FLOATING-POINT NUMBERS	7090 1523NSSTAU
ORTRAN FUNCTION FOR OBTAINING PRIMES	7090 1496BCNEXP	ON-LINE LOADER FOR ROW BINARY CARDS	7090 1502TYRNF
PROGRAM TO READ OCTAL DATA FROM ROM FOR REINITIALIZATION	7090 1361G0010	F A LINEAR DECISION RULE	7090 1356SD9216
#ABSOLUTE BINARY OCTAL LOADER UPPER	7090 1362GCC011	#ADAMS-MCULTON, RUNGE-KUTTA INTEGRATOR	7090 1512DFDK00
#ROCKET - OMIBUS CALCULATOR KINEMATICS OF TRAJECTORIES	7090 1404NSABOL	TRAN FLOATING POINT RUNGE-KUTTA INTEGRATION	7090 1354JPMARK
#OKOO-ONE CARD ON-LINE LOADER FOR ROW BINARY CARDS	7090 1512DFDK00	#FAP FOR FORTRAN S READ TAPE, WRITE TAPE	7090 3010ASBBJ1
IMIZING, MINIMIZING OPERATIONS	7090 1504TYMXMN	#SUB 4 CYLINDRICAL GEOMETRY CELL CODE	7090 1576XZAPM
SEARCH AND BURNDOUT OPTIONS	7090 7090NUNCL30	#U.S. STANDARD ATMOSPHERE, 1962	7090 1308MIWAC
#ORDER	7090 1466BCORDR	#S-PROGRAM	7090 1507FAT62
UNCTIONS OF COMPLEX ORDER AND ARGUMENT	7090 1315E0BESL	#GE-HAPO S-X	7090 10-094
HANKEL FUNCTION FOR ORDER 1/0 AND 2/3, COMPLEX ARGUMENT.	7090 1488NB5HMK	#SAIL	7090 7090NUNCL31
TIONPROGRAM TO READ OCTAL DATA FROM ROM FOR REINITIALIZATION	7090 1489NBSHF1	#VERAGES#FORECASTING SALES BY EXPONENTIALLY WEIGHTED MOVING A	7090 1571XYZFRS
#LINEAR PROGRAMMING OUTPUT ANALYZER	7090 1521ERLPOA	#WORK MEASUREMENT SAMPLING	7090 CO-05X
LM RECORDED PRINTED OUTPUT ROUTINE	7090 1567AMXTP	#KAGE	7090 1593XYZWOM
#SHIELDING PACKAGE/ 15-2	7090 NUCL64	#SAP-F SUBROUTINES COMPLEX ARITHMETIC PAC	7090 1524NBGPK
#CRITICAL PATH AND MANUSCHEDULING	7090 1453R0B001	#SYSTEMS ROUTINE TO SAVE INFORMATION AFTER /EPT/	7090 1582TYFPC
#BELL LABS PERMUTATION INDEX PROGRAM	7090 1239BEP1P	NGUAGE	7090 1482JMSMRN
#PERT	7090 7090NUNCL14	#SCAR I	7090 NUCL44
#PERT /PROGRAM EVALUATION AND REVIEW TECH	7090 1304WCPERT	#SCAR F	7090 NUCL45
#PERT COST	7090 CP-21X	YSTEM -SUCCESSOR TO SCROL	7090 1300IKLP90
#7090/7094 PERT COST II	7090 CP-22X	# CRITICALITY SEARCH AND BURNDOUT OPTIONS	7090 7090NUNCL30
#PERTURBATOR GENERATOR	7090 1421G1PL3PG	#DIRECT SEARCH MINIMIZATION	7090 1259APMINS
#ONE PHASE MONITOR SYSTEM	7090 10946SY653	#ADDITIVE SECTIONAL ANALYSIS WITH CHARTS	7090 1464UCABS
#FORTRAN GRAPH PLOT	7090 1586AMPLOF	#APWRC /CROSS SECTION LIBRARY/	7090 NUCL53
#NETWORK AUTO PLOT /NAP/	7090 1550NAG26HA	MP /SOL/-OBTAINING/ SECTION OF LP DECOMPOSITION	7090 1251SMOUCM
#PLOT ROUTINE FOR THE 7090.	7090 1332PKPLOT	ASS /DATA ASSEMBLY/ SECTION OF LP DECOMPOSITION CODE	7090 12505MDASS
#PLOT ROUTINE	7090 1561URTBN	#STUDENT SECTIONING PROGRAM	7090 1594XYZSSC
#GENERAL PURPOSE PLOTTING SUBROUTINE	7090 1495SUMPLT	#IG SELDEC	7090 1470IGSLDC
		#PORTFOLIO SELECTION PROGRAM	7090 F1-03X
		HARTREE-FOCK-SLATER SELF-CONSISTENT ATOMIC FIELD	7090 1417MLHFSS
		R #THIRTYSEXTENSE-SENSITIVE SIMULATOR SETTER AND TESTE	7090 1252NUNINDI
		#SERIES AND SENSIBLE BITS OF A WRLD UR ARRAY	7090 1588NMLEW
		#-3 LINEAR AND SEPARABLE PROGRAMMING SYSTEM	7090 1476SC3MB8
		BROUTINES	7090 1490NB5HSH
		VALUATES ASYMPTOTIC SERIES FOR NBS F13	7090 1569NUPQWR
		#POWER SERIES PACKAGE	7090 1491NB5SP
		#TIME SERIES SUBROUTINE PACKAGE	7090 1406BETISR

```

TITLE                                SYSTEM FILE NO.
#SETS AND SENSES BITS OF A WORD OR ARRAY 7090 1568NUMSEM
E-SWITCH SIMULATOR, SETTER AND TESTER    #THIRTY SIX SENS 7090 1252NUINDI
ALCULATION OF ANGLE SETTINGS              #PROGRAM FOR C 7090 1343ERSOCO
GRET, COMPARISON OF SEVERAL REGRESSION LINES #RE 7090 1462ZLAREGR
#SHARE ALGOL 60 TRANSLATOR                7090 14260RA1
#SHARE INTERNAL FORTRAN TRANSLATOR        7090 1367HSSIFT
#ADVANCED SHIELD CODES                    7090 NUC155
D 14-3/ #CCC-3 SHIELDING PROGRAM PACKAGE CCC-3 /14-2 AN 7090 1422UMUMMT
ON PROBLEM WITH FEW SHIPPERS              #TRANSPCRTATI 7090 NUC152
#SHOCK                                     7090 7090NUCL29
L #SIMPLIFIED SPACE DEPENDENT KINETICS MCDE 7090 1544RSSIMS
GUAGE #SIMSCRIPT - A SIMULATION PROGRAMMING LAN 7090 15978C704
#SIMULATE A 32K 704 CN A 65K 7090 7090NUCL29
H - THE ANALYSIS OF SIMULATED TRANSIENTS WITH A #ZORC 7090 S1-946
ANSMISSION CONTROL #SIMULATION OF THE IBM 7750 PROGRAMMED TR # 7090 1544RSSIMS
#SIMSCRIPT - A SIMULATION PROGRAMMING LANGUAGE #GENE 7090 CS-05X
RAL PURPOSE SYSTEMS SIMULATOR             7090 15258CSHFT
#FAP INSTRUCTION SIMULATOR FOR FORTRAN   7090 12538FIOOC
N INPUT-OUTPUT LIST SIMULATOR FOR THE 7090 #704 FORTRA 7090 1572RECDDP
#CARD TO TAPE SIMULATOR IBSYS SYSTEM /CRDTP/ 7090 CS-13X
RAL PURPOSE SYSTEMS SIMULATOR II         #GENE 7090 1252NUINDI
RTYSIX SENSE-SWITCH SIMULATOR, SETTER AND TESTER #THI 7090 14596DFICM
SOLUTION OF LINEAR SIMULTANEOUS COMPLEX MATRIX INVERSION AND # 7090 15328CSIMQ
#SIMULTANEOUS EQUATION SUBROUTINES       7090 14801YDOLAP
#SINE/COSINE SUBROUTINE                  7090 15521YQBRT
UCT ACCUMULATION OF SINGLE PRECISION #DOUBLE PRECISION PROD 7090 13636C0012
#CUBE ROOT FOR SINGLE PRECISION FLOATING NUMBERS 7090 14673IREAD
# COEFFICIENTS AND SINGLE PRECISION I/O 7090 7090NUCL16
#SIZLE                                     7090 7090NUCL27
IGROUP INTERNUCLEAR SLAP TRANSPCRT/      #MIST /MULT 7090 1130RLA14A
#SMASHT                                    7090 1370RLA140
#SMASHT /SHARE VERSION II/               7090 1374RLWLF
#WRITE SMASHT LIBRARY FILE              7090 NUC149
#SNAPKIN AND SNAPKIN A                   7090 7090NUCL09
#SNAPKIN AND SNAPKIN A                   7090 13636C0012
#FORTRAN SNG                             7090 13646C0013
IT DOUBLE PRECISION SOLUTIONGENERAL CUBIC WITH REAL #EXPLIC 7090 15080RWO5T
IT DOUBLE PRECISION SOLUTIONGENERAL CUBIC WITH REAL #EXPLIC 7090 12768E510
GENERALIZED INTERNAL SORT                 #G 7090 1557GRSRT
INT/ #SORT ROUTINE /FLOATING POINT OR FIXED PO # 7090 1559GRGEN
FORTRAN II CALLABLE SORT SYSTEM          7090 1558GRGTFL
FORTRAN II CALLABLE SORT SYSTEM-BCD TO COLLATOR CONVERSION # 7090 12291QCSDS
FORTRAN II CALLABLE SORT SYSTEM-GET AND FILE ROUTINE # 7090 13285OTRCC
#SCS PROGRAM LOADER                      7090 1482J5AMRN
#SOTRC-DENNIS METHOD TRANSPORTATION CODE 7090 NUC159
IMIT FINDER FORTRAN SOURCE LANGUAGE #GRAPH SCALE AND L 7090 7090NUCL29
GRATION CODE- INPUT SOURCES #CCC2 - KERNEL INTE 7090 3002LRLIAR
N CODE - CALCULATED SOURCES #CCC1 - KERNEL INTEGRATIO 7090 1346ME3DL5
# SIMPLIFIED SPACE DEPENDENT KINETICS MODEL #ASSEM 7090 1554YDYSQT
BLY ROUTINE OF 1401 SPS PROGRAMS         7090 1585TYVABS
E DIMENSIONAL LEAST SQUARE FIT           7090 15348CRDPT
G NUMBERS #SQUARE ROOT FOR DOUBLE PRECISION FLCCATIN 7090 15031YSQ8R
#FLOATING POINT SQUARE ROOT ROUTINE.     7090 1585TYVABS
#IMPROVED SQUARE-ROOT FOR FORTRAN II    #SSQ 7090 129251GLSP
ARE ROOT OF SUMS OF SQUARES              7090 1477TYLS2
#GENERAL LEAST SQUARES PROGRAM            7090 1575XYZLCS
ONENTIALS #LEAST SQUARES REGRESSION FIT TO SUM OF TWO EXP 7090 1360GC0009
#IARUNCY CYCLE STABILITY ANALYSIS PROGRAM 7090 1507LFA162
WITH MEAN ZERO AND STANDARD #RANDOM NUMBER GENERATOR NORMAL 7090 1501SD9138
#U.S. STANDARD ATMOSPHERE, 1962         7090 1500SD9137
#EQUATION OF STATE 3 /MIXTURES/         7090 1333SCB5MR
#EQUATION OF STATE 3 /1 COMPONENT/      7090 1489PLCS51
#BIDIRECTIONAL STEPWISE MULTIPLE REGRESSION-FORTRAN PRG 7090 1528BCFFCT
#CUTTING STOCK I                        7090 1369H5SCHM
#ERROR COUNT                             7090 1594XYZSSC
#STUDENT SECTIONING PROGRAM              7090 7090NUCL18
#SUB 4 CYLINDRICAL GEOMETRY CELL CODE   7090 1395MITME
#A FAP CODED SUBPROGRAM                  7090 1396MITMR
#A FAP CODED SUBPROGRAM                  7090 14618ANMG
AL NUMBER GENERATOR SUBPROGRAM           7090 1287LTPD
#A FAP SUBPROGRAM TO BE USED BY FAP PROGRAMS 7090 1477TYLS2
S REGRESSION FIT TO SUM OF TWO EXPONENTIALS #LEAST SQUARE 7090 1344ERFR2
ALGORITHMIC FOURIER SUMMATION PROGRAM #CRYST 7090 7090NUCL17
#SUMMIT                                   7090 1585TYVABS
#SQUARE ROOT OF SUMS OF SQUARES         7090 143551SLSQ
#SUPER LEAST-SQUARES PROGRAM            7090 S1-124
#7090/7094 SUPPORT PACKAGE FOR THE 7040/7044 7090 1350JPIOTR
#I/O TRAP SUPVSR.                       7090 1551NOCOP
#LINEAR SURFACE MINIMIZATION ROUTINE    7090 1294MDCSIR
#GENERAL SYMBOLIC INPUT ROUTINE /FORTRAN/ 7090 1285NOCSS
#COLUMN BINARY SYMBOLIC SUBROUTINE LOADER 7090 1588NUMLEW
VECTOR ROUTINE REAL SYMMETRIC MATRICES #EIGENVALUE-EIGEN 7090 1375NUMLEW
VECTOR ROUTINE REAL SYMMETRIC MATRICES #EIGENVALUE-EIGEN 7090 1549HUESA
LITTLE-PATH ENGLISH SYNTACTIC ANALYZER #HARVARD FU 7090 1559GRKGEN
VECTOR ROUTINE REAL SYMMETRIC MATRICES #FORTR 7090 1558GRGTFL
AN II CALLABLE SORT SYSTEM-BCD TO COLLATOR CONVERSION #FOR 7090 1439ALTAIN
#AL TAIN, TABLE LOOK-UP AND INTERPOLATION 7090 13518AB987
#FORTRAN TANGENT OF A COMPLEX ARGUMENT 7090 1312EOTANZ
#HYPERBOLIC TANGENT SUBROUTINE          7090 1537 BCTAN
S READ TAPE, WRITE TAPE #FAP FOR FORTRAN 7090 1284NUTPB
NARY INFORMATION ON TAPE #TRANSMIT BI 7090 1424NUTRAN
#TAPE DUMP                               7090 1590BCTD
NO TRAPPED #TAPE INPUT-OUTPUT SUBROUTINE, BUFFERED A 7090 13188SINOT
#CARD TO TAPE SIMULATOR IBSYS SYSTEM /CRDTP/ 7090 1572RECDDP
#CURE-3 TAPE VERSION FOR 7090/94        7090 NUC137
P FOR FORTRANS BKSP TAPE, REW TAPE, WRITE E-O-F #FA 7090 1288NUPOS
RANS BKSP TAPE, REW TAPE, WRITE E-O-F #FAP FOR FORT 7090 1288NUPOS
FOR FORTRAN S READ TAPE, WRITE TAPE #FAP 7090 1284NUTPB
ALUATION AND REVIEW TECHNIQUE/ #PERT /PROGRAM EV 7090 1330WCPERT
#TEMPEST                                  7090 7090NUCL19
#TEMPEST-II                              7090 7090NUCL2C
GAMMA /A/ & POISSON TERM IN DOUBLE PRECISION #GAMMA /A,X/ 7090 1299URGM2
MULATOR, SETTER AND TESTER #THIRTY SIX SENSE-SWITCH SI 7090 1252NUINDI
ART, SUBROUTINE FOR TESTING HOMOGENEITY OF VARIANCES #B 7090 1463LABART
#TET                                       7090 7090NUCL26
AND TESTER #THIRTY SIX SENSE-SWITCH SIMULATOR, SETTER 7090 1252NUINDI
#THREE DIMENSIONAL LEAST SQUARE FIT     7090 1346ME3DL5
# EXECUTION TIME                          7090 146851MAP
#TIME SERIES SUBROUTINE PACKAGE         7090 1406BETISR
LOOKUP SUBROUTINE, TLU #TABLE            7090 13518AB987
#DKOI-DUMP DISK TRACKS                  7090 1513DFOK01
LATOR KINEMATICS OF TRAJECTORIES #RCCKET - OMNIBUS CALCU 7090 3001RSKUKI

```

```

TITLE                                SYSTEM FILE NO.
#INTEGRAL TRANSFORMATION FUNCTION        7090 1458NCFIT
LYSIS OF SIMULATED TRANSIENTS WITH A #ZORCH - THE ANA 7090 7090NUCL29
RE INTERNAL FORTRAN TRANSLATOR #SHA 7090 1367HSSIFT
#SHARE ALGOL 60 TRANSLATOR              7090 14260RA1
IBM 7750 PROGRAMMED TRANSMISSION CONTROL #SIMULATION OF THE 7090 1424NUTRAN
P INTERNUCLEAR SLAP TRANSPCRT/ #TRANSMIT BINARY INFGMATION ON TAPE 7090 7090NUCL27
SOTRC-DENNIS METHOD TRANSPORTATION CODE #MIST /MULTIGROU # 7090 13285OTRCC
#TRANSPORTATION PROBLEM WITH FEW SHIPPERS # 7090 1422UMUMMT
#TRANSPORTATION PROBLEM 7090 1423UMUMAP
#FLOATING POINT TRAP                    7090 15278CFPT
INE, FLOATING POINT TRAP #IMPROVED SYSTEMS ROUT 7090 1581TYEPT
#FLOATING POINT TRAP /7090 FAP CODED/ 7090 1553TYJCPM
#I/O TRAP SUPVSR. #TAPE INPUT-OUTPUT SUBRO 7090 13188SINOT
UTINE, BUFFERED AND TRAPPED #THE TRAVELING SALESMAN PROBLEM PROGRAM 7090 CO-05X
#ZUT AND TUZ                             7090 7090NUCL23
#TWENTY GRAND                             7090 7090NUCL21
#DDB - A TWO DIMENSIONAL REACTOR DIFFUSION CODE W 7090 7090NUCL30
SSION FIT TO SUM OF TWO EXPONENTIALS #LEAST SQUARES REGRE 7090 1477TYLS2
EN FUNCTION BETWEEN TWO POINTS #ZERO OF A GIV 7090 1584TYJCPD
EN FUNCTION BETWEEN TWO POINTS /SP/ #ZERO OF A GIV 7090 1507LFA162
#U.S. STANDARD ATMOSPHERE, 1962         7090 1487NUTILL
#UTILITY SYSTEM UNDER IBSYS #BRAND 7090 13596C0008
OM NUMBER GENERATOR UNIFORM ON 0 TO 1 #UNIVERSITY OF MICHIGAN EXEC. SYSTEM FOR 7090 1368MUMSY
BINARY OCTAL LOADER UPPER #ABSOLUTE 7090 1404NSABOL
#MATRIX PACKAGE FOR USE WITH IBM FORTRAN MONITOR #A F 7090 1497BEMATP
AP SUBPROGRAM TO BE USED BY FAP PROGRAMS #IG FIND 7090 1473IGFIND
- FORMAT-FREE INPUT USING IGDECIN # 7090 UT-145
7090/7094 HYPERTAPE UTILITY PROGRAMS /INDEPENDENT VERSION/ # 7090 1487NUTILL
#UTILITY SYSTEM UNDER IBSYS #BART, SUBROUTINE FOR TES 7090 1463LABART
TING HOMOGENEITY OF VARIANCES #VARIATE PROBABILITY INTEGRAL 7090 1384RWP4F
#FLOATING POINT /N/ #VECTAN - PROGRAMMING MANUAL AND SYSTEM 7090 1460CA2218
DESCRIPTION #CURE-3 TAPE VERSION FOR 7090/94 7090 NUC137
#SMASHT /SHARE VERSION II/              7090 1370RLA14D
OGRAMS /INDEPENDENT VERSION/ #7090/7094 HYPERTAPE UTILITY PR 7090 UT-145
#B-DSN                                    7090 NUC161
#NO 7090 7090NUCL29
ES BY EXPONENTIALLY WEIGHTED MOVING AVERAGES #FORECASTING SAL 7090 1571XYZFRS
#WEIGHTED REGRESSION ANALYSIS PROGRAM 7090 1336TJWRAP
#WHIRLAWAY                                7090 7090NUCL22
NO SENSES BITS OF A WORD OR ARRAY #SETS A 7090 1568NUMSEM
NDEX - TO COMPARE A WORD WITH A LIST OF WORDS #IG I 7090 1471IGINDX
WORD WITH A LIST OF WORDS #IG INDEX - TO COMPARE A 7090 1471IGINDX
GATE PRODUCTION AND WORK FORCE COEFFICIENT#COMPUTE THE AGGRE 7090 1575XYZAPM
#WORK MEASUREMENT SAMPLING #FAP FOR FORTRANS B 7090 1593XYZWOM
KSP TAPE, REW TAPE, WRITE E-O-F #WRITE SMASHT LIBRARY FILE 7090 1288NUPOS
#WRITE SMASHT LIBRARY FILE #FAP FOR F 7090 1374RLWLF
ORTRAN S READ TAPE, WRITE TAPE #FAP FOR F 7090 1284NUTPB
#PROGRAM FOR X-RAY INTENSITY DATA CORRECTION 7090 1342ERLPA
ECISION #GAMMA /A,X/ GAMMA /A/ & POISSON TERM IN DOUBLE PR 7090 1299URGM29
OR NORMAL WITH MEAN ZERO AND STANDARD #RANDOM NUMBER GENERAT 7090 1360GC0009
NTS /SP/ #ZERO OF A GIVEN FUNCTION BETWEEN TWO POI 7090 1584TYJCPD
#ZERO OF A GIVEN FUNCTION BETWEEN TWO POI 7090 1584TYJCPD
POLYNOMIAL FROM ITS ZEROS #COEFFICIENTS OF A REAL 7090 1478TYPLPM
IENTS WITH A #ZORCH - THE ANALYSIS OF SIMULATED TRANS 7090 7090NUCL29
#NB5 ZPK COMPLEX ARITHMETIC PACKAGE 7090 1493NB5ZPK
#ZUT AND TUZ                             7090 7090NUCL23

```

## 7094 KWIC Index

```

#DIGITAL ANALOG SIMULATOR              7094 1564MFOAS
DE FOR THE 709/90/9#APWRC /ARMY PRESSURIZED WATER REACTOR CO 7094 NUC101
#DOUBLE PRECISION ARCTANGENT SUBROUTINE 7094 1441ARDATN
#DOUBLE PRECISION BASIC ROUTINES        7094 1447ARDBP
RIZED WATER REACTOR CODE FOR THE 709/90/9#APWRC /ARMY PRESSU 7094 NUC101
UBLE PRECISION SINE COSINE SUBROUTINE #DD 7094 1443ARDSC
#DIGITAL ANALOG SIMULATOR              7094 1564MFOAS
#DOUBLE PRECISION ARCTANGENT SUBROUTINE 7094 1441ARDATN
#DOUBLE PRECISION BASIC ROUTINES        7094 1447ARDBP
#DOUBLE PRECISION EXPONENTIAL FUNCTION 7094 1442ARCEX3
#DOUBLE PRECISION LOGARITHM SUBROUTINE 7094 1444ARDMD
#DOUBLE PRECISION MODULUS FUNCTION      7094 1445ARDMD
#DOUBLE PRECISION PACKAGE              7094 1444ARLP
#DOUBLE PRECISION SINE COSINE SUBROUTINE 7094 1443ARDSC
#DOUBLE PRECISION SQUARE RCCT SUBROUTINE 7094 1444ARDSRT
#DOUBLE PRECISION EXPONENTIAL FUNCTION #PRINTER PLOT ROUTINE FOR 7094 1560URHIST
#DOUBLE PRECISION LOGARITHM SUBROUTINE 7094 1444ARDMD
#DOUBLE PRECISION MODULUS FUNCTION      7094 1445ARDMD
LOT ROUTINE FOR ONE PAGE /VERTICAL/ HISTOGRAMS #PRINTER P 7094 1560URHIST
TOGRAMS #PRINTER PLOT ROUTINE FOR ONE PAGE /VERTICAL/ HIS 7094 1560URHIST
O9/90/9#APWRC /ARMY PRESSURIZED WATER REACTOR CODE FOR THE 7 7094 NUC101
CAL/ HISTOGRAMS #PRINTER PLOT ROUTINE FOR ONE PAGE /VERTI 7094 1560URHIST
Y PRESSURIZED WATER REACTOR CODE FOR THE 709/90/9#APWRC /ARM 7094 NUC101
BLE PRECISION BASIC ROUTINES #DDU 7094 1447ARDBP
#DIGITAL ANALOG SIMULATOR              7094 1564MFOAS
#DOUBLE PRECISION SINE COSINE SUBROUTINE 7094 1443ARDSC
#DOUBLE PRECISION SQUARE RCCT SUBROUTINE 7094 1444ARDSRT
C /ARMY PRESSURIZED WATER REACTOR CODE FOR THE 709/90/9#APWR 7094 NUC101
EACTOR CODE FOR THE 709/90/9#APWRC /ARMY PRESSURIZED WATER R 7094 NUC101

```

**Abstracts of Available  
Type I and Type II Programs  
Programs  
0704-0709-7040/7044 and 7090  
Section A**



CONTINUED FROM PRIOR COLUMN--

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP.  
ONE MAGNETIC TAPE - BINARY CARDS ON TAPE.

OPTIONAL PROGRAM MATERIAL -  
TWO MAGNETIC TAPES - SYMBOLIC CARDS ON TAPE.

## 0704

## 0704-F0-039 32K FORTRAN PROGRAMMING SYSTEM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0704-F0-039

PURPOSE THE IBM FORMULA TRANSLATING SYSTEM, 32K 704 FORTRAN, IS AN AUTOMATIC CODING SYSTEM FOR THE IBM 704 DATA PROCESSING SYSTEM. MORE PRECISELY, IT IS A 704 PROGRAM WHICH ACCEPTS A SOURCE PROGRAM WRITTEN IN THE FORTRAN LANGUAGE, CLOSELY RESEMBLING THE ORDINARY LANGUAGE OF MATHEMATICS, AND WHICH PRODUCES A MACHINE-LANGUAGE OBJECT PROGRAM READY TO BE RUN ON A 704.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP...  
ONE MAGNETIC TAPE - 32K FORTRAN SYSTEM.  
CARD DECK - EDITOR DECK.

OPTIONAL PROGRAM MATERIAL -  
FIVE MAGNETIC TAPES - ASSEMBLY LISTINGS.

## 0709-PR-064 SHARE OPERATING SYSTEM - SHARE MONITOR VERSION

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-PR-064

PURPOSE SOS IS A SET OF COMPONENTS CONTROLLED BY A THREE-PHASE MONITOR OPERATING ON STACKED JOBS. THE SYSTEM COMPILES SYMBOLIC MACHINE-ORIENTED LANGUAGE INTO CONDENSED SQUEEZED FORM AND/OR PERFORMS ONE-PASS LOADING OF SQUEEZED DECKS WITH SYMBOLIC MODIFICATION. THE OUTPUT INCLUDES ABSOLUTE DECKS, LISTINGS, AND NEW SQUEEZE DECK. FEATURES INCLUDE PROGRAMMER MACROS, LIBRARY FACILITIES, SYSTEM MACROS, AND ROUTINES FOR SYMBOLIC DEBUGGING. THE SOS SYSTEM INCLUDES JOB DATA EDITORS OPERATING TO AND FOLLOWING JOB EXECUTION. TAPE ASSIGNMENTS AND SYSTEM REFERENCES ARE SYMBOLIC.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP.  
TWO MAGNETIC TAPES - /ONE TAPE/ - SHARE OPERATING SYSTEM...  
/ONE TAPE/ SQUEEZE TAPE.

OPTIONAL PROGRAM MATERIAL -  
TWO MAGNETIC TAPES - SYMBOLIC CARDS ON TAPE.

## 0709-SM-066 SORT 709

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-SM-066

PURPOSE THIS IS A GENERALIZED SORT PROGRAM. THIS PROGRAM USES A 2 THROUGH 5-WAY MERGE. INPUT IS BINARY OR BCD FROM TAPE. THE TAPE MAY CONSIST OF ONE OR MORE REELS OF FIXED-LENGTH RECORDS. INPUT FILE IS SORTED INTO ASCENDING SEQUENCE BASED UPON 1 THROUGH 5 CONTROL FIELDS ARBITRARILY ARRANGED WITHIN THE RECORD. THE CONTROL FIELDS MAY HAVE A TOTAL OF UP TO 360 BITS. USE CONTROL CARDS SPECIFY RECORD LENGTH, INPUT AND OUTPUT BLOCKINGS, CONTROL FIELDS, MEMORY AVAILABLE, MERGE ORDER, AND TAPE UNITS. PROGRAM MAY BE INTERRUPTED AT ANY POINT AND LATER RESTARTED.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL.  
CARD DECK - BINARY DECK.

OPTIONAL PROGRAM MATERIAL -  
TWO MAGNETIC TAPES - /ONE TAPE/ - SYMBOLIC CARDS... /ONE TAPE/-  
ASSEMBLY LISTING.

## 0709

## 0709-F0-062 32K FORTRAN PROGRAMMING SYSTEM FOR 709/7090

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-F0-062

PURPOSE THE IBM FORMULA TRANSLATING SYSTEM, 32K 709/7090 FORTRAN, IS AN AUTOMATIC CODING SYSTEM FOR THE IBM 709/7090 DATA PROCESSING SYSTEM. MORE PRECISELY, IT IS A 709/7090 PROGRAM WHICH ACCEPTS A SOURCE PROGRAM WRITTEN IN THE FORTRAN LANGUAGE, CLOSELY RESEMBLING THE ORDINARY LANGUAGE OF MATHEMATICS, AND WHICH PRODUCES A MACHINE-LANGUAGE OBJECT PROGRAM READY TO BE RUN ON A 709 OR 7090. THE SYSTEM ALSO CONTAINS THE FAP ASSEMBLER AND FORTRAN MONITOR, ENABLING JOBS TO BE COMPILED, ASSEMBLED, AND EXECUTED AUTOMATICALLY.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... OPERATING INSTRUCTIONS.  
ONE MAGNETIC TAPE - 32K FORTRAN SYSTEM TAPE.  
CARD DECK - EDITOR DECK.

OPTIONAL PROGRAM MATERIAL -  
FIVE MAGNETIC TAPES - /TWO TAPES/ - SYMBOLIC INPUT... /THREE TAPES/ - ASSEMBLY LISTINGS.

## 0709-SM-067 GENERALIZED MERGE

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-SM-067

PURPOSE THIS IS A GENERALIZED MERGE ON 2, 3, 4 OR 5 BCD OR BINARY FILES. THE INPUT MAY BE ONE OR MORE REELS OF FIXED-LENGTH RECORDS. THE FILES ARE MERGED INTO ASCENDING SEQUENCES ON AS MANY AS 360 BITS OF CONTROLLED DATA CONTAINED IN UP TO 5 CONTROL FIELDS. OUTPUT IS IN THE SAME FORMAT AS INPUT, BUT BLOCKED AS PER CONTROL CARD. SEQUENCED INPUT FILES MAY ARISE FROM SPLITTING A LARGE FILE TO STAY WITHIN THE CAPACITY OF SORT 709, OR FROM BATCH TIMING IS ESSENTIALLY THAT OF ONE-TAPE PASS FOR THE OUTPUT FILE.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP.  
CARD DECK - BINARY DECK.

OPTIONAL PROGRAM MATERIAL -  
TWO MAGNETIC TAPES - /ONE TAPE/, SYMBOLIC CARDS... /ONE TAPE/ -  
ASSEMBLY LISTINGS.

## 0709-PR-063 SHARE OPERATING SYSTEM - IB MONITOR VERSION

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-PR-063

PURPOSE SOS IS A SET OF COMPONENTS CONTROLLED BY A ONE-PHASE MONITOR OPERATING ON STACKED JOBS. THE SYSTEM COMPILES SYMBOLIC MACHINE-ORIENTED LANGUAGE INTO CONDENSED SQUEEZED FORM AND/OR PERFORMS ONE-PASS LOADING OF SQUEEZED DECKS WITH SYMBOLIC MODIFICATION. THE OUTPUT INCLUDES ABSOLUTE DECKS, LISTINGS, AND NEW SQUEEZE DECK. FEATURES INCLUDE PROGRAMMER MACROS, LIBRARY FACILITIES, SYSTEM MACROS, AND ROUTINES FOR SYMBOLIC DEBUGGING. TAPE ASSIGNMENTS AND SYSTEM REFERENCES ARE SYMBOLIC.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

## 0709-UT-068 UTILITIES

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 0709-UT-068

PURPOSE THIS IS A COLLECTION OF 8 UTILITY ROUTINES. 1. RAFG GENERATES A FILE OF RANDOM BINARY OR BCD DIGITS. 2. 90AL LOADS INSTRUCTIONS PUNCHED IN ABSOLUTE OCTAL WITH THEIR ALPHABETIC MNEMONIC OPERATION CODES. 3. YMSG PRINTS ON-LINE MESSAGES. 4. TCOMP COMPARES TWO TAPES WORD FOR WORD. 5. SEQK CHECKS THE SEQUENCE OF A FILE OF RECORDS. RECORDS MAY BE BLOCKED AND HAVE UP TO FIVE CONTROL FIELDS. 6. SPTR PROVIDES A HIGH-SPEED SPOT TRACE. THE INFORMATION IS STORED IN UPPER MEMORY AND PRINTS UPON COMPLETION OF PROGRAM. 7. TELD BUILDS SHORT TAPES FOR TESTING AND OTHER SPECIAL PURPOSES. 8. TD PROVIDES AN OCTAL OR BCD PRINT OF TAPE.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP.  
CARD DECK - SYMBOLIC DECK.

## 7040/7044

## 7040-CO-08X 7040/7044 LINEAR PROGRAMMING SYSTEM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7040-CO-08X

THE 7040/7044 LINEAR PROGRAMMING SYSTEM IS WRITTEN IN A UNIQUE LANGUAGE WHICH MUST BE PROCESSED BY THE SPECIAL 7090/7094 ASSEMBLER-LIBRARIAN. CONSIDERABLE FLEXIBILITY HAS BEEN DESIGNED INTO THE 7040/7044 LINEAR PROGRAMMING SYSTEM TO REDUCE THE NEED FOR CUSTOMER MODIFICATIONS. MINOR MODIFICATIONS WHEN REQUIRED MAY BE MADE WITH PATCH OR SYSPT ROUTINES ON THE 7040/7044. OTHER MODIFICATIONS OR ADJUSTMENTS MUST BE MADE ON A 7090/7094 WITH THE SPECIAL ASSEMBLER-LIBRARIAN. VERSION II; A SYSTEM WHICH WILL FUNCTIONALLY OPERATE UNDER THE CONTROL OF THE 7040/7044 OPERATING SYSTEM /16K-32K/, WILL BE AVAILABLE IN 3Q 1964.

## FEATURES-

- PROBLEM SIZE IS LARGE--UP TO 1023 ROWS AND APPROXIMATELY 200,000 COLUMNS DEPENDING ON MATRIX DENSITY. /NUMBER OF COLUMNS IS LIMITED ONLY BY THE NUMBER OF NON-ZERO ELEMENTS THAT CAN BE STORED ON ONE REEL OF MAGNETIC TAPE./
- AGENDUM CARDS PROVIDE FLEXIBILITY AT THE USER'S OPTION TO TAILOR THE INPUT, SOLUTION PROCEDURE, AND OUTPUT FOR AN APPLICATION.
- INPUT CARD FORMAT FOR MATRIX COEFFICIENTS CONFORMS TO THE SHARE STANDARD AND IS COMPATIBLE WITH OTHER LINEAR PROGRAMMING SYSTEMS.
- THE PRODUCT FORM OF THE REVISED SIMPLEX ALGORITHM WITH SPECIAL FEATURES IS USED FOR PROBLEM SOLUTIONS.
- PARAMETRIC STUDIES CAN BE MADE BY SYSTEMATICALLY VARYING THE RIGHT HAND SIDE OR THE OBJECTIVE FUNCTION.
- IN ADDITION TO NORMAL OUTPUT REPORTS, MANAGEMENT REPORTS MAY BE PRODUCED IN A FORMAT DESIRED BY THE USER.

THE LP SYSTEM CAN BE USED INDEPENDENTLY OR BE CALLED BY IBM 7040/7044 SYSTEM MONITOR /IBSYS/ THROUGH THE USE OF A LIBRARY ROUTINE. HOWEVER, THE LP SYSTEM WILL ALWAYS BE ON A SEPARATE TAPE. THE LP SYSTEM CAN USE THE S.SIN AND S.SCU TAPES FOR INPUT AND OUTPUT TAPES RESPECTIVELY. THE TAPES REQUIRED BY IBSYS ARE IN ADDITION TO THE TAPES SPECIFIED IN THE MACHINE CONFIGURATION. SYSTEM REQUIREMENTS--DEPENDS ON THE SIZE OF THE PROBLEM MATRIX AND THE TYPE AND NUMBER OF AGENDUM STATEMENTS USED IN THE APPLICATION. THE CONFIGURATION CAPABLE OF HANDLING MOST PROBLEMS IS--A 32K 7040 OR 7044 WITH LIGHT 729 II, IV, V, OR VI MAGNETIC TAPE UNITS IN ADDITION TO THOSE REQUIRED IF THE LP SYSTEM IS CALLED BY IBSYS... TWO ADDITIONAL DATA CHANNELS... STORAGE CLOCK-INTERVAL TIMER... EXTENDED PERFORMANCE... DOUBLE PRECISION FLOATING POINT ARITHMETIC... 1402 CARD READ PUNCH, MODEL 2... 1403 PRINTER, MODEL 2 OR 3... WITH LESSER CONFIGURATIONS, THE LP SOLUTION TIME WILL BE INCREASED AND/LK OPERATIONAL FLEXIBILITY WILL BE REDUCED. A 1622 READ PUNCH WITH EXPANDED CHARACTER SET FEATURE /#3831/ CAN BE SUBSTITUTED FOR THE 1402-- THIS PRECLUDES THE USE OF THE 1403. MINIMUM SYSTEM REQUIREMENTS-- A16K 7040 OR 7044 WITH SIX 729 OR 7330 MAGNETIC TAPE UNITS, ANY MODEL, IN ANY COMBINATION... ONE OR MORE DATA CHANNELS... EXTENDED PERFORMANCE... DOUBLE PRECISION FLOATING POINT ARITHMETIC... 1622 WITH EXPANDED CHARACTER SET FEATURE #3831 OR 1402-1403.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

- BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL /4 PARTS/, TWO MAGNETIC TAPES - /ONE TAPE/ - OPERATING SYSTEM TAPE... /CNC TAPE/ - CARD DECKS TAPE - REQUIRED.
- OPTIONAL PROGRAM MATERIAL -  
THREE MAGNETIC TAPES - /TWO TAPES/ - ASSEMBLY LIST TAPES... /ONE TAPE/ - GENERATING TAPE... SYSTEM MANUAL WITH FLOWCHARTS.

## 7040-PR-150 7040/7044 OPERATING SYSTEM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7040-PR-150

THE FOLLOWING PROGRAMS ARE CONTAINED ON THIS SYSTEM TAPE.  
SYSTEM MONITOR /IBSYS/ 7040-SV-951  
INPUT/OUTPUT CONTROL SYSTEM 7040-IO-952  
GENERALIZED SORTING SYSTEM 7040-SM-953  
PROCESSOR 7040-PR-954  
PROCESSOR MONITOR /IBJOB/ 7040-SV-811  
LOADER /IBLDR/ 7040-SV-812  
SUBROUTINE LIBRARY /IBLIB/ 704C-LM-813  
MACRO ASSEMBLY PROGRAM /IBMAP/ 7040-SP-814  
FORTRAN IV COMPILER /IBFIC/ 7040-FO-615  
THE 7040/7044 UPDATE PROGRAM 7040-UT-955

## - ALSO -

7040/7044-1401 INPUT/OUTPUT CONTROL PROGRAM 1401-IO-152  
7040/7044-1401 AUXILIARY PROGRAMS 1401-UT-153  
/THE TWO 1401 PROGRAMS ARE PROVIDED SOLELY FOR SUPPORT OF 7040/7044 INSTALLATIONS HAVING 1401 DATA PROCESSING SYSTEM PROCESSING NEEDS/.

THE 7040/7044 OPERATING SYSTEM'S PRIMARY FUNCTION IS TO PROVIDE CONTINUOUS MACHINE OPERATION DURING A SEQUENCE OF JOBS THAT COULD INVOLVE THE USE OF SEVERAL PROGRAMS OR PROGRAMMING SYSTEMS, THUS AFFORDING SUBSTANTIAL SAVINGS IN TIME AND GREATER PROGRAMMING FLEXIBILITY.

SYSTEM MONITOR-- THE SYSTEM MONITOR, TOGETHER WITH THE INPUT/OUTPUT CONTROL SYSTEM, FORMS THE CORE OF THE 7040/7044 OPERATING SYSTEM. THIS PROGRAM PROVIDES FOR CONTINUOUS MACHINE OPERATION, COORDINATES ALL THE COMPONENT PROGRAMS, HANDLES INPUT/OUTPUT ASSIGNMENTS, AND PERFORMS SYSTEM MAINTENANCE.

INPUT/OUTPUT CONTROL SYSTEM /IOCS/- THIS CONTROL SYSTEM SCHEDULES THE EFFICIENT UTILIZATION OF THE VARIOUS INPUT/OUTPUT DEVICES ATTACHED TO THE IBM 7040/7044. PROVISION IS MADE FOR COMMUNICATION WITH AN ON-LINE 1401, AND FOR BOTH RANDOM AND SEQUENTIAL ACCESS USE OF A 1301 DISK STORAGE. THIS RELIEVES THE PROGRAMMER OF THE NECESSITY OF WRITING INPUT/OUTPUT ROUTINES. THE INPUT/OUTPUT CONTROL SYSTEM HAS FACILITIES FOR LABEL CHECKING AND BLOCKING AND UNBLOCKING OF DATA RECORDS.

GENERALIZED SORTING SYSTEM-- THIS PROGRAM SORTS AND MERGES SIGNED OR UNSIGNED BINARY OR BCD FILES. IT HANDLES FIXED-LENGTH OR VARIABLE-LENGTH RECORDS AND SORTS IN LOGICAL OR ALGEBRAIC SEQUENCE, IN EITHER ASCENDING OR DESCENDING ORDER.

PROCESSOR-- THIS PROCESSOR MAKES POSSIBLE THE COMPILATION, ASSEMBLY, AND EXECUTION OF PROGRAMS WRITTEN IN THE FORTRAN IV AND MAP LANGUAGES. A SINGLE JOB MIGHT CONSIST OF COMPILATION, ASSEMBLY AND EXECUTION OF A SOURCE PROGRAM TOGETHER WITH THE EXECUTION OF PREVIOUSLY ASSEMBLED BINARY DECKS. THIS VERSION OF THE PROCESSOR IS COMPOSED OF THE FOLLOWING PROGRAMS--  
PROCESSOR MONITOR-- THE PROCESSOR MONITOR IS THE DOMINANT COMPONENT OF THE PROCESSOR THAT MAINTAINS COMMUNICATION WITH THE SYSTEM MONITOR. THE PROCESSOR MONITOR IS DIRECTED BY CONTROL CARDS IN THE SUPERVISION OF JOBS ENTAILING COMPILATION, ASSEMBLY, LOADING, AND EXECUTION OF OBJECT PROGRAMS.

LOADER-- THIS PROGRAM PROCESSES AND COMBINES SEVERAL RELOCATABLE BINARY PROGRAMS PRODUCED BY THE MACRO ASSEMBLY PROGRAM INTO ONE ABSOLUTE BINARY OBJECT PROGRAM, WHICH IS THEN LOADED AND EXECUTED. THE CHAIN FEATURE IS PROVIDED TO ALLOW THE EXECUTION OF PROGRAMS THAT EXCEED THE CAPACITY OF CORE STORAGE. UNIT ASSIGNMENT OF FILES MAY BE MADE ONLY BY SYSTEM UNIT OR CARD EQUIPMENT SPECIFICATION, AND ALL OTHER OPTIONS PREVIOUSLY ANNOUNCED ARE DEFERRED TO A LATER VERSION.

SUBROUTINE LIBRARY-- THE SUBROUTINE LIBRARY CONTAINS ROUTINES THAT MAY BE LOADED AT OBJECT TIME TO PERFORM CERTAIN STANDARD FUNCTIONS. THESE INCLUDE THE NATURAL LOGARITHM, SINE, COSINE, EXPONENTIAL, SQUARE ROOT, ARC TANGENT, HYPERBOLIC TANGENT, AND ARC SINE/ARC COSINE FUNCTIONS.

MACRO ASSEMBLY PROGRAM-- THE MACRO ASSEMBLY PROGRAM PROCESSES COMPILER OUTPUT AND PROGRAMS WRITTEN IN MAP LANGUAGE, WHICH INCLUDES ALL 7040/7044 MACHINE INSTRUCTIONS, SPECIAL OPERATIONS, PREFIX CODES, MACRO STATEMENTS, AND SYSTEM PSEUDO-OPERATIONS. THE ASSEMBLY PROGRAM PRODUCES RELOCATABLE BINARY OUTPUT FOR PROCESSING BY THE LOADER.

FORTRAN IV COMPILER-- THIS COMPILER ACCEPTS SOURCE PROGRAMS WRITTEN IN THE FORTRAN IV LANGUAGE, WHICH CLOSELY RESEMBLES THE LANGUAGE OF MATHEMATICS, AND PRODUCES INPUT FOR THE MACRO ASSEMBLY PROGRAM.

COBOL COMPILER-- THIS COMPILER ACCEPTS SOURCE PROGRAMS WRITTEN IN THE COBOL LANGUAGE, WHICH RESEMBLES ENGLISH, AND PRODUCES INPUT FOR THE MACRO ASSEMBLY PROGRAM.

7040/7044 UPDATE PROGRAM-- THIS MAINTENANCE PROGRAM, OPERATING UNDER SYSTEM MONITOR CONTROL, GENERATES AND UPDATES MAGNETIC TAPE FILES WRITTEN IN THE 7040/7044 SYSTEM FILE FORMAT. THE VARIOUS DECKS THAT MAKE UP THE JOBS TO BE PROCESSED, TOGETHER WITH THE NECESSARY CONTROL CARDS, ARE STACKED ON THE INPUT UNIT. PROCESSING IS INITIATED AND CONTINUES UNINTERRUPTED UNTIL ALL THE JOBS ARE COMPLETED, UNLESS OPERATION INTERVENTION IS REQUESTED.

MACHINE REQUIREMENTS-- THE MINIMUM CONFIGURATION NECESSARY FOR OPERATION WITH THE 7040/7044 OPERATING SYSTEM IS A 7040/7044 DATA PROCESSING SYSTEM THAT HAS AT LEAST 16,384 CORE STORAGE LOCATIONS AND THE EXTENDED PERFORMANCE INSTRUCTION SET OPTION. IN ADDITION, THE FORTRAN COMPILER REQUIRES THE SINGLE-PRECISION FLOATING-POINT OPTION.

THE INPUT/OUTPUT REQUIREMENTS FOR THE SYSTEM MONITOR AND THE OPERATING SYSTEM COMPONENT PROGRAMS FOLLOW--

## THE BASIC REQUIREMENT--

A SYSTEM LIBRARY UNIT /S.SLBI/, WHICH MAY BE IBM 729 OR 7330 MAGNETIC TAPE UNITS OR 1301 DISK STORAGE.  
AN INPUT UNIT /S.SNI/, WHICH MAY BE IBM 729 OR 7330 MAGNETIC TAPE UNITS-- OR, 1301 DISK STORAGE-- OR, 1622 CARD READ PUNCH /WITH EXPANDED CHARACTER SET, FEATURE #3831/ IF THE INPUT IS ENTIRELY SYMBOLIC-- OR A 1402 CARD READ PUNCH, /ATTACHED THROUGH AN IBM 1414 INPUT/OUTPUT SYNCHRONIZER, MODEL 4, WITH THE COLUMN BINARY FEATURE/. AN OUTPUT UNIT /S.SOU/, WHICH MAY BE IBM 729 OR 7330 MAGNETIC TAPE UNITS OR 1301 DISK STORAGE OR A 1403 PRINTER WITH 132 PRINT POSITIONS.

IN ADDITION TO THE BASIC REQUIREMENT, THE GENERALIZED SORTING SYSTEM REQUIRES 2M MERGE TAPES /WHERE M EQUALS THE ORDER OF MERGE TO BE PERFORMED/. THE MINIMUM NUMBER OF MERGE TAPES REQUIRED IS FOUR. THESE MERGE TAPES MAY BE IBM 729 OR 7330 MAGNETIC TAPE UNITS.

THIS 1401 PROGRAM PERMITS THE INPUT/OUTPUT DEVICES ON A 1401 ON CHANNEL A OF A 7040/7044 TO BE USED AS IF THEY WERE ON THE 7040/7044. THIS PROGRAM ACCEPTS CONTROL INFORMATION AND DATA FROM THE 7040/7044 OPERATING SYSTEM /16/32K/ AND PERFORMS ON-LINE TAPE, BASIC CARD READ-PUNCH, AND PRINTER FUNCTIONS. THIS PROGRAM IS READ INTO THE 1401 BY ITS 1402 CARD READER AND OPERATES IN CONJUNCTION WITH THE 7040/7044 16/32K IOCS. MACHINE REQUIREMENTS-- A 1401 DATA PROCESSING SYSTEM USED WITH THE 7040/7044-1401 INPUT/OUTPUT CONTROL PROGRAM MUST BE EQUIPPED WITH THE SERIAL INPUT/OUTPUT ADAPTER /FEATURE CODE #7800/, AND THE 7040/7044 MUST LIKEWISE HAVE A 1401 ADAPTER #1034. THE 1401 MUST HAVE AT LEAST 4000 POSITIONS OF CORE STORAGE AND THE COLUMN BINARY FEATURE #1900 IF BINARY DATA IS TO BE PROCESSED, A 1402 CARD READ-PUNCH, AND THE ADVANCED PROGRAMMING FEATURE. IBM 7040/7044-1401 AUXILIARY PROGRAMS

THIS GROUP OF 1401 PROGRAMS IS PROVIDED SOLELY FOR SUPPORT OF 7040/7044 INSTALLATIONS HAVING 1401 DATA PROCESSING SYSTEM PROCESSING NEEDS. THE FOLLOWING PROGRAMS ARE AVAILABLE--  
THE 7040/7044-1401 INPUT STACKING PROGRAM-- THIS PROGRAM IS AN OFF-LINE 1401 PROGRAM THAT READS STACKED CARD DECKS OF JOBS TO BE PREPARED FOR THE 7040/7044 AND PRODUCES A SYSTEM INPUT FILE IN THE PROPER FORMAT FOR THE 7040/7044. THUS, THIS PROGRAM EFFECTIVELY REPLACES THE USE OF AN ON-LINE 7040/7044 CARD READER FOR CARD INPUT.

THE 7040/7044-1401 OUTPUT PRINT/PUNCH PROGRAM-- THIS IS AN OFF-LINE 1401 AID FOR PRINTING BCD RECORDS OR PUNCHING BCD AND

BINARY RECORDS FROM THE SYSTEM OUTPUT AND PUNCH TAPES, EITHER SEPARATE OR COMBINED ON ONE TAPE.  
 THE 7040/7044-1401 MAP SYMBOLIC UPDATING PROGRAM- THIS 1401 PROGRAM ALLOWS THE USER TO MAINTAIN THE MAP SYMBOLIC MASTER TAPE CONTAINING THE PROGRAMS AND SYSTEMS AVAILABLE AT AN INSTALLATION. IT ELIMINATES THE NECESSITY OF KEEPING A CARD FILE SINCE THE USER CAN MODIFY, DELETE, REPLACE, OR ADD PROGRAMS TO THE EXISTING MASTER FILE. THIS PROGRAM CAN ALSO BE USED TO PRODUCE A SYSTEM INPUT FILE.  
 THE 7040/7044-1401 AUXILIARY PROGRAMS ARE DIRECTED BY CONTROL CARDS IN THE PERFORMANCE OF THE VARIOUS OPERATIONS.  
 MACHINE REQUIREMENTS- A 1401 WITH AT LEAST 4000 POSITIONS OF CORE STORAGE, WITH THE COLUMN BINARY FEATURE #1990 IF BINARY DATA IS TO BE PROCESSED, AND WITH THE CAPABILITY OF ATTACHING AN IBM 729 OR 7330 MAGNETIC TAPE UNIT, A 1402 CARD READ PUNCH AND A 1403 PRINTER, MODEL 2.  
 ADVANCE PROGRAMMING FEATURES.  
 HIGH-LOW-EQUAL COMPARE FEATURES  
 1402 CARD READ PUNCH  
 1403 PRINTER, MODEL 2  
 ONE MAGNETIC TAPE UNIT IS REQUIRED BY THE 7040/7044-1401 INPUT STACKING PROGRAM AND THE 1401 OUTPUT PRINT/PUNCH PROGRAM.  
 7040/7044-1401 MAP SYMBOLIC UPDATING PROGRAM REQUIRES- TWO MAGNETIC TAPE UNITS.  
 1. THE 7040/7044-1401 AUXILIARY PROGRAMS OBJECT PROGRAMS, SYMBOLIC INPUT, AND AUTOCHART LISTING TAPE /ONE REEL/  
 THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
 DOCUMENTATION - PROGRAM WRITE-UP...REFERENCE MANUAL...SAMPLE PROBLEM WRITE-UP.  
 FOUR MAGNETIC TAPES - /ONE TAPE/ - SYSTEM TAPE.../ONE TAPE/ - RELOCATABLE TAPE.../TWO TAPES/ - SYMBOLIC TAPES.  
 CARD DECKS - SORT MAP...COBOL DECK...FORTRAN SAMPLE PROBLEM DECK.

OPTIONAL PROGRAM MATERIAL -  
 FOUR MAGNETIC TAPES - /THREE TAPES/ AUTOCHART LISTING TAPES FOR SYSTEM FLOWCHARTS.../ONE TAPE/ - ASSEMBLY LIST TAPE FOR 1401-UT-153.  
 OBJECT PROGRAM DECK...SYMBOLIC INPUT DECK...FLOWCHARTS FOR 1401-IO-152.

#### 7040-PR-154 7040/7044 8K OPERATING SYSTEM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
 SPECIFY FILE NUMBER 7040-PR-154

THE FOLLOWING PROGRAMS ARE CONTAINED ON THIS SYSTEM TAPE.  
 8K SYSTEM MONITOR, 7040-SV-956  
 8K SYSTEM EDITOR, 7040-UT-974  
 8K INPUT/OUTPUT CONTROL SYSTEM, 7040-IO-957  
 8K RELOCATABLE LOADER, 7040-UT-958  
 8K ASSEMBLY PROGRAM, 7040-SP-959  
 REPORT PROGRAM GENERATOR, 7040-RG-961  
 8K 7040/7044-1401 PERIPHERAL UTILITY PROGRAM, 1401-UT-157

THE 8K OPERATING SYSTEM SATISFIES THE REQUIREMENTS OF THE CARD ORIENTED INSTALLATION AND PROVIDES FOR COMPATIBLE GROWTH TO MACHINE CONFIGURATIONS EMPLOYING MAGNETIC TAPE UNITS AND AN ON-LINE 1401 DATA PROCESSING SYSTEM. THIS GROWTH POTENTIAL IS ACHIEVED IN THE FOLLOWING MANNER-

1. WHEN USED AS A GROUP OF INTEGRATED CARD PROGRAMS /WITHOUT THE SYSTEM MONITOR/, THE 8K OPERATING SYSTEM SUPPORTS THE CARD-ORIENTED INSTALLATION.
2. WHEN USED ON MAGNETIC TAPE /WITH THE SYSTEM MONITOR/, THE 8K OPERATING SYSTEM PROVIDES FOR CONTINUOUS MACHINE OPERATION DURING A SEQUENCE OF JOBS, THEREBY ACHIEVING A SUBSTANTIAL SAVING OF TIME AND INCREASED OPERATING FLEXIBILITY.

7040-SV-956

8K SYSTEM MONITOR- THE 8K SYSTEM MONITOR, USING INFORMATICA FROM CONTROL CARDS, COORDINATES THE PROCESSING OF A SEQUENCE OF JOBS.

7040-UT-974

8K SYSTEM EDITOR- THE 8K SYSTEM EDITOR IS A FACILITY FOR CREATING AND MAINTAINING THE SYSTEM TAPE.

7040-IO-957

8K INPUT/OUTPUT CONTROL SYSTEM /8K IOCS/- THE 8K IOCS IS A MODULAR SET OF SUBROUTINES, INCLUDING SELECT AND ERROR RECOVERY ROUTINES, THAT FACILITATES BASIC INPUT/OUTPUT OPERATIONS FOR DEVICES ATTACHED TO CHANNEL A.

7040-RG-961

REPORT PROGRAM GENERATOR- THIS PROGRAM USES REPORT SPECIFICATIONS TO GENERATE INPUT TO THE 8K ASSEMBLY PROGRAM, WHICH THEN PRODUCES AN OBJECT PROGRAM. WHEN EXECUTED, THE OBJECT PROGRAM PRODUCES THE DESIRED REPORT.

7040-SP-959

8K ASSEMBLY PROGRAM- THIS PROGRAM ACCEPTS, AS INPUT, THE OUTPUT FROM THE REPORT PROGRAM GENERATOR, AS WELL AS ACCEPTING SYMBOLIC PROGRAMS WRITTEN IN ITS OWN LANGUAGE. IT PRODUCES EITHER ABSOLUTE OR RELOCATABLE OBJECT PROGRAMS IN COLUMN BINARY FORMAT.

7040-UT-958

8K RELOCATABLE LOADER- THIS PROGRAM LOADS THE ABSOLUTE BINARY PROGRAMS PRODUCED BY THE 8K BASIC ASSEMBLY PROGRAM, AS WELL AS THE ABSOLUTE AND RELOCATABLE BINARY PROGRAMS PRODUCED BY THE 8K ASSEMBLY PROGRAM. IT ALSO LOADS OCTAL AND CORRECTION CARDS AND ESTABLISHES LINKAGE BETWEEN PROGRAMS BEING LOADED TOGETHER.

1401-UT-157

8K 7040/7044-1401 PERIPHERAL UTILITY PROGRAM- THIS 1401 PROGRAM, USING INFORMATION SUPPLIED BY A SINGLE CONTROL CARD AND SENSE SWITCHES, PERFORMS THE BASIC PERIPHERAL OPERATIONS /CARD-TAPE AND TAPE PRINT/PUNCH/ REQUIRED BY THE IBM 7040/7044 8K OPERATING SYSTEM ON THE IBM 1401 DATA PROCESSING SYSTEM, THEREBY SAVING 7040/7044 MACHINE TIME.

THE 8K PROGRAMS MAY BE USED EITHER SEPARATELY OR UNDER MONITORED CONTROL. IN THE FORMER CASE, THE OPERATOR MUST PERFORM THOSE FUNCTIONS THAT WOULD OTHERWISE BE PROVIDED AUTOMATICALLY THE 8K SYSTEM MONITOR. IN BOTH MONITORED AND UNMONITORED MODES OF OPERATIONS, THE INPUT/OUTPUT ASSIGNMENTS /E.G., CARD OR TAPE INPUT/ ARE MADE INITIALLY BUT THE OPERATOR VIA THE SENSE SWITCHES. ONCE THIS INFORMATION IS PLACED IN CORE STORAGE, THE SENSE SWITCHES ARE AVAILABLE FOR USE BY OBJECT PROGRAMS. IT IS RECOMMENDED THAT THE SYSTEM LOADER /ABSOLUTE CARD LOADER OR SYSTEM TAPE LOADER/, AS WELL AS THE INPUT/OUTPUT ASSIGNMENTS, REMAIN IN CORE STORAGE BOTH TO KEEP THE SENSE SWITCHES FREE AND TO SIMPLIFY PROGRAM LOADING. NOTE- THOSE INSTALLATIONS USING AN ON-LINE IBM 1401 DATA PROCESSING SYSTEM REQUIRE THE 7040/7044-1401 INPUT/OUTPUT CONTROL PROGRAM /IOCP/ 1401-IO-152.

MACHINE REQUIREMENTS- THE IBM 7040/7044 8K OPERATING SYSTEM WILL OPERATE WITH AN IBM 7040/7044 DATA PROCESSING SYSTEM HAVING THE FOLLOWING MINIMUM MACHINE CONFIGURATION-  
 1. AN IBM 7106/7107 PROCESSING UNIT WITH THE EXTENDED PERFORMANCE INSTRUCTION SET AND AT LEAST 8,192 POSITIONS OF CORE STORAGE.  
 2. THE FOLLOWING PERIPHERAL EQUIPMENT ATTACHED TO CHANNEL A -  
 A. AN IBM 1402 CARD READ PUNCH, MODEL 2, ATTACHED THROUGH AN IBM 1414 INPUT/OUTPUT SYNCHRONIZER, MODEL 4, WITH THE COLUMN BINARY FEATURE  
 B. AN IBM 1403 PRINTER, MODEL 2 OR 3  
 THIS MINIMUM MACHINE CONFIGURATION IS INTENDED FOR PUNCH CARD OPERATION. THE 1402 CARD READ PUNCH AND THE 1403 PRINTER MAY BE REPLACED BY MAGNETIC TAPE UNITS /729 II, IV, V, OR VI OR 733C/ OR THEY MAY BE ATTACHED THROUGH AN ON-LINE 1401 DATA PROCESSING SYSTEM. UP TO SIX MAGNETIC TAPE UNITS /729 II OR IV, OR 7330/ MAY BE ATTACHED TO THE 1401. A 1401 DATA PROCESSING SYSTEM USED ON-LINE WITH THE 7040/7044-1401 INPUT/OUTPUT CONTROL PROGRAM MUST BE EQUIPPED WITH THE SERIAL INPUT/OUTPUT ADAPTER /FEATURE CODE 7080/, AND THE 7040/7044 MUST LIKEWISE HAVE A 1401 ADAPTER 1034. THE 1401 MUST HAVE AT LEAST 4000 POSITIONS OF CORE STORAGE AND THE COLUMN BINARY FEATURE 1990 OF BINARY DATA IS TO BE PROCESSED, A 1402 CARD READ-PUNCH, AND THE ADVANCED PROGRAMMING FEATURE. WITH MAGNETIC TAPE UNITS ADDED TO THE MINIMUM EQUIPMENT CONFIGURATION, MONITORED OPERATION CAN BE USED TO OBTAIN A FASTER AND MORE AUTOMATED OPERATION. THE FLEXIBILITY OF THE IBM 7040/7044 8K OPERATING SYSTEM INCREASES AS THE SYSTEM CONFIGURATION INCREASES. WITH ONE /ON-LINE/ MAGNETIC TAPE UNIT, THE SYSTEM CAN RUN IN A MONITORED ENVIRONMENT. WITH TWO MAGNETIC TAPE UNITS, THE SYSTEM CAN PERFORM STACKED ASSEMBLIES, REPORT PROGRAM GENERATION FOLLOWED BY AN ASSEMBLY, ETC. WITH THREE OR MORE MAGNETIC TAPE UNITS, ALL FEATURES OF THE 8K SYSTEM MONITOR PROGRAM, INCLUDING COMPILER AND EXECUTE, ARE AVAILABLE WITHOUT OPERATOR INTERVENTION.

8K 7040/7044-1401 PERIPHERAL UTILITY PROGRAM- THIS REQUIRES A 1401 DATA PROCESSING SYSTEM WITH THE ADVANCE PROGRAMMING FEATURE, THE COLUMN-BINARY FEATURE 1990, AND AT LEAST 4,000 POSITIONS OF CORE STORAGE. THE FOLLOWING INPUT/OUTPUT DEVICES ARE ALSO REQUIRED- 1403 PRINTER, MODEL 2 1402 CARD READ PUNCH ONE MAGNETIC TAPE UNIT /729, MODEL 11 OR IV/

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
 DOCUMENTATION - PROGRAM WRITE-UP...REFERENCE MANUAL...PROGRAM MATERIAL LIST...SAMPLE PROBLEM WRITE-UP...LISTINGS.  
 THREE MAGNETIC TAPES - /TWO TAPES/ - ASSEMBLY LIST TAPES... /ONE TAPE/ - PROGRAM TAPE  
 CARD DECK - FORTRAN 8K SAMPLE PROBLEM DECK.

OPTIONAL PROGRAM MATERIAL -  
 THREE MAGNETIC TAPES - /TWO TAPES/ - SYMBOLIC CARDS ON TAPE .../ONE TAPE/ - AUTOCHART LISTINGS.

#### 7040-SI-141 650 SIMULATOR FOR 7040/7044

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
 SPECIFY FILE NUMBER 7040-SI-141

TO SIMULATE THE ACTIONS OF AN IBM 650 USING AN IBM 7040/7044, THUS EASING THE CONVERSION FROM AN IBM 650 SYSTEM TO AN IBM 7040 OR 7044 SYSTEM.

MACHINE REQUIREMENTS- 650 TO BE SIMULATED MAY INCLUDE- 2,000 WORD DRUM, IMMEDIATE ACCESS STORAGE, FLOATING-POINT ARITHMETIC, 654 AUXILIARY STORAGE MODEL 1, 2, 3 OR 4, IBM 727 MAGNETIC TAPE UNITS, NEGATIVE OPERATION CODES, THREE INPUT/OUTPUT SYNCHRONIZERS. 650 TO BE SIMULATED MAY NOT INCLUDE- 4,000 WORD DRUM, IBM 407 ACCOUNTING MACHINE ON-LINE, IBM 537 CARD UNITS, IBM 355 DISK STORAGE, IBM 838 INQUIRY STATIONS. CONTROL PANELS FOR THE IBM 533 543 AND 544 CARD UNITS ARE NOT SIMULATED. FORMAT EDITING MAY BE DONE BY THE USER EITHER ON-LINE OR OFF-LINE.

7040/7044 TO BE USED MUST INCLUDE- 8,192 WORD CORE STORAGE, EXTENDED PERFORMANCE INSTRUCTION SET, AT LEAST ONE TAPE UNIT OR AN IBM 1402 CARD READ/PUNCH OR ON-LINE ADDITIONAL INPUT/OUTPUT DEVICES AS REQUIRED, BASED ON THE 650 CONFIGURATION. 7040/7044 TAPE UNITS MAY BE SUBSTITUTED FOR ANY OR ALL 650 CARD UNITS.

OPTIONAL MATERIAL - REQUESTOR MUST SUBMIT 1 REEL OF TAPE TO OBTAIN ASSEMBLY LISTING AND 1 REEL OF TAPE TO OBTAIN SOURCE LANGUAGE.

#### 7040-SP-136 BASIC ASSEMBLY PROGRAM

7040/7044

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
 SPECIFY FILE NUMBER 7040-SP-136

THE 7040/7044 BASIC ASSEMBLY PROGRAM /BAP/ IS A PROGRAM WHICH ALLOWS THE PROGRAMMER TO CODE HIS PROGRAM IN SYMBOLIC LANGUAGE AND PERFORMS THE TRANSLATION OF THE SYMBOLIC PROGRAM INTO MACHINE LANGUAGE. BAP USES ONLY THE BASIC MACHINE OPERATION SET /INCLUDING THE CHANNEL A OPERATION SET/ AND THE EXTENDED PERFORMANCE SET. HOWEVER, IT WILL ASSEMBLE ALL MACHINE INSTRUCTIONS AVAILABLE ON THE IBM 7040 /7044. THE LANGUAGE OF BAP IS A SUBSET OF A LARGER ASSEMBLY PROGRAM, THE IBM 7040/7044 MACRO ASSEMBLY PROGRAM /IBMAMP/. THE BASIC ASSEMBLY PROGRAM IS DESIGNED TO RUN ON AN IBM 7040/7044 MACHINE SYSTEM WITH THE FOLLOWING MINIMUM CONFIGURATION- 7106 PROCESSING UNIT WITH 4,096 WORD STORAGE, EXTENDED PERFORMANCE OPTION, 1414 SYNCHRONIZER WITH COLUMN BINARY FEATURE, 1402 CARD/READER/PUNCH, 1403

## 7090

PRINTER. IN ADDITION TO THE ABOVE, ONE TAPE UNIT IS REQUIRED IF THE SOURCE PROGRAM IS TO BE READ FROM TAPE OR IF THE SECOND PASS OF THE ASSEMBLY IS TO USE TAPE, AND ONE TAPE UNIT IS REQUIRED IF THE ASSEMBLER ITSELF IS TO BE LOADED FROM TAPE. THE ASSEMBLER CAN BE RUN ON THE IBM 7040/7044 MACHINE SYSTEMS WITH 4K, 8K, 16K, OR 32K MEMORY. THE ASSEMBLER ALLOCATES A PORTION OF MEMORY TO A SYMBOL TABLE, THE SIZE OF THIS TABLE DEPENDING UPON THE SIZE OF THE MEMORY OF THE SOURCE MACHINE.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL... LISTINGS  
FLOWCHARTS... STORAGE MAP OF THE ASSEMBLER.  
CARD DECKS - BINARY SYSTEM DECK... SAMPLE PROBLEM DECK.

OPTIONAL PROGRAM MATERIAL -  
ONE MAGNETIC TAPE - SYMBOLIC CARDS ON TAPE /FOR TAPE ORIENTED SYS  
ONE MAGNETIC TAPE - ASSEMBLY LISTINGS.

## 7040-UT-142 UTILITY PROGRAMS FOR THE

7040/7044

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7040-UT-142

THE IBM 7040/7044 UTILITY PROGRAMS CONSIST OF TEN ROUTINES TO PERFORM CERTAIN COMMON OPERATIONS RELATED TO CARD AND TAPE LOADING, CORE AND TAPE DUMPING, FILE GENERATION AND THE STORAGE, RETRIEVAL, AND PRESERVATION OF DATA IN IBM 1301 DISK STORAGE. THE TEN ROUTINES PROVIDED ARE-

7040/7044 ABSOLUTE BINARY LOAD PROGRAM - THIS PROGRAM LOADS ABSOLUTE COLUMN BINARY PROGRAM CARDS IN THE STANDARD FORMAT FROM EITHER CARDS OR TAPE.

7040/7044 BASIC CORE DUMP PROGRAM - THIS PROGRAM PRODUCES A LISTING IN OCTAL WORD FORMAT WITH OR WITHOUT MNEMONICS. THE OUTPUT IS PRODUCED ON THE ON-LINE 1403 PRINTER.

7040/7044 CORE AND TAPE DUMP PROGRAM - THIS PROGRAM PRODUCES A LISTING OF THE CONTENTS OF 7040/7044 CORE STORAGE, OR A LISTING OF THE CONTENTS OF A 729 OR 7330 MAGNETIC TAPE UNIT WRITTEN IN EITHER BCD OR BINARY. THE OUTPUT IS WRITTEN ON-LINE BY A 1403 II PRINTER, OR ON TAPE, OR BOTH ON-LINE AND ON TAPE, AS DESIRED. THE PROGRAM HAS PROVISIONS FOR DUMPING SELECTED PORTIONS OF CORE STORAGE OR TAPE, AND THEN RESTORING CORE STORAGE. 7040/7044 IOCS LABELS ARE ALSO HANDLED BY THE PROGRAM.

7040/7044 TAPE FILE GENERATOR PROGRAM - THIS PROGRAM IS USED TO BUILD OR GENERATE FILES ON MAGNETIC TAPE IN A VARIETY OF FORMATS. THE PROGRAM IS CAPABLE OF PRODUCING FIXED-LENGTH OR VARIABLE-LENGTH LOGICAL RECORDS IN BCD OR BINARY MODE. THESE RECORDS CAN BE WRITTEN AS SEPARATE OR BLOCKED TAPE RECORDS. THE INPUT TO BUILD THESE RECORDS IS IN THE FORM OF CARDS OR CARD-IMAGES ON TAPE, OR THE RECORDS CAN BE GENERATED BY MEANS OF INTERNAL PSEUDO-RANDOM GENERATION TECHNIQUES.

7040/7044 HOME ADDRESS AND RECORD ADDRESS GENERATOR PROGRAM - THIS PROGRAM GENERATES THE HOME ADDRESS IDENTIFIER AND RECORD ADDRESS FOR ONE OR MORE TRACKS ON THE 1301 DISK STORAGE. STANDARD HOME ADDRESS IDENTIFIERS AND RECORD ADDRESSES ARE WRITTEN - HOWEVER, PROVISION IS MADE FOR INCLUSION OF THE USER'S OWN HOME ADDRESS IDENTIFIERS AND RECORD ADDRESSES. BOTH THE FORMAT TRACK GENERATOR AND ADDRESS AND RECORD ADDRESS GENERATOR OCCUPY CORE STORAGE AT THE SAME TIME, AND EITHER ONE OR BOTH CAN BE EXECUTED IN THE SAME MACHINE RUN.

7040/7044 LOAD DISK PROGRAM - THIS PROGRAM LOADS TAPE RECORDS ONTO A DESIGNATED AREA OF THE DISK BY ONE OF TWO METHODS. ONE METHOD ALLOWS WRITING IN THE SINGLE RECORD MODE OF OPERATION, PERMITTING THE USER TO LOAD ONE OR MORE RECORDS SEQUENTIALLY ONTO EACH SPECIFIED TRACK. THE OTHER METHOD, THE FULL TRACK MODE OF OPERATION, PERMITS THE USER TO LOAD ONE OR MORE RECORDS ONTO EACH SPECIFIED TRACK. THE RECORDS ARE, HOWEVER, FIRST BLOCKED IN CORE STORAGE AND THEN WRITTEN IN FULL TRACK MODE.

7040/7044 DUMP DISK PROGRAM - THIS PROGRAM DUMPS THE CONTENTS OF THE 1301 DISK STORAGE ONTO 729 OR 7330 MAGNETIC TAPE UNITS. A SINGLE TRACK, TWO-NON-SEQUENTIAL TRACKS, OR A SERIES OF TRACKS CAN BE DUMPED USING A CONTROL CARD TO SPECIFY DUMP PARAMETERS. THE DUMP TAPE CONTAINS CONTROL CARD INFORMATION NECESSARY TO RESTORE THE DISK STORAGE.

7040/7044 RESTORE DISK PROGRAM - THIS PROGRAM TAKES ALL OF THE OUTPUT, OR SECTIONS OF THE OUTPUT, FROM THE DUMP DISK PROGRAM AND PLACES IT BACK ON THE DISK IN ITS ORIGINAL FORM IN THE SAME AREA FROM WHICH IT WAS DUMPED.

7040/7044 CLEAR DISK PROGRAM - THIS PROGRAM CLEARS ANY DISK TRACK OR SEQUENTIAL SERIES OF TRACKS. THE TRACKS TO TO BE CLEARED AND THE CHARACTER TO WHICH THEY ARE CLEARED IS SPECIFIED BY THE USER ON CONTROL CARDS.

MACHINE REQUIREMENTS- A TAPE UNIT IS DEFINED AS A 729 II, IV, V, OR VI, OR A 7330 MAGNETIC TAPE UNIT. A PRINTER IS DEFINED, UNLESS OTHERWISE STATED, AS A 132- CHARACTER 1403 II PRINTER. WITH THE ADDITION OF A SERIAL I-O ADAPTER /NO. 7080/, A 1401 PROCESSING UNIT CAN BE USED TO A 1414 IV ON CHANNEL A. ALL PROGRAMS ASSUME A 7106 OR 7107 PROCESSING UNIT WITH THE EXTENDED PERFORMANCE OPTION. THE ABSOLUTE BINARY LOAD AND BASIC CORE DUMP PROGRAMS ASSUME A MINIMUM OF 4,096 WORDS OF CORE STORAGE, WHILE ALL OTHER PROGRAMS ASSUME A MINIMUM OF 8,192 WORDS OR MORE. ALL DISK PROGRAM ASSUME A 7904 I OR II DATA CHANNEL, A +631 II, III, OR IV FILE CONTROL, AND A 1301-I OR II DISK STORAGE.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL...  
FLOWCHARTS... SAMPLE PROGRAM WRITE-UP.  
ONE MAGNETIC TAPE - SYMBOLIC CARDS ON TAPE.  
CARD DECK - BINARY PROGRAM DECK.

7090-CO-05X THE TRAVELING SALESMAN  
PROBLEM PROGRAM  
ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-CO-05X

THE TRAVELING SALESMAN PROBLEM IS THE CLASSICAL MATHEMATICAL PROBLEM OF FINDING A ROUTE WHICH PROVIDES THE MINIMUM TRAVEL DISTANCE FOR VISITING THE CITIES ON A GIVEN LIST, WITH THE CONDITIONS THAT EACH CITY SHALL BE VISITED EXACTLY ONCE AND THE TOUR SHALL END AT THE CITY WHERE IT BEGAN. VARIOUS TYPES OF PRACTICAL PROBLEMS MAY BE FORMULATED AS TRAVELING SALESMAN PROBLEMS. ESSENTIALLY, THE PROBLEM IS ONE OF SEQUENCING UNDER THE FOLLOWING CONDITIONS- GIVEN A SET OF OBJECTS /E.G. CITIES/ FOR WHICH SOME FIXED COST /E.G. TRAVEL DISTANCE/ IS ASSOCIATED WITH EACH ORDERED PAIR OF OBJECTS IN THE SET, FIND THAT CLOSED-LOOP SEQUENCE /CLOSED TOUR/ IN WHICH EACH OF THE OBJECTS APPEARS EXACTLY ONCE AND SUCH THAT THE SUM OF THE COSTS ASSOCIATED WITH THE CORRESPONDING ORDERED PAIRS IS A MINIMUM. FOR ANY PROBLEM WHICH CAN BE SO FORMULATED, THE DIFFICULTY OF EXACT SOLUTION STEMS FROM THE LARGE NUMBER OF SEQUENCES OR PERMUTATIONS TO BE CONSIDERED. THE 7090 PROGRAM PRESENTED HERE EMPLOYS A DYNAMIC PROGRAMMING ALGORITHM TO TREAT THE PROBLEM AS ONE INVOLVING COMBINATIONS RATHER THAN PERMUTATIONS. THE PROGRAM OBTAINS THE OPTIMUM SOLUTION FOR PROBLEMS INVOLVING UP TO 13 OBJECTS. THROUGH ITERATIVE USE OF THE ALGORITHM, THE PROGRAM CAN HANDLE PROBLEMS INVOLVING UP TO 50 OBJECTS, PRODUCING AN OPTIMUM OR NEAR-OPTIMUM SOLUTION.

MACHINE REQUIREMENTS-  
THE PROGRAM REQUIRES AN IBM 7090 WITH THE FOLLOWING MINIMUM CONFIGURATION.

1. 32,768 WORDS OF CORE STORAGE
2. TWO TAPE UNITS
3. ONE ON-LINE CARD READER
4. ON-LINE PRINTER

PERIPHERAL EQUIPMENT IS ALSO REQUIRED FOR OFF-LINE TAPE TO PRINTER OPERATIONS.  
PROGRAMMING SYSTEM- THIS PROGRAM WAS DEVELOPED USING FORTRAN II. SOURCE PROGRAM LISTINGS AND FLOW CHARTS ARE INCLUDED IN THE MANUAL. EXECUTION REQUIRES ENTRY OF THE OBJECT DECK WITH ITS BSS LOADER THROUGH THE CARD READER. CORE REQUIREMENTS PREVENT RECOMPILATION OF THE PROGRAM UNDER PRESENT FORTRAN SYSTEMS.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... PRELIMINARY REFERENCE MANUAL  
... LISTINGS.  
CARD DECKS - BINARY DECK /MAIN PROGRAM/... BINARY DECK /AUXILIARY PROGRAM/... SAMPLE PROBLEM DATA DECK.

7090-CP-01X PERT COST  
ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-CP-01X

THE 7090 PERT COST PROGRAM PROCESSES PERT NETWORKS WITH OR WITHOUT COST DATA AT THE USER'S OPTION. THE PROGRAM INTEGRATES UP TO 100 SUBNETS TO FORM A SINGLE DETAILED NET, OR FOR NETWORKS CONTAINING LESS THAN 100 SUBNETS, ANY COMBINATION OF NETWORKS, AND THEIR SUBNETS WHERE-

NUMBER OF NETWORKS & NUMBER OF SUBNETS MORE THAN 101

EACH SUBNET HAS AN UPPER LIMIT OF 750 ACTIVITIES. OUTPUT CONSISTS OF PERT TIME AND PERT COST REPORTS, GRAPHS, AND PICTORIAL NETWORKS. SEVEN LEVELS OF SUMMARY REPORTS CAN BE OBTAINED. OUTPUTS CAN BE CHOSEN OF SUPPRESSED AT THE USER'S OPTION.

THE 7090 PERT COST PROGRAM IS DESIGNED FOR BOTH GOVERNMENT CONTRACT AND GENERAL INDUSTRY USAGE IN THE PLANNING AND CONTROL OF COMPLEX PROJECTS.

MINIMUM MACHINE REQUIREMENTS-  
A 32K 7090 SYSTEM... 716 PRINTER... AND TWELVE MAGNETIC TAPE UNITS. THE PROGRAM IS WRITTEN IN IBSFAP, USING THE IBM 7090 IBSYS MONITOR. /WILL ALSO OPERATE ON 7094 IN MULTIPLE TAG MODE/.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL... TAPE CREATION INSTRUCTION  
ONE MAGNETIC TAPE - BINARY CARD-IMAGE PROGRAM TAPE.  
CARD DECK - INPUT CONTROL DECK.

OPTIONAL PROGRAM MATERIAL -  
FLOWCHARTS.  
FIVE MAGNETIC TAPES - /TWO TAPES/- SAMPLE PROBLEM OUTPUT LIST TAPES... /ONE TAPE/- SYMBOLIC INPUT TAPE... /TWO TAPES/- ASSEMBLY LISTINGS.  
TWO MAGNETIC TAPES - SAMPLE PROBLEM INPUT DATA.

7090-CP-02X 7090/7094 PERT COST II  
ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-CP-02X

THE IBM 7090/7094 PERT COST II PROGRAM PROCESSES PERT NETWORKS WITH OR WITHOUT COST DATA AT THE USER'S OPTION. THE PROGRAM INTEGRATES UP TO 100 SUBNETS TO FORM A SINGLE DETAILED NET, OR FOR NETWORKS CONTAINING LESS THAN 100 SUBNETS, ANY COMBINATION OF NETWORKS AND THEIR SUBNETS WHERE- NUMBER OF NETWORKS & NUMBER OF SUBNETS LESS THAN 101 EACH SUBNET HAS AN UPPER LIMIT OF 750 ACTIVITIES. THE PROGRAM USES A PRODUCT ANALYSIS TABLE TO DEFINE THE CHARGE NUMBER STRUCTURE FOR COSTING THE ACTIVITIES. THE INPUT CARDS ARE SIMILAR IN CONTENT TO THE IBM 7050 PERT COST PROGRAM. TO ALLOW MORE INPUT CAPABILITY, THE INPUT FORMATS HAVE BEEN MODIFIED, MAKING THE PERT COST II FORMATS INCOMPATIBLE WITH THE PERT COST FORMATS. OUTPUT CONSISTS OF PERT TIME AND PERT COST REPORTS, GRAPHS AND PICTORIAL NETWORKS. OUTPUTS CAN BE CHOSEN OR SUPPRESSED AT THE USER'S OPTION. USE THE IBM 7090/7094 PERT COST II PROGRAM IS DESIGNED FOR BOTH GOVERNMENT CONTRACT AND GENERAL INDUSTRY USAGE IN THE PLANNING AND CONTROL OF COMPLEX PROJECTS. IT IS BASED ON THE CHARACTERISTICS DESCRIBED IN SUPPLEMENT NO. 1 TO THE DOD AND NASA GUIDE, PERT COST, DATED MARCH 1963. MACHINE REQUIREMENTS- IBM 7090/7094 WITH... 32K MEMORY... 12 TAPE DRIVES... ON-LINE PRINTER... OFF-LINE CARD-TO-TAPE TAPE-TO-PUNCH, AND TAPE-TO-PRINT /132-CHARACTER LINE/ EQUIPMENT. THE SYSTEM IS WRITTEN IN IBSFAP AND OPERATES UNDER THE 7050/7094 IBSYS OPERATING SYSTEM.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP...REFERENCE MANUAL...  
OPERATORS INSTRUCTIONS MANUAL.  
ONE MAGNETIC TAPE - BINARY CARD IMAGE PROGRAM TAPE.  
CARD DECK - INPUT CONTROL DECK.

OPTIONAL PROGRAM MATERIAL -  
SEVEN MAGNETIC TAPES - SAMPLE PROBLEM OUTPUT TAPE /ONE TAPE/  
...SYMBOLIC INPUT /TWO TAPES/...ASSEMBLY LISTINGS /THREE  
TAPES/...AUTOCHART FLOWCHARTS /ONE TAPE/.  
TWO SAMPLE PROBLEM INPUT CARD DECKS...PROGRAM SYSTEMS MANUAL.

#### 7090-CS-05X GENERAL PURPOSE SYSTEMS

##### SIMULATOR

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-CS-05X

THE GENERAL PURPOSE SYSTEMS SIMULATOR ALLOWS THE USER TO STUDY THE LOGICAL STRUCTURE OF A SYSTEM, TO FOLLOW THE FLOW OF TRAFFIC THROUGH THE SYSTEM, AND TO OBSERVE THE EFFECTS OF DELAYS CAUSED EITHER BY THE NEED TO SHARE PARTS OF THE SYSTEM OR BY THE LIMITS OF CAPACITY OF PARTS OF THE SYSTEM. THE RESULTS OF THE SIMULATOR MAY BE USED TO EVALUATE THE RELATIVE IMPORTANCE OF SYSTEM VARIABLES, TO TEST NEW POLICIES AND METHODS, AND TO CHECK THE RESULTS OF ANALYTIC SOLUTION. THE SIMULATOR PROVIDES INFORMATION ON TRAFFIC QUANTITIES, TRAFFIC TIMES, EQUIPMENT UTILIZATION, TRAFFIC DELAYS. STATISTICAL VARIATIONS CAN BE INTRODUCED INTO THE SIMULATION AND ARRANGEMENTS ARE MADE TO SAMPLE THE STATE OF THE SYSTEM AT VARIOUS POINTS AND TIMES. THE EFFECT OF ASSIGNING LEVELS OF PRIORITY TO UNITS OF TRAFFIC CAN BE STUDIED, AND THE EFFECTS OF PEAK LOADS MAY BE SIMULATED BY VARYING THE LOAD ON THE SYSTEM WITH TIME OR BY VARYING THE SPEEDS OF OPERATION WITH LOAD. THE PROGRAM REQUIRES A 7090 WITH THE MINIMUM CONFIGURATION REQUIRED FOR OPERATION OF THE FORTRAN MONITOR.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... PRELIMINARY REFERENCE MANUAL... OPERATING INSTRUCTIONS.  
ONE MAGNETIC TAPE - ASSEMBLY LISTINGS.  
CARD DECK - BINARY PROGRAM DECK.

OPTIONAL PROGRAM MATERIAL -  
FLOWCHARTS... PROGRAM DESCRIPTION MANUAL.

#### 7090-CS-13X GENERAL PURPOSE SYSTEMS

##### SIMULATOR II

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-CS-13X

GPSS II ALLOWS THE USER TO STUDY THE LOGICAL STRUCTURE OF A SYSTEM, TO FOLLOW THE FLOW OF TRAFFIC THROUGH THE SYSTEM, AND TO OBSERVE THE EFFECTS OF DELAYS CAUSED EITHER BY THE NEED TO SHARE PARTS OF THE SYSTEM OR BY THE LIMITS OF CAPACITY OF PARTS OF THE SYSTEM. THE RESULTS OF THE SIMULATOR MAY BE USED TO EVALUATE THE RELATIVE IMPORTANCE OF SYSTEM VARIABLES, TO TEST NEW POLICIES AND METHODS, AND TO CHECK THE RESULTS OF ANALYTIC SOLUTIONS. THE SIMULATOR PROVIDES INFORMATION ON

TRAFFIC QUANTITIES  
TRAFFIC TIMES  
EQUIPMENT UTILIZATION  
TRAFFIC DELAYS

STATISTICAL VARIATIONS CAN BE INTRODUCED INTO THE SIMULATION, AND ARRANGEMENTS ARE MADE TO SAMPLE THE STATE OF THE SYSTEM AT VARIOUS POINTS AND TIMES. THE EFFECT OF ASSIGNING LEVELS OF PRIORITY TO UNITS OF TRAFFIC CAN BE STUDIED, AND THE EFFECTS OF PEAK LOADS MAY BE SIMULATED BY VARYING THE LOAD ON THE SYSTEM WITH TIME OR BY VARYING THE SPEEDS OF OPERATION WITH LOAD. USE OF THE PROGRAM REQUIRES THAT THE SYSTEM TO BE SIMULATED MUST BE DESCRIBED IN TERMS OF A BLOCK DIAGRAM DRAWN IN THE MANNER SET FORTH IN THE MANUAL. SOME KNOWLEDGE OF THE COMPUTER OPERATION WOULD BE HELPFUL IN CERTAIN ASPECTS OF SIMULATION PREPARATION, BUT FOR THE MOST PART THE USER NEED ONLY KNOW THE RULES BY WHICH SYSTEM MODELS ARE CONSTRUCTED. ONLY ONE OF THE 33 BLOCK TYPES REQUIRES THE SERVICES OF A TRAINED PROGRAMMER.

MACHINE REQUIREMENTS-  
THE PROGRAM RUNS UNDER IBSYS/FORTRAN ON THE 7090/94, AND THE SOURCE LANGUAGE IS FORTRAN ASSEMBLY /FAP/. THE MINIMUM PROGRAM EMPLOYS A SINGLE INPUT TAPE SYSINI AND A SINGLE OUTPUT TAPE SYSOUT, PLUS THOSE ADDITIONAL TAPES REQUIRED BY THE MINIMUM IBSYS. IF THE ASSEMBLER FEATURE IS USED, UTILITY TAPES UT1, UT2, AND UT3 MUST BE CONNECTED. IF THE WRITE BLOCK OR JOBTAPE FEATURES ARE USED, ONE OR MORE OF TAPES UT4, B7, A8, AND B8 MUST BE CONNECTED. USE UT4 ONLY IF THE TRANSACTIONS TAPE IS NOT TO BE RETAINED. IF SAVES OR READS IS USED, TAPE A8 MUST BE CONNECTED.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL... OPERATING INSTRUCTIONS.  
CARD DECK - BINARY OBJECT PROGRAM DECK.

OPTIONAL PROGRAM MATERIAL -  
ONE MAGNETIC TAPE - ASSEMBLY LISTINGS... FLOWCHARTS... PROGRAM ORGANIZATION MANUAL... MAIN PROGRAM... I/O ROUTINES.

#### 7090-F1-03X PORTFOLIO SELECTION PROGRAM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-F1-03X

THIS PROGRAM IMPLEMENTS A NEW STATISTICAL THEORY OF PORTFOLIO SELECTION DEVELOPED BY H. M. MARKOWITZ WHICH CLOSELY SIMULATES THE LOGIC OF SECURITY DIVERSIFICATION TO MINIMIZE RISK AS EMPLOYED IN NON-SPECULATIVE INVESTMENT PRACTICE. THE PROGRAM IS GENERAL-PURPOSE IN SCOPE AND IS DESIGNED TO PERMIT EXPERIMENTAL TESTING OF THIS THEORY ON A PRACTICAL BASIS.

INPUT IS OF TWO TYPES- PROBABILITY BELIEFS ABOUT RETURN ON SECURITIES AND SPECIFIC RESTRICTIONS IMPOSED ON PORTFOLIOS. ENTERED EXPLICITLY OR IMPLICITLY AS DATA ARE THE EXPECTED RETURN AND PROBABLE RANGE OF VARIATION FOR EACH SECURITY AND THE PRICE CORRELATIONS BETWEEN PAIRS OF SECURITIES. ALSO STATED ARE ANY DESIRED LINEAR EQUALITY OR INEQUALITY CONSTRAINTS ON THE ALLOCATION OF FUNDS AMONG THE SECURITIES WHICH MUST BE SATISFIED FOR LEGAL, POLICY OR OTHER REASONS. THE PORTFOLIO SELECTION PROCEDURE INVOLVES OPTIMIZATION BY THE MATHEMATICAL TECHNIQUE OF PARAMETRIC QUADRATIC PROGRAMMING. OUTPUT FROM THE PROGRAM CONSISTS OF MINIMUM RISK PORTFOLIOS AT SPECIFIED LEVELS OF NET RETURN /AFTER TAXES/. THIS OUTPUT IS SUITED TO THE NEEDS OF PORTFOLIO MANAGERS, PROVIDING QUALITATIVE AND QUANTITATIVE GUIDANCE FOR THE DEVELOPMENT OF APPROPRIATE INVESTMENT STRATEGIES.

THE PROGRAM USES THE CHAINING FEATURE OF THE FORTRAN MONITOR SYSTEM AND REQUIRES AN IBM 7090 OF THE FOLLOWING MINIMUM CONFIGURATION-

1. 32,768 WORDS OF CORE STORAGE
2. TWELVE TAPE UNITS /WHICH INCLUDES THOSE FOR THE FORTRAN MONITOR SYSTEM/
3. ONE ON-LINE CARD READER
4. ONE ON-LINE PRINTER

PERIPHERAL EQUIPMENT CONSISTING OF AN IBM 1401 IS ALSO REQUIRED FOR OFF-LINE CARD-TO-TAPE AND TAPE-TO-PRINTER OPERATIONS.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL.  
ONE MAGNETIC TAPE - ASSEMBLY LISTINGS.  
CARD DECKS - BINARY PROGRAM DECK... SAMPLE PROBLEM DECK.

#### 7090-F0-06Z 32K FORTRAN PROGRAMMING

##### SYSTEM FOR 709/7090

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-F0-06Z

PURPOSE THE IBM FORMULA TRANSLATING SYSTEM, 32K 709/7090 FORTRAN, IS AN AUTOMATIC CODING SYSTEM FOR THE IBM 709/7090 DATA PROCESSING SYSTEM. MORE PRECISELY, IT IS A 709/7090 PROGRAM WHICH ACCEPTS A SOURCE PROGRAM WRITTEN IN THE FORTRAN LANGUAGE, CLOSELY RESEMBLING THE ORDINARY LANGUAGE OF MATHEMATICS, AND WHICH PRODUCES A MACHINE-LANGUAGE OBJECT PROGRAM READY TO BE RUN ON A 709 OR 7090. THE SYSTEM ALSO CONTAINS THE FAP ASSEMBLER AND FORTRAN MONITOR, ENABLING JOBS TO BE COMPILED, ASSEMBLED, AND EXECUTED AUTOMATICALLY.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... OPERATING INSTRUCTIONS.  
ONE MAGNETIC TAPE - SYSTEM TAPE.  
CARD DECK - EDITOR DECK.

OPTIONAL PROGRAM MATERIAL -  
THREE MAGNETIC TAPES - /ONE TAPE/ SYMBOLIC INPUT... /TWO TAPES/ ASSEMBLY LISTINGS.

#### 7090-IO-094 S-PROGRAM

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-IO-094

PURPOSE THE S-PROGRAM CONSISTS OF INTERDEPENDENT SUBROUTINES FOR WRITING I-LANGUAGE STRING OUTPUT. SOME OF THESE SUBROUTINES ADD I-LANGUAGE ELEMENTS TO THE STRING OTHERS ARE SYSTEM SUBROUTINES. I-LANGUAGE ELEMENTS ARE ADDED TO THE STRING WITHOUT REGARD TO THEIR LOGICAL VALIDITY. THE 7090 INPUT/OUTPUT CONTROL SYSTEM /IOCS/ IS USED TO TRANSMIT INFORMATION FROM CORE STORAGE TO TAPE.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... LISTINGS... REFERENCE MANUAL  
CARD DECK - SYMBOLIC CARDS.

#### 7090-PR-130 7090/7094 IBSYS PROCESSOR

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-PR-130

THE FOLLOWING PROGRAMS ARE CONTAINED ON THIS SYSTEM TAPE.  
709/7090 COMMERCIAL TRANSLATOR 7090-CT-921  
7090 FORTRAN II PROCESSOR 7090-FD-928 7090  
INPUT/OUTPUT CONTROL SYSTEM /IOCS/ 7090-OI-919  
7090/7094 9PAC PROCESSOR 7090-PR-924  
7090/7094 IJOB PROCESSOR /729 CAPABILITY/ 7090-PR-929  
7090/7094 GENERALIZED SORTING PROGRAM 7090-SM-922  
7090 IBSFAP 7090-SP-920  
7090 BASIC MONITOR IBSYS 7090-SV-918  
7090/7094/1301 DISK UTILITY PACKAGE 7090-UT-927

COMMERCIAL TRANSLATOR  
7090-CT-921

PURPOSE TO FACILITATE THE REDUCTION OF TIME AND EFFORT REQUIRED TO PROGRAM COMMERCIAL PROBLEMS BY PERMITTING A USER TO COMPILE PROGRAMS WRITTEN IN THE COMMERCIAL TRANSLATOR LANGUAGE, AND TO LOAD AND EXECUTE THESE PROGRAMS. USE COMMERCIAL TRANSLATOR, VERSION 3, IS A SUBSYSTEM OF THE IBSYS PROCESSOR, 7090-PR-130, OPERATING UNDER THE CONTROL OF THE BASIC MONITOR \*IBSYS\*. ALL INPUT AND OUTPUT FUNCTIONS ARE PERFORMED THROUGH THE 7090 IOCS SYSTEM. MACHINE CONFIGURATION 1. 32768 WORDS OF CORE STORAGE. 2. ONE ON-LINE PRINTER. 3. A MINIMUM OF 5 TAPES. 4. ONE ADDITIONAL TAPE, OR A CARD READER FOR INPUT. 5. ONE ADDITIONAL TAPE, OR A PUNCH FOR PUNCH OUTPUT.

FORTRAN II PROCESSOR  
7090-FD-928

PURPOSE--THE FORTRAN II PROCESSOR ACCEPTS SOURCE PROGRAMS WRITTEN IN THE FORTRAN II LANGUAGE WHICH RESEMBLES THE LANGUAGE OF MATHEMATICS, OR IN THE FAP SYMBOLIC LANGUAGE AND COMPILES, LOADS AND EXECUTES THE RESULTING OBJECT PROGRAMS.

USE--THE FORTRAN II PROCESSOR OPERATES UNDER THE BASIC MONITOR \*IBSYS\* AND MAY RESIDE OPTIONALLY ON 729 TAPE OR 1301 DISK STORAGE. THE FORTRAN II PROCESSOR CONTAINS FAP \*FORTRAN ASSEMBLY PROGRAM\* AND THE FORTRAN MONITOR ENABLING COMPILATIONS, FAP ASSEMBLIES, AND BINARY PROGRAMS FROM PREVIOUS COMPILATIONS OR ASSEMBLIES TO BE EXECUTED AS PARTS OF A SINGLE JOB.

MACHINE CONFIGURATION-- THE FORTRAN II PROCESSOR WILL OPERATE ON ANY IBM 7090/7094 OR IBM 709 EQUIPPED WITH DATA CHANNEL TRAP. THE FOLLOWING MINIMUM MACHINE CONFIGURATION IS REQUIRED: \*1\* MINIMUM OF 32K WORDS OF STORAGE... \*2\* ONE ON-LINE PRINTER... \*3\* ONE SYSTEM TAPE OR 1301 DISK STORAGE... \*4\* THREE INTERMEDIATE TAPES \*FOUR ARE REQUIRED FOR CHAIN JOBS\*... \*5\* ONE SYSTEM INPUT TAPE... \*6\* ONE SYSTEM OUTPUT TAPE... \*7\* ONE PUNCH TAPE... \*8\* ADDITIONAL TAPES AS REQUIRED FOR FAP UPDATING.

INPUT/OUTPUT CONTROL SYSTEM /IOCS/  
7090-10-919

THIS ABSTRACT SUPPLEMENTS, NOT REPLACES, THE ABSTRACTS FOR THE 7090 INPUT/OUTPUT CONTROL SYSTEM AND SUPPLEMENT FOR 7090 IOCS WITH 1301 SEQUENTIAL CAPABILITY. THE INPUT/OUTPUT CONTROL SYSTEM IS DESIGNED TO RELIEVE THE PROGRAMMER OF THE NECESSITY OF WRITING INPUT AND OUTPUT ROUTINES BY AUTOMATICALLY HANDLING PREPARATION AND CHECKING OF LABELS, THE BLOCKING AND UNBLOCKING OF DATA RECORDS, AND THE OVERLAPPING OF PROCESSING WITH INPUT AND OUTPUT OPERATIONS. THIS NEW SECTION IS BEING ADDED TO 7090 IOCS IN ORDER TO TAKE FULL ADVANTAGE OF THE RANDOM ACCESS CAPABILITY OF IBM 1301 DISK STORAGE. IT IS A MODULAR PROGRAM, USING IOEX TO MAKE IT COMPATIBLE WITH THE IBSYS BASIC MONITOR UNDER WHICH IT OPERATES. THE RANDOM ACCESS SECTION OF IOCS CAN BE USED SEPARATELY OR IN CONJUNCTION WITH ANY ONE OF THE FOUR CONFIGURATIONS OF SEQUENTIAL ACCESS IOCS. IOCS IS A COMPONENT OF THE IBSYS PROCESSOR OPERATING SYSTEM. THE USE OF IOCS/AND THE RANDOM CAPABILITY/ REQUIRES A 7090 OR 7094 DATA PROCESSING SYSTEM WITH AT LEAST ONE CARD READER /OR TAPE UNIT/, AN ON-LINE PRINTER, AND AN IBSYS SYSTEM LIBRARY UNIT. IF 1301 DISK STORAGE IS USED FOR THE SYSTEM LIBRARY UNIT, AN ACTUAL CARD READER IS REQUIRED.

9 PAC PROCESSOR  
7090-PR-924

THE 9PAC PROCESSOR IS A BUSINESS-ORIENTED PROGRAMMING SYSTEM FOR THE ESTABLISHMENT AND MAINTENANCE OF DATA FILES AND FOR THE PRODUCTION OF REPORTS. 9PAC IS A SUBSYSTEM OF THE IBSYS PROCESSOR, 7090-PR-130 OPERATING UNDER CONTROL OF THE BASIC MONITOR /IBSYS/. THIS VERSION OF 9PAC MAY RESIDE ON EITHER 729 TAPE OR 1301 DISK STORAGE. 9PAC, WHICH INCLUDES THE FILE PROCESSOR AND REPORTS GENERATOR, COMPILES PROGRAMS STATED AS FIXED-FORMAT PARAMETERS AND LOADS AND EXECUTES THESE PROGRAMS. 9PAC VERSION 3 ALSO PROVIDES THE FILE PROCESSOR WITH REPORTS GENERATOR CAPABILITIES, THUS MAKING IT POSSIBLE TO UPDATE A FILE AND PRODUCE REPORTS FROM THE FILE IN A SINGLE MACHINE RUN. THE I-STRONG REPORT OUTPUT FEATURE WILL NOT BE IMPLEMENTED. MACHINE CONFIGURATION-- 7090/7094 9PAC MAY BE USED ON A 709 EQUIPPED WITH THE DATA CHANNEL TRAP FEATURE. THE FOLLOWING MINIMUM CONFIGURATION IS REQUIRED: /1/ 32,768 WORDS OF CORE STORAGE... /2/ ONE ON-LINE PRINTER... /3/ ONE SYSTEM TAPE OR 1301 DISK STORAGE... /4/ ONE TAPE FOR SYSTEM INPUT... /5/ ONE TAPE FOR PUNCHED OUTPUT... /6/ ONE TAPE FOR SYSTEM OUTPUT... /7/ FIVE TAPES FOR WORK TAPES AND 9PAC DATA TAPES.

IBJOB PROCESSOR /729 CAPABILITY/  
7090-PR-929

THE IBJOB PROCESSOR IS THE FIRST STEP TOWARD INTEGRATION OF PRESENT AND FUTURE COMPILERS IN A SINGLE OPERATING SYSTEM THAT WILL PROCESS SEVERAL SOURCE LANGUAGES WITHIN A SINGLE JOB. DEFINED AS THE BASIC UNIT BEING PROCESSED BY THE IBJOB MONITOR AT ANY ONE TIME, A JOB CONSISTS OF ONE OR MORE PROGRAMS WHICH MAY OR MAY NOT BE RELATED, DEPENDING ON WHETHER THEY ARE TO BE EXECUTED TOGETHER ONCE COMPILATIONS AND ASSEMBLIES ARE COMPLETED. THE 7090/7094 IBJOB PROCESSOR CONSISTS OF THE FOLLOWING COMPONENTS WHICH ARE LISTED TOGETHER WITH THEIR SPECIFIC PURPOSE.

7090-SV-801 /THE MONITOR-IBJOB/  
7090-SV-802 /THE LOADER-IBLDR/  
7090-LM-803 /THE LIBRARY-IBLIB/  
7090-SP-804 /MACRO ASSEMBLY-IBMAP/  
7090-FO-805 /FORTRAN IV COMPILER-IBFTC/  
7090-CB-806 /COBOL COMPILER-IBCBC/

7090-SV-801 /THE MONITOR-IBJOB/

THE MONITOR /IBJOB/, CONSISTING OF JOB CONTROL AND PROCESS CONTROL, IS DOMINANT WITHIN THE PROCESSOR. AS THE SUPERVISORY PORTION, IT OPERATES UNDER AND PROVIDES COMMUNICATION WITH IBSYS, POSITIONS THE SYSTEM TAPE, AND REGULATES THE INPUT/OUTPUT PHASING OF VARIOUS PARTS OF THE COMPILERS, ASSEMBLER, AND LOADER. IT OPERATES WITH BASIC IOCS.

7090-SV-802 /THE LOADER-IBLDR/

THE LOADER /IBLDR/ CREATES AN EXECUTABLE MACHINE LANGUAGE PROGRAM FROM RELOCATABLE BINARY DECKS PRODUCED BY THE IBMAP ASSEMBLY PROGRAM. AS PART OF THE LOADING PROCEDURE, SEPARATELY ASSEMBLED PROGRAM SEGMENTS ARE LOADED, THE LIBRARY /IBLIB/ IS SEARCHED FOR ANY ADDITIONAL PROGRAM SEGMENTS REQUIRED, DIRECT CROSS-REFERENCING BETWEEN THEM IS ACCOMPLISHED, STORAGE IS ALLOCATED FOR COMMON DATA AND I/O BUFFERS, AND THE SPECIFIED MODULE OF IOCS IS INITIALIZED FOR PROGRAM USE DURING EXECUTION. UNDER DIRECTION OF LOADER CONTROL CARDS, A STORAGE MAP MAY BE PRODUCED, SYMBOLIC TAPE ASSIGNMENT AND THE FACILITY FOR LOAD TIME DESCRIPTION OF INPUT/OUTPUT FILE CHARACTERISTICS ARE PROVIDED.

7090-LM-803 /THE LIBRARY-IBLIB/

THE LIBRARY /IBLIB/ CONSISTS OF SUBROUTINES WHICH EVALUATE MATHEMATICAL FUNCTIONS-- PERFORM ALL INPUT, OUTPUT AND CONVERSION OF DATA AS REQUIRED BY OBJECT PROGRAMS-- ESTABLISH CORRESPONDENCE BETWEEN SOURCE PROGRAM INPUT/OUTPUT UNIT DESIGNATIONS AND SYSTEM FILES-- MONITOR EXECUTION ERRORS-- AND, INITIATE OBJECT PROGRAM DUMP REQUESTS.

7090-SP-804 /MACRO ASSEMBLY-IBMAP/

THE MACRO ASSEMBLY PROGRAM /IBMAP/ PROCESSES ALL 7090/7094 MACHINE LANGUAGE AND EXTENDED MNEMONICS, AS WELL AS MACRO INSTRUCTIONS AND A LARGE NUMBER OF PSEUDO-OPERATIONS. 7094 INSTRUCTIONS FOR THE 7090.

7090-FO-805 /FORTRAN IV COMPILER-IBFTC/

THE FORTRAN IV COMPILER /IBFTC/, AS A COMPONENT OF THE IBJOB PROCESSOR, TRANSLATES A FORTRAN IV SOURCE PROGRAM INTO MAP LANGUAGE. THE FORTRAN IV LANGUAGE INCLUDES-- DOUBLE-PRECISION AND COMPLEX ARITHMETIC-- LOGICAL VARIABLES, FUNCTIONS, AND EXPRESSIONS-- STANDARDIZED FUNCTION NOTATION-- BLOCKED COMMON-- ADJUSTABLE ARRAY DIMENSIONS-- GENERALIZED READ AND WRITE STATEMENTS-- AND THE DATA STATEMENT. THE OBJECT PROGRAMS PRODUCED SUPPORT BOTH THE 7090 AND 7094. THEY USE FULL-WORD INTEGER ARITHMETIC. ON OPTION, THEY WILL ALSO USE 7094 DOUBLE-PRECISION AND INDEXING INSTRUCTIONS WHERE APPLICABLE AS WELL AS 3, 4, 5, 6, OR 7 INDEX REGISTERS.

7090-CB-806 /COBOL COMPILER-IBCBC/

THE 7090/7094 COBOL COMPILER /IBCBC/ TRANSLATES A COBOL SOURCE PROGRAM INTO MAP LANGUAGE. THE COBOL LANGUAGE WAS DEVELOPED FOR BUSINESS APPLICATIONS BY A COMMITTEE OF THE CONFERENCE ON DATA SYSTEMS LANGUAGE /CCDSAL/ AS A COOPERATIVE EFFORT OF COMPUTER USERS IN INDUSTRY, THE DEPARTMENT OF DEFENSE AND OTHER FEDERAL GOVERNMENT AGENCIES, AND COMPUTER MANUFACTURERS.

THE IBJOB PROCESSOR OPERATES UNDER THE BASIC MONITOR /IBSYS/, 729/1301 SEQUENTIAL VERSION, NO. 7090-PR-130.

THE MINIMUM MACHINE CONFIGURATION NECESSARY FOR OPERATION OF THIS SYSTEM IS-- AN IBM 7090 OR 7094 WITH 32,768 WORDS OF CORE STORAGE, ONE IBM 716 PRINTER, ONE IBM 711 CARD READER, AND EIGHT IBM 729 /II, IV, V, VI/ TAPE UNITS ATTACHED. IF AN IBM 1401, WITH ITS ATTACHED READER/PUNCH AND PRINTER, IS AVAILABLE FOR THE PROCESSING OF SYSTEM OUTPUT AND A SINGLE TAPE IS ASSIGNED IN IBSYS TO BOTH SYS001 AND SYS001 /LIST AND PUNCH FUNCTIONS/, THEN ONLY SEVEN IBM 729 TAPE UNITS ARE REQUIRED.

GENERALIZED SORTING PROGRAMS  
7090-SR-922

THE PROGRAM WILL SORT AND/OR MERGE SIGNED OR UNSIGNED BINARY OR BCD FILES IN LOGICAL OR ALGEBRAIC SEQUENCE. VERSION 5 INCLUDES PROVISIONS TO SORT VARIABLE-LENGTH RECORDS. THE 7090/7094 SORT IS RUN UNDER THE CONTROL OF THE IBSYS OPERATING SYSTEM. INFORMATION IS SUPPLIED TO THE SORT PROGRAM BY CONTROL CARD STATEMENTS. THE FORMATS FOR THESE STATEMENTS, DETAILS OF THEIR PREPARATION, AND INSTRUCTIONS FOR OPERATING THE SORT SYSTEM ARE EXPLAINED IN THE REFERENCE MANUAL, IBM 7090/7094 GENERALIZED SORTING SYSTEM 7090/7094 SORT, FORM C28-6307. THE SORT PROGRAM OPERATES ON AN IBM 7090/7094 WITH A MINIMUM OF 32,768 WORDS OF CORE STORAGE. IF THE SYSTEM IS TO BE LOADED FROM TAPE, THE PROGRAM REQUIRES A MINIMUM OF TWO 7607 DATA CHANNELS AND FIVE MAGNETIC TAPE UNITS, TWO OF WHICH MUST BE ON THE SAME CHANNEL. IF THE SYSTEM IS TO BE LOADED FROM DISK, THE PROGRAM REQUIRES A MINIMUM OF TWO 7607 DATA CHANNELS AND FOUR MAGNETIC TAPE UNITS, TWO ATTACHED TO EACH CHANNEL, AND ONE 1301 DISK STORAGE. ADDITIONAL TAPE UNITS CAN BE UTILIZED TO PROVIDE UP TO A 10-WAY MERGE. AN ON-LINE PRINTER IS NECESSARY, WHEREAS AN ON-LINE CARD READER IS OPTIONAL.

IBSFAP  
7090-SP-920

PURPOSE TO FACILITATE AN ASSEMBLY, INCLUDING MACRO-OPERATION COMPILATION, AND SYMBOLIC TAPE MAINTENANCE UNDER THE BASIC MONITOR \*IBSYS\*. IBSFAP CAN BE CALLED WITH THE BASIC MONITOR CONTROL CARD \*\$EXECUTE IBSFAP\*. THIS BEING DONE, IBSFAP WILL RECOGNIZE ALL CARDS WHICH ARE IN THE FORMAT OF FAP CARDS. THE EXCEPTION TO THIS RULE IS THAT ALL IBSFAP CONTROL CARDS MUST HAVE AN ASTERISK /\*/ IN COLUMN SEVEN \*7\*. A SPECIAL FEATURE OF IBSFAP IS THE PSEUDO-OPERATION, SST+SAVE SYMBOL TABLE, WHICH PROVIDES THE SYMBOLIC DEFINITION ENTRIES MOST COMMONLY NEEDED BY IBSYS AND IOEX. IBSFAP IS USED UNDER THE BASIC MONITOR OPERATING SYSTEM. FOR AN EXAMPLE, REFERENCE SHOULD BE MADE TO THE FAP SUPPLEMENT #J28-6186. MACHINE CONFIGURATION DATA CHANNEL TRAP FEATURE. IF THE 709 IS TO BE USED, THE REQUEST FOR THE SYSTEM MUST STATE IT IS GOING TO BE USED ON THE 709 AND THE APPROPRIATE SYSTEM WILL BE SENT. THE FOLLOWING MINIMUM CONFIGURATION IS REQUIRED: 1. 32,768 WORDS OF CORE STORAGE. 2. ONE ON-LINE PRINTER. 3. ONE SYSTEM TAPE. 4. ONE TAPE OR A CARD READER FOR INPUT. 5. ONE TAPE OR A CARD PUNCH FOR PUNCHED OUTPUT. 6. ONE TAPE FOR PRINTED OUTPUT. 7. TWO TAPES FOR WORK TAPES. IBSFAP WORKS UNDER IBSYS AND THIS WILL OBTAIN ITS TAPE UNITS FROM IBSYS.

BASIC MONITOR IBSYS  
7090-SV-918

PURPOSE TO FACILITATE THE REDUCTION OF TIME AND EFFORT REQUIRED TO PERFORM THE INTER-SYSTEM COMMUNICATION THUS ALLOWING CONTINUOUS PROCESSING WITH A MINIMUM OF OPERATOR INTERVENTION. THE BASIC MONITOR CAN BE EQUIPPED WITH JUST THOSE PROGRAMMING SYSTEMS DESIRED AT A PARTICULAR INSTALLATION. THE BASIC MONITOR CAN COORDINATE UNIT ASSIGNMENTS AND COMMUNICATE INTERMEDIATE INFORMATION BETWEEN THE DESIRED SYSTEM FACILITATING CONTINUOUS OPERATION AND REDUCING SET-UP TIME. THIS WILL EFFECT A SUBSTANTIAL TIME SAVING IN COMPUTER OPERATION, AND WILL ALLOW GREATER FLEXIBILITY IN PROGRAMMING. USE OF PROGRAM BASIC MONITOR, IBSYS, PROVIDES 1. AN EDITOR ROUTINE TO MODIFY, ADD, AND/OR DELETE PROGRAMMING SYSTEMS TO SATISFY THE REQUIREMENTS OF ANY USERS. 2. MACHINE INSTALLATION

ASSEMBLY PARAMETERS NEED ONLY BE SPECIFIED FOR THE BASIC MONITOR. THIS INFORMATION WILL BE TRANSMITTED TO EACH SYSTEM AS REQUIRED. 3. A DUMP ROUTINE TO RECORD CORE WHEN THE TERMINATION OF A SYSTEM OPERATION BECOMES NECESSARY BECAUSE OF AN ERROR WHICH MAKES RECOVERY IMPOSSIBLE. IBSYS MAKES IT POSSIBLE TO HAVE SYSTEM MAINTENANCE, ASSEMBLIES, AND SELECTION OF CURRENT SYSTEMS EACH PASSING INFORMATION AS NEEDED TO THE NEXT SYSTEM TO BE EXECUTED. IBSYS CONTROL CARDS ARE USED TO OBTAIN THE DESIRED RESULTS WITH THE MINIMUM OF COMPUTER TIME. MACHINE CONFIGURATION THE 7090 BASIC MONITOR MAY BE USED ON A 7090, OR ON A 709 EQUIPPED WITH THE DATA CHANNEL TRAP. IF THE 709 IS USED, THE REQUEST FOR THE SYSTEM MUST STATE IT IS GOING TO BE USED ON THE 709 AND THE APPROPRIATE SYSTEM WILL BE SENT. THE FOLLOWING MINIMUM CONFIGURATION IS REQUIRED 1. 32,768 WORDS OF CORE STORAGE. 2. ONE ON-LINE PRINTER. 3. ONE SYSTEM TAPE. 4. ONE TAPE OR A CARD READER FOR INPUT. 5. ONE TAPE OR A PUNCH FOR PUNCHED OUTPUT. 6. ANY OTHER REQUIREMENTS ARE DETERMINED BY THE SYSTEM WHICH IS BEING MONITORED BY BASIC MONITOR.

7090/7094/1301 DISK UTILITY PACKAGE  
7090-UT-927

PURPOSE-THE 7090/7094/1301 DISK UTILITY PACKAGE CONSISTS OF THE 1301 DISK UTILITY MONITOR AND SIX ROUTINES TO PERFORM CERTAIN COMMON OPERATIONS RELATED TO THE STORAGE, RETRIEVAL, AND PRESERVATION OF DATA IN IBM 1301 DISK STORAGE. THE SIX ROUTINES PROVIDED ARE FORMAT TRACK GENERATION, HOME ADDRESS AND RECORD ADDRESS GENERATION, LOAD DISK, DUMP DISK, RESTORE DISK, CLEAR DISK, USE-THE 1301 DISK UTILITY MONITOR, OPERATING UNDER THE BASIC MONITOR #IBSYS#, MAINTAINS CONTROL OF AND LOADS THE UTILITY ROUTINES. IT PROCESSES THE CONTROL CARDS WHICH DIRECT THE PROCESSING OF DIFFERENT JOBS. THE DISK UTILITY MONITOR ALSO CONTAINS VARIOUS COMMON SUBROUTINES. THE FORMAT TRACK GENERATION ROUTINE WILL GENERATE FROM SPECIFICATIONS PROVIDED IN CONTROL CARDS, CHARACTERS FOR A FORMAT TRACK AND WILL WRITE THEM ON ONE OR MORE FORMAT TRACKS. THE HOME ADDRESS AND RECORD ADDRESS GENERATION ROUTINE WILL GENERATE FROM SPECIFICATIONS PROVIDED IN CONTROL CARDS, HOME ADDRESS IDENTIFIERS AND RECORD ADDRESSES AND WILL WRITE THEM ON ONE OR MORE TRACKS. THE LOAD DISK ROUTINE WILL LOAD THE DATA CONTAINED IN TAPE RECORDS INTO AN AREA OF DISK STORAGE DESIGNATED BY CONTROL CARDS. ONE OR MORE TRACKS MAY BE LOADED. THE DUMP DISK ROUTINE WILL WRITE ALL OF THE DATA ON ONE OR MORE TRACKS DESIGNATED BY CONTROL CARDS ONTO MAGNETIC TAPE. THE RESTORE DISK ROUTINE WILL RETURN DATA WRITTEN ON MAGNETIC TAPE BY THE DUMP DISK ROUTINE TO THE DISK STORAGE LOCATION FROM WHICH IT WAS UNLOADED. THE CLEAR DISK ROUTINE WILL FILL DATA RECORD AREAS ON ONE OR MORE TRACKS SPECIFIED BY CONTROL CARDS WITH A CHARACTER SPECIFIED BY THE USER.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP...REFERENCE MANUAL...  
OPERATING INSTRUCTIONS...SAMPLE PROBLEM...FLOWCHARTS.  
ONE MAGNETIC TAPE - IBSYS SYSTEM TAPE.  
CARD DECKS - THREE EDITOR DECKS...FIVE SAMPLE PROBLEM DECKS  
...ONE IJOB ASSEMBLY DECK.

OPTIONAL PROGRAM MATERIAL -  
FOURTEEN MAGNETIC TAPES - SYMBOLIC INPUT /FIVE TAPES/...  
ASSEMBLY LISTINGS - /NINE TAPES/  
CARD DECKS - TWO OBJECT DECKS...TWO SYMBOLIC DECKS /THESE  
FOUR DECKS ARE FOR THE 1401-UT-158 PROGRAM.  
DOCUMENTATION - PRELIMINARY SYSTEM GUIDE MATERIAL INCLUDING  
FLOWCHARTS.

7090-SI-124 7090/7094 SUPPORT PACKAGE  
FOR THE 7040/7044

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-SI-124

THE PURPOSE OF THE SUPPORT PACKAGE IS TO PROVIDE AN ASSEMBLER AND SIMULATOR TO PERMIT ADVANCE TESTING OF 7040/7044 APPLICATIONS ON THE 7090/7094. THE SUPPORT PACKAGE CONSISTS OF TWO SECTIONS, THE ASSEMBLER AND THE SIMULATOR. THE ASSEMBLER IS A MODIFICATION OF THE 7090 MACROFAP AND OPERATES UNDER THE 7090/7090 FORTRAN MONITOR SYSTEM. THE SIMULATOR IS A PART OF THE LIBRARY AND IS OBTAINED BY THE PSEUDO OPERATION CALL S40. THE SIMULATOR REQUIRES 1600 STORAGE LOCATIONS AND IS RELOCATABLE. LOADING IS AUTOMATIC UNDER MONITOR CONTROL, WITH CONTROL CARDS AS SPECIFIED IN THE MONITOR BULLETINS.

THE MINIMUM MACHINE CONFIGURATION REQUIRED FOR THIS SYSTEM IS 7090/7090 WITH 32,768 STORAGE LOCATIONS, 8 TAPE UNITS, 1 ON-LINE CARD READER, 1 ON-LINE PRINTER.

REQUESTOR MUST SUBMIT TAPES AS FOLLOWS - FOR BASIC PROGRAM MATERIAL 1 TAPE. OPTIONAL MATERIAL - 1 TAPE.

7090-SI-946 SIMULATION OF THE IBM 7750  
PROGRAMMED TRANSMISSION CONTROL ON THE 7090/7094

ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-SI-946

THE PROGRAM SIMULATES THE IBM 7750, ITS HOST COMPUTER AND ITS COMMUNICATION NETWORK, USING THE IBM 7090. IT IS USEFUL FOR TESTING 7750 PROGRAMS PRIOR TO THEIR USE ON AN IBM TELEPROCESSING SYSTEM, BUT IT IS NOT A SUBSTITUTE FOR A 7750. THE SIMULATED 7750 HAS 12+288 WORDS OF PROCESS STORAGE, 128 WORDS OF CONTROL STORAGE AND A MAXIMUM NETWORK OF FOUR MCAs WITH ESSENTIALLY IDENTICAL SPECIFICATIONS FOR ALL TERMINALS ON A GIVEN MCA. FULL DUPLEX OPERATION IS NOT PROVIDED. THE PROGRAM IS USED WITH THE FORTRAN II MONITOR, WHICH IS UNDER IBSYS.

THE SIMULATION PROGRAM REQUIRES AN IBM 7090/7094 DATA PROCESSING SYSTEM HAVING FOUR TAPE UNITS, USED AS FOLLOWS-

- /1/ SYSTEM /SYSLBL/
  - /2/ INPUT /SYSIN1/
  - /3/ OUTPUT /SYSOUT1/
  - /4/ DUMP /SYSCK1/, RESTART /SYSCK2/
- BASIC PROGRAM MATERIAL-
1. PROGRAM DECK
  2. LISTING TAPE
  3. FLOW CHARTS
  4. SAMPLE PROBLEM

5. REFERENCE MANUAL  
OPTIONAL PROGRAM MATERIAL -  
1. SOURCE LANGUAGE TAPE

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED. OPTIONAL MATERIAL REQUESTED MUST BE ITEMIZED ON THE ORDER CARD.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL... FLOWCHARTS  
... SAMPLE PROBLEM.  
ONE MAGNETIC TAPE - LISTING TAPE.  
CARD DECK - BINARY DECK.

OPTIONAL PROGRAM MATERIAL -  
ONE MAGNETIC TAPE - SYMBOLIC CARDS ON TAPE.

7090-UT-145 7090/7094 HYPERTAPE UTILITY  
PROGRAMS /INDEPENDENT VERSION/  
ORDER THROUGH LOCAL IBM BRANCH OFFICE  
SPECIFY FILE NUMBER 7090-UT-145

THE IBM 7090/7094 HYPERTAPE UTILITY PROGRAMS CONSIST OF TWO ROUTINES ONE OF WHICH PERFORMS THE DUTIES OF A GENERALIZED LOADER AND THE OTHER IS A CORE STORAGE, 729 TAPE OR HYPERTAPE DUMP PROGRAM. THE TWO ROUTINES ARE-

1. 7090/7094 HYPERTAPE LOAD PROGRAM.
2. 7090/7094 CORE AND TAPE DUMP.

USE-

7090/7094 HYPERTAPE LOAD PROGRAM-

THIS PROGRAM LOADS BINARY CARD IMAGES FROM A 7340 HYPERTAPE UNIT. THE BINARY CARDS MUST BE PUNCHED IN THE IBM FORTRAN II FORMAT. ALL PROGRAM DECKS PRODUCED BY FORTRAN MAY BE LOADED.

7090/7094 CORE AND TAPE DUMP PROGRAM-

THIS PROGRAM IS USED TO PRODUCE A LISTING OF THE CONTENTS OF MEMORY IN ANY OF SIX POSSIBLE FORMATS, A LISTING OF THE CONTENTS OF A 729 MAGNETIC TAPE UNIT OR A 7340 HYPERTAPE UNIT WRITTEN IN BINARY OR BCD. THE OUTPUT IS WRITTEN ON A 729 TAPE UNIT OR A 716 ON-LINE PRINTER OR ON BOTH. THE PROGRAM HAS PROVISIONS FOR DUMPING SELECTED PORTIONS OF CORE STORAGE OR TAPE AND THEN RESTORING CORE STORAGE TO ITS STATUS BEFORE DUMPING. 7090/7094 IOCS LABELS ARE RECOGNIZED AND HANDLED BY THE PROGRAM.

MACHINE REQUIREMENTS-

THE HYPERTAPE LOAD PROGRAM REQUIRES AN IBM 7090/7094 DATA PROCESSING SYSTEM WITH ONE 7340 HYPERTAPE DRIVE FOR INPUT, A 7909 DATA CHANNEL AND A 7640 CONTROL UNIT. IT ALSO REQUIRES A 711 CARD READER OR A 729 MAGNETIC TAPE UNIT. THE CORE AND TAPE DUMP PROGRAM REQUIRES AN IBM 7090/7094 DATA PROCESSING SYSTEM EQUIPPED WITH THE FOLLOWING-

1. ONE 716 ON-LINE PRINTER FOR ERROR MESSAGES.
2. A 711 CARD READER.
3. IF THE PROGRAM IS NOT LOADED FROM THE CARD READER A 7340 HYPERTAPE OR 729 MAGNETIC TAPE UNIT IS NEEDED.
4. A 729 MAGNETIC TAPE UNIT AND/OR AN ON-LINE PRINTER FOR OUTPUT.
5. AN ADDITIONAL TAPE UNIT /7340 HYPERTAPE OR 729 MAGNETIC TAPE/ FOR A WORK TAPE.
6. AN ADDITIONAL TAPE UNIT /7340 HYPERTAPE OR 729 MAGNETIC TAPE/ FOR INPUT IF A TAPE DUMP IS DESIRED.
7. IF HYPERTAPE IS USED A 7909 DATA CHANNEL AND A 7640 CONTROL UNIT ARE REQUIRED.

THE NUMBER OF TAPES INDICATED MUST BE PROVIDED FOR EACH ITEM THAT IS ORDERED.

BASIC PROGRAM MATERIAL -  
DOCUMENTATION - PROGRAM WRITE-UP... REFERENCE MANUAL... FLOW  
CHARTS... SAMPLE PROBLEM.  
ONE MAGNETIC TAPE - SYMBOLIC PROGRAM DECKS.  
CARD DECK - BINARY OBJECT PROGRAM DECKS.

# Abstracts of Available Type III and Type IV Programs and Nuclear Codes 0704-0709-7040/7044-7090 and 7094 Section B

## 0704

0704-0058UAINV1 MATRIX INVERSION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0058UAINV1

AUTHOR...KARL J. BERG

DIRECT INQUIRIES TO..  
MR. WALTER A. RAMSHAW  
COMPUTATION LABORATORY  
RESEARCH DEPARTMENT  
UNITED AIRCRAFT CORPORATION  
400 MAIN STREET  
EAST HARTFORD 8, CONNECTICUT

INVERTS A MATRIX STORED IN CORE STORAGE. USES AN  
ELIMINATION METHOD. THE STARRING ELEMENT IS THE LARGEST IN  
THE COLUMN, BUT THE COLUMNS ARE USED IN ORDER FROM LEFT TO  
RIGHT. THE ORIGINAL MATRIX IS DESTROYED, AND IS REPLACED  
IN STORAGE BY THE INVERSE. THE ROUTINE REQUIRES 171 CELLS  
PLUS 2N&8 COMMON. A 61 BY 61 MATRIX CAN BE INVERTED IN A  
4096 WORD MACHINE IN ABOUT 100 SECONDS.

0704-0069LAS820 FLOATING NATURAL LOGARITHM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0069LAS820

AUTHOR...I.J. CHERRY

DIRECT INQUIRIES TO..  
THOMAS L. JORDAN  
T-1  
LOS ALAMOS SCIENTIFIC LABORATORY  
LOS ALAMOS, NEW MEXICO

COMPUTES FLOATING NATURAL LOG OF FLOATING X FOR X GREATER  
THAN ZERO. TSX SEQUENCE WITH ERROR RETURN FOR AN X OF ZERO  
OR LESS. ACCURATE TO 8 OR -3 IN EIGHTH SIGNIFICANT DECIMAL  
DIGIT. MAXIMUM TIME ABOUT 2.22 MILLISECOND. USES 39  
STORAGE CELLS 63 COMMON./CORR-- 171

0704-0073UADBC1 DECIMAL, OCTAL, BCD LOADER  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0073UADBC1

AUTHOR...W.P. MELCHER

DIRECT INQUIRIES TO..  
MR. WALTER A. RAMSHAW  
COMPUTATION LABORATORY  
RESEARCH DEPARTMENT  
UNITED AIRCRAFT CORPORATION



CONTINUED FROM PRIOR PAGE--  
400 MAIN STREET  
EAST HARTFORD 8, CONNECTICUT

USED WITH UA TSM OR UA CSH 2. CONTROLS TAPE PROGRAM UA TSM 2 OR TAPE OR CARD PROGRAM UA CSH 2 TO READ BCD INFORMATION INTO CORE. CONVERTS THIS INFORMATION TO BINARY, - FIXED OR FLOATING DECIMAL NUMBERS BEING CONVERTED TO FIXED OR FLOATING BINARY NUMBERS, AND DECIMAL OR OCTAL INTEGERS BEING CONVERTED TO BINARY INTEGERS. ALSO READS AND STORES HOLLERITH LABELS, COMMENTS, ETC. INPUT CARD FORMAT IS VARIABLE. LOADING MAY BE CONTROLLED BY TRANSFER CARDS. ROUTINE REQUIRES 372 CELLS PLUS 24 COMMON. CORR.--089

0704-0108RSLP51 LINEAR PROGRAMING SYSTEM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0108RSLP51

AUTHORS..WM. ORCHARD-HAYS HAL JUDD LEOLA CUTLER

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

USES MODIFIED SIMPLEX METHOD WITH PRODUCT FORM OF INVERSE, WILL SOLVE PROBLEMS HAVING 255 EQUATIONS AND ANY NUMBER OF VARIABLES. CODE IS COMPLETE WITH SIDE ROUTINES TO AID COMPLICATED BACKUPS. SPECIAL FEATURES INCLUDE PARAMETRIC LINEAR PROG, MULTIPLE OPTIMISING FORMS, & SUNDRY PARTITIONING AND RESTART DEVICES. I/O IS FIXED PT, CALC IS DBL PREC FL PT. STANDARD SHARE BOARDS ARE USED. ID ON BINARY CARDS IS INDICATIVE OF FUNCTION AND IS NOT RSPLS. CORR./ 161,254,306,328,348,380,666.

0704-0110GLDEV1 DETERMINANT EVALUATION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0110GLDEV1

AUTHOR...CAROLINE EDWARDS

DIRECT INQUIRIES TO..

MR. E. K. RITTER  
DEPT. 72-22, MAIL ZONE 174  
LOCKHEED AIRCRAFT CORP.  
86 SOUTH COBB DRIVE  
MARIETTA, GEORGIA

EVALUATES BY GAUSS ELIMINATION METHOD THE DETERMINANT OF A REAL OR COMPLEX MATRIX OF ORDER N IN SINGLE OR DOUBLE PRECISION. DESIGNED FOR USE WITH GL DPAL. NORMAL ISX SEQUENCE. USES 191 STORAGES.

0704-0116CLLSQ3 LEAST SQUARES SOL. OF  
SIMULTANEOUS EQUATIONS  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0116CLLSQ3

AUTHOR...R. HARRISON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

SOLVE M SIMULTANEOUS EQUATIONS IN N UNKNOWNNS SO SOLUTION IS BEST POSSIBLE FIT TO ALL POINTS BY METHOD OF LEAST SQUARES. POINTS IN FLOATING POINT. REQUIRES 268 STORAGES PLUS VARIABLE COMMON. CORR./479

0704-0116CLREL RELATIVIZE SYMBOLIC DECK  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0116CLREL

AUTHOR...R. HARRISON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

CONSISTS OF TWO DECKS DESIGNATED BY REL1 AND REL2. REPRODUCE SYMBOLIC DECK WITH LOCATION SYMBGLS RELATIVE TO FIRST. OUTPUT IS TO TAPE FOR OFF-LINE PUNCHING ONLY. USAGE SIMILAR TO SAP IN MANY RESPECTS. USES CORE AND TAPES 1 AND 6, AND TAPE 4 IF INPUT FROM TAPE. REVISED DIST. 236

0704-0116CLSM1 SIMULTANEOUS REAL EQUATIONS,  
DETERMINANT  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0116CLSM1

AUTHOR...RCGER JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

CONTINUED FROM PRIOR COLUMN--

K VECTOR SOLUTIONS AND DETERMINANT OF N SIMULTANEOUS EQUATIONS. REQUIRES 429 STORAGES PLUS 1. CORR.-- 222,479

0704-0116CLSM2 SIMULTANEOUS EQUATIONS  
COMPLEX

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0116CLSM2

AUTHOR...RCGER JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

K VECTOR SOLUTIONS OF N SIMULTANEOUS EQUATIONS. REQUIRES 304 STORAGES PLUS 21 COMMON.

0704-0121GMHAS1 HARMONIC ANALYSIS SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0121GMHAS1

AUTHOR...C.S. GERRISH JR.

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MCUND ROADS  
WARREN, MICHIGAN

GIVEN A TABLE OF Y IN AN INTERVAL, WHERE Y EQUALS F OF X, WHICH CORRESPOND TO A SET OF EQUALLY SPACED VALUES OF X, HAS1 COMPUTES THE COEFFICIENTS OF A TRIGONOMETRIC SERIES. IN PARTICULAR, THE AMPLITUDE AND PHASE ANGLE OF EACH HARMONIC IS COMPUTED. REQUIRES 33C PRGGRAM CELLS AND ANSWERS AND COMMON. CORR./ 186, 453

0704-0139CLRAN1 RANDOM NUMBER GENERATOR  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0139CLRAN1

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

CALCULATES A RANDOM NUMBER. REQUIRES 28 STORAGES. CORR/ 187

0704-0223CLDET3 DETERMINANT AND EIGENVECTOR,  
REAL

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0223CLDET3

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

CALCULATES THE DETERMINANT AND NORMALIZED EIGENVECTOR OF A REAL MATRIX. REQUIRES 157 STORAGES PLUS 13 COMMON CORR/ 410

0704-0223CLMIV2 INVERSE, REAL  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0223CLMIV2

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

TO INVERT A REAL N TH ORDER SQUARE MATRIX. DETERMINANT NOT COMPUTED REQUIRES 270 STORAGES PLUS COMMON THROUGH COMMON 6/136N/.

0704-0253MUEAS2 MURA EFFECTIVE ADDRESS  
SEARCH ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0253MUEAS2

AUTHOR...J.N. SNYDER

DIRECT INQUIRIES TO..

MR. MELVIN R. STORM  
MIDWESTERN UNIV. RESEARCH ASSOC.  
2203 UNIVERSITY AVENUE  
MADISON 5, WISCONSIN  
ATTN-MR. HENRY L. CARLSON

CONTINUED FROM PRIOR PAGE--

SELF LOADING. SEARCHES MEMORY FOR ANY EFFECTIVE ADDRESS /I.E. ACCOUNT TAKEN OF INDEXING/ SET UP ON PANEL SWITCHES. ACCOUNT IS TAKEN OF MULTIPLE INDICES. LOCATIONS AND WORDS FOUND ARE PRINTED. OCCUPIES FIRST 110 WORDS OF MEMORY TIMING, ABOUT 4 SECONDS PER ADDRESS SEARCHED PLUS ONE LINE OF PRINT FOR EACH REFERENCE THERETO FOUND. CORR/800, MU EAS3

**0704-0261GMIOS1 INPUT-OUTPUT SYSTEM**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0261GMIOS1

AUTHOR...MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

DIRECT INQUIRIES TO AUTHOR

AN EXECUTIVE ROUTINE WHICH CONTROLS MULTIJOB NON-STOP OFF LINE OPERATION OF THE 704. OPERATES IN THREE PHASES /1/ CONVERTS ALL JOBS FROM BCD TO BINARY. /2/ SUPERVISES SEQUENCING OF JOBS DURING PROGRAM EXECUTION AND /3/ CONVERTS BINARY OUTPUT TO BCD FOR ALL JOBS. ALSO PROVIDES SAP ASSEMBLIES WITH OPTIONAL IMMEDIATE EXECUTION, TWO TYPES OF DEBUGGING ROUTINES AND JOB ACCTG. REQUIRES 6 TAPES, 1 CORE, DRUM 1 AND A PROGRAMMABLE CLOCK /OPTIONAL/.

**0704-0273CLMMD1 MATRIX ELEMENT BY ELEMENT MULTIPLY OR DIVIDE, REAL**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0273CLMMD1

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

OPERATES ON TWO MATRICES BOTH OF WHICH ARE REAL AND ENTIRELY IN CORE, TO FORM A RESULTING MATRIX REAL AND ENTIRELY IN CORE BY AN ELEMENT BY ELEMENT MULTIPLICATION OR DIVISION. REQUIRES 81 WORDS PLUS COMMON THROUGH COMMON & 8 CORR. 343

**0704-0273CLMMP2 POSTMULTIPLY REAL BY SYMMETRIC REAL MATRIX**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0273CLMMP2

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

TO POSTMULTIPLY A REAL MATRIX, WHICH IS IN CORE, BY A SYMMETRIC REAL MATRIX WHICH IS IN CORE, IN AN ELEMENTAL MANNER. THE PRODUCT WILL BE IN CORE. USES MATRIX INTERPRETATION ROUTINE, CL MTX1. REQUIRES 306 WORDS PLUS COMMON THROUGH COMMON AND 16. CORR. 343.

**0704-0273CLSM6 NON-LINEAR SIMULTANEOUS EQUATIONS, REAL**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0273CLSM6

AUTHOR...R. JOHNSON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

TO CALCULATE A VECTOR SOLUTION OF N SIMULTANEOUS QUADRATIC EQUATIONS IN THE NEIGHBORHOOD OF A VECTOR GUESS. THE ROUTINE ASSUMES THE SOLUTIONS HAVE CONVERGED WHEN THE SUMS OF THE ITERATES OF TWO SUCCESSIVE ITERATIONS AGREE TO FOUR DECIMAL FIGURES. REQUIRES 364 WORDS PLUS COMMON THROUGH COMMON & 14 CORR. 343

**0704-0280MURKY1 MURA FIXED POINT RUNGE-KUTTA**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0280MURKY1

AUTHOR...L.D. FOSDICK

DIRECT INQUIRIES TO..

MR. MELVIN R. STORM  
MIDWESTERN UNIV. RESEARCH ASSOC.  
2203 UNIVERSITY AVENUE  
MADISON 5, WISCONSIN  
ATTN- MR. HENRY L. CARLSON

CONTINUED FROM PRIOR COLUMN--

SOLVES A SET OF N SIMULTANEOUS FIRST ORDER DIFFERENTIAL EQUATIONS. 52 WORDS OF PROGRAM PLUS 3 COMMON PLUS 3N WORDS OF STORAGE. TIMING 4.22N & 0.59 MS. PLUS AUXILIARY TIME PER RUNGE-KUTTA STEP. SEE S.D. 02 MU RKY4 891

**0704-0284WHH20 ARBITRARY CURVE PLOTTER SUBROUTINE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0284WHH20

AUTHOR...FRANK ENGEL JR.

DIRECT INQUIRIES TO..

DR. P.A. ZAPHYR MGR  
DIGITAL ANALYSIS & COMPUTATIONS  
ADVANCED SYSTEMS ENG. & ANAL. CEPT.  
COMPUTER BLDG.  
EAST PITTSBURGH PENN.

PLOTS SIMULTANEOUSLY FROM 1 TO 6 FUNCTIONS USING ON-LINE PRINTER. COORDINATE LINES PRINTED AT SPECIFIED INTERVALS. PLOTTING CHARACTER FOR EACH VARIABLE MAY BE CHANGED AT WILL. PRINT WHEEL POSITIONS 8 THRU 108 ARE USED. TIMING DEPENDENT UPON VALUES PLOTTED. VARIES FROM 75 TO 150 LINES/MIN. RESOLUTION & OR - 0. PER CENT FULL SCALE. CORR./397.

**0704-0324NYDM13 MATRIX INVERSION BY PARTITIONING**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0324NYDM13

AUTHORS...D. BLOOM B. KLEINMAN

DIRECT INQUIRIES TO..

MR. A. WALLACH  
SERVICE BUREAU CORPORATION  
NEW YORK DATA PROCESSING CENTER  
635 MADISON AVENUE  
NEW YORK 22, NEW YORK

INVERSION OF POSITIVE DEFINITE SYMMETRIC MATRICES OF ORDER UP TO 150.

**0704-0327GMITR2 ITERATION SUBROUTINE, INTERVAL-HALVING METHOD**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0327GMITR2

AUTHOR...DONALD E. HART

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

GIVEN  $F(X)$ , TO FIND A VALUE FOR X WITHIN A GIVEN EPSILON OF RELATIVE ERROR IN A SPECIFIED INTERVAL  $A, B$ . THE INTERVAL-HALVING METHOD IS PREFERRED OVER THE METHOD USED IN GMITR1 WHEN X MUST BE BOUNDED BY  $w$ , OR FOUND IN A GIVEN INTERVAL  $A, B$ . THE INTERVAL IS THEN HALVED SUCCESSIVELY TOWARD  $F(X)=0$  UNTIL THE PRESCRIBED ACCURACY IS SATISFIED REQUIRES 134 STORAGE CELLS & 2 COMMON.

**0704-0331CLSM3 SMOOTH AND DIFFERENTIATE UNEQUALLY SPACED DATA POINTS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0331CLSM3

AUTHOR...R. HARRISON

DIRECT INQUIRIES TO..

MR. RONALD W. HOLLENBECK  
MATHEMATICAL ANALYSIS DEPARTMENT  
LOCKHEED AIRCRAFT CORPORATION  
CALIFORNIA DIVISION  
BURBANK, CALIFORNIA

TO SMOOTH N POINTS, WHERE N EQUALS OR IS GREATER THAN 7, WHICH MAY BE UNEQUALLY SPACED, BY THE METHOD OF LEAST SQUARES. OPTIONS TO MINIMIZE RANDOM ERRORS/I.E. DISCARD WILD POINTS/ AND TO DIFFERENTIATE ARE PROVIDED. THIS ROUTINE DIFFERS FROM CL SMC2 IN THAT THE FIRST DATA POINT IS ANCHORED, I.E., UNCHANGED, SO THAT THE CURVE WILL ALWAYS PASS THROUGH THIS POINT. REQUIRES 448 WORDS PLUS 66 COMMON.

**0704-0347UASAP3 SHARE ASSEMBLER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0347UASAP3

AUTHOR...W. P. MELCHER

DIRECT INQUIRIES TO..

MR. WALTER A. RAMSHAW  
COMPUTATION LABORATORY  
RESEARCH DEPARTMENT  
UNITED AIRCRAFT CORPORATION  
400 MAIN STREET  
EAST HARTFORD 8, CONNECTICUT

CONTINUED FROM PRIOR PAGE--

ASSEMBLES PROGRAMS WRITTEN IN SYMBOLIC FORM. INPUT AND OUTPUT MAY BE EITHER OFF-LINE OR ON. PRINTED OUTPUT INCLUDES THE GIVEN PROGRAM IN SYMBOLIC AND THE ASSEMBLED PROGRAM IN OCTAL. OUTPUT IS ALSO PUNCHED ON BINARY CARDS, OR IT MAY BE WRITTEN ON TAPE IN BINARY CARD IMAGE FORM. DECIMAL, OCTAL, AND HOLLERITH DATA MAY BE USED. A LIBRARY OF STANDARD SUB-ROUTINES IS AVAILABLE ON TAPE. ADDRESS ARITHMETIC MAY BE PERFORMED. UA SAP 3-7 SUPERCEDES UA SAP 1-2. CORR/ 431,457, WRITE-UP DIST. 564. CORR./716

**0704-0352GMFS01 THE F SYSTEM**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0352GMFS01

AUTHORS...DON F. HARRCOFF JAMES J. FISHMAN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

THIS IS AN EXECUTIVE PROGRAM THAT CONTROLS FORTRAN TO ALLOW MULTI-JOB--MULTI-FUNCTION OPERATION. ANY COMBINATION OF COMPILE, EXECUTE, OR COMPILE AND EXECUTE JOBS MAY BE PLACED ON THE INPUT TAPE. NORMAL OPERATION UTILIZES INSTRUCTION DECKS THAT ARE ACCEPTABLE TO THE PERIPHERAL EQUIPMENT. BINARY 4 DECKS MAY BE OBTAINED. THE SAP 7 LISTING MAY BE PRINTED OR PUNCHED. OPERATION IS SINGLE PHASE WITH FORTRAN UNCHANGED. IT REQUIRES 3 TAPES BEYOND THE MACHINE COMPONENTS NEEDED BY FORTRAN.

**0704-0355GMATN1 SINGLE-VALUED ARCTANGENT ROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMATN1

AUTHORS...J.E. DALLEMAND P.C. HAYES

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

COMPUTES ARCTAN QUOTIENT OF TWO ARGUMENTS WITH PROPER QUADRANT ALLOCATION. DIVISION IS CHECKED. USES 122 CELLS PLUS 9 COMMON. TIMING. MAXIMUM 6.1 MILLISECOND.

**0704-0355GMDETR DETERMINANT EVALUATING SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMDETR

AUTHOR...MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

DIRECT INQUIRIES TO AUTHOR

GIVEN AN ARBITRARY SQUARE MATRIX A AND SOME FLOATING POINT VARIABLE D, THIS SUBROUTINE WILL EVALUATE THE EXPRESSION,  $D \times \det A / A$ . REQUIRES 426 MEMORY LOCATIONS PLUS 6 COMMON. THIS ROUTINE IS PART OF THE SUBROUTINE GMSIMC.

**0704-0355GMDTAB DOUBLE INTERPOLATION**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMDTAB

AUTHOR...J.T. OLSZTYN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

COMPUTES Y EQUALS F OF X AND Z FROM A TABLE OF X,Y,Z. ALL VALUES AND CALCULATIONS ARE IN FLOATING POINT. GM TAB1 MUST ALSO BE IN CORE STORAGE. REQUIRES 122 STORAGE CELLS & COMMON DEPENDING UPON TABLE SIZE. EXTRAPOLATES FOR X OUTSIDE TABLE. CORR./394

**0704-0355GMITRF ITERATION SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMITRF

AUTHOR...M.C. MORRIS

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

CONTINUED FROM PRIOR COLUMN--

GIVEN  $X-R/X$ , TO FIND A VALUE FOR X WITHIN A GIVEN EPSILON OF RELATIVE ERROR. THIS TECHNIQUE ACCELERATES THE RATE OF CONVERGENCE IF THE ITERATION CONVERGES AND INDUCES CONVERGENCE IF THE ITERATION DIVERGES.

**0704-0355GMSIMQ SIMULTANEOUS EQUATIONS SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMSIMQ

AUTHOR...J.T. OLSZTYN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

SOLVES  $AX = B$  WHERE A, B, AND X ARE MATRICES N BY N BY S, AND N BY S. S LESS THAN OR EQUAL TO N. ALL ELEMENTS MUST BE STORED IN FLOATING POINT FORM. SUBROUTINE DESTROYS A AND B. REQUIRES 415 STORAGE CELLS. 2 MINUTES TO INVERT A 40 BY 40 MATRIX.

**0704-0355GMTAB1 TABLE INTERPOLATION**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0355GMTAB1

AUTHOR...J.T. OLSZTYN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

ALL FLOATING POINT. GIVEN X COMPUTES Y EQUALS F OF X FROM A TABLE OF X,Y, VALUES. USUAL IS X SEQUENCE WITH RETURN TO L&3. REQUIRES 99 STORAGE CELLS & COMMON DEPENDING UPON TABLE SIZE. EXTRAPOLATES FOR X OUTSIDE TABLE. CORR /408

**0704-0370RS0133 NORMALIZED LOG-EXTENDED RANGE FLOATING BINARY ARITH.**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0370RS0133

AUTHOR...J.D. BABCOCK

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

TO EVALUATE THE NATURAL LOGARITHM OF A NUMBER EXPRESSED IN EXTENDED RANGE FLOATING BINARY. NUMBER OCCUPIES 2 MEMORY CELLS; 35 BIT FRACTION AND 35 BIT EXPONENT. ERROR RETURN PROVIDED. RS0130 MUST BE IN MEMORY. 131 CELLS & 6 CELLS OF COMMON. CORR/ 554

**0704-0370BSRN FIXED POINT PSEUDO RANDOM NUMBER GENERATOR**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0370BSRN

AUTHOR...MR. J. H. WEGSTEIN

NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.

DIRECT INQUIRIES TO AUTHOR

GENERATES A POSITIVE FIXED-POINT PSEUDO-RANDOM NUMBER. A NEW RANDOM NUMBER R SUB N IS GENERATED FROM THE PREVIOUSLY GENERATED NUMBER R SUB N MINUS 1 BY TAKING THE LEAST SIGNIFICANT PORTION OF THE PRODUCT R SUB O R SUB N MINUS 1 WHERE R SUB O EQUALS 5 15TH POWER SEQUENCE HAS A PERIOD OF 2 33RD POWER OR ABOUT 10 9.9 TENTH. WHEN ONLY A FEW BINARY DIGITS ARE TO BE USED, THEY SHOULD BE TAKEN FROM THE LEFT-MOST PART OF THE NUMBER, EXCLUDING THE SIGN. REFERENCE-- NATIONAL BUREAU OF STANDARDS REPORT 3370, GENERATION AND TESTING OF PSEUDO-RANDOM NUMBERS BY OLGA TAUSSKY AND JOHN TODD.

**0704-0390MIPMR1 POST-MORTEM ROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0390MIPMR1

AUTHORS...S. BEST F. HELWIG A. SIEGEL

DIRECT INQUIRIES TO..

SHARE LIBRARIAN  
COMPUTATION CENTER  
ROOM 26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

MIPMR1 RECORDS SPECIFIED RANGES OF CORE MEMORY IN SPECIFIED FORMATS WHICH CORRESPOND TO THESE FORMATS ALLOWED BY THE SAP INPUT LANGUAGE. ONE OF THESE FORMATS IS INSTRUCTIONS WITH SYMBOLIC ADDRESSES.

**0704-0405PFMVP1 EIGENVALUE COMPUTATION.**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0405PFMVP1

AUTHOR...D. CLERG

DIRECT INQUIRIES TO..  
INSTITUT DE CALCUL SCIENTIFIQUE  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 2, FRANCE

DETERMINATION OF THE M LARGEST EIGENVALUES OF AN M. ORDRE  
MATRIX AND OF THE CORRESPONDING EIGENVECTORS. ITERATIVE  
METHOD. OCCUPIES 956 CELLS& VARIABLE BLOC.

**0704-0414GLMARK A MORE ACCURATE RUNGE-KUTTA**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0414GLMARK

AUTHOR...P. D. WILLIAMS

DIRECT INQUIRIES TO..  
MR. E. K. RITTER  
DEPT. 72-22, MAIL ZONE 174  
LOCKHEED AIRCRAFT CORP.  
86 SOUTH COBB DRIVE  
MARIETTA, GEORGIA

A DIFFERENTIAL EQUATIONS ROUTINE UTILIZING THE METHOD OF  
RUNGE-KUTTA-GILL TO SOLVE A SET OF N SIMULTANEOUS FIRST  
ORDER DIFFERENTIAL EQUATIONS. USES DOUBLE-PRECISION  
FLOATING POINT ARITHMETIC THROUGHOUT, LARGELY ELIMINATING  
THE EFFECT OF ROUND-OFF ERROR. REQUIRES THE USE OF SHARE  
ROUTINE GL DPPA. HAS AN OPTION FOR THE USER TO COMPUTE  
THE DERIVATIVES IN DOUBLE-PRECISION. PROGRAM REQUIRES  
TOTAL OF 499 & 6N STORAGES/INCLUDING 331 FOR GL DPPA/  
CGR. / 419

**0704-0415ATBES1 BESSEL FUNCTIONS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0415ATBES1

AUTHOR...C. F. SPRAGUE

DIRECT INQUIRIES TO..  
MR. CHARLES K. FENDALL  
MATHEMATICS AND COMPUTING  
AERONAUTRONIC, A DIVISION OF  
FORD MOTOR COMPANY  
FORD ROAD  
NEWPORT BEACH, CALIFORNIA

BESSEL FUNCTIONS COMPUTES ALL ORDERS OF THE MODIFIED  
BESSEL FUNCTIONS.

**0704-0417PFCF1 DOUBLE PRECISION SIGN**  
COMPATIBILITY  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0417PFCF1

AUTHOR...M. GUERIN

DIRECT INQUIRIES TO..  
INSTITUT DE CALCUL SCIENTIFIQUE  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 1, FRANCE

GRANTS IDENTICAL SIGNS TO 2 PORTIONS OF  
A FLOATING POINT DOUBLE PRECISION NUMBER  
OCCUPIES 47 STORAGE CELLS.

**0704-0417PFCSH1 HYPERBOLIC SINE AND COSINE,  
FLOATING POINT**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0417PFCSH1

AUTHOR...R. TABORY

DIRECT INQUIRIES TO..  
INSTITUT DE CALCUL SCIENTIFIQUE  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 2, FRANCE

OCCUPIES 77 STORAGE CELLS.

**0704-0417PFSAC1 FLOATING POINT COMPLEX  
ARITHMETICS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0417PFSAC1

AUTHOR...M. GUERIN

DIRECT INQUIRIES TO..  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 2, FRANCE

CONTINUED FROM PRIOR COLUMN--

EXECUTION OF MACHINE OPERATIONS ON COMPLEX NUMBERS BY A  
PROGRAM WRITTEN IN ORDINARY MACHINE LANGUAGE. OCCUPIES  
328 STORAGE CELLS.

**0704-0417PFSDP1 FLOATING POINT DOUBLE  
PRECISION ARITHMETICS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0417PFSDP1

AUTHOR...M. GUERIN

DIRECT INQUIRIES TO..  
INSTITUT DE CALCUL SCIENTIFIQUE  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 1, FRANCE

EXECUTION OF MACHINE OPERATIONS ON DOUBLE PRECISION  
NUMBERS BY A PROGRAM WRITTEN IN ORDINARY LANGUAGE  
OCCUPIES 326 STORAGE CELLS.

**0704-0420CSDS01 DUMP STORAGE, CORE, DRUM,  
AND TAPES**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0420CSDS01

AUTHOR...W. FLYNN

DIRECT INQUIRIES TO..  
MR. H. W. BUCKNER  
DIGITAL COMPUTING LABORATORY  
MAIL ZONE 101-51X  
CONVAIR-SAN DIEGO  
P. O. BOX 1950  
SAN DIEGO 12, CALIFORNIA

THIS IS A MODIFICATION OF NY DS1 WHICH WILL DUMP CORES,  
DRUMS AND TAPES, NOT REQUIRING THE USE OF A LOGICAL DRUM  
FOR SAVING THE FIRST 2048 WORDS OF CORE MEMORY. A MAGNETIC  
TAPE /LOGICAL 1 TO 8/ IS USED FOR SAVING INSTEAD. THE SAME  
SENSE OPTION AS NYCS1 IS USED TO SELECT THE TAPE. WITH CS  
DS1 IT IS POSSIBLE TO DUMP ALL OF CORE AND ALL OF DRUM  
MEMORY WITH ONE PASS ON THE MACHINE. SELF LOADING BINARY  
DECK. REQUIRES MINIMUM 704 & 711 CARD READER, 727 TAPE AND  
716 PRINTER OR AN ADDITIONAL 727 TAPE. SUPERSEDED BY CS-  
DS2 DIST. 496.

**0704-0421AAANVA ANALYSIS OF VARIANCE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0421AAANVA

AUTHOR...P. REAL

DIRECT INQUIRIES TO..  
W. B. FRITZ MGR.  
MGR. INFORMATION PROCESSING DEPT  
WESTINGHOUSE ELECTRIC CORP.  
BUSINESS SYSTEMS DIVISION  
FRIENDSHIP INTERNATIONAL AIRPORT  
P. O. BOX 1693  
BALTIMORE 3, MARYLAND

COMPUTES MEANS,SUMS OF SQUARES,DEGREES OF FREEDOM AND F  
FACTOR FOR UP TO 13 WAY ANALYSIS. ANY NUMBER OF VARIABLES  
PER WHY AND ANY AMOUNT OF DATA MAY BE USED.

**0704-0424ANE201 ARGONNE LEAST SQUARE  
LEGENDRE POLYNOMIAL FIT**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0424ANE201

AUTHOR...MARILYN HANSON

DIRECT INQUIRIES TO..  
MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

GIVEN N /NOT MORE THAN 80/ POINTS, CALCULATES IN FLOATING  
POINT THE COEFFICIENTS FOR THE EXPANSION IN LEGENDRE  
POLYNOMIALS /NOT MORE THAN 20/ IN THE LEAST-SQUARES SENSE,  
AND THE VARIANCE OF THE DATA FROM THE CALCULATED CURVE.  
REQUIRES 8K CORE MEMORY. COMPLETE INCLUDING NYINP1, UAS&C1  
SCPFX, UAINV1, UASQR4, MUPFC2, AND MOUT2. INPUT FROM  
CARDS OR TAPE. MURA PRINT BOARD. OPTION FOR WEIGHTS OF  
POINTS EQUAL TO 1, 1/Y, OR ARBITRARY. ACCURACY TO 5 SIG.  
FIGURES FOR CASES TESTED

**0704-0428GSSTPR THERMODYNAMIC PROPERTIES OF  
STEAM AND WATER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0428GSSTPR

AUTHOR...JANE E. KING

DIRECT INQUIRIES TO..  
MR. HARRY N. CANTRELL  
LARGE STEAM TURBINE-GENERATOR  
DEPARTMENT 59-244  
GENERAL ELECTRIC COMPANY  
SCHENECTADY, NEW YORK

CONTINUED FROM PRIOR PAGE--

A SET OF SUBROUTINES TO BE USED IN VARIOUS COMBINATIONS WITH ONE ANOTHER TO PRODUCE VALUES FOR THE THERMODYNAMIC PROPERTIES OF STEAM AS TABULATED BY KEENAN AND KEYES. RESULTS CAN BE COMPUTED FOR PRESSURE, TEMPERATURE, ENTHALPY, ENTROPY, VISCOSITY, SPECIFIC VOLUME, AND QUALITY IN TERMS OF ONE OR TWO OF THE OTHER PARAMETERS IN THE WET, DRY, SATURATED, OR LIQUID REGIONS WHEREVER APPLICABLE. CORR/ 852

**0704-0429BAN203 RANDOM NUMBER GENERATOR**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0429BAN203

AUTHOR...ROGER C. KENNEDY

DIRECT INQUIRIES TO..

MR. JOHN F. STOCKMAN  
STAFF ANALYST  
THE BOEING COMPANY  
P. O. BOX 3707  
SEATTLE 24, WASHINGTON

UNIFORM AND NORMAL RANDOM NUMBER GENERATOR- PRODUCES UNIFORM MEMBER IF ENTERED WITH ACC POSITIVE AND NORMAL IF ENTERED WITH ACC NEGATIVE-FL PT-42 WORDS-NC COMMON-METHCC OF CONGRUENCES

**0704-0460MHD11 EIGENVALUES AND VECTORS OF A REAL, SYMMETRIC MATRIX**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0460MHD11

AUTHOR...F.J. CARBATO

DIRECT INQUIRIES TO..

SHARE LIBRARIAN  
COMPUTATION CENTER  
RCOM26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

THIS SUBROUTINE DIAGONALIZES A REAL, SYMMETRIC MATRIX BY MEANS OF JACOBI'S METHOD WHEN THE MATRIX ELEMENTS ARE SINGLE-PRECISION, FLOATING-POINT NUMBERS STORED IN TRIANGULAR FORM. MATRICES OF LARGE ORDER, N, ARE DIAGONALIZED IN A TIME PROPORTIONAL TO N CUBED AND WITH A MINIMUM NUMBER OF ROTATIONS. SUPERSEDED BY MI HD14, DIST. 697.

**0704-0464IBTFL THE TRANSPORTATION PROBLEM, FLOW- OR HUNGARIAN METHOD**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0464IBTFL

AUTHOR...F.S. BECKMAN

DIRECT INQUIRIES TO..

MR. A. MASTROGIANNI  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

INPUT FROM CARD OR TAPE. COMPUTATION ENTIRELY IN CORE-STORAGE. RESTRICTIONS...N SMALLER, EQUAL 600, M, N&1 6 2. N&M 8 700 SMALLER THAN HIGH SPEED STORAGE AVAILABLE. CORR./588, 644, 701, 796

**0704-0466RL0178 FIXED POINT LOGARITHM**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0466RL0178

AUTHOR...E. CAMPBELL

DIRECT INQUIRIES TO..

MR. JOHN A. JCRDAN  
7090 COMPUTING AND PROGRAMMING BRANCH  
SYSTEM DEVELOPMENT CORPORATION  
2500 COLORADO AVENUE  
SANTA MONICA, CALIFORNIA

COMPUTES LOGARITHM OF X IN FIXED POINT USING A RAND APPROX..MAX ERROR IS 3 IN THE EIGHTH DECIMAL PLACE. REQUIRES 41 CELLS PLUS 2 COMMON. REPLACES RL0038. TIME 3.5 MS

**0704-0469NUBES1 BESSEL FUNCTIONS FOR REAL ARGUMENT AND ORDER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0469NUBES1

AUTHORS..MR. MAX GOLDSTEIN MARY KRESGE

DIRECT INQUIRIES TO..

MR. MAX GOLDSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

FOR A GIVEN REAL ARGUMENT AND ORDER, COMPUTES THE BESSEL FUNCTIONS  $J_n Y$ ,  $EXP(-X) I_n$ ,  $CR EXP(X) K_n$ . NOT RESTRICTED TO INTEGRAL ORDER. CORR. 986

**0704-0474NUMXEW EIGENVALUES AND EIGENVECTORS SYMMETRIC MATRIX - FI**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0474NUMXEW

AUTHORS..P. FCX A. ROTHENBERG E. WETHERELL

DIRECT INQUIRIES TO..

MR. MAX GOLDSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

COMPUTES EIGENVALUES AND EIGENVECTORS /IF DESIRED/ OF A REAL SYMMETRIC MATRIX OF UP TO 81 BY 81 FOR 8K MACHINE, UP TO 175 BY 175 FOR 32K MACHINE. GIVENS METHCC IS USED FOR EIGENVALUES. A METHOD DUE TO WILKINSON IS USED TO FIND VECTORS. THE MATRIX IS ASSUMED GIVEN IN FIXED POINT IN CORE STORAGE. OUTPUT OF EIGENVALUES AND VECTORS AS FIXED POINT BINARY NUMBERS IS ON A BINARY TAPE, VALUES ALSO AVAILABLE IN CORE STORAGE. EIGENVECTORS MORE ACCURATE THAN XEW. APPROXIMATE TIME .1 TIMES N SQUARED SECONDS FOR N BY N MATRIX. CORR. /545

**0704-0477ERMPR2 STEPWISE MULTIPLE REGRESSION PROCEDURE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0477ERMPR2

AUTHOR...M. A. EFROYMSON

ESSO RESEARCH AND ENGINEERING COMPANY  
P. O. BOX 209  
MADISON, NEW JERSEY

DIRECT INQUIRIES TO AUTHOR

PERFORMS A STEPWISE MULTIPLE LINEAR REGRESSION ON M SETS OF DATA CONTAINING N INDEPENDENT VARIABLES AND ONE DEPENDANT VARIABLE. EACH SET OF DATA CAN BE WEIGHTED. A SUBSET OF K COEFFICIENTS, K EQUAL OR LESS THAN N, IS OBTAINED THAT ARE SIGNIFICANT AT A SPECIFIED SIGNIFICANCE LEVEL. PREDICTED VALUES OF DEPENDANT VARIABLE ARE CALCULATED. RESTRICTIONS -INDEPENDANT VARIABLE LIMITED TO 59 - SETS OF OBSERVATIONS UNLIMITED - 85 CORE AND 3 TAPES REQUIRED

**0704-0480CEFLP FORTRAN LINEAR PROGRAMMING CODE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0480CEFLP

AUTHOR...R.B. TREADWAY

DIRECT INQUIRIES TO..

MR. ELI HELLERMAN  
C.E.I.R., INCORPORATED  
1200 JEFFERSON DAVIS HIGHWAY  
ARLINGTON 2, VIRGINIA

91 COLUMNS INCLUDING ALL FUNCTIONALS BUT EXCLUDING ARTIFICIAL COLUMNS AND RIGHT HAND SIDE. DESIGN IS MODULAR WITHIN LIMITS OF FORTRAN. ALGORITHM INCLUDES PHASE I, ARBITRARY TRANSFORMATIONS AND COMPOSITE ALGORITHM. SPEED QUITE GOOD BUT PRECISION ONLY FAIR. COMPUTED TOLERANCES USED TO PARTIALLY OFFSET INADEQUACY OF SINGLE PRECISION FLOATING POINT. THE TOLERANCE IN STATEMENT 109 MAY BE CRITICAL. MAKING IT LARGE HAS EFFECT OF BYPASSING COMPOSITE ALGORITHM. COMPILE TIME ABOUT 15 MINS

**0704-0480CE650S SIMULATE BASIC 650 COMPUTER WITH 704**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0480CE650S

AUTHORS..R.B. TREADWAY W. D. HAYES

DIRECT INQUIRIES TO..

MR. ELI HELLERMAN  
C.E.I.R., INCORPORATED  
1200 JEFFERSON DAVIS HIGHWAY  
ARLINGTON 2, VIRGINIA

SHOULD WORK ON 4K IF ONLY 1904 LOCATIONS USED FOR 65C PRG. USES CE 650W TO SIMULATE 65C INPUT PLUGBOARD. TAPE INPUT IS MANDATORY. ISSUED ONLY AS BINARY DECK. CORR/ 562

**0704-0480CE650W SIMULATES INPUT PLUGBOARD OF BASIC 650**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0480CE650W

AUTHORS..CHARLES G. COOPER JOSEPH C. BAIZ

DIRECT INQUIRIES TO..

MR. ELI HELLERMAN  
C.E.I.R., INCORPORATED  
1200 JEFFERSON DAVIS HIGHWAY  
ARLINGTON 2, VIRGINIA

TAPE 9 AND WRITES BINARY TAPE 10. FOR USE WITH CE 650S. CODED FOR 8K BUT SHOULD WORK ON 4K. ISSUED ONLY IN BINARY.

**0704-0491RWDE4F FLOATING POINT GILL METHOD FOR RUNGE-KUTTA INTEGRATION**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR PAGE--

SPECIFY FILE NUMBER 0704-0491RWDE4F

AUTHOR...RUTH GITTLEMAN

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

SOLVES N SIMULTANEOUS FIRST ORDER DIFFERENTIAL EQUATIONS BY THE RUNGE-KUTTA-GILL METHOD. USES DOUBLE PRECISION INTERNALLY IN CALCULATING THE DEPENDENT VARIABLES. THE USER MUST PROVIDE AN AUXILIARY SUBROUTINE WHICH EVALUATES THE FIRST ORDER DERIVATIVES. INITIALLY, THE USER MUST PROVIDE THE VALUES OF THE FIRST ORDER DERIVATIVES. REQUIRES 135 PLUS 2N CELLS.

0704-0511MICNF1 CAPACITATED NETWORK FLOW PROGRAM

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0511MICNF1

AUTHOR...LEROY H. WALKER

DIRECT INQUIRIES TO..

SHARE LIBRARIAN  
COMPUTATION CENTER  
RCOM26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

THE PROGRAM DETERMINES A FLOW PATTERN OVER A GENERAL NETWORK SO THAT A LINEAR COST FUNCTION OF THE BRANCH FLOWS ASSUMES ITS MINIMUM VALUE. BRANCH FLOWS ARE RESTRICTED TO BEING NON-NEGATIVE AND LESS THAN OR EQUAL TO THE CAPACITIES OF THE BRANCHES, AND FLOW INTO AND OUT OF THE NODES IS CONSERVED.

0704-0514NA0299 DETERMINANT EVALUATION AND ROOT EXTRACTION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0514NA0299

AUTHOR...MAX OJALVO

DIRECT INQUIRIES TO..

MR. LLOYD GREEN, GENERAL SUPERVISOR  
INTEGRATED DATA PROCESSING  
LOS ANGELES DIVISION  
NORTH AMERICAN AVIATION, INC.  
INTERNATIONAL AIRPORT  
LOS ANGELES 45, CALIFORNIA

THIS ROUTINE EVALUATES A DETERMINANT WITH POLYNOMIAL ELEMENTS AND EXTRACTS THE ROOTS OF THE RESULTING POLYNOMIAL. THE ORDER OF THE DETERMINANT, N, MAY VARY FROM 2 TO 20, AND THE DEGREE OF THE ELEMENTS, M, MAY BE POSITIVE INTEGRAL VALUES FROM 0 UPWARD, SUCH THAT M\*1 TIMES N SQUARED IS EQUAL TO OR LESS THAN 1200. THE ROOT EXTRACTION PART HANDLES UP TO A 60TH DEGREE POLYNOMIAL. IN ADDITION, THE ROUTINE MAY BE USED TO EVALUATE A DETERMINANT ONLY, OR EXTRACT THE ROOTS OF A POLYNOMIAL ONLY.

0704-0516LAS862 INCOMPLETE GAMMA FUNCTION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0516LAS862

AUTHORS..B. FAGAN

M. GOLDSTEIN

DIRECT INQUIRIES TO..

THOMAS L. JORDAN  
I-1  
LOS ALAMOS SCIENTIFIC LABORATORY  
LOS ALAMOS, NEW MEXICO

GIVEN A AND X, THIS SUBROUTINE WILL COMPUTE THE INCOMPLETE GAMMA FUNCTION DEFINED AS THE INTEGRAL FROM X TO INFINITY OF EXP(-U) TIMES U TO THE /A-1/ POWER DU.

0704-0523SCMAP MUSH DATA ASSEMBLER AND PRINT ROUTINES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0523SCMAP

AUTHOR...E.S. KRASNOW

DIRECT INQUIRIES TO..

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

PROVIDES INPUT AND OUTPUT FOR SC-MUSH. USES A SLIGHTLY MODIFIED RAND LP INPUT TAPE FOR DECK/. OUTPUT FORMAT SIMILAR TO THAT OF RANC.

0704-0523SCMUSH LINEAR PROGRAMMING SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0523SCMUSH

AUTHOR...E.S. KRASNOW

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

SOLVES PROBLEM WITH UP TO 55 EQUATIONS BY MODIFIED SIMPLEX METHOD. MAXIMUM NUMBER OF VARIABLES DEPENDS ON SIZE OF CORE FOR WHICH ASSEMBLED. SINGLE PRECISION ARITHMETIC USED THROUGH OUT. ROUND-OFF ERROR IN INVERSE CAN BE REDUCED BY PERIODIC USE OF A PURIFICATION DEVICE. FEASIBILITY OBTAINED BY BIG M METHOD. VARIOUS RESTARTS PROVIDED.

0704-0526TVTSDA TIME SERIES DECOMPOSITION

AND ADJUSTMENT

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0526TVTSDA

AUTHOR...JAMES R. WHITE

DIRECT INQUIRIES TO..

MARTIN HOCHDORF  
CHIEF, COMPUTING CENTER  
TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE

FORTRAN PROGRAM TO ADJUST SEASONAL AND IRREGULAR TIME SERIES TO A FORM THAT SHOWS PRIMARILY THE TREND-CYCLICAL MOVEMENTS. SEASONAL FACTORS, IRREGULAR FLUCTUATIONS AND MANY SUMMARY MEASURES USEFUL IN TIME SERIES ANALYSIS ARE COMPUTED IN THE PROCESS. USES I6K DRUMLESS MACHINE.

0704-0533CF0091 THREE DIMENSIONAL LEAST SQUARES PROCEDURE.

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0533CF0091

AUTHORS..L.C. HOUNSEL

S. W. WILSON

DIRECT INQUIRIES TO..

B. J. MCHORTER  
ENGINEERING COMPUTATIONS LABORATORY  
CONVAIR DIV. OF GEN. DYNAMICS CORP.  
FORT WORTH, TEXAS

COMPUTES THE COEFFICIENTS OF AN EQUATION EXPRESSING A DEPENDENT VARIABLE Y AS A FUNCTION OF TWO INDEPENDENT VARIABLES, X AND Z, STAND. DEV. OF Y, UNCERTAINTIES IN COEFFICIENTS, THE DEGREE OF FREEDOM IN DATA, THE NUMBER OF TERMS IN THE EQUATION, THE EXPONENTS OF X, AND THE EXPONENTS OF Z. THE DATA IS TESTED ACCORDING TO CRITERIA PROVIDED FOR IN THE INPUT AND WILD POINTS ARE REJECTED. UA EXP1, CL TAN1, UA INVL, UA ARTN, UA LNI, & UA SQRT1 ARE REQUIRED. 6970 STORAGES PLUS 2 COMMON.

0704-0539GLGAU2 FORTRAN 2 INTEGRATION SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0539GLGAU2

AUTHOR...ERNEST W. CAPERCS

DIRECT INQUIRIES TO..

MR. E. K. RITTER  
DEPT. 72-22, MAIL ZONE 174  
LOCKHEED AIRCRAFT CORP.  
86 SOUTH COBB DRIVE  
MARIETTA, GEORGIA

GAUSS QUADRATURE /10 POINT/ METHOD. THIS IS A MODIFICATION OF SAP SUBROUTINE GL GAUS. THE SUBROUTINE DIVIDES THE INTERVAL /A,B/ INTO N EQUAL INTERVALS AND BY THE PROPER TRANSFORMATION EACH INTERVAL IS INTEGRATED OVER THE INTERVAL /0,1/. CORR. 1210

0704-0547PFBES1 MODIFIED NUBES1 PROGRAM FOR FORTRAN LIBRARY

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0547PFBES1

AUTHOR...A. ROUNDEL

DIRECT INQUIRIES TO..

INSTITUT DE CALCUL SCIENTIFIQUE  
MR. P. MELLIN  
COMPAGNIE IBM FRANCE  
5, PLACE VENDOME  
PARIS 1, FRANCE

APPLICATIONS OF A BESSEL FUNCTIONS SUBROUTINE FORTRAN FUNCTION NAMES ARE BESJF, BESRF, BESYF, BESIF.

0704-0550CSDEV1 RANDOM NORMAL DEViate SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0550CSDEV1

AUTHOR...C.J. SWIFT

DIRECT INQUIRIES TO..

MR. H. W. BUCKNER  
DIGITAL COMPUTING LABORATORY  
MAIL ZONE 101-51X  
CONVAIR-SAN DIEGO  
P. O. BOX 1950  
SAN DIEGO 12, CALIFORNIA

CONTINUED FROM PRIOR PAGE--

COMPUTES A FLOATING POINT NUMBER FROM A NEARLY NORMAL DISTRIBUTION WITH A SPECIFIED STANDARD DEVIATION. USES THE CENTRAL LIMIT THEOREM. TIME IS .536.46N MILLISECS WHERE N IS SPECIFIED IN THE CALLING SEQUENCE. N EQUAL TO 8 IS USUALLY SATISFACTORY.

**0704-0551CSDEV2 RANDOM TABLE LOOKUP SUBROUTINE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0551CSDEV2

AUTHOR...C.J. SWIFT

DIRECT INQUIRIES TO..

MR. H. W. BUCKNER  
DIGITAL COMPUTING LABORATORY  
MAIL ZONE 101-51X  
CCNAIR-SAN DIEGO  
P. O. BOX 1950  
SAN DIEGO 12, CALIFORNIA

PICKS AN ENTRY AT RANDOM FROM A GIVEN TABLE AND ASSIGNS A RANDOM SIGN TO IT. TIME IS .468 MILLISECS. TABLE EXTENT MUST BE A POWER OF TWO.

**0704-0556ERPLOT POLAR POINT PLOT SUBROUTINE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0556ERPLOT

AUTHOR...C.S. HWA

DIRECT INQUIRIES TO..

MR. M. A. EFRONSON  
ESSO RESEARCH AND ENGINEERING COMPANY  
P. O. BOX 209  
MADISON, NEW JERSEY

TO REPRESENT NUMERICAL DATA BY GRAPHICAL METHODS. A 120 BCD CHARACTER HOLLERITH FORMAT IS SET UP FOR EACH LINE TO BE PLOTTED. IT CAN HANDLE UP TO SIX CURVES SIMULTANEOUSLY. OPTIONS ARE AVAILABLE FOR AUTOMATIC ORDERING AND SCALING OF THE DATA POINTS. CORR./ 696

**0704-0574CSTUKS WAVE RECORD ANALYSIS OF TWO SIMULTANEOUS RECORDS OF A--**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0574CSTUKS

AUTHOR...NANCY CLARK

DIRECT INQUIRIES TO..

MR. H. W. BUCKNER  
DIGITAL COMPUTING LABORATORY  
MAIL ZONE 101-51X  
CCNAIR-SAN DIEGO  
P. O. BOX 1950  
SAN DIEGO 12, CALIFORNIA

SINGLE TIME SERIES. FOR SINGLE RECORDS THE AUTOCORRELATION, SPECTRUM AND LOG SPECTRUM ARE COMPUTED. FOR TWO SIMULTANEOUS RECORDS TWO CROSS CORRELATIONS IN-PHASE CO-SPECTRUM, OUT-OF-PHASE QUASPECTRUM, COHERENCE BETWEEN RECORDS, PHASE LAG OF ONE RECORD WITH THE OTHER, BEAM WIDTH, AND DIRECTION FROM WHICH THE WAVES ARRIVED ARE ALSO COMPUTED. OPTIONAL ALIASING AND/OR INSTRUMENT CORRECTION. UNLIMITED SIZE OF TIME SERIES RECORD. THE MAX. NO. OF PTS. ON THE FREQ. SCALE IS DEPENDENT ON CORE SIZE/510 FOR 8192 CORE/. TUKEY METHOD CORR.618,627,757

**0704-0577RWAC2F AUTO- AND CROSS-CORRELATION FUNCTION GENERATOR, FLOATING**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0577RWAC2F

AUTHOR...J.F. HOLT

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO COMPUTE ONE POINT OF EITHER THE AUTO- OR CROSS-CORRELATION FUNCTION, GIVEN A SET OF TIME-SERIES DATA FOR EQUALLY-SPACED POINTS. 29 LOC. & 6 ERASABLE.

**0704-0583BELID INTERPRETER FOR 650 DOUBLE PRECISION PROGRAMS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0583BELID

AUTHORS..D.J. BIERMAN T.R. BASHKOW

DIRECT INQUIRIES TO..

DR. G. L. BALDWIN  
MATHEMATICAL RESEARCH DEPT.  
BELL TELEPHONE LABORATORIES  
MURRAY HILL LABORATORY  
MURRAY HILL, NEW JERSEY

ACCEPTS AND PRODUCES THE SAME INFORMATION /AFTER TAPE-CARD/ AS THE L1 OR THE BELL INTERPRETIVE DOUBLE PRECISION ROUTINE /LIDP/ WRITTEN FOR THE IBM 650. PROVIDES ON THE AVERAGE A 60-TO-1 SPEED INCREASE OVER THE 650 OPERATION. CORR./695

**0704-0592NUMLEV FORTRAN 2 EIGENVALUE-EIGENVECTOR SUBPROGRAM**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0592NUMLEV

AUTHOR...MR. MAX GELSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHCR

THIS PROGRAM IS A REVISION OF NUMLEV FOR USE WITH FORTRAN 2. IT COMPUTES THE EIGENVALUES AND VECTORS OF A REAL SYMMETRIC MATRIX BY THE GIVENS METHOD. CORR./78C

**0704-0603WH0055 ARCTAN A/B, FORTRAN II VERSION, SAP CODED**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0603WH0055

AUTHOR...FRANK ENGEL, JR.

DIRECT INQUIRIES TO..

DR. P.A. ZAPHYR MGR  
DIGITAL ANALYSIS AND COMPUTATIONS  
ADVANCED SYSTEMS ENGINEERING DEPT.  
COMPUTER BLDG.  
EAST PITTSBURGH PENN.

FUNCTION SUBROUTINE FOR FORTRAN II LIBRARY. COMPUTES FL. POINT ARCTAN(A/B) IN RANGE -PI TO PI. USES IBATN1. REQUIRES 117 STORAGE CELLS & 3 COMMON.

**0704-0609CA0034 EXTENDED RANGE COMPLEX ARITHMETIC PACKAGE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0609CA0034

AUTHOR...BARRY BOEHM

DIRECT INQUIRIES TO..

MR. H. W. BUCKNER, FEAD  
RESEARCH GROUP ENGINEER  
MAIL ZONE 101951X  
GENERAL DYNAMICS/ASTRONAUTICS  
P.O. BOX 1128  
SAN DIEGO 12, CALIFORNIA

PACKAGE CONTAINS SUBROUTINES TO ADD, SUB, MPY, DIV, AND TAKE SORT OF EXTENDED RANGE COMPLEX NRS. ALSO MULTIPLIES AND DIVIDES EXT RANGE COMPLEX NRS BY EXT RANGE REAL NRS. EXT 230 CELLS & 8 COMMON.

**0704-0635RWDET DETERMINANT EVALUATOR FORTRAN SUBROUTINE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWDET

AUTHOR...W.L. FRANK

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM EVALUATES THE DETERMINANT OF A MATRIX A-ALPHA TIMES I WHERE A IS OF DIMENSION N TIMES N AND ALPHA IS A SCALAR. IT HAS A DIMENSION STATEMENT A/5C, 50/ WHICH CAN BE CHANGED ACCORDING TO NEEDS OF THE PROGRAMMER. INPUT MATRIX A IS DESTROYED IN COMPUTATION. 237 CELLS EXCLUDING ARRAY A ARE REQUIRED.

**0704-0635RWDETn DETERMINANT EVALUATOR FOR NEARLY TRIANGULAR MATRICES**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWDETn

AUTHOR...W.L. FRANK

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM EVALUATES THE DETERMINANT OF A MATRIX A-ALPHA TIMES I WHERE A IS A NEARLY TRIANGULAR MATRIX OF DIMENSION N TIMES N AND ALPHA IS A SCALAR. IT HAS A DIMENSION STATEMENT OF A/50,50/ AND B/50/ WHICH CAN BE CHANGED ACCORDING TO NEEDS OF THE PROGRAMMER. INPUT MATRIX A IS NOT DESTROYED BY THE PROGRAM. 216 CELLS EXCLUDING ARRAYS A AND B ARE REQUIRED.

**0704-0635RWEIGN REAL EIGENVALUES OF REAL MATRICES**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWEIGN

AUTHOR...W.L. FRANK

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM DETERMINES THE N REAL EIGENVALUES OF A REAL MATRIX A. IT HAS A DIMENSION STATEMENT OF A/50, 50/, B/50/ AND C/50/ AND USES THE COMMON REGION INPUT MATRIX A IS DESTROYED BY THE COMPUTATION. THE PROGRAM REQUIRES 3 SUBSIDIARY SUBROUTINES IN ADDITION TO THE PROGRAMS WHICH WRITE OUTPUT ON TAPE. THE PROGRAM DECK FOR EIGN ALREADY INCLUDES THE 3 SUBSIDIARIES. CORR./684

0704-0635RWGLSQ GENERAL LEAST SQUARES  
FORTRAN SUBPROGRAM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWGLSQ

AUTHOR...DAVID MORRISON

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVES THE LEAST SQUARES SOLUTION TO A SYSTEM OF OVER-DETERMINED LINEAR EQUATIONS BX EQUALS C WHERE B IS AN N TIMES M MATRIX WITH N GREATER THAN, OR EQUAL TO M AND C A COLUMN VECTOR OF DIMENSION N. IT HAS A DIMENSION STATEMENT A/50, 25/ X/25/ AND IL/25/ WHICH CAN BE CHANGED TO NEEDS OF THE PROGRAMMER. INPUT DATA IS DESTROYED DURING COMPUTATION REQUIRED 341 CELLS EXCLUDING ARRAYS A, X AND IL AND THE SQUARE ROOT ROUTINE.

0704-0635RWGRT GENERAL ROOT FINDER FORTRAN  
SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWGRT

AUTHOR...WERNER L. FRANK

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P.O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM FINDS THE REAL ZEROS OF ANY ANALYTIC FUNCTION F(X). IT HAS A DIMENSION STATEMENT C/50/ WHICH CAN BE CHANGED TO SUIT NEEDS OF THE PROGRAMMER. REQUIRES 453 CELLS EXCLUDING THE ARRAY C, THE OUTPUT SUBROUTINES, THE SQUARE ROOT ROUTINE AND THE AUXILIARY PROGRAM.

0704-0635RWMATS LINEAR MATRIX EQUATION  
SOLVER  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWMATS

AUTHOR...W.L. FRANK

DIRECT INQUIRIES TO..  
MR. WALTER A. RAMSHAW  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P.O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM FINDS THE SOLUTION X OF A LINEAR MATRIX EQUATION BX EQUALS C WHERE THE MATRIX B IS OF ORDER N TIMES N AND THE MATRIX C IS OF ORDER N TIMES M. IF C IS THE IDENTITY MATRIX THEN X EQUALS INVERSE OF B. IT HAS A DIMENSION STATEMENT A/50, 50/ AND X/25,25/ WHICH CAN BE CHANGED ACCORDING TO NEEDS OF THE PROGRAMMER. INPUT DATA IS DESTROYED DURING COMPUTATION. 418 CELLS EXCLUDING ARRAYS A AND X ARE REQUIRED.

0704-0635RWNTRI NEARLY TRIANGULARIZATION OF  
A MATRIX SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWNTRI

AUTHOR...W. L. FRANK

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM TRANSFORMS A REAL MATRIX A INTO A NEARLY TRIANGULAR  $\gamma$ 1-SUB TRIANGULAR MATRIX M BY SIMILARITY TRANSFORMATIONS. IT HAS A DIMENSION STATEMENT OF A/50, 50/ AND B/50/ WHICH CAN BE CHANGED ACCORDING TO THE NEEDS OF THE PROGRAMMER. THE INPUT MATRIX A IS DESTROYED DURING COMPUTATION. 339 CELLS REQUIRED EXCLUDING ARRAYS A AND B.

0704-0635RWVCTR EIGENVECTOR DETERMINATOR  
SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0635RWVCTR

CONTINUED FROM PRIOR COLUMN--

AUTHOR...WERNER L. FRANK

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN A REAL EIGENVALUE ALPHA OF A MATRIX A OF ORDER N TIMES N, THIS FORTRAN SUBPROGRAM DETERMINES THE CORRESPONDING REAL EIGENVECTOR V. IT HAS A DIMENSION STATEMENT A/50,50/ AND V/50/ WHICH CAN BE CHANGED ACCORDING TO NEEDS OF THE PROGRAMMER. THE INPUT MATRIX A IS DESTROYED IN COMPUTATION. 345 CELLS REQUIRED EXCLUDING ARRAYS A AND V. CORR/ 816

0704-0636RWB2F BESSEL FUNCTIONS OF ORDER  
ZERO

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0636RWB2F

AUTHOR...R.J. MERCER

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

COMPUTES J ZERO AND Y ZERO OF X FROM ASYMPTOTIC FORMULAS. REQUIRES 232 CELLS PLUS 10 COMMON. SIN, SQUARE ROOT AND LOG ROUTINES INCLUDED

0704-0636RWB3F BESSEL FUNCTIONS OF ORDER  
ONE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0636RWB3F

AUTHOR...R.J. MERCER

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

COMPUTES J ONE AND Y ONE OF X FROM ASYMPTOTIC FORMULAS. REQUIRES 235 CELLS PLUS 10 COMMON. SIN, SQUARE ROOT AND LOG ROUTINES INCLUDED.

0704-0647NPPMC2 EIGENVALUE SOLUTION, REAL  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0647NPPMC2

AUTHOR...R.H. TIBBITTS

DIRECT INQUIRIES TO..  
E. M. PIPER  
COMPUTING & DATA PROC., SEC 1351/31  
NORAIR, A DIV. OF NCRTHROP CORP.  
1001 E. BROADWAY  
HANTHORNE, CALIFORNIA

TO FIND THE HIGHEST EIGENVALUE AND CORRESPONDING EIGENVECTORS OF THE MATRIX EQUATION  $\lambda I - \lambda M$  SUB I /X SUB I/ WHERE  $\lambda$  M SUB I/ IS AN EIGENVALUE AND  $\lambda$  X SUB I/ IS THE ASSOCIATED EIGENVECTOR OF THE MATRIX  $\lambda$  A.

0704-0650RWREAD DOUBLE PRECISION FLOATING  
POINT CARD INPUT

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0650RWREAD

AUTHORS...W.L. FRANK R.B. FREUND

DIRECT INQUIRIES TO..  
ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS FORTRAN SUBPROGRAM REACS A 16 DECIMAL DIGIT /DOUBLE PRECISION/ FLOATING POINT NUMBER FROM A CARD. REQUIRES 502 CELLS. CORR/ 886

0704-0654AMCHKF SET SENSE LIGHTS  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0654AMCHKF

AUTHOR...SHARON E. GODD

DIRECT INQUIRIES TO..  
DR. JOHN W. WRENCH, JR.  
APPLIED MATHEMATICS LAB. CODE 840  
DAVID TAYLOR MODEL BASIN  
WASHINGTON 7, D. C.  
ATTENTION-MRS. F. E. HOLBERTON

FORTRAN SUBROUTINE TO TEST BITS 1-4 OF 9 LEFT ROW AND TURN ON CORRESPONDING SENSE LIGHTS.

0704-0659GCTLU1 TABLE READ IN & TABLE  
LOOKUP, INTERPOLATION SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.



CONTINUED FROM PRIOR PAGE--  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0659GCTLU1

AUTHOR...EMANUEL HAYES

DIRECT INQUIRIES TO..  
MR. GERALD D. FCGEL  
SUPERVISOR, AUTOMATIC COMPUTING GROUP  
RESEARCH DEPARTMENT  
GRUMMAN AIRCRAFT  
BETHPAGE, LONG ISLAND, NEW YORK

FOR FUNCTIONS OF ONE, TWO, AND THREE VARIABLES. STORES ALL TABLES AS A SINGLY-SUBSCRIPTED ARRAY. PROVISION TO READ IN ADDITIONAL TABLES AS NEEDED. SUITABLE ERROR RETURNS PROVIDED FOR BY A COMPUTED GO TO. SAME STANDARD CARD FORMATS FOR ALL TABLES. TABLES ARE SEQUENCE CHECKED WHILE BEING READ IN FROM BCD TAPE OR CARD READER.  
CORR/770

**0704-0664ANF202 EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0664ANF202

AUTHORS..MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE

DIRECT INQUIRIES TO AUTHOR

FORTRAN II SUBROUTINE FINDS ALL SCALAR SOLUTIONS, L /INCLUDING PROPER MULTIPLICITY/, AND, OPTIONALLY, THE ASSOCIATED UNIT NORM VECTORS, X, TO THE MATRIX EQUATION  $AX=IX$ . REQUIRES 935 CELLS PLUS VARIABLE COMMON.

**0704-0664ANF402 MATRIX INVERSION WITH SOLUTION OF LINEAR EQUATIONS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0664ANF402

AUTHOR...GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

DIRECT INQUIRIES TO AUTHOR

FORTRAN II SUBROUTINE SOLVES THE MATRIX EQUATION  $AX=B$ , WHERE A IS A REAL, SQUARE COEFFICIENT MATRIX AND B IS A MATRIX OF CONSTANT VECTORS. THE INVERSE MATRIX AND DETERMINANT ARE ALSO OBTAINED. A IS DESTROYED IN THE INVERSION. REQUIRES 458 CELLS PLUS VARIABLE COMMON.

**0704-0674RWSPAD ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0674RWSPAD

AUTHOR...ROBERT W. FINKEL

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS PROGRAM FINDS THE APPROXIMATE SOLUTION OF A SET OF ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS ON A TWO DIMENSIONAL REGION WITH PRESCRIBED BOUNDARY CONDITIONS BY THE METHODS OF FINITE DIFFERENCES AND SUCCESSIVE OVER RELAXATION. THE REGION MAY BE ARBITRARY IN SHAPE AND MAY INCLUDE INTERFACES AND HOLES. THE BOUNDARY CONDITIONS MAY BE MIXED. THE MAIN PROGRAM REQUIRES 5966 CELLS. EXCLUSIVE OF THE THREE SUBROUTINES THE USER MUST SUPPLY.

**0704-0687IBNL01 NON-LINEAR ESTIMATION /PRINCETON-IBM/**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0687IBNL01

AUTHORS..G. W. BOOTH T. I. PETERSON

DIRECT INQUIRIES TO..  
G. W. BOOTH  
IBM CORPORATION  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

GIVEN A FUNCTIONAL RELATION AND DATA FOR N OBSERVED VALUES OF A SINGLE DEPENDENT VARIABLE, NK CORRESPONDING VALUES FOR K INDEPENDENT VARIABLES, AND INITIAL VALUES FOR P PARAMETERS, THE PROGRAM /1/ PROVIDES BY AN ITERATIVE LEAST SQUARES PROCEDURE ESTIMATES FOR THE PARAMETERS AND /2/ PROVIDES STATISTICAL INFORMATION TO ASSES THE WORTH OF THE ESTIMATED PARAMETERS. USE OF THE PROGRAM FOR MORE THAN ONE DEPENDENT VARIABLE IS POSSIBLE. THE FUNCTIONAL RELATION MAY BE NON-LINEAR OR LINEAR IN THE PARAM. & INDEP. VAR.  
CORR/ 845

**0704-0688GKTHRI TAPE MANEUVERING ROUTINE.**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0688GKTHRI

AUTHOR...E.E. KAZMIERCZAK

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..  
MR. WALTER W. STONE  
ACA, COMPUTER TECHNIQUES DIV.  
KNOLLS ATOMIC POWER LAB.  
GENERAL ELECTRIC CO.  
SCHENECTADY N. Y.

THR IS A TAPE COPY ROUTINE WITH A NUMBER OF SUBROUTINES WHICH PERMIT RECORD MANIPULATION AND MODIFICATION IN ANY OF SEVERAL WAYS. THESE INCLUDE INDIVIDUAL WORD CHANGES AND CHECKSUM CORRECTION, AS WELL AS RECORD READ-IN FROM CARDS WHILE COPYING TAPES. ITS CHECKING METHCC MAKES IT A LITTLE SLOWER THAN GMTEC OR RL0044 IN SOME RESPECTS, BUT WHERE MERGING OF SEVERAL TAPES IS DESIRED, IT IS FASTER.

**0704-0697MIHDI4 SAP-CODED MATRIX DIAGONALIZATION SUBROUTINE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0697MIHDI4

AUTHOR...F. J. CORBATO

DIRECT INQUIRIES TO..  
SHARE LIBRARIAN  
COMPUTATION CENTER  
ROOM 26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

THIS SUBROUTINE DIAGONALIZES A REAL, SYMMETRIC MATRIX BY MEANS OF JACOBI'S METHOD WHEN THE MATRIX ELEMENTS ARE SINGLE-PRECISION, FLOATING-POINT NUMBERS STORED IN TRIANGULAR FORM MATRICES OF LARGE ORDER, N, ARE DIAGONALIZED IN A TIME PROPORTIONAL TO N CUBED AND WITH A MINIMUM NUMBER OF ROTATION.

**0704-0704NUCL15 HAFEVER**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL15

AUTHORS..M. A. FRIEDMAN P. F. ZWEIFEL

DIRECT INQUIRIES TO..  
MRS. MARGARET BUTLER  
ARGONNE NATIONAL LAB.  
ARGONNE CODE CENTER  
9700 SOUTH CASS AVE.  
ARGONNE, ILLINOIS

NATURE OF PROBLEM SOLVED CALCULATION OF THE ENERGY EXCHANGE INELASTIC SCATTERING CROSS SECTION / INTEGRATED OVER ANGLE/ ACCORDING TO THE HAUSER-FESHBACH THEORY AS MODIFIED BY D. GOLDMAN. THIS MODIFICATION INCLUDES THE EFFECT OF SPIN-ORBIT COUPLING ON THE TRANSMISSION COEFFICIENTS.

**0704-0704NUCL17 HECTIC**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL17

AUTHORS..W. C. REYNOLDS D. W. THOMPSON C. R. FISHER

DIRECT INQUIRIES TO..  
G. A. LINENBERGER  
SAN RAMON, CALIFORNIA

HECTIC IS A COMPUTER PROGRAM FOR CALCULATING HEAT TRANSFER RATES AND TEMPERATURES IN THE FUEL ELEMENTS OF TYPICAL GAS-COOLED NUCLEAR REACTORS. EFFECTS OF TURBULENT INTERCHANGE BETWEEN FLOW PASSAGES ARE CONSIDERED. THE COMPUTATION PROCEDURE AMOUNTS TO A NODAL OR LUMPED PARAMETER TYPE CALCULATION. AN 8K MEMORY IS REQUIRED. A FULL-SIZE RUN REQUIRES APPROXIMATELY 15 MINUTES.

**0704-0704NUCL19 INDEXING POWDER PATTERNS**  
AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL19

AUTHORS..I. R. TANNENBAUM B. J. LEMKE C. KRAMER

DIRECT INQUIRIES TO..  
I. R. TANNENBAUM  
KRAMER  
ATOMICS INTERNATIONAL

DESCRIPTION OF CODE A CODE IS PRESENTED FOR INDEXING POWDER PATTERNS QUICKLY AND ECONOMICALLY BY ADAPTATION OF HESSE'S METHOD FOR USE ON MODERN HIGH-SPEED COMPUTERS. THE DATA IS FINALLY TREATED BY COHEN'S METHOD TO GBVIATE INACCURACIES DUE TO SYSTEMATIC ERRORS.

**0704-0704NUCL23 PECAN**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL23

AUTHORS..I. S. LUCHTER W. J. O DONNELL W. C. REYNOLDS

DIRECT INQUIRIES TO..  
D. A. LINENBERGER  
SAN RAMON, CALIF.

THE PECAN CYCLE ANALYSIS CODE CALCULATES VARIOUS THERMODYNAMIC CYCLE DATA FOR GAS TURBINE POWER PLANTS, BASED ON A GIVEN SET OF DESIGN PARAMETERS. THE CALCULATIONS ENABLE OPTIMIZATION OF A SPECIFIC POWER PLANT DESIGN TO A MAJOR REQUIREMENT SUCH AS WEIGHT, ECONOMY, OR OUTPUT. THE CODE IS RESTRICTED TO THE USE OF A GASEOUS WORKING FLUID WITHIN A TEMPERATURE RANGE OF 300 R TO 2300 R, BUT IS

CONTINUED FROM PRIOR PAGE--  
OTHERWISE GENERAL.

0704-0704NUCL34 SNG  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL34

AUTHOR...BARBARA LEMKE

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANCRA PARK, CALIF.

THE PROGRAM IS A NEUTRON DIFFUSION CODE WHICH SOLVES THE NEUTRON TRANSPORT EQUATIONS IN THE STATIONARY CASE, USING THE SN METHOD / $\lambda = 1891$ /, AND ASSUMING ISOTROPIC SCATTERING AND ONE-DIMENSIONAL GEOMETRY. THE PRESENT VERSION OF THE CODE HAS BEEN MODIFIED TO REDUCE THE NUMBER OF ITERATIONS REQUIRED IN A GIVEN PROBLEM BY BETTER THAN A FACTOR OF TWO. THE CODE IS READILY APPLICABLE TO ANY SN APPROXIMATION OF REASONABLE ORDER /CONSTANTS FOR N EQUALS 2, 4, 6, AND 8 SUPPLIED/, TO ANY ONE-DIMENSIONAL GEOMETRY /PLANE, SPHERICAL OR INFINITE CYLINDRICAL IN SYMMETRY/, AND TO THE THREE EIGEN-VALUES-REACTIVITY, OUTER DIMENSION, OR EXPONENTIAL RATE. THE PROGRAM WAS WRITTEN USING THE LOS ALAMOS FLOW CODE SYSTEM /FLOCC/.

0704-0704NUCL38 STDY-3  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL38

AUTHOR...R. S. PYLE

DIRECT INQUIRIES TO..  
B. H. MOUNT  
P. O. BOX 1468  
PITT., PA.

STDY-3 IS A COMPUTER PROGRAM DESIGNED FOR THE THERMAL ANALYSIS OF A PRESSURIZED WATER NUCLEAR REACTOR DURING STEADY-STATE OPERATION. IT PERFORMS A COMPLETE STEADY-STATE, PARALLEL CHANNEL THERMAL ANALYSIS OF A RECTANGULAR WATER CHANNEL CORE WITH A PLATE-TYPE FUEL ELEMENT. A 16K MEMORY IS REQUIRED, AS WELL AS THREE TAPE UNITS AND A LOGICAL DRUM. TYPICAL COMPUTING TIME FOR A TWO-PASS CORE CONTAINING A HOT CHANNEL IN EACH PASS IS 0.72 MINUTES.

0704-0704NUCL50 ZOOM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL50

AUTHORS..R. N. STUART E. H. CANFIELD

DIRECT INQUIRIES TO..  
R. N. STUART  
LAWRENCE RADIATION LAB.  
UNIV. OF CALIF.  
LIVERMORE, CALIF.

SOLVES THE ONE-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION EQUATION FOR SLABS, CYLINDERS OR SPHERES. A MAXIMUM OF 10 MATERIALS, 30 REGIONS /OR ZONES/MAY BE USED. A HIGHER ORDER DIFFERENCING IS USED FOR THE LAPLACIAN AND A GENERAL TRANSFER MATRIX IS PERMITTED. 10 MINUTES.

0704-0704NUCL51 2DXY  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL51

AUTHORS...J. BENGSTON S. T. PERKINS

DIRECT INQUIRIES TO..  
G. A. LINENBERGER  
ARGONNE NATIONAL LABORATORY  
SAN RAMOS, CALIFORNIA

THE 2DXY PROGRAM SOLVES THE HOMOGENEOUS OR INHOMOGENEOUS MULTI-GROUP TRANSPORT EQUATION IN XY GEOMETRY. VACUUM, SURFACE SOURCE, OR REFLECTING BOUNDARY CONDITIONS ARE AVAILABLE AS OPTIONS. IN THE HOMOGENEOUS CASE THE USER MAY REQUEST THE COMPUTATION OF REACTIVITY, PERIOD, CRITICAL CONCENTRATIONS OF SOME COMPOSITION OR THE CRITICAL THICKNESS OF A ZONE. THE SR APPROXIMATION IS USED. SCATTERING MUST BE ISOTROPIC. ONE AND ONE-HALF HOURS FOR 6 GROUP, 1000 MESH POINTS ON THE T090 /USING THE BINARY EDITOR/.

0704-0704NUCL52 RE 224 REACTOR ECONOMICS  
CALCULATIONS  
AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL52

AUTHORS...J. HEESTAND L.T. WGS

DIRECT INQUIRIES TO..  
J. HEESTAND  
ARGONNE NATIONAL LABORATORY  
6700 SOUTH CLASS AVENUE  
ARGONNE, ILL.

THIS PROGRAM EVALUATES A COST FUNCTION FOR POWER REACTORS, SOLVING FOR EITHER M, THE COST OF ELECTRICITY /MILLS/KWHR/, OR V, THE VALUE OF PLUTONIUM /\$/GM/, GIVEN VARIOUS COST PARAMETERS AS INPUT. UP TO 10 FUEL CYCLES, EITHER CORE OR BLANKET CAN BE ACCOMMODATED, OR A FUEL CYCLE COST FOR FOSSIL-FUELED PLANTS CAN BE GIVEN AS INPUT FOR COMPARISON CALCULATIONS.

CONTINUED FROM PRIOR COLUMN--

THE MAXIMUM NUMBER OF FUEL CYCLES /CORE & BLANKET/  
ALLOWED IS TEN.

LESS THAN 1 MINUTE/PROBLEM WITH OFF-LINE OUTPUT.

0704-0704NUCL53 TCUP STRESSES AND  
DEFLECTIONS IN THICK, CURVED PLATES  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL53

AUTHORS..D. S. GRIFFIN C. M. FRIEDRICH

DIRECT INQUIRIES TO..  
D. S. GRIFFIN  
BETTIS ATOMIC POWER LABORATORY  
PITTSBURGH, PENNSYLVANIA

THE PROGRAM CALLED TCUP FOR THICK CURVED PLATE, IS IN FORTRAN-11 LANGUAGE AND HAS BEEN RUN ON THE IBM-704 AND THE PHILCO 2000 COMPUTERS. THE INPUT IS ON TAPE 8 AND THE OUTPUT IS ON TAPE 10. PROBLEMS MAY BE RUN SUCCESSIVELY WITH A BLANK LINE OF INPUT FOLLOWING THE LAST PROBLEM. OPTIONS ALLOW THE USER SEVERAL CHOICES AS TO THE TYPES OF PROBLEMS TO BE RUN-

/1/ A PARAMETRIC STUDY WITH DIFFERENT COMBINATIONS OF INSIDE RADIUS, OUTSIDE RADIUS, AND MAXIMUM ANGLE-  
/2/ A UNIFORM SPACING OF RADII AND ANGLES AT WHICH STRESSES ARE CALCULATED-  
/3/ RANDOM LOCATIONS OF RADIUS AND ANGLE AT WHICH STRESSES ARE CALCULATED-  
/4/ A LOAD PROBLEM WITH THE MOMENT, SHEAR FORCE, AND TENSILE FORCE SPECIFIED AT ONE END- OR A DEFLECTION PROBLEM WITH THE THREE WORKING DEFLECTIONS OF MOMENT, SHEAR FORCE, AND TENSILE FORCE SPECIFIED AT ONE END.

0704-0704NUCL54 HERESY 2 HETEROGENEOUS  
REACTOR CALCULATION METHODS  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL54

AUTHORS..CARL N. KLAHR L. B. MENDELSON JEROME HEITNER

DIRECT INQUIRIES TO..  
CARL N. KLAHR  
TECHNICAL RESEARCH GROUP  
2 AERIAL WAY  
SYOSSET, N. Y.

IN THIS REPORT IS PRESENTED A COMPLETE DESCRIPTION OF THE HERESY 2 CODE. THIS CODE CAN PERFORM REACTIVITY AND POWER DISTRIBUTION CALCULATIONS FOR COMPLEX LATTICE CORE ARRANGEMENTS IN AN INFINITE REFLECTOR TAKING INTO ACCOUNT MULTIPLE U-238 ABSORPTION RESONANCES AND U-235 FISSION RESONANCES. THE INCLUSION OF THE MULTIPLE RESONANCES REPRESENTS A DISTINCT ADVANCE OVER HERESY 1 WHICH INCLUDED PROVISIONS FOR ONLY ONE LUMPED ABSORPTION RESONANCE. HERESY 2 INCLUDES MANY OPTIONS WITHIN THE CODE ITSELF TO INCREASE ITS FLEXIBILITY AND TO DECREASE INPUT PREPARATION AND MACHINE RUNNING TIME FOR VERY COMPLEX PROBLEMS. THE REPORT INCLUDES SECTIONS ON INPUT PREPARATION, MACHINE OPERATING INSTRUCTIONS, OUTPUT FORMATS AND A COPY OF THE FORTRAN SOURCE PROGRAM. INPUT AND OUTPUT FOR A SAMPLE HERESY 2 REACTOR PROBLEM ARE ALSO GIVEN.

0704-0704NUCL55 QUADRIFIT  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL55

AUTHOR...R. G. SAINT PAUL  
INGENIEUR TECHNICIEN DES INDUSTRIES  
DE LELECTRICITE  
UNIVERSITE DU TRAVAIL  
PAUL PASTUR  
CHARLEROI, BELGIUM

DIRECT INQUIRIES TO AUTHOR

THE QUADRIFIT PROGRAM IS COMPOSED OF 3 SECTIONS, THE PURPOSE OF WHICH IS /A/ TO COMPUTE THE B COEFFICIENTS OF THE EMPIRICAL EQUATION /A/ AND ESTIMATE THE ACCURACY OF THE FITTING- /B/ TO COMPUTE Y EQUALS F/Y SUB 1, Y SUB K/ WHERE Y SUB 1 Y SUB K ARE SECOND DEGREE EXPRESSIONS OF THE SAME FORM AS /A/ AND Y A FITTED EXPRESSION, DEFINED WITH THE SAME VARIABLES AS IN Y SUB 1 AND Y SUB 2 AND ON THE SAME DOMAIN- /C/ TO COMPUTE Y EQUALS Y/X SUB 1 X SUB N/ FOR ANY VALUE OF X SUB 1 X SUB N.

0704-0704NUCL56 ARES-1 A RESONANCE INTEGRAL  
CODE  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL56

AUTHOR...F. L. FILLMORE  
ATOMICS INTERNATIONAL  
A DIVISION OF NORTH AMERICAN AVIATION

DIRECT INQUIRIES TO AUTHOR

ARES-1 IS USED TO CALCULATE EFFECTIVE RESONANCE INTEGRALS AND MULTIGROUP CROSS SECTIONS FOR LUMPS AND MIXTURES USING RESONANCE PARAMETERS. IF COMBINED, IN A SINGLE CODE, THE RESOLVED, UNRESOLVED AND 1/V PARTS OF THE CALCULATION WHICH WERE PREVIOUSLY IN SEPARATE CODES. IN ADDITION, MOST OF THE PRELIMINARY DATA PREPARATION AND ALL OF THE CORRECTIONS TO THE RESONANCE INTEGRAL THAT WERE PREVIOUSLY MADE BY HAND ARE NOW DONE BY THE MACHINE. THIS GREATLY REDUCES THE LABOR THAT WAS FORMERLY INVOLVED IN MAKING THESE CALCULATIONS/.

## 0704-0704NUCL57 CLIP 1

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL57

AUTHORS...B. ANDERSON J. DAVIS E. GELBARD  
P. JARVIS J. PEARSON

## DIRECT INQUIRIES TO..

B. ANDERSON  
BETTIS ATOMIC POWER LABORATORY  
PITTSBURGH, PENNSYLVANIA

CLIP IS DESIGNED TO SOLVE THE ONE VELOCITY TRANSPORT EQUATION IN ONE DIMENSIONAL CYLINDRICAL GEOMETRY IN A P-3 APPROXIMATION. THE P-3 EQUATIONS ARE SOLVED ITERATIVELY WITH THE AID OF STANDARD FINITE DIFFERENCING TECHNIQUES. ANISOTROPIC SCATTERING IS PERMITTED, WITHIN THE LIMITATIONS OF P-3, BUT THE INPUT SOURCE MUST BE ISOTROPIC. ZERO FLUX OR ZERO GRADIENT BOUNDARY CONDITIONS ARE AVAILABLE AS OPTIONS; AND AS A CONSEQUENCE OF THE METHOD OF SOLUTION, A P-1 SOLUTION CAN BE OBTAINED. CLIP IS RESTRICTED TO A MAXIMUM OF 50 REGIONS AND 501 MESH POINTS.

## 0704-0704NUCL58 KERNMAT

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL58

AUTHOR...S. A. RAJE  
ATOMIC POWER DEPARTMENT  
WESTINGHOUSE ELECTRIC CORPORATION  
FOREST HILLS, PENNSYLVANIA

## DIRECT INQUIRIES TO AUTHOR

COMPUTER FOR WHICH CODE IS DESIGNED-IBM 7090 - IBM 704  
PROGRAMMING SYSTEM-FORTRAN 11

NATURE OF PROBLEM SOLVED-EFFECTIVE MULTIPLICATION FACTOR AND RELATIVE POWER DISTRIBUTION AT FUEL ASSEMBLIES BY THE HETEROGENEOUS METHOD OR SMALL SOURCE THEORY OF REACTOR CALCULATIONS. FUEL ASSEMBLIES THAT ARE FULLY EQUIVALENT TO EACH OTHER WITHIN THE HETEROGENEOUS LATTICE FORM A ROD TYPE. COORDINATE SPECIFICATION OF EVERY PAIR OF RODS FOR ALL THE ROD TYPES MUST BE ENTERED. FOR RECTANGULAR LATTICES A SEPARATE ROUTINE, DECAR, IS AVAILABLE FOR COORDINATE GRID GENERATION.

RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM- A MAXIMUM OF 36 ROD TYPES IS AVAILABLE. THERMAL AGE-DIFFUSION KERNELS OR THEIR LINEAR COMBINATION UP TO THREE TERMS CORRESPONDING TO INFINITE LINE SOURCE SINKS IN AN INFINITE MODERATOR ARE ASSUMED, WITH ALL RESONANCE ABSORPTIONS-FISSIONS IN FUEL LUMPED AT ONE ENERGY. MACHINE REQUIREMENTS- 32 K MEMORY, 3 INTERMEDIATE TAPES, INPUT-OUTPUT TAPES UNDER FORTRAN MONITOR.

TYPICAL RUNNING TIME- 1 TO 5 MIN., DEPENDING UPON PROBLEM SIZE/OPTIONS.

UNUSUAL FEATURES OF THE CODE-COORDINATE, KERNEL AND/OR MATRIX INTERMEDIATE DATA CAN BE WRITTEN ON AND READ FROM AUXILIARY TAPES FOR USE IN SUBSEQUENT PROBLEMS.

## 0704-0704NUCL59 GENDA-RENUPAK

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL59

AUTHOR...G. RABINOWITZ  
UNITED NUCLEAR CORP.  
DEVELOPMENT DIV - NDA  
WARREN, MICHIGAN

## DIRECT INQUIRIES TO AUTHOR

ALL INPUT TO THIS CODE, EXCEPT FOR TITLE CARD, IS IN DECIMAL FORM PUNCHED ON CARDS ACCORDING TO THE REQUIREMENTS OF SAP /SHARE ASSEMBLY PROGRAM/.

- A. COLUMNS 1-M MUST ALWAYS BE BLANK.
- B. COLUMNS 8-10 CONTAIN THE LETTERS -  
BCD - TITLE CARD  
DEC - DECIMAL DATA  
TRA - TRANSFER CARD
- C. DECIMAL NUMBERS ARE PUNCHED IN COLS. 12-71.
- D. ALL DATA PUNCHED TO THE RIGHT OF THE FIRST BLANK COLUMN BEYOND COL. 12 ARE IRRELEVANT.
- E. COMMAS SEPARATE SUCCESSIVE WORDS OF DATA ON A CARD BUT A COMMA MUST NOT FOLLOW THE LAST NUMBER ON A CARD.
- F. EACH DIFFERENT TYPE OF INPUT MUST BEGIN WITH A NEW CARD.
- G. FIXED DECIMAL INTEGERS /FX/ ARE PUNCHED WITHOUT A DECIMAL POINT /E.G., 1, 10, 100, ETC./
- H. FLOATING DECIMAL NUMBERS /FL/ ARE PUNCHED EITHER AS FIXED DECIMAL NUMBERS WITH A DECIMAL POINT /E.G., 1.04, .5, .003, ETC./ OR FLOATING DECIMAL NUMBERS WITH THE EXPONENT SEPARATED FROM THE FRACTIONAL PORTION BY THE LETTER E /E.G., 1.01E-1, .5E1, 3.E-2, ETC./
- I. THE SIGN OF A NUMBER NEED ONLY BE PUNCHED IF IT IS NEGATIVE.
- J. AT LEAST ONE BLANK COLUMN MUST SEPARATE THE LAST WORD ON A CARD FROM ANY LABEL INFORMATION THAT MIGHT BE SUPPLIED IN COLS. 72-80.

## 0704-0704NUCL60 FIRN

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL60

AUTHORS...RICHARD LEVEE WILLIAM LINDLEY GLORIA SCOGGIN

## DIRECT INQUIRIES TO..

RICHARD LEVEE  
LAWRENCE RADIATION LAB.  
UNIVERSITY OF CALIF.  
LIVERMORE, CALIF.

CONTINUED FROM PRIOR COLUMN--

THE FIRN CODE DETERMINES A NUMERICAL SOLUTION TO THE NEUTRON TRANSPORT EQUATION IN FINITE CYLINDRICAL GEOMETRY. IT IS BASED ON THE MULTI-GROUP ISOTROPIC THEORY AND THE DIFFERENCE EQUATIONS ARE DERIVED FROM THE DISCRETE SN METHOD OF B. CARLSON AND C. LEE /LA 2260/. IT IS WRITTEN IN FORTRAN LANGUAGE. THE PRESENT FIRN IS LIMITED TO A MAXIMUM OF SIX GROUPS AND TO 52, 54, 56.

## 0704-0704NUCL61 AX-1, A COMPUTING PROGRAM FOR COUPLED NEUTRONICS HYDRODYNAMICS CALCULATIONS

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL61

AUTHORS...D. OKRENT J.M. COOK D. SATKUS  
R.B. LAZARUS M.B. WELLS

## DIRECT INQUIRIES TO..

D. OKRENT  
ARGONNE NATIONAL LABORATORY  
P.O. BOX 299  
LEMONT, ILL.

GIVEN A SPHERICALLY SYMMETRIC, SUPER-PROMPT CRITICAL SYSTEM, THE PROGRAM COMPUTES THE VARIATION IN TIME AND SPACE OF THE SPECIFIC ENERGY, TEMPERATURE, PRESSURE, DENSITY, VELOCITY, AS A FUNCTION OF TIME IT COMPUTES THE REACTIVITY /IN THE FORM OF ALPHA, THE INVERSE PERIOD/, THE POWER, THE TOTAL ENERGY, AND THE POSITION OF THE BOUNDARIES OF THE VARIOUS SHELLS INTO WHICH THE SYSTEM HAS BEEN SUBDIVIDED. ALL DELAYED NEUTRON EFFECTS ARE IGNORED, AND NO ALLOWANCE IS MADE FOR TRANSFER OF HEAT BY CONDUCTION OR RADIATION. THE INPUT INFORMATION INCLUDES THE INITIAL REACTIVITY OR GEOMETRY, THE INITIAL VELOCITIES AND TEMPERATURES OF THE MASS POINTS, THE COMPOSITION AND DISPOSITION OF MATERIALS, THE APPROPRIATE EQUATION OF STATE CONSTANTS, AND THE MICROSCOPIC NEUTRON CROSS SECTIONS. FOR PURPOSES OF CALCULATION THE SPHERICAL ASSEMBLY IS DIVIDED INTO A NUMBER OF HYPOTHETICAL SPHERICAL SHELLS OR MASS POINTS. THE NEUTRONICS OF THIS SYSTEM ARE CALCULATED IN CONVENTIONAL FASHION, USING THE S SUB N METHOD, /5.67/ THEREBY PROVIDING A POWER DISTRIBUTION ACROSS THE RADIAL NETWORK, AS WELL AS THE ALPHA OF THE SYSTEM.

## 0704-0704NUCL62 2D PERT

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL62

AUTHOR...J.A. KOERNER  
ARGONNE NATIONAL LAB.  
9700 SOUTH CASS AVE.  
ARGONNE, ILL.

## DIRECT INQUIRIES TO AUTHOR

NATURE OF PROBLEM SOLVED- GIVEN MULTIGROUP REAL AND ADJOINT FLUXES OF A CYLINDRICAL CONFIGURATION, 2D PERT MAY COMPUTE THE PROMPT NEUTRON LIFETIME, THE RELATIVE WORTH OF VARIOUS DELAYED NEUTRONS, REACTION INTEGRALS OF GIVEN MATERIALS OVER A GIVEN REGION, LOCAL PERTURBATIONS AND INTEGRATED PERTURBATIONS. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM- THE CODE IS WRITTEN TO USE THE REAL AND ADJOINT FLUX TAPES MANUFACTURED BY THE CUREM CODE, HOWEVER, A SUBROUTINE HAS BEEN WRITTEN TO PREPARE THESE TAPES WHEN THE INFORMATION IS AVAILABLE FROM A SOURCE OTHER THAN THE CUREM CODE. UP TO 20 GROUPS, 36 REGIONS, 50 POINTS ON THE R AXIS, AND 60 ON THE Z AXIS ARE ALLOWED. MACHINE REQUIREMENTS- 32K MEMORY. TYPICAL RUNNING TIME- AN AVERAGE PROBLEM RUNS 5 TO 10 MINUTES DEPENDING ON THE NUMBER OF OPTICNS SELECTED.

## 0704-0704NUCL63 NDC / NUCLEAR DESIGN CALCULATIONS /

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL63

AUTHORS...H.W. GRAVES, JR. S.A. RAJE

## DIRECT INQUIRIES TO..

H.W. GRAVES, JR.  
NUCLEAR ENGINEERING SECTION  
WESTINGHOUSE ELECTRIC CORPORATION  
ATOMIC POWER DIVISION  
P.O. BOX 355  
PITTSBURGH 30, PA.

THE NDC /NUCLEAR DESIGN CALCULATIONS/ PROGRAM HAS BEEN DEVELOPED - IN FORTRAN FOR USE ON THE IBM-704/709/7090 - TO COMPUTE THE REACTIVITY AND BURNUP PROPERTIES OF PRESSURE-TUBE LATTICES WITH CLUSTERED FUEL RODS BY APPLYING THE UNIT CELL METHOD. THE REQUIRED INPUT CONSISTS OF THE FUEL ASSEMBLY AND THE TUBE LATTICE GEOMETRY, THE MATERIAL DISTRIBUTIONS AND SOME PHYSICAL DATA.

THE UNIT CELL ANALYSIS IS APPLIED TO A PIECEWISE HOMOGENEOUS, CYLINDRICAL, EQUIVALENT MODEL OF THE ACTUAL REACTOR STRUCTURE. THE AMOVAL-BENDIST METHOD IS USED TO OBTAIN THE THERMAL UTILIZATION. THE DANCORR CORRECTION AND THE DOPPLER FACTOR IS APPLIED IN EVALUATING THE RESONANCE INTEGRAL FOR THE FISSIONABLE MATERIALS. THE SPINRAD APPROACH IS USED TO COMPUTE THE FAST FISSION FACTOR. THE RESONANCE FISSIONS FEEDBACK IS TAKEN INTO ACCOUNT IN THE NEUTRON CYCLE. ONLY THE U-PU SERIES IS CONSIDERED IN THE CELL-HOMOGENIZED DEPLETION CALCULATIONS.

THE PROGRAM OUTPUT INCLUDES THE EQUIVALENT CYLINDRICAL GEOMETRY, THE VARIOUS CROSS SECTIONS, THE CRITICALITY FACTORS, THE INITIAL CONVERSION RATION AND THE BURNUP RESULTS. PROVISION FOR TEMPERATURE AND VOID COEFFICIENTS EVALUATION IS MADE. A 32K MACHINE IS REQUIRED. TYPICAL PROBLEM RUNNING TIMES ON THE IBM 7090 ARE OF THE ORDER OF A MINUTE.

0704-0704NUCL64 HATCHET FOR IBM 704  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL64

AUTHOR...J. P. LEHMAN  
AEROJET-GENERAL NUCLEONICS  
SAN RAMON, CALIF.

DIRECT INQUIRIES TO AUTHOR

HATCHET IS AN IBM 704 CODE DESIGNED TO STUDY BURST CHARACTERISTICS OF A SUPER-PROMPT CRITICAL, CONCENTRIC SHELL PULSED REACTOR. IT COMPUTES SPECIFIC ENERGY, TEMPERATURE, PRESSURE, DENSITY, AND VELOCITY VARIATIONS AS A FUNCTION OF TIME AND SPACE. THE CODE ALSO COMPUTES REACTIVITY AS A FUNCTION OF INVERSE REACTOR PERIOD, POWER, THE TOTAL AND KINETIC ENERGIES, AND THE POSITION OF THE SHELLS WHICH COMPRISE THE SYSTEM. DELAYED NEUTRON EFFECTS ARE IGNORED AND NO ALLOWANCE IS MADE FOR TRANSFER OF HEAT. THE CODE IS LIMITED TO A MAXIMUM OF THREE NEUTRON ENERGY GROUPS AND SIX MATERIALS.

0704-0704NUCL65 PECAN II  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0704NUCL65

AUTHORS...S. LUCHTER P. J. DUBOIS

DIRECT INQUIRIES TO...

S. LUCHTER  
AEROJET-GENERAL NUCLEONICS  
SAN RAMON, CALIF.

THE PECAN II CYCLE ANALYSIS CODE CALCULATES VARIOUS THERMODYNAMIC CYCLE DATA FOR GAS TURBINE POWER PLANTS, WITH ONE OR TWO STAGE INTERCOOLING, BASED ON A GIVEN SET OF DESIGN PARAMETERS. THE CODE IS RESTRICTED TO THE USE OF A GASEOUS WORKING FLUID WITHIN A TEMPERATURE RANGE OF 300 DEGREE TO 3700 DEGREE R, BUT IS OTHERWISE GENERAL.

0704-0705MHD12 704-SAP FLOATING-PT. TRAP  
MATRIX DIAGONALIZATION--  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0705MHD12

AUTHOR...SHARE LIBRARIAN  
COMPUTATION CENTER  
ROOM 26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

DIRECT INQUIRIES TO AUTHOR

SUBROUTINE. THIS SUBROUTINE DIAGONALIZES A REAL, SYMMETRIC MATRIX BY MEANS OF JACOBI'S METHOD WHERE THE MATRIX ELEMENTS ARE SINGLE-PRECISION, FLOATING-POINT NUMBER STORED IN TRIANGULAR FORM. MATRICES OF LARGE ORDER, N, ARE DIAGONALIZED IN A TIME PROPORTIONAL TO N CUBED AND WITH A MINIMUM NUMBER OF ROTATIONS. MHD12 IS ESSENTIALLY MHD14 MODIFIED TO TAKE ADVANTAGE OF FLOATING POINT TRAP.

0704-0705MHD13 704-FORTRAN II SUBPROGRAM  
FOR MATRIX--  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0705MHD13

AUTHOR...SHARE LIBRARIAN  
COMPUTATION CENTER  
ROOM 26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

DIRECT INQUIRIES TO AUTHOR

DIAGONALIZATION. THIS FORTRAN II SOURCE LANGUAGE SUBROUTINE DIAGONALIZES A REAL, SYMMETRIC MATRIX BY MEANS OF JACOBI'S METHOD WHERE THE MATRIX ELEMENTS ARE SINGLE-PRECISION FLOATING-POINT NUMBERS. CRRR./731

0704-0726SCXPCD TRANSPORTATION CODE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0726SCXPCD

AUTHOR...L.M. ISAACSON

DIRECT INQUIRIES TO...

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

704 TRANSPORTATION CODE USING JAMES MUNKERS ALGORITHM /SIAM JOURNAL, MARCH 1957/. REQUIRES 8K CORE, 4 DRUMS AND AT LEAST 1 TAPE UNIT.

0704-0743ORFLOT FLOAT A FRACTION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0743ORFLOT

AUTHOR...MR. E. B. CARTER

DIRECT INQUIRIES TO...

MR. J. P. KELLY  
UNION CARBIDE NUCLEAR CORPORATION  
OAK RIDGE GASEOUS DIFFUSION PLANT  
OAK RIDGE, TENNESSEE

CONTINUED FROM PRIOR COLUMN--  
ATTENTION-MR. E. B. CARTER  
THIS 704 SUBROUTINE CONVERTS A FRACTION TO NORMALIZED FLOATING POINT. THE RESULT IS UNROUNDED.

0704-0749SCBOP1 MULTIPLE REGRESSION BACK  
SOLUTION PROGRAM

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0749SCBOP1

AUTHORS...K.K. BAILEY E.J. THOMPSON D.C. MCGOWAN

DIRECT INQUIRIES TO...

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

TO PROVIDE BACK SOLUTIONS FOR THE RESULTS OF THE MULTIPLE REGRESSION CODE SCRAP.

0704-0749SCIEMR INPUT EDITOR FOR MULTIPLE  
REGRESSION CODE SCRAP

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0749SCIEMR

AUTHORS...K.K. BAILEY E.J. THOMPSON D.C. MCGOWAN

DIRECT INQUIRIES TO...

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

THIS 704 PROGRAM USES FORTRAN TO CALCULATE FUNCTION VARIABLES FROM OBSERVED VARIABLES AND PLACE THEM IN THE FORMAT REQUIRED FOR THE MULTIPLE REGRESSION CODE SCRAP.

0704-0749SCRAP MULTIPLE REGRESSION &  
CORRELATION ANALYSIS PROGRAM

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0749SCRAP

AUTHORS...K.K. BAILEY E.J. THOMPSON D.C. MCGOWAN

DIRECT INQUIRIES TO...

MR. B. A. ROSENBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

PROVIDES MULTIPLE CORRELATION COEFFICIENTS, STANDARD ERROR OF ESTIMATES, MEANS, STANDARD DEVIATIONS, REGRESSION COEFFICIENTS AND T-TABLE ENTRIES FOR UP TO 39 INDEPENDENT VARIABLES WITH AS MANY AS 400 OBSERVATIONS PER VARIABLE. REQUIRES 4K 704 WITH 1 DRUM AND AT LEAST 4 TAPES. CRRR/944

0704-0753NUEXPI EXPONENTIAL INTEGRAL

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0753NUEXPI

AUTHOR...JAMES W. CECLEY

DIRECT INQUIRIES TO...

MR. MAX GOLDSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

COMPUTES  $E1/X$ ,  $EXP(-X)/E1/X$ , OR  $E1/X - LOG(X)$ . FORTRAN 2 SUBROUTINE VERSION OF NU EXPI ON RELOCATABLE BINARY CARDS INCLUDING LOG AND EXP SUBROUTINES. 29219 COMMON STORAGE.

0704-0766ANC203 ZEROS OF A POLYNOMIAL IN  
DOUBLE PRECISION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0766ANC203

AUTHOR...MARY FISHERKILLER

DIRECT INQUIRIES TO...

MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

COMPUTES IN DOUBLE PRECISION THE REAL AND COMPLEX ZEROS OF A REAL POLYNOMIAL. OUTPUT OF ZEROS WITH MULTIPLICITIES AND REMAINDER TERMS AS WELL AS ORIGINAL COEFFICIENTS. OPTIONAL OUTPUT OF MODULI AND COEFFICIENTS OF POLYNOMIAL GENERATED FROM ZEROS FOUND. MODIFICATION OF ROOT-SQUARING METHOD. C203 IS A COMPLETE PROGRAM WHICH INCLUDES- BS INTP, BS CONV, BS OUT, BS LNX, BS DPSQ, BS EXP, UA CSH2, UA SPH1, MU RCI2.

0704-0768UADB2 DECIMAL-TO-BINARY CONVERSION  
PROGRAM-UA DBC 2

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0768UADB2

CONTINUED FROM PRIOR PAGE--

AUTHOR...RCU HUTT

DIRECT INQUIRIES TO..

MR. WALTER A. RAMSHAW  
COMPUTATION LABORATORY  
RESEARCH DEPARTMENT  
UNITED AIRCRAFT CORPORATION  
400 MAIN STREET  
EAST HARTFORD 8, CONNECTICUT

FIXED POINT, FLOATING POINT, INTEGER OR BCD CONVERSION.  
VARIABLE FIXED FIELD FORMAT A LA FORTRAN. FLAG COLUMNS MAY  
BE SPECIFIED TO CAUSE INTERRUPTION OF CONVERSION. UPON  
INTERRUPT NUMBERS MAY BE SCALED, REPLACED, IGNORED, ETC.  
LOADING IS BY BLOCK, BUT THE INTERRUPT ALLOWS INPUT TO BE  
LOADED INTO ARBITRARY CORE LOCATIONS. REQUIRES THE USE OF  
UATSM2 OR UACSH2 TO READ TAPE OR CARDS. OCCUPIES 467 CORE  
STORAGE LOCATIONS AND 40 WORDS OF COMMON STORAGE.

0704-0772ANE206 LEAST SQUARE POLYNOMIAL FIT  
/FORTRAN 11/

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0772ANE206

AUTHOR...BURTON S. GARBOW

DIRECT INQUIRIES TO..

MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

GIVEN A SET OF N VALUES OF X WITH WEIGHTS W, AND ONE OR  
MORE SETS OF CORRESPONDING VALUES OF Y, ROUTINE DETERMINES  
THE M COEFFICIENTS OF THE POLYNOMIAL/S/ OF DEGREE M-1  
WHICH GIVES THE BEST FIT TO THE SETS/ OF Y. THE  
RESIDUALS, WEIGHTED SUMS/ OF SQUARES OF RESIDUALS, AND  
THE ERROR MATRIX ARE ALSO COMPUTED. REQUIRES 296 CELLS  
PLUS VARIABLE COMMON. SUBROUTINES POLY1 AND XLOC INCLUDED  
IN DECK. USES ANF402.

0704-0775RWDE6F FLOATING PT. COWELL /2ND  
SUM/, RUNGE-KUTTA INTEGRATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0775RWDE6F

AUTHORS...J.F. HOLT W.G. STRANG

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

OF SECOND-ORDER EQUATIONS. SOLVES A SET OF N SIMULTANEOUS  
SECOND-ORDER ORDINARY DIFFERENTIAL EQUATIONS, IN WHICH  
FIRST DERIVATIVES MAY OR MAY NOT APPEAR.

0704-0775RWGLSC GENERAL LEAST SQUARE CURVE  
FITTING ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0775RWGLSC

AUTHORS...L. SACHNOFF J.F. HOLT

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN AN N X M MATRIX A, AN M DIMENSIONAL ROW VECTOR B AND  
AN N X N DIAGONAL MATRIX S /STORED AS A ROW/ THIS ROUTINE  
FINDS AN N DIMENSIONAL ROW VECTOR V. IF THE USER SETS ALL  
S = 0 SOLVES V IN THE LEAST SQUARES SENSE.

0704-0776RWAV4F GENERAL ANALYSIS OF VARIANCE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0776RWAV4F

AUTHOR...D.W. GIEDT

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO COMPUTE AND PRINT ALL SUMS OF SQUARES ASSOCIATED WITH  
FACTRIAL EXPERIMENTATION. ALL SUMS OF OBSERVATIONS  
ENTERING INTO EACH SUM OF SQUARES ARE ALSO PRINTED.  
POLYNOMIAL PARTITIONING OF MAIN EFFECT SUMS OF SQUARES IS  
OPTIONAL. ANY DEGREE OF FRACTIONAL REPLICATION CAN BE  
HANDLED, AS WELL AS A HIGH DEGREE OF MULTIPLE REPLICATION.  
CORR/ 874

0704-0776RWAV5F LATIN SQUARES ANALYSIS OF  
VARIANCE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0776RWAV5F

AUTHOR...D.W. GIEDT

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO COMPUTE AND PRINT ALL SUMS OF SQUARES ASSOCIATED WITH  
LATIN SQUARES EXPERIMENTATION. SUMS OF OBSERVATION OVER  
EACH LEVEL OF EACH FACTOR ARE ALSO PRINTED. POLYNOMIAL  
PARTITIONING IS OPTIONAL. A HIGH DEGREE OF MULTIPLE  
REPLICATION IS PERMISSIBLE.

0704-0781WH0042 SELF LOADING TAPE WRITING  
ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0781WH0042

AUTHOR...T.W. MARTIN

DIRECT INQUIRIES TO..

DR. P.A. ZAPHYR MGR  
DIGITAL ANALYSIS&COMPUTATIONS  
ADVANCED SYSTEMS ENGINEERING DEPT.  
COMPUTER BLDG.  
EAST PITTSBURGH PENN.

TO LOAD THE INFORMATION FROM A FORTRAN OBJECT PROGRAM  
ONTO A MASTER PROGRAM TAPE. TO BE USED WITH ALL BUT THE  
DECK WHICH MAKES UP THE FINAL RECORD. A CHECK SUM IS  
COMPUTED FOR EACH RECORD.

0704-0781WH0043 SELF LOADING TAPE WRITING  
ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0781WH0043

AUTHOR...T.W. MARTIN

DIRECT INQUIRIES TO..

DR. P. A. ZAPHYR MGR  
DIGITAL ANALYSIS&COMPUTATIONS  
ADVANCED SYSTEMS ENGINEERING DEPT.  
COMPUTER BLDG.  
EAST PITTSBURGH PENN.

TO LOAD THE INFORMATION FROM A FORTRAN OBJECT PROGRAM ONTO  
A MASTER PROGRAM TAPE. TO BE USED WITH THE DECK WHICH  
MAKES UP THE FINAL RECORD.

0704-0789IBMLO1 MACHINE LOADING PROBLEM OF  
LINEAR PROGRAMMING

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0789IBMLO1

AUTHORS..KURT EISEMANN JANICE R. LOURIE

DIRECT INQUIRIES TO..

KURT EISEMANN  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

SOLVES A GENERALIZATION OF THE TRANSPORTATION PROBLEM IN  
WHICH EACH TERM OF ROW AND/OR COLUMN SUMS MAY BE WEIGHTED  
BY ARBITRARY NON-UNITARY COEFFICIENTS. SAP LISTING  
DISTRIBUTED IN S.O. 883

0704-0794RWNP3F FLOATING POINT /N/ VARIATE  
PROBABILITY INTEGRAL

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0794RWNP3F

AUTHOR...RUTH GITTLEMAN

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

OBTAINS THE PROBABILITY INTEGRAL FOR N/2 LESS THAN OR  
EQUAL N LESS THAN OR EQUAL 5/ VARIATES OF THE NORMAL  
FREQUENCY FUNCTION OVER POLYGONAL REGIONS. REQUIRES  
279 CELLS FOR PROGRAM AND CONSTANTS PLUS 14 COMMON.CORR.  
1208

0704-0804RWMIN MINIMIZATION ROUTINE FOR A  
FUNCTION OF N VARIABLES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0804RWMIN

AUTHOR...FRANCIS S. WELSH

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

LOCATES THE MINIMUM OF A FUNCTION OF N VARIABLES  
REQUIRES 272 CELLS

**0704-0818CESCL COMPREHENSIVE LINEAR**

**PROGRAMMING ON THE**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0818CESCL

**AUTHOR...MR. ELI HELLERMAN**  
C. E. I. A., INCORPORATED  
1200 JEFFERSON CAVIS HIGHWAY  
ARLINGTON 2, VIRGINIA

**DIRECT INQUIRIES TO AUTHOR**

SCROL IS A COMPREHENSIVE OPERATING SYSTEM FOR PERFORMING LINEAR PROGRAMMING COMPUTATIONS ON THE IBM 704. USES RS-1051 AS A BASE. INCORPORATES A WHOLE NEW DIMENSION OF CONTROL FOR L.P. ON 700 SERIES MACHINES. REQUIRES AT LEAST 8K CORE STORAGE 8K DRUM STORAGE, ON-LINE CARD READER, CARD PUNCH, 6 SENSE SWITCHES, 6 TAPE UNITS/PREFERABLY 77, AND PERIPHERAL TAPE TO PRINTER. SCROL IS NOT SUITABLE FOR INCORPORATION IN ANOTHER OPERATING SYSTEM. CORR/ 831, 840, 888

**0704-0822TVREM MAIN REGRESSION PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0822TVREM

**AUTHORS...L. R. GROSENBAUGH CARCL HADEK**

**DIRECT INQUIRIES TO...**

MARTIN HOCHDORF  
CHIEF, COMPUTING CENTER  
TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE

A MULTIPLE REGRESSION PROGRAM WHICH PERFORMS ANALYSIS OF A DEPENDENT VARIABLE AND ALL LINEAR COMBINATIONS OF UP TO NINE INDEPENDENT VARIABLES. THE MAXIMUM NUMBER OF VARIATIONS DEPENDS UPON THE SIZE OF THE 704 /8K, 16K, OR 32K/. THE PROGRAM FURNISHES A MATRIX OF VARIATIONS AND CO-VARIATIONS AND ALSO THE REGRESSION COEFFICIENTS OF ALL INDEPENDENT VARIABLE COMBINATIONS ALONG WITH THE EXPLAINED VARIATIONS OF EACH COMBINATION.

**0704-0825JPDEQ DIFFERENTIAL EQUATIONS**

**SOLVER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0825JPDEQ

**AUTHOR...FRED LESH**

**DIRECT INQUIRIES TO...**

MR. WILLIAM R. HOOVER  
JET PROPULSION LABORATORY  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
4800 OAK GROVE DRIVE  
PASADENA 3, CALIFORNIA

SOLVES SIMULTANEOUS DIFFERENTIAL EQUATIONS WITH INTERRUPTIBLE INTEGRATION ON EITHER THE INDEPENDENT OR THE DEPENDENT VARIABLES. METHOD USED IS A FOURTH ORDER RUNGE KUTTA. STORAGE REQUIREMENTS ARE 452 WORDS FOR PROGRAM, PLUS 6 WORDS OF COMMON.

**0704-0825JPINT GENERAL INTERGRAL EVALUATOR**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0825JPINT

**AUTHOR...FRED LESH**

**DIRECT INQUIRIES TO...**

MR. WILLIAM R. HOOVER  
JET PROPULSION LABORATORY  
CALIFORNIA INSTITUTE OF TECHNOLOGY  
4800 OAK GROVE DRIVE  
PASADENA 3, CALIFORNIA

GENERATES THE SIMPSON RULE APPROXIMANTS FOR ANY TYPE OF INTEGRAL EXPRESSION, WHETHER ITERATED INTEGRAL, MULTIPLE INTEGRAL, VECTOR VALUED INTEGRAL FROM A VECTOR VALUED FUNCTION, OR THE INTEGRAL OF A FUNCTION OF OTHER INTEGRALS. REQUIRES 92 WORDS PLUS 1 COMMON.

**0704-0833RWBJO BESSEL FUNCTIONS JO/X/AND YO/X/**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0833RWBJO

**AUTHOR...R. J. MERCER**

**DIRECT INQUIRIES TO...**

ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN X, TO APPROXIMATE THE BESSEL FUNCTIONS JO/X/AND/OR YO/X/,REQUIRES 275 CELLS.

**0704-0833RWBJY1 BESSEL FUNCTION J1/X/ AND Y1/X/**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0833RWBJY1

**AUTHOR...R. J. MERCER**

CONTINUED FROM PRIOR COLUMN--

**DIRECT INQUIRIES TO...**

ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN X, TO APPROXIMATE THE BESSEL FUNCTIONS J1/X/ AND/OR Y1/X/,REQUIRES 278 CELLS.

**0704-0837ORNLLS NON-LINEAR LEAST SQUARES**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0837ORNLLS

**AUTHOR...MR. E. B. CARTER**

**DIRECT INQUIRIES TO...**

MR. J. P. KELLY  
UNION CARBIDE NUCLEAR CORPORATION  
OAK RIDGE GASEOUS DIFFUSION PLANT  
OAK RIDGE, TENNESSEE  
ATTENTION - MR. E. B. CARTER

ITERATES FOR THE LEAST SQUARES ESTIMATES OF PARAMETERS WHEN DATA ARE BEING FITTED WITH NON-LINEAR FUNCTIONS. THE USER PROVIDES A PROGRAM TO EVALUATE THE FUNCTION AND ITS DERIVATIVES. THE VARIANCE OF ANY FUNCTION OF THE PARAMETERS CAN BE ESTIMATED.

**0704-0837ORT005 STUDENTS T AT .05 LEVEL**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0837ORT005

**AUTHOR...P. B. WOOD**

**DIRECT INQUIRIES TO...**

MR. J. P. KELLY  
UNION CARBIDE NUCLEAR CORPORATION  
OAK RIDGE GASEOUS DIFFUSION PLANT  
OAK RIDGE, TENNESSEE  
ATTENTION - MR. E. B. CARTER

COMPUTES STUDENTS T AT THE .05 LEVEL FOR A FIXED OR FLOATING POINT ARGUMENT. TIMING - 1.6 MS. USES 75 LOCATIONS IN LOWER MEMORY.

**0704-0843ORICBH INCREMENT COLUMN BINARY**

**IMAGE OF HOLLERITH NUMBER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0843ORICBH

**AUTHOR...MR. E. B. CARTER**

**DIRECT INQUIRIES TO...**

MR. J. P. KELLY  
UNION CARBIDE NUCLEAR CORPORATION  
OAK RIDGE GASEOUS DIFFUSION PLANT  
OAK RIDGE, TENNESSEE  
ATTENTION-MR. E. B. CARTER

ADDS 1 TO 3-DIGIT HOL. NO. IMAGE IN 1 COLUMN-BINARY WORD.

**0704-0844MEGPL1 GENERAL PROGRAM LOADER**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0844MEGPL1

**AUTHOR...R. W. CORNELLI**

**DIRECT INQUIRIES TO...**

WILLIAM W. BROWN  
THE MITRE CORPORATION  
P. O. BOX 208  
BEDFORD, MASS.

5 CARD SELF-LOADING PROGRAM WHICH LOADS BINARY, OCTAL AND TRANSFER CARDS, ANY OF WHICH MAY BE EITHER ABSOLUTE OR RELOCATABLE. USES 167 OCTAL LOCATIONS. LOCATION IN CORE IS DETERMINED AT ASSEMBLY TIME.

**0704-0848ARCS11 FN II SINE-COSINE INTEGRAL SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0848ARCS11

**AUTHOR...R. L. CUSHMAN**

RESEARCH AND ADVANCE DEVELOPMENT DIV.  
AVCO MANUFACTURING CORPORATION  
201 LOWELL STREET  
WILMINGTON, MASSACHUSETTS

**DIRECT INQUIRIES TO AUTHOR**

COMPUTES INTEGRAL //SIN/Y//Y+DY/ FROM 0 TO X AND INTEGRAL //COS/Y//Y+DY/ FROM INFINITY TO X, FOR X GOING FROM MINUS TO PLUS INFINITY. REQUIRES AR TOR 1. USES 606 WORDS.

**0704-0849MIDIAT DIATOMIC MOLECULAR INTEGRAL PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0849MIDIAT

**AUTHORS...A. C. SWITENDICK F. J. CORBATC**

CONTINUED FROM PRIOR PAGE--

## DIRECT INQUIRIES TO..

SHARE LIBRARIAN  
COMPUTATION CENTER  
RCOM26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

PROGRAM CALCULATES ANY OR ALL 1 AND 2 ELECTRON 1 AND 2 CENTER INTEGRALS BETWEEN SETS OF BASIS FUNCTIONS BY NUMERICAL INTEGRATION USING THE BARNETT-COULSON METHOD FOR THE 2 CENTER INTEGRALS. THE BASIS SET MAY CONSIST OF UP TO 20 RALS. FUNCTIONS PER CENTER. A FUNCTION CONSISTS OF A LINEAR COMBINATION OF SLATER ORBITALS /16 TERMS MAXIMUM/. INDICATIONS OF INTEGRAL AND SUM CONVERGENCE ARE GIVEN. PUNCHED/PRINTED/BINARY OUTPUT. E

## 0704-0850BSORTH GENERAL-ORTHONORMALIZING SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0850BSORTH

AUTHORS..PHILIP J. WALSH EMILIE HAYNSWERTH

## DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.

A. ORTHONORMALIZES A SET OF VECTORS WITH RESPECT TO A GENERAL INNER PRODUCT. B. APPROXIMATES A GIVEN FUNCTION BY A LINEAR COMBINATION OF ARBITRARY FUNCTIONS DEFINED NUMERICALLY BY A SET OF VALUES. C. FINDS BEST /LEAST SQUARE / POLYNOMIAL FIT TO GIVEN FUNCTIONS. D. DETERMINES ORTHONORMAL EXPANSIONS OF FUNCTIONS. E. FINDS BEST SOLUTION /IN L.S.S./ TO A SYSTEM OF M LINEAR EQUATIONS IN N UNKNOWN./N LESS THAN OR EQUAL TO M/. CODE OCCUPIES 1111 CELLS AND USES 15 COMMON CELLS. 1221

## 0704-0858G55412 CONTINUED FRACTIONS CURVE FITTING AND INTERPOLATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0858G55412

AUTHOR..ADELE K. ORICK

## DIRECT INQUIRIES TO..

MR. HARRY N. CANTRELL  
LARGE STEAM TURBINE-GENERATOR  
DEPARTMENT 59-244  
GENERAL ELECTRIC COMPANY  
SCHENECTADY, NEW YORK

FROM A SET OF GIVEN POINTS ON A CURVE, THIS PROGRAM CALCULATES TWO EQUATIONS PASSING EXACTLY THROUGH THE POINTS. ONE EQUATION BY THE CONTINUED FRACTION METHOD, AND ONE EQUATION BY THE DIVIDED DIFFERENCE METHOD. ALSO, THE PROGRAM INTERPOLATES /OR EXTRAPOLATES/ TWO SETS OF Y VALUES ONE FOR EACH OF THE TWO EQUATIONS CALCULATED/ FOR A GIVEN SET OF X VALUES.

## 0704-0859GSL165 LEAST SQUARES RATIONAL FUNCTION CURVE FITTING

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0859GSL165

AUTHOR..ADELE K. ORICK

## DIRECT INQUIRIES TO..

MR. HARRY N. CANTRELL  
LARGE STEAM TURBINE-GENERATOR  
DEPARTMENT 59-244  
GENERAL ELECTRIC COMPANY  
SCHENECTADY, NEW YORK

FROM A SET OF POINTS ON A CURVE, THIS PROGRAM MAKES A SEARCH FOR THE FUNCTIONS WHICH FIT THE CURVE CLOSELY, USING A LEAST SQUARES METHOD. THE RATIONAL FUNCTIONS AND POLYNOMIALS /WHEN THE DENOMINATOR=1.0/ FITTED TO THE CURVE ARE OF THE FOLLOWING FORM--Y-/A16A2X6A3X\*\*2E44X\*\*3E...// /1.0G61X6B2X\*\*2.../

## 0704-0861ERTSDA TIME SERIES DECOMPOSITION AND ADJUSTMENT

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0861ERTSDA

AUTHOR...L.T. UNG

## DIRECT INQUIRIES TO..

MR. M. A. EFROYMONS  
ESSC RESEARCH AND ENGINEERING COMPANY  
P. O. BOX 209  
MADISON, NEW JERSEY

FORTTRAN PROGRAM TO ADJUST SEASONAL AND IRREGULAR TIME SERIES TO A FORM THAT SHOWS PRIMARILY THE TREND-CYCLICAL MOVEMENTS. SEASONAL FACTORS, IRREGULAR FLUCTUATIONS AND MANY SUMMARY MEASURES USEFUL IN TIME SERIES ANALYSIS ARE COMPUTED IN THE PROCESS. BASICALLY ADAPTATION OF TENNESSEE VALLEY AUTHORITY PROGRAM /T/ TSDA/ TO BK 704. PROGRAM ALSO EXTENDED TO PERMIT /1/ ADJUSTING FOR DELIVERY DAYS AND /2/ FITTING LEAST SQUARES TREND LINE AS FORECASTING AID.

## 0704-0863RS001 FORTRAN MATHEMATICAL PROGRAMMING SYSTEM ONE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR COLUMN--  
SPECIFY FILE NUMBER 0704-0863RS001

AUTHOR...PHILIP WOLFE

## DIRECT INQUIRIES TO..

MR. GEORGE A. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

A SYSTEM OF ROUTINES FOR LINEAR PROGRAMMING WRITTEN ALMOST ENTIRELY IN THE FORTRAN LANGUAGE. THE REVERSE-TIMPLEX METHOD WITH EXPLICIT INVERSE IS USED, WITH SINGLE-OR DOUBLE PRECISION OPTION. THE PRESENT OBJECT PROGRAM WAS COMPILED FOR 32K AND HANDLES PROBLEMS HAVING UP TO 97 EQUATIONS, 299 VARIABLES, AND 2499 NON-ZERO MATRIX ENTRIES. SPECIAL FEATURES INCLUDE OUTPUT FLEXIBILITY, REINVERSION, INTERRUPT ABILITY, USE OF SYSTEM TAPE, AND BATCH RUNNING. EMPHASIS WAS PLACED ON EASE OF MODIFICATION IN THE SYSTEM DESIGN.

## 0704-0878BEMIMX EXTREMUM OF UNIMODAL FUNCTIONS OF ONE VARIABLE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0878BEMIMX

AUTHOR...J.F. TRAUB

## DIRECT INQUIRIES TO..

DR. G. L. BALDWIN  
MATHEMATICAL RESEARCH DEPT.  
BELL TELEPHONE LABORATORIES  
MURRAY HILL LABORATORY  
MURRAY HILL, NEW JERSEY

ANY NUMBER OF FUNCTIONS MAY BE MAXIMIZED /MINIMIZED/. THE DESIRED ACCURACY MAY BE SPECIFIED, OR THE NUMBER OF FUNCTIONAL VALUES TO BE USED MAY BE SPECIFIED AND THE PROGRAM WILL CALCULATE THE EXTREMUM TO THE BEST ACCURACY THEN POSSIBLE. THE PROGRAM HAS ADDITIONAL ERROR PRINTOUTS.

## 0704-0878BEMSD1 ESTIMATION FROM DOUBLY TRUNCATION SAMPLES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0878BEMSD1

AUTHOR...J.F. TRAUB

## DIRECT INQUIRIES TO..

DR. G. L. BALDWIN  
MATHEMATICAL RESEARCH DEPT.  
BELL TELEPHONE LABORATORIES  
MURRAY HILL LABORATORY  
MURRAY HILL, NEW JERSEY

ESTIMATES THE MEAN AND STANDARD DEVIATION OF THE ORIGINAL POPULATION FROM A DOUBLY TRUNCATED SAMPLE OF A NORMAL POPULATION WHERE THE AMOUNT OF TRUNCATION IS UNKNOWN AND THE TRUNCATION POINTS ARE KNOWN. THE COVARIANCE MATRIX OF THE ESTIMATES BASED ON THE ASYMPTOTIC PROPERTIES OF THE ESTIMATES IS ALSO GIVEN.

## 0704-0880BSME1 SOLUTION OF MATRIX EQUATION AX-B USING INTERVAL ARITH

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0880BSME1

AUTHOR...DR. GEORGE COLLINS  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

## DIRECT INQUIRIES TO AUTHCR

PROGRAM IS IN THE FORM OF AN INTERNAL SUBROUTINE. THE ELEMENTS OF OUTPUT MATRIX X ARE CLOSED FINITE INTERVALS WHICH CONTAIN THE ELEMENTS OF THE EXACT SOLUTION, ROUND-OFF ERROR ACCOUNTED FOR. USEFUL FOR MATRICES OF SMALL ORDER, SAY 15 OR LESS. USES FORM OF GAUSS ELIMINATION. EMPLOYS 18 INTL FOR INTERVAL ARITHMETIC. REQUIRES 491 LOCATIONS EXCLUSIVE OF 18 INTL. EXECUTION TIME ABOUT .6M/6M62MM6M66 N/ MILLI-SECONDS, WHERE A IS MAX AND B IS MIN.

## 0704-0884PKKWIC KEY WORD IN CONTEXT

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0884PKKWIC

AUTHOR...MARILYN LOCKHART

## DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

EACH WORD IN A SERIES OF BIBLIOGRAPHY TITLES IS LOOKED UP IN A TABLE TO DETERMINE ITS STATUS AS EITHER A KEY WORD OR A COMMON WORD. FOR EACH KEY WORD FOUND 60 CHARACTERS OF THE SURROUNDING TITLE AS PUT OUT WITH THE EMBEDDED KEY-WORD BEGINNING AT THE 256TH CHARACTER. THE TOTAL KEY WORD IN CONTEXT OUTPUT MAY BE STORED TO PRODUCE AN INDEX FOR THE BIBLIOGRAPHY AUTHOR AND SOURCE INFORMATION ATTENDANT TO EACH TITLE IS CONDENSED IN A STANDARD FASHION TO 11 CHARACTERS FOR OUTPUT WITH EACH KEY WORD IN THE CORRESPONDING TITLE.

## 0704-0891MURKY4 MURA FIXED POINT RUNGE-KUTTA

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR PAGE--  
SPECIFY FILE NUMBER 0704-0891MURKY4

AUTHOR...JESSE ANDERSON

DIRECT INQUIRIES TO..

MR. MELVIN R. STORM  
MIDWESTERN UNIV. RESEARCH ASSOC.  
2203 UNIVERSITY AVENUE  
MADISON 5, WISCONSIN  
ATTN- MR. HENRY L. CARLSON

SOLVES A SET OF N SIMULTANEOUS FIRST ORDER DIFFERENTIAL EQUATIONS. 48 WORDS OF PROGRAM PLUS 3 COMMON PLUS 3N WORDS OF STORAGE. TIMING /4.12N60.5964/AUXILIARY TIME// MS. PER INTEGRATION STEP.

0704-0897AAPDS1 POWER DENSITY SPECTRUM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0897AAPDS1

AUTHORS..PHILIP REAL CYNTHIA CANNADAY

DIRECT INQUIRIES TO..

MR. W. B. FRITZ MGR.  
MGR. INFORMATION PROCESSING DEPT  
WESTINGHOUSE ELECTRIC CORP.  
BUSINESS SYSTEMS DIVISION  
FRIENDSHIP INTERNATIONAL AIRPORT  
P. O. BOX 1693  
BALTIMORE 3, MARYLAND

THE SUBROUTINE COMPUTES THE RMS, ARITHMETIC MEAN, AND THE POWERS AT A SPECIFIED FREQUENCY INTERVAL FOR A SET OF DATA THE NUMBER OF DATA POINTS AND THE TIME INCREMENT AT WHICH THE POINTS ARE OBTAINED ARE REQUIRED. THE PROGRAM USES 246 CELLS.

0704-0913NCKRFP KWIC REPORT FOR PRINTING OR PUNCHING

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0913NCKRFP

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

READS SORTED KWIC OUTPUT FROM NC KSP2 AND WRITES A TAPE TO PUNCH OR PRINT THE TAPE IS IN THE SAME FORMAT AS THE ORIGINAL KWIC OUTPUT.

0704-0914NCKSP1 KWIC SORT PROGRAM FIRST PART  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0914NCKSP1

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

SORT PROGRAM FOR THE KEY WORDS OF THE PK KWIC PROGRAM. WRITTEN IN SURGE FOR 8K 704. NC KRFP IS NECESSARY TO WRITE THE ACTUAL REPORT. USES NC KSP2 TO COMPLETE THE DECK. NC KSP1 PRECEDES NC KSP2 AS ONE COMPLETE DECK.

0704-0914NCKSP2 KWIC SORT PROGRAM SECOND PART

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0914NCKSP2

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

SECOND PART OF NC KSP1 NECESSARY BECAUSE ONE BINARY DECK CANNOT EXCEED 100 CARDS / SEE NC KSP1 /

0704-0915VMRCA MULTIPLE REGRESSION, COMPREHENSIVE ANALYSIS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0915VMRCA

AUTHOR...WILLIAM M. SNYDER

DIRECT INQUIRIES TO..

MARTIN HOCHDORF  
CHIEF, COMPUTING CENTER  
TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE

CONTINUED FROM PRIOR COLUMN--

INCORPORATES ALL NORMAL PHASES OF STATISTICAL REGRESSION ANALYSIS. STARTING WITH DATA LISTING OF ALL VARIABLES, COMPUTATION PROCEEDS THRU LEAST SQUARES FITTING. STANDARD STATISTICAL COEFFICIENTS, STANDARD ERRORS, SUMS OF SQUARES, AND AVERAGES ARE COMPUTED AND PRINTED. PREDICTIONS AND RESIDUAL ERRORS FOR EACH ITEM IN DATA LISTING ARE COMPUTED AND PRINTED. OPTIONAL FEATURES INCLUDE USE OF SYNTHETIC OBSERVATIONS AND ALSO RE-EVALUATION OF ANY NUMBER OF ANY COMBINATION OF VARIABLES. CORR/1167

0704-0918MEPYRS FORTRAN II BINOMIAL COEFFICIENT SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0918MEPYRS

AUTHOR...PETER W. BRANCT

DIRECT INQUIRIES TO..

WILLIAM W. BROWN  
THE MITRE CORPORATION  
P. O. BOX 208  
BEDFORD, MASS.

FOR NON-NEGATIVE, INTEGRAL NUMBERS LESS THAN 131, COMPUTES A SET OF BINOMIAL COEFFICIENTS BY ADDITION IN THE FORTRAN SINGLE-PRECISION FLOATING-POINT MODE AND STORES THEM IN A ONE DIMENSIONAL ARRAY. MAXIMUM ACCURACY IS MAINTAINED DURING THE COMPUTATION. WITH INCLUDED BINARY CORRECTION CARD, INNERMOST LOOP IS 13 CYCLES /CN 704/ AND IS EXECUTED N/N-1/2 TIMES. 6562 IN COMMON.

0704-0926TAVIPS VIPP SORTER.

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0926TAVIPS

AUTHOR...R. T. DORRANCE

DIRECT INQUIRIES TO..

J. F. HERRON  
CHIEF OF COMPUTING  
TEMCO AIRCRAFT CORP.  
P. O. BOX 6191  
DALLAS 22, TEXAS

FIRST PHASE OF A GENERAL PURPOSE TAPE SORTER FOR THE IBM 704. SECOND PHASE IS M3 TA VIPM. PROGRAM CHARACTERISTICS INCLUDE /1/ ABILITY TO SORT VARIABLE LENGTH ITEMS. /2/ ABILITY TO SORT NON-VIPP TAPES. /3/ ABILITY TO SORT ON ANY PORTIONS OF AN ITEM. /4/ CONTROL CHECKSUM TO GUARANTEE THE SORT. /5/ RECOVERY PROCEDURE. /6/ TAPE COUNTS FOR TAPE ERROR DIAGNOSIS. /7/ FAVORABLE TIMING.

0704-0929OLDPSC DOUBLE PRECISION SIN-COS ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0929OLDPSC

AUTHOR...RICH. V. WADDING

DIRECT INQUIRIES TO..

MR. P. R. PERCINO  
IBM CORPORATION  
FEDERAL SYSTEMS DIVISION  
DEPARTMENT 537  
OWEGO, NEW YORK

COMPUTES A DOUBLE PRECISION FLOATING POINT SINE OR COSINE OF A DOUBLE PRECISION FLOATING POINT ARGUMENT. THE ARGUMENT MUST BE IN RADIANS. 291 STORAGE CELLS & 26 COMMON.

0704-0930GMGMD GMR DYANA DYNAMICS ANALYZER-PROGRAMMER

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0930GMGMD

AUTHORS..E. JACKS J. CLZTYN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

A PROGRAMMING SYSTEM FOR THE STUDY OF LUMPED-PARAMETER VIBRATION SYSTEMS AND OTHER DYNAMICS SYSTEMS. PART 1 FOR TIME VARYING SOLUTIONS. NONLINEAR/DISCONTINUOUS PARAMETERS ALLOWED USES RKG INTEGRATION. PART 2 FOR FREQUENCY RESPONSE OF LINEAR SYSTEMS. IN EACH CASE DYANA PRODUCES COMPLETE FORTRAN PROGRAM FOR THE SOLUTION OF A PARTICULAR PHYSICAL SYSTEM AND/OR SET OF DIFF. EQNS. ALSO PRODUCES SPECIFICATION SHEET INDICATING FORMAT OF NUMERICAL DATA TO BE USED WITH GENERATED FORTRAN PROGRAM. USES 4 TAPE UNITS, 8K STORAGE. CORR./1189

0704-0931PKXPX DOUBLE PRECISION FLOATING POINT EXPONENTIAL ROUTINE.

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0931PKXPX

AUTHOR...TIEN-CHI CHEN



CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

GIVEN A DOUBLE PRECISION FLOATING POINT ARGUMENT IN THE  
AC-MQ, PKEXPD COMPUTES THE EXPONENTIAL OF THE ARGUMENT, AND  
LEAVES THE RESULT IN THE AC-MQ. ANSWER HAS AT LEAST 53  
GOOD BITS. ARGUMENT MUST BE LESS THAN 88 IN MAGNITUDE.  
TIME-8 MS, SPACE 256 CELLS & 13 COMMON.

0704-0937ERCONV LP/90 TO SCROL 704 INPUT  
CONVERTER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0937ERCONV

AUTHOR...L. J. LARSON

DIRECT INQUIRIES TO..

MR. M. A. EFROYMSON  
ESSO RESEARCH AND ENGINEERING COMPANY  
P. O. BOX 209  
MADISON, NEW JERSEY

PROGRAM CONVERTS SHARE STANDARD LINEAR PROGRAMMING INPUT  
DATA FROM LP/90 FORMAT TO SCROL 704 FORMAT. LP/90 FORMAT  
PERMITS THE USE OF 6 CHARACTER ROW MNEMONICS AND ELIMINATES  
THE NECESSITY OF SPECIFYING SLACK VECTORS IN THE INITIAL  
BASIS AND IN THE MATRIX.

0704-0962SQSIMQ SIMULTANEOUS EQUATIONS  
SOLVER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0962SQSIMQ

AUTHOR...E.K. MONTOYA

DIRECT INQUIRIES TO..

MR. M. T. MCFAT  
DATA SERVICES DEPARTMENT 7240  
SANDIA CORPORATION  
SANDIA BASE  
ALBUQUERQUE, NEW MEXICO

THIS IS A SELF CONTAINED FORTRAN PROGRAM DESIGNED TO  
OBTAIN A VECTOR SOLUTION OF N SIMULTANEOUS LINEAR EQUATIONS  
IN N UNKNOWN. TAKES A CARD INPUT WITH COEFFICIENTS OF  
VARIABLES AND VECTORS PUNCHED IN BCD WITH VARIABLE FIELD  
WIDTH.

0704-0963IB3FES FORECASTING BY ECONOMETRIC  
SYSTEMS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0963IB3FES

AUTHOR...HARRY EISENPRESS  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

DIRECT INQUIRIES TO AUTHCR

ESTIMATES THE COEFFICIENTS OF A SYS. OF LINEAR STOCHASTIC  
EQUATIONS BY LIMITED-INFORMATION, TWO-STAGE LEAST-SQUARES,  
AND FULL-INFO. COVARIANCES OF ESTIMATES ARE COMPUTED. ALSO  
REDUCED-FORM EQUATIONS FOR COMPLETE SYS. CAN HANDLE UP TO  
30 EQUATS. IN 30 DEPENDENT VARIABLES AND 35 INDEPENDENT  
VARIABLES FOR 1000 OBSERVATIONS. CORR/ 1019, 1106, 1270

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0704-0963IB4FES FORECASTING BY ECONOMETRIC  
SYSTEMS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0963IB4FES

AUTHOR...HARRY EISENPRESS  
WATSON SCIENTIFIC COMPUTING LAB.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

DIRECT INQUIRIES TO AUTHCR

ESTIMATES THE COEFFICIENTS OF A SYS. OF LINEAR STOCHASTIC  
EQUATIONS BY LIMITED-INFORMATION, TWO-STAGE LEAST-SQUARES,  
AND FULL-INFO. COVARIANCES OF ESTIMATES ARE COMPUTED. ALSO  
REDUCED-FORM EQUATIONS FOR COMPLETE SYS. CAN HANDLE UP TO  
70 EQUATS. IN 70 DEPENDENT VARIABLES AND 70 INDEPENDENT  
VARIABLES FOR 5000 OBSERVATIONS. CORR/ 1019, 1106, 1271

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0704-0969PKIP01 INTEGER PROGRAMMING 1

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0969PKIP01

AUTHOR...C. SHANESY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONTINUED FROM PRIOR COLUMN--

INDEPENDANT FORTRAN PROGRAM FOR SOLVING INTERGER PROG.  
PROBLEMS, I.E. L/PROGRAMMING PROBLEMS WITH RESTRICTION THAT  
VARIABLES INVOLVED BE INTERGERS. REQUIRES 32K MEMORY AND  
ACCEPTS PROB. WITH ONE OBJECTIVE FUNCTION, UP TO 100  
VARIABLES, AND AS MANY AS 200-N CONSTRAINTS, WHERE N IS THE  
NUMBER OF VARIABLES. ALL COEFFICIENTS IN PROBLEM  
FORMULATION MUST BE INTERGERS, METHOD USED IN DESCRIPTION  
IN R.E. GOMORY, ALL-INTERGER PROGRAMMING ALGORITHM, IBM  
RESEARCH REPORT RC-189.

0704-0969PKIP81 INTEGER PROGRAMMING 1

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0969PKIP81

AUTHCR...C. SHANESY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

AN 8K MEMORY VERSION OF PK IP01. HANDLES PROBLEMS WITH ONE  
OBJECTIVE FUNCTION, UP TO 35 VARIABLES, AND AT MOST 75-N  
CONSTRAINTS, WHERE N IS THE NUMBER OF VARIABLES.

0704-0970PKIP02 INTEGER PROGRAMMING 2

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0970PKIP02

AUTHCR...C. SHANESY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

INDEPENDENT FORTRAN PROG. FOR SOLVING INTEGER PROGRAMMING  
PROBS. METHOD USED IS BASICALLY THE ALL-INTEGER ALGORITHM  
EMPLOYED IN PK IP01, BUT CONTAINS MODIFICA-WHICH PERMIT  
SOLUTION OF SOME PROBS. INTRACTABLE FOR IP01. RUN TIME  
PER ITERATION IS INCREASED, BUT NUMBER OF ITERATIONS IS  
GENERALLY REDUCED, WITH THE RESULT THAT THE CODE IS FASTER  
FOR DIFFICULT PROBLEMS, SLOWER ONLY ON SIMPLE PROBLEMS.  
MACHINE AND PROBLEM RESTRICTIONS ARE SAME FOR IPC1 1237

0704-0970PKIP82 INTEGER PROGRAMMING 2

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0970PKIP82

AUTHCR...C. SHANESY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

AN 8K MEMORY VERSION OF PK IP02, WITH THE PROBLEM SIZE  
RESTRICTIONS OF IP81. THAT IS, PROBLEMS MAY HAVE AT MOST  
35 VARIABLES AND 75-N CONSTRAINTS, WHERE N IS THE NUMB. OF  
VARIABLES. CORR. 1237

0704-0971PKIP03 INTEGER PROGRAMMING 3

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0971PKIP03

AUTHCR...C. SHANESY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

INDEPENDENT FORTRAN PROG. FOR SOLVING INTEGER PROGRAMMING  
PROBS. GENERALLY MORE EFFECTIVE THAN IP01 OR IP02 EXCEPT  
ON DEGENERATE PROBLEMS. REQUIRES 32K MEMORY, 1 TAPE, TAPE-  
TO-PRINTER. NUMB. OF VARIABLES, N, MAY NOT EXCEED 100, AND  
TOTAL NUMBER OF OBJECTIVE FUNCTIONS AND CONSTRAINTS HAS AN  
APPROXIMATE LIMIT OF 190-N. EMPLOY METHODS OF R.E. GOMORY'S  
REPORTS--PRINCETON-IBM MATHEMATICS RESEARCH PROJECT  
TECHNICAL REPORT NO. 1 AND IBM RESEARCH REPORT RC-189.

0704-0973RSBP01 LINEAR PROGRAMMING WITH  
UPPER BOUNDS ON VARIABLES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-0973RSBP01

AUTHCR...LEOLA CUTLER

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

THIS LINEAR PROGRAMMING SYS. WILL SOLVE PROBLEMS THAT HAVE  
UPPER BOUND RESTRICTIONS ON SOME OR ALL THE VARIABLES. THE  
ALGORITHM IS A MODIFICATION OF THE REVISED SIMPLEX METHOD  
WITH THE INVERSE IN PRODUCT FORM. NO EQUATIONS ARE WRITTEN  
FOR THE BOUNDS. THEY ARE HANDLED AS SPECIAL DATA. MAXIMUM

CONTINUED FROM PRIOR PAGE--  
 PROBLEM SIZE IS 256 EQUAT. AND 11,232 VARIABLES. CODE DOES  
 A MINIMUM AMOUNT OF TAPE READING. JOB CAN BE INTERRUPTED.  
 RESTART PROCEDURES, REINVERSION OF BASIS, AND PRINTOUT OF  
 D/J VALUES ARE SPECIAL FEATURES.

**0704-0977ALEPT ELLIPTIC INTEGRAL, COMPLETE  
 AND INCOMPLETE**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-0977ALEPT

AUTHOR...DAVID J. KAPLAN

DIRECT INQUIRIES TO--  
 DR. WILLIAM A. MERSMAN  
 AMES RESEARCH CENTER  
 NATIONAL AERONAUTICS  
 AND SPACE ADMINISTRATION  
 MOFFET FIELD, CALIFORNIA

THIS SUBROUTINE WILL EVALUATE THE INCOMPLETE ELLIPTIC  
 INTEGRALS OF THE FIRST AND SECOND KIND GIVEN PHI AND K.  
 IT WILL ALSO EVALUATE THE COMPLETE ELLIPTIC INTEGRALS OF  
 THE FIRST AND SECOND KIND, GIVEN K. THE METHOD USED IN THE  
 EVALUATION GIVES IMPROVED ACCURACY FOR K NEAR ONE.

**0704-0979NUBES3 BESSEL FUNCTION OF COMPLEX  
 ARGUMENT AND ORDER**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-0979NUBES3

AUTHOR...MR. MAX GOLDSTEIN  
 AEC COMPUTING CENTER  
 INSTITUTE OF MATHEMATICAL SCIENCES  
 NEW YORK UNIVERSITY  
 4 WASHINGTON PLACE  
 NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO COMPUTE THE BESSEL FUNCTIONS J AND Y FOR COMPLEX  
 ARGUMENT AND COMPLEX ORDER. 704 FORTRAN SOURCE LANGUAGE  
 AND USES METHOD OF NU BES1.

**0704-0980ANZ013 VARIABLE METRIC MINIMIZATION**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-0980ANZ013

AUTHOR...K. E. HILSTROM

DIRECT INQUIRIES TO--  
 MR. GEORGE ROBINSON  
 APPLIED MATHEMATICS DIVISION  
 ARGONNE NATIONAL LABORATORY 203-C246  
 9700 CASS AVENUE  
 ARGONNE, ILLINOIS

THIS FORTRAN ROUTINE DETERMINES LOCAL MINIMA OF  
 DIFFERENTIABLE FUNCTIONS OF N VARIABLES. THE PROGRAM  
 EMPLOYS THE VARIABLE METRIC METHOD FOR MINIMIZATION. IN  
 THE PROCESS OF LOCATING EACH MINIMUM, A MATRIX H WHICH  
 CHARACTERIZES THE BEHAVIOR OF THE FUNCTION ABOUT THE  
 MINIMUM IS DETERMINED. FOR A REGION IN WHICH THE FUNCTION  
 DEPENDS QUADRATICALLY ON THE VARIABLES, NO MORE THAN N  
 ITERATIONS ARE REQUIRED. ROUTINE REQUIRES 6,137 STORAGES.  
 VOIDED BY Z0 ANF2013 SDA 1117

**0704-1006RSIPL5 INFORMATION PROCESSING  
 LANGUAGE V INTERPRETIVE SYSTEM**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1006RSIPL5

AUTHORS..A. NEWELL F.M. TONGE

DIRECT INQUIRIES TO--  
 MR. GEORGE H. MEALY  
 NUMERICAL ANALYSIS DEPARTMENT  
 THE RAND CORPORATION  
 1700 MAIN STREET  
 SANTA MONICA, CALIFORNIA

INTERPRETS AND EXECUTES PROGRAMS WRITTEN IN IPL-V  
 LANGUAGE, AS DESCRIBED IN INFORMATION PROCESSING LANGUAGE  
 V MANUAL, SECTIONS I AND II

**0704-1008IBCTR CHEBYSHEV TRUNCATION SYSTEM**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1008IBCTR

AUTHOR...MR. KURT SPIELBERG  
 INTERNATIONAL BUSINESS MACHINES CORP.  
 1271 AVENUE OF AMERICAS  
 NEW YORK 22, N. Y.

DIRECT INQUIRIES TO AUTHOR

COMPUTES POLYNOMIAL, RATIONAL AND CONTINUED FRACTION  
 APPROXIMATIONS TO ANALYTIC FUNCTIONS, DOUBLE PRECISION  
 ACCURACY, INPUT...POWERSERIES COEFFICIENTS, REQUIRED  
 ACCURACY OR NUMBER OF COEFFICIENTS SPECIFIED IN CALL.  
 SEQU., RESULTS CAN BE TESTED AT UP TO 106 POINTS

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1012ORCBL ON-LINE LOADER FOR COL. BIN.  
 ABS. AND TSF. CARDS**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR COLUMN--  
 SPECIFY FILE NUMBER 0704-1012ORCBL

AUTHOR...E.B. CARTER

DIRECT INQUIRIES TO--  
 MR. J. P. KELLY  
 UNICARB CARBIDE NUCLEAR CORPORATION  
 OAK RIDGE GASEOUS DIFFUSION PLANT  
 OAK RIDGE, TENNESSEE  
 ATTENTION - MR. E. B. CARTER

UPPER, LOWER VERSIONS OF DS CBL 1 WITH PROVISIONS FOR 7/5  
 PCH.

**0704-1017AND107 NUMERICAL INTEGRATION BY  
 MIDPOINT PROCEDURE**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1017AND107

AUTHOR...DAVID L. RUSSELL

DIRECT INQUIRIES TO--  
 MR. GEORGE ROBINSON  
 APPLIED MATHEMATICS DIVISION  
 ARGONNE NATIONAL LABORATORY 203-C246  
 9700 CASS AVENUE  
 ARGONNE, ILLINOIS

NUMERICAL INTEGRATION BY MIDPOINT PROCEDURE--  
 WITH PREFERENTIAL INTERVAL PLACEMENT.  
 FORTRAN II FUNCTION SUBPROGRAM EVALUATES THE INTEGRAL OF A  
 FUNCTION BETWEEN TWO LIMITS WITH MAXIMUM ERROR SUPPLIED BY  
 THE USER. PROGRAM PLACES INTERVALS WHERE NEEDED BY  
 ESTIMATING THE SECOND DERIVATIVE OF THE FUNCTION.  
 ITERATIONS NOT USED. INTEGRATION IS DONE IN ONE STEP. ONE  
 DIMENSIONAL. PROGRAM USES 286 LOCATIONS. NO COMMON  
 STORAGE USED.

**0704-1028GC001 EXPLICIT SOLUTION OF THE  
 GENERAL CUBIC EQUATION**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1028GC001

AUTHOR...F. B. CANNONITO

DIRECT INQUIRIES TO--  
 MR. GERALD C. FOGEL  
 SUPERVISOR, AUTOMATIC COMPUTING GROUP  
 RESEARCH DEPARTMENT  
 GRUMMAN AIRCRAFT  
 BETHPAGE, LONG ISLAND, NEW YORK

VIETA SUBSTITUTION IS MADE USING NORMALIZED POLYNOMIAL.  
 ROOTS ARE OBTAINED BY METHOD OF DEL FERRO. 289 LOCATIONS  
 PLUS 159 FOR REQUIRED SUBROUTINES.

**0704-1029ANF203 EIGENVALUES AND EIGENVECTORS  
 OF REAL SYMMETRIC MATRICES**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1029ANF203

AUTHOR...BURTON S. GARBOW

DIRECT INQUIRIES TO--  
 MR. GEORGE ROBINSON  
 APPLIED MATHEMATICS DIVISION  
 ARGONNE NATIONAL LABORATORY 203-C246  
 9700 CASS AVENUE  
 ARGONNE, ILLINOIS

A GENERAL PROGRAM BUILT AROUND SUBROUTINE ANF202 DIST. 664  
 WHICH USES GIVENS METHOD. COMPILED WITH DIMENSIONS 98 BUT  
 CAN BE RECOMPILED WITH DIMENSION 16 TO RUN ON 4K 704.  
 OPTIONAL INPUT PRINT-OUT AND CHECKS OF VALUES AND VECTORS  
 BY SUBSTITUTION INTO MATRIX EQUATION

**0704-1035SCLAGR LAGRANGE INTERPOLATION**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1035SCLAGR

AUTHOR...ESTER M. ANDERSON

DIRECT INQUIRIES TO--  
 MR. B. A. ROSENBLATT  
 ELECTRONICS COMPUTING CENTER  
 STANDARD OIL OF CALIFORNIA  
 225 BUSH STREET  
 SAN FRANCISCO, CALIFORNIA

USES 7 POINTS, THREE PRECEDING AND THREE AFTER VALUE -  
 LIMIT OF 250 POINTS IN TABLE

**0704-1041JPZ01 ZERO, MINIMUM SOLVER**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1041JPZ01

AUTHOR...S. SILVER

DIRECT INQUIRIES TO--  
 MR. WILLIAM R. HOOVER  
 JET PROPULSION LABORATORY  
 CALIFORNIA INSTITUTE OF TECHNOLOGY  
 4800 OAK GROVE DRIVE  
 PASADENA 3, CALIFORNIA

## Section B

CONTINUED FROM PRIOR PAGE--

SOLVES THE CLASS OF PROBLEMS WHICH CAN BE STATED AS  
 $F1/X1...XN/-ZERO / MINIMUM 1-1...N$   
 WHERE ANY COMBINATION OF ZEROS AND/OR MINIMUMS ARE POSSIBLE  
 TO SOLVE SIMULTANEOUSLY.

**0704-1043JPSRCH SIMULTANEOUS PARTIAL  
 DIFFERENTIAL EQUATIONS SOLVER**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1043JPSRCH

AUTHOR...S. SILVER

DIRECT INQUIRIES TO..

MR. WILLIAM R. HOOVER  
 JET PROPULSION LABORATORY  
 CALIFORNIA INSTITUTE OF TECHNOLOGY  
 4800 OAK GROVE DRIVE  
 PASADENA 3, CALIFORNIA

SOLVES THE PROBLEM OF THE FORM  
 $ABS(F1/X1...XN/-Y1 /WANTED// LESS OR EQUAL E1/I-1...N/$   
 WHERE F1 IS NON-LINEAR. STANDARD NEWTON-RAPHSON WHERE THE  
 PARTIALLYING IS DONE NUMERICALLY BY PERTURBING THE X1.  
 STORAGE REQUIRED IS 484 WORDS & 8 WORDS OF COMMON.

**0704-1048JPGIN GAUSS APPROXIMANT GENERATOR**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1048JPGIN

AUTHOR...S. SILVER

DIRECT INQUIRIES TO..

MR. WILLIAM R. HOOVER  
 JET PROPULSION LABORATORY  
 CALIFORNIA INSTITUTE OF TECHNOLOGY  
 4800 OAK GROVE DRIVE  
 PASADENA 3, CALIFORNIA

THIS SUBROUTINE IS CAPABLE OF GENERATING THE GAUSS  
 APPROXIMANT FOR ANY TYPE OF INTEGRAL EXPRESSION, WHETHER IT  
 BE AN ITERATED INTEGRAL, VECTOR VALUED INTEGRAL OF A VECTOR  
 VALUED FUNCTION, OR THE INTEGRAL OF A FUNCTION OF OTHER  
 INTEGRALS, OR ANY COMBINATION OF THESE. USES 227  
 LOCATIONS.

**0704-1050RSQP1 QUADRATIC PROGRAMMING CODE**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1050RSQP1

AUTHORS..LEOLA CUTLER A. SPECKHARD PHILIP WOLFE

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
 NUMERICAL ANALYSIS DEPARTMENT  
 THE RAND CORPORATION  
 1700 MAIN STREET  
 SANTA MONICA, CALIFORNIA

THE CODE WILL SOLVE THE QUADRATIC PROGRAMMING PROBLEM OF  
 MINIMIZING A QUADRATIC FUNCTION OF NONNEGATIVE VARIABLES  
 SUBJECT TO LINEAR CONSTRAINTS. THE NUMBER OF CONSTRAINTS  
 PLUS VARIABLES MUST BE LESS THAN 253. THE PROGRAM WILL  
 OPERATE ON A 704 WITH A MINIMUM OF 8K, 4 DRUMS, AND 6  
 TAPES. THE CODE, WITH THE ADDITION OF TWO CARDS, CAN RUN  
 ON A 7090 WITH COMPATIBILITY. CORR/1268

**0704-1054BSSEAC GENERAL LOGICAL CORE SORT  
 SUBROUTINE FOR 32K704**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1054BSSEAC

AUTHOR...WILLIAM W. YOUNDEN

DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
 NATIONAL BUREAU OF STANDARDS  
 COMPUTATION LABORATORY  
 WASHINGTON 25, D. C.

SORTS INTO LOGICAL SEQUENCE A BLOCK OF N CONSECUTIVE ITEMS  
 OF W WORDS EACH, USING AS THE SORT KEY K CONSECUTIVE BITS  
 OR CHARACTERS STARTING AT ANY BIT OR CHARACTER IN THE ITEM  
 KEEPING ITEMS WITH IDENTICAL KEYS. CORR/1153

**0704-1058WRELI MULTI-PURPOSE ESTIMATION FOR  
 RELIABILITY STUDIES**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1058WRELI

AUTHORS..P.A. LEWIS C.A. NOEL

DIRECT INQUIRIES TO..

MR. KENNETH M. KING  
 EDUCATIONAL RESEARCH  
 WATSON SCIENTIFIC COMPUTING LAB.  
 612 WEST 116TH STREET  
 NEW YORK 25, NEW YORK

THIS PROGRAM IS USED IN RELIABILITY STUDIES AND HAS BEEN  
 WRITTEN TO IMPLEMENT SEVERAL STATISTICAL ANALYSES OF  
 COMPONENT FAILURE FROM DATA CONSISTING OF INDEPENDENT  
 OBSERVATIONS ON A SINGLE RANDOM VARIABLE.

**0704-1059WLFALL ANALYZING SYSTEM FAILURE  
 DATA**  
 AVAILABLE 4TH QUARTER 1961.

CONTINUED FROM PRIOR COLUMN--  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1059WLFALL

AUTHORS..P.A. LEWIS C.A. NOEL

DIRECT INQUIRIES TO..

MR. KENNETH M. KING  
 EDUCATIONAL RESEARCH  
 WATSON SCIENTIFIC COMPUTING LAB.  
 612 WEST 116TH STREET  
 NEW YORK 25, NEW YORK

THIS 704 PROGRAM WAS WRITTEN TO IMPLEMENT THE STATISTICAL  
 ANALYSIS OF THE FAILURE PROPERTIES OF COMPUTER SYSTEMS  
 WHICH IS GIVEN IN "THE THEORY & MEASUREMENT OF COMPUTER  
 SYSTEM RELIABILITY" /IN PRESS/.

**0704-1061PKPSTP PI-STAR PROGRAM**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1061PKPSTP

AUTHOR...RUTH NORBY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
 IBM CORPORATION  
 RESEARCH COMPUTING CENTER 1300  
 THOMAS J. WATSON RESEARCH CENTER  
 YCRKTOWN HEIGHTS, NEW YORK

THE PI-STAR PROGRAM INCLUDES A DATA LOADER AND A TAPE  
 PRINT ROUTINE IN ADDITION TO THE PI-STAR SUBROUTINE. THE  
 PROGRAM READS IN THE INJECTIVE WORD AND THE PRIMITIVE  
 FUNCTIONS GENERATES THE FUNCTION INFORMATION LIST AND THE  
 CALLING SEQUENCE PARAMETERS, AND TRANSFERS TO THE PI-STAR  
 SUBROUTINE. UPON RETURN FROM THE SUBROUTINE, TRANSFER IS  
 MADE TO THE TAPE PRINT ROUTINE TO PRINT THE OUTPUT ORDER  
 LIST IN BINARY AND THE ANSWER ARRAYS IN 1-0-X NOTATION.

**0704-1062PKPST PI-STAR SUBROUTINE**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1062PKPST

AUTHOR...RUTH NORBY

DIRECT INQUIRIES TO..

MR. J. J. WADE  
 IBM CORPORATION  
 RESEARCH COMPUTING CENTER 1300  
 THOMAS J. WATSON RESEARCH CENTER  
 YCRKTOWN HEIGHTS, NEW YORK

SUBROUTINE TO TRANSFORM AN IR6909 98 64. A BOOLEAN  
 FUNCTION OR FUNCTIONS INTO A NORMAL FORM EXPRESSION OR  
 EXPRESSIONS. OTHERWISE EXPRESSED, IT GIVES THE FUNCTION OR  
 FUNCTIONS DESCRIBED BY A BOOLEAN TREE OR GRAPH.

**0704-1072MUSCHR SOLUTION OF RADIAL  
 SCHRÖDINGER EQUATION**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1072MUSCHR

AUTHOR...J.W. COOLEY

DIRECT INQUIRIES TO..

MR. MAX GOLDSTEIN  
 AEC COMPUTING CENTER  
 INSTITUTE OF MATHEMATICAL SCIENCES  
 NEW YORK UNIVERSITY  
 4 WASHINGTON PLACE  
 NEW YORK 3, NEW YORK

THIS IS A FORTRAN PROGRAM TO CALCULATE THE EIGENVALUES  
 AND EIGENFUNCTIONS OF THE RADIAL SCHRÖDINGER EQUATION.

**0704-1073BCDIFF SECOND ORDER DIFFERENTIAL  
 EQUATION SUBROUTINE**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1073BCDIFF

AUTHORS..R. DEVOGELAERE H.R. GILLETTE

DIRECT INQUIRIES TO..

MR. DONALD C. HOBBS  
 SHARE LIBRARIAN  
 COMPUTER CENTER CAMPBELL HALL  
 UNIVERSITY OF CALIFORNIA  
 BERKELEY CALIFORNIA

THIS SUBROUTINE WILL COMPUTE, STEP-BY-STEP, A FOURTH  
 ORDER APPROXIMATION TO THE SOLUTION OF A SYSTEM OF SECCND  
 ORDER DIFFERENTIAL EQUATIONS WITHOUT EXPLICIT FIRST  
 DERIVATIVES. ROUTINE USES 412/OCTAL/ OR 266/DECIMAL/  
 LOCATIONS PLUS 10 LOCATIONS IN ERRASIBLE COMMON.

**0704-1075ANF104 A GENERAL PROGRAM FOR  
 COMPLEX MATRIX INVERSION**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1075ANF104

AUTHOR...BURTON S. GARBOW

DIRECT INQUIRIES TO..

MR. GEORGE ROBINSON  
 APPLIED MATHEMATICS DIVISION  
 ARGONNE NATIONAL LABORATORY 203-C246  
 9700 CASS AVENUE  
 ARGONNE, ILLINOIS

CONTINUED FROM PRIOR PAGE--

FORTRAN DECIMAL INPUT-CUTPUT STRUCTURE BUILT AROUND SUBPROGRAM ANF103 FOR THE INVERSION OF COMPLEX MATRICES OF ORDER 20 OR LESS.

**0704-1076ANE208 A GENERAL LEAST SQUARES FITTING PROCEDURE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1076ANE208

AUTHORS..E.A. CROSBIE J.E. MONAHAN

**DIRECT INQUIRIES TO..**

MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

FORTRAN GENERAL PROGRAM USES NEWTON-RAPHSON ITERATION TO FIT ARBITRARY FUNCTION OF M PARAMETERS TO A GIVEN SET OF N OBSERVED VALUES WITH ASSOCIATED ERRORS.

**0704-1077GC0003 FITTING TO SELECTED TERMS OF A GENERAL POLYNOMIAL**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1077GC0003

AUTHOR...ARTHUR W. KAERCHER

**DIRECT INQUIRIES TO..**

MR. GERALD C. FOGEL  
SUPERVISOR, AUTOMATIC COMPUTING GROUP  
RESEARCH DEPARTMENT  
GRUMMAN AIRCRAFT  
BETHPAGE, LONG ISLAND, NEW YORK

A METHOD OF OBTAINING THE BEST COEFFICIENTS IN THE LEAST SQUARES SENSE TO ARBITRARILY SELECTED TERMS OF A MULTIVARIATE POLYNOMIAL. REQUIRES 197 LOCATIONS PLUS 40 FOR EXP /2, AND 426 FOR XSINEQ.

**0704-1079NOTIA TRACE INSTRUCTION ALTERATION**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1079NOTIA

AUTHOR...DR. D.S. VILLARS

**DIRECT INQUIRIES TO..**

MR. ROBERT H. BRACKEN  
DATA COMPUTATION BRANCH  
CODE 3037, MICHELSON LABORATORY  
NAVAL ORDNANCE TEST STATION  
CHINA LAKE, CALIFORNIA

THIS TRACING PROGRAM IS A POWERFUL TOOL FOR IDENTIFYING SOURCE OF TRANSFER TO AN UNINTENDED LOCATION OR OF UNDESIRABLE ALTERATION OF MEMORY. BY MEANS OF IT THE MACHINE IS DIVERTED TO A MEMORY DUMP AT FIRST TRAPPED TRANSFER OCCURRING IMMEDIATELY BEFORE TRANSFERRING TO A SPECIFIED EFFECTIVE ADDRESS OR AFTER ONE OF SEVERAL DESIGNATED LOCATIONS BECOMES ALTERED FROM SPECIFIED CONTENTS.

**0704-1085UMPL0T GENERAL PURPOSE PLOTTING SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1085UMPL0T

AUTHORS..PLOT CARNAHAN LARRY EVANS

**DIRECT INQUIRIES TO..**

MR. BRUCE W. ARDEN  
UNIVERSITY OF MICHIGAN  
COMPUTING CENTER  
NORTH UNIVERSITY BLDG.  
ANN ARBOR, MICHIGAN

RAPID PLOTTING OF NUMERIC INFORMATION FOR FORTRAN, SAP, OR MAD CALLING PROGRAMS. A CORE REGION CONTAINS A SEGMENT OF OR COMPLETE GRAPH IMAGE. THE ROUTINE PREPARES A FLEXIBLE CARTESIAN GRID BUT ANY BCD CHARACTERS /TITLES, SPECIAL GRIDS, AN NUMBER OF PLOTTING CHARACTERS FOR ANY NUMBER OF UNSORTED DATA POINTS/ CAN BE PLACED. GRID AND CHARACTER PLACING AND TAP WRITING FOR A FULL PAGE 200 POINT PLOT REQUIRES 1.8 SEC. ANY NUMBER OF COPIES OF THE GRAPH CAN BE WRITTEN ON ANY DECIMAL OUTPUT TAPE FOR PRINTING OR PUNCHING IN ABOUT 1. SEC. EACH.

**0704-1092RSMIAS MATHEMATICAL PROGRAMMING SYSTEM I-ALL SOLUTIONS**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1092RSMIAS

AUTHOR...MICHEL BALINSKY

**DIRECT INQUIRIES TO..**

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

THESE ROUTINES CONSTITUTE AN AUGMENTATION OF THE RSFMI ROUTINE FOR LINEAR PROGRAMMING. THEY PERMIT THE FINDING OF ALL OPTIMAL SOLUTIONS OF A LINEAR PROGRAMMING PROBLEM OR OF ALL VERTICES OF A POLYHEDRON GIVEN BY INEQUALITIES. AN EFFICIENT NON-EXHAUSTIVE ALGORITHM IS USED.

**0704-1096TVSMPL SYSTEM IMMEDIATELY MAKING PROGRAMMING LANGUAGE EASY**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1096TVSMPL

AUTHORS..KATHRYN KEATON F.R. LCKMILLER

**DIRECT INQUIRIES TO..**

MARTIN HOCHDORF  
CHIEF, COMPUTING CENTER  
TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE

SIMPLE IS A 704 AUTOMATIC CODING SYSTEM WHICH PRODUCES OBJECT PROGRAMS FOR THE IBM 1401 DATA PROCESSING SYSTEM. THE SIMPLE COMPILER IS WRITTEN IN FORTRAN WITH SOME EXTENSIONS /SEE APPENDIX A OF SIMPLE MANUAL/, AND IS COMPILED ON THE 704 THE LANGUAGE PROVIDES FOR ANY OR ALL OF THE FOLLOWING - /1/HIGH-LOW-EQUAL COMPARE/2/COLUMN BINARY, /3/ PUNCH FEED READ,/4/ MULTIPLY-DIVIDE /SUBROUTINES ARE PROVIDED FOR THESE IF NOT BUILT-IN 1401 HARDWARE/, AND /5/ MOVE RECORD. A SUB-ROUTINE PROV. HANDLE TAPE ERRORS. CORR/1262

**0704-1101UMHAD MAD TRANSLATOR AND ASSOCIATED SUBROUTINES**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1101UMHAD

AUTHORS..B.A. GALLER R.M. GRAHAM

**DIRECT INQUIRIES TO..**

MR. BRUCE W. ARDEN  
UNIVERSITY OF MICHIGAN  
COMPUTING CENTER  
NORTH UNIVERSITY BLDG.  
ANN ARBOR, MICHIGAN

TRANSLATOR FOR THE MAD /MICHIGAN ALGORITHM DECIDER/ LANGUAGE. STATEMENTS INCLUDE BOOLEAN EXPRESSIONS, SIMPLE AND COMPOUND CONDITIONALS, GENERAL ITERATION STATEMENTS, AND SYMBOL MANIPULATION FACILITIES. VERY RAPID TRANSLATION. SUBROUTINES, SUCH AS INPUT-OUTPUT, WHICH ARE CALLED BY OBJECT PROGRAMS, ARE INCLUDED. BINARY CARDS PRODUCED BY TRANSLATOR ARE IN STANDARD RELOCATABLE FORM. TRANSLATOR IS IN THE FORM OF A SUBROUTINE AND CAN BE IMBEDDED IN ANY SYSTEM USING BSS LADER. CORR IN 1301

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

**0704-1103PKSEQ SEQUENTIAL CIRCUIT PROBLEM SOLVING**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1103PKSEQ

AUTHOR...SPENCER GANZELL

**DIRECT INQUIRIES TO..**

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

THE PURPOSE OF THE SUBROUTINE IS FOURFOLD, NAMELY-GENERATES A MOORE OR MEALY STATE DIAGRAM- COMPUTES A SET OF EQUATIONS AND THE -DONT CARE CONDITIONS- FROM EITHER A MOORE OR MEALY STATE DIAGRAM- REDUCES A SEQUENTIAL MACHINE REPRESENTED BY EITHER A MOORE STATE DIAGRAM, A SERIES OF INPUT-OUTPUT SEQUENCES, OR A HUFFMAN FLOW TABLE- GENERATES A MOORE STATE DIAGRAM FROM A SET OF EQUATIONS AND THE -DONT CARE CONDITIONS- AND REDUCE THE STATE DIAGRAM.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1104PKMIN4 COMPUTATION OF A MIN 2 LEVEL &/OR SWITCHING CIRCUIT**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1104PKMIN4

AUTHOR...A.C. EWING

**DIRECT INQUIRIES TO..**

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

GENERATES A MINIMUM TWO-LEVEL SWITCHING CIRCUIT W85R5 ONE LEVEL IS ALL ANDS AND THE OTHER LEVEL IS ALL ORS. -DONT-CARE-CONDITIONS AND MULTIPLE OUTPUT PROBLEMS ARE PERMITTED. CAN ALSO BE DIRECTLY APPLIED TO THE MINIMIZATION OF A BOOLEAN FUNCTION IN NORMAL FORM. PROGRAM MAY BE RUN ON A MACHINE WITH 2 OR 4 737S OR A 738 MEMORY FRAME. IN ADDITION, IT REQUIRES FIVE TAPES.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1109NUTPL1 QUASI-TRIDIAGONAL MATRIX ROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1109NUTPL1

AUTHORS..FLORENCE RAGUSA SAMUEL SCHECHTER

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..  
MR. MAX GOLDSSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

THIS PROGRAM SOLVES THE MATRIX EQUATION  $QV=U$  WHERE  $Q$  IS A.

0704-1110UGEN1 GENERATE MATRICES TO BE  
SOLVED BY NU TPL1  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1110UGEN1

AUTHOR...MR. MAX GOLDSSTEIN  
AEC COMPUTING CENTER  
INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO GENERATE AND WRITE THE MATRICES NECESSARY TO SOLVE  
THE EQUATION  $QV=U$  BY USING NU TPL1.

0704-1119ERNLR NON-LINEAR REGRESSION  
PROCEDURE WITH DIFFERENTIAL EQNS.  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1119ERNLR

AUTHOR...M. A. EFRONYSON

DIRECT INQUIRIES TO..

M. A. EFRONYSON  
ESSC RESEARCH AND ENGINEERING COMPANY  
P. O. BOX 209  
MADISON, NEW JERSEY

GIVEN  $M$  SIMULTANEOUS DIFFERENTIAL EQUATIONS WHICH ARE  
NON-LINEAR IN EITHER OR BOTH THE  $N$  INDEPENDENT VARIABLES  
AND THE  $K$  UNKNOWN COEFFICIENTS AND GIVEN  $MN$  VALUES OF  
OBSERVED DATA, THE PROGRAM GIVES BY AN ITERATIVE MULTIPLE  
REGRESSION TECHNIQUE THE LEAST SQUARE ESTIMATES OF THE  
UNKNOWN COEFFICIENTS AND INFORMATION ON THE PRECISION OF  
THESE COEFF. TWO FORTRAN II SUBROUTINES DESCRIBING THE  
DIFFERENTIAL EQNS. AND INITIAL ESTIMATES OF THE  
COEFFICIENTS MUST BE PROVIDED. 32K CORE AND TWO TAPES  
REQUIRED.

0704-1129AQALL1 SINGLE OR DOUBLE  
INTERPOLATION SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1129AQALL1

AUTHOR...MR. R. A. VOORHIS  
COORDINATOR DATA PROCESSING  
PLANT 1  
ALLISON DIVISION  
GENERAL MOTORS CORP.  
SPEEDWAY, INDIANA

DIRECT INQUIRIES TO AUTHOR

GIVEN SOME FUNCTION WITH ONE OR TWO INDEPENDENT VARIABLES,  
 $X$  AND  $Z$ . THIS ROUTINE PERFORMS  $KX$ TH AND  $LX$ TH INTERPOLATION  
TO CALCULATE THE DEPENDENT VARIABLE  $Y$ . THE DEGREE OF  
INTERPOLATION IS VARIABLE IN BOTH DIRECTIONS FROM 1 TO 7.  
LAGRANGE INTERPOLATION IS USED THROUGHOUT THIS ROUTINE.  
FUNCTIONS MAY BE EITHER CONTINUOUS OR DISCONTINUOUS.

0704-1134ELFIOP FORTRAN INPUT/OUTPUT PACKAGE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1134ELFIOP

AUTHOR...WARREN B. HARDING

DIRECT INQUIRIES TO..

IBM CORP.  
ENG. DATA PROCESSING  
OPERATING SYSTEMS-DEPT. 304  
GPD LAB.  
ROUTE 17C & GLENDALE DRIVE  
ENDICOTT N.Y.

PROVIDES GREATER INPUT AND OUTPUT FLEXIBILITY WITH 704  
FORTRAN II. IT ALLOWS VARIABLE LENGTH TAPE RECORDS UP TO  
1500 WORDS, BINARY OR BCD. ERROR, END OF FILE, AND  
PHYSICAL END OF TAPE INDICATIONS MAY BE USED FOR BRANCHING.  
MULTIPLE FORMAT STATEMENTS ARE USED IN DESCRIBING TAPE  
RECORDS. REQUIRES 1500 WORDS OF UPPER STORAGE FOR I/O  
BUFFER

0704-1143IB4PRM AUTOPROMT  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1143IB4PRM

AUTHOR...SAMUEL M. MATSA  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

DIRECT INQUIRIES TO AUTHOR

CONTINUED FROM PRIOR COLUMN--

AUTOMATIC TOOL PATH GENERATION FOR NUMERICAL CONTROL OF  
MACHINE TOOLS. SELF-CONTAINED SYSTEM ACCEPTS SYMBOLIC  
DESCRIPTION OF THREE-DIMENSIONAL SHAPES IN AUTOPROMT  
LANGUAGE. COMPILES TOOL CENTERS REQUIRED FOR MACHINING.  
OUTPUT ON MAGNETIC TAPE. CORR/1155

0704-1144NC138 MODIFIED PK KWIC PROGRAM  
/SDA 884  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC138

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

INCLUDES WRAP-AROUND FEATURE THIS IS ONE OF A SET OF 9  
PROGRAMS CURRENTLY USED BY CHEMICAL ABSTRACTS SERVICE TO  
PRODUCE CHEMICAL TITLES. THE COMPLETE SET INCLUDES NC 139,  
NC 140, NC 141, NC 142, NC 143, NC 144, NC 145, AND NC 146.

0704-1144NC139 PROGRAM TO SORT THE KEY  
WORDS FROM NC138  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC139

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

SORTS THE KEY WORDS FROM NC138.

0704-1144NC140 READS THE FINAL SORTED TAPE  
FROM NC 139  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC140

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

READS THE FINAL SORTED TAPE FROM NC 139 AND WRITES A TAPE.

0704-1144NC141 READS THE SORTED KEY WORDS  
FROM NC 139  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC141

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

READS THE SORTED KEY WORDS FROM NC 139 AND WRITES A TAPE  
TO PRINT IN A SPECIAL FORMAT.

0704-1144NC142 SORTS THE BIBLIOGRAPHY TAPE  
FROM NC 138  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC142

AUTHOR...D.H. STROMINGER

DIRECT INQUIRIES TO..

MR. SY BERLIN  
D/92, BUILDING 6  
COLUMBUS DIVISION  
NORTH AMERICAN AVIATION, INC.  
4300 EAST FIFTH AVENUE  
COLUMBUS 16, OHIO

SORTS THE BIBLIOGRAPHY TAPE FROM NC 138.

0704-1144NC143 READS THE SORTED  
BIBLIOGRAPHY TAPE FROM NC 142  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1144NC143

AUTHOR...D.H. STROMINGER

CONTINUED FROM PRIOR PAGE--

## DIRECT INQUIRIES TO..

MR. SY BERLIN  
 0/92, BUILDING 6  
 COLUMBUS DIVISION  
 NORTH AMERICAN AVIATION, INC.  
 4300 EAST FIFTH AVENUE  
 COLUMBUS 16, OHIO  
 READS THE SORTED BIBLIOGRAPHY TAPE FROM NC 142  
 AND WRITES A TAPE TO PRINT IN A SPECIAL FORMAT.

0704-1144NC144 READS THE FINAL SORTED  
 BIBLIOGRAPHY TAPE FROM NC 142  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1144NC144

AUTHOR...D.H. STROMINGER

## DIRECT INQUIRIES TO..

MR. SY BERLIN  
 0/92, BUILDING 6  
 COLUMBUS DIVISION  
 NORTH AMERICAN AVIATION, INC.  
 4300 EAST FIFTH AVENUE  
 COLUMBUS 16, OHIO

READS THE FINAL SORTED BIBLIOGRAPHY TAPE FROM NC 142  
 WRITES ANOTHER TAPE AND SORTS IT.

0704-1144NC145 READS THE SORTED AUTHOR  
 CROSS INDEX TAPE  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1144NC145

AUTHOR...D.H. STROMINGER

## DIRECT INQUIRIES TO..

MR. SY BERLIN  
 0/92, BUILDING 6  
 COLUMBUS DIVISION  
 NORTH AMERICAN AVIATION, INC.  
 4300 EAST FIFTH AVENUE  
 COLUMBUS 16, OHIO  
 READS THE SORTED AUTHOR CROSS INDEX TAPE AND WRITES  
 ANOTHER TO PRINT IN A SPECIAL FORMAT

0704-1144NC146 SKIPS ONE FILE ON A DECIMAL  
 TAPE AND PUNCHES  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1144NC146

AUTHOR...D.H. STROMINGER

## DIRECT INQUIRIES TO..

MR. SY BERLIN  
 0/92, BUILDING 6  
 COLUMBUS DIVISION  
 NORTH AMERICAN AVIATION, INC.  
 4300 EAST FIFTH AVENUE  
 COLUMBUS 16, OHIO  
 SKIPS ONE FILE ON A DECIMAL TAPE AND PUNCHES  
 THE SECOND FILE

0704-1147EGRKOP FLOATING POINT OPTIMIZED  
 RUNGE KUTTA  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1147EGRKOP

AUTHOR...HERBERT GETREU

## DIRECT INQUIRIES TO..

ROBERT C. RAY  
 AEROSPACE DATA SYSTEMS BRANCH -FTFSE  
 AIR FORCE FLIGHT TEST CENTER  
 EDWARDS AFB, CALIFORNIA  
 FEATURING AN OPTIONAL ERROR CONTROL FOR  
 DETERMINING THE INTEGRATION INTERVAL SIZE.  
 SOLVES A SET OF N FIRST ORDER DIFFERENTIAL  
 EQUATIONS. DETERMINES AN INTEGRATION STEP SIZE  
 DEPENDENT ON A VARIABLE ERROR CONTROL.  
 FIXED STEP SIZES MAY BE USED. A MODIFICATION  
 OF ML RKY3. 218 WORDS OF PROGRAM & 12N OF STORAGE.

0704-1156LRROND ROCKET NOZZLE PROGRAM  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1156LRROND

AUTHOR...PAUL BETTINGER

## DIRECT INQUIRIES TO..

DR. LYNN U. ALBERS  
 NATIONAL AERONAUTICS AND  
 SPACE ADMINISTRATION  
 LEWIS RESEARCH CENTER  
 21000 BROOKPARK ROAD  
 CLEVELAND 35, OHIO

THIS PROGRAM WILL DEVELOP, BY THE METHOD OF  
 CHARACTERISTICS, A CONVERGING-DIVERGING SUPERSONIC NOZZLE  
 CONTOUR FOR INVISCID FLOW WHICH HAS OPTIMUM SPECIFIC  
 IMPULSE FOR SPECIFIED AREA RATIO AND AMBIENT PRESSURE. IT  
 INCLUDES VARIATION OF ISENTROPIC EXPONENT.

0704-1157TU9005 NUMERICAL INTEGRATION OF  
 UNEQUALLY SPACED POINTS  
 AVAILABLE 4TH QUARTER 1961.

CONTINUED FROM PRIOR COLUMN--  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1157TU9005

AUTHOR...LARRY BROWN

## DIRECT INQUIRIES TO..

ROBERT F. BROCKISH, HEAD  
 SCIENTIFIC DATA PROCESSING DEPT.  
 MAIL STOP 191  
 TRIDCOL CHEMICAL CORPORATION  
 WASATCH DIVISION  
 BRIGHAM CITY, UTAH

EVALUATES THE INTEGRAL OF A SET OF UNEQUALLY SPACED POINTS  
 BY EITHER OF TWO METHODS /1/ USING DIVIDED DIFFERENCES  
 THROUGH THE FOURTH DIFFERENCE OR /2/ USING THE  
 TRAPEZOIDAL RULE

0704-1165PNSLIB A 1401 PROGRAM TO MAINTAIN  
 THE SHARE LIBRARY ABSTRACTS ON TAPE  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1165PNSLIB

AUTHOR...BENGT GALLMC

## DIRECT INQUIRIES TO..

PER SVENONIUS  
 RESEARCH INST. OF NATL. DEFENSE  
 AVDELNING 4  
 STOCKHOLM, SWEDEN

THE PROGRAM WRITES A TAPE LOADER  
 PROGRAM, A LISTING PROGRAM AND THE EXISTING ABSTRACTS ON A  
 TAPE. THIS TAPE IS THEN SELF-LOADING AND CAPABLE OF  
 UPDATING, COPYING AND LISTING ITSELF. THE LISTING MAY  
 COVER ALL PROGRAMS, 709-PROGRAMS ONLY, 7090-PROGRAMS ONLY  
 OR 709- AND 7090-PROGRAMS TOGETHER. FORTRAN PROGRAMS AND  
 COMMENTS WILL APPEAR IN ALL LISTINGS. REQUIRES A 4K 14CI  
 WITH 2 TAPES, STORE ADDRESS REGISTER, HIGH-LOW-EQUAL  
 COMPARE, SENSE SWITCHES AND COLUMN BINARY.

0704-1168TVPCPE PRINCIPAL COMPONENTS  
 PREDICTION EQUATION

AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1168TVPCPE

AUTHOR...WILLARD SNYDER

## DIRECT INQUIRIES TO..

MARTIN HOCHDRF  
 CHIEF, COMPUTING CENTER  
 TENNESSEE VALLEY AUTHORITY  
 CHATTANOOGA, TENNESSEE

FN 22 PROGRAM TO EVALUATE AN EQUATION BY FITTING DATA  
 USING MULTIVARIATE TECHNIQUE OF COMPONENT ANALYSIS. METHOD  
 DIFFERS FROM MULTIPLE REGRESSION IN THAT COEFFICIENTS WHICH  
 ARE DERIVED REPRESENT ORTHOGONAL CONTRIBUTIONS OF  
 RESPECTIVE TERMS OF EQ., THUS SUPPRESSING EFFECTS OF  
 CORRELATIONS AMONG INDEPENDENT VARIABLES. AN  
 EIGENVALUE-EIGENVECTOR ANALYSIS OF CHARACTERISTIC EQ. OF  
 MATRIX OF CORRELATIONS EXPRESSES RELATIONSHIP BETWEEN  
 INDEPENDENT VARIABLES AND ORTHOGONAL COMPONENTS. ADAPTION OF  
 CA 0054 USED AS SUBROUTINE. CORR. 1207

0704-1181ANG502 PSEUDO-RANDOM NUMBER  
 GENERATOR

AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1181ANG502

AUTHOR...N. R. MANN

## DIRECT INQUIRIES TO..

MR. GEORGE ROBINSON  
 APPLIED MATHEMATICS DIVISION  
 ARGONNE NATIONAL LABORATORY 203-C246  
 9700 CASS AVENUE  
 ARGONNE, ILLINOIS

GIVEN A NORMALIZED FLOATING POINT NUMBER Z-SUBN BETWEEN  
 -1 AND 61, THE NUMBER Z-SUBN/61 IS PRODUCED, WHERE Z-SUBN  
 IS A SEQUENCE OF UNIFORMLY DISTRIBUTED PSEUDO-RANDOM  
 NUMBERS ON THE INTERVAL /-1,1/. THE CONGRUENCE METHOD IS  
 USED IN THIS

0704-1183GDCORI SIX CARD UPPER LOADER  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1183GDCORI

AUTHOR...R.M. COLOMB

## DIRECT INQUIRIES TO..

MR. HAYDEN E. WILLIAMS, MANAGER  
 DATA PROCESSING OPERATIONS  
 HEAVY MILITARY ELEC. EQPMT. DEPT.  
 GENERAL ELECTRIC COMPANY  
 ELECTRONICS DIVISION  
 BLDG. 1, RM. 7, COURT ST. PLANT  
 SYRACUSE, NEW YORK  
 ATTN- MR. R.P. BROWN

LOADS FILE OF STANDARD 709 COLUMN BINARY CARDS WITH SHARE  
 STANDARD OCTAL CORRECTION CARDS FROM CHANNEL A CARD READER.

0704-1184ININIB PROCESS CONTROL COMPUTER  
 ASSEMBLY

AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 0704-1184ININIB

CONTINUED FROM PRIOR PAGE--

AUTHORS..A.D. PENOLETON W.B. TRAVER

DIRECT INQUIRIES TO..

DR. M. W. NELSON  
TECHNICAL COMPUTING COORDINATOR  
RESEARCH AND DEVELOPMENT DEPARTMENT  
AMERICAN OIL COMPANY  
P. O. BOX 431  
WHITING INDIANA

INIB PRODUCES, FROM IBM 1620-1710 S.P.S. CARDS, AN ASSEMBLY WITH LISTING AND CARDS USING THE IBM 704 FOR RUNNING ON THE IBM 1620, 1710, AND OTHER CONFIGURATIONS OF IBM PROCESS CONTROL COMPUTER.

0704-11861BDST2 MULTICOMPONENT DISTILLATION PROGRAM.

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-11861BDST2

AUTHORS..DR. J. GREENSTADT YCNATHAN BARD

DIRECT INQUIRIES TO..

DR. JOHN L. GREENSTADT  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

SOLVES PLATE-TC-PLATEMULTI COMPONENT DISTILLATION, BUBBLE, DEW, AND FLASH POINT PROBLEMS FOR UP TO 23 COMPONENTS ON BK MACHINE.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0704-11871BTEQ2 BENEDICT-WEBO-RUBIN EQUATIONS OF STATE..

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-11871BTEQ2

AUTHORS..YONATHAN BARD B. MORSE

DIRECT INQUIRIES TO..

YCNATHAN BARD  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

APPLIES THE B-W-R EQUATIONS TO THE SOLUTION OF DISTILLATION PROBLEMS, FOR USE AS A SUBROUTINE WITH IB CST2, REQUIRING A 16K MACHINE

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0704-1188GMCP CRITICAL PATH PROGRAMMING METHOD

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1188GMCP

AUTHORS..J.R. GILLESPIE R.J. SULLIVAN

DIRECT INQUIRIES TO..

MR. DONALD E. HART  
DATA PROCESSING DEPT.  
GENERAL MOTORS RESEARCH LABORATORIES  
GENERAL MOTORS TECHNICAL CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

THIS PROGRAM IMPLEMENTS THE ALGORITHM OF J.E. KELLEY, THAT SERVES AS THE BASIS OF THE PROJECT CONTROL TECHNIQUE CALLED CRITICAL PATH PROGRAMMING BY MAUCHLIT ASSOCIATES. THE ALGORITHM GENERATES A SERIES OF CHARACTERISTIC SCHEDULES FOR A PROJECT BY ASSIGNING TO EACH ACTIVITY A COST-DURATION OPERATING POINT FOR EACH GENERATED SCHEDULE. FOR A GIVEN SCHEDULE, ITS COST IS THE LEAST POSSIBLE FOR THE ASSOCIATED PROJECT DURATION. USES 10 TAPES IN GMR OPER SYS

0704-1189GMDYAN GMR DYANA - DYNAMICS ANALYZER - PROGRAMMER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1189GMDYAN

AUTHORS..E. JACKS J. CLSZTYN T. THEODOROFF  
B. HARGREAVES C. R. LEWIS

DIRECT INQUIRIES TO..

E. JACKS  
DATA PROCESSING DEPT.  
GENERAL MOTORS TECH. CENTER  
12 MILE AND MOUND ROADS  
WARREN, MICHIGAN

THE DYANA COMPUTING SYSTEM WAS DEVELOPED TO FACILITATE THE STUDY OF A LARGE CLASS OF DYNAMICS PROBLEMS WHICH ARE FREQUENTLY ENCOUNTERED IN THE WORK OF THE ENGINEER. INCORPORATED INTO DYANA IS THE ABILITY TO DO ANALYTICAL AND PROGRAMMING WORK WHICH IS REQUIRED IN PRODUCING FORTRAN PROGRAMS FOR THE SOLUTION OF DYNAMICS PROBLEMS. AS THE ORIGINAL DYANA SYSTEM RECEIVED MORE EXTENSIVE USE, THE TYPES OF PROBLEMS THAT WERE POSED SOMETIMES WENT BEYOND THE CLASS OF PROBLEMS WHICH DYANA WAS DESIGNED TO SOLVE. THEREFORE, THE DYANA SYSTEM HAS NOW BEEN MODIFIED TO ACCEPT HOLONOMIC CONSTRAINTS /EQUATIONS RELATING POSITION COORDINATES/ IN THE DESCRIPTION OF A DYNAMICS PROBLEM. THE USE OF CONSTRAINTS ALLOWS THE MOTION OF INDIVIDUAL POINTS IN A DYNAMICS SYSTEM TO BE DESCRIBED BY MORE THAN A SINGLE DEGREE OF FREEDOM.

REQUESTOR MUST SUBMIT 4 TAPES FOR BASIC PROGRAM MATERIAL.

0704-1193AFFAP FAP ASSEMBLY PROGRAM FOR AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1193AFFAPAUTHOR...MR. P. CHAVY  
4RUE DE MONDOVI  
PARIS

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM IS WRITTEN ON THE FORTRAN SYSTEM TAPE. IT ASSEMBLES WITH THE 704, 704 AND 709 PROGRAMS WRITTEN IN THE FAP LANGUAGE. CORR. 1226, 1227. CRR/1267

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0704-1209RWEZ2F FLOATING POINT EXPONENTIAL AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1209RWEZ2F

AUTHOR...F. WELSH JR.

DIRECT INQUIRIES TO..

ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 49, CALIFORNIA

WITH THE NORMALIZED FLOATING POINT ARGUMENT IN THE ACCUMULATOR AND EXITS WITH THE FLOATING POINT EXPONENTIAL IN THE ACCUMULATOR. SPACE REQUIRED 3663 COMMON. TIMING IS 2.196MS.

0704-1220NSABC AUTOMATIC CODER, COMPATIBLE WITH SAP

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1220NSABC

AUTHORS..J. ELLIOTT A.E. GLENNIE

DIRECT INQUIRIES TO..

DIRECTOR  
NATIONAL SECURITY AGENCY  
FORT GEORGE G. MEADE, MARYLAND  
ATTN. MR. JIMMIE M. PORTER, MPRO

AUTOMATIC CODING SYSTEM WHOSE SOURCE LANGUAGE INCLUDES SAP CODING AS WELL AS STATEMENTS IN MATHEMATICAL LANGUAGE AND ENGLISH. TRANSLATES AUTOMATIC CODE TO SAP CODE, WHICH IS THEN ASSEMBLED, USING UA SAP. INCLUDES 82 SUBROUTINES ON SYSTEM LIBRARY TAPE. AUTOMATIC CODE LANGUAGE LIKE FORTRAN, WITH RESTRICTION TO SINGLE SUBSCRIPTS. HANDLES MIXED, ARITHMETIC. CONTAINS DATA PROCESSING PACKAGE. HAS MORE GENERAL SUBROUTINE LOGIC. OBJECT PROGRAM ON BINARY CARDS WITH SAP LISTING.

0704-1224UCSCUL SHARE CATALOG UPDATER, LISTER, 1401

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1224UCSCUL

AUTHOR...PAUL TANI

DIRECT INQUIRIES TO..

MR. JAMES T. SCOTT, MANAGER  
ELECTRONIC DATA PROCESSING DEPT.  
UNION CARBIDE CORPORATION  
270 PARK AVENUE, 37TH FLOOR  
NEW YORK 17, NEW YORK

REQUIRES 4K 1401 WITH ADV. PROG., H-L-E, AND 2 TAPES PROGRAM CAN PERFORM FOUR FUNCTIONS. 1, UPDATE THE CATALOG FILE ON TAPE WITH INPUT CATALOG CARDS. 2, SEQUENCE CHECK THE INPUT CATALOG CARDS BEFORE UPDATING. 3, LIST THE CATALOG BY THE CLASSIFICATION CODE. 4, LIST THE CATALOG ITEMS FOR AN INSTALLATION. IF DESIRED, JUST THE TITLES MAY BE LISTED. CORR/1290

0704-1231TVTPPR 704 PROGRAM TO GENERATE 1401 T/P PROG. ON OUTPUT TAPES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1231TVTPPR

AUTHOR...JOHN J. MORGAN

DIRECT INQUIRIES TO..

MARTIN HOCHCREF  
CHIEF, COMPUTING CENTER  
TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE

TO MINIMIZE OPERATOR ATTENTION IN 1401 PRINT OPERATION FROM 704 OUTPUT TAPE THROUGH PROGRAMMED 1401 INSTRUCTIONS WRITTEN ON THE TAPE AT THE TIME OF 704 COMPUTATION. THE 1401 TAPE-TO-PRINT INSTRUCTIONS PRECEGE ANY OUTPUT INFORMATION, AND THE PRINT OPERATION REQUIRES ONLY THE MOUNTING OF THE TAPE AND PRESSING THE LOAD TAPE BUTTON.

0704-1232AAICE4 INTEGRATION WITH CONTROLLED ERROR

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1232AAICE4

AUTHORS..JAMES A. MILLER ROBERT M. MILLER

CONTINUED FROM PRIOR PAGE--

## DIRECT INQUIRIES TO..

W. B. FRITZ MGR.  
MGR. INFORMATION PROCESSING DEPT  
WESTINGHOUSE ELECTRIC CORP.  
BUSINESS SYSTEMS DIVISION  
FRIENDSHIP INTERNATIONAL AIRPORT  
P. O. BOX 1693  
BALTIMORE 3, MARYLAND

AAICE4 IS DESIGNED TO BE USED IN CONJUNCTION WITH AN INTEGRATION SUBROUTINE/AA INT1 IF DESIRED/ TO PROVIDE A NUMERICAL SOLUTION OF AN NTH ORDER SYSTEM OF LINEAR AND/OR NON-LINEAR DIFFERENTIAL EQUATIONS EXPRESSED AS A SYSTEM OF N FIRST ORDER EQUATIONS. THE LOCAL ERROR GENERATED BY THE NUMERICAL PROCESS IS CONTROLLED BY ADJUSTING THE INTEGRATION STEP SIZE BASED ON THE RELATIVE ERROR AS ESTIMATED BY EXTRAPOLATION TO ZERO STEP SIZE.

## 0704-1233AAINT1 SECOND, THIRD, AND FOURTH ORDER RUNGE-KUTTA INTEGRATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1233AAINT1

AUTHORS...JAMES A. MOLLER ROBERT M. MILLER

## DIRECT INQUIRIES TO..

W. B. FRITZ MGR.  
MGR. INFORMATION PROCESSING DEPT  
WESTINGHOUSE ELECTRIC CORP.  
BUSINESS SYSTEMS DIVISION  
FRIENDSHIP INTERNATIONAL AIRPORT  
P. O. BOX 1693  
BALTIMORE 3, MARYLAND

AA INT1 IS A FORTRAN II SUBROUTINE DESIGNED TO BE USED IN CONJUNCTION WITH AA ICE4 TO PROVIDE A SECOND, THIRD, OR FOURTH ORDER RUNGE-KUTTA SOLUTION OF AN NTH ORDER SYSTEM OF LINEAR AND/OR NON-LINEAR DIFFERENTIAL EQUATIONS EXPRESSED AS A SYSTEM OF N FIRST ORDER EQUATIONS.

## 0704-1234AAWEG2 WEGSTEIN ITERATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1234AAWEG2

AUTHOR...JAMES A. MILLER

## DIRECT INQUIRIES TO..

W. B. FRITZ MGR.  
MGR. INFORMATION PROCESSING DEPT  
WESTINGHOUSE ELECTRIC CORP.  
BUSINESS SYSTEMS DIVISION  
FRIENDSHIP INTERNATIONAL AIRPORT  
P. O. BOX 1693  
BALTIMORE 3, MARYLAND

GIVEN AN IMPLICIT EQUATION OF THE FORM  $X-F(X)/AA WEG2$  WILL FIND A VALUE FOR X WHICH WILL PROVIDE A SPECIFIED ACCURACY IN EITHER A RELATIVE OR ABSOLUTE SENSE.

## 0704-1244ANCOO1 A GENERAL PROGRAM FOR SYSTEMS EVALUATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1244ANCOO1

AUTHOR...JERALD DICK

## DIRECT INQUIRIES TO..

MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

GIVEN A DESCRIPTION OF THE BLOCK DIAGRAM OF A SYSTEM AND THE TRANSFER FUNCTIONS OF EACH COMPONENT OF THE SYSTEM, THIS COMPLETE PROGRAM COMPUTES THE TRANSFER FUNCTION OF THE SYSTEM AND CALCULATES THE ATTENUATION AND PHASE ANGLE FOR GIVEN VALUES OF FREQUENCY. SIMPLE FEEDBACK LCCPS ARE PERMITTED IN THE SYSTEM. THE PROGRAM AS SUBMITTED IS DESIGNED FOR A 32K MEMORY.

## 0704-1264ANE209 A GENERAL PROGRAM FOR LEAST SQUARE POLYNOMIAL FITTING

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1264ANE209

AUTHOR...BURTON S. GARROW  
203-C257 APPLD. MATH. DIV. ARGONNE  
ARGONNE NATL. LAB.  
9700 S. CASS AVE.  
ARGONNE ILLINOIS

## DIRECT INQUIRIES TO AUTHOR

FORTRAN DECIMAL INPUT-OUTPUT STRUCTURE BUILT AROUND SUBPROGRAM ANE206. DIMENSIONS WHICH CAN BE ALTERED BY RECOMPILING ALLOW 50 DATA POINTS AND PROVIDE FOR UP TO A 7TH DEGREE FIT. PROVISION FOR POLYNOMIAL EVALUATIONS AT UNFITTED POINTS IS ALSO MADE. 3919 STORAGES INCLUDING SUBROUTINES.

## 0704-1265ANE210 CHEBYSHEV LINE FIT

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1265ANE210

AUTHOR...BURTON S. GARROW

CONTINUED FROM PRIOR COLUMN--

## DIRECT INQUIRIES TO..

MR. GEORGE ROBINSON  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY 203-C246  
9700 CASS AVENUE  
ARGONNE, ILLINOIS

FORTRAN SUBPROGRAM FITS THAT LINE TO A SET OF POINTS SUCH THAT THE MAXIMUM ERROR ON THE SET IS SMALLEST. 221 LOCATIONS.

## 0704-1274RF0100 FORTRAN DECIMAL TO BINARY CONVERSION.

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1274RF0100

AUTHOR...L.W. LEVIN

## DIRECT INQUIRIES TO..

MR. BERNARD TANNENBAUM  
PROGRAMMING TECHNIQUES SECTION  
COMPUTER PROGRAMMING AND ANALYSIS  
REPUBLIC AVIATION CORP.  
FARMINGDALE LONG ISLAND  
NEW YORK

READS FROM LOGICAL TAPE 5, CARD IMAGES CONTAINING DECIMAL, OCTAL, AND BCD DATA, LOADING THEIR BINARY REPRESENTATION INTO SPECIFIED CORE LOCATIONS. ALL INPUT IS CODED IN FORTRAN TO PROVIDE COMPATIBILITY THROUGH RECOMPILATION, WITH MONITOR SYSTEM CHANGES.

## 0704-1275BSO00C SYSTEM CONTROL PROGRAM

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1275BSO00C

AUTHOR...FRED HOOD

## DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.

A SELF-LOADING PROGRAM FROM LIBRARY TAPE 1. THE LIBRARY TAPE MAY CONTAIN ANY NUMBER OF SUBJECT PROGRAMS WHICH ARE CALLED AS DESIRED. THE PROGRAM CAN DO THE FOLLOWING /1/ LOAD SUBJECT PROGRAMS INTO MEMORY, /2/ PRINT REMARKS TO AN OPERATOR, /3/ KEEP RUNNING TIME FOR INDIVIDUAL PROGRAMS, AND /4/ INITIATE A CORE DUMP /IF DESIRED/ WHEN USED WITH GK052.

## 0704-1276BS01DC BUILD TREES PROGRAM USING MODIFIED MOORE ALGORITHM

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1276BS01DC

AUTHOR...PAUL JENNINGS

## DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.

THE PROGRAM BUILDS MINIMUM TIME PATHS FROM DESIGNATED NODES TO ALL OTHER NODES OF A NETWORK. MAXIMUM OF 999 TREES MAY BE BUILT FOR A GIVEN NETWORK. THIS PROGRAM MUST BE USED IN CONJUNCTION WITH CONTROL PROGRAM BS00DC. INPUT IS SINGLE RECORD BINARY NETWORK, OUTPUT IS ONE OR MORE REELS OF BINARY TREES OF ONE RECORD PER TREE FORMAT. BCC TREE /PATH/ TIMES ARE ON A TAPE FOR PRINTING. DUPLICATE TREE TAPES MAY BE WRITTEN SIMULTANEOUSLY AND ALSO TREES MAY BE BUILT TWICE AND COMPARED.

## 0704-1277BS11DC FORMAT TREES PROGRAM

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1277BS11DC

AUTHOR...PAUL JENNINGS

## DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.

THE PROGRAM CONVERTS SELECTED BINARY TREE RECORDS AS PRODUCED BY THE TREE BUILDING PROGRAM, BS01DC, INTO A BCD TAPE FORMAT SUITABLE FOR OFF-LINE PRINTING. THIS PROGRAM MUST BE USED IN CONJUNCTION WITH CONTROL PROGRAM BS00DC.

## 0704-1278BSTWDC BASIC TAPE WRITER PROGRAM GE VERSION

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1278BSTWDC

AUTHOR...G.E. COMPUTER DIV

## DIRECT INQUIRIES TO..

MR. J. H. WEGSTEIN  
NATIONAL BUREAU OF STANDARDS  
COMPUTATION LABORATORY  
WASHINGTON 25, D. C.



CONTINUED FROM PRIOR PAGE--

WRITES BINARY RECORDS AND FILES ON TAPE FROM ABSOLUTE RCH BINARY CARDS. OCTAL AND BINARY CORRECTION CARDS MAY BE USED. CONTROL OF THE WRITING IS BY CARDS. CHECKSUMS MAYBE WRITTEN AND VERIFIED IF DESIRED. PROGRAM IS SELF-LOADING FROM CARDS AND OCCUPIES CELLS 0-200 OF CORE.

**0704-1281RSM SUB LINEAR PROGRAMMING**

**SUBROUTINE, FORTRAN CODED**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1281RSM SUB

AUTHOR...R.J. CLASEN

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

A FORTRAN SUBROUTINE WHICH SOLVES A LINEAR PROGRAMMING PROBLEM FROM DATA SET UP IN MACHINE STORAGE. SUBROUTINE ACCEPTS DATA IN TWO-DIMENSIONAL ARRAY. DIMENSIONS OF THE ARRAY ARE SPECIFIED BY THE USER IN THE CALLING SEQUENCE OF THE SUBROUTINE. COMPILES TO 1151 LOCATIONS ON THE 7090.

**0704-1291UMTR MADTRAN**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1291UMTR

AUTHOR...ROBERT F. RCSIN

DIRECT INQUIRIES TO..

MR. BRUCE W. ARDEN  
UNIVERSITY OF MICHIGAN  
COMPUTING CENTER  
NORTH UNIVERSITY BLDG.  
ANN ARBOR, MICHIGAN

MADTRAN WILL TRANSLATE ANY CORRECT FORTRAN II PROGRAM INTO AN EQUIVALENT MAD PROGRAM. IT IS WRITTEN PRIMARILY IN MAD WITH A VERY FEW SHORT SUBROUTINES IN ASSEMBLY LANGUAGE. MADTRAN TRANSLATES FORTRAN PROGRAMS AT APPROXIMATELY 100 CARDS PER MINUTE ON THE 709, PRODUCING A MAD INPUT DECK AND A LISTING OF THE RESULTANT PROGRAM.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1297RF101 READ TAPE RECORD %VARIABLE LENGTH- MIXED MODE**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1297RF101

AUTHOR...LIONEL W. LEVIN

DIRECT INQUIRIES TO..

MR. BERNARD TANNENBAUM  
PROGRAMMING TECHNIQUES SECTION  
COMPUTER PROGRAMMING AND ANALYSIS  
REPUBLIC AVIATION CORP.  
FARMINGDALE LONG ISLAND  
NEW YORK

READS FROM ANY TAPE A VARIABLE LENGTH RECORD IN AN UNSPECIFIED MODE. THE CORRECT MODE OF READING IS AUTOMATICALLY SELECTED BY THE ROUTINE. RETURNS INDICATE WHETHER THE RECORD WAS BCD, BINARY, END OF FILE OR

**0704-1304BICHN CHAIN**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1304BICHN

AUTHORS...C. LOLLI L. CALL OLIO

DIRECT INQUIRIES TO..

DR. ARNALDO CHIARINI  
CENTRO DI CALCOLO DEL C.N.R.  
VIA DEL BORGHO, 136  
BLOGNA, ITALY

BSS LOADER MODIFIED TO CREATE ONE OR MORE BINARY TAPES BEARING A PROGRAM FURNISHED BY FORTRAN II COMPILED AND THAT MAY EXCEED CORE STORAGE DISPONIBILITY. SUBROUTINE CHAIN IS USED TO CALL IN THE PROGRAM TAPES. REQUIRES 342 STORAGE.

**0704-1305PE40AN INSTRUCTION ANALYSER FOR 7040/44**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1305PE40AN

AUTHOR...ARTHUR J. BONNER  
IBM CORP.  
P.O. BOX 390  
POUGHKEEPSIE N.Y.

DIRECT INQUIRIES TO AUTHOR

THE 7040/44 INSTRUCTION ANALYZER IS TO TEST PROGRAMS WRITTEN IN SYMBOLIC LANGUAGE FOR THE 704, 709, AND THE 7090 FOR COMPATIBILITY TO THE 7040/44 AND TO SERVE AS AN AID IN REVISING THESE PROGRAMS FOR THE 7040/44. PROGRAMS ANALYZED WILL BE ASSEMBLED WITH INCOMPATIBLE INSTRUCTIONS FLAGGED. A COUNT BY OPTION OF ALL INSTRUCTIONS APPEARING IN THE PROGRAM IS PROVIDED.

**0704-1307BCCOMB SETCOM/CCOMBS**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1307BCCOMB

AUTHOR...ELEANOR S. KRASNOW  
UNIVERSITY OF CALIF. COMP. CTR.  
CAMPBELL HALL  
BERKELEY 4 CALIF.

DIRECT INQUIRIES TO AUTHOR

A PAIR OF FORTRAN SUBROUTINES TO EVALUATE AN EXPRESSION CONSISTING OF PRODUCTS OF FACTORIALS. EACH FACTORIAL MAY BE RAISED TO AN INTEGER POWER.

**0704-1321BCHOW FORTRAN SUBROUTINE HOW**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1321BCHOW

AUTHOR...DAVID MATULA  
COMPUTER CENTER LIBRARY  
UNIV OF CALIFORNIA  
BERKELEY CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

PURPOSE-FINDS EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX. METHOD-NON-ITERATIVE ROUTINES OF HOUSEHOLDER, ORTEGA AND WILKINSON \*1958-1960\* ARE USED. SPACE-1,352 CORE LOCATIONS; COMMON IS NOT DISTURBED. ACCURACY-ROOTS 6 DECIMAL DIGITS, VECTORS 5 DECIMAL DIGITS. 7.4 TIME-20X20 1 MIN., 40X40 2 MIN., 75X75 10 MIN. DIMENSION-VARIABLE DIMENSION INPUT ALLOWS COMPACTNESS WITHOUT RECOMPILOATION.

**0704-1322LAERRI ERROR FUNCTION /HASTINGS, P. 169/**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1322LAERRI

AUTHOR...ROGER H. MCCRE  
LOS ALAMOS SCIENTIFIC LAB.,  
LOS ALAMOS NEW MEXICO

DIRECT INQUIRIES TO AUTHOR

COMPUTES  $\text{PHI } \frac{x}{\sqrt{2\pi}} e^{-x^2/2}$  INTEGRAL FROM 0 TO X OF  $\text{EXP}^{-T} e^{-2T}$ , GIVEN X NON-NEGATIVE. USES EXPF SUBROUTINE. TIMING --X#0, 3.636MS--0 LESS X LESS 1/4, 5.532 MS--X GREATER THAN 1/4, 5.964MS. STORAGE 79 LOCATIONS. ACCURACY 1.5 IN 7TH DECIMAL PLACE. COMPARED WITH FORTRAN SUBROUTINE ERRORF, THIS MEANS ERRI DOUBLES THE ACCURACY AT THE EXPENSE OF ABOUT 13 PER CENT MORE COMPUTING TIME. MAT. AVAIL. WU,LS, SYSFOR,BI-RR,BI-RC.

**0704-1323LABVN BIVARIATE NORMAL PROBABILITY EVALUATION**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1323LABVN

AUTHOR...ROGER H. MCCRE  
LOS ALAMOS SCIENTIFIC LAB.  
LOS ALAMOS NEW MEXICO

DIRECT INQUIRIES TO AUTHOR

EVALUATES THE PROBABILITY THAT A RANDOM OBSERVATION FROM A BIVARIATE NORMAL DIST. WITH ARBITRARY MEANS, VARIANCES, AND CORRELATION OCCURS IN THE UPPER RIGHT QUARTER PLANE. CODED IN FORTRAN. REQUIRES FORTRAN SUBROUTINES ASINF, COSF, EXPF, EXP\*2, AND SINP. ALSO REQUIRES C3 LAFERRI FOR ERROR FUNCTION EVALUATION. TIMING VARIES--AVERAGE TIME ABOUT ONE SECOND. 458 LOCATIONS. MAT. AVAIL. WUY\* SYSFOR,BI-RR,BI-RC.

**0704-1324TVDRTR DATA REARRANGEMENT AND TRANSFORMATION**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1324TVDRTR

AUTHOR...J. WAYNE VINYARD

DIRECT INQUIRIES TO..

MARTIN HOCHDORF  
TVA COMPUTING CENTER  
116 OLD POST OFFICE BUILDING  
CHATTAHOOGA, TENNESSEE

FN II PROGRAM TO REARRANGE AND/OR TRANSFORM DATA FOR USE IN EITHER CARD OR TAPE FORM IN OTHER PROGRAMS. DATA FIELDS MAY BE SHIFTED OR CHANGED. ADDITION, SUBTRACTION, MULTIPLICATION DIVISION, EXPONENTIATION, SINE, COSINE, LOG /BASE E/, LOG /BASE 10/, SCALING, AND SQUARE ROOT MAY BE USED TO TRANSFORM ANY FIELD. PROVISION MADE WITHIN DRTR TO INCLUDE CONTROL CARDS NEEDED FOR NEXT PROGRAM. MAX. OF 99 VARIABLES WITH ANY NO. OF OBSERVATIONS MAY BE HANDLED. MAX. OF 200 TRANSFORMATIONS & 200 REARRANGEMENTS CAN BE MADE ON ONE DATA SET.

**0704-1337BCGUTS TO GENERATE GUTTMAN SCALES FOR A SET OF ITEMS.**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1337BCGUTS

AUTHOR...E. KRASNOW  
UNIVERSITY OF CALIF.  
CAMPBELL HALL  
BERKELEY 4 CALIF.

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

TO ASSIGN SCALE SCORES TO THE SUBJECTS BASED ON THE BEST OF THE SCALES GENERATED. THE PROGRAM WILL BE MOST USEFUL TO PSYCHOLOGISTS, POLITICAL SCIENTISTS, AND SOCIOLOGISTS.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1345PQKAV DISTRIBUTION-FREE ONE-WAY ANALYSIS OF VARIANCE**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1345PQKAV

AUTHOR...N. LAUBSCHER  
CSIR  
P.O. BOX 395  
PRETORIA, SOUTH AFRICA

DIRECT INQUIRIES TO AUTHOR

A FORTRAN II PROGRAM TO COMPUTE THE KRUSKAL-WALLIS DISTRIBUTION-FREE STATISTIC FOR COMPARING THE MEANS OF  $K \times 20$  SAMPLES. /INCLUDING THE WILCOXON-MANN-WHITNEY STATISTIC WHEN  $K = 2$  /. NOT MORE THAN 50 OBSERVATIONS PER SAMPLE.

**0704-1355UMUMT SOLUTION OF GENERALIZED DISTRIBUTION PROBLEM**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1355UMUMT

AUTHOR...BERNARD A. GALLER  
COMPUTING CENTER  
UNIV. OF MICH.  
1000 N. UNIV. BLDG.  
ANN ARBOR, MICH.

DIRECT INQUIRIES TO AUTHOR

THE PROBLEM OF /CF/A/ CONCERNS THE ALLOCATION OF SHIPMENTS /AND, INDIRECTLY, SCHEDULING OF PRODUCTION/ CF ITEMS BETWEEN SHIPPING POINTS AND RECEIVING POINTS SO AS TO MINIMIZE TRANSPORTATION COSTS. THE MULTISTAGE ASPECT ARISES FROM THE POSSIBILITY OF HAVING INTERMEDIATE ASSEMBLY OR TRANSFER POINTS BETWEEN THE ORIGIN AND DESTINATION OF THE SHIPMENT.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1372LSDI SELECTIVE DISSEMINATION OF INFORMATION /SDI/**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1372LSDI

AUTHORS...R. BENJAMIN S. MILLER E. ROWLAND

DIRECT INQUIRIES TO..

R. BENJAMIN  
IBM CORP.  
7220 WISCONSIN AVE.  
BETHESDA, MD.

THE PURPOSE OF THE S.-D.-I. SYSTEM IS TO FACILITATE THE DISTRIBUTION OF TECHNICAL DOCUMENTS TO THE PEOPLE WHO ARE INTERESTED IN RECEIVING THEM. IT IS DESIGNED FOR USE ON THE IBM 7090 COMPONENTS REQUIRED OTHER THAN MINIMUM 709 ARE /1/ MAGNETIC CORE MUST BE 32,768 WORDS /2/ IBM 1401 NEEDED FOR OFF-LINE PRINTING OF TAPE B5 AS IT IS WRITTEN FOR 132 CHARACTERS/LINE AND FOR PUNCHING CARDS FROM TAPE B4.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1382NCIOSM SIMULATES THE 709 INPUT/OUTPUT ON THE 7040/44.**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1382NCIOSM

AUTHOR...ALBERT S. FARHA  
NORTH AMERICAN AVIATION  
4300 E. FIFTH AVE.  
DEPT. 92, BLDG. 6  
COLUMBUS, OHIO

DIRECT INQUIRIES TO AUTHOR

SIMULATES 709 I/O COMMANDS ON THE 7040/44. IT SIMULATES THE FOLLOWING I/O COMMANDS - RDS, WRS, RCHA, RCHB, LCHA, LCHB, SCH, TCNA, AND TCNB. BECAUSE IT CHANGES ALL CHANNEL AS /TAPE OPERATIONS/ TO CHANNEL B5 AND CHANNEL B5 TO CHANNEL C5 IT ALSO SIMULATES BSR, BSF, WEF, REW, TCGA, TCOB, TRCA, TRCB, TEFA, TEFB, AND ETT.

**0704-1383LAERR1 ERROR FUNCTION /HASTINGS, P. 169/**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1383LAERR1

AUTHOR...ROGER H. MCCRE  
LOS ALAMOS SCIENTIFIC LABORATORY  
LOS ALAMOS, N.M.

DIRECT INQUIRIES TO AUTHOR

COMPUTES  $\Phi(x)$  /X/ EQUALS 2/ /PI/ 1/2 /INTEGRAL FROM 0 TO X OF EXP - 2 DT/, GIVEN X NON-NEGATIVE. USES EXPF SUBROUTINE. TIMING -- X EQUALS 0, 3.636 MS -- 0 LESS X LESS 1/4, 5.532 MS -- X GREATER THAN 1/4, 5.964 MS. STORAGE 75 LOCATIONS. ACCURACY 1.5 IN 7TH DECIMAL PLACE. COMPARED WITH FORTRAN SUBROUTINE ERRORF, THIS MEANS ERR1 HALVES THE

CONTINUED FROM PRIOR COLUMN--

MAX. ERROR AT THE EXPENSE OF ABOUT 13 PER CENT MORE COMPUTING TIME. MAT. AVAIL. WU,LS,SYFDR,BI-RR,BI-RC. CORR. 1383

**0704-1385ANF202 EIGENVALUES AND EIGENVECTORS OF A REAL SYMMETRIC MATRIX**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1385ANF202

AUTHOR...BURTON S. GARROW  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY  
9700 SOUTH CASS AVENUE  
ARGONNE, ILLINOIS

DIRECT INQUIRIES TO AUTHOR

FORTRAN II SUBROUTINE FINDS ALL SCALAR SOLUTIONS, L /INCLUDING PROPER MULTIPLICITY/, AND, OPTIONALLY, THE ASSOCIATED UNIT NORM VECTORS, X, TO THE MATRIX EQUATION  $AX = LAX$ . REQUIRES 1010 CELLS PLUS VARIABLE COMMON.  $AX = LAX$ . REQUIRES 935 CELLS PLUS VARIABLE COMMON. VOID BY 1385

**0704-1386ANM101 ALGEBRAIC SORT**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1386ANM101

AUTHOR...BURTON S. GARROW  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY  
9700 SOUTH CASS AVENUE  
ARGONNE, ILLINOIS

DIRECT INQUIRIES TO AUTHOR

FORTRAN SUBROUTINE-TYPE SUBPROGRAM SORTS AN ARRAY OF ELEMENTS IN EITHER ASCENDING OR DESCENDING ALGEBRAIC ORDER. A LOWER LEVEL SUBPROGRAM INCLUDED HERE CAN BE USED SEPARATELY TO MERGE TWO ARRAYS. REQUIRES 275 CELLS.

**0704-1387ANE211 LEAST SQUARE N-DIMENSIONAL SPHERE FIT**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1387ANE211

AUTHOR...BURTON S. GARROW  
APPLIED MATHEMATICS DIVISION  
ARGONNE NATIONAL LABORATORY  
9700 SOUTH CASS AVENUE  
ARGONNE, ILLINOIS

DIRECT INQUIRIES TO AUTHOR

FORTRAN SUBROUTINE-TYPE SUBPROGRAM, CREATED FOR PARTICULAR USE WITH THE GENERAL PROGRAM ANZ013, VARIABLE METRIC MINIMIZATION, DIS1, J117, DETERMINING THE CENTER AND COORDINATES OF THE CENTER OF THE SPHERE /OR CIRCLE IF N EQUALS 2/ THAT FITS BEST IN THE LEAST SQUARES SENSE TO A SET OF POINTS IN N-DIMENSIONAL SPACE. REQUIRES 2244 CELLS PLUS ANZ013.

**0704-1388DHR019 NON-LINEAR MULTIPLE CORRELATION**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1388DHR019

AUTHOR...ROY HARDY  
CALIFORNIA DEPARTMENT OF EMPLOYMENT  
800 CAPITOL AVENUE,  
SACRAMENTO 14, CALIF.

DIRECT INQUIRIES TO AUTHOR

COMPUTES LINEAR OR NON-LINEAR MULTIPLE CORRELATIONS TO FIND INDEX OF MULTIPLE DETERMINATION, STANDARD ERROR OF ESTIMATE AND INDEX OF MULTIPLE CORRELATION. FINDS REGRESSION CURVE BY METHOD OF LEAST SQUARES. UP TO 10 INDEPENDENT VARIABLES IN LOG OR EXP TO POWER 4 HAS BUILT IN BREAK-OFF BREAK-ON ROUTINE USES APPROXIMATELY 6000 LOCATIONS AND 3 TO 5 TAPE DRIVES.

**0704-1389TOCCG1 PROJECT COST CURVE COMPUTATION FOR THE IBM 704**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1389TOCCG1

AUTHORS...H. LERCHS C.A. SHARDLOW

DIRECT INQUIRIES TO..

H. LERCHS  
IBM SCIENTIFIC DATACENTRE  
600 EGLINTON AVE. E.  
TORONTO, ONTARIO, CANADA

CALCULATES COST CURVE AND SELECTED SCHEDULES FOR A GIVEN PROJECT IN WHICH EACH ACTIVITY HAS AN ASSOCIATED NORMAL DURATION AND COST, CRASH DURATION AND PENALTY COST. USES ANY 704 WITH CARD-READER, ON-LINE PRINTER, MINIMUM 4 TAPES. PROJECT SIZE LIMITED BY 3A PLUS 4N PLUS 1125 LESS THAN CORE STORAGE AVAILABLE, WHEN A EQUALS NC. ACTIVITIES, N EQUALS NC. NCDES IN PROJECT. PROGRAM WRITTEN IN SAP AND FORTRAN. PROVISION MADE FOR INDIRECT COST CURVE AND RE-RUNS.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

## Section B

**0704-13900SCOR3 BLOCK CORRELATION PROGRAM.**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-13900SCOR3

AUTHOR...RCY F. REEVES  
NUMERICAL COMPUTATION LABORATORY  
OHIO STATE UNIVERSITY  
1314 KINNEAR ROAD  
COLUMBUS 12, OHIO

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM IS DESIGNED TO COMPUTE ALL CORRELATIONS BETWEEN TWO BLOCKS OF VARIABLES. THE BLOCKS MAY OVERLAP OR COINCIDE. MEANS, STANDARD DEVIATIONS, SUMS, SUMS OF SQUARES, SUMS OF PRODUCTS, COVARIANCES, AND CORRELATIONS SQUARED ARE ALSO COMPUTED. THE RESULTS MAY BE PRINTED OR PUNCHED. MAXIMUM SIZE OF INPUT DATA IS SIX DECIMAL DIGITS. THE NUMBER OF OBSERVATIONS MUST BE LESS THAN 10000.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-13910SMR02. MULTIPLE REGRESSION ANALYSIS PROGRAM.**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-13910SMR02

AUTHOR...DONALD P. MILLER

DIRECT INQUIRIES TO...  
ROY F. REEVES  
NUMERICAL COMPUTATION LABORATORY  
OHIO STATE UNIVERSITY  
1314 KINNEAR ROAD  
COLUMBUS 12, OHIO

THIS PROGRAM PERFORMS THE MULTIPLE REGRESSION ANALYSIS UNDER THE HYPOTHESIS  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \epsilon$ . THE NUMBER OF INDEPENDENT VARIABLES MUST NOT EXCEED 31. THE NUMBER OF OBSERVATIONS MUST BE LESS THAN 10000. SEVERAL PROBLEMS MAY BE STACKED AND PROCESSED CONSECUTIVELY. THE MAXIMUM INPUT SIZE IS SIX DECIMAL DIGITS.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-13920SCOR4 SIMPLE CORRELATION PROGRAM**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-13920SCOR4

AUTHOR...DONALD P. MILLER

DIRECT INQUIRIES TO...  
RCY F. REEVES  
NUMERICAL COMPUTATION LABORATORY  
OHIO STATE UNIVERSITY  
1314 KINNEAR ROAD  
COLUMBUS 12, OHIO

THIS PROGRAM IS DESIGNED TO COMPUTE CORRELATIONS BETWEEN INDIVIDUAL VARIABLES SELECTED FROM A LARGE BLOCK. MEANS, STANDARD DEVIATIONS, SUMS, SUMS OF SQUARES, SUMS OF PRODUCTS, COVARIANCES, AND CORRELATIONS SQUARED ARE ALSO COMPUTED. THE RESULTS MAY BE PRINTED OR PUNCHED. MAXIMUM SIZE OF INPUT DATA IS SIX DECIMAL DIGITS. THE NUMBER OF OBSERVATIONS MUST BE LESS THAN 10000.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0704-1408GSTSMM TASMN SYSTEM**  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1408GSTSMM

AUTHORS...D.G. ARNOLD E.M. GURKA J.E. KING

DIRECT INQUIRIES TO...  
D.G. ARNOLD  
LST-G DEPT., BLDG. 59-214,  
GENERAL ELECTRIC CO.  
273 NORTH AVE.,  
SCHENECTADY 5, N.Y.

A LOAD-AND-GO COMPILING SYSTEMS FOR BOTH SCIENTIFIC AND DATA PROCESSING TYPE PROGRAMS INCLUDING DECISION TABLE FACILITIES. COMPILING SPEED UP TO 2000 INSTRUCTIONS PER MINUTE. TASMN SUPPORT PACKAGE /GS TSMP/ REQUIRED FOR COMPUTER OPERATION.

**0704-1409GSTSMP TASMN SUPPORT PACKAGE**  
AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1409GSTSMP

AUTHORS...D.G. ARNOLD E.M. GURKA J.E. KING

DIRECT INQUIRIES TO...  
D.G. ARNOLD  
LST-G DEPT., BLDG. 59-214  
GENERAL ELECTRIC CO.  
273 NORTH AVE.  
SCHENECTADY 5, N.Y.

A GROUP OF SERVICE ROUTINES REQUIRED FOR OPERATING THE TASMN SYSTEM /GS TSMP/ AS EITHER A SINGLE OR MULTI-JOB PROCESSOR OF SOURCE PROGRAMS.

**0704-1428DP2135 LEAST SQUARES ESTIMATION OF NONLINEAR PARAMETERS**  
AVAILABLE 2ND QUARTER 1963.

CONTINUED FROM PRIOR COLUMN--  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1428DP2135

AUTHOR...T. BAUMEISTER, III D. W. MARQUARDT

DIRECT INQUIRIES TO...  
D. W. MARQUARDT  
ENGINEERING DEPT.  
E.I. DUPONT DE NEMOURS & CO., INC.  
WILMINGTON, DELAWARE

FORTRAN PROGRAM EMPLOYS MAXIMUM NEIGHBORHOOD METHOD OF ITERATION TO FIND LEAST SQUARES VALUES OF PARAMETERS IN A NONLINEAR MODEL. OPTIONS TO USE ANALYTIC OR ESTIMATED DERIVATIVES AND TO PLOT OBSERVED AND PREDICTED CURVES. BOTH CONVENTIONAL AND SUPPORT PLANE CONFIDENCE LIMITS ARE PROVIDED, ALSO NONLINEAR LIMITS, CORRELATION MATRIX, ETC. USER MUST SUPPLY DATA, INITIAL GUESSES AND FORTRAN CODING FOR MODEL.

**0704-1505RP1228 FORTRAN II**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1505RP1228

AUTHORS...MR. CARL M. BENNETT  
U.S. NAVY MINÉ DEFENSE LAB.  
PANAMA CITY, FLORIDA

DIRECT INQUIRIES TO AUTHOR

TO FIND THE NORMALIZED LAG PRODUCTS /PREWHITENED/, AND POWER AND /OR CROSS POWER SPECTRA OF STATIONARY TIME SERIES, ALLOWING FOR TREND ELIMINATION BY REGRESSION OF LEAST SQUARES. SPECTRAL ESTIMATES USING PARZEN/S FILTER, I.E., LAG WINDOW. UNITS CONVERSION AND PREWHITENING CORRECTIONS AND ALLOWING FOR TWO MODES OF OPERATION, NAMELY- POWER SPECTRUM OF A SINGLE TIME SERIES AND THEIR CROSS SPECTRUM  
8K CORE FOR PROGRAM AND DATA, 3 TAPES REQUIRED.

**0704-1555ACDEP1 ANALOG SIMULATOR**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1555ACDEP1

AUTHOR...J.R. HURLEY  
ALLIS CHALMERS  
P.O. BOX 512  
MILWAUKEE, WISCONSIN

DIRECT INQUIRIES TO AUTHOR

TO SIMULATE THE ACTIONS OF AN ELECTRONIC DIFFERENTIAL ANALYZER ON THE IBM 704. REQUIRES PROGRAMS NYINPL AND NYOUTL IN CORE AT DIGITAL LOCATIONS 129 AND 1164, RESPECTIVELY. REQUIRES 8K CORE, NO DRUM. A 4TH ORDER RUNGE-KUTTA NUMERICAL INTEGRATION METHOD IS EMPLOYED. ACCURACY DEPENDS ON SELECTION OF INCREMENT SIZE BY USER. DEPI REQUIRES NUMERICAL CONSTANTS AND A DESCRIPTION OF THE INTERCONNECTIONS BETWEEN HYPOTHETICAL ANALOG COMPUTING COMPONENTS. THE PREPARATION OF THIS DATA IS DETAILED IN THE COMPLETE WRITE-UP. MACHINE LANGUAGE-SAP.

**0704-1580ANL107 PEST ASSEMBLER**  
AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-1580ANL107

AUTHOR...NANCY CLARK  
ARGONNE NATIONAL LAB  
APPLIED MATHEMATICS DIVISION  
ARGONNE, ILLINOIS

DIRECT INQUIRIES TO AUTHOR

THE 704 PEST ASSEMBLER WAS WRITTEN TO ASSEMBLE PEST CODED IBM 1401 PROGRAMS ON THE 704. THE 704 PEST ASSEMBLER IS A MODIFICATION OF PHILLIP PETROLEUMS LI\*PP PEST /DISTRIBUTION 961/ WHICH WAS WRITTEN FOR THE 709-90. THE PEST CODING SYSTEM IS IDENTICAL TO THAT OF PP PEST. PART I OF THE PP PEST WRITEUP PERTAINS TO THE CODING SYSTEM AND IS ALSO COMPLETELY PERTINENT TO THE 704 VERSION. PART II OF THE PP PEST WRITEUP COVERS PARTICULARS AND OPERATING INSTRUCTIONS. MUCH OF THIS PORTION OF THE WRITEUP HAS BEEN CHANGED- THESE CHANGES WILL BE NOTED UNDER USAGE. USAGE THE 704 PEST ASSEMBLER IS WRITTEN IN FAP AND ASSEMBLED WITH AFFAP. IN USING THIS ASSEMBLER THE ASSEMBLER RELOCATABLE COLUMN BINARY DECK MAY BE LOADED FROM TAPE IN THE SAME MANNER AS A FORTRAN ROUTINE FOLLOWED BY ITS DATA /IN THIS CASE PEST LANGUAGE SYMBOLIC CARDS TO BE ASSEMBLED/.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL

**0704-3007GZPERT PERT PROGRAM -EVENT ORIENTED-**  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-3007GZPERT

AUTHORS...B. YOUKER D. T. OLIVEIRA

DIRECT INQUIRIES TO...  
DIANA T. OLIVEIRA  
GENERAL ELECTRIC ORDNANCE DEPT.  
ENGINEERING ANALYSIS & COMPUTATIONS  
CPI - ROOM 1063  
PITTSFIELD, MASS.

PROGRAM EVALUATION AND REVIEW TECHNIQUE METHOD FOR SCHEDULING AND PROGRAMMING RESEARCH AND DEVELOPMENT PROJECTS TO ACCOMPLISH PROJECT OBJECTIVES ON TIME. MACHINE LANGUAGE TASMN.

0704-3008GZSORT PERT SORT PROGRAM  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0704-3008GZSORT

AUTHORS..B. YOUKER D. T. OLIVEIRA

DIRECT INQUIRIES TO..  
DIANA T. OLIVEIRA  
GENERAL ELECTRIC ORDNANCE DEPT.  
ENGINEERING ANALYSIS & COMPUTATIONS  
DPI- ROOM 1063  
PITTSFIELD, MASS.

FINAL OUTPUT TAPE FROM 704 PERT PROGRAM IS SORTED TO  
GENERATE THREE REPORTS IDENTICAL IN FORMAT, EACH A  
DIFFERENT SORT- A- EVENT, B- SLACK, TE MINOR, C- TE-  
EXPECTED DATE. MACHING LANGUAGE SAP.

## 0709

0709-0388G57109 BASIC 709 I/O CONVERSION  
SUBROUTINES

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0388G57109

AUTHOR...JANE E. KING

DIRECT INQUIRIES TO..  
MR. HARRY N. CANTRELL  
LARGE STEAM TURBINE-GEN. DEPT. 59-244  
GENERAL ELECTRIC COMPANY  
SCHENECTADY, NEW YORK

A SET OF BASIC INPUT AND OUTPUT CONVERSION SUBROUTINES FOR  
USE WITH THE 709. THE TWO GROUPS OF SUBROUTINES ARE  
INTER-RELATED AMONG THEMSELVES AND USE A COMMON  
COMMUNICATION REGION. THE ACTUAL CODING HAS NOT BEEN  
DISTRIBUTED. SPECIFICATIONS ARE BY THE 709 SYSTEMS  
COMMITTEE.

0709-0502RLTC09 TAPE COMPARE FOR THE 709  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0502RLTC09

AUTHOR...J.L. KOORY

DIRECT INQUIRIES TO..  
MR. JOHN A. JORDAN  
7090 COMPUTING AND PROGRAMMING BRANCH  
SYSTEM DEVELOPMENT CORPORATION  
2500 COLORADO AVENUE  
SANTA MONICA, CALIFORNIA

TO COMPARE TAPES BY FILES /WORD BY WORD/. 1. COMPARES TAPES  
A6 TO TAPE B6. 2. REQUIRES SHARE BOARD IN ON-LINE PRINTER.  
3. RECORDS LONGER THAN 10000 10TH WILL NOT BE PROCESSED  
PROPERLY. 4. TC9 WILL READ ONLY ONE /1/ CONTRL CARD. 5. THE  
CONTROL CARD MUST FOLLOW THE BINARY TRANSFER CARD. A. CHECKS  
FOR THE SAME NUMBER OF WORDS IN THE RECORDS. B. CHECKS WORD FOR  
WORD, BY SUBTRACTION. C. CHECKS FOR THE SAME NUMBER OF RECORDS  
IN THE FILES.

0709-0536SE09AP ASSEMBLY PROGRAM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0536SE09AP

AUTHOR...MR. S. CASHTON  
SYLVANIA ELECTRONIC SYSTEMS  
DIV. OF SYLVANIA ELECTRIC PROD. INC.  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B STREET  
NEEDHAM 94, MASSACHUSETTS

DIRECT INQUIRIES TO AUTHOR

THE TAPE WRITING ROUTINE  
THE CONTROL RECORD FOR THE FIRST PASS THE FIRST PASS  
THE CONTROL RECORD FOR THE SECOND PASS THE SECOND PASS  
THE CALL CARD FOR THE ASSEMBLER

0709-0563SE9LRL RELOCATING BINARY LOADER,  
LOWER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0563SE9LRL

AUTHOR...PAUL HANNAH

DIRECT INQUIRIES TO..  
MR. S. CASHTON  
SYLVANIA ELECTRONIC SYSTEMS  
DIV. OF SYLVANIA ELECTRIC PROD. INC.  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B STREET  
NEEDHAM 94, MASSACHUSETTS

LOADS INTO CORE MEMORY INFORMATION FROM ABSOLUTE AND  
RELOCATABLE BINARY DATA CARDS, CORRECTION-TRANSFER CARDS,  
AND ORIGIN TABLE CARDS. ONLY THE DATA CARDS WILL BE  
CHECK-SUMMED. CORRECTIONS MAY BE UP-DATED AND UP-DATING  
WILL CONTINUE EVEN THOUGH A PREVIOUS INSTRUCTION HAS BEEN  
IGNORED. SELF LOADS INTO 0-334 OCTAL LOCATIONS.

0709-0563SE9RBL RELOCATABLE BINARY LOADER  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0563SE9RBL

AUTHOR...PAUL HANNAH

DIRECT INQUIRIES TO..  
MR. S. CASHTON  
SYLVANIA ELECTRONIC SYSTEMS  
DIV. OF SYLVANIA ELECTRIC PROD. INC.  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B STREET  
NEEDHAM 94, MASSACHUSETTS

CONTINUED FROM PRIOR COLUMN--

LOADS AND CHECKS STANDARD SHARE ABSOLUTE AND RELOCATABLE  
CARDS. WILL NOT ACCEPT SHARE CORRECTION OR SHARE  
CORRECTION-TRANSFER CARDS. SELF LOADS INTO C-170 OCTAL  
LOCATIONS.

0709-0563SE9URL RELOCATING BINARY LOADER,  
UPPER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0563SE9URL

AUTHOR...PAUL HANNAH

DIRECT INQUIRIES TO..  
MR. S. CASHTON  
SYLVANIA ELECTRONIC SYSTEMS  
DIV. OF SYLVANIA ELECTRIC PROD. INC.  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B STREET  
NEEDHAM 94, MASSACHUSETTS

LOADS INTO CORE MEMORY INFORMATION FROM ABSOLUTE AND  
RELOCATABLE BINARY DATA CARDS, CORRECTION-TRANSFER CARDS,  
AND ORIGIN TABLE CARDS. ONLY THE DATA CARDS WILL BE  
CHECK-SUMMED. CORRECTIONS MAY BE UP-DATED AND UP-DATING  
WILL CONTINUE EVEN THOUGH A PREVIOUS INSTRUCTION HAS BEEN  
IGNORED. SELF LOADS INTO LOCATIONS 77452-77777 OCTAL PLUS  
0,1,2 USED TO BOOT STRAP IN.

0709-0569SE90U2 A GENERAL OUTPUT PROGRAM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0569SE90U2

AUTHOR...ROGER MCDOWELL

DIRECT INQUIRIES TO..  
MR. S. CASHTON  
SYLVANIA ELECTRONIC SYSTEMS  
DIV. OF SYLVANIA ELECTRIC PROD. INC.  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B. STREET  
NEEDHAM 94, MASSACHUSETTS

TO SET UP AND PRINT ONE LINE-72 OR 120 COLUMNS-OR TO  
OUTPUT A COMPLETE LINE TO A SPECIFIED TAPE, OR BOTH. ANY  
DESIRED FORMAT MAY BE USED AND CONVERSIONS FROM FLOATING  
BINARY TO FIXED DECIMAL, FLOATING BINARY TO FLOATING  
DECIMAL OR FIXED BINARY TO FIXED DECIMAL ARE MADE AS  
INDICATED. OUTPUT IN HOLLERITH AND OCTAL CAN ALSO BE DONE.  
LOCATIONS TO BE OUTPUT MAY BE INDEXED IF DESIRED. THE  
SHARE 2 BOARD IS USED FOR ON-LINE OUTPUT.

0709-0605WDCTS CARD TO TAPE SIMULATOR  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0605WDCTS

AUTHORS..D. P. MOORE D. E. FERGUSON

DIRECT INQUIRIES TO..  
SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24, CALIF.

714 SIMULATOR. READS HOLLERITH OR COLUMN BINARY FROM  
CHANNEL 4 CARD READER AND WRITES BCD OR BINARY RECORDS ON  
TAPE. TAPE ADDRESS GIVEN IN KEYS AND KEYS CONTRL  
REWINDING BEFORE AND AFTER. INSERTS PROPER LOOK-AHEAD  
WORDS. RUNS AT CARD READ SPEED FOR ANY TAPE. CONTRL  
CARDS TO INSERT END OF FILES AND TO SIMULATE CLEAR LOAD  
CARDS.

0709-0633WDCRD BUFFERED CARD-INPUT  
SUBROUTINE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0633WDCRD

AUTHOR...D. P. MOORE

DIRECT INQUIRIES TO..  
SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24 CALIF.

READS HOLLERITH CARDS AND TRANSLATES TO BCD. CHECKS FOR  
ILLEGAL PUNCHES.

0709-0651WDTPS TAPE TO PRINTER/PUNCH  
SIMULATOR

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0651WDTPS

AUTHOR...D. P. MOORE

DIRECT INQUIRIES TO..  
SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24, CALIF.

SIMULATES 717 PRINTER WITH ECHO CHECKING AND OPTIONAL  
PROGRAM CARRIAGE CONTROL. ALSO SIMULATES 722 PUNCH FOR BCD  
DATA.

0709-0709NUCLO1 APWRG-SYNFAR  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

## Section B

CONTINUED FROM PRIOR PAGE--

SPECIFY FILE NUMBER 0709-0709NUCL01

AUTHOR...D. H. FREDERICK  
WAL # 820  
MARTIN CO., NUCLEAR DIV.  
BALTIMORE, MARYLAND

DIRECT INQUIRIES TO AUTHOR

THIS CODE DOES A SYNTHESIS COMPUTATION OF THE STATIC FLUX AND REACTIVITY, OR OF THE STABLE PERIOD AND CORRESPONDING FLUX SHAPE, IN XY OR RZ GEOMETRY. A DIRECT COMPUTATION OF THE SAME QUANTITIES IS MADE IN ONE-DIMENSIONAL SPHERICAL GEOMETRY. IT IS ASSUMED, IN TWO-DIMENSIONAL PROBLEMS, THAT THE FLUX IS SEPARABLE IN THE TWO PERPENDICULAR DIRECTIONS. ONE-DIMENSIONAL CALCULATIONS ARE CARRIED OUT ALTERNATELY IN EACH DIRECTION, AND ARE COUPLED THROUGH LITHARGY DEPENDENT BUCKLINGS. A 32K MEMORY WITH TEN TAPE UNITS. FOR TRANSPORT CALCULATIONS, TWO OR THREE GROUPS MAY BE USED, AND P TO THE SUB 1, S TO THE SUB 2, S TO THE SUB 6, S TO THE SUB 8, AND S TO THE SUB 16. CALCULATIONS MAY BE MADE. THE S TO THE SUB 16 CALCULATION MAY NOT BE DONE IN CYLINDRICAL GEOMETRY. UP TO 199 SPACE INTERVALS IN EACH DIRECTION. 12 MINUTES ON THE 709 FOR 3 PASSES ON A RIGHT-CIRCULAR CYLINDER WITH HOMOGENEOUS CORE AND REFLECTOR.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

0709-0709RWTL TWO MACHINE LOADER  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0709RWTL

AUTHOR...T.G. SANBORN

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

WILL LOAD RWO-BINARY CARDS AS PRODUCED BY SAP AND 9AP, LOGICAL OCTAL CARDS, AND BINARY TRANSFER CARDS, ON EITHER THE 704 OR 709. CORR./741

0709-0808DRCC1 SELF-LOADING ROW BINARY TO COLUMN BINARY CONVERTER

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0808DRCC1

AUTHOR...ROBERT SHEPARDSON

DIRECT INQUIRIES TO..

MR. HAYDEN E. WILLIAMS, MANAGER  
DATA PROCESSING OPERATIONS  
HEAVY MILITARY ELECTRONIC EQPMT. DEPT  
GENERAL ELECTRIC COMPANY  
ELECTRONICS DIVISION  
BLDG. 1, RM. 7, COURT ST. PLANT  
SYRACUSE, NEW YORK  
ATTN-MR. R. M. BROWN

THIS IS A ONE CARD SELF-LOADING PROGRAM WHICH WILL READ FORTRAN TYPE ROW BINARY CARDS ON-LINE AT FULL SPEED AND CONVERT TO COLUMN BINARY FOR OFF-LINE PUNCHING. A NEW CHECKSUM IS COMPUTED. REQUIRES 709 WITH ON-LINE CARD READER AND 1 TAPE UNIT.

0709-0824LLFLCA FLOW CHART ANALYSIS BY BOOLEAN MATRIX MANIPULATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0824LLFLCA

AUTHORS..JANE HEART DAVID RIENER

DIRECT INQUIRIES TO..

MR. JAMES J. FITZGERALD  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
LINCOLN LABORATORY  
LEXINGTON 73, MASSACHUSETTS

DETECTS ERRORS IN CONNECTIVITY OF FLOW CHARTS UP TO 500 BOXES BY TREATING A FLOW CHART AS A BOOLEAN MATRIX. WILL ALSO DETERMINE SUBPROGRAMS IN THE FLOW CHART IF INFORMATION ABOUT DATA FLOW IS GIVEN. PRINTS COMPLETE LIST OF INPUTS AND OUTPUTS OF ANY SPECIFIED BOX. PROGRAM SHOULD ALSO BE USEFUL FOR NETWORK ANALYSIS AND OTHER PROBLEMS INVOLVING BOOLEAN MATRIX MANIPULATION.

0709-0860RWCF LEAST SQUARES CURVE-FITTING ROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0860RWCF

AUTHOR...L.C. STOLLER

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

USING ORTHOGONAL POLYNOMIALS 704-709 FORTRAN FAP STATISTICAL VALUES INDICATING RELIABILITY OF THE DERIVATIVES ARE PROVIDED. WEIGHTS OTHER THAN ONE MAY BE OPTIONALLY PROVIDED. THE MINIMIZATION MAY BE OPTIONALLY CONSTRAINED TO FORCE UP TO SEVEN OF THE LOW-ORDER COEFFICIENTS TO VANISH. 427 CELLS PROGRAM PLUS TEMPERATIES. CORR/ 920

0709-0887PPTDAC TAPE DUPLICATE AND COMPARE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0887PPTDAC

AUTHOR...JIMMIE J. JONES

DIRECT INQUIRIES TO..

MR. G. R. TAIT  
COMPUTER METHODS AND PROCEDURE  
COMPUTING DEPARTMENT  
PHILLIPS PETROLEUM COMPANY  
BARTLESVILLE, OKLAHOMA

THE PURPOSE OF THIS ROUTINE IS--/1/ TO MOVE RECORDS AND/OR FILES OF BINARY AND/OR BCD INFORMATION FROM ANY TAPE OR TAPES ON CHANNEL A TO ANY TAPE OR TAPES ON CHANNEL B, AND /2/ TO COMPARE ANY NUMBER OF RECORDS AND/OR FILES OF BINARY AND/OR BCD INFORMATION FROM ANY TAPE OR TAPES ON CHANNEL A WITH ANY TAPE OR TAPES ON CHANNEL B.

0709-0892RWLN3F FLOATING-POINT 709 NATURAL LOGARITHM SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0892RWLN3F

AUTHOR...F.F. WELSH JR

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO COMPUTE THE NATURAL LOGARITHM OF A NORMALIZED FLOATING-POINT NUMBER CORR/1166

0709-0893RWAF3F FLOATING-POINT ARCFUNCTION SUBROUTINE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0893RWAF3F

AUTHOR...F.F. WELSH JR

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO COMPUTE THE ARCSIN AND ARCCOS /OR ARCTAN AND ARCCOT/ OF A NORMALIZED FLOATING-POINT NUMBER CORR.983

0709-0923RWMA4F ARDC ATMOSPHERE OF 1959

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0923RWMA4F

AUTHOR...A.J. DA COSTA

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO APPROXIMATE THE DENSITY, PRESSURE, TEMPERATURE AND SPEED OF SOUND OF ANY ALTITUDE IN THE GIVEN RANGE

0709-0924RWMA5F ARDC MODEL ATMOSPHERE OF 1959

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0924RWMA5F

AUTHOR...A.J. DA COSTA

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

TO APPROXIMATE THE DENSITY, PRESSURE, TEMPERATURE AND SPEED OF SOUND OF ANY ALTITUDE IN THE GIVEN RANGE. CORR/ 1091

0709-0927MAPOLY ROOTS OF POLYNOMIAL WITH REAL COEFFICIENTS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0927MAPOLY

AUTHOR...R. C. AUBUCHON

DIRECT INQUIRIES TO..

MRS. JUNE WATSON  
SCIENTIFIC DATA PROCESSING, DEPT. 73  
MCDONNELL AUTOMATION CENTER  
P.O. BOX 516  
ST. LOUIS 66, MISSOURI

SINGLE PRECISION FLOATING POINT COMPUTATION FOR THE REAL AND COMPLEX ROOTS OF A REAL POLYNOMIAL BY NEWTON-RAPHSON OR MODIFIED BAIRSTON METHOD. STORAGE 389C3W67 PLUS 5 COMMON

**0709-0933NOANAV GENERAL PURPOSE ANALYSIS OF VARIANCE PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0933NOANAV

AUTHOR...R.S. GARDNER

**DIRECT INQUIRIES TO..**

MR. ROBERT H. BRACKEN  
DATA COMPUTATION BRANCH  
CODE 3037, MICHELSON LABORATORY  
NAVAL ORDNANCE TEST STATION  
CHINA LAKE, CALIFORNIA

PROGRAM TO CARRY OUT ANALYSIS OF VARIANCE OF ANY DESIGN OF NO MORE THAN 8 FACTORS OR 2000 DATA FOR WHICH A VALID ANALYSIS EXISTS

**0709-0934NOLSQ A LEAST SQUARES ITERATION**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0934NOLSQ

AUTHOR...R.S. GARDNER

**DIRECT INQUIRIES TO..**

MR. ROBERT H. BRACKEN  
DATA COMPUTATION BRANCH  
CODE 3037, MICHELSON LABORATORY  
NAVAL ORDNANCE TEST STATION  
CHINA LAKE, CALIFORNIA

SUBROUTINE TO CARRY OUT AN ITERATIVE LEAST SQUARES FIT OR MINIMIZATION OF A MORE GENERAL FUNCTION OF SEVERAL VARIABLES WORKING ENTIRELY IN TERMS OF FUNCTION VALUES

**0709-0936LLMMP MATRIX MANIPULATING INTERPRETIVE PROGRAM FOR THE 709**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0936LLMMP

AUTHOR...G. W. ARMERDING

**DIRECT INQUIRIES TO..**

MR. JAMES J. FITZGERALD  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
LINCOLN LABORATORY  
LEXINGTON 73, MASSACHUSETTS

THIS ABSTRACTION IS A GENERAL PURPOSE INTERPRETIVE PROGRAM FOR SOLVING MATRIX EQUATIONS AND FOR PERFORMING OPERATIONS ON MATRICES AND VECTORS. INSTRUCTIONS ARE READ IN LL MMP LANGUAGE AND THE INDICATED OPERATIONS ARE PERFORMED ON MATRICES AND VECTORS READ FROM DATA CARDS. CORR. 987 CORR 1139

**0709-0949WDFAP FAP ASSEMBLY PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0949WDFAP

AUTHORS...D.E. FERGUSON D.P. MORE A.S. NOBLE

**DIRECT INQUIRIES TO..**

SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24 CALIF.

THIS DISTRIBUTION CONSISTS OF THE PROGRAM LISTING AND EXTENDED PROGRAM WRITE-UP FOR THE FAP ASSEMBLY PROGRAM THIS PROGRAM WRITE-UP IS INTENDED AS A GUIDE TO SYSTEM PROGRAMMERS WHO WISH TO MODIFY FAP, OR WISH TO BORROW PORTIONS OF THE CODING FOR USE IN OTHER PROGRAMMING SYSTEMS. THE FAP PROGRAM, TOGETHER WITH ALL INFORMATION PERTAINING TO ITS USE, IS AVAILABLE FROM IBM AS PART OF THE 709 FORTRAN SYSTEM. ORDINARY FAP USERS WILL NOT REQUIRE THE MATERIAL IN THIS DISTRIBUTION.

**0709-0956LCPSP POISON**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0956LCPSP

AUTHORS...MARK BROWN FRANCIS LOMBARO FRED MARTIN

**DIRECT INQUIRIES TO..**

MR. EMANUEL J. GUTNICK  
SHARE LIBRARIAN  
BUILDING 120 C ROOM 16221  
UNIVERSITY OF CALIFORNIA  
LAWRENCE RADIATION LABORATORY  
LIVERMORE, CALIFORNIA

THIS CODE COMPUTES THE PROBABILITY DISTRIBUTION OF AN ELECTRON MULTIPLIER FOR ONE INCIDENT ELECTRON, USING THE POISON DISTRIBUTION.

**0709-0961PPPEST PERIPHERAL EQUIPMENT SYMBOLIC TRANSLATOR**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0961PPPEST

AUTHORS...R.S. DICKSON J.J. JONES

**DIRECT INQUIRIES TO..**

MR. G. R. TAIT  
COMPUTER METHODS AND PROCEDURE  
COMPUTING DEPARTMENT  
PHILLIPS PETROLEUM COMPANY  
BARTLESVILLE, OKLAHOMA

CONTINUED FROM PRIOR COLUMN--

PEST IS AN ASSEMBLY ROUTINE FOR USE ON THE IBM 709 FOR TRANSLATING IBM 1401 PROGRAMS WRITTEN IN THE PEST LANGUAGE INTO 1401 MACHINE LANGUAGE. CORR/ 972, 1083

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-0963IB9FES FORECASTING BY ECONOMETRIC SYSTEMS**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0963IB9FES

AUTHOR...HARRY EISENPRESS

**DIRECT INQUIRIES TO..**

MR. P. STERBENZ  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF THE AMERICAS  
NEW YORK 22, N. Y.

ESTIMATES THE COEFFICIENTS OF A SYS. OF LINEAR STOCHASTIC EQUATIONS BY LIMITED-INFORMATION, TWO-STAGED LEAST-SQUARES, AND FULL-INFO. COVARIANCES OF ESTIMATES ARE COMPUTED. ALSO REDUCED-FORM EQUATIONS FOR COMPLETE SYS. CAN HANDLE UP TO 70 EQUATS. IN 70 DEPENDENT VARIABLES AND 70 INDEPENDENT VARIABLES FOR 5000 OBSERVATIONS. CORR/ 1015,1106, 1272

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-0978WDIOF WDPC BUFFERED I/O PACKAGE FOR 709 FORTRAN**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0978WDIOF

AUTHORS...D. E. FERGUSON P. A. CRAMER

**DIRECT INQUIRIES TO..**

SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24, CALIF.

/SEPTEMBER 1960 FIELD-TEST VERSION/A COMPLETE SET OF ROUT. TO REPLACE THE I/O ROUTINES IN THE 709 FORTRAN LIBRARY. THIS SET PROVIDES TAPE BUFFERING FOR ALL FORTRAN PROGRAMS. NO CHANGE IS REQUIRED IN FORTRAN SOURCE DECKS OR IN PREVIOUSLY COMPILED OBJ. DECKS. OTHER FEATURES PROVIDE FILE SKIPPING, RECORD PREVIEWING, AND DIAGNOSTIC ERROR COMMENTS. FAP LANG. PROGRAMS CAN USE NON-CONVERTING-TRANSMISSION FEATURES. THERE ARE SOME RESTRICTIONS. CORR/ 1044

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

**0709-0984RWB7F ALL ORDERS OF BESSEL**

FUNCTION J SUB K TIMES Z OR I  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0984RWB7F

AUTHOR...JOHN ZANCANARO

**DIRECT INQUIRIES TO..**

ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

SUB K TIMES Z FOR COMPLEX Z. GIVEN AN INTEGER N GREATER THAN OR EQUAL TO 0 AND A COMPLEX ARGUMENT Z - X & THE PRODUCT OF LOWER CASE I AND Y, THIS SUBROUTINE COMPUTES THE BESSEL FUNCTIONS J SUB K TIMES Z OR, OPTIONALLY, I SUB K TIMES Z FOR K = 0,1,...,N. REQUIRES PROGRAM 468 CELLS COMMON 15 CELLS. TIMING IS APPROX .7L & 2 MS., WHERE L - K OVER 2. /7090/ CORR/1161 CORR/1282, 1282

**0709-0985RWB8F ALL ORDERS OF THE BESSEL**

FUNCTIONS Y SUB K TIMES Z AND  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0985RWB8F

AUTHOR...JOHN ZANCANARO

**DIRECT INQUIRIES TO..**

ROBERT A. BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN AN INTEGER GREATER THAN OR EQUAL TO 0 AND A COMPLEX ARGUMENT Z - X & THE PRODUCT OF LOWER CASE I AND Y, THIS SUBROUTINE COMPUTES THE BESSEL FUNCTIONS Y SUB K TIMES Z AND J SUB K TIMES Z FOR K = 0,1,...,N. REQUIRES PROGRAM 790 CELLS-COMMON 18 CELLS. TIME TO COMPUTE Y SUB 0 IS ABOUT 5 & .7L MS. MAXIMUM TIME TO COMPUTE Y SUB 1,...., Y. CORR/1162 CORR/1283

**0709-0990RWE4F LINEAR EQUATION SOLVER OF BAND MATRICES**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-0990RWE4F

AUTHOR...J.F. HOLT

## Section B

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..  
ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

GIVEN A LINEAR MATRIX EQUATION AX=B, THIS ROUTINE FINDS THE SOLUTION WHERE A IS A BAND MATRIX OF DIMENSION N X N /KLGKZEL/ AND B IS OF DIMENSION N X M. REQUIRES 802 CELLS OF PROGRAM AND CONSTANTS. 5 CELLS OF COMMON THROUGH COMMON & 4. CORR/ 1049

0709-1000RSED1 SQUOZE TAPE EDITOR  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1000RSED1

AUTHOR...GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM MAINTAINS A MASTER TAPE CONTAINING SQUOZE DECKS IN MOCK-DONALD BUFFERED FORMAT. IT WILL ALSO SELECT DECKS FROM THE MASTER AND/OR TAPES CONTAINING SQUOZE DECKS IN CARD IMAGE FORM AND MERGE THEM WITH MODIFICATION PACKAGES IN ORDER TO PRODUCE A SYSPIT SUITABLE FOR RUNNING BY SCS. MUST BE RUN UNDER CONTROL OF THE MOCK-DONALD MONITOR. CORR/ 1047

0709-1001NA8600 NORMAL PROBABILITY -  
ORDINATE AND AREA  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1001NA8600

AUTHOR...M.G. SINGLETON

DIRECT INQUIRIES TO..

MR. LLOYD GREEN, GENERAL SUPERVISOR  
INTEGRATED DATA PROCESSING  
LOS ANGELES DIVISION  
NORTH AMERICAN AVIATION, INC.  
INTERNATIONAL AIRPORT  
LOS ANGELES 45, CALIFORNIA

A FORTRAN SUBROUTINE WHICH COMPUTES THE ORDINATE AND/OR AREA OF EITHER OF 2 CLOSELY RELATED FORMS OF THE NORMAL PROBABILITY FUNCTION. WHEN AREA OF EITHER FUNCTION IS TO BE DETERMINED. IT MAY BE OBTAINED IN ANY ONE FIVE DIFFERENT FORMS OF AREAL SEGMENT - CENTRAL, SEMICENTRAL, TWO TAIL, SINGLE TAIL, OR CUMULATIVE FROM MINUS INFINITY. THE CALL STATEMENT REQUIRES AN ABCISSA ARGUMENT, FUNCTION TYPE AND FORM SPECIFICATION. ERROR INDICATION IS PROVIDED AND THE ANSWER/S/ ARE SINGLE PRECISION.

0709-1002NA8610 INVERSE NORMAL PROBABILITY  
FUNCTIONS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1002NA8610

AUTHOR...M.G. SINGLETON

DIRECT INQUIRIES TO..

MR. LLOYD GREEN, GENERAL SUPERVISOR  
INTEGRATED DATA PROCESSING  
LOS ANGELES DIVISION  
NORTH AMERICAN AVIATION, INC.  
INTERNATIONAL AIRPORT  
LOS ANGELES 45, CALIFORNIA

A FORTRAN SUBROUTINE WHICH COMPUTES THE ABCISSA X WHEN EITHER THE AREA OR DERIVATIVE VALUE FOR EITHER OF TWO CLOSELY RELATED FORMS OF NORMAL PROBABILITY FUNCTION IS SPECIFIED IF THE ABCISSA VALUE IS TO BE DETERMINED AS A FUNCTION OF AREA. ANY ONE OF FIVE DIFFERENT AREAL FORMS MAY BE USED AS INPUT - CENTRAL, SEMICENTRAL, 2-TAIL, SINGLE-TAIL, OR CUMULATIVE FROM MINUS INFINITY. THE CALL STATEMENT REQ. TWO PIECES OF INPUT - AN AREAL OR ORDINATE VALUE AND FUNCTION TYPE AND FORM. ERROR INDICA. IS PROVIDED- SINGLE PRECISION

0709-1009WDSERI UPDATE SYMBOLIC PROGRAM TAPE  
USING SERIAL NUMBERS

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1009WDSERI

AUTHOR...DONALD P. MOORE

DIRECT INQUIRIES TO..

SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24 CALIF.

UPDATES SYMBOLIC PROGRAM DECK ON TAPE BY INSERTING, DELETING, AND RE-ORDERING RECORDS, USING LABELS IN COLUMNS 73-80 FOR CONTROL. WILL RELABEL ITS OUTPUT OR COPY CLE LABELS. REQUIRES 709 FORTRAN MONITOR AND WD 10F. CRRR/ 1053

0709-1027RSIPLV IPL-V INTERPRETIVE SYSTEM  
FOR 709/7090

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1027RSIPLV

AUTHORS...C.L. BAKER H.S. KELLY

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

INTERPRETS AND EXECUTES PROGRAMS WRITTEN IN THE IPL-V LANGUAGE. WRITTEN IN THE FORM OF A SUBROUTINE, IT MAY BE USED INDEPENDENTLY OF, WITH, OR AS PART OF SCS.

0709-1033BEFAP FAP ASSEMBLY PROGRAM  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1033BEFAP

AUTHOR...DR. G. L. BALDWIN  
MATHEMATICAL RESEARCH DEPT.  
BELL TELEPHONE LABORATORIES  
MURRAY HILL LABORATORY  
MURRAY HILL, NEW JERSEY

DIRECT INQUIRIES TO AUTHOR

THIS DISTRIBUTION INCLUDES A LISTING TAPE, A SYMBOLIC TAPE, A BE FAP MANUAL, AND A SHORT WRITE-UP OF THE ASSEMBLER AND ITS MONITOR. A SYSTEM PROGRAMMERS WRITE-UP SHOULD BE AVAILABLE EARLY IN 1961. THE SYMBOLIC TAPE HAS PROPER CONTROL CARDS FOR ASSEMBLY BY WD FAP, HOWEVER INDIVIDUAL INSTALLATIONS WILL WANT TO REPLACE THE MONITOR SUPPLIED BY ONE MEETING THEIR OWN REQUIREMENTS. SEE WRITE-UP. CORR/ 1093, 1216

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

0709-1037SCM02 MATHEMATICAL PROGRAMMING  
SYSTEM TWO  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1037SCM02

AUTHORS...R.D. MCKNIGHT PHILIP WOLFE R.A. ZEMLIN

DIRECT INQUIRIES TO..

MR. B. A. RENSEBLATT  
ELECTRONICS COMPUTING CENTER  
STANDARD OIL OF CALIFORNIA  
225 BUSH STREET  
SAN FRANCISCO, CALIFORNIA

A REVISION OF RS M1. A SINGLE PRECISION 7090 CODE USING THE REVISED SIMPLEX METHOD WITH PRODUCT FORM INVERSE. CAN HANDLE PROBLEMS HAVING UP TO 200 ROWS, 599 COLUMNS, AND OBJECTIVES, INTERRUPT AND PUNCH-OUT ABILITY, USE OF SYSTEM TAPE, AND BATCH RUNNING. CORR/1067

0709-1038RWPCRG PRINT CONTROL FOR REPORT  
GENERATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1038RWPCRG

AUTHOR...M. KORY

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

THIS SUBROUTINE SETS UP AND CONTROLS THE PRINTING OF THE OUTPUT FOR A REPORT GENERATING PROGRAM. IT FACILITATES THE SETTING UP OF PRINT FIELDS, LINES OR PARAGRAPHS FOR SPECIFIC REPORTS AND, IF DESIRED, PROVIDES FOR AUTOMATIC PAGING AND TITLING. THE SUBROUTINE MUST BE USED IN CONJUNCTION WITH STL SYSTEM E.

0709-1039RWPR9 GENERAL OUTPUT ROUTINE FOR  
THE 709

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1039RWPR9

AUTHOR...MONTE MINAMI

DIRECT INQUIRIES TO..

ROBERT A BEACH, MGR.  
DATA PROC. AND OPERATIONS DEPT.  
SPACE TECHNOLOGY LABORATORIES, INC.  
P. O. BOX 95001  
LOS ANGELES 45, CALIFORNIA

RW PR9 IS A MODIFICATION OF RW PR2 DIST. NC. 652.  
REQUIRES 533 CELLS PLUS 10 COMMON.

0709-1045WDL0AD 709-7090 LOADER PACKAGE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1045WDL0AD

AUTHORS...D.E. FERGUSON E.A. STEFFERUD

DIRECT INQUIRIES TO..

SHARE REPRESENTATIVE WD  
WDPC UCLA  
LOS ANGELES 24 CALIF.

PROVIDES A FULL SET OF LOADERS FOR USE IN CONJUNCTION WITH THE-LOAD CARDS-OR-LOAD TAPE- KEY ON THE 709-7090 CONSOLES. THIS PACKAGE VOIDS DISTRIBUTIONS NUMBERED 527 AND 535.

**0709-1063GEQUDE QD SURGE /709-90 CONVERSION OF 704 SURGE/**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1063GEQUDE

AUTHORS..EVELYN AUSTIN BERT GOOR

**DIRECT INQUIRIES TO..**

JAMES A. PORTER, MANAGER  
COMPUTER TECHNIQUES DEVELOPMENT  
GENERAL ELECTRIC CO.  
BUILDING 305  
CINCINNATI 15, OHIO  
ATT. MISS SHYRL EMOFF

PROVIDES FOR THE DIRECT USE OF 704 SURGE SOURCE PROGRAM DECKS TO PRODUCE 709 OR 7090 PROGRAMS. REQUIRES A 32K 709 OR 7090 CORRECTION DIST. 1200

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-1084RSOKF1 OUT OF KILTER NETWORK FLOW ROUTINE ONE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1084RSOKF1

AUTHOR...RICHARD CLASEN

**DIRECT INQUIRIES TO..**

MR. GEORGE H. MEALY  
NUMERICAL ANALYSIS DEPARTMENT  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

AN INDEPENDENT ROUTINE TO SOLVE CAPACITATED NETWORK FLOW PROBLEMS USING A METHOD IN WHICH A MEASURE OF OPTIMALITY IS NOT WORSEMED ON ANY ITERATION. FLOWS HAVE UPPER AND LOWER BOUNDS WHICH MAY BE POSITIVE OR NEGATIVE. NO INITIAL FEASIBLE SOLUTION IS NEEDED. HAS PROVISION FOR SOLVING PROBLEMS WHICH VARY SLIGHTLY FROM PREVIOUSLY SOLVED PROBLEMS IN MINIMAL MACHINE TIME. SOURCE LANGUAGE IS FORTRAN AND PAF.

**0709-1086IBAPF SCHEDULING WITH ARBITRARY PROFIT FUNCTIONS**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1086IBAPF

AUTHORS..MECHEAL HELD RICHARD M KARP RICHARD SHARESHIAN

**DIRECT INQUIRIES TO..**

MR. P. STERBENZ  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF THE AMERICAS  
NEW YORK 22, N. Y.

WE CONSIDER A SET OF JOBS TO BE EXECUTED SUCCESSIVELY ON A SINGLE FACILITY. ANY GIVEN JOB REQUIRES THE SERVICES OF THE FACILITY FOR A KNOWN LENGTH OF TIME. WITH EACH JOB IS GIVEN THE PROFIT ASSOCIATED WITH COMPLETING THE JOB AT TIME T. WE ASSUME THAT THE FACILITY IS TO BE CONSTANTLY IN USE. ANY GIVEN ORDER OF EXECUTION OF THE JOBS /A SCHEDULE/ IMPLICITLY ASSIGNS TO EACH JOB A TERMINATION TIME, AND HENCE A PROFIT. THE PROGRAM SEEKS TO FIND A SCHEDULE WHICH YIELDS THE MAXIMUM ACHIEVABLE TOTAL PROFIT.

**0709-1102SE9DUL ABSOLUTE BINARY UPPER LOADER ONE CARD**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1102SE9DUL

AUTHOR...DONALD F. DOND

**DIRECT INQUIRIES TO..**

MR. S. CASHTEN  
SYLVANIA ELECTRONIC SYSTEMS  
A DIV. OF SYLVANIA ELECTRIC PRODUCTS  
COMPUTER OPERATIONS  
NEEDHAM OPERATIONS  
189 B STREET  
NEEDHAM 94, MASSACHUSETTS

LOADS A FILE OF ABSOLUTE ROW BINARY CARDS INTO CORE FROM ON LINE CARD READER. HALTS ON BAD CHECKSUM EXCEPT WHEN THERE IS A 9 ROW PUNCH IN COLUMN 3 OR A CHECKSUM IS ZERO. RECOGNIZES TRANSFER CAR. USES LOCATIONS 7751 THROUGH 7777 /OCTAL/

**0709-1118URPLOT PRINTER PLOT BCD TEXT GENERATOR FOR FORTRAN OUTPUT**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1118URPLOT

AUTHORS..J.S. ANNINO D.M. LONG H.L. COLEMAN

**DIRECT INQUIRIES TO..**

DR. F. HOLLANDER  
NUMERICAL ANALYSIS RESEARCH  
UNIVERSITY OF CALIFORNIA  
LOS ANGELES 24, CALIFORNIA

CONSTRUCTS A 120 CHAR LINE OF TEXT SUITABLE FOR OUTPUT WITH AN-A-TYPE FORMAT DESCRIPTION. THE CALLING SEQUENCE INCLUDES A LIST OF CHARACTERS TO BE PLOTTED, A VECTOR OF POSITIONS FOR EACH CHARACTER, AND THE LOCATION OF A 20 WORD BLOCK INTO WHICH THE LINE IS TO BE STORED FOR SUBSEQUENT OUTPUTTING.

**0709-1120ATLOC ADDRESS LOCATION SUBROUTINE AVAILABLE 4TH QUARTER 1961.**

ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1120ATLOC

AUTHOR...THOMAS R. HERSHEY

**DIRECT INQUIRIES TO..**

MR. CHARLES K. FENDALL  
MATHEMATICS AND COMPUTING  
AERONUTRONIC, DIV. OF FORD MOTOR CO.  
FORD ROAD  
NEWPORT BEACH, CALIFORNIA

FINDS THE LOCATION OF ANY CONSTANT OR VARIABLE IN THE PROGRAM VARIABLES MAY BE FIXED OR FLOATING, SUBSCRIBED OR NOT. SUBSCRIPTS MAY BE EXPRESSIONS OF STANDARD FORTRAN FORM.

**0709-1121NRNRCM FORTRAN MULTIPLE CORRELATION ANALYSIS PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1121NRNRCM

AUTHOR...H. KASPAR

**DIRECT INQUIRIES TO..**

ROCKETDYNE DIVISION OF NAA  
6633 CANGA AVENUE  
CANGA PARK CALIFORNIA  
ATTN. C.C. KUNDEL

THIS PROGRAM IS FOR THE STATISTICAL ANALYSIS OF A SET OF POINTS /P1, P2...PM/ WHERE P1 - /X0,X1, X2...XN/. THE PROGRAM WILL PERFORM MULTIPLE CORRELATIONS OF THE FORM  $X1/B1/B2/B3/X3/L...6B/N/X/N/$  WHERE X1/ IS THE DEPENDENT VARIABLE, X2/, X3/...X/N/ ARE INDEPENDENT VARIABLE FUNCTIONS, AND THE B VALUES ARE TO BE STATISTICALLY ESTIMATED FROM THE DATA.

**0709-1133EL9LUP FORTRAN LOAD/UNLOAD PACKAGE AVAILABLE 4TH QUARTER 1961.**

ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1133EL9LUP

AUTHOR...WARREN B. HARDING

**DIRECT INQUIRIES TO..**

IBM CORP  
ENG. DATA PROCESSING  
OPERATING SYSTEMS-DEPT. 304  
GPD LAB.  
ROUTE 17C & GLENDALE DRIVE  
ENDICOTT N. Y.

PROVIDES GREATER INPUT AND OUTPUT FLEXIBILITY WITH 709/7090 FORTRAN. IT ALLOWS FOR VARIABLE LENGTH BCD TAPE RECORDS UP TO 31500 WORDS. END OF FILE, AND PHYSICAL END OF TAPE INDICATION WHICH MAY BE USED FOR BRANCHING. IT MAKES USE OF MULTIPLE FORMAT STATEMENTS TO DESCRIBE TAPE RECORDS. 1500 WORDS OF UPPER STG. ARE REQUIRED

**0709-1135BHVIPP VARIABLE INFORMATION PROCESSING PACKAGE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1135BHVIPP

AUTHORS..JAMES HERRINGTON RONALD HURNBY

**DIRECT INQUIRIES TO..**

MR. WILLIAM R. BAYLESS  
DIGITAL COMPUTING UNIT  
BOEING AIRPLANE COMPANY  
WICHITA 1, KANSAS

709-7090 VIPP, LIKE 704VIPP, IS A COLLECTION OF SUBROUTINES DESIGNED TO SERVE AS AN EFFICIENT GENERAL PURPOSE DATA PROCESSING PACKAGE CORR./1178

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-1148NDDPAT DOUBLE PRECISION FLOATING POINT ARCTANGENT SUBROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1148NDDPAT

AUTHOR...WM. CLELLANE III

**DIRECT INQUIRIES TO..**

MR. ROBERT H. BRACKEN  
DATA COMPUTATION BRANCH  
CODE 3037, MICHELSON LABORATORY  
NAVAL ORDNANCE TEST STATION  
CHINA LAKE, CALIFORNIA

RATIONAL APPROXIMATION METHOD, INPUT IN AC-HC OR FROP CORE, OUTPUT IN RADIANS, EITHER PRINCIPAL VALUE OR CORRECTED FOR QUADRANT, DEPENDING ON OPTION CHOSEN. 256 LOCATIONS & 14 COMMON & NECESSARY DP ABSTRACTION, SUCH AS NO DPAB

**0709-1159MDSORT GENERALIZED VARIABLE LENGTH RECORD SORT FOR 709/7090**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1159MDSORT

AUTHOR...MARY FERGUSON



## Section B

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..  
MR. JOHN HOPKO  
MARTIN COMPANY, DENVER DIVISION  
MAIL A-213  
P.O. BOX 179  
DENVER 1, COLORADO

THIS GENERALIZED SORT PROGRAM PROVIDES A 2-5 WAY MERGE, BCD OR BINARY INPUT OF N REELS, VARIABLE OR FIXED LENGTH BLOCKED RECORDS, 1-6 SCATTERED CONTROL FIELDS, INTERRUPT FEATURES, OPTIONAL INPUT AND OUTPUT LABELING. MINIMUM MACHINE REQUIREMENTS - 1 CHANNEL, 6 TAPES & CD. READER OR 7 TAPES, PRINTER. CONTROL CARDS ARE USED TO SPECIFY ALL SORT PARAMETERS. SPECIFIED LEVELS MAY BE DELETED FROM THE FILE. DUPLICATE RECORDS ARE SUMMARIZED OUT.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

0709-1160MDSRST RESTART PROGRAM FOR MD SORT  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1160MDSRST

AUTHOR...MARY FERGUSON

DIRECT INQUIRIES TO..  
MR. JOHN HOPKO  
MARTIN COMPANY, DENVER DIVISION  
MAIL A-213  
P.O. BOX 179  
DENVER 1, COLORADO

USED TO RESTART A SORT AT THE BEGINNING OF ANY PHASE OR MERGE PASS. RELOADS CHECKPOINT TAPE INTO CORE AND CHECKS THE TAPE TRANSMISSION.

0709-1163MWRCTC FORTRAN CARD OR TAPE /ROW  
AND/OR COLUMN BINARY/ LOADER  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1163MWRCTC

AUTHOR...MR. M. J. BAILEY  
COOPERATIVE COMPUTING LAB. RM. 8302  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
DEPARTMENT OF PHYSICS  
CAMBRIDGE 39, MASS.

DIRECT INQUIRIES TO AUTHOR

LOADS FORTRAN PROGRAMS FROM TAPE, FROM CARDS, OR FROM FIRST CARDS THEN TAPE. BASICALLY AN EXTENSION OF THE F2 BSS LOADER, THE PROGRAM ALLOWS OCTAL CORRECTION AND COMMENT CARDS AT OBJECT TIME, AND OPTIONALLY LISTS THESE ON- OR OFF-LINE. A MAP OF MEMORY ALLOCATION IS ALSO OPTIONALLY LISTED. CARD DECKS MAY BE IN ROW OR COLUMN BINARY FORM OR A MIXTURE OF BOTH.

0709-1164MWFOTO INTERRUPT FORTRAN-LOADING TO  
COPY MEMORY ON TO TAPE  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1164MWFOTO

AUTHORS..MR. M. J. BAILEY E.J.D. CARTER

DIRECT INQUIRIES TO..  
MR. M. J. BAILEY  
COOPERATIVE COMPUTING LAB. RM. 8302  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
DEPARTMENT OF PHYSICS  
CAMBRIDGE 39, MASS.

WRITES COPY OF MEMORY, AS IT IS WHEN FOTO IS ENCOUNTERED DURING LOADING BY FRCTC, PRECEDED BY A SELF-LOADING TAPE READING PROGRAM, SO THAT THE TAPE MAY BE LATER SIMPLY RELOADED AND FRCTC LOADING CONTINUED. FRCTC LOADING RESUMES AFTER TAPE IS COPIED./FRCTC LOADER PREVIOUSLY DISTRIBUTED./

0709-1170ATRSKJ FLOATING POINT OPTIMIZED  
RUNGE-KUTTA INTEGRATION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1170ATRSKJ

AUTHOR...CHARLES K. FENDALL  
MATHEMATICS AND COMPUTING  
AERONUTRONIC, DIV. OF FORD MOTOR CO.  
FORD ROAD  
NEWPORT BEACH, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

FIXED INTERVAL OR VARIABLE INTERVAL OPTIMIZED BY A SIMPSONS RULE CHECK USING DERIVATIVES ALREADY FORMED IN THE 4TH ORDER RUNGE-KUTTA PROCESS. INTEGRATES A SYSTEM OF N FIRST ORDER DIFFERENTIAL EQUATIONS WITH ACCURACY CONTROLLABLE BY RELATIVE AND/OR ABSOLUTE CRITERIA FOR EACH EQUATION. COMMUNICATES WITH USER-SUPPLIED DERIVATIVE AND CONTROL SUBROUTINES. USES DOUBLE PRECISION INTERNALLY TO INCREMENT THE VARIABLES. SPACE REQUIRED- 277 WORDS AND 13069 CELLS OF WORKING STORAGE.

0709-1171ATRSK3 FORTRAN FLOATING POINT  
RUNGE-KUTTA INTEGRATION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1171ATRSK3

AUTHOR...CHARLES K. FENDALL  
MATHEMATICS AND COMPUTING  
AERONUTRONIC, DIV. OF FORD MOTOR CO.

CONTINUED FROM PRIOR COLUMN--

FORD ROAD  
NEWPORT BEACH, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

FIXED INTERVAL OR VARIABLE INTERVAL OPTIMIZED BY A SIMPSONS RULE CHECK USING DERIVATIVES ALREADY FORMED IN THE 4TH ORDER RUNGE-KUTTA PROCESS. INTEGRATES A SYSTEM OF N FIRST ORDER DIFFERENTIAL EQUATIONS WITH ACCURACY CONTROLLABLE BY RELATIVE AND/OR ABSOLUTE CRITERIA FOR EACH EQUATION. COMMUNICATES WITH USER-SUPPLIED DERIVATIVE AND CONTROL SUBROUTINES. USES DOUBLE PRECISION INTERNALLY TO INCREMENT THE VARIABLES. SPACE REQUIRED- 318 WORDS AND 9N66 CELLS OF WORKING STORAGE.

0709-1198MIGOMT COMIT-GENERAL PURPOSE  
LANGUAGE FOR SYMBOL MANIPULATION  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1198MIGOMT

AUTHOR...VICTOR H. YNGVE

DIRECT INQUIRIES TO..

SHARE LIBRARIAN  
COMPUTATION CENTER  
ROOM 26-142  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

USEFUL FOR PRIMARILY NON-NUMERICAL PROGRAMS-TRANSLATION, INFORMATION RETRIEVAL, DICTIONARY WORK, FILE MAINTENANCE AND SEARCH, FORMAL ALGEBRA, THEOREM PROVING, SIMULATION, GAME PLAYING, TEXT PROCESSING, DATA REDUCTION, ARTIFICIAL INTELLIGENCE, ETC. A CONVENIENT, HIGH-LEVEL LANGUAGE-EASY TO USE AND QUICK TO CHECK OUT. FEATURES DIRECTNESS OF EXPRESSION, EASY USE OF MNEMONICS, BUILT-IN PUSH DOWN LISTS AND ADDRESS-ABLE STORAGE, FREEDOM FROM FIXED FORMAT AND WORD-LENGTH RESTRICTIONS, AUTO. INTERNAL STGE. ALLOCATION 1222

0709-1201NRDICI SINGLE PRECISION TO DOUBLE  
PRECISION FORTRAN INPUT

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1201NRDICI

AUTHOR...L.A. SENNEVILLE

DIRECT INQUIRIES TO..

ROCKETDYNE DIVISION OF NAA  
6633 CANOGA AVENUE  
CANOGA PARK CALIFORNIA  
ATTN: C. C. KUNKEL

ALLOWS A FORTRAN PROGRAMMER TO READ IN SINGLE PRECISION NUMBERS - WITH K DECIMAL DIGITS /WHERE K IS EQUAL TO OR LESS THAN 25/ WITH EXPONENT E /WHERE E IS EQUAL OR LESS THAN 11/ ACCORDING TO A SPECIFIED CARD FORMAT - AND TO CONVERT THESE DECIMAL NUMBERS TO DOUBLE PRECISION NUMBERS. SHOULD BE USED ONLY WITH THE ROCKETDYNE /SHARE CODE NR/ DOUBLE PRECISION PACKAGE NPRE.

0709-1202NRDOCV DOUBLE PRECISION OUTPUT FOR  
FORTRAN

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1202NRDOCV

AUTHOR...L.A. SENNEVILLE

DIRECT INQUIRIES TO..

ROCKETDYNE DIVISION OF NAA  
6633 CANOGA AVENUE  
CANOGA PARK CALIFORNIA  
ATTN: C. C. KUNKEL

ALLOWS A FORTRAN PROGRAMMER TO CONVERT A DOUBLE PRECISION NUMBER TO K /K EQUAL TO OR LESS THAN 22/ DECIMAL DIGITS WITH EXPONENT AND PRINT OUT ACCORDING TO A SPECIFIED FORMAT. SHOULD BE USED ONLY WITH THE ROCKETDYNE /SHARE CODE NR/ DOUBLE PRECISION PACKAGE NPRE.

0709-1215AQE73 DOUBLE PRECISION POLYNOMIAL  
ROOT EXTRACTION PROGRAM

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1215AQE73

AUTHOR...JOHN L. MILLIGAN

DIRECT INQUIRIES TO..

MR. R. A. VGRHIS  
COORDINATOR DATA PROCESSING  
PLANT 1  
ALLISON DIVISION  
GENERAL MOTORS CORP.  
SPEEDWAY, INDIANA

EXTRACTS THE ROOTS OF AN NTH DEGREE POLYNOMIAL WITH REAL COEFFICIENTS. N CANNOT EXCEED FIFTY. ALL FLOATING POINT ARITHMETIC IS PERFORMED IN THE DOUBLE PRECISION MODE. CORR. IN 1298

0709-1219WDHDLR HOLLERITH WORD GENERATOR

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1219WDHDLR

AUTHOR...C. H. GOLDBERG

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO..  
SHARE REPRESENTATIVE WD  
WPC UCLA  
LOS ANGELES 24, CALIF.

SUBROUTINE HOLRTH FACILITATES THE HANDLING OF HOLLERITH CHARACTERS IN A FORTRAN PROGRAM. IT PLACES A STRING OF HOLLERITH CHARACTERS INTO A ONE-DIMENSIONAL ARRAY SO THAT THE USER CAN REFER TO THE STRING BY REFERRING TO THE NAME OF THE ARRAY. OCCUPIES 16 LOCATIONS IN CORE STORAGE. LISTING INCLUDED IN SHORT WRITE-UP.

**0709-1249WDSORT GENERALIZED INTERNAL SORT - FORTRAN ORIENTED**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1249WDSORT

AUTHOR...DON MOORE  
WPC UCLA  
LOS ANGELES 24, CALIF.

DIRECT INQUIRIES TO AUTHOR

PARAMETERS INCLUDE LOCATION OF DATA, NUMBER OF ITEMS, LENGTH OF EACH ITEM, ASCENDING VS DESCENDING, ALGEBRAIC VS LOGICAL, AND THE LOCATION AND PRECEDENCE OF KEY BITS. SORTS ABOUT 1000 ITEMS PER SECOND ON A 709. REQUIRES ONLY 504 LOCATIONS AND NO ADDITIONAL WORK SPACE.

**0709-1257ATVFRD GENERAL PURPOSE DATA INPUT AND/OR CONVERSION PROGRAM**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1257ATVFRD

AUTHOR...CHARLES K. FENDALL  
MATHEMATICS AND COMPUTING  
AERONUTRONIC, A DIVISION OF  
FORD MOTOR COMPANY  
FORD ROAD  
NEWPORT BEACH, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

READS ARBITRARILY FORMATTED HOLLERITH CARDS OR UNBLOCKED OR UNBLOCKED BCD TAPE UNDER SENSE SWITCH CONTROL. CONVERTS BCD, OCTAL, OR FIXED OR FLOATING DECIMAL ACCORDING TO A TABLE OF FIELD DEFINITIONS AND STORES THE BINARY RESULTS IN CORE. ALLOWS MINUS OVERPUNCHES. READING IS BUFFERED AND 1 RECORD IS CONVERTED PER PROGRAM ENTRY. MAY ALSO BE USED TO CONVERT AND STORE BCD INFO ALREADY IN CORE WITHOUT DISTURBING BUFFER REGION. PROGRAM USES 741 LOCATIONS PLUS A REDUCEABLE 140 WORD BUFFER AREA.

**0709-1258UW TH TESTING HYPOTHESIS ROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1258UW TH

AUTHOR...B.M. PRINCE

DIRECT INQUIRIES TO..

MR. DAVID B. DEKKER, DIR.  
RESEARCH COMPUTER LABORATORY  
UNIVERSITY OF WASHINGTON  
SEATTLE 5, WASHINGTON

THIS PROGRAM TESTS LINEAR HYPOTHESIS IN MULTIVARIATE ANALYSIS OF COVARIANCE. CORR.1309

**0709-1258UWFTH TESTING HYPOTHESIS ROUTINE**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1258UWFTH

AUTHOR...B.M. PRINCE  
7755-25TH N.E.  
SEATTLE 15 WASHINGTON

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM TESTS LINEAR HYPOTHESIS IN GENERALIZED ANALYSIS OF COVARIANCE.

**0709-1279RL0346 ABSOLUTE OCTAL MEMORY DUMP /709 OR 7090/**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1279RL0346

AUTHOR...H.T. NORTON

DIRECT INQUIRIES TO..

D. E. BEAR  
7090 COMPUTING AND PROGRAMMING BRANCH  
SYSTEM DEVELOPMENT CORPORATION  
SANTA MONICA, CALIFORNIA

DUMPS PANEL AND CONTENTS OF MEMORY IN OCTAL ON-LINE OR OFF-LINE. PORTIONS OF MEMORY TO BE DUMPED ARE PRESCRIBED BY CONTROL CARDS. DESTROYED TO 10 OCTAL. REQUIRES ONE CHANNEL ONLY.

**0709-1280RL0350 TAPE DUMP**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1280RL0350

AUTHOR...H.T. NORTON

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..  
D. E. BEAR  
2500 COLORADO AVE.  
SANTA MONICA CALIF.

PRINTS OUT VIA THE 709 /OR 7090/, THE CONTENTS OF BINARY OR DECIMAL MODE TAPES IN OCTAL OR BCD FORMAT, ON-LINE OR OFF-LINE. REQUIRES ONE CHANNEL ONLY.

**0709-1293TEVPAP VARIABLE PRECISION ARITHMETIC PACKAGE**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1293TEVPAP

AUTHORS...L. F. GUSEMAN H. A. LUTHER

DIRECT INQUIRIES TO..

L. F. GUSEMAN  
HEAD, DATA PROCESSING CENTER  
TEXAS A. AND M. COLLEGE  
COLLEGE STATION, TEXAS

SUBROUTINE MAKES POSSIBLE ARITHMETIC FOR INTEGERS WHOSE ABSOLUTE VALUES RANGE FROM 0 TO 10\*\*500. INCLUDES ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION WITH RETENTION OF REMAINDER\*. THE ARITHMETIC IS PERFORMED ON INTEGERS RADIX 2\*\*35. THE NECESSARY CONVERSION AND RECONVERSION ROUTINES ARE INCORPORATED. USES 912 STORAGE LOCATIONS INCLUDING 221 COMMON.

**0709-1295MLTHAN LMSC THERMAL NETWORK ANALYZER PROGRAM..**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1295MLTHAN

AUTHOR...J. L. FICK  
LOCKHEED MISSILES AND SPACE CO.  
SUNNYVALE, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

USING AN ELECTRICAL ANALOGUE OF AN N-DIMENSIONAL HEAT TRANSFER NETWORK THIS PROGRAM PERFORMS FINITE DIFFERENCE LUMPED PARAMETER HEAT TRANSFER ANALYSIS TO PRODUCE A TIME HISTORY OF BASIC NETWORK PARAMETERS.

**0709-1303FS650S SIMULATE THE BASIC 650 ON THE 709.**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1303FS650S

AUTHOR...H.G. FRIEDMAN  
CHEMISTRY DEPT.  
FLORIDA STATE UNIVERSITY  
TALLAHASSEE FLORIDA

DIRECT INQUIRIES TO AUTHOR

THE SIMULATOR RECOGNIZES AND EXECUTES ALL CP CODES IN THE BASIC 650. TAPE I/O IS ALSO PROVIDED - THE USER MAY CHOOSE TAPE INPUT AND/OR OUTPUT, OR NO TAPES. 650 PROGRAM CHECK IS ACCEPTED, WITH MINOR MODIFICATION FOR READING COLS. 73-800. STANDARD 80/80 PUNCHCARD ON THE 650 CARD READ/PUNCH IS SIMULATED. COMPUTATIONAL SPEED IS APPROX. DOUBLE THAT OF AN OPTIMIZED 650.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-1306SIIOP PKG. FOR ASYNCHRONOUS I-O WITH AUTOMATIC ERROR RECOVERY**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1306SIIOP

AUTHOR...ROY E. NORRIS JR.

DIRECT INQUIRIES TO..

MR. FRANK ENGEL, JR., MANAGER  
HARVARD COMPUTATION CENTER  
CAMBRIDGE 38, MASSACHUSETTS

USER SPECIFIES UNIT /LCG-/MACH-/, SELECT, CHANNEL PRG. FOR MULTIRECORD TRANSMISSION, AND LOCATION FOR RETURN OF SYNOPSIS OF TRANSMISSION. SELECT MAY BE NON-DATA OR/ANC DATA. PACKAGE CONSISTS OF 9 SUBPRGS. ICSC USE OF WHICH IS OPT. AUTOMATICALLY RECOVERS TAPE ERRORS, PREPARES SYNOPSIS, AND CHANGES REELS PER ETTX XADJ. LPT. OPERATION IN DATA CHANNEL TRAP MODE IS A VARIABLE OPT. USE OF SUBPRGS. TO STACK CHANNEL REQUESTS FOR INITIATION AT TRAP TIME IS FACILITATED.

**0709-1310UCTSDA SEASONAL ANALYSIS AND TIME SERIES DECOMPOSITION**

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1310UCTSDA

AUTHOR...JUANITA JOHNSON

DIRECT INQUIRIES TO..

MR. JAMES T. SCOTT, MANAGER  
ELECTRONIC DATA PROCESSING DEPT.  
UNION CARBIDE CORPORATION  
270 PARK AVENUE, 37TH FLOOR  
NEW YORK 17, NEW YORK

CONTINUED FROM PRIOR PAGE--

CENSUS METHOD II-WITH CHARTS. ADJUSTMENT BY MOVING MULTIPLICATIVE SEASONAL INDEXES, TREND CYCLE COMPONENT REPRESENTED BY 15 TERM SPENGER CURVE, OUTPUT-SEASONAL, TREND-CYCLE, IRREGULAR, SEASONALLY ADJUSTED, SMOOTHED DATA, AND RATIOS SHOWING RELATIVE IMPORTANCE OF COMPONENTS. CHARTING OF ORIGINAL SERIES, ADJUSTED SERIES, SEVERAL RATIOS, BY PLOTTING X AND O ON PRINTER.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**0709-1352AECOM BCD TO BINARY CONVERSION ROUTINE**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1352AECOM

AUTHOR...PAL SCHMELZER  
MET. DEPT.  
FORT HUACHUCA, ARIZ.

DIRECT INQUIRIES TO AUTHOR

THE ROUTINE WILL PERFORM CONVERSION ON ARBITRARILY SELECTED FIELDS OF A 14 WORD BCD RECORD AND STORE THE RESULTS INJO INDICATED LOCATIONS.

**0709-1371M9BCD BCD MANIPULATIVE SUBROUTINES**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1371M9BCD

AUTHORS..M.J. BAILEY P.B. BUCLESON E.J.D. CARTER  
K.L. KELLEY

DIRECT INQUIRIES TO..

MICHAEL J. BAILEY, ROOM 10-406  
M.I.T. COOPERATIVE COMPUTING LAB.  
MASS. INST. OF TECHNOLOGY  
CAMBRIDGE 39, MASS

ON LINE PRINTING, SEARCHING, PACKING, UNPACKING, SHIFTING, AND DEFINING OF BCD SYMBOLS, AND BCD/BINARY CONVERSIONS OF INTEGERS AND FLOATING-POINT NUMBERS. FOR I/O VIA CARDS OR TAPE.

**0709-1400UCFD FREQUENCY DISTRIBUTION ANALYSIS ON THE 704 AND 709/90**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1400UCFD

AUTHORS..NATL. BUREAU OF ECONOMIC RSCH., INC.  
ELECTRONIC COMPUTING UNIT  
261 MADISON AVE.  
NEW YORK, N.Y.

DIRECT INQUIRIES TO AUTHCR

DERIVES FREQ. DIST. FROM RAW DATA /UNWEIGHTED OR WEIGHTED/ OR ACCEPTS DIST. /ABS OR REL TERMS/ AS INPUT; ALSO ACCEPTS AN INCOME DIST. COMPUTES COMPREHENSIVE SET OF ANALYTIC MEASURES BASED ON CLASS MIDPOINTS, CLASS MEANS COMPUTED FROM RAW DATA OR AVERAGES GIVEN BY USER. OUTPUT INCLUDES FREQUENCIES AND PRODUCTS /ABS AND REL TERMS- SIMPLE AND CUM, SOME PERCENTILES /BAND & RANGES/, 4 AVERAGES, 3 MOMENTS, SEVERAL MEASURES OF DISPERSION, SKEWNESS, KURTOSIS AND INEQUALITY. 704-8K ROW BINARY, 709/90 COLUMN /INCL SQUOZE/ AND ROW BINARY DECKS.

**0709-1401MWSHOW SHADOW IV SYSTEM**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1401MWSHOW

AUTHORS..M.J. BAILEY M.P. BARNETT R.P. FUTRELLE

DIRECT INQUIRIES TO..

M.J. BAILEY  
MIT COOPERATIVE COMPUTING LAB.10-408  
MASS. INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASS.

THIS SYST. PERFORMS SYNTACTIC ANAL. OF AN INPUT STRING OF BCD CHARACTERS /READ FROM CARDS/ IN ACCORDANCE WITH A SYNTAX THAT IS EXPRESSED IN THE SHADOW MNEMONIC LANG. THE INPUT INCLUDES THE STRING TO BE ANALYZED & THE SYNTAX /DEFINITION TABLE/. THE OUTPUT IS A TRACE TABLE. THE SHADOW LANG. & SYST. ARE DISCUSSED IN COMM. ACM, 15, 515, OCT.62. THE SHADOW SUBROUTINE CAN BE USED IN FORTRAN CODED PROGRAMS /ON A 709 OR 90/, OUTSIDE THE SHADOW SYSTEM, TO EFFECT SYNTACTIC ANALYSES THAT PRECEDE OTHER PROCESSES OF SYMBOL. MANIPULATION.

**0709-1412MFBPY FULL WORD BINARY INTEGER COEFFICIENT POLYNOMIAL MANIPULATION**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1412MFBPY

AUTHORS..MRS. K.R. KELLEY H.D. WACTLAR

DIRECT INQUIRIES TO..

H.D. WACTLAR  
COOPERATIVE COMPUTING LAB.  
M. I. T.,  
CAMBRIDGE 39, MASS.

THIS IS A PRECISE COUNTERPART OF THE MW POLY PACKAGE, AND DEALS WITH POLYNOMIALS WHOSE COEFFICIENTS ARE FULL LENGTH BINARY INTEGERS OR RATIONAL FRACTIONS OF THESE.

**0709-1413MWPOLY INTEGER & RATIONAL FRACTION POLYNOMIAL MANIPULATION PACKAGE**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1413MWPOLY

AUTHORS..MRS. K.R. KELLEY H.D. WACTLAR

DIRECT INQUIRIES TO..

H.D. WACTLAR  
COOPERATIVE COMPUTING LAB.  
M. I. T.,  
CAMBRIDGE 39, MASS.

THIS PACKAGE PERFORMS SIMPLE ARITHMETIC OPERATIONS ON REPRESENTATIONS OF POLYNOMIALS IN A SINGLE VARIABLE. A POLYNOMIAL IS REPRESENTED BY ITS COEFFICIENTS ARRANGED IN A LINEAR ARRAY. THE REPRESENTATION IS IDENTIFIED BY ITS ORDER, AND BY THE SUBSCRIPT OF THE WCRC CONTAINING ITS ZEROTH ORDER TERM IN A LARGE WORKING ARRAY THAT STORES THE POLYNOMIAL REPRESENTATIONS. COEFFICIENTS MAY BE FORTRAN INTEGERS OR RATIONAL FRACTIONS OF THESE.

**0709-1415MWSPT SEPTUPLE PRECISION INTEGER ARITHMETIC FOR FORTRAN PROGRAMS**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1415MWSPT

AUTHOR...H. D. WACTLAR  
COOPERATIVE COMPUTING LABORATORY  
MASS. INSTITUTE OF TECHNOLOGY  
CAMBRIDGE, MASS.

DIRECT INQUIRIES TO AUTHOR

THIS PACKAGE CONTAINS 33 SUBROUTINES FOR THE MANIPULATION AND INPUT/OUTPUT, WITHIN THE FORTRAN LANGUAGE, OF INTEGERS WHOSE MAGNITUDES ARE IN THE RANGE 1 TO 2 TO THE 245TH POWER-1. THE PACKAGE IS SELF-CONTAINED EXCEPT THAT THE OUTPUT ROUTINE WTIINT REQUIRES USE OF /I/O/, A FORTRAN II, VERSION 2, LIBRARY ROUTINE. FORTRAN II, VERSION 2, MACHINE LANG.

**0709-1416M7PFR SEPTUPLE PRECISION RATIONAL FRACTION PACKAGE**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1416M7PFR

AUTHORS..M.P. BARNETT H.D. WACTLAR

DIRECT INQUIRIES TO..

H.D. WACTLAR  
COOPERATIVE COMPUTING LAB.  
MASS. INSTITUTE OF TECHNOLOGY  
CAMBRIDGE, MASS.

THIS PACKAGE CONSISTS OF 12 SUBROUTINES FOR ARITHMETIC MANIPULATION AND INPUT/OUTPUT OF RATIONAL FRACTIONS IN WHICH NUMERATOR AND DENOMINATOR ARE INTEGERS LESS THAN 2 TO THE 245TH POWER /APPROXIMATELY 10 TO THE 72 POWER/. THE SUBROUTINES ARE DESIGNED TO BE USED IN FORTRAN CODED PROGRAMS. ALL THE ROUTINES MAKE USE OF SHARE DISTRIBUTION MW SEPT, SEPTUPLE PRECISION INTEGER ARITHMETIC FOR FORTRAN PROGRAMS. IN ADDITION, THE FOUR INPUT/OUTPUT ROUTINES MAKE USE OF SHARE DISTRIBUTION MW9, BCD MANIPULATION PACKAGE.

**0709-1419MWDVIC A VERBAL - DIGITAL INTEGER CONVERSION ROUTINE**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1419MWDVIC

AUTHOR...ALTON B. OTIS  
COOPERATIVE COMPUTING LAB.  
MASS. INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASS.

DIRECT INQUIRIES TO AUTHCR

TO FORM THE BCD REPRESENTATIONS OF VERBAL ORDINAL AND CARDINAL EXPRESSIONS THAT CORRESPOND TO A GIVEN FORTRAN INTEGER /E.G. TO FORM SEVENTY TWO AND SEVENTY SECOND FROM 72/- TO FORM THE FORTRAN INTEGER REPRESENTATION OF A GIVEN VERBAL CARDINAL THAT IS STORED IN ECC REPRESENTATION /E. G. TO FORM 72 FROM SEVENTY TWO/. THE BCD PACKAGE MW9BCD /SHARE DISTRIBUTION NO. 1371/ IS USED BY THE VDIC PACKAGE. MACHINE LANGUAGE- FORTRAN II.

**0709-1425RHT027 FINITE AUTOCORRELATION MATRIX INVERSION**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1425RHT027

AUTHOR...KURT THUM  
RADIO CORPORATION OF AMERICA  
DATA HANDLING AND SIMULATION  
500 N. READ STREET  
RIVERTON, NEW JERSEY

DIRECT INQUIRIES TO AUTHOR

THIS FORTRAN SUBPROGRAM FINDS THE INVERSE OF POSITIVE DEFINITE HERMITIAN MATRICES OF THE FORM T SUB N EQUALS /O SUB R-S/ /O LESS THAN OR EQUAL TO R, S LESS THAN OR EQUAL TO N, N EQUAL TO OR GREATER THAN O/. WHERE THE SEQUENCE /C SUB J/ /- INFINITY LESS THAN J LESS THAN INFINITY/. THIS SUBROUTINE REQUIRES A 32K 709 FORTRAN II SYSTEM THAT PROVIDES FOR THE COMPLEX ARITHMETIC FEATURE AS DESCRIBED BY IBM BULLETIN J28-6114-1 8/61.

0709-1474TEMADI ADJOINT OF A MATRIX WITH  
VARIABLE PRECISION INTEGRAL ENTRIES  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1474TEMADI

AUTHOR...L.F. GUSEMAN, JR. H.A. LUTHER

DIRECT INQUIRIES TO..

L.F. GUSEMAN, JR.  
DATA PROCESSING CENTER  
TEXAS ENGINEERING EXPERIMENT STATION  
COLLEGE STATION, TEXAS

TEMADI BUILDS THE ADJOINT OF A SQUARE MATRIX WHOSE ENTRIES ARE MULTIPLE-PRECISION INTEGERS. AS DIMENSIONED, THE PROGRAM CAN PRODUCE THE ADJOINT OF A MATRIX UP TO ORDER 50. THE ENTRIES IN THE ORIGINAL MATRIX CAN RANGE FROM 0 TO 10 TO THE 70TH POWER. EACH INTEGER IS INPUT TO THE PROGRAM IN THE FORM OF DIGITS\* BASE 10 TO THE 10TH POWER. FOR INTERNAL MANIPULATION THE PROGRAM CONVERTS EACH INTEGER TO BASE 2 TO THE 35TH POWER. WHEN OUTPUT IS REQUIRED, EACH INTEGER IS RECONVERTED TO BASE 10 TO THE 10TH POWER. A DISCUSSION OF THE CONVERSION AND RECONVERSION SCHEMES IS GIVEN IN /1/. TEMADI IS COMPOSED OF A MAIN PROGRAM, FOUR INPUT-OUTPUT SUBROUTINES, AND A VARIABLE-PRECISION INTEGER ARITHMETIC PACKAGE /TEVPAP- SHARE DISTRIBUTION NO.1293/. THE MAIN PROGRAM AND THE FOUR INPUT-OUTPUT SUBROUTINES ARE WRITTEN IN FORTRAN II AND ARE DISCUSSED BELOW. THE VARIOUS IAP SUBROUTINES, WHICH COMPRISE THE ARITHMETIC PACKAGE, PERFORM THE NECESSARY INITIALIZATION /SETUP/- CONVERSION /CCNVRT/- RECONVERSION /RECVNT/- ARITHMETIC /ADD, SUB, MPY, DIV/- TESTING /IF/- AND ERROR PRINTING /ERROR/. THE ONLY SPECIAL REQUIREMENT OF TEMADI IS THE ABILITY TO INPUT-OUTPUT FULL-WORD INTEGERS. THIS REQUIRES SLIGHT MODIFICATIONS OF THE FORTRAN II SYSTEM AND THE IOH ROUTINE IS DISCUSSED IN THE FINAL PARAGRAPH.

0709-1498UQRANI RANI - RESPONSE ANALYSIS  
PROGRAM

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1498UQRANI

AUTHOR...WILLIAM E. COLLINS

DIRECT INQUIRIES TO..

DR. KENNETH E. CLARK  
COLLEGE OF ARTS AND SCIENCES  
UNIVERSITY OF COLORADO  
BOULDER, COLORADO

THE RESPONSE ANALYSIS PROGRAM ANALYZES ITEM RESPONSE DATA COLLECTED IN CONJUNCTION WITH EITHER THE MINNESOTA VOCATIONAL INTEREST INVENTORY OR THE STRONG VOCATIONAL INTEREST BLANK. THE PROGRAM IS WRITTEN IN TWO SEPARATE PARTS. PART I ACCEPTS DATA FROM MAGNETIC TAPE, SCORES IT WITH UP TO 100 KEYS, AND PRODUCES A FULL LISTING OF THE RESULTS. PART II CALCULATES AND LISTS THE SUMS, MEANS, STANDARD DEVIATIONS, CORRELATIONS, ETC. OF THE SCORED RESULTS AND ALSO PRODUCES A PLOT OF ANY KEY CROSSPLOTTED WITH ANY OTHER KEY. THIS SECOND PART IS A MODIFICATION OF BMDX 13 CORRELATION ANALYSIS DEVELOPED BY THE DIVISION OF BIOSTATISTICS OF UCLA'S SCHOOL OF MEDICINE. MACHINE LANGUAGE- FAP- F.  
PART I OF THE PROGRAM USES 16,000 LOCATIONS IN CORE STORAGE.  
PART II OF THE PROGRAM USES 29,000 LOCATIONS IN CORE STORAGE.  
IBM 709, 7 TAPE UNITS, 2 CHANNELS, 32K MEMORY, ON-LINE PRINTER.

0709-1511UW0626 CARTESIAN PLOTTER  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1511UW0626

AUTHOR...GARY W. HARDING  
UNIVERSITY OF WASHINGTON  
RESEARCH COMPUTER LABORATORY  
SEATTLE 5, WASHINGTON

DIRECT INQUIRIES TO AUTHOR

TO PLOT ON CARTESIAN CO-ORDINATES ONE TO TEN CURVES SIMULTANEOUSLY. THE MAIN CHARACTERISTICS OF THE PLOT ARE A COMMON X AND Y-SCALE FOR ALL CURVES, THEORETICALLY INFINITE X AND Y-AXIS, AND UNUSUAL ACCURACY WHERE THE DATA PERMITS A SMALL DELTA Y. THE OUTPUT CAN BE PRINTED AT 6 OR 8 LINES PER INCH. IF THE GRAPH EXTENDS BEYOND A PHYSICAL PAGE, THE OVERFLOW SWITCH ON THE PRINTER CAN BE TURNED OFF SO THAT THERE WILL BE NO GAPS IN THE GRAPH. THE PLOT METHOD CONSISTS OF MOVING ALONG THE X-AXIS AT A PARTICULAR VALUE OF Y AND DELTA Y, COMPARING THE DATA WITH THE GRAPH POSITION AND PUTTING IN POINTS WHERE THEY COMPARE. THEN DECREASING Y BY DY AND REPEATING UNTIL TEN LINES HAVE BEEN CONSTRUCTED. THESE ARE PRINTED OUT AND THE LOWER LIMIT OF THE Y-SCALE IS CHECKED AGAINST THE LAST Y POSITION TO SEE IF THE GRAPH FOR ONE PAGE IS COMPLETE. MACHINE COMPONENTS- 709 MAIN FRAME, CORE STORAGE, AND STANDARD MONITOR COMPONENTS. THE OUTPUT IS ON TAPE A3/67. OTHER PROGRAMS REQUIRED LWPLCT USES THREE SUBSIDIARY SUBROUTINES.  
1/ IMAGE... SINGLE DATA ARRAY PROCESSOR.  
2/ CURVN... PLACES EACH SYMBOL IN ITS RESPECTIVE PLACE.  
3/ RTRN... DETERMINES THE CORRECT RETURN TO THE MAIN PROGRAM.  
EACH OF THESE IS INCLUDED IN THE SYMBOLIC AND BINARY DECKS.  
SOURCE LANGUAGE-FORTRAN II AND FAP.

0709-1514AYRTS1 ROOTS OF A POLYNOMIAL  
/RTSCH/  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1514AYRTS1

AUTHORS...MR. WILLIAM C. MESSEGAR  
LOCKHEED AIRCRAFT CORP.  
OPERATIONS RES. ASSOC.  
BURBANK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

CONTINUED FROM PRIOR PAGE--

THIS SUBROUTINE WILL CALCULATE THE N ROOTS OF THE POLYNOMIAL-  
F(Z) = A SUBN Z TO N POWER B SUBN-1Z TO N POWER MINUS 1E...CA  
SUB 1Z & A SUB 0.

THIS SUBROUTINE WILL FIND ALL THE ROOTS OF A POLYNOMIAL OF UP TO  
DEGREE 90. THIS SUBROUTINE REQUIRES A 32K 709 FORTRAN II SYSTEM  
THAT PROVIDES FOR THE COMPLEX ARITHMETIC FEATURE AS DESCRIBED BY  
IBM BULLETIN J28-6114-1 8/61. RTSCH USES A METHOD DEvised BY DR.  
C. H. LEHMER. FOR FURTHER DETAILS SEE THE JOURNAL OF THE  
ASSOCIATION FOR COMPUTING MACHINERY, APRIL 1961. VOL. 8, NO. 2,  
PAGE 151.  
SOURCE LANGUAGE - FORTRAN II

**0709-1562NAJJO0 JJ00 SORT**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1562NAJJO0

AUTHORS...MR. JCN CRISTOFER MILLER  
SYSTEMS DEVELOPMENT  
NORTH AMERICAN AVIATION, INC.  
LCS ANGELES INTL. AIRPORT  
LCS ANGELES 9, CALIF.

DIRECT INQUIRIES TO AUTHOR

JJ00 IS A SCAT LANGUAGE CORE SORT SUBROUTINE FOR USE BY 709-  
7090-7094 FORTRAN II. IT ACCEPTS, OR GENERATES, AN ARRAY OF  
SUBSCRIPTS FOR THE RECORDS TO BE SORTED. THE SUBSCRIPTS ARE  
RE-ARRANGED TO CORRESPOND TO AN ASCENDING OR DESCENDING,  
ALGEBRAIC OR LOGICAL, SORT OF THE UNMOVED RECORDS. SORT KEYS  
NEED NOT BE WHOLE OR CONSECUTIVE WORDS-- RECORDS NEED NOT BE  
FIXED LENGTH OR CONSECUTIVELY PLACED IN CORE. MACHINE LANGUAGE--  
SCAT.

**0709-1599RHSTMI SCOPE AND MERT - EXTENSIONS TO PERT, PHASE ONE**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-1599RHSTMI

AUTHOR...H.R. HEADLEY  
RADIO CORPORATION OF AMERICA  
DEFENSE ELECTRONIC PRODUCTS  
MISSILE AND SURFACE RADAR DIVISION  
MCRESTOWN, NEW JERSEY

DIRECT INQUIRIES TO AUTHOR

SCOPE AND MERT ARE PERT-BASED TECHNIQUES DESIGNED SPECIFICALLY  
TO MEET THE NEEDS OF COMPLEX R AND D PROJECT MANAGEMENT. BASED  
ON OVERALL PROJECT CONSIDERATIONS OF TECHNICAL COMPLEXITY,  
COST AND SCHEDULE, SCOPE DEVELOPS FEASIBLE SCHEDULES AND TOTAL  
RESOURCE REQUIREMENTS INCLUDING TIME, FUNDING AND MANPOWER. MERT  
IS INTENDED PRIMARILY TO ANALYZE MAN-POWER ASSIGNMENTS, BUT IS  
READILY ADAPTABLE TO ANY RESOURCE FOR WHICH A UNIT PER-WEEK  
ANALYSIS IS DESIRED. RESTRICTIONS  
A. OTHER PROGRAMS REQUIRE-PERT, PHASE ONE, FOR IBM TYPE  
709/7090 AS INSTALLED BY POLARIS MISSILE SYSTEM, MISSILES AND  
SPACE DIVISION, LOCKHEED AIRCRAFT CORPORATION, SEPTEMBER 23,  
1960.  
B. DATA-1. QUANTITY-A. SCOPE - NUMBER OF ACTIVITIES LESS THAN OR  
EQUAL TO 5000. B. MERT - NUMBER OF ACTIVITIES LESS THAN OR EQUAL  
TO 1500. 2. FORM-AS RESTRICTED BY LOCKHEED PERT PROGRAM AND AS  
DESCRIBED BELOW- A. SCOPE - INPUT LIMITED TO FIVE UNIQUE  
MANPOWER CATEGORIES IN ADDITION TO MATERIAL COSTS AND FIXED COSTS  
PER NETWORK. B. MERT - INPUT LIMITED TO FIVE UNIQUE RESOURCES  
PER ACTIVITY AND 2104 UNIQUE RESOURCES PER NETWORK. WRITTEN IN  
FORTRAN II.

**0709-3003EIJULI JULIAN DATE SUBROUTINE**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-3003EIJULI

AUTHOR...WALTER WELER  
ASTRONOMY DEPARTMENT  
NORTHWESTERN UNIVERSITY  
EVANSTON, ILL.

DIRECT INQUIRIES TO AUTHOR

THIS IS A CALENDAR SUBROUTINE WHICH RETURNS A JULIAN DATE  
TO A CALLING PROGRAM SUPPLYING AN ORDINARY /GREGGIAN/  
DATE. THE JULIAN DATE IS BY DEFINITION THE NUMBER OF  
ELAPSED DAYS SINCE JAN 0, 4713 B.C. THE DIFFERENCE OF TWO  
JULIAN DATES IS THE NUMBER OF DAYS BETWEEN THEM. THUS-  
J.D. /DEC 14, 1960/ - J.D. /JAN 3, 1960/ EQUALS  
2437282.5 - 2305446.5 EQUALS 131,836. FAP LANGUAGE.

**0709-3006EIQREI EIGENVALUES BY THE QR TRANSFORM**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 0709-3006EIQREI

AUTHORS...FAWAZI P. IMAD J.E. VAN NESS

DIRECT INQUIRIES TO..

FAWAZI P. IMAD  
NORTHWESTERN UNIVERSITY  
EVANSTON, ILLINOIS

TO FIND THE EIGENVALUES OF A REAL MATRIX EITHER SYMMETRICAL OR  
NONSYMMETRICAL A SUBROUTINE IS INCLUDED TO FIRST TRANSFORM THE  
MATRIX TO UPPER HESSENBERG FORM, AND THEN THE EIGENVALUES ARE  
FOUND USING THE QR TRANSFORM OF J.C.F. FRANCIS. THERE ARE TWO  
SEPARATE SUBROUTINES IN THIS PROGRAM, HESSEN AND QREIG, AND THE  
SECOND, QREIG, CALLS A THIRD SUBROUTINE CRT. ALL THREE DECKS, AS  
SUBMITTED, ARE DIMENSIONED FOR A 100 BY 100 MATRIX. THIS MAY BE  
CHANGED BY REPLACING THE DIMENSION CARD IN EACH OF THE THREE  
DECKS AND REASSEMBLING. IN THIS WRITE UP, THE SUBROUTINES ARE  
REFERRED TO BY THE NAME USED IN THE CALLING SEQUENCE. TO AVOID  
DIFFICULTIES WITH FORTRAN IV, THE DECK NAMES ARE DIFFERENT.  
SUBROUTINE HESSEN HAS THE DECK NAME HESS- SUBROUTINE QREIG THE

CONTINUED FROM PRIOR COLUMN--

DECK NAME QREIG- AND SUBROUTINE CRT THE DECK NAME CRT.  
SUBROUTINE QREIG CONTAINS SOME WRITE STATEMENTS WHICH WRITE ON  
LOGICAL TAPE 6. THIS IS ASSUMED TO BE SYS001, THE OUTPUT TAPE.  
THERE IS NO OTHER REFERENCE TO TAPE UNITS IN THE PROGRAMS.

THE FIRST SUBROUTINE CALLED, HESSEN, TRANSFORMS THE MATRIX TO  
UPPER HESSENBERG FORM USING A SERIES OF SIMILARITY TRANSFORMS. J.  
VECTOR PRODUCTS IS ESSENTIALLY SINGLE PRECISION, EXCEPT THAT THE  
LOGICAL PRODUCTS REQUIRED IN THE TRANSFORMATION ARE ACCUMULATED  
IN DOUBLE PRECISION. THE SECOND SUBROUTINE CALLED, QREIG, FINDS  
THE EIGENVALUES OF THIS UPPER HESSENBERG MATRIX. QREIG ITSELF IS  
A CONTROL PROGRAM THAT TESTS THE CONVERGENCE OF THE ITERATIVE  
METHOD AND MAKES THE DECISIONS AS TO WHEN TO ACCEPT THE VALUES  
FOUND. THE ACTUAL QR TRANSFORM IS MADE BY ANOTHER SUBROUTINE,  
CRT, THAT IS CALLED BY QREIG. CRT IS A FORTRAN IV VERSION OF THE  
SECOND ALGOL PROGRAM GIVEN BY FRANCIS IN HIS PAPER WHICH  
DESCRIBES THIS METHOD. MACHINE LANGUAGE-FORTRAN IV

**7040/7044****7040-1410RDSFTI SHARE INTERNAL FORTRAN TRANSLATOR FOR 7040/44**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1410RDSFTI

AUTHORS...7040/44 PROJECT - FORTRAN COMMITTEE

DIRECT INQUIRIES TO..

FRANK CARNELLA  
1271 AVENUE OF AMERICAS  
NEW YORK 20, NEW YORK

AUTOMATICALLY TRANSLATES A FORTRAN II SOURCE PROGRAM OR  
SUBPROGRAM INTO A FORTRAN IV SOURCE PROGRAM. SIFT IS A  
STANDARD THREE-LINK FORTRAN CHAIN PROGRAM DESIGNED TO  
RUN UNDER CONTROL OF THE 32K FORTRAN MONITOR SYSTEM, THE  
PROGRAMS TO BE CONVERTED ARE CONSIDERED DATA AND ARE PLACED  
BEHIND THE DATA CONTROL CARD IN THE DECK, EXCEPT FOR A FEW  
CHANGES THIS PROGRAM IS IDENTICAL WITH HS-1367.

**7040-1519DCC570 SIMULATION OF THE IBM 709/90 ON THE 7040/44**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1519DCC570

AUTHOR...JULIAN H. BRAUN  
IBM FEDERAL REGION OFFICE  
1111 CONNECTICUT AVENUE, N.W.  
WASHINGTON, D.C. 20036

DIRECT INQUIRIES TO AUTHOR

ANY 7040 OR 7044 WITH EXTENDED PERFORMANCE SET. /REQUIREMENTS  
OF PERIPHERAL EQUIPMENT ARE BASED SOLELY ON REQUIREMENTS OF  
ORIGINAL 709/90 PROGRAM./  
SOURCE LANGUAGE- BAP. THE SOURCE DECK CAN ALSO BE ASSEMBLED IN  
RELOCATABLE FORM BY MAP WITH THE USUAL MONITOR CONTROL CARDS.  
TO SIMULATE MOST OF THE 709/90 ARITHMETICAL INSTRUCTIONS ON THE  
7040/44, NO I/O TYPE INSTRUCTIONS ARE SIMULATED BY THIS  
SUBROUTINE. ALL OTHER INSTRUCTIONS WHICH EXIST ON THE 709/90 BUT  
NOT ON THE 7040/44 ARE SIMULATED EXCEPT EGM, EFM, ESM, ESTM,  
ETM, LCA, LFM, LSNN, LTM, NCP, TTR, AND VDH. IT IS SUGGESTED  
THAT NCP BE SIMULATED BY REPLACING WITH AXI 0,0. THE PROGRAM  
BEING SIMULATED MUST NOT HAVE ANY STR/S BECAUSE THIS WILL DESTROY  
ACCESS INTO THE SIMULATION PROGRAM, THE MAXIMUM COUNT FIELD FOR  
SIMULATED CONVERT INSTRUCTIONS IS RESTRICTED TO 15. MACHINE  
LANGUAGE. BAP

**7040-1543HSB00L B00L, ARTHRUZ, HOLOCT**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1543HSB00L

AUTHOR...MR. FRANK CARNELLA  
1271 AVENUE OF THE AMERICAS  
NEW YORK 20, NEW YORK

DIRECT INQUIRIES TO AUTHOR

ARTHRUZ- A SUBROUTINE OF TWO ARGUMENTS WHICH SETS THE FIRST  
ARGUMENT EQUAL TO THE SECOND. INTENDED USE IS FOR INTRODUCTION  
OF ALPHANUMERIC LITERALS INTO FORTRAN IV PROGRAMS.

B00L- A FUNCTION SUBPROGRAM WHOSE SINGLE ARGUMENT IS PLACED IN  
THE LOGICAL AC /P, 1-35/. USED TO ACHIEVE RESULTS CORRESPONDING  
TO THOSE OF FORTRAN II BOOLEAN IF STATEMENTS.

HOLOCT- A SUBROUTINE OF TWO ARGUMENTS WHICH CONSTRUCTS AN OCTAL  
CONSTANT FROM ITS BCD REPRESENTATION IN AN ALPHANUMERIC LITERAL,  
E.G. 6HO77777. THE FIRST ARGUMENT IS THE RESULT STORAGE, THE  
SECOND IS THE ALPHANUMERIC LITERAL.

ALL THREE ROUTINES ARE CODED IN MAP, USING THE SAVE AND RETURN  
PSEUDO-OPERATIONS. SYMBOLIC DECK INCLUDES CONTROL CARDS  
NECESSARY TO ASSEMBLE THESE ROUTINES WHILE EDITING THEM INTO THE  
7040/44 IBLIB, FOLLOWING THE MACHINE TRIGGER OR TEST SUBROUTINES.

**7040-1566M1COMI COMIT SYSTEM FOR THE 7040/7044**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1566M1COMI

CONTINUED FROM PRIOR PAGE--

AUTHORS..V.H. YNGVE M.L. CRAMER

DIRECT INQUIRIES TO..  
M.L. CRAMER  
ELECTRONIC ASSOCIATES, INC.  
P.O. BOX 582  
PRINCETON, N.J.

COMIT IS A GENERAL-PURPOSE PROBLEM-ORIENTED PROGRAMMING LANGUAGE FOR PRIMARILY NON-NUMERICAL APPLICATIONS. THE 709/90/94 VERSION HAS FOUND CONSIDERABLE APPLICATION IN SUCH FIELDS AS NATURAL LANGUAGE PROCESSING, THEOREM PROVING, INFORMATION RETRIEVAL, MECHANICAL TRANSLATION, PROGRAM EDITING NON-NUMERICAL DATA REDUCTION, GAME PLAYING, SIMULATION OF HUMAN PROBLEM-SOLVING BEHAVIOR, ALGEBRAIC MANIPULATION AND SO ON. COMIT WAS DESIGNED TO BE EASY TO LEARN AND EASY TO USE SO THAT THE PROBLEM ORIGINATOR CAN QUICKLY WRITE HIS OWN PROGRAM THUS ELIMINATING THE PROBLEMS INVOLVED IN EXPLAINING HIS NEEDS TO A PROGRAMMER. COMIT FEATURES SPECIAL FACILITIES FOR SYMBOL MANIPULATION, PATTERN MATCHING, DICTIONARY SEARCH, PUSH-DOWN STORAGE, AND FLEXIBLE INPUT AND OUTPUT. LIMITED ARITHMETIC FACILITIES ARE PROVIDED. THE 7040/44 VERSION MAINTAINS FULL SOURCE-PROGRAM COMPATIBILITY WITH THE 709/90/94 VERSION. MACHINE LANGUAGE-FAP.

7040-1589E0FAKE SIMULATION PROGRAM OF THE  
7094

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1589E0FAKE

AUTHORS..D.F. STEVENS DCN WATSON TED ROSS

DIRECT INQUIRIES TO..  
D.F. STEVENS  
MATH AND COMPUTING DEPT.  
LAWRENCE RADIATION LAB.  
BERKELEY 4, CALIF.

TO PERMIT A 7090/94 MAP /OR FAP/ PROGRAM /EXCLUSIVE OF INPUT, OUTPUT, AND DOUBLE PRECISION PORTIONS/ TO RUN ON A 7040 WITH ONLY MINOR MODIFICATIONS. THE PROGRAM CONSISTS OF THREE PARTS-- A MACRO PACKAGE WHICH BECOMES PART OF THE 7094 PROGRAM AND SERVES TO REDEFINE THE NON-7040 INSTRUCTIONS AS SPECIALLY CODED STRS. A SUBROUTINE /XFERX/ TO SAVE THE ORIGINAL STR TRAP INSTRUCTION, REPLACE IT WITH A TRANSFER TO THE ANALYSIS AND SIMULATION PROGRAM, AND RESTORE IT WHEN SIMULATION IS COMPLETED. A SUBROUTINE /ANLYZ/ WHICH DECODES THE STR INSTRUCTIONS AND SIMULATES THE 7094 INSTRUCTIONS THEY REPLACED. MACHINE-7040, WITH EXTENDED PERFORMANCE AND SINGLE PRECISION FLOATING POINT INSTRUCTION SETS. MAP LANGUAGE DESIGNED TO RUN UNDER 7040 IBSYS MONITOR. MEMORY REQUIRED ABOUT ABOUT 400 LOCATIONS.

7040-1595XYZPCGR COMMERCIAL CONVERSION  
ROUTINE FOR THE IBM 7040/44

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1595XYZPCGR

AUTHOR...D.M. PALMER  
IBM CORP.  
P.O. BOX 31  
BOISE, TEXAS

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM IS DESIGNED FOR COMMERCIAL USERS OF THE IBM 7040/44. ITS PURPOSE IS TO PROVIDE THE COMMERCIAL USER WITH A CONVENIENT MEANS OF HANDLING OUTPUT DATA CONVERSION AND OUTPUT RECORD GENERATION. THIS PROGRAM WILL CONVERT A BINARY WORD TO BCD, EDIT THE BCD WORDS WITH COMMAS, DECIMALS, MINUS SIGNS, ETC., AND WILL ACT AS AN INTERFACE TO JOBS AND JOBOU WHEN SO DESIRED. IT WILL ALSO CONVERT BINARY TO OCTAL AND ALLOW FOR DIRECT TRANSMISSION OF DATA WITHOUT ANY CONVERSION. THE USER WILL BE ABLE TO SELECT A SPECIFIC EDIT WORD /MAXIMUM OF 8/ DESIGNATE WHEN HALF-ADJUSTING IS TO TAKE PLACE, AND TO SPECIFY WHERE THE DECIMAL IS TO BE LOCATED IN THE EDITED FIELD. THIS PROGRAM WILL NOT ACCEPT FLOATING POINT DATA. FOR ANY ONE PARAMETER IN THE CALLING SEQUENCE THE NUMBER OF OUTPUT WORDS ON A BINARY TO BCD CONVERSION IS 3. WHEN CONVERTING TO OCTAL THERE WILL BE TWO WORDS OF OUTPUT, AND WHEN TRANSMITTING WITHOUT CONVERSION THE PROGRAM PERMITS ONLY ONE WORD OF OUTPUT, PER CALLING SEQUENCE WORD. THE PROGRAM IS WRITTEN IN MAP AND CAN BE RUN ON A 7040/44 WITH THE EXTENDED PERFORMANCE INSTRUCTION SET. 456 WORDS OF CORE STORAGE ARE REQUIRED, THIS MAY BE REDUCED TO 431 THROUGH USE OF OPTIONAL ROUTINES WITHIN THE PROGRAM.

7040-1596BPABILD MAP SUBROUTINE FOR SAVING  
CHAIN TAPES

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7040-1596BPABILD

AUTHORS..THOM LANE JOHN WALKER

DIRECT INQUIRIES TO..  
THOM LANE  
BONNEVILLE POWER ADMINISTRATION  
P.O. BOX 3621  
ZCNE 8  
PORTLAND, OREGON

THE 7040 IBSYS SYSTEM DOES NOT CURRENTLY ALLOW THE RE-USE OF CHAIN TAPES. ON AN A CHANNEL SYSTEM WITH 73305 THE NORMAL TIME TO LOAD A CHAIN TAPE PRIOR TO EXECUTION RANGES FROM 5 TO 20 MINUTES. BY CREATING A SELF-LOADING TAPE, FUTURE LOADS OF THAT CHAIN PROGRAM ARE CUT TO 30 TO 50 SECONDS. IBM PROJECTS A RELEASE OF A SIMILAR FEATURE IN THE FIRST QUARTER, 1964. IF THE USER HAS N DEPENDENT LINKS IN HIS PROGRAM, HE PLACES A CALL CHAIN /NGL/ STATEMENT AS THE FIRST EXECUTABLE STATEMENT OF HIS MAIN LINK. AT THE END OF HIS CHAIN DECK, HE ADDS A LINK COMPOSED OF A FORTRAN PROGRAM WITH A CALL MAKCHN STATEMENT. THE MAKCHN ROUTINE MAY BE LOADED FROM THE LIBRARY TAPE OR PLACED IN THE LINK AS A BINARY DECK AND WILL BE EXECUTED AFTER THE CHAIN DECK HAS BEEN LOADED. THE LINK NAME OF THE LAST LINK MUST BE SAVCHN. WHEN EXECUTION BEGINS THE MAIN LINK CALLS LINK /NGL/, WHICH CONTAINS ZO BPA BILD, AND ZO BPA BILD GENERATES THE TAPE ON S.SU01. AT THIS POINT, THE SELF-LOADING TAPE IS READY ON S.SU01, IT MUST BE LOADED FROM S.SU00. IF YOU DIAL THESE TWO UNITS SO AS TO INTERCHANGE THEM, FILE PROTECTING THE SELF-LOADING TAPE AS A PRECAUTION, YOU ARE READY TO EXECUTE.

7090

7090-NUCL34 FARSE-1A

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL34

AUTHOR...R. A. BLAINE  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

NATURE OF PROBLEM SOLVED - THE PROGRAM COMPUTES THE NEUTRON LEAKAGE FROM A SHIELD ANNULUS USING AN ATTENUATION MODEL BASED ON MEAN FREE PATHS TRAVERSED ALONG A STRAIGHT LINE TRAJECTORY, THE REMOVAL CROSS SECTIONS INCORPORATE MULTISCATTERING EFFECTS. DOSE DEPOSIT AT THE TARGET MESH IS THEN DETERMINED FROM THE ANGULAR DISTRIBUTION OF THE LEAKAGE NEUTRONS, INTEGRATED OVER THE SHIELD SURFACE. MAY BE USED ON THE 704, 709, 7090. WRITTEN IN FORTRAN.

7090-NUCL35 APWRC-SYBURN

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL35

AUTHOR...T. M. OLSEN  
MARTIN MARIETTA CORPORATION  
BALTIMORE 3, MARYLAND

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

NATURE OF PROBLEM SOLVED - ONE-DIMENSIONAL REGIONWISE OR INTERVALWISE DETERMINATION OF ISOTOPE CONCENTRATIONS DURING REACTOR BURNUP, INCLUDING EFFECTS OF ROD OR OTHER CONTROL EIGENVALUE VARIATION, PROVIDING CORE AVERAGED REACTOR CONSTANTS FOR SUBSEQUENT SYNTHESIZED AXIAL BURNUP PROGRAM. MAY BE USED ON THE 7090 AND 7094. WRITTEN IN FORTRAN II AND FAP.

7090-NUCL36 APMRC-GAMICO /GAM ADAPTED TO APMRC/

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL36

AUTHOR...T. M. OLSEN  
MARTIN MARIETTA CORPORATION  
BALTIMORE 3, MARYLAND

DIRECT INQUIRIES TO AUTHOR

AS IN THE ORIGINAL GAM CODE, THIS PROGRAM COMPUTES THE SLOWING-DOWN SPECTRUM IN EITHER THE P-1 OR B-1 APPROXIMATION, USING 68 GROUPS OF NEUTRONS WITH A CONSTANT GROUP WIDTH OF DELTA U0.25. THE CALCULATED FLUX AND CURRENT SPECTRA ARE USED TO REDUCE THE ORIGINAL 68-GROUP CROSS-SECTION DATA TO AVERAGE VALUES OVER AS MANY AS 32 BRGD GROUPS. MAY BE USED ON THE 7090 AND 7094. WRITTEN IN FORTRAN II AND FAP. MACHINE REQUIREMENTS - 32K CORE PLUS 10 TAPE UNITS. NO CARD READER OR PUNCH REQUIRED.

7090-NUCL37 CURE-3 TAPE VERSION FOR 7090/94

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL37

AUTHOR...T. M. OLSEN  
MARTIN MARIETTA CORPORATION  
BALTIMORE 3, MARYLAND

DIRECT INQUIRIES TO AUTHOR

SAME AS FOR ORIGINAL CURE FOR IBM 704. TWO DIMENSIONAL NEUTRON DIFFUSION EQUATIONS. MACHINE REQUIREMENTS - 32K MEMORY. CARD READER AND PUNCH NOT NEEDED. UNUSUAL FEATURES OF THE CODE-CURE IS STILL THE ONLY 2-D DIFFUSION THEORY PROGRAM WITH AN R-THETA GEOMETRY OPTION. WRITTEN IN FAP.

7090-NUCL38 EQUIPOISE-3-A

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL38

AUTHORS...C. W. NESTOR, JR. T. B. FOWLER M. L. TOBIAS

DIRECT INQUIRIES TO...

C. W. NESTOR, JR.  
OAK RIDGE NATIONAL LABORATORY  
OAK RIDGE, TENNESSEE

EQUIPOISE-3-A IS A SLIGHTLY REVISED VERSION OF EQUIPOISE-3 /SEE ABSTRACT 397/. IN ADDITION TO THE STANDARD OUTPUT, A PICTURE IS PRINTED OF THE MATERIAL ARRANGEMENT IN THE REACTOR. IF THE ADJOINT FLUX OPTION IS USED, THE PROMPT NEUTRON LIFETIME IS CALCULATED AND PRINTED, WITH THE REACTIVITY PER UNIT CHANGE IN EACH GROUP CONSTANT IN EACH REGION OF THE REACTOR. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM-SAME AS FOR EQUIPOISE-3 WITH THE EXCEPTION THAT IF THE NUMBER OF DIFFERENT MATERIALS IN THE REACTOR EXCEEDS 35 NO PICTURE WILL BE PRINTED. WRITTEN IN FORTRAN.

7090-NUCL39 FAIM

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL39

AUTHOR...DEGROTHY C. BALLER  
APPLIED MATHEMATICS DEPT 716-61  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANOGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

THE FAIM LIST CODE, WRITTEN IN FORTRAN II FOR THE IBM 709/7090 COMPUTER, LISTS THE OUTPUT FROM THE FAIM LIB PUNCH CODE. THE OUTPUT FROM THE FAIM LIB CODE IS A MICROSCOPIC CROSS-SECTION LIBRARY IN COLUMN BINARY FORM FOR USE WITH THE FAIM CODE.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

7090-NUCL40 CRAM

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL40

AUTHOR...A. HASSITT  
UK ATOMIC ENERGY AUTHORITY  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

DIRECT INQUIRIES TO AUTHOR

NATURE OF PROBLEM SOLVED- CRAM IS A PROGRAM TO SOLVE THE MULTIGROUP DIFFUSION EQUATIONS IN 3D-DIMENSIONS /R-Z, X-Y, OR R-GEOMETRY/, OR IN ONE-DIMENSIONAL /SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRY/. NEUTRONS MAY SCATTER FROM ANY GROUP TO ANY OTHER. REAL, ADJOINT, AND SOURCE-TYPE PROBLEMS ARE ALL SOLVABLE. THE PROGRAM WILL COMPUTE THE-EFFECTIVE OF THE SYSTEM OR ALTERNATIVELY SEARCH FOR CRITICALITY BY MOVING SPATIAL BOUNDARIES, VARYING MATERIAL COMPOSITIONS, OR VARYING TRANVERSE BUCKLING. THE EQUATIONS ARE SOLVED BY FINITE DIFFERENCE METHODS.

CONTINUED FROM PRIOR COLUMN--

UNUSUAL FEATURES OF THE CODE- A GENERAL OUTPUT COMPILER IS PROVIDED WHICH CAN BE GIVEN OUTPUT INSTRUCTIONS IN ALGEBRAIC FORM AS PART OF THE PROBLEM INPUT DATA. THE USER CAN THEREBY DEVELOP HIS OWN ROUTINES FOR PROCESSING RESULTS. CROSS SECTIONS MAY BE PUT IN DIRECTLY OR MAY BE CHOSEN FROM THE PROGRAM LIBRARIES-- A GROUP CONDENSATION ROUTINE IS PROVIDED. THERE ARE FACILITIES FOR RUNNING PROBLEMS IN SUCCESSION-- PASSING FLUXES AND/OR DATA FROM PROBLEM TO PROBLEM. OPTIONAL MESH DOUBLING IS PROVIDED TO CHECK FINITE DIFFERENCE ERRORS OR TO SPEED UP CRITICALITY SEARCHES IN THE EARLY STAGES.

7090-NUCL41 CROC 90

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL41

AUTHORS...MR DAVID W THOMPSON  
AEROJET GENERAL NUCLEOMICS  
P.O. BOX 77  
SAN RAMON, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

THE CROC-90 CODE WAS DEVELOPED FOR USE AS AN EXPEDIENT TOOL IN THE DATA REDUCTION OF VARIOUS OUT-OF-PILE FLUID FLOW EXPERIMENTS ON THE M-1 FUEL ELEMENTS. THE CODE, WRITTEN IN FORTRAN LANGUAGE, IS SPECIFICALLY DESIGNED TO EVALUATE FUEL ELEMENT FRICTION FACTORS, ENTRANCE AND EXIT COEFFICIENTS, AND ORIFICE CALIBRATIONS FROM HYDRODYNAMIC DATA OBTAINED IN THE AGN CUT-OFF PILE LOOP. AS PRESENTLY COMPILED, IT IS LIMITED FOR USAGE ONLY IN CONJUNCTION WITH THE TEST SECTION IN THE AGN CUT-OF-PILE WATER-LOOP. SLIGHT MODIFICATIONS IN THE FORTRAN LISTING CAN MAKE THIS CODE UNIVERSALLY APPLICABLE TO THE REDUCTION OF DATA FROM SINGLE PHASE EXPERIMENTAL FLUID FLOW TESTS IN AXIAL FLOW DUCTS.

7090-NUCL42 CONEC

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL42

AUTHORS...C. KOLAR N. PRUVOST

DIRECT INQUIRIES TO...

C. KOLAR  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
LIVERMORE, CALIFORNIA

A NEW, COUPLED, ONE-DIMENSIONAL NEUTRONIC-ELASTICITY THEORY CODE IS DESCRIBED. THE CODE HAS BEEN PREPARED TO RUN ON THE IBM 7090 DIGITAL COMPUTER. THE CALCULATION IS DESIGNED FOR APPLICATION TO PULSED, FAST REACTORS SUCH AS GODIVA AND SUPER KUKLA. THE QUANTITIES CALCULATED AS A FUNCTION OF TIME AND SPATIAL COORDINATES ARE- ALPHA, TEMPERATURE, RADIAL AND TANGENTIAL STRESSES, ACCELERATIONS, VELOCITIES, AND DISPLACEMENTS. SOME RESULTS OF APPLICATION OF CONEC TO SPECIFIC SYSTEMS ARE GIVEN AND COMPARED WITH THE EXPERIMENTAL OR ANALYTICAL RESULTS.

7090-NUCL43 ARES-1 /A RESONANCE INTEGRAL CODE/

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL43

AUTHOR...F. L. FILLMORE  
APPLIED MATHEMATICS DIVISION  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANOGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

ARES-1 IS USED TO CALCULATE EFFECTIVE RESONANCE INTEGRALS AND MULTIGROUP CROSS SECTIONS FOR LUMPS AND MIXTURES USING RESONANCE PARAMETERS. IT COMBINES, IN A SINGLE CODE, THE RESOLVED, UNRESOLVED AND I/V PARTS OF THE CALCULATION WHICH WERE PREVIOUSLY IN SEPARATE CODES. IN ADDITION, MOST OF THE PRELIMINARY DATA PREPARATION AND ALL OF THE CORRECTIONS TO THE RESONANCE INTEGRAL THAT WERE PREVIOUSLY MADE BY HAND ARE NOW DONE BY THE MACHINE. THIS GREATLY REDUCES THE LABOR THAT WAS FORMERLY INVOLVED IN MAKING THESE CALCULATIONS. THE MULTIGROUP CROSS SECTIONS ARE PRINTED IN A FORM FOR USE IN MULTIGROUP REACTOR CALCULATIONS. FOR EXAMPLE, THEY CAN BE INSERTED INTO THE AIM-6 OR FAIM LIBRARIES. 1/1 /2/ UP TO 50 GROUPS CAN BE SPECIFIED, THE ENERGY BREAKPOINTS BEING INPUT DATA. A RESONANCE PARAMETER LIBRARY IS INCLUDED IN THE CODE.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

7090-NUCL44 SCAR I

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL44

AUTHOR...R. A. BLAINE  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANOGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

SCAR I IS ONE OF SEVERAL SURVEY CODES WHICH HAVE BEEN DEVELOPED AS RANGE-FINDING DEVICES FOR SNAP SHIELDING DESIGNS. ALL OF THESE CODES EMPLOY RAY-TRACING TECHNIQUES. ALL ARE DESIGNED FOR SHORT MACHINE TIMES. SCAR I COMPUTES THE CURRENT AT GIVEN TARGET POINTS DUE TO FAST NEUTRONS WHICH ARE PRODUCED WITHIN SPECIFIED REACTOR VOLUME ELEMENTS AND SCATTER FROM DESIGNATED CYLINDRICAL SURFACE ELEMENTS. THE PROGRAM NORMALLY REQUIRES FORTY-NINE ITEMS OF INPUT DATA AND ONE TO THREE MINUTES OF MACHINE TIME ON THE IBM -7090.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL45 SCARF I**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL45

AUTHOR...R. A. BLAINE  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

THE SCARF I CODE IS A COMPUTING AID DESIGNED FOR APPLICATION TO SHIELDING PROBLEMS INVOLVING SPACECRAFT POWERED BY SNAP REACTOR SYSTEMS. SPECIFICALLY, IT PROVIDES A FIRST ORDER APPROXIMATION OF THE FAST NEUTRON CURRENT AT THE PAYLOAD SURFACE DUE TO NEUTRONS WHICH SCATTER FROM THE RADIATOR FINS. SCARF I ENABLES THE USER TO INVESTIGATE THE EFFECT OF RADIATOR POSITION ON THE INCIDENT RADIATION AT THE TARGET /REAR PAYLOAD SURFACE/. IN ADDITION, IT PROVIDES THE USER WITH THE DATA NECESSARY TO DESIGN THE MOST EFFECTIVE SHIELD TO REDUCE THIS SCATTERED RADIATION. SCARF I IS DESIGNED AS A COMPLEMENTARY PROGRAM TO FARSE I /SEE TDR 5772/, WHICH DETERMINES THE SHADOW SHIELD DESIGN FOR SNAP REACTOR SYSTEMS. THE SHIELD PARAMETER OUTPUT OF THE LATTER PROGRAM IS USED AS INPUT DATA FOR SCARF I. IN ADDITION, MUCH OF THE OTHER INPUT DATA IS IDENTICAL.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL46 AIREK 3**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL46

AUTHORS...L. R. BLUE M. HOFFMAN

DIRECT INQUIRIES TO..

L. R. BLUE  
APPLIED MATHEMATICS  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

AIREK III, A 7090 FORTRAN PROGRAM FOR THE NUMERICAL SOLUTION OF THE SPACE INDEPENDENT REACTOR KINETICS EQUATIONS. THIS AMTQ IS A DESCRIPTION OF THE CURRENT AIREK PROGRAM. THIS CURRENT CODE IS A COMPLETE REVISION OF THE PROGRAM DESCRIBED IN NAA-SR-MEMO 4980 TO THE POWER OF ONE. THIS AMTQ AND THE CODE HEREIN DESCRIBED COMPLETELY OBSOLETE AND REPLACE ALL PREVIOUS VERSIONS AND DESCRIPTION OF AIREK.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL47 BAM**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL47

AUTHOR...R. A. BLAINE  
APPLIED MATHEMATICS DIVISION  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

BAM COMPUTES THERMAL GROUP CONSTANTS ASSUMING SEPARABILITY OF SPACE AND ENERGY IN THE BOLIZMAN EQUATION. THE CODE ITERATES BETWEEN A SPECIAL CALCULATION USING AN S SUB 4 CYLINDRICAL GEOMETRY CELL CODE AND A SPECTRUM CALCULATION USING TEMPEST II. CONVERGENCE IS RAPID., TYPICAL RUNNING TIME IS ONE-HALF TO ONE MINUTE. THE INPUT NECESSARY TO OPERATE BAM IS ESSENTIALLY THE GEOMETRY OF THE CELL, THE TEMPEST IDENTIFICATION NUMBERS AND DENSITIES FOR EACH ELEMENT OF EACH REGION, AND THE VARIOUS OPTIONS. MUCH OF THE DATA FORMALLY NEEDED /CONVERGENCE CRITERIA, EXTRAPOLATION PARAMETERS, ETC./ ARE BUILT INTO BAM. THE CALCULATIONAL PROCEDURE IS AS FOLLOWS. FIRST, THE TEMPEST II LIBRARY IS READ IN, FOLLOWED BY ANY ADDITIONAL BINARY AND/OR DECIMAL LIBRARIES AND A CARD WITH THE WORD DATA TO SIGNIFY THAT ALL LIBRARIES HAVE BEEN READ. NEXT, THE TITLE CARD IS READ, FOLLOWED BY THE CASE DATA WHICH IS ENTERED BY MEANS OF THE DECRD SUBROUTINE.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL48 APMRC-CELCOR**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL48

AUTHOR...C. GICHELDERGER  
THE MARTIN COMPANY  
NUCLEAR DIVISION  
BALTIMORE, MARYLAND

DIRECT INQUIRIES TO AUTHOR

THIS REPORT CONTAINS A COMPLETE DESCRIPTION OF THE NUCLEAR ANALYSIS CODE, CELCOR, A FORTRAN-II PROGRAM FOR THE IBM 7090 COMPUTER. CELCOR CALCULATES MULTIPLY LETHARGY LEVEL CELL CORRECTIONS FOR SPHERICAL, CYLINDRICAL OR SLAB CELLS. FOR THE SLAB CASE, A TWO-DIMENSIONAL SYNTHESIS OPTION IS AVAILABLE, ALLOWING CONSIDERATION OF THE FLUX DISTRIBUTION, BOTH PERPENDICULAR AND PARALLEL TO THE PLANE OF THE SLAB. FLUX DISTRIBUTIONS MAY BE CALCULATED USING PI OR SN OPTION.\* S2, S4, S6, S8 AND S16 APPROXIMATIONS ARE AVAILABLE IN ALL GEOMETRIES EXCEPT CYLINDRICAL, WHERE STORAGE REQUIREMENTS LIMITED THE HIGHEST ORDER TO S8. THE REPORT CONTAINS COMPARISONS OF CELCOR ANALYSIS WITH EXPERIMENTAL RESULTS. THE LATTER INCLUDE EXPERIMENTAL FINE ACTIVATION DISTRIBUTIONS THROUGH A UNIT CELL, HETEROGENEOUS-HOMOGENEOUS FUEL ELEMENT SUBSTITUTION EXPERIMENTS AND ASSEMBLY OF CLEAN CRITICAL CONFIGURATIONS. ALSO INCLUDED IN THE REPORT ARE A COMPLETE COVERAGE OF INPUT AND OUTPUT, OPERATING INSTRUCTIONS, SAMPLE PROBLEM.

CONTINUED FROM PRIOR COLUMN--  
REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL49 SNAPKIN AND SNAPKIN A**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL49

AUTHORS...W. A. RHOADES G. A. LONG

DIRECT INQUIRIES TO..

W. A. RHOADES  
APPLIED MATHEMATICS DEPT 721-13  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

SNAPKIN PROVIDES A ONE-REGION TIME-DEPENDENT CALCULATION OF POWER, ENERGY, TEMPERATURE, REACTIVITY, INVERSE PERIOD, AND HYDROGEN LOSS IN A SNAP REACTOR AFTER A PERTURBATION FROM GIVEN INITIAL CONDITIONS. HEAT CAPACITY IS TREATED AS A CONTINUOUS FUNCTION OF TEMPERATURE. TEMPERATURE COEFFICIENT OF REACTIVITY CAN BE TREATED AS A CONSTANT, A LINEAR FUNCTION, OR A COMBINATION OF BOTH. HYDROGEN EVOLUTION IS TREATED ACCORDING TO AN EQUATION DEVELOPED TO FIT EXISTING EMPIRICAL DATA. FOREC ADDRESSABLE DATA INPUT IS USED FOR MAXIMUM EASE IN WRITING INPUT. A SIMPLE, INPUT. A SIMPLE, COMPACT DATA OUTPUT FORMAT IS USED. SNAPKIN A PERFORMS THE ABOVE-LISTED CALCULATIONS WITH THE ADDITIONAL FEATURE OF WEIGHTING POWER, HEAT CAPACITY, AND REACTIVITY IMPORTANCE FOR TWENTY FIVE OR LESS REGIONS.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL50 QUICKIE**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL50

AUTHORS...WA RHOADES GA LONG

DIRECT INQUIRIES TO..

WA RHOADES  
APPLIED MATHEMATICS DEPT 721-13  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

THE NEUTRON SLOWING DOWN AND THERMALIZATION PROBLEM IN INFINITE MEDIA IS SOLVED BY SOLUTION OF A SIMULTANEOUS SET OF EQUATIONS REPRESENTING GROUP PHENOMENA. FINITE MEDIA EFFECTS ARE INCLUDED BY MEANS OF DB TO THE 2ND POWER INSERTION. A FORTRAN COMPUTER PROGRAM, QUICKIE, IS DESCRIBED WHICH PERFORMS THIS CALCULATION IN 6 - 8 SECONDS FOR AN 18 GROUP PROGRAM. SEVERAL APPLICATIONS ARE DESCRIBED. THE ONE-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION EQUATIONS SOLVED BY ULCER /1/ HAVE A DIRECT ANALYTICAL SOLUTION IN THE CASE WHERE THE TOTAL BUCKLING FOR THE SYSTEM IS KNOWN. SINCE A SUITABLE BUCKLING CAN BE CALCULATED FOR MOST ON-REGION SYSTEMS HAVING A REGULAR GEOMETRIC SHAPE, THEN IT IS POSSIBLE TO SOLVE SUCH PROBLEMS IN ZERO DIMENSIONS. BY TREATING THE LEAKAGE AS ABSORPTION, THIS TREATMENT IS EXACTLY LIKE THAT GIVEN TRANSVERSE BUCKLING IN ULCER. THE ADVANTAGES ARE, FIRST, SIMPLICITY OF DATA REQUIREMENT, AND SECOND, ECONOMY OF EXECUTION TIME.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE.

**7090-NUCL51 CROCK**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL51

AUTHORS...R.A. STONE R.H. SHUDDÉ H.L. FRIEDMAN

DIRECT INQUIRIES TO..

R.A. STONE  
ATOMICS INTERNATIONAL  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

CROCK IS A CODE THAT SOLVES A SERIES OF SEVEN EQUATIONS DESCRIBING HEAT TRANSFER, FLUID FLOW, METEOROID PROTECTION, AND GEOMETRIC PROPERTIES OF A RADIATOR-CONDENSER. THE LAST OF THE SEVEN EQUATIONS SUMS THE WEIGHT OF THE RADIATOR. PRINTOUT IS EITHER IN TABULAR FORM SHOWING WEIGHT AS A FUNCTION OF THE VARIOUS DESIGN PARAMETERS, OR IN ONE LINE SHOWING THE DESIGN PARAMETERS WHICH GIVE THE MINIMUM WEIGHT CONFIGURATION.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-NUCL52 SHOCK**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL52

AUTHORS...R.A. STONE R.H. SHUDDÉ H.L. FRIEDMAN

DIRECT INQUIRIES TO..

R.A. STONE  
ATOMICS INTERNATIONAL  
A DIVISION OF NORTH AMERICAN AVIATION INC.  
P.O. BOX 309  
CANGGA PARK, CALIFORNIA

SHOCK IS A CODE ANALOGOUS TO CROCK THAT CALCULATES AND OPTIMIZES THE DESIGN PARAMETERS OF A SPACE RADIATOR THAT REFLECTS THE SENSIBLE HEAT LOST FROM A SINGLE-PHASE FLUID. CODE INPUT AND OUTPUT ARE VERY SIMILAR TO THOSE IN CROCK. SINCE, HOWEVER, THERE IS NO DIRECT RELATIONSHIP BETWEEN PRESSURE DROP AND RADIATING TEMPERATURE SELECTION OF THE OPTIMUM PRESSURE DROP AND TEMPERATURE DROP DEPENDS ON SOME RATHER TENUOUS ASSUMPTIONS.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.



## Section B

## 7090-NUCL53 APWRC /CROSS SECTION LIBRARY/

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL53

AUTHOR...T.M. OLSEN  
THE MARTIN COMPANY  
NUCLEAR DIVISION  
BALTIMORE, MARYLAND

DIRECT INQUIRIES TO AUTHOR

THIS REPORT DESCRIBES A SYSTEM OF IBM 7090/FORTRAN-II AND FAP SUBROUTINES FOR PREPARING PROGRAM AND CROSS-SECTION LIBRARY TAPES. THESE SUBROUTINES ARE INTENDED PRIMARILY FOR USE WITH THE ARMY PRESSURIZED WATER REACTOR CODE /APWRC/, BUT MANY OF THEIR FEATURES AND ADVANTAGES MAKE THEM USEFUL FOR OTHER CODES ALSO, PARTICULARLY THOSE IN THE PLANNING STAGES. THE PROGRAM LIBRARY SUBROUTINES ARE ADDED TO AN EXISTING CODE BY MEANS OF A SINGLE CALL STATEMENT. THEY PROVIDE A DIAGNOSTIC EDIT FOR ANY OF THE STANDARD FORTRAN-II I/O /INPUT-OUTPUT/ HALTS AND FOR ANY LOGICAL HALTS WHICH THE PROGRAMMER CARES TO INCLUDE IN FORTRAN-II SOURCE PROGRAMS. THE SAME ROUTINES ALSO ALLOW ANY PROGRAM CONTAINING THEM TO BE WRITTEN ON A REFERENCE LIBRARY TAPE WITHOUT NEED FOR FURTHER MODIFICATION. THIS PROGRAM LIBRARY TAPE IS THE FOUNDATION FOR THE AUTOMATED APWRC. CHANNEL TRAPPING IS USED TO SEARCH FOR A PROGRAM ON THIS TAPE WHILE CALCULATIONS ARE PROCEEDING IN THE CENTRAL PROCESSING UNIT OF THE COMPUTER. RAPID PROGRAM ACCESS IS THUS PROVIDED WITHOUT THE DISADVANTAGE OF WRITING LARGE DECKS ON A TEMPORARY MAGNETIC TAPE AT EACH APPLICATION, AS WITH THE FORTRAN-II CHAIN FUNCTION. THE SUBROUTINES REQUIRE THE FIRST 1700/8 CORE LOCATIONS. THE REPORT ALSO CONTAINS ALL NECESSARY INFORMATION FOR GENERATING, USING AND MODIFYING THE THREE CROSS SECTION VERSUS ENERGY FILES REQUIRED BY APWRC. \* A 19-LEVEL FILE, A 22-GROUP FILE AND A 68-GROUP FILE.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

## 7090-NUCL54 APWRC-SYNFAR-02

AVAILABLE 3RD QUARTER 1963.

ORDER FROM PROGRAM DISTRIBUTION CENTER

SPECIFY FILE NUMBER 7090-NUCL54

AUTHOR...MR. TOM OLSEN  
THE MARTIN CO.  
NUCLEAR DIVISION  
BALTIMORE, MARYLAND

DIRECT INQUIRIES TO AUTHOR

COMPUTER FOR WHICH CODE IS DESIGNED- IBM 7090 WITH 32K CORE PLUS 10 TAPE UNITS., NO CARD READER OR PUNCH REQUIRED. PROGRAMMING SYSTEM- FORTRAN II INCLUDING FAP. NATURE OF PROBLEM SOLVED- SYNTHESIS COMPUTATION OF THE STATIC FLUX AND REACTIVITY, OR OF THE STABLE PERIOD AND CORRESPONDING FLUX SHAPE, IN XY OR Z GEOMETRY. DIRECT COMPUTATION OF THE SAME QUANTITIES IN ONE-DIMENSIONAL SPHERICAL GEOMETRY. UNUSUAL FEATURES- THE DYNAMIC CALCULATION YIELDS THE INVERSE STABLE PERIOD, AS WELL AS THE K-DYNAMIC, THE K-INSTITANTANEOUS, MEAN NEUTRON LIFETIME AND THE EFFECTIVE DELAY FRACTION. P1 AND/OR SN SYNTHESIS. P1 OR SN ADJOINT COMPUTATION OPTION. ANISOTROPIC P1/ SCATTERING IS ALLOWED IN THE SN SOLUTIONS. INHOMOGENEOUS MODERATION SOLUTION FOR REFLECTOR REGIONS. AN INHOMOGENEOUS TRANSPORT SOLUTION, USING A FIXED FISSION OR SLOWING-DOWN SOURCE DISTRIBUTION IS AVAILABLE. THUS, A THREE-THERMAL GROUP CALCULATION, INCLUDING UP-SCATTERING, IS POSSIBLE. EDIT INCLUDES OPTIONAL BENSON-LEHNER PLOTTING DATA. LOGICAL ERROR DIAGNOSTICS.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

## 7090-NUCL55 ADVANCED SHIELD CODES

AVAILABLE 3RD QUARTER 1963.

ORDER FROM PROGRAM DISTRIBUTION CENTER

SPECIFY FILE NUMBER 7090-NUCL55

AUTHOR...DR. S. PREISER  
DEVELOPMENT DIVISION  
5 NEW STREET  
WHITE PLAINS, NEW YORK

DIRECT INQUIRIES TO AUTHOR

ADVANCED SHIELD CODES CONSIST OF 3 PROGRAMS, -9- NI0BE, SANE AND ADCNIS. THESE CODES ARE BROKEN DOWN AS FOLLOWS-

THE CODE /9-NI0BE/ FOR NUMERICALLY INTEGRATING THE TIME-INDEPENDENT NEUTRON OR GAMMA RAY BOLTZMANN TRANSPORT EQUATION, ORIGINALLY WRITTEN FOR THE IBM-704, HAS BEEN REVISED FOR USE ON THE IBM-7090. THE CODE WILL CALCULATE ANGULAR DISTRIBUTION, TOTAL FLUXES, AND CURRENTS FOR NEUTRONS /OR PHOTONS/ AS A FUNCTION OF ENERGY /OR WAVE LENGTH/ IN A FINITE, MULTILAYERED, SPHERICALLY SYMMETRIC CONFIGURATION.

SANE-SAGE SOLVES A NEUTRON OR GAMMA TRANSPORT PROBLEM IN SPHERICALLY SYMMETRIC MULTILAYER GEOMETRY. THE PROGRAMS COMPUTE NEUTRON /SANE/ OR GAMMA /SAGE/ FLUXES AT INTERIOR OF THE ASSEMBLY FAST DOSE AT THE EXTERIOR IS ALSO CALCULATED. BY THE USE OF RESPONSE FUNCTIONS, SECONDARY GAMMA RAY SOURCES CAN BE GENERATED THROUGHOUT THE CONFIGURATION. THE SAME PROGRAM HANDLES VOLUME DISTRIBUTED FISSION OR MONOENERGETIC SOURCES. THE SAGE PROGRAM HANDLES VOLUME DISTRIBUTED MONOENERGETIC GAMMA SOURCES. 32K CORE. PROGRAM WRITTEN IN FAP AND FORTRAN.

ADCNIS CALCULATES THE SOLUTION TO THE TRANSPORT EQUATION FOR PRIMARY NEUTRONS /OR GAMMAS/ IN A THREE DIMENSIONAL RECTANGULAR GEOMETRY. THE PROGRAM COMPUTES EITHER NEUTRON OR GAMMAS FLUXES AND THEIR STANDARD DEVIATIONS IN EACH OF UP TO 80 REGIONS. BY USE OF RESPONSE FUNCTIONS, DOSE AND SECONDARY GAMMA RAY SOURCES CAN BE GENERATED THROUGHOUT THE CONFIGURATION. IN PARTICULAR, THE CODE HAS PROVED USEFUL IN ANALYZING THE PENETRATION OF NEUTRONS OR GAMMAS THROUGH DUCTED SHIELDS. 32K CORE PROGRAMS WRITTEN IN FORTRAN AND FAP.

REQUESTOR MUST SUBMIT 3 REELS OF TAPES FOR 9-NI0BE, 6 REELS OF TAPE FOR SANE-SAGE, AND 10 REELS OF TAPE FOR ADCNIS FOR BASIC PROGRAM MATERIAL.

## 7090-NUCL56 CCC-3 SHIELDING PROGRAM

PACKAGE CCC-3 /14-2 AND 14-3/

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL56

AUTHORS...J.T. MARTIN J.P. YALCH W.E. EDWARDS  
M.D. MCDONALD

DIRECT INQUIRIES TO...

RADIATION SHIELDING INFORMATION CENTER  
OAK RIDGE NATIONAL LABORATORY  
P.O. BOX  
OAK RIDGE, TENNESSEE

THE PROGRAM PACKAGE INCLUDES A KERNEL INTEGRATION CODE, 14-2, AND A DATA CHECK, 14-3. THE CODE, 14-2, CALCULATES THE PENETRATION OF NEUTRONS AND GAMMA RAYS IN A REACTOR SHIELD AND ALSO COMPUTES REACTOR SHIELD WEIGHTS. SOURCES ARE DESCRIBED IN A RECTANGULAR COORDINATE SYSTEM AND MUST BE FURNISHED BY THE USER AS INPUT INFORMATION. REACTOR AND SHIELD GEOMETRIES ARE DESCRIBED BY COMBINATIONS OF REGIONS FORMED BY ROTATION OF RECTANGLES AND TRAPEZIODS ABOUT THE SYSTEM AXIS OR PARALLEL AXES OR BY TRANSLATION OF CONVEX QUADRILATERALS PARALLEL TO ANY AXIS OF THE RECTANGULAR COORDINATE SYSTEM. RECTANGULAR PARALLELEPIPED VOLUME, RECTANGULAR PLANE SURFACE, LINE, OR POINT SOURCES MAY BE DESCRIBED. SOURCE-DENSITY DISTRIBUTIONS, USED AS INPUT DATA, MUST BE IDENTICAL FOR NEUTRONS AND GAMMA RAYS AND ARE NON-SEPARABLE. GAMMA-RAY SOURCE ENERGY SPECTRA ARE ASSUMED INDEPENDENT OF POSITION. THE FAST-NEUTRON FLUX OR DOSE-RATE CALCULATION IN HYDROGENOUS MATERIALS UTILIZES ALBERT-WELTON THEORY. MOMENTS METHOD DIFFERENTIAL NUMBER SPECTRA AND DIFFERENTIAL SCATTERING GAMMA-RAY ENERGY SPECTRA ARE USED TO COMPUTE DIFFERENTIAL NEUTRON SPECTRA AND GAMMA-RAY ENERGY SPECTRA, RESPECTIVELY. BUILDUP FACTORS COMPUTED BY EMPIRICAL EXPRESSIONS ARE USED IN CONJUNCTION WITH EXPONENTIAL ATTENUATION TO COMPUTE GAMMA-RAY FLUXES AND DOSE AND ENERGY ABSORPTION RATES.

## 7090-NUCL57 NUCY DEVELOPMENT OF A GENERAL METHOD OF EXPLICIT SOLUTION TO NUCLIDE CHAIN EQUATIONS

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL57

AUTHOR...D.R. VONDY  
UNION CARBIDE NUCLEAR DIVISION  
OAK RIDGE NATIONAL LABORATORY  
OAK RIDGE, TENNESSEE

DIRECT INQUIRIES TO AUTHOR

A CALCULATIONAL PROCEDURE DEVELOPED PREVIOUSLY FOR THE DETERMINATION OF NUCLIDE CONCENTRATIONS AT POINT IN A REACTOR AT SUCCESSIVE TIME INTERVALS HAS BEEN MODIFIED AND EXPANDED. PROVISIONS HAVE BEEN INCORPORATED FOR CALCULATION OF REACTION RATES AND SUMMED REACTIONS. THE REVISED PROGRAM PERMITS A NUMBER OF SUCCESSIVE CHANGES IN REACTOR OPERATING CONDITIONS, SUCH AS CHANGES IN THE RATIO OF FAST-NEUTRON FLUX TO THERMAL-NEUTRON FLUX, TO BE RAPIDLY INCORPORATED INTO A CALCULATION. PROGRAMMING SYSTEM- FORTRAN. THE CALCULATION IS OF NUCLIDE CONCENTRATIONS AT POINT IN A REACTOR AT SUCCESSIVE TIME INTERVALS, WITH EXPOSURE TO A TWO-GROUP NEUTRON FLUX. INFINITE SYSTEM CRITICALITY IS CALCULATED. RESTRICTION ON COMPLEXITY OF THE PROBLEM- 99 DIFFERENT NUCLIDES, 50 NUCLIDE CHAINS, 50 NUCLIDES IN A CHAIN, 32K MACHINE REQUIRED.

THE PRIMARY EQUATIONS ARE USED IN A FORM THAT MINIMIZES LOSS OF SIGNIFICANCE IN SINGLE-PRECISION CALCULATIONS. A PROVISION IS INCORPORATED FOR CONSIDERING INTERLOCKING CHAINS. CIRCULATING AND NONCIRCULATING NUCLIDES MAY BE CONSIDERED IN THE SAME CALCULATION. CONCENTRATIONS OF SIX NUCLIDES MAY BE ADJUSTED TO MAINTAIN CRITICALITY. FLUX LEVELS MAY BE ADJUSTED TO MAINTAIN THE POWER LEVEL, AND THE RATIO OF FAST-NEUTRON FLUX TO THERMAL-NEUTRON FLUX MAY BE ADJUSTED TO ACCOUNT FOR THE EFFECT OF A CHANGE IN THE THERMAL MACROSCOPIC ABSORPTION CROSS SECTION. ALL DATA ARE INPUT, SO PROGRAM CHANGES ARE NOT NECESSARY TO CONSIDER ANY SITUATION OF INTEREST. REACTION RATES AND SUMMED REACTIONS MAY BE OBTAINED WITH EACH NUCLIDE. RESONANCE INTEGRAL CORRELATIONS ARE USED.

## 7090-NUCL58 CCC1 - KERNEL INTEGRATION CODE - CALCULATED SOURCES

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-NUCL58

AUTHOR...BETTY MASKEWITZ  
NUCLEAR MATERIALS AND PROPULSION OPERATION  
GENERAL ELECTRIC CORP.  
CINCINNATI, OHIO

DIRECT INQUIRIES TO AUTHOR

PROGRAMMING SYSTEM - 7090 SAP/FAP. SHIELDING COMPUTER PROGRAM 14-0 EVALUATES POINT-TO-POINT KERNELS AND INTEGRATES OVER SOURCE REGIONS TO PERFORM REACTOR-SHIELD PENETRATION CALCULATIONS FOR NEUTRONS AND GAMMA RAYS. NEUTRON AND GAMMA-RAY FLUXES, SPECTRA, AND DOSE AND ENERGY ABSORPTION RATES CAN BE COMPUTED FOR POSITIONS IN AND AROUND COMPLEX SHIELDS CONTAINING MULTIPLE SOURCES DESCRIBED IN A CYLINDRICAL COORDINATE SYSTEM. IN ADDITION, THE PROGRAM CAN COMPUTE REACTOR SHIELD WEIGHT. COMPUTATION OF ANY OF THESE QUANTITIES IN A SINGLE PROBLEM IS OPTIMAL. REACTOR AND SHIELD GEOMETRIES ARE DESCRIBED BY COMBINATIONS OF REGIONS FORMED BY ROTATION OF RECTANGLES AND TRAPEZIODS ABOUT THE REACTOR-SHIELD AXIS OR PARALLEL AXES OR BY TRANSLATION OF CONVEX QUADRILATERALS PARALLEL TO ANY AXIS OF THE RECTANGULAR COORDINATE SYSTEM. COMPOSITIONS ARE EXPRESSED AS VOLUME FRACTIONS FOR EACH MATERIAL IN THE REACTOR-SHIELD ASSEMBLY AND ARE ASSOCIATED WITH THE APPROPRIATE GEOMETRICAL REGIONS BY CODE NUMBERS. SOURCE-REGION INTEGRATION LIMITS ARE SPECIFIED FOR EACH OF AS MANY AS SIX SOURCE TYPES, AND LOCATION DIMENSIONS ARE SPECIFIED FOR THE AXIS OF EACH OF A POSSIBLE 200 SOURCE REGIONS. SOURCE-REGION NOCAL POINTS ARE LOCATED BY INTERSECTION OF AXIAL LINES IN SHELLS CONCENTRIC ABOUT THE SOURCE REGION AXES AND PLANES NORMAL TO THE AXES. THE PROVISIONS FOR SPACING THESE LINES, SHELLS, AND PLANES PERMIT DESCRIPTION OF CYLINDRICAL VOLUME, CYLINDRICAL OR PLANE SURFACE, AXIAL OR RADIAL LINE, OR POINT SOURCES. A DIFFERENT SOURCE-POINT SPACING IS PERMITTED FOR EACH SOURCE TYPE.

**7090-NUCL59 CCC2 - KERNEL INTEGRATION**  
**CODE- INPUT SOURCES**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL59

**AUTHOR...BETTY MASKEWITZ**  
 NUCLEAR MATERIALS AND PROPULSION OPERATION  
 GENERAL ELECTRIC  
 CINCINNATI, OHIO

**DIRECT INQUIRIES TO AUTHOR**

PROGRAMMING SYSTEM - 7090 SAP/FAP. SHIELDING COMPUTER PROGRAM 14-1 EVALUATES POINT-TO-POINT KERNELS AND INTEGRATES OVER SOURCE REGIONS TO PERFORM REACTOR-SHIELD PENETRATION CALCULATIONS FOR NEUTRONS AND GAMMA RAYS. NEUTRON AND GAMMA-RAY FLUXES, SPECTRA, AND DOSE AND ENERGY ABSORPTION RATES CAN BE COMPUTED FOR POSITIONS IN AND AROUND COMPLEX SHIELDS CONTAINING MULTIPLE SOURCES DESCRIBED IN A CYLINDRICAL COORDINATE SYSTEM. IN ADDITION, THE PROGRAM CAN COMPUTE REACTOR SHIELD WEIGHT COMPUTATION OF ANY OF THESE QUANTITIES IN A SINGLE PROBLEM IS OPTIONAL. REACTOR AND SHIELD GEOMETRIES ARE DESCRIBED BY COMBINATIONS OF REGIONS FORMED BY ROTATION OF RECTANGLES AND TRAPEZOIDS ABOUT THE REACTOR-SHIELD AXIS OR PARALLEL AXES OR BY TRANSLATION OF CONVEX QUADRILATERALS PARALLEL TO ANY AXIS OF THE RECTANGULAR COORDINATE SYSTEM. COMPOSITIONS ARE EXPRESSED AS VOLUME FRACTIONS FOR EACH MATERIAL IN THE REACTOR-SHIELD ASSEMBLY AND ARE ASSOCIATED WITH THE APPROPRIATE GEOMETRICAL REGIONS BY CODE NUMBERS. SOURCE-REGION INTEGRATION LIMITS ARE SPECIFIED FOR EACH OF AS MANY AS SIX SOURCE TYPES, AND LOCATION DIMENSIONS ARE SPECIFIED FOR THE AXIS OF EACH OF A POSSIBLE 200 SOURCE REGIONS. SOURCE-REGION NODAL POINTS ARE LOCATED BY INTERSECTION OF AXIAL LINES IN SHELLS CONCENTRIC ABOUT THE SOURCE REGION AXES AND PLANES NORMAL TO THE AXES. THE PROVISIONS FOR SPACING THESE LINES, SHELLS, AND PLANES PERMIT DESCRIPTION OF CYLINDRICAL VOLUME, CYLINDRICAL OR PLANE SURFACE, AXIAL OR RADIAL LINE, OR POINT SOURCES. A DIFFERENT SOURCE-POINT SPACING IS PERMITTED FOR EACH SOURCE TYPE. SOURCE-DENSITY DISTRIBUTIONS ARE ASSUMED INDEPENDENT OF ANGULAR POSITION. THE SOURCE DENSITY MUST BE SPECIFIED AS INPUT FOR EACH RING OF SOURCE POINTS IN EACH DIFFERENT SOURCE TYPE.

**7090-NUCL60 MED**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL60

**AUTHORS...J. ASKEW R. BRISSENDEN**

**DIRECT INQUIRIES TO..**

S. FRANCESCEN  
 MATHEMATICS DEPARTMENT  
 UNIVERSITY COLLEGE  
 LEICESTER UNIVERSITY  
 LEICESTER, ENGLAND

THE CODE EDITS THE MAGNETIC TAPE PRODUCED BY W-DSN TO PRODUCE REACTION RATES BY ENERGY AND BY VOLUME WITH TOTALS. IT CAN ALSO PRODUCE REACTION RATES FOR FED IN CROSS-SECTIONS.

**7090-NUCL61 W-DSN**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL61

**AUTHORS...J. ASKEW R. BRISSENDEN**

**DIRECT INQUIRIES TO..**

S. FRANCESCEN  
 MATHEMATICS DEPARTMENT  
 UNIVERSITY COLLEGE  
 LEICESTER UNIVERSITY  
 LEICESTER, ENGLAND

THE SOLUTION OF THE DISCRETE SN EQUATIONS IN A CYLINDRICAL GEOMETRY. EIGENVALUE OPTION IS REACTIVITY /K SUB EIGHT/ ONLY. VOLUME DISTRIBUTED SOURCES ARE ALLOWED, BUT NO SURFACE SOURCES. RESTRICTIONS ON COMPLEXITY OF THE PROBLEM - THE SPLIT UP OF ENERGY GROUPS SPACIAL MESH AND SN APPROXIMATION IS FULLY VARIABLE, LIMITED ONLY BY THE TOTAL FAST STORAGE CAPACITY OF THE COMPUTER. SPECIAL FEATURES OF THE CODE - THE CODE IS DESIGNED FOR THERMALIZATION PROBLEMS IN LATTICE CELL CONFIGURATIONS, AND THE GROUP ITERATION SCHEME IS DESIGNED TO CONVERGE QUICKLY IN THIS SITUATION. THE BOUNDARY CONDITION IF FREE OR GENERALIZED NON-LEAKAGE. THE DISCRETE ORDINATES MAY BE CHOSEN TO SATISFY LOW ORDER SPHERICAL HARMONICS CONDITIONS. THE OUTPUT IS DUMPED ON A TAPE WHICH MAY BE EDITED AT ANY TIME USING THE MED CODE.

**7090-NUCL62 MURGATROYD ANALYSIS OF THE KINETICS OF THE MSRE**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL62

**AUTHOR...C.W. NESTOR, JR.**  
 OAK RIDGE NATIONAL LABORATORY  
 UNION CARBIDE CORPORATION  
 U.S. ATOMIC ENERGY COMMISSION  
 OAK RIDGE, TENNESSEE

**DIRECT INQUIRIES TO AUTHOR**

THE IBM 7090 PROGRAM MURGATROYD IS A REVISED AND EXTENDED VERSION OF THE IBM 704 PROGRAM PET-1, WHICH SOLVES /BY A FIFTH-ORDER RUNGE-KUTTA PROCEDURE/ THE COUPLED FIRST-ORDER DIFFERENTIAL EQUATIONS FOR POWER, DELAYED NEUTRON CONCENTRATION AND TEMPERATURE IN A ONE-REGION REACTOR AS A FUNCTION OF TIME, GIVEN AN INPUT REACTIVITY VARIATION REPRESENTED BY A SERIES OF LINEAR RAMPS. THE BASIC EXTENSIONS WERE THOSE WHICH WERE NECESSARY TO INCLUDE THE EFFECTS OF THE SEPARATE HEAT CAPACITIES AND TEMPERATURE COEFFICIENTS OF THE FUEL SALT AND GRAPHITE IN THE MSRE, AND OF HEAT TRANSFER BETWEEN THE FUEL AND GRAPHITE. IN ADDITION, THE INPUT AND OUTPUT SECTIONS OF THE PREVIOUS PROGRAM WERE MODIFIED TO FACILITATE THE USE OF THE PROGRAM IN EXTENSIVE PARAMETER STUDIES, AND A CALCULATION OF THE PRESSURE RISE IN THE CORE WAS INCLUDED. TYPICAL RUNNING TIMES ARE OF THE

CONTINUED FROM PRIOR COLUMN--  
 ORDER OF 12 MILLISECONDS PER TIME STEP- A CALCULATION OF A 30-SECOND POWER HISTORY USING A 10 MILLISECOND TIME STEP REQUIRES ABOUT 36 SECONDS OF MACHINE TIME.

**7090-NUCL63 RATRAP**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL63

**AUTHOR...W.B. GREEN**  
 ATOMICS INTERNATIONAL  
 CANGGA PARK, CALIFORNIA

**DIRECT INQUIRIES TO AUTHOR**

THE RATRAP CODE COMPUTES DOSE RATE AT SPECIFIED SPATIAL POINTS ABOUT A SYSTEM OF SNAP GEOMETRY. AN ATTENUATION MODEL BASED ON MEAN FREE PATHS TRAVERSED ALONG A STRAIGHT LINE TRAJECTORY IS USED. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - 1000 CORE/ REFLECTOR SOURCE POINTS, 50 DOSE POINTS- DIMENSIONS MAY BE ENTERED IN CENTIMETERS OR INCHES. PROGRAMMING SYSTEM - FORTRAN

**7090-NUCL64 CCC-4 /SHIELDING PROGRAM PACKAGE/ 15-2**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-NUCL64

**AUTHORS...N.R. BAUMGARDT A. TRAPPUS J.E. MACDONALD**  
 M.A. CAPO

**DIRECT INQUIRIES TO..**

RADIATION SHIELDING INFORMATION CENTER  
 OAK RIDGE NATIONAL LABORATORY  
 P.O. BOX X  
 OAK RIDGE, TENNESSEE

THE CODE, 15-2, CALCULATES THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF GAMMA RAYS AT A POINT DETECTOR DUE TO SINGLE AND MULTIPLE SCATTERING IN AIR FROM A MONOENERGETIC, MONODIRECTIONAL POINT SOURCE. THE SINGLE-SCATTERING CONTRIBUTION IS COMPUTED BY NUMERICAL INTEGRATION WHILE THE CONTRIBUTION DUE TO SECOND- AND HIGHER-ORDER SCATTERING IS DETERMINED USING MONTE CARLO TECHNIQUES. TWO OPTIONS IN THE PROGRAM PROVIDE FOR REDUCTION OF THE VARIANCES OF THE ESTIMATES- /1/ BIASED SAMPLING OF THE SCATTERING ANGLE AND /2/ EXPONENTIAL TRANSFORMATION. ANOTHER OPTION ALLOWS THE GENERATION AND TRACKING OF 0.5-MEV PHOTONS FOLLOWING PAIR-PRODUCTION EVENTS.

**7090-ZOXY0002 CLUSTERING PROGRAM**  
 AVAILABLE 1ST QUARTER 1964.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-ZOXY0002

**AUTHOR...R. BONNER**  
 IBM CORP., A.S.D.D.  
 DEPT. 967  
 PEEKSKILL, N.Y.

**DIRECT INQUIRIES TO AUTHOR**

TO FORM CLUSTERS OF SAMPLES FROM AN INPUT SAMPLE POPULATION SUCH THAT SAMPLES WITHIN A CLUSTER ARE SIMILAR. EACH SAMPLE IS EXPRESSED AS A BINARY WORD WHERE EACH BIT REPRESENTS THE PRESENCE OR ABSENCE OF A PARTICULAR ATTRIBUTE. SIMILARITY IS A WEIGHTED SUM OF ALL THE ATTRIBUTES WHICH ARE IN THE SAME STATE /0 OR 1/ FOR TWO SAMPLES. CLUSTERS ARE FORMED BY CHOOSING A SAMPLE FOR THE CLUSTER CENTER, CALCULATING SIMILAR SAMPLES ABOUT THE CENTER, AND CALCULATING THE CHI-SQUARE PROBABILITY OF THE CLUSTER OCCURRING IF THE ATTRIBUTES WERE INDEPENDENT OF EACH OTHER. 7090 MACHINE WITH 2 CHANNELS AND 32K MEMORY. MAXIMUM /NUMBER OF ATTRIBUTES X NUMBER SAMPLES/ EQUALS 718K. MAXIMUM OF 359 ATTRIBUTES. FAP PROGRAM WITH FORTRAN SUBROUTINES. 550 SOURCE STATEMENTS. PROGRAM RUN SUCCESSFULLY ONCE FOR 350 SAMPLES IN UNDER 2 MINUTES.

OPTIONAL PROGRAM MATERIAL - REQUESTOR MUST SUBMIT ONE REEL OF TAPE TO OBTAIN THE SAMPLE PROBLEM INPUT DATA.

**7090-1094BESYS3 ONE PHASE MONITOR SYSTEM**  
 AVAILABLE 4TH QUARTER 1962.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1094BESYS3

**AUTHORS...G. L. BALDWIN R. DRUMMOND D. E. EASTWOOD**  
 G. HANSEN M. C. MCILROY V. A. VYSOTTSKY

**DIRECT INQUIRIES TO..**

MISS F. L. BUGELY  
 BELL TELEPHONE LABORATORIES  
 MURRAY HILL, NEW JERSEY

A MONITOR PROGRAM COMPOSED OF SIX /6/ MAJOR PROGRAMS. REQUIRES A TWO CHANNEL 32K MACHINE, 7090 OR 709 WITH DATA CHANNEL TRAPS. NORMAL OPERATION USES NINE TAPES. SUBMITTAL IS CONTAINED ON FIVE /5/ TAPES, A HIGH DENSITY BINARY SYSTEM TAPE, TWO SYMBOLIC TAPES, AND TWO LISTING TAPES. CORR 1152

REQUESTOR MUST SUBMIT 6 TAPES FOR BASIC PROGRAM MATERIAL.

**7090-1130RLA14A SMASHT**  
 AVAILABLE 4TH QUARTER 1961.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1130RLA14A

**AUTHOR...CARTER L. CLE**  
 SYS. DEL. CORP.  
 2500 COLORADO AVENUE  
 SANTA MONICA, CALIFORNIA

## Section B

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

A TWO PASS COMPILER LOADING PROGRAM DESIGNED TO REPLACE THE COMPILER-MODIFY AND LOAD PARTS OF THE SOS SYSTEM AND TO WORK IN CONJUNCTION WITH THE REMAINDER OF THE SOS SYSTEM.

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

**7090-1190PK1P3 INTEGER PROGRAMMING 3**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1190PK1P3

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONV. OF PKFIPO3 FOR 7090 USING FORTRAN EM. 1247

**7090-1190PKIP93 INTEGER PROGRAMMING 3**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1190PKIP93

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONVERSION OF PKFIPO3 FOR 7090 WHICH DOES NOT REQUIRE FORTRAN MONITOR SYSTEM. CORR. 1246

**7090-1191PKIPM2 INTEGER PROGRAMMING 2**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1191PKIPM2

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONV. OF PKFIPO2 FOR 7090 USING FORTRAN EM. CORR. 1237

**7090-1191PKIP92 INTEGER PROGRAMMING 2**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1191PKIP92

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONVERSION OF PKFIPO2 FOR 7090 WHICH DOES NOT REQUIRE FORTRAN MONITOR SYSTEM. CORR. 1237

**7090-1192PKIPM1 INTEGER PROGRAMMING 1**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1192PKIPM1

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONVERSION OF PKFIPO1 FOR 7090 USING FORTRAN MONITOR SYSTEM.

**7090-1192PKIP91 INTEGER PROGRAMMING 1**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1192PKIP91

AUTHOR...C.S. WADE

DIRECT INQUIRIES TO..

MR. J.J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 1300  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

CONVERSION OF PKFIPO1 FOR 7090 WHICH DOES NOT REQUIRE FORTRAN MONITOR SYSTEM.

**7090-1196LLIPLV LINCOLN IPL-V INTERPRETIVE SYSTEM - 709, 7090**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1196LLIPLV

AUTHORS...B. F. GREEN A. K. WOLF

DIRECT INQUIRIES TO..

A. K. WOLF  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
LINCOLN LABORATORY  
LEXINGTON 73, MASSACHUSETTS

TO EXECUTE PROGRAMS WRITTEN IN IPLV AS DESCRIBED IN RAND CORP PAPERS, P-1929, P1897, P1918, 1960. THE SYSTEM CONTAINS AN ASSEMBLER, INTERPRETER, TRACE, AND DUMP. SEE LONG DESCRIPTION OF HOW TO RUN SYSTEM. TAPE DENSITIES MUST BE SET EXTERNALLY ON THE 7090. ASSEMBLY OF SAP DECK PROCESSES SYMBOL TABLE, BINARY DECK, 2 WRITE TAPE CARDS, CALL AND FIX, RESUME TR TO START CARD. BINARY DECK MUST FOLLOW UPPER BINARY OCTAL LOADER. CORR. 1223

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1197LLBAM BOOLEAN ALGEBRA MINIMIZER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1197LLBAM

AUTHOR...C. R. BURGESS  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
LINCOLN LABORATORY  
LEXINGTON 73, MASSACHUSETTS

DIRECT INQUIRIES TO AUTHOR

FINDS THE TWO-LEVEL MINIMUM SUM OF PRODUCTS OR PRODUCT OF SUMS FORM FOR SETS OF SIMULTANEOUS BOOLEAN EQUATIONS. HAS THE CAPABILITY OF MINIMIZING UP TO 36 SIMULTANEOUS BOOLEAN EQUATIONS, EACH OF WHICH CONTAINS UP TO 36 INDEPENDENT VARIABLES.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1211IQMDLD IQ MOD LOADER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1211IQMDLD

AUTHOR...LT. RAY R. HANSEN

DIRECT INQUIRIES TO..

MR. R. W. CANNIZZARO  
OMAHA SYSTEMS ENGINEERING OFFICE  
IBM CORPORATION  
FEDERAL SYSTEMS DIVISION  
3104 FARNAM STREET  
OMAHA 31, NEBRASKA

EDITS AN A5 SOS PUNCH SQUEEZE TAPE AND A MOD PACKAGE OF CONTROL CARDS AND MODIFICATIONS TO PRODUCE AN A3 SOS PROGRAM INPUT TAPE. ELIMINATES PUNCHING SQUEEZE DECKS AND CARD TO TAPE OPERATIONS IN PRODUCING AN A3 SOS PROGRAM INPUT TAPE.

**7090-1229IQCSOS SOS PROGRAM LOADER**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1229IQCSOS

AUTHOR...EUGENE E. MITCHELL

DIRECT INQUIRIES TO..

MR. R. W. CANNIZZARO  
OMAHA SYSTEMS ENGINEERING OFFICE  
IBM CORPORATION  
FEDERAL SYSTEMS DIVISION  
3104 FARNAM STREET  
OMAHA 31, NEBRASKA

CALLS IN A SELECTED SOS PROGRAM FROM A MASTER SQUEEZE TAPE, MODIFIES PROGRAM VIA 6690 95 459 /IF DESIRED/ AND TRANSFERS THE SELECTED PROGRAM TO SYSPIT/A3/. ALTER CARDS MAY BE INCLUDED ON MASTER TAPE. ANY ALTERS IN CARD READER WILL BE INSERTED IMMEDIATELY PRIOR TO ENMOD. SENSE SWITCH 6 IS USED TO OBLITERATE GO CARD FOLLOWING SQUEEZE /FOR PUNCH SQUEEZE ONLY/. LOAD TAPE IS SIMULATED AT END OF THIS LOADER PROGRAM. EITHER A GO OR PS CARD FOLLOWING JOB CARD IN READER DETERMINES ACTION.

**7090-1236IBCURV PROGRAM CURVES**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1236IBCURV

AUTHOR...MR. OKAN GUREL  
INTERNATIONAL BUSINESS MACHINES CORP.  
1271 AVENUE OF AMERICAS  
NEW YORK 22, N. Y.

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM GIVES COORDINATES OF POINTS ON A CURVE DEFINED BY AN EQUATION OF THE FORM  $F(X, Y, ZK) = 0$  WHERE ZK ARE THE PARAMETERS ENTERING THE FUNCTION  $F(X, Y, ZK)$ . OUTPUT IS IN LIST FORM AS WELL AS SUITABLE FOR PLOTTING.

**7090-1239BEPIP BELL LABS PERMUTATION INDEX PROGRAM**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1239BEPIP

CONTINUED FROM PRIOR PAGE--

AUTHOR...CCOMPUTER USAGE CO.

DIRECT INQUIRIES TO..

R. A. KENNEDY  
BELL TELEPHONE LABORATORIES, INC.  
MURRAY HILL, NEW JERSEY

PRODUCES FROM INPUT BIBLIOGRAPHIC DATA A FOUR-PART DOCUMENT INDEX. THE PRINCIPAL PART IS A PERMUTED TITLE INDEX WITH A 120-CHARACTER LINE. ALSO OUTPUT ON THE SAME TAPE AS THE PERMUTED INDEX IS A COMPLETE BIBLIOGRAPHY OF THE INPUT DATA. THE OTHER TWO INDEXES ARE OUTPUT AS A MIXED CARD FILE OF // AUTHORS AND // PROJECT NUMBERS. EXCEPT FOR THE BE SYS INPUT, OUTPUT AND TAPE CONTROL ROUTINES, THIS IS AN INDEPENDENT PROGRAM.

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

7090-1250SMDASS DATASS /DATA ASSEMBLY/  
SECTION OF LP DECOMPOSITION CODE

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1250SMDASS

AUTHOR...A. R. FRIEDENHEIT  
SOCCNY OIL CO.  
OPERATIONS ANALYSIS DEPT.  
150 E 42ND ST.  
NEW YORK 17 N.Y.

DIRECT INQUIRIES TO AUTHOR

COMPLEMENTS SMDCOM /Q.V./, THE SOLUTION OBTAINING SECTION. INPUT FROM ONE OR MORE BCD TAPES. FIRST MASTER LP AND THEN ANY NUMBER SUBPROBLEMS, EACH EITHER AN LP IN LP/90 FORMAT. MAXIMUM 90 NUMERIC ROWS, 500 COLS., 3600 NON-ZERO TERMS /OR AN ALLOCATION-TRANSP. TYPE IN APPROX. DENNIS MIT FORMAT/. MAX. 166 SOURCES, 4500 DEMANDS, 11,092 NON-INFINITE COSTS. ASCERTAINS INTERACTION VECTORS, RESHUFFLES AND PACKS DATA. ERROR CHECKS, ETC. OUTPUT /MLP AT END/ TO ONE BINARY DATA TAPE FOR SUBSEQUENT READING/SOLVING BY DECOMP SECTION.

7090-1251SMDCOM DECOMP /SOL--OBTAINING/  
SECTION OF LP DECOMPOSITION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1251SMDCOM

AUTHOR...A.C. WILLIAMS

DIRECT INQUIRIES TO..

ARTHUR R. FRIEDENHEIT  
SOCCNY MOBIL OIL CO.  
OPERATIONS ANALYSIS DEPT.  
150 E 42ND STREET  
NEW YORK 17 N.Y.

COMPLEMENTS SMDASS /Q.V./, THE DATA-ASSEMBLY SECTION. USES DANTZIG-WULFE DECOMPOSITION ALGORITHM, REVISED SIMPLEX WITH 90X90 DBL. PREC. EXPLICIT INVERSE, TWO PHASES. ONE PROPOSAL VECTOR FROM EACH SUBPROBLEM SENT TO MPL /EXTREMAL PROBLEM/ EACH ITER., HOMOG. SOL. WHEN UNBOUNDED. NATURAL DIST. UNDER NEW SOURCE POTENTIALS FOR ALLOCATION TYPES. DELTAJS DIVIDED BY SUM ABS. VALUES INNER PRODUCT. PRESENT LIMIT 16 SUBPROGRAMS EASILY EXPANDED. TOTAL TIME REDUCABLE BY FAP-CODING INPUT-OUTPUT, ETCETARA

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

7090-1252NUINDI THIRTY-SIX SENSE-SWITCH  
SIMULATOR, SETTER AND TESTER

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1252NUINDI

AUTHOR...ROGER VAN NORTON  
N.Y.U.-A.E.C.  
4 WASHINGTON PL.  
NEW YORK 3 N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS IS A LOAD, TEST, ALTER SENSE INDICATORS FORTRAN/FAP SUBROUTINE FORTRAN/FAP CODED. THE PURPOSE OF THIS SUBROUTINE IS TO PROVIDE A MEANS FOR LOADING /SETTING/, TESTING, ALTERING UP TO 36 SIMULATED SENSE-SWITCHES USING THE SENSE INDICATORS AND A STORED WORD.

7090-1253BSFIOC 704 FORTRAN INPUT-OUTPUT  
LIST SIMULATOR FOR THE 7090

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1253BSFIOC

AUTHOR...GUY G. ZIEGLER  
NATIONAL BUREAU OF STANDARDS  
WASHINGTON 25, D.C.

DIRECT INQUIRIES TO AUTHOR

MAKES POSSIBLE THE RUNNING OF 704 FORTRAN COMPILED OBJECT PROGS. ON THE 7090 WHEN THE DIFFERENCE IN BCD INPUT-OUTPUT

7090-1254NUFLIP SUBROUTINE TO FLIP AN ARRAY

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1254NUFLIP

AUTHOR...RUTH LEE  
N.Y.U.-A.E.C.  
4 WASHINGTON PL.  
NEW YORK 3 N.Y.

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO AUTHOR

THE PURPOSE OF THIS SUBROUTINE IS TO ENABLE THE PROGRAMMER TO TAKE AN ARRAY STORED FORWARD /I.E. IN ORDER OF INCREASING ABSOLUTE STORAGE LOCATIONS/ AND STORE IT BACKWARDS IN THE SAME BLOCK OF MEMORY FOR USE BY A FORTRAN SUBROUTINE.

7090-1255NUFFT FLOATING POINT TRAP /7090  
FAP CODED/

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1255NUFFT

AUTHOR...MAX GOLDSTEIN  
N.Y.U.-A.E.C.  
4 WASHINGTON PL.  
NEW YORK 3 NEW YORK

DIRECT INQUIRIES TO AUTHOR

THIS SUBROUTINE PROVIDES ALTERNATE METHODS FOR DEALING WITH A FLOATING POINT OVERFLOW OR UNDERFLOW.

7090-1259APMINS DIRECT SEARCH MINIMIZATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1259APMINS

AUTHOR...GEO. E. LINDAMOOD

DIRECT INQUIRIES TO..

LOUIS G. KELLY  
APPLIED PHYSICS LAB  
JOHN HOPKINS UNIV.  
8621 GEORGIA AVE.  
SILVER SPRING MD.

THIS SUBROUTINE FINDS A LOCAL MINIMUM OF A CONTINUOUS FUNCTION OF N VARIABLES. A SYSTEMATIC SEARCHING PROCEDURE IS USED. SENSE INDICATORS ARE USED TO IMPROVE EFFICIENCY BY USING PREVIOUS RESULTS TO PREDICT WHERE THE MINIMUM MAY BE. EXECUTION TIME IS DIRECTLY PROPORTIONAL TO N AND IS DEPENDENT MAINLY ON THE TIME REQUIRED TO EVALUATE THE FUNCTION. THE ROUTINE MAY BE USED WITH FORTRAN OR SAP-TYPE PROGRAMS. 221 STORAGE LOCATIONS ARE REQUIRED.

7090-1260SOCHEB CHEBYSEV POLYNOMIAL  
APPROXIMATION

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1260SOCHEB

AUTHORS...L. J. DERR M. J. KUNIN

DIRECT INQUIRIES TO..

L. J. DERR  
SHELL OIL COMPANY  
DATA PROCESSING DEPARTMENT  
111 WEST 50TH STREET  
NEW YORK 20 NEW YORK

FITS A CURVE OR SURFACE WITH A CHEBYSEV APPROXIMATION OF SPECIFIED DEGREES. NO MORE THAN 24 DEGREES MAY BE USED. A TABLE OF VALUES F/X/ OR F/X,Y/, AT EQUALLY SPACED INTERVALS, IS ENTERED AS DATA. A MAXIMUM OF 1500 ELEMENTS PER ROW IS ALLOWED. THERE IS NO LIMIT TO THE NUMBER OF ROWS. THERE IS AN OPTION TO SMOOTH THE DATA.

7090-1284NUTPB FAP FOR FORTRAN S READ TAPE,  
WRITE TAPE

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1284NUTPB

AUTHOR...FLORENCE RAGLISA  
N.Y.U.-A.E.C.  
4 WASHINGTON PL.  
NEW YORK 3 N.Y.

DIRECT INQUIRIES TO AUTHOR

A FAP SUBPROGRAM TO BE USED BY FAP PROGRAM TO PERFORM THE FORTRAN I-O OPERATIONS-READ TAPE, WRITE TAPE. TO BE USED INSTEAD OF NU SNAP TO CONSERVE MEMORY SPACE IF THESE ARE THE ONLY I-O OPERATIONS NEEDED.

7090-1285NUCBSS COLUMN BINARY SYMBOLIC  
SUBROUTINE LOADER

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1285NUCBSS

AUTHOR...ANNAMARY MC CANN  
N.Y.U.-A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3 N.Y.

DIRECT INQUIRIES TO AUTHOR

THE PURPOSE OF THIS ROUTINE IS TO LOAD FROM THE CARD FOLLOWING THREE TYPES OF COLUMN BINARY CARDS  
/A/ THOSE CARDS LOADABLE BY BSS LOADER  
/B/ ABSOLUTE CARDS DESCRIBED IN FAP PROGRAMMERS MANUAL  
/C/ CONTROL CARDS NECESSARY FOR THIS PROGRAM /NU CSBB/

7090-1286NUCPP 7090 I-O SUBROUTINE

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1286NUCPP

## Section B

CONTINUED FROM PRIOR PAGE--

AUTHOR...FLORENCE RAGUSA  
N.Y.U.-A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3 N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS IS A FAP SUBROUTINE TO BE USED BY FAP PROGRAMS TO PERFORM THE I-C OPERATIONS-READ PRINT PUNCH. THIS IS TO BE USED INSTEAD OF NU SNUP TO CONSERVE MEMORY SPACE IF THESE ARE THE ONLY I-C OPERATIONS NEEDED.

**7090-1287NUTPD** A FAP SUBPROGRAM TO BE USED BY FAP PROGRAMS

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1287NUTPD

AUTHOR...FLORENCE RAGUSA  
N.Y.U.-A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

DIRECT INQUIRIES TO AUTHOR

TO PERFORM THE FORTRAN I-O OPERATIONS READ INPUT TAPE, WRITE OUTPUT TAPE, TO BE USED INSTEAD OF NU SNUP TO CONSERVE MEMORY SPACE IF THESE ARE ONLY I-O OPERATIONS NEEDED.

**7090-1288NUPOS** FAP FOR FORTRANS BKSP TAPE, REM TAPE, WRITE E-O-F

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1288NUPOS

AUTHOR...FLORENCE RAGUSA  
N.Y.U.-A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

THIS IS A FAP SUBPROGRAM TO BE USED BY FAP PROGRAMS TO PERFORM THE FORTRAN I-O OPERATIONS...BACKSPACE TAPE, REWIND TAPE, WRITE END OF FILE. IT IS TO BE USED INSTEAD OF NU SNUP TO CONSERVE MEMORY SPACE IF THESE ARE THE ONLY I-C OPERATIONS NEEDED.

**7090-1289SOSNAP** REGRESSION ANALYSIS PROGRAM

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1289SOSNAP

AUTHOR...M. J. KUNIN  
SHELL OIL COMPANY  
DATA PROCESSING DEPT.  
111 WEST 50TH STREET  
NEW YORK 20, NEW YORK

DIRECT INQUIRIES TO AUTHOR

GIVES A LEAST SQUARES FIT OF AN UNLIMITED NUMBER OF OBSERVATIONS TO EQUATIONS OF UP TO 30 TERMS, 9 OF WHICH MAY BE DEPENDENT, IN A SINGLE RUN. 30 TRANSFORMATIONS MAY BE MADE TO FORM NON-LINEAR TERMS WHICH ARE HANDLED AS LINEAR VARIABLES. SNAP GIVES MANY OF THE COMMON STATISTICAL TESTS ON THE RESULTS, AND RECALCULATES DEPENDENT VARIABLES. OBSERVATIONS MAY BE WEIGHTED. THERE ARE OPTIONS TO FORCE THE CURVE THROUGH THE ORIGIN AND TO DELETE VARIABLES HAVING AN INSIGNIFICANT VALUE.

**7090-1292SIGLSP** GENERAL LEAST SQUARES PROGRAM

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1292SIGLSP

AUTHORS..P. L. KADAKIA G. M. JOHNSON

DIRECT INQUIRIES TO..

P. L. KADAKIA  
SMITHSONIAN OBSERVATORY  
60 GARDEN ST.  
CAMBRIDGE 38 MASS.

LEAST SQUARES SOLUTION TO NORMAL EQUATIONS WITH NUMBER OF UNKNOWNNS LESS THAN OR EQUAL TO THE NUMBER OF EQUATIONS FOR CASES WITH OR WITHOUT WEIGHTS. THE ROUTINE DETERMINES THE SOLUTION VECTOR, THE RESIDUALS, THE STANDARD ERRORS FOR THE SOLUTION VECTOR, THE VARIANCE-COVARIANCE MATRIX, AND THE INVERSE MATRIX. VOIDS DISTRIBUTION NO. 1243 SI LSQR

**7090-1294MDGSIR** GENERAL SYMBOLIC INPUT ROUTINE /FORTRAN/

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1294MDGSIR

AUTHORS..STEPHEN P. LUBECK R. BIXBY SMITH

DIRECT INQUIRIES TO..

STEPHEN P. LUBECK  
MARTIN MARIETTA CORP. AEROSPACE DIV.  
P.O. BOX 179  
DENVER, COLORADO

GSIR PROVIDES A FORTRAN INPUT ROUTINE TO READ DECIMAL DATA IN ARBITRARY FORMATS AND STORE THE CONVERTED DATA BY INPUT SYMBOL OR ABSOLUTE OCTAL LOCATION. IN ADDITION ALPHAMERIC DATA AND TWELVE DIGIT OCTAL NUMBERS MAY BE INPUT. EACH INPUT CARD IS PRINTED WHEN READ TO PROVIDE A LISTING OF THE INPUT DECK.

**7090-1299URGAM2** GAMMA /A,X/ GAMMA /A/ & POISSON TERM IN DOUBLE PRECISION  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1299URGAM2

AUTHOR...JOHN R. WHITTLESEY

DIRECT INQUIRIES TO..

RUTH HORGAN  
UCLA COMPUTING FACILITY  
405 HILGARD AVE.  
LOS ANGELES 24 CALIF.

EXTENDS THE INTERNAL ACCURACY OF GAMA /DIST. 1177/ FROM SIX TO 10 & DIGITS. GAMMA /A,X/ IS DEFINED AS THE INTEGRAL FROM X TO INFINITY OF EXP /-U/ TIMES U TO THE /A-1/TH POWER DU. GAM-GAMMA /A,X/ GAMMA /A/ IS THE NORMALIZED INTEGRAL. THE INPUT-OUTPUT ARGUMENTS /A,X,GAM,1-GAM,h, ETC.../ ARE IN SINGLE-PRECISION, BUT CAN BE CHANGED TO DOUBLE-PRECISION BY AN EASY SEVEN CARD SUBSTITUTION IN THE FORTRAN PROGRAM.

**7090-1300IKLP90** LINEAR PROGRAMMING SYSTEM - SUCCESSOR TO SCROL

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1300IKLP90

AUTHORS..C-E-I-R TECHNICAL SERVICES DEPARTMENT

DIRECT INQUIRIES TO..

G. H. LOLMAUGH, HEAD  
TECHNICAL SERVICES DEPARTMENT  
INFORMATION PROCESSING TECHNOLOGY DIV  
C-E-I-R CORPORATE HEADQUARTERS

LP/90 IS A COMPLETE PROGRAMMING AND OPERATING SYSTEM INCLUDING A SYSTEM ASSEMBLER. ALL I/O STANDARDIZED AND CENTRALIZED - OVER 30 AGENDA ITEMS; ELABORATE DATA INPUT AND OUTPUT. ROWS AS WELL AS COLUMNS MAY HAVE MNEMONIC NAMES. VERY FAST DUE TO IMPROVED I/O AND ALGORITHMIC TECHNIQUES. FEATURES DOUBLE PRECISION. HANDLES 1024 ROWS. BUILT-IN PROVISIONS SIMPLIFY DEBUGGING MACHINE, PROGRAMMING AND FORMULATION ERRORS. CORR. DIST. 1213 VOIDED BY SD NC. 1300

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1308MIMAD** A GENERAL PURPOSE ALGEBRAIC COMPILER

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1308MIMAD

AUTHORS..DR. F. J. CORBATO R.C. DALEY M.M. DAGGETT

DIRECT INQUIRIES TO..

DR. F. J. CORBATO  
COMPUTATION CENTER  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE, MASS.

FOR USE IN THE FORTRAN/FAP 709/709C 32K MONITOR SYSTEM, VERSION 2.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1311BSBIOP** BUFFERED INPUT/OUTPUT PACKAGE FOR FORTRAN

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1311BSBIOP

AUTHOR...RCBERT A HOODES  
PENN. JERSEY TRANSPORTATION STUDY  
5151 G PARKSIDE AVE.  
PHILADELPHIA 31 PA.

DIRECT INQUIRIES TO AUTHOR

PROVIDES FAST, FLEXIBLE, BUFFERED INPUT/OUTPUT OF BINARY AND BCD TAPE RECORDS IN A FORTRAN PROGRAM. DATA CHANNEL TRAP FEATURE IS EMPLOYED. NO CONVERSION FEATURE IS AVAILABLE FOR BCD TAPE RECORDS.

**7090-1312EOTANZ** FORTRAN TANGENT OF A COMPLEX ARGUMENT

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1312EOTANZ

AUTHOR...P. G. BURKE

DIRECT INQUIRIES TO..

HAROLD HANERFELD  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4 CALIFORNIA

COMPUTES TAN Z WHERE Z CAN TAKE ALL COMPLEX VALUES EXCEPT HALF ODD MULTIPLES OF PI.

**7090-1313ECHYPR** FORTRAN HYPERGEOMETRIC FUNCTION

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1313ECHYPR

AUTHOR...P. G. BURKE

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO--  
HAROLD HANERFELD  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4 CALIFORNIA

COMPUTES THE HYPERGEOMETRIC FUNCTION F OF A,B,C, AND Z WHERE A,B, AND C ARE COMPLEX AND Z IS REAL AND LESS THAN ONE. A,B, AND C CAN TAKE ON ANY COMPLEX VALUES EXCEPT ZERO AND THE NEGATIVE INTEGERS.

**7090-1314EGAMA FORTRAN GAMMA FUNCTION OF A COMPLEX ARGUMENT**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1314EGAMA

AUTHOR...P. G. BURKE

DIRECT INQUIRIES TO..  
HAROLD HANERFELD  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4 CALIFORNIA

COMPUTES GAMMA OF Z WHERE Z CAN TAKE ALL COMPLEX VALUES EXCEPT THE NEGATIVE INTEGERS AND ZERO.

**7090-1315EOBESL FORTRAN BESSEL FUNCTIONS OF COMPLEX ORDER AND ARGUMENT**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1315EOBESL

AUTHORS..P.G. BURKE C. TATE

DIRECT INQUIRIES TO..  
HAROLD HANERFELD  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4 CALIFORNIA

COMPUTES J SUB N OF Z TIMES SQUARE ROOT OF PI Z/2 AND D/2 OF THE ABOVE. N CAN BE ANY COMPLEX VALUE EXCEPT NEGATIVE INTEGERS AND Z CAN BE ANY COMPLEX VALUE WITH ABSOLUTE VALUE OF ARGUMENT Z LESS THAN PI.

**7090-1316OLEGN FORTRAN LEGENDRE FUNCTION OF COMPLEX DEGREE AND REAL ARGUMENT**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1316OLEGN

AUTHOR...P. G. BURKE

DIRECT INQUIRIES TO..  
HAROLD HANERFELD  
LAWRENCE RADIATION LABORATORY  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4 CALIFORNIA

COMPUTES LEGENDRE FUNCTIONS OF THE FIRST AND SECOND KIND.

**7090-1318BSINOT TAPE INPUT-OUTPUT SUBROUTINE, BUFFERED AND TRAPPED**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1318BSINOT

AUTHOR...DAVID F. SANFORD  
PENN JERSEY TRANSPORTATION STUDY  
51ST STREET AND PARKSIDE AVE.,

DIRECT INQUIRIES TO AUTHOR

INOT, CALLED BY A FAP CODED PROGRAM, PERFORMS BUFFERED READING AND WRITING OF BLOCKS OF TAPE RECORDS. IT USES THE DATA CHANNEL TRAP, & PROVIDES SIMULTANEOUS OPERATION OF THE DATA CHANNELS AND THE CPU. IT USES A MINIMUM OF STORAGE AND IS DESIGNED TO IMITATE SIMPLE, SEQUENTIAL PROCESSING.

**7090-1319BSIOH FORTRAN BUFFERED INPUT/OUTPUT HOLLERITH**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1319BSIOH

AUTHOR...ROBERT A. HOODES  
PENN. JERSEY TRANSPORTATION STUDY  
51ST & PARKSIDE AVE.  
PHILADELPHIA 31 PA.

DIRECT INQUIRIES TO AUTHOR

A REPLACEMENT FOR IB9ICH WHICH OFFERS THE FORTRAN PROGRAMMER COMPLETE BUFFERING OF BCO TAPE TRANSMISSION WITH USE OF DATA CHANNEL TRAP, INPUT/OUTPUT OF VARIABLE LENGTH TAPE RECORDS OF AN ARBITRARY NUMBER OF WORDS, PROGRAMMABLE END OF FILE, END OF TAPE, ILLEGAL CHARACTER AND REDUNDANCY INDICATIONS, USE OF J SPECIFICATION IN FORMAT STATEMENT FOR FULL WORD INTEGER CONVERSION.

**7090-1325OREGNH EIGENVALUES OF AN HERMITIAN MATRIX**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1325OREGNH

AUTHOR...R. E. FUNDERLIC  
UNION CARBIDE NUCLEAR CC.  
P.O. BOX P

CONTINUED FROM PRIOR COLUMN--  
OAK RIDGE TENNESSEE

DIRECT INQUIRIES TO AUTHOR

FORTRAN 2 SUBROUTINE CALCULATES ALL THE EIGENVALUES OF AN HERMITIAN MATRIX BY THE GIVENS METHOD. REQUIRES 71785N-3 LOCATIONS PLUS 2N /NGU/2/ LOCATIONS FOR INPUT-OUTPUT ARGUMENTS.

**7090-1326PNLMAP FORTRAN LIBRARY MAPPER**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1326PNLMAP

AUTHOR...B. GALLMC  
RESEARCH INSTITUTE OF NATL. DEFENCE  
FOA 429  
FACK, STOCKHOLM 80 SWEDEN

DIRECT INQUIRIES TO AUTHOR

PRODUCES A TABLE-OF-CONTENTS- TO THE FORTRAN LIBRARY, STATING FOR EACH ROUTINE ITS SIZE, ENTRY POINTS AND TRANSFER VECTOR. CAN ALSO BE USED TO MAP A DECK OF RELOCATABLE BINARY CARDS.

**7090-1328SOTRCO SOTRC-DENNIS METHOD TRANSPORTATION CODE**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1328SOTRCO

AUTHOR...ROBERT KOMAR  
SHELL OIL COMPANY  
111 WEST 50TH STREET  
NEW YORK 20, NEW YORK

DIRECT INQUIRIES TO AUTHOR

SOLVES TRANSPORTATION-TYPE LINEAR PROGRAMMING PROBLEMS ON THE 7090 USING JACK DENNIS ADAPTATION OF THE STEPPING STONE METHOD. SOLVES PROBLEMS HAVING A TOTAL OF UP TO 6000 SUPPLIES AND DEMANDS.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1330WCPERT PERT /PROGRAM EVALUATION AND REVIEW TECHNIQUE/**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1330WCPERT

AUTHOR...SCL W. VALENTINE  
ASNCOP  
WRIGHT-PATTERSON AIR FORCE BASE  
OHIO

DIRECT INQUIRIES TO AUTHOR

A MANAGEMENT PROJECT USED TO EVALUATE, ANALYZE AND PLAN THE SCHEDULED DEVELOPMENT OF A RESEARCH AND DEVELOP. PROGRAM. REQUIRES THE FORMULATION AND DEVELOPMENT OF A SEQUENCED NETWORK OF THE MANY TASKS NECESSARY FOR THE ATTAINMENT OF A FINAL OBJECTIVE. FORTRAN II MONITOR SYSTEM. REQUIRES 6 ADDITIONAL TAPES.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1331PKMAP CONTOUR MAP OF FUNCTION**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1331PKMAP

AUTHOR...MR. J. J. WADE  
IBM CORPORATION  
RESEARCH COMPUTING CENTER 13-0  
THOMAS J. WATSON RESEARCH CENTER  
YORKTOWN HEIGHTS, NEW YORK

DIRECT INQUIRIES TO AUTHOR

PRODUCES A CONTOUR MAP OF A FUNCTION, WHEN VALUES OF THE FUNCTION ARE GIVEN AS ELEMENTS OF A MATRIX BY ONE OF TWO METHODS. FOR BOTH METHODS, THE ELEMENTS ARE SORTED INTO NUMERICALLY ASCENDING ORDER. THEY ARE THEN DIVIDED INTO A SPECIFIED NUMBER OF SEGMENTS AS FOLLOWS. /1/ ALL SEGMENTS HAVE NUMERICAL RANGES OF THE SAME LENGTH, OR /2/ ALL SEGMENTS HAVE THE SAME NUMBER OF ELEMENTS. MAXIMUM ARRAY SIZE IS 100X100. TIME REQUIRED TO PRODUCE A MAP FOR A MAXIMUM-SIZED ARRAY IS 12 SECONDS.

**7090-1332PKPLOT PLOT ROUTINE FOR THE 7090.**

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1332PKPLOT

AUTHOR...W. R. WHITTLE  
IBM CORPORATION  
186 JORALEMON STREET  
BROOKLYN 1, NEW YORK

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM PLOTS UP TO FOUR FUNCTIONS SIMULTANEOUSLY AND PLACES THE RESULTING GRAPH ON A TAPE TO BE PRINTED OFF-LINE. PROVIDES AUTOMATIC SCALING AND THE OPTION OF LABELING. DESIGNED TO BE USED WITH A FORTRAN PROGRAM. REQUIRES NO OTHER PROGRAMS BUT 100 TABLE IN PK PLOT 2 MUST BE MODIFIED.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1333SCBSMR BIDIRECTIONAL STEPWISE  
MULTIPLE REGRESSION-FORTRAN PRG**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1333SCBSMR

AUTHORS..R. BAER P. JOHN L. TORNHEIM

DIRECT INQUIRIES TO..

R. BAER  
STANDARD OIL OF CALIFORNIA  
225 BUSH ST.  
SAN FRANCISCO CALIF.

A MULTIPLE REGRESSION PROGRAM IN WHICH SOLUTIONS ARE FOUND FOR WHICH ONLY THE VARIABLES IN CERTAIN SUBSETS OF THE SET OF INDEPENDENT VARIABLES ARE ALLOWED TO HAVE NONZERO COEFFICIENTS. THESE SUBSETS ARE CHOSEN BY HAVING A VARIABLE ADJOINED TO OR DELETED FROM A PREVIOUS SUBSET AND ARE THE BEST SET FOUND FOR THAT MANY VARIABLES UP TO THAT STAGE, ACCORDING TO THE CRITERION OF LEAST SQUARES. THIS PROGRAM IS A STANDARD FORTRAN MONITOR JOB.

**7090-1334JPGAL GAUSSIAN OR LOBBATT  
INTEGRATION SUBROUTINE**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1334JPGAL

AUTHOR...R. JIRKA  
JET PROPULSION  
4800 OAK GROVE DRIVE  
PASADENA 3, CALIF.

DIRECT INQUIRIES TO AUTHOR

GAL IS A FAP WRITTEN SUBROUTINE PROGRAM. GAL CAN HANDLE MULTIPLE CASES AS WELL AS MULTIPLE INTEGRALS. GAL RETURNS TO THE CALLING ROUTINE FOR EVALUATION OF THE INTEGRANDS. ALL CONSTANTS FOR GAUSSIAN AND LOBBATT FORMULAS ARE INTERNALLY STORED. GAL ALSO HAS INTERRUPTION CAPABILITIES.

**7090-1335WHCAN CYLINDER ANALYSIS**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1335WHCAN

AUTHOR...W. KUNKEL  
WESTINGHOUSE ELECTRIC CORP.  
EAST PITTS. PA.

DIRECT INQUIRIES TO AUTHOR

CALCULATES THE STRESSES IN CYL. GEOMETRIES CAUSED BY IMPOSED LOADS. IT SOLVES THE SYSTEM OF RESTRAINTS BY USING THE SHORT CYLINDER COEFFICIENTS DEVELOPED IN THE THEORY OF BEAMS ON ELASTIC FOUNDATION. DEFLECTIONS, ROTATIONS, AND THREE PRINCIPAL STRESSES ARE CALCULATED AT A NUMBER OF POINTS THROUGHOUT THE GEOMETRY. RESTRICTIONS NO OTHER ROUTINES ARE REQUIRED BUT THE STANDARD LIBRARY ROUTINES FROM TAPE A FORTRAN PROGRAM MACHINE REQUIREMENTS 7090 16K 3 TAPES INPUT, OUTPUT, AND LIBRARY. NO DRUM.

**7090-1336TJWRAP WEIGHTED REGRESSION ANALYSIS  
PROGRAM**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1336TJWRAP

AUTHOR...M. FIMPLE  
SANDIA CORPORATION  
SANDIA BASE  
ALBUQUERQUE NEW MEXICO

DIRECT INQUIRIES TO AUTHOR

PERFORMS MULTIPLE LINEAR REGRESSION ON AS MANY AS 80 INDEPENDENT AND 25 DEPENDENT VARIABLES. WEIGHTED OBSERVATIONS OPTIONAL. TRANSFORMATIONS AND CODING OF INPUT DATA BY SIMPLE INTERPRETIVE SYSTEM. SELECTS SIGNIFICANT SUBSET OF INDEPENDENT VARIABLES BY FIXED F OR FIXED PROBABILITY, DELETING LEAST SIGNIFICANT VARIABLES ONE AT A TIME. OUTPUT INCLUDES REGRESSION AND CORRELATION PARAMETERS AT EACH STEP. FINAL LISTING OF RESIDUALS AND DATA OPTIONAL. PROGRAMMED IN FORTRAN AND FAP FOR 709/90 FORTRAN MONITOR OPERATION. / 32K CORE REQUIRED /

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1342ERLPA PROGRAM FOR X-RAY INTENSITY  
DATA CORRECTION**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1342ERLPA

AUTHOR...J. VAN DEN HENDE  
ESSO RESEARCH & ENGINEERING  
P.O. BOX 209  
MADISON N.J.

DIRECT INQUIRIES TO AUTHOR

IT CORRECTS FOR EQUI-INCLINATION AND NORMAL-BEAM DATA, FOR SPHERICAL AND CYLINDRICAL SPECIMENS. THE PROGRAM IS INTENDED FOR USE WITH THE IB MONITOR.

**7090-1343ERSCO PROGRAM FOR CALCULATION OF  
ANGLE SETTINGS**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1343ERSCO

AUTHOR...J. VAN DEN HENDE

CONTINUED FROM PRIOR COLUMN--  
ESSO RESEARCH & ENGINEERING  
P.O. BOX 209  
MADISON N.J.

DIRECT INQUIRIES TO AUTHOR

FOR THE G.E. SINGLE CRYSTAL ORIENTER. X-RAY DATA INTENDED FOR USE WITH THE I.B. FORTRAN MONITOR.

**7090-1344ERFR2 CRYSTALLOGRAPHIC FOURIER  
SUMMATION PROGRAM**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1344ERFR2

AUTHORS..W. SLY D. SHOEMAKER J. VAN DEN HENDE

DIRECT INQUIRIES TO..

J. VAN DEN HENDE  
ESSO RESEARCH AND ENGINEERING  
P. O. BOX 209  
MADISON N.J.

FOR ALL SPACE GROUPS - 2 AND 3 DIMENSIONAL EXTENSION OF 704 PROGRAM OF SLY - SHOEMAKER INTENDED FOR USE WITH I B FORTRAN MONITOR COMPLETE WRITE UP IS AVAILABLE.

**7090-1346ME3DLS THREE DIMENSIONAL LEAST  
SQUARE FIT**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1346ME3DLS

AUTHOR...B. SOKKAPPA  
MITRE CORPORATION  
P. O. BOX 208  
BEDFORD MASS.

DIRECT INQUIRIES TO AUTHOR

GIVEN A SET OF POINTS / X / I /, Y / I /, Z / I // WHERE Z IS A FUNCTION OF X AND Y, THE PROGRAM, 3DLS, FINDS THE COEFFICIENTS OF THE BEST POLYNOMIAL IN THE LEAST SQUARE SENSE. THE EXPONENTS OF X AND Y MUST BE SPECIFIED. THE COMPUTED VALUES OF Z AND THE DIFFERENCES AND THE ROOT-MEAN-SQUARE ERROR ARE CONTAINED IN THE OUTPUT AS WELL AS THE COEFFICIENTS.

**7090-1347OLKWIC KEY-WORD-IN-CONTEXT PACKAGE  
/KNIC I/**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1347OLKWIC

AUTHOR...R. V. WADDING  
IBM SPACE GUIDANCE CENTER  
OWEGO, N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS IS A PROGRAM PACKAGE FOR THE 7090 WHICH CAN BE USED TO INDEX BOOKS, PERIODICALS, TECHNICAL REPORTS, ETC. IT CONSISTS OF SEVERAL PROGRAMS AND SORTS WHICH PRODUCE KEY WORD LISTS, AUTHOR LISTS, AND BIBLIOGRAPHY LISTS. THE STANDARD IBSORT PROGRAM IS NECESSARY FOR THIS PACKAGE. THE PROGRAM IS A 7090 VERSION OF PK KNIC.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1348OLKWIC KEY-WORD-IN-CONTEXT PACKAGE.  
/KNIC II/**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1348OLKWIC

AUTHOR...R. V. WADDING  
IBM SPACE GUIDANCE CENTER  
OWEGO, N. Y.

DIRECT INQUIRIES TO AUTHOR

THIS IS A PROGRAM PACKAGE FOR THE 7090 WHICH CAN BE USED TO INDEX BOOKS, PERIODICALS, TECHNICAL REPORTS, ETC. IT CONSISTS OF SEVERAL PROGRAMS AND SORTS WHICH PRODUCE KEY WORD LISTS, AUTHOR LISTS, AND BIBLIOGRAPHY LISTS. THE STANDARD IBSORT PROGRAM IS NECESSARY FOR THIS PACKAGE. THE PROGRAM IS A 7090 VERSION OF PK KNIC. THIS PROGRAM USES THE FIRST AUTHOR FIELD AS THE REFERENCE CODE.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1349NA8986 DECRO, DECIMAL READ**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1349NA8986

AUTHOR...J. WRIGHT  
NORTH AMERICAN AVIATION, INC.  
DEPT. 181-084  
LOS ANGELES 9, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

FORTRAN SUBROUTINE TO READ A VARIABLE NUMBER OF PIECES OF FLOATING POINT DATA INTO AN ARRAY. ONLY THE INFORMATION SPECIFIED IS READ INTO STORAGE.

**7090-1350JP10TR I/O TRAP SUPVSR.**  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1350JP10TR

CONTINUED FROM PRIOR PAGE--

AUTHOR...WILLIAM J. THOMAS  
JET PROPULSION LABORATORY  
4800 OAK GROVE DRIVE  
PASADENA, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

COMPATIBLE WITH NON TRAPPING I-O CODING PROVIDES THE FOLLOWING FEATURES-COMPATIBLE WITH NON TRAPPING I/O SUB-ROUTINES-STACKS I/O OPERATIONS-LESS THAN 700 WORDS IN SIZE-AUTOMATIC REDUNDANCY PROCEDURES.

7090-1351NA8987 TABLE LOOKUP SUBROUTINE, TLU  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1351NA8987

AUTHORS..J. KOJIMA E. EVERSOLE

DIRECT INQUIRIES TO..

E. EVERSOLE  
NORTH AMERICAN AVIATION, INC.  
DEPT. 282-190  
LOS ANGELES 9, CALIFORNIA

FORTTRAN SUBROUTINE TO PERFORM TABLE LOOK-UP WITH LINEAR INTERPOLATION, ON EITHER TWO-OR THREE-DIMENSIONAL TABLES STORED IN A SPECIFIC FORMAT. WILL HANDLE MORE THAN ONE SET OF DEPENDENT VARIABLES PER TABLE. A SECOND-LEVEL SUB-ROUTINE, RATIO, IS INCLUDED IN THE DECK.

7090-1353MIFPM FORTTRAN II POST MORTEM  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1353MIFPM

AUTHORS..DR. F. J. CORBATO M. M. DAGGETT LYNDALEE KORN

DIRECT INQUIRIES TO..

DR. F. J. CORBATO  
COMPUTATION CENTER M. I. T.  
CAMBRIDGE, MASS.

ALLOWS TERMINAL AND BREAKPOINT DUMPS OF CORE IN RELOCATABLE AND ABSOLUTE LOCATIONS IN SEVERAL MODES ALONG WITH MACHINE CONDITIONS. ALLOWS DUMPS OF TAPES PREPARED BY FORTTRAN PROGRAMS. REQUESTS ARE SUBPROGRAM ORIENTED. TERMINAL REQUESTS NEED NOT BE COMPILED.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

7090-1354JPMARK ADAMS-MOULTON, RUNGE-KUTTA  
INTEGRATOR

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1354JPMARK

AUTHORS..D. E. RICHARDSON G. GIANGPULOS

DIRECT INQUIRIES TO..

DONALD E. RICHARDSON  
4800 OAK GROVE DRIVE  
PASADENA, CALIFORNIA

SOLVES 1ST J OF A SET N OF 1ST ORDER DIFFERENTIAL EQUATIONS SIMULTANEOUSLY. USES ADAMS-MOULTON WITH RUNGE-KUTTA 4TH ORDER TO GENERATE BACKWARD DIFFERENCES. INTEGRATION CAN BE INTERRUPTED ON INDEPENDENT OR DEPENDENT VARIABLES. ADAMS-MOULTON ORDER IS LESS THAN 9.

7090-1356SD9216 ROUND FLOATING-POINT NUMBERS  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1356SD9216

AUTHOR...D. D. TUNNICLIFF  
SHELL DEVELOPMENT COMPANY  
EMERYVILLE, CALIF.

DIRECT INQUIRIES TO AUTHOR

A SUBROUTINE WHICH ROUNDS RESULTS OF CALCULATIONS TO ANY REQUIRED NUMBER OF SIGNIFICANT FIGURES. THE ROUNDED RESULT IS IN THE FORM OF A HOLLERITH WORD AND CONSEQUENTLY IS LIMITED TO A MAXIMUM OF 6 CHARACTERS. THE NUMBER OF SIGNIFICANT FIGURES, THE MAXIMUM NUMBER OF DECIMALS, THE NUMBER OF CHARACTERS IN THE HOLLERITH RESULT AND THE LOCATION OF THE DECIMAL POINT MAY EITHER BE SPECIFIED OR MAY BE CALCULATED IN THE CALLING PROGRAM.

7090-1357PMCOMB COMBIN-A COMBINATORIAL  
PROGRAM  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1357PMCOMB

AUTHOR...C. E. PARKER  
CODE 01-2  
BOX 1/P.M.R  
POINT MUGO, CALIF.

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM ENUMERATES THE COMBINATIONS OF N THINGS TAKEN K AT A TIME. THE USER SPECIFIES N IN COLUMNS 1 AND 2 AND K IN COLUMNS 3 AND 4. THE PROGRAM REQUIRES 315 LOCATIONS /DECIMAL/ AND PRODUCES 3,000 COMBINATIONS PER MINUTE ON THE 7090.

7090-1359GC0008 RANDOM NUMBER GENERATOR  
UNIFORM ON 0 TO 1  
AVAILABLE 4TH QUARTER 1962.

CONTINUED FROM PRIOR COLUMN--  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1359GC0008

AUTHOR...A. W. KAERCHER  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, L.I., NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO GENERATE PSEUDO-RANDOM NUMBERS SATISFYING THE RECTANGULAR DISTRIBUTION ON /0,1/. THE NUMBERS ARE IN NORMALIZED FLOATING POINT FORM.

7090-1360GC0009 RANDOM NUMBER GENERATOR  
NORMAL WITH MEAN ZERO AND STANDARD DEVIATION ONE  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1360GC0009

AUTHOR...A. W. KAERCHER  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, L.I., NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO GENERATE PSEUDO-RANDOM NUMBERS SATISFYING THE NORMAL DISTRIBUTION WITH MEAN ZERO AND STANDARD DEVIATION ONE. THE NUMBERS ARE IN NORMALIZED FLOATING POINT FORM.

7090-1361GC0010 PROGRAM TO READ OUT OCTAL  
DATA FROM RDM FOR REINITIALIZATION  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1361GC0010

AUTHOR...A. W. KAERCHER  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, L.I., NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO ENTER RDM AND RETURN WITH THE I TH ELEMENT OF THE FIXED POINT SEQUENCE WHICH RDM HAS GENERATED, AND TO RETURN THIS NUMBER IN THE FORM OF A 12 DIGIT OCTAL WORD TO THE CALLING PROGRAM.

7090-1362GC0011 PROGRAM TO READ IN OCTAL  
DATA TO RDM FOR REINITIALIZATION  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1362GC0011

AUTHOR...A. W. KAERCHER  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, L.I., NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO ENTER RDM AND RE-STORE THE I TH ELEMENT OF THE FIXED POINT SEQUENCE WHICH RDM HAS PREVIOUSLY GENERATED. THIS ELEMENT WILL BE IN THE FORM OF A 12 DIGIT OCTAL WORD.

7090-1363GC0012 EXPLICIT DOUBLE PRECISION  
SOLUTION GENERAL CUBIC WITH REAL COEFFICIENTS AND SINGLE PRECISION I/O  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1363GC0012

AUTHOR...ERIK K. JAEDE  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT PLANT 5  
BETHPAGE, L. I., NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO SOLVE EXPLICITLY THE GENERAL CUBIC EQUATION WITH REAL COEFFICIENTS. A SUB 1 X CUBED PLUS A SUB 2 X SQUARED PLUS A SUB 3 X PLUS A SUB 4 EQUALS ZERO.

7090-1364GC0013 EXPLICIT DOUBLE PRECISION  
SOLUTION GENERAL CUBIC WITH REAL COEFFICIENTS AND DOUBLE PRECISION INPUT  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1364GC0013

AUTHOR...ERIC K. JAEDE  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, LONG ISLAND, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO SOLVE EXPLICITLY THE GENERAL CUBIC EQUATION WITH REAL COEFFICIENTS. A SUB 1 X CUBED PLUS A SUB 2 X SQUARED PLUS A SUB 3 X PLUS A SUB 4 EQUALS ZERO.

7090-1365GC0014 EXPLICIT DOUBLE PRECISION  
SOLUTION OF  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1365GC0014

AUTHOR...ERIC K. JAEDE  
DIGITAL COMPUTER GROUP  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, LONG ISLAND, NEW YORK



## Section B

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

TO SOLVE EXPLICITLY THE GENERAL QUARTIC EQUATION WITH REAL COEFFICIENTS- A SUB 1 X TO THE FOURTH PLUS A SUB 2 X CUBED PLUS A SUB 3 X SQUARED PLUS A SUB 4 X PLUS A SUB 5.

**7090-1366GC0016 EXPLICIT DOUBLE PRECISION SOLUTION OF**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1366GC0016

AUTHOR...ERIC K. JAEDE  
DIGITAL COMPUTER GRUPO  
GRUMMAN AIRCRAFT/PLANT 5  
BETHPAGE, LONG ISLAND, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO SOLVE EXPLICITLY THE GENERAL QUARTIC EQUATION WITH REAL COEFFICIENTS- A SUB 1 X TO THE FOURTH PLUS A SUB 2 X CUBED PLUS A SUB 3 X SQUARED PLUS A SUB 4 X PLUS A SUB 5.

**7090-1367HSSIFT SHARE INTERNAL FORTRAN TRANSLATOR**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1367HSSIFT

AUTHORS..SHARE FORTRAN COMMITTEE  
1271 AVE. OF AMERICAS  
NEW YORK 20, N. Y.

DIRECT INQUIRIES TO AUTHOR

AUTOMATICALLY TRANSLATES A FORTRAN II SOURCE PROGRAM OR SUBPROGRAM INTO A FORTRAN IV SOURCE PROGRAM. SIFT IS A STANDARD THREE-LINK FORTRAN CHAIN PROGRAM DESIGNED TO RUN UNDER CONTROL OF THE 32K FORTRAN MONITOR SYSTEM. THE PROGRAMS TO BE CONVERTED ARE CONSIDERED DATA AND ARE PLACED BEHIND THE DATA CONTROL CARD IN THE DECK.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1368UMUMSY UNIVERSITY OF MICHIGAN EXEC. SYSTEM FOR IBM 709-7090**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1368UMUMSY

AUTHORS..UNIVERSITY OF MICHIGAN COMPUTING CENTER

DIRECT INQUIRIES TO..

BERNARD A. GALLER  
COMPUTING CENTER  
UNIV. OF MICH.  
ANN ARBOR MICHIGAN

A COMPLETE, VERY EFFICIENT EXECUTIVE SYSTEM FOR THE 709-7090 INCLUDING MAD, FORTRAN, AND UMAP /A MODIFICATION OF BE FAP/. DISTRIBUTION TAPES CONTAIN SYMBOLIC DECKS, BINARY DECKS, AND COMPLETE WRITE-UPS FOR THE USE OF THE SYSTEM, AS WELL AS SELF-GENERATING MASTER TAPES AND SYSTEM EDIT DECKS.

REQUESTOR MUST SUBMIT 5 TAPES FOR BASIC PROGRAM MATERIAL.

**7090-1369HSSCHM STORAGE TO CARD HOLLERITH MODIFIED**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1369HSSCHM

AUTHORS..SHARE FORTRAN COMMITTEE  
1271 AVE. OF AMERICAS  
NEW YORK 20, N. Y.

DIRECT INQUIRIES TO AUTHOR

WITH FORTRAN II OPERATING UNDER THE FORTRAN MONITOR, THIS SUBPROGRAM WILL WRITE CARD IMAGES ON TAPE 7 WHEN ON-LINE PUNCHING IS DEMANDED.

**7090-1370RLA140 SMASHT /SHARE VERSION II/**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1370RLA140

AUTHOR...HOWARD FRIEDEN  
2500 COLORADO AVE.  
SANTA MONICA, CALIF.

DIRECT INQUIRIES TO AUTHOR

A TWO PASS COMPILER DESIGNED TO REPLACE THE COMPILER AND MODIFY AND LOAD PARTS OF THE SOS SYSTEM AND TO WORK IN CONJUNCTION WITH THE REMAINDER OF THE SOS SYSTEM.

REQUESTOR MUST SUBMIT 2 TAPES FOR BASIC PROGRAM MATERIAL.

**7090-1373NUEIG3 EIGENVALUES OF REAL MATRICES**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1373NUEIG3

AUTHOR...B. N. PARLETT  
NEW YORK UNIVERSITY A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO AUTHOR

THIS ROUTINE COMPUTES THE EIGENVALUES OF A GIVEN REAL MATRIX A. IT REDUCES MATRIX A TO HESSENBERG FORM H BY ELEMENTARY SIMILARITY TRANSFORMATIONS. THE CHARACTERISTIC POLYNOMIAL AND ITS DERIVATIVES ARE EVALUATED BY AN EXTENSION OF HYMANS METHOD. EACH EIGENVALUE OF H / AND SO OF A / IS FOUND ITERATIVELY USING A MODIFICATION OF LAGUERRES METHOD.

**7090-1374RLWLF WRITE SMASHT LIBRARY FILE**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1374RLWLF

AUTHORS..HOWARD FRIEDEN JOHN KNEEMEYER

DIRECT INQUIRIES TO..

HOWARD FRIEDEN  
SYSTEMS DEVELOPMENT CORP.  
2500 COLORADO AVE.  
SANTA MONICA, CALIF.

WRITES LIBRARY FILE FOR SMASHT COMPILER. INPUT IS SMASHT DECKS AND ITEM CONTROL CARDS. WITH OPTIONAL CHANGE CARDS AND OLD LIBRARY FILE. OUTPUT IS NEW LIBRARY FILE ON SYSUO: AND SYSTEM TAPE WITH NEW LIBRARY FILE ON SYSUO3.

**7090-1375NUMLEW EIGENVALUE-EIGENVECTOR ROUTINE REAL SYMMETRIC MATRICES**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1375NUMLEW

AUTHORS..SAM GREENSPAN AUBREY ROTHENBERG

DIRECT INQUIRIES TO..

SAM GREENSPAN  
NEW YORK UNIVERSITY A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

THIS ROUTINE COMPUTES ALL THE EIGENVALUES AND VECTORS OF A REAL SYMMETRIC MATRIX USING HOUSEHOLDERS METHOD TO REDUCE THE MATRIX TO TRIAGONAL FORM. THE EIGENVALUES ARE THEN ISOLATED USING STURM SEQUENCING AND FINALLY THE VECTORS ARE FOUND BY WILKINSONS METHOD.

**7090-1376BEFIND SORT ROUTINE /FLOATING POINT OR FIXED POINT/**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1376BEFIND

AUTHOR...D. LOGAN  
BELL TELEPHONE LABORATORIES, INC.  
HOLMDEL, N.J.

DIRECT INQUIRIES TO AUTHOR

BE FIND IS A FAP SUBROUTINE WHICH, WHEN GIVEN A LIST OF NUMBERS, WILL RETURN TO THE CALLING PROGRAM THE SMALLEST NUMBER IN THE LIST AND ITS RELATIVE LOCATION. IT WILL ALSO PLACE A NEW NUMBER IN A SPECIFIED LOCATION IN THE LIST AND RETURN TO THE CALLING PROGRAM THE VALUE AND LOCATION OF THE SMALLEST NUMBER IN THE ALTERED LIST WITH HIGH SPEED.

**7090-1378MWFBI FORTRAN FULL BINARY INTERGER ARITHMETIC & CONV. ROUTINE**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1378MWFBI

AUTHORS..KALON KELLEY R.B. BURKSON

DIRECT INQUIRIES TO..

HOWARD D. WACTLAR  
COOPERATIVE CLMP. LAB.  
M.I.T.  
CAMBRIDGE 39, MASS.

TO ADD, SUBTRACT, MULTIPLY, DIVIDE AND CONVERT TO AND FROM BCD CHARACTERS FULL BINARY WORDS IN FORTRAN COBOL PROGRAMS. INDICATORS FOR ADD AND SUBTRACT OVERFLOW AND DIVIDE CHECK FOR DIVISION BY ZERO ARE INCLUDED.

**7090-1379RSMFOR PRODUCT FORM LINEAR PROGRAMMING CODE**

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1379RSMFOR

AUTHOR...R.J. CLASEN  
RAND CORP.  
1700 MAIN ST.  
SANTA MONICA, CALIF.

DIRECT INQUIRIES TO AUTHOR

A PRODUCT FORM LINEAR PROGRAMMING CODE THAT SETS DIMENSIONS DEPENDING ON THE SIZE OF THE PROBLEM INPUT. THIS ENABLES ONE TO DO LARGER PROBLEMS WITH THIS CODE THAN WITH THE PREVIOUS ALL-IN-CORE ROUTINES. THIS PROGRAM FEATURES SUCH CONVENIENCES AS SYMBOLIC CONTROL CARDS.

REQUESTOR MUST SUBMIT 1 TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1381SCRNKT FORTRAN INTEGRATION SUBROUTINE /RUNGE-KUTTA/**

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR PAGE--

SPECIFY FILE NUMBER 7090-1381SCRNKT

AUTHOR...E. HIRSH  
CALIFORNIA RESEARCH CORP.  
RICHMOND, CALIF.

DIRECT INQUIRIES TO AUTHOR

SUBROUTINE ENTRANCE BY CALL. AUTOMATIC STEP ADJUSTMENT  
TO PRESERVE RELATIVE ERROR SPECIFIED. REQUIRES 2500  
LOCATIONS.

**7090-1384RWNPF4** FLOATING POINT /N/ VARIATE  
PROBABILITY INTEGRAL

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1384RWNPF4

AUTHOR...RUTH GITTELMAN  
SPACE TECHNOLOGY LABORATORIES, INC.  
ONE SPACE PARK  
REDONDO BEACH, CALIF.

DIRECT INQUIRIES TO AUTHOR

OBTAINS THE INTEGRAL /P/ OF THE NORMAL FREQUENCY OVER  
ANY REGIONS. REQUIRES 274 CELLS PLUS 3 CELLS OF COMMON.  
TIMING WHEN N EQUALS 2 .3 SECONDS -- N EQUALS 3 TEN  
SECONDS -- N EQUALS 4 FOUR MINUTES.

**7090-1395MITME** A FAP CODED SUBPROGRAM

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1395MITME

AUTHORS..M.M. DAGGETT F.J. CORBATO

DIRECT INQUIRIES TO..

F.J. CORBATO  
M. I. T.  
ROOM 26-142  
CAMBRIDGE 39, MASS.

FOR USING INTERVAL TIMER CLOCK /RPQ F89349/ ON 7090,  
DURING USER EXECUTION TIME ONLY. PROVIDES USAGE OF CLOCK  
AS STOP WATCH, ALARM CLOCK OR BOTH.

**7090-1396MITMR** A FAP CODED SUBPROGRAM

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1396MITMR

AUTHORS..M.M. DAGGETT F.J. CORBATO

DIRECT INQUIRIES TO..

F.J. CORBATO  
M. I. T.  
ROOM 26-142  
CAMBRIDGE 39, MASS.

FOR USING INTERVAL TIMER CLOCK /RPQ F89349/ ON 7090,  
INTEGRATED WITH THE FORTRAN MONITOR SYSTEM. PROVIDES USAGE  
OF CLOCK AS STOP WATCH, ALARM CLOCK OR BOTH AND AUTOMATIC  
JOB TERMINATION.

**7090-1398NULGAM** LOG OF THE GAMMA FUNCTION  
FOR COMPLEX ARGUMENT

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1398NULGAM

AUTHOR...MAX GOLDSTEIN  
N.Y.U. - A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS FAP CODED ROUTINE COMPUTES THE LOG OF THE GAMMA FUNC-  
TION FOR COMPLEX ARGUMENT, U EQUALS RE LN GAMMA FUNCTION  
/XGIY/, V EQUALS IM LN GAMMA FUNCTION /CGIY/, WHERE X AND Y  
ARE NORMALIZED FLOATING POINT NUMBERS.

**7090-1399SDGP90** GRADIENT PROJECTION METHOD  
FOR NONLINEAR PROGRAMMING

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1399SDGP90

AUTHOR...RUTH P. MERRILL  
SHELL DEVELOPMENT CO.  
EMERYVILLE, CALIF.

DIRECT INQUIRIES TO AUTHOR

MAXIMIZES A NONLINEAR FUNCTION SUBJECT TO LINEAR  
CONSTRAINT INEQUALITIES AND EQUALITIES USING GRADIENT  
PROJECTION ALGORITHM. HANDLES UP TO 108 VARIABLES AND 270  
CONSTRAINTS. REQUIRES A SUBROUTINE PROFIT FOR THE FUNC-  
TION BEING MAXIMIZED. A GENERAL QUADRATIC PROFIT SUB-  
ROUTINE IS PROVIDED. PROGRAM INCLUDES OWN INPUT/OUTPUT  
ROUTINES BUT OPERATES UNDER FORTRAN MONITOR SYSTEM.

**7090-1402SIGI0H** IOH INCLUDING FREE FIELD  
INPUT

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1402SIGI0H

AUTHOR...DR. O. GINGERICH

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..

ST SHARE LIBRARIAN  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASS.

STANDARD 709/7090 IOH, SLIGHTLY LENGTHENED TO INCLUDE G  
TYPE FORMAT FOR FREE FIELD INPUT.

**7090-1404NSAB0L** ABSOLUTE BINARY OCTAL LOADER  
UPPER

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1404NSAB0L

AUTHOR...GARY A. SMITH

DIRECT INQUIRIES TO..

DIR. NATIONAL SECURITY AGENCY  
FT. G.G. MEADE, MARYLAND  
ATTN. C41

1. TO LOAD AND CHECK STANDARD SHARE ABSOLUTE BINARY  
AND TRANSFER CARDS. 2. TO LOAD UP TO FOUR-PER-CARD OCTAL  
CORRECTION CARDS. RESTRICTIONS- 1. THIS LOADER WILL NOT  
HANDLE RELOCATABLE BINARY CARDS. 2. THIS PROGRAM WILL  
LOAD ONLY THE FOLLOWING TYPE OF CARDS- /A./ STANDARD  
SHARE ABSOLUTE BINARY CARDS. THE CHECK SUM WILL BE IGNORED  
IF 9R IS BLANK OR IF 9L COLUMN 3 IS PUNCHED. /B./ OCTAL  
CARDS. THE OCTAL CARD MAY CONTAIN UP TO FOUR WORDS. WORDS  
MUST BE PUNCHED IN LOGICAL WORD FORM /E.G., THE INSTRU-  
TION -075400 1 00000 MUST BE PUNCHED 475400100000/.  
LOADING PROCEEDS FROM LEFT TO RIGHT AND IGNORES ANY WORDS  
WHICH HAVE A BLANK OR ZERO LOCATION FIELD.

**7090-1406BETISR** TIME SERIES SUBROUTINE  
PACKAGE

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1406BETISR

AUTHORS..M.J.R. HEALY B.P. BOGERT

DIRECT INQUIRIES TO..

B.P. BOGERT  
BELL TELEPHONE LAB.  
MURRAY HILL, N.J.

THE TISR PACKAGE COMPRISES A SET OF FORTRAN SUBROUTINES  
FOR PROCESSING TIME SERIES. A DISCUSSION OF THE  
CONSTRUCTION AND THE USE OF EACH SUBROUTINE IS CONTAINED  
IN INDIVIDUAL WRITE-UPS.

**7090-1417MLHFSS** HARTREE-FOCK-SLATER  
SELF-CONSISTENT ATOMIC FIELD PROGRAM-TABULAR DISPLAY PROGRAM

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1417MLHFSS

AUTHORS..FRANK HERMAN SHERWOOD SKILLMAN

DIRECT INQUIRIES TO..

FRANK HERMAN  
DEPT. 52-40 BLDG. 201  
LOCKHEED RESEARCH LAB.  
PALM ALTO, CALIF.

THE ATOMIC FIELD PROGRAM YIELDS- UNABRIDGED SELF-CON-  
SISTENT SOLUTION OF NON-RELATIVISTIC HARTREE-FOCK-SLATER  
EQUATIONS FOR ANY ATOM OR ION IN PERIODIC TABLE- POTENTIAL-  
EIGENVALUES- AND RADIAL WAVE FUNCTIONS. TABULAR DISPLAY  
ABRIDGES SOLUTION FOR DISPLAY. WRITTEN IN FORTRAN.

**7090-1418MIMAD** GENERAL PURPOSE ALGEBRAIC  
COMPILER

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1418MIMAD

AUTHORS..R. C. DALEY M. M. DAGGETT F. J. CORBATO

DIRECT INQUIRIES TO..

F. J. CORBATO  
COMPUTATION CENTER  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASS.

THE ADDITION OF MAD TO VERSION 2 OF THE FORTRAN MONITOR  
SYSTEM REQUIRES ONE MORE CHANGE THAN WAS NOTED IN THE SHARE  
DISTRIBUTION NO. 1308. THIS ADDITION IS NEEDED TO  
CORRECTLY POSITION THE SYSTEM TAPE AFTER A FORTRAN  
COMPILATION IN WHICH THE \* LIBE CARD IS USED. FOR USE IN  
THE FORTRAN-FAP 709/7090 32K MONITOR SYSTEM.

**7090-1421GPL3PG** PERTURBATOR GENERATOR

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1421GPL3PG

AUTHOR...LANE K. DEWEES

DIRECT INQUIRIES TO..

M. J. HEFFNER  
GENERAL ELECTRIC CO.  
V.F.S.T.C., ROOM 4620-U  
P.O. BOX 8555  
PHILADELPHIA 1, PA.

THIS ADDITION TO THE DEBUGGER IS TO PROVIDE A CONVENIENT  
MEANS OF STUDYING THE EFFECTS OF SUCH THINGS AS MACHINE  
ROUND-OFF, SIGNIFICANT DIGITS, AND NUMERICAL METHODS ON  
RESULTS FROM FORTRAN PROGRAMS. THE DEBUGGER HAS BEEN  
MODIFIED SLIGHTLY TO COMPILER INSTRUCTIONS TO CHANGE THE

## Section B

CONTINUED FROM PRIOR PAGE--

VALUE OF A VARIABLE. THESE INSTRUCTIONS ARE COMPILED IMMEDIATELY AFTER THOSE WHICH PROVIDE FOR THE NORMAL DEBUGGER DUMP OUTPUT. NORMAL DEBUGGER TYPE STATEMENTS ARE USED WITH THE EXCEPTION THAT THE WORD DUMP IS REPLACED BY THE WORD AAAAP AND THREE CONTROL WORDS ARE PROVIDED FOR USE IN THE LIST PORTION OF THE STATEMENTS.

**7090-1422UMUMMT TRANSPORTATION PROBLEM WITH FEW SHIPPERS**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1422UMUMMT

AUTHOR...B. A. GALLER  
COMPUTING CENTER  
UNIVERSITY OF MICHIGAN  
ANN ARBOR, MICHIGAN

DIRECT INQUIRIES TO AUTHOR

THE PROBLEM CONCERNS THE ALLOCATION OF SHIPMENTS /AND, INDIRECTLY, SCHEDULING OF PRODUCTION/ OF ITEMS BETWEEN A FEW SHIPPING POINTS AND MANY RECEIVING POINTS SO AS TO MINIMIZE TRANSPORTATION COSTS. THE METHOD USED HERE, WHICH TAKES ADVANTAGE OF THE SMALL NUMBER OF SHIPPERS, IS THE DETAILED METHOD OF OPTIMAL REGIONS, DEVELOPED BY PROFESSOR PAUL S. DWYER OF THE UNIVERSITY OF MICHIGAN. I/O IS DEFINED BY MACROS, THEREFORE EASILY ADAPTED TO ANY SYSTEM.

**7090-1423UMUMAP AN APPROXIMATE SOLUTION TO THE MULTI-DIMENSIONAL TRANSPORTATION PROBLEM**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1423UMUMAP

AUTHOR...B. A. GALLER  
COMPUTING CENTER  
UNIVERSITY OF MICHIGAN  
ANN ARBOR, MICHIGAN

DIRECT INQUIRIES TO AUTHOR

THE PROBLEM CONCERNS THE ALLOCATION OF SHIPMENTS /AND, INDIRECTLY, SCHEDULING OF PRODUCTION/ OF ITEMS BETWEEN SHIPPING POINTS AND RECEIVING POINTS SO AS TO MINIMIZE TRANSPORTATION COSTS. THE MULTI-DIMENSIONAL ASPECT ARISES FROM THE POSSIBILITY OF HAVING INTERMEDIATE ASSEMBLY OR TRANSFER POINTS BETWEEN THE ORIGIN AND DESTINATION OF THE SHIPMENT. THE THEORY ON WHICH THIS APPROXIMATE SOLUTION IS BASED WAS DEVELOPED BY PROFESSOR PAUL S. DWYER OF THE UNIVERSITY OF MICHIGAN, AND IS BASED ON THE CALCULATION OF WEIGHTED DEVIATES OF THE ELEMENTS OF THE COST MATRIX. FAP MACHINE LANG.

**7090-1424NUTRAN TRANSMIT BINARY INFORMATION ON TAPE**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1424NUTRAN

AUTHOR...DR. JOHN GARY  
AEC COMPUTING & APPLIED MATH. CTR.  
COURANT INSTITUTE OF MATH. SCIENCES  
NEW YORK UNIVERSITY  
NEW YORK 3, N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS SUBROUTINE PERMITS FORTRAN COMPUTATION TO PROCEED SIMULTANEOUSLY WITH THE TRANSMISSION OF BINARY INFORMATION ON TAPES. FAP MACHINE LANG.

**7090-1426ORA1 SHARE ALGOL 60 TRANSLATOR**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1426ORA1

AUTHORS...SHARE ALGOL PROJECT

DIRECT INQUIRIES TO...  
MARJORIE P. LIETZKE  
UNION CARBIDE NUCLEAR CO.  
P.O. BOX P  
OAK RIDGE, TENN.

THIS IS A BRIEF PRELIMINARY MANUAL INTENDED TO SERVE AS A GUIDE FOR THOSE WHO WISH TO USE THE SHARE ALGOL 60 TRANSLATOR IN THE VERY NEAR FUTURE. MUCH MORE COMPLETE DOCUMENTATION IS IN PREPARATION, AND WILL BE MADE AVAILABLE AS SOON AS POSSIBLE.

NO ATTEMPT HAS BEEN MADE HERE TO TEACH THE ALGOL LANGUAGE. THE POINTS WHERE OUR TRANSLATOR DIFFERS FROM PURE ALGOL HAVE BEEN DESCRIBED. A NUMBER OF TEACHING REFERENCES FOR THE ALGOL LANGUAGE ARE INCLUDED IN THE BIBLIOGRAPHY.

**7090-1433SIMPPY FLOATING POINT MATRIX MULTIPLICATION**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1433SIMPPY

AUTHOR...NICOLE SIMON  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASS.

DIRECT INQUIRIES TO AUTHOR

ACCURATE FOR MATRICES WITH ELEMENTS DIFFERING BY  $E 04$  FOR FORTRAN AND FAP PROGRAMS. 132 OCTAL LOCATIONS. FORMATION OF ELEMENTS BY CUMULATIVE MULTIPLICATION, LEAST SIGNIFICANT PARTS OF MULTIPLICATIONS AND ADDITIONS ARE ACCUMULATED IN A SEPARATE LOCATION, WHOSE CONTENTS ARE ADDED TO THE FINAL

CONTINUED FROM PRIOR COLUMN--

RESULT, HENCE 8-PLACE SINGLE PRECISION RESULT WHEN EXPONENTS OF MATRIX ELEMENTS DIFFER BY AS MUCH AS 4. TIME ELEMENT EQUALS 11 CYCLES PLUS 1FAD PLUS N /19 CYCLES PLUS 3FAC PLUS 1FMP/ N EQUALS INNER DIM. MAXIMUM 6 CYCLES FOR A STEP MULTIPLYING A ZERO ELEMENT.

**7090-1434SIANTO FIXED AND FLOATING POINT TO BCD**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1434SIANTO

AUTHOR...NICOLE SIMON  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASS.

DIRECT INQUIRIES TO AUTHOR

A CONVERSION PROGRAM-- FIXED AND FLOATING POINT TO BCD. THE PRIMARY INTENTION IS TO PROVIDE THE PARAMETER DESIRED FOR ANNOTATION OF GRAPHS PLOTTED ON THE EAI DATA- PLOTTER. CHANGES IN CONVERT TABLES PERMIT ORDINARY CONVERSION.

**7090-1435SISLSQ SUPER LEAST-SQUARES PROGRAM**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1435SISLSQ

AUTHOR...PRAVIN L. KADAKIA  
PERKIN-ELMER CORP.  
RESEARCH & ENGINEERING DIV.  
P.O. BOX 730  
NORWALK, CONN.

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM COMBINES SEVERAL LEAST-SQUARES APPROXIMATIONS /SOLUTIONS/ WITH KNOWN VARIANCE-COVARIANCE MATRICES /WEIGHT MATRICES/, COMPUTES AN AVERAGE APPROXIMATION WITH A VARIANCE-COVARIANCE MATRIX, AND COMPUTES A STANDARD DEVIATION. FAP MACHINE LANGUAGE.

**7090-1439ALTAIN AL TAIN, TABLE LOOK-UP AND INTERPOLATION**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1439ALTAIN

AUTHOR...V. L. SORENSEN

DIRECT INQUIRIES TO...

MISS M.K. CHARTZ  
NASA  
AMES RESEARCH CENTER  
MCFFETT FIELD, CALIF.

THIS FORTRAN SUBPROGRAM WILL EVALUATE Y EQUALS F /X/ FOR A GIVEN VALUE OF X FROM TABLES OF X AND Y VALUES. ONE OR MORE Y ARRAYS MAY BE USED. FAP MACHINE LANG.

**7090-1453R08001 CRITICAL PATH AND SCHEDULELING**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1453R08001

AUTHOR...W. W. SHIRLEY  
RICHFIELD OIL CORP.  
LOS ANGELES 5, CALIF.

DIRECT INQUIRIES TO AUTHOR

TO ACCOMPLISH THE CALCULATING ASSOCIATED WITH THE CRITICAL PATH TECHNIQUE AND THEN TO SCHEDULE THE PROJECT USING A SPECIFIED MANPOWER POOL AND THE CRITICAL PATH RESULTS. A. 32K FORTRAN SYSTEM WITH CHAIN FEATURE, USING FOUR INTERMEDIATE TAPES. B. ONLY STANDARD FORTRAN FUNCTIONS AND SUBROUTINES ARE USED BY THE PROGRAM. C. ALL 32K IS USED.

**7090-1455CA2781 CONFIGURATION FACTORS 1**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1455CA2781

AUTHORS...R.S. DUMMER W.T. BRECKENRIDGE

DIRECT INQUIRIES TO...

W.T. BRECKENRIDGE  
GENERAL DYNAMICS/ASTRONAUTICS  
P.O. BOX 1128  
SAN DIEGO 12, CALIF.

THIS PROGRAM COMPUTES CONFIGURATION FACTOR, OTHERWISE KNOWN AS A VIEW FACTOR, SHAPE FACTOR, OR FORM FACTOR, WHICH IS DEFINED AS THE FRACTION OF THE RADIATION THAT IS EMITTED BY A BLACK BODY RADIATING SURFACE WHICH IS INTERCEPTED BY A RECEIVING SURFACE. THE PROGRAM ALWAYS CONSIDERS AN EMITTING BODY AND A RECEIVING BODY AND MAY ALSO CONSIDER INTERVENING SHADOWING BODIES. THERE ARE EIGHT SHAPES WHICH CAN BE PIECED TOGETHER TO APPROXIMATE THE DESIRED BODIES-- CYLINDER, CONE, SPHERE, SPHEROID, RECTANGLE, DISK, TOROID, AND POLYNOMIAL OF REVOLUTION. EACH BASIC SHAPE IS DIVIDED INTO LITTLE ELEMENTAL AREAS. A SUMMATION PROCESS, APPROACHING THE THEORETICAL INTEGRATION PROCESS, IS PERFORMED TO COMPUTE THE CONFIGURATION FACTOR AND, IF DESIRED, THE BLACK BODY HEAT FLOW RATE FROM THE EMITTING TO THE RECEIVING BODY. THE SUMMATION PROCESS CAN APPROXIMATE THE THEORETICAL INTEGRAL AS CLOSELY AS DESIRED, LIMITED ONLY BY THE CORE STORAGE AVAILABLE AND COMPUTER TIME AVAILABLE. IN ACTUAL PRACTICE MANY RUNS REQUIRE CONSIDERABLE THOUGHT IN ORDER TO ACHIEVE ACCURATE RESULTS

CONTINUED FROM PRIOR PAGE--  
AT A REASONABLE COST, ESPECIALLY IF SHADOWING BODIES ARE USED.

NOTE THAT A BINARY CORRECTION IS REQUIRED AT VECTRAN STATEMENT 781 TO IMPROVE THE ACCURACY OF THE SUMMATION PROCESS.

NOTE THAT THIS PROGRAM MUST BE COMPILED WITH THE VECTRAN PRE-COMPILER WHICH IS AVAILABLE FROM SHARE. ALSO THE VECTRAN SUBROUTINES CALLED OUT BY THE VECTRAN PRE-COMPILER MUST BE AVAILABLE AT EXECUTION TIME. MACHINE LANGUAGE, VECTRAN.

**7090-1456NUEIG4 EIGENVALUES OF COMPLEX MATRICES**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1456NUEIG4

AUTHOR...DR. B.N. PARLETT  
N.Y.U.-A.E.C.  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

DIRECT INQUIRIES TO AUTHOR

THIS ROUTINE FINDS M /LESS THAN OR EQUAL TO N/ OF THE EIGENVALUES OF A GIVEN COMPLEX N X N MATRIX FOR N GREATER THAN OR EQUAL TO 2 AND LESS THAN OR EQUAL TO 70.

**7090-1458NOFT1 INTEGRAL TRANSFORMATION FUNCTION**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1458NOFT1

AUTHOR...DR. D.S. VILLARS  
RESEARCH DEPT.  
MICHELSON LAB.  
NAVAL ORDINANCE TEST STATION  
CHINA LAKE, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

COMPUTES LINEAR COMBINATIONS OF QUANTUM MECHANICAL INTEGRALS OF BASIS FUNCTIONS STORED IN BLOCKS OF MINIMUM SIZE REQUIRED BY SYMMETRY CHARACTERISTICS.

**7090-1459GDF1CM COMPLEX MATRIX INVERSION AND SOLUTION OF LINEAR SIMULTANEOUS COMPLEX EQUATIONS**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1459GDF1CM

AUTHOR...JERRY E. MCILINN  
GENERAL ELECTRIC CO.  
HEAVY MILITARY ELECTRONICS DEPT.  
COMPUTER TECHNIQUES & NUM. ANALYSIS  
COURT STREET PLANT  
SYRACUSE, N.Y.

DIRECT INQUIRIES TO AUTHOR

THE SUBPROGRAM INVERT DESCRIBED HEREIN PERFORMS EITHER OF TWO OPERATIONS-- A. INVERTS A COMPLEX MATRIX A. B. SOLVES A SET OF LINEAR SIMULTANEOUS COMPLEX EQUATIONS OF THE FORM  $AY/Y$  EQUALS  $Y/X$ , WHERE  $A$  IS AN N BY N COMPLEX MATRIX AND  $Y/X$  IS EITHER A REAL, IMAGINARY, OR COMPLEX COLUMN VECTOR. THE SUBPROGRAM INVERT USES 32K 709/7090 COMPLEX ARITHMETIC AS DESCRIBED IN IBM BULLETIN NUMBER J28-6114-1.

**7090-1460CA2218 VECTRAN - PROGRAMMING MANUAL AND SYSTEM DESCRIPTION**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1460CA2218

AUTHOR...R.E. SNYDER  
GENERAL DYNAMICS/ASTRONAUTICS  
MAIL ZONE 101-70  
P.O. BOX 1128  
SAN DIEGO 12, CALIF.

DIRECT INQUIRIES TO AUTHOR

VECTRAN IS THE NAME GIVEN TO A PREPROCESSOR WHICH TRANSLATES FORTRAN-TYPE EXPRESSIONS CONTAINING MATRIX AND VECTOR ALGEBRA INTO EQUIVALENT FORTRAN. THIS MANUAL IS INTENDED TO PROVIDE ALL THE INFORMATION THAT IS NEEDED TO WRITE A VECTRAN PROGRAM, BUT IT MUST BE USED IN CONJUNCTION WITH A FORTRAN II MANUAL, AS REPETITION OF FORTRAN INFORMATION WILL BE HELD TO A MINIMUM. IN ADDITION TO ASSUMING A KNOWLEDGE OF FORTRAN, IT IS REQUIRED BY VECTRAN THAT THE USER UNDERSTAND THE BINARY AND UNARY OPERATIONS INVOLVED IN MATRIX AND VECTOR ALGEBRA.

**7090-1461BARNNG RANDOM NORMAL NUMBER GENERATOR SUBPROGRAM**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1461BARNNG

AUTHORS...G. MARSAGLIA M. G. MACLEAN T. A. BRAY

DIRECT INQUIRIES TO...

T. A. BRAY  
BCEING SCIENTIFIC RESEARCH LABORATORIES  
P. O. BOX 3707  
SEATTLE 24, WASHINGTON

A FORTRAN II FUNCTION SUBPROGRAM TO GENERATE A SEQUENCE OF NORMALLY DISTRIBUTED RANDOM NUMBERS WITH MEAN ZERO AND VARIANCE ONE. THE ROUTINE IS WRITTEN IN THE IBM 7090 FAP LANGUAGE FOR USE AS A FORTRAN II FUNCTION SUBPROGRAM. IT HAS THREE ENTRY POINTS-- RNST/X/ IS THE ENTRY POINT FOR STARTING A NEW SEQUENCE OF NORMAL NUMBERS. THE FORTRAN EXPRESSION  $Y$  EQUALS  $RNST/X/$  WILL

CONTINUED FROM PRIOR COLUMN--  
USE THE ABSOLUTE VALUE OF THE BINARY FORM OF THE NUMBER X TO BEGIN THE SEQUENCE OF UNIFORMLY DISTRIBUTED RANDOM NUMBERS. PROGRAM REQUIRES CORE STORAGE ONLY.

**7090-1462LAREGR REGRET, COMPARISON OF SEVERAL REGRESSION LINES**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1462LAREGR

AUTHOR...AARON GOLDMAN  
LOS ALAMOS SCIENTIFIC LABORATORY  
P O BOX 1663  
LOS ALAMOS, NEW MEXICO

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM COMPUTES CORRELATION COEFFICIENTS, THEIR CONFIDENCE INTERVALS, AN ANALYSIS OF VARIANCE USED TO COMPARE SEVERAL REGRESSION LINES, AND ALL OF THE POSSIBLE REGRESSION LINES THAT MIGHT BE USED.

AS MANY AS 5 SETS OF DATA MAY BE COMPARED WITH A MAXIMUM OF 700 POINTS PER SET.

THIS PROGRAM IS DESIGNED TO OPERATE UNDER A MONITOR SYSTEM THAT PROVIDES FOR A TAPE 10 INPUT AND A TAPE 9 OUTPUT. NO OTHER TAPES ARE USED.

**7090-1463LABART BART, SUBROUTINE FOR TESTING HOMOGENEITY OF VARIANCES**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1463LABART

AUTHOR...AARON GOLDMAN  
P O BOX 1663  
LOS ALAMOS SCIENTIFIC LABORATORY  
LOS ALAMOS, NEW MEXICO

DIRECT INQUIRIES TO AUTHOR

A SUBROUTINE TO TEST HOMOGENEITY OF VARIANCES USING BARTLETT'S TEST. AS MANY AS 20 DIFFERENT VARIANCES MAY BE TESTED WITH A MAXIMUM OF 999 POINTS PER SET.

**7090-1464UCABS ADDITIVE SEASONAL ANALYSIS WITH CHARTS**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1464UCABS

AUTHORS...J. M. JOHNSON R. F. KILGORE

DIRECT INQUIRIES TO...

J. M. JOHNSON  
NAT BUREAU OF ECO. RESEARCH  
261 MADISON AVE  
NEW YORK, NEW YORK

THE PROGRAM IS DESIGNED TO ADJUST MONTHLY TIME SERIES FOR SEASONAL VARIATION WHEN THE SERIES TO BE ANALYZED CONSISTS OF COMPONENTS WHICH ARE PRESUMED TO BE ADDITIVE /TREND-CYCLE & SEASONAL & IRREGULAR/ OR WHEN THE ORIGINAL SERIES INCLUDES NEGATIVE VALUES AND IF THE RELATIONSHIP SEEMS BASICALLY MULTIPLICATIVE, IT MIGHT BE PREFERABLE TO REPLACE THE NEGATIVE VALUES AND USE THE STANDARD ANALYSIS /CENSUS METHOD II/. THE GENERAL APPROACH IS ANALOGOUS TO METHOD II OF THE CENSUS BUREAU EXCEPT THAT ADDITIVE RELATIONSHIPS ARE USED INSTEAD OF MULTIPLICATIVE ONES. ALSO, THE PRESENT PROGRAM DOES NOT CARRY THROUGH THE TIME SERIES DECOMPOSITION, BUT STOPS WITH THE COMPLETION OF THE SEASONAL ADJUSTMENT AND A FIVE MONTH MOVING AVERAGE OF THE ADJUSTED SERIES.

**7090-1466BCORDR ORDER**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1466BCORDR

AUTHOR...E. S. KRASNCW

DIRECT INQUIRIES TO...

EDWARD C. HOBBS  
COMPUTER CENTER  
UNIVERSITY OF CALIF.  
BERKELEY 4, CALIF.

ORDER RANKS A LIST OF N-WORD ARGUMENTS. THE PRESENT VERSION HAS 4 ENTRY POINTS CORRESPONDING TO 1,2,3, OR 4 WORD ARGUMENTS. THE ARGUMENTS CAN FORM EITHER THE ROWS OR COLUMNS OF ANY-DIMENSIONED ARRAY. THE ARGUMENTS CAN BE TREATED LOGICALLY /36 BITS TO THE WORD/ OR ALGEBRAICALLY /EACH WORD IS A SIGNED 35 BIT NUMBER/. IN THE LATTER CASE, IF THE ARGUMENTS ARE FLOATING POINT NUMBERS, ALL WORDS IN THE MULTI-PRECISION ARGUMENT MUST BE NORMALIZED. THEY NEED NOT HAVE THE SAME SIGN, HOWEVER. THE OUTPUT OF ORDER IS A LIST OF INDICES WHICH GIVES THE RANKED POSITION OF EACH ARGUMENT IN THE INPUT LIST. THE INDICES CAN BE USED AS SUBSCRIPTS TO PICK UP EITHER THE ARGUMENTS OR ASSOCIATED FUNCTIONS IN THEIR RANKED ORDER. THE ARGUMENT LIST IS NEVER RE-ARRANGED BY ORDER. ORDER CAN BE REASSEMBLED TO ALLOW FOR HIGHER PRECISION ARGUMENTS. SOURCE LANGUAGE - FAP.

**7090-1467SIREAD SIREAD, REREAD**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1467SIREAD

AUTHOR...DR. O. GINGERICH  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASSACHUSETTS

CONTINUED FROM PRIOR PAGE--

## DIRECT INQUIRIES TO AUTHOR

FMS FORTRANS TAPE READING LIBRARY SUBROUTINE HAS BEEN MODIFIED TO ALLOW MULTIPLE SCANNING OF BCD INPUT DATA WITH DIFFERENT FORMATS AND/OR LISTS. THE COMPUTER PHYSICALLY READS IN THE INPUT RECORD ONLY ONCE.

/TSM/ AND /TSM/ HAVE BEEN ALTERED FROM THE ORIGINAL FMS FORTRAN LIBRARY VERSION SO THAT EVERY BCD RECORD READ FROM TAPE WILL BE SAVED IN NON-ERASABLE STORAGE UNTIL THE NEXT SUCH RECORD IS READ. THUS ONLY THE LAST RECORD READ WILL BE AVAILABLE FOR RE-SCANNING. IF THE PROGRAM DOES NOT REQUIRE MULTIPLE SCANNING, RE-READ WILL BE INDISTINGUISHABLE FROM THE STANDARD /TSM/ AND /TSM/ VERSIONS EXCEPT FOR THE SOMEWHAT GREATER STORAGE SPACE USED. AS MANY CALL REREAD STATEMENTS AND AS MANY RE-SCANS OF THE RECORD AS ARE DESIRED CAN BE EXECUTED, BUT A CALL REREAD MUST PRECEDE THE READ INPUT TAPE IN THE LOGICAL FLOW EACH TIME A RE-SCAN IS DESIRED. IF THE CALL REREAD IS BYPASSED, A REGULAR READ INPUT TAPE INPUT WILL OCCUR. SOURCE LANGUAGE - FAP.

**7090-1468SIMAP** LOADING MAP OF SUBROUTINE LOCATIONS AND ENTRIES AT EXECUTION TIME  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1468SIMAP

AUTHOR...DR. C. GINGERICH  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASS.

## DIRECT INQUIRIES TO AUTHOR

SIMILE MAPS THE LOCATIONS OF SUBROUTINES AND THEIR ENTRY POINTS AT FMS LOADING TIME. IT IS DESIGNED TO WORK IN CONJUNCTION WITH THE STANDARD FMS BSS LGADER. WHEN USED AS THE FIRST BINARY DECK OF A RUN, SUBSEQUENT SUBROUTINES IN THE BINARY DECK, PLUS PRIOR COMPLICATIONS OR ASSEMBLIES, PLUS THE LIBRARY SUBROUTINES WILL BE MAPPED AT THE BEGINNING OF THE OUTPUT TAPE. THIS ABSOLUTE FAP PROGRAM REQUIRES 100 LOCATIONS FROM THE DECK PATCH SPACE OR BELOW 144 OCTAL. THEREFORE ONLY THE SOURCE DECK IS PROVIDED SO THAT EACH INSTALLATION CAN PROVIDE THE NECESSARY ORG CARDS FOR COMPATIBILITY WITH ITS SYSTEM. SOURCE LANGUAGE IS FAP.

**7090-1469IGDECN** IG DECIN - FLEXIBLE DECIMAL AND ALPHABETIC INPUT ROUTINE FOR FORTRAN II  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1469IGDECN

AUTHOR...M. F. MITCHELL  
U. K. A. E. A.  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

## DIRECT INQUIRIES TO AUTHOR

THE ROUTINE ASSUMES THAT THE INPUT TAPE HAS FORTRAN LOGICAL NUMBER 5 AND THE OUTPUT TAPE IS 6. THESE CAN EASILY BE CHANGED. IT ASSUMES THAT THE INPUT TAPE CONTAINS BCD RECORDS, AND THE FIRST 72 CHARACTERS IN EACH RECORD ARE TO BE READ. THE ROUTINE READS NUMERIC AND ALPHABETIC INFORMATION WITHOUT THE USE OF FORMAT STATEMENTS. THERE ARE TWO MAIN ENTRY POINTS - X EQUALS FLOEC /O/ SETS X EQUAL TO THE FLOATING POINT VALUE OF THE NEXT NUMBER I EQUALS INDEC /O/ SETS I EQUAL TO THE INTEGER VALUE OF THE NEXT NUMBER. THE FIRST USE OF FLOEC /OR INDEC/ CAUSES A TAPE RECORD TO BE READ, AND THE FIRST NUMBER ABSTRACTED FROM IT. THE NEXT ENTRY WILL PICK UP THE NEXT NUMBER, AND SO ON. WHEN 72 CHARACTERS HAVE BEEN SCANNED, THE NEXT RECORD IS READ AUTOMATICALLY. NUMBERS ARE SEPARATED BY ONE OR MORE BLANKS, AND MUST NOT BE SPLIT BETWEEN TWO RECORDS. MACHINE LANGUAGE SAP-F.

**7090-1470IGSLDC** IG SELDEC  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1470IGSLDC

AUTHOR...M. F. MITCHELL  
U. K. A. E. A.  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

## DIRECT INQUIRIES TO AUTHOR

TO ALLOW THE ROUTINE IGDECIN TO READ RECORDS OF ANY LENGTH UP TO 132 CHARACTERS, AND TO READ INFORMATION FROM MORE THAN ONE TAPE, REQUIRES IGDECIN. DECIN NORMALLY READS THE FIRST 72 CHARACTERS OR RECORDS ON TAPE 5, HOWEVER CALL SELDEC /NT,N/ WILL CAUSE DECIN TO READ ITS RECORDS FROM TAPE NUMBER NT AND TO ACCEPT RECORDS OF UP TO N CHARACTERS. IF ANY RECORD HAS LESS THAN N CHARACTERS, SELDEC WILL PLACE AN END OF RECORD MARKER /THE CHARACTER 77 OCTAL/ AFTER THE LAST CHARACTER, AND DECIN WILL READ THE RECORD CORRECTLY. SELDEC CONTAINS THREE BUFFERS AND WILL REMEMBER INFORMATION FROM UP TO THREE TAPES. CALL SELDEC /NT,N/ READS THE NEXT RECORD INTO A BUFFER AND SETS DECIN TO ACCEPT THIS INFORMATION. CALL SELDEC /NT/ SETS DECIN SO THAT IT CONTINUES READING FROM A BUFFER THAT HAD ALREADY BEEN IN USE. ONE TYPICAL USE OF SELDEC WOULD BE WHEN STANDARD INPUT TAPE CONTAINS VARIOUS CODE-WORDS WHICH ARE USED TO INDICATE WHICH RECORDS OF A SUBSIDIARY TAPE SHOULD BE SCANNED.

**7090-1471IGINDX** IG INDEX - TO COMPARE A WORD WITH A LIST OF WORDS  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1471IGINDX

AUTHOR...M. F. MITCHELL  
U. K. A. E. A.  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

CONTINUED FROM PRIOR COLUMN--

## DIRECT INQUIRIES TO AUTHOR

CALL INDEX /J,X,19HABC\*2\*0\*THREE\*//ETC/ / WILL COMPARE X AGAINST THE ITEMS SEPARATED BY A. IT WILL SET J EQUALS 1 IF X EQUALS 3HABC AND SO ON, J EQUALS 4 IF X EQUALS 6H /ETC/ J EQUALS 5 IF NO AGREEMENT IS FOUND. THE LIST MAY BE OF ANY LENGTH AND MAY CONTAIN ANY NUMBER OF ITEMS. THIS ROUTINE CAN BE USED IN CONJUNCTION WITH THE ROUTINE IGDECIN. FOR EXAMPLE, W EQUALS FLOEC/3/, CALL INDEX /J,W,3HX\*Y/, GO TO /1, 2, 3/, J, I. CALL SUBX GO TO 3, 2. CALL SUBY, 3. CONTINUE, WILL GO TO THE ROUTINE SUBX IF THE LETTER X IS READ, SUBY IF Y IS READ, AND STATEMENT 3 IF NEITHER X OR Y IS READ. SOURCE LANGUAGE - SAP-F.

**7090-1472IGPCPN** CPYCHN - COPY AND MERGE  
CHAIN LINKS PRODUCED BY THE FORTRAN II SYSTEM.  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1472IGPCPN

AUTHOR...M. F. MITCHELL  
U. K. A. E. A.  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

## DIRECT INQUIRIES TO AUTHOR

ALLOWS ONE LINK TO BE RECOMPILED AND MERGED WITH EXISTING LINKS. THE ROUTINE HAS TWO ENTRY POINTS AND 1, 2, 3 OR 4 ARGUMENTS. IN NORMAL USE A MASTER CHAIN TAPE, CONTAINING LINKS GENERATED ON SOME PREVIOUS MONITOR RUN, IS LOADED ON TAPE UNIT WITH FORTRAN NUMBER NT-. NEW LINKS, GENERATED DURING THE CURRENT MONITOR RUN WILL BE ON TAPE NTA,.... NTA,.... MUST CORRESPOND TO PHYSICAL UNIT B2, B3 OR A4. NT MUST CORRESPOND TO A PHYSICAL UNIT WHICH IS NOT AL-4 OR B1-4. CPYCHN WILL LOOK AT /IOH/ TO CHECK THESE FACTS. CALL RCHN/NT,NTA,../ WILL CAUSE THE ROUTINE TO COLLECT LINKS FROM NTA,.... AND PUT THEM ON B1. IT WILL THEN COPY LINKS FROM NT INTO B2, B3 OR A4 AS APPROPRIATE, SUBSTITUTING THE VERSION FROM B1 IF A LABEL MATCHES. FINALLY ANY LINKS REMAINING ON B1 ARE COPIED, AND TAPE NT IS UNLOADED. CALL WRCHN/NT,NTA,../ COPIES LINKS FROM NTA,.... ONTO NT AND UNLOADS NT FOR FUTURE USE. TAPE NT SHOULD BE FILE PROTECTED WHEN IT UNLOADS. IF AN ERROR OCCURS, A SUITABLE REMARK IS WRITTEN ON A3, AND SOMETIMES ON THE PRINTER. TAPE WRITING REDUNDANCIES RESULT IN THE BAD TAPE BEING UNLOADED. OPERATION WILL CONTINUE IF THE TAPE IS REPLACED. ANY OTHER FORM OF ERROR DURING RCHN RESULTS IN PREMATURE TERMINATION OF THE JOB. ERRORS DURING WRCHN DO NOT TERMINATE THE JOB BUT THE MASTER TAPE IS NOT WRITTEN. SOURCE LANGUAGE-SAP-F.

**7090-1473IGFIND** IG FIND - FORMAT-FREE INPUT USING IGDECIN  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1473IGFIND

AUTHOR...A. HASSITT  
U. K. A. E. A.  
RISLEY, WARRINGTON  
LANCASHIRE, ENGLAND

## DIRECT INQUIRIES TO AUTHOR

THE STANDARD VERSION OF /IOH/ IS ASSUMED, IN THAT THE CONTENTS OF LOCATION 2 ARE SAVED IN LOCATION COMMON /-165/. A STANDARD FORTRAN INPUT STATEMENT IS GIVEN BUT THE STANDARD FORTRAN FORMAT IS NOT USED, IT IS REPLACED BY A STATEMENT WHICH INDICATES WHETHER THE ITEM TO BE READ IS FLOATING POINT OR INTEGER OR ALPHANUMERIC MODE /F OR I OR A/. FOR EXAMPLE, TO READ A SERIES OF INTEGER VARIABLES I, J, K. CALL FIND READ INPUT TAPE 5, 500, I, J, K 500 FORMAT /IHI/ THE NUMBERS ARE READ BY THE ROUTINE IGDECIN AND MAY BE PUNCHED ANYWHERE ON THE CARD. THE MODIFIED FORMAT STATEMENT CONSISTS OF NH FOLLOWED BY N CHARACTERS. THESE CHARACTERS MAY BE F OR I OR A OR AN INTEGER. TO READ THREE FLOATING POINT NUMBERS FOLLOWED BY AN INTEGER FOLLOWED BY TWO FLOATING POINT NUMBERS, ONE MAY WRITE--6HFFFFF OR 5H3F12F OR 6H2F12F OR EVEN 3H3F1. THIS LAST FORM ILLUSTRATES THE POINT THAT WHEN THE END OF THE FORMAT IS REACHED THE ROUTINE GOES BACK TO THE BEGINNING OF THE FORMAT. TO GIVE A MORE COMPLICATED EXAMPLE-- CALL FIND READ INPUT TAPE 5, 501 I, J, 8, //A/M/N/, M EQUALS 1, I, N EQUALS 1, / 501 FORMAT /8H2IA1000F/.

**7090-1476SCM3BB** M-3 LINEAR AND SEPARABLE PROGRAMMING SYSTEM  
AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1476SCM3BB

AUTHORS...R. D. MCKNIGHT R. P. HARVEY

## DIRECT INQUIRIES TO...

R. P. HARVEY  
STANDARD OIL COMPANY OF CALIFORNIA  
SAN FRANCISCO, CALIFORNIA

M-3 IS A SYSTEM OF SINGLE PRECISION 7090 ROUTINES FOR SOLUTION OF MATHEMATICAL /LINEAR AND SEPARABLE/ PROGRAMMING PROBLEMS. THE SYSTEM EMPLOYS THE REVISED SIMPLEX METHOD IN WHICH THE INVERSE IS MAINTAINED IN PRODUCT FORM. SOME OF THE MORE IMPORTANT FEATURES ARE A SEPARABLE ALGORITHM WHICH PERMITS INCLUSION OF NON-LINEAR /POLYGONAL/ CONSTRAINTS, A COMPOSITE ALGORITHM, MULTIPLE RIGHT HAND SIDES, MULTIPLE OBJECTIVES, AN UPPER BOUND ALGORITHM FOR VARIABLES UPPER BOUNDED AT UNITY, COST RANGING, FREE VARIABLES WHICH MAY TAKE VALUES OF EITHER SIGN, AND FROZEN VARIABLES WHICH MUST HAVE ZERO VALUE IN THE SOLUTION. M-3 RUNS IN THE FORTRAN MONITOR SYSTEM AND REQUIRES 32K CORE STORAGE, AN ON-LINE PRINTER, A CLOCK /OPTIONAL/, AND TWO DATA CHANNELS. THE PROCEDURE MAY USE UP TO 10 TAPES, A1-A5 AND B1-B5 DEPENDING ON THE SIZE OF THE PROBLEM. PROBLEMS WITH UP TO 300 ROWS AND 299 SETS OF SPECIAL VARIABLES MAY BE HANDLED. THE LIMITATION ON THE NUMBER OF VARIABLES /NON-ARTIFICIALS/ CANNOT BE STATED DEFINITELY AS CORE STORAGE IS ALLOCATED AT PROBLEM ASSEMBLY TIME, BUT FOR PRACTICAL PURPOSES 4000 COULD BE TAKEN AS AN UPPER BOUND. DATA IS REQUIRED IN S-RARE FORMAT. ROWS THEREFORE ARE NOT NUMBERED, BUT NAMED. THE COEFFICIENTS AND RIGHT HAND SIDE ELEMENTS MUST BE WITHIN THE RANGE - 10,000 TO

OPTICAL PROGRAM MATERIAL - REQUESTOR MUST SUBMIT ONE REEL OF TAPE TO

CONTINUED FROM PRIOR PAGE--  
OBTAIN LISTINGS AND ONE REEL OF TAPE TO OBTAIN FORTRAN SOURCE CARDS  
AND DOCUMENTATION WRITEUP.

**7090-1477TYELS2 LEAST SQUARES REGRESSION FIT  
TO SUM OF TWO EXPONENTIALS /FORTRAN II/  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1477TYELS2**

AUTHOR...G. MEEK

DIRECT INQUIRIES TO--  
DR. B.H. WORSLEY  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO  
CANADA

GIVEN A SET OF N IRREGULARLY-SPACED VALUES OF AN INDEPENDENT  
VARIABLE X AND N CORRESPONDING VALUES OF A DEPENDENT VARIABLE Y,  
THE PROGRAM GIVES A LEAST SQUARES REGRESSION FITTING OF Y TO THE  
FUNCTION  
 $F(X) = A + Bx + Cx^2 + Dx^3 + K$   
IT IS ASSUMED THAT K IS A KNOWN CONSTANT. THE STANDARD  
DEVIATIONS OF EACH OF THE FITTED VALUES OF A, B, C, AND D ARE  
ALSO CALCULATED, AS WELL AS THE RATIO OF, AND DIFFERENCE BETWEEN,  
THE OBSERVED AND FITTED VALUES OF Y. A SCHEME FOR WEIGHTING THE  
OBSERVED YJ BY INTEGERS WJ IS PROVIDED. MINIMUM 7090. OPERATES  
UNDER FORTRAN 2 WITH MONITOR. A ROUTINE TO INVERT A MATRIX BY  
THE METHOD OF GAUSSIAN ELIMINATION IS BUILT-IN. USES LOG, EXP  
AND SQRT OF FORTRAN II, VERSION 2.

**7090-1478TYPOLM COEFFICIENTS OF A REAL  
POLYNOMIAL FROM ITS ZEROS  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1478TYPOLM**

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO  
CANADA

DIRECT INQUIRIES TO AUTHOR

TO OBTAIN THE COEFFICIENTS A/I/ OF A REAL POLYNOMIAL GIVEN ITS  
ZEROS. IT IS USEFUL IN CHECKING THE RESULTS GIVEN BY POLYNOMIAL  
ROOT-FINDING ROUTINES. MINIMUM 7090. WRITTEN FOR FORTRAN II,  
VERSION 2. USES SUB-PROGRAMS /FIL/ AND /STH/ AS IN FORTRAN II,  
VERSION 2 AS WELL AS UNCLE AND XLOG. UNCLE IS THE NAME OF AN  
ARGUMENT-FREE SUBROUTINE WHICH INITIATES A SPECIAL POST-MORTEM  
PROCEDURE BUILT INTO THE TY INSTALLATION MONITOR SYSTEM. IT  
INITIATES KICK-OFF OF THE RUN UNDER CERTAIN CONDITIONS. CELLS 226  
/3428/ BESIDES THOSE USED BY ARGUMENTS AND BY THE  
SUB-PROGRAMS LISTED IN 3. ABOVE.

**7090-1479TYRNDG GAUSSIAN PSEUDO RANDOM  
NUMBER GENERATOR  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1479TYRNDG**

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO  
CANADA

DIRECT INQUIRIES TO AUTHOR

TO GENERATE A SEQUENCE OF N PSEUDO-RANDOM NUMBERS Y WITH  
GAUSSIAN DISTRIBUTION, BEGINNING WITH A PRESCRIBED NUMBER X.  
MINIMUM 7090. FLOATING-POINT NUMBERS. USES SUB-PROGRAM RAND,  
INCLUDED WITH THE RNDG CARD DECKS; AND SUB-PROGRAMS COS, SIN, LOG  
AND SQRT, ASSUMED PRESENT IN THE FORTRAN II VERSION 2 PACKAGE.  
USES 85 CELLS /1258/ IN ADDITION TO THE CELLS USED BY  
SUB-PROGRAMS LISTED IN 3. RAND IS THE 709/90 FAP VERSION OF SD  
#181 /AN-G502/ AND USES 30 CELLS. THIS PROGRAM IS DISTINGUISHED  
FROM THE RECENT SHARE DISTRIBUTION /SD #1360/ WITH THE SAME  
PURPOSE BY THE FACT THAT THE USER OF RNDG NEED NOT BE EXPLICITLY  
AWARE THAT THE RANDOM NUMBERS ARE GENERATED IN PAIRS.

**7090-1480TYDLAP DOUBLE PRECISION PRODUCT  
ACCUMULATION OF SINGLE PRECISION REAL FLOATING POINT  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1480TYDLAP**

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO  
CANADA

DIRECT INQUIRIES TO AUTHOR

TO ACCOMPLISH DOUBLE-PRECISION ACCUMULATION OF PRODUCTS OF  
SINGLE-PRECISION NUMBERS IN A PSEUDO-ACCUMULATOR DLA. THE USE OF  
THE FIRST ENTRY-POINT DLAP LEADS TO THE ACCUMULATION OF THE NEW  
PRODUCT WITH THE EXISTING SUM IN DLA. THE USE OF THE OTHER  
ENTRY-POINT DLAS PLACES THE NEW PRODUCT DIRECTLY IN DLA. WRITTEN  
IN 709/90 FAP. USES REAL, FLOATING-POINT NUMBERS. CAN BE USED  
AS A SUB-PROGRAM OF A FORTRAN PROGRAM, AND, AS SUCH, IS USEFUL IN  
CERTAIN MATRIX OPERATIONS. NO OTHER SUB-PROGRAMS ARE USED. USES  
23 CELLS /278/.

**7090-1481TYQUAD ROMBERG QUADRATURE TO  
PRESCRIBED ACCURACY  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1481TYQUAD**

AUTHOR...C. F. DUNKL

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO--  
DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO  
CANADA

A FORTRAN 2 FUNCTION USING FLOATING-POINT NUMBERS TO PERFORM  
THE INTEGRATION BETWEEN GIVEN LIMITS OF A FUNCTION DEFINED AS A  
FORTRAN FUNCTION OF ONE ARGUMENT. INTEGRATION IS IN  
EQUALLY-SPACED STEPS. THE STEP SIZE IS DETERMINED AUTOMATICALLY  
BY A PROCESS WHICH ENSURES THAT THE PRESCRIBED ACCURACY IS  
ATTAINED. MINIMUM 7090. FORTRAN II, VERSION 2. FLOATING-POINT  
NUMBERS. USES 297 /4518/ CELLS BESIDES THOSE REQUIRED FOR  
ARGUMENTS AND THE SUB-PROGRAM FCN/X/. FCN /X/ IS A SUB-PROGRAM  
TO BE WRITTEN BY THE PROGRAMMER DEFINING THE FUNCTION APPEARING  
IN THE INTEGRATION.

**7090-1482J5AMRNG GRAPH SCALE AND LIMIT FINDER  
FORTRAN SOURCE LANGUAGE SUBROUTINE  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1482J5AMRNG**

AUTHOR...JOSEPH E. SULLIVAN  
CODE 841  
DAVID TAYLOR MODEL BASIN  
WASHINGTON 7, D. C.

DIRECT INQUIRIES TO AUTHOR

AM RNGE, GIVEN A SET OF X/S, DETERMINES SUITABLE UPPER AND LOWER  
LIMITS FOR THE X-AXIS, THE NUMBER OF GRID LINES TO BE DRAWN, AND  
THE GRID LINES TO BE LABELED. AM RNGE MAY THUS BE ENTERED TWICE  
TO OBTAIN SUITABLE LIMITS AND SCALING FOR A TWO-DIMENSIONAL PLOT.

**7090-1485PLCSS1 CUTTING STOCK I  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1485PLCSS1**

AUTHOR...CAROL S. WADE  
IBM CORP.  
T.J. WATSON RESEARCH CENTER  
BOX 218  
YORKTOWN HEIGHTS, NEW YORK

DIRECT INQUIRIES TO AUTHOR

CSSI SOLVES THE CUTTING STOCK OR TRIM PROBLEM WHICH IS THE  
PROBLEM OF FILLING, AT MINIMUM COST, GREGS FOR WIDTHS OF  
MATERIAL WHICH ARE TO BE CUT FROM A SUPPLY OF GIVEN STOCK WIDTHS  
EACH OF GIVEN COST. CSSI EMPLOYS AN ALGORITHM DESCRIBED IN A  
PAPER ENTITLED, "A LINEAR PROGRAMMING APPROACH TO THE CUTTING  
STOCK PROBLEM", BY P. C. GILMORE AND R. E. GOMORY- THE FIRST  
PART OF THE PAPER IS IN THE JOURNAL OF OPERATIONS RESEARCH, VOL  
9, 1961, 849-859, AND THE SECOND PART IS IBM RESEARCH REPORT 949,  
JUNE, 1963. UNLIKE PREVIOUS PROGRAMS, CSSI DOES NOT GENERATE AND  
STORE A LIBRARY OF COLUMNS. CSSI IS A FORTRAN CODE WRITTEN FOR  
THE FORTRAN MONITOR SYSTEM ON THE 709C/94. IT WILL ACCEPT UP TO  
15 STOCK WIDTHS, EACH WITH SUPPLY LIMITS, AND UP TO 89 ORDERED  
WIDTHS. IT REQUIRES 32K CORE, THREE TAPES, ONE CHANNEL. WRITTEN  
IN FORTRAN II.

**7090-1487WCUTIL UTILITY SYSTEM UNDER IBSYS  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1487WCUTIL**

AUTHORS..F. D. PITTS F. W. BAUER L. B. FALL

DIRECT INQUIRIES TO--

F. D. PITTS  
AERONAUTICAL SYSTEMS DIVISION  
WRIGHT-PATTERSON AFB, OHIO

THE UTILITY SYSTEM OPERATES AS A SUB-SYSTEM UNDER THE 7090/94  
IBSYS BASIC MONITOR. IT PROVIDES AN AUTOMATED CAPABILITY TO  
PERFORM SUCH OPERATIONS AS TAPE COPY, TAPE COMPARE, TAPE DUMP,  
ETC. ALL I/O IS EXECUTED THROUGH IOEX.

**7090-1488NBHMKL HANKEL FUNCTION OF COMPLEX  
ORDER AND ARGUMENT.  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1488NBHMKL**

AUTHOR...LESLIE A. BERRY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

DIRECT INQUIRIES TO AUTHOR

TO EVALUATE HENKEL FUNCTIONS HV/K//Z/ COMPLEX ORDER, V, AND  
COMPLEX ARGUMENT, Z. REQUIRES- SUBROUTINE HANK /PROGRAM NBS  
HF13/ SUBROUTINE SERIES /PROGRAM NBS HSR/ SUBROUTINE SP /PROGRAM  
NBS SP/ FUNCTION GAMMA /PROGRAM NBS GAM/ COMPLEX PACKAGE /PROGRAM  
NBS ZPK/ USES ASYMPTOTIC FORMS. MACHINE LANGUAGE FORTRAN II.

**7090-1489NBHSHF13 HANKEL FUNCTION FOR ORDER  
1/0 AND 2/3, COMPLEX ARGUMENT.  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1489NBHSHF1**

AUTHOR...LESLIE A. BERRY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

TO EVALUATE THE HANKEL FUNCTIONS. REQUIRES- SUBROUTINE SERIES /PROGRAM NBS HSR/ SUBROUTINE SP /PROGRAM NBS SP/ FUNCTION GAMMA /PROGRAM NBS GAM/ COMPLEX PACKAGE /PROGRAM NBS ZPK/ METHOD- FOR SMALL  $z$ . FORTRAN II.

**7090-1490NBSHSR SERIES EVALUATION FOR HANKEL FUNCTION SUBROUTINES**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1490NBSHSR

AUTHOR...LESLIE A. BERRY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

DIRECT INQUIRIES TO AUTHOR

REQUIRES SUBROUTINE ZMPY OF COMPLEX PACKAGE, NBS ZPK. USAGE- CALL SERIES /A, B, V, S, Y/ X & IY#SV /AGIB/. 7090 FORTRAN II

**7090-1491NBS SP EVALUATES ASYMPTOTIC SERIES FOR NBS HF13**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1491NBS SP

AUTHOR...LESLIE A. BERRY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

DIRECT INQUIRIES TO AUTHOR

EVALUATES ASYMPTOTIC SERIES. TV/Z/ WRITTEN IN NBS HF13 AS EXPLAINED IN WRITE-UP FOR NBS HF13. REQUIRES THE COMPLEX PACKAGE NBS ZPK AND FUNCTION GAMMA, NBS GAM. EVALUATES SERIES. IF NECESSARY MULTIPLIES LAST TERM USED BY CONVERGENCE FACTOR. SEE NBS HF13. 7090 FORTRAN II.

**7090-1493NBSZPK NBS ZPK COMPLEX ARITHMETIC PACKAGE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1493NBSZPK

AUTHOR...LESLIE A. BERRY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

DIRECT INQUIRIES TO AUTHOR

MULTIPLIES AND DIVIDES TWO COMPLEX NUMBERS, FINDS THE SQUARE ROOT, SINE, EXPONENTIAL, OR POLAR FORM OF COMPLEX NUMBER. 7090 FORTRAN II

**7090-1494BCKOMD MULTIPLY-PRECISE ROUTINE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1494BCKOMD

AUTHOR...ELEANOR S. KRASNOW

DIRECT INQUIRIES TO..

DONALD C. HOBBS  
COMPUTER CENTER  
UNIVERSITY OF CALIFORNIA  
201 CAMPBELL HALL  
BERKELEY 4, CALIFORNIA

THE PRINCIPAL USE OF THIS SUBROUTINE IS TO EVALUATE RATIOS OF PRODUCTS OF POWERS OF FACTORIALS MAINTAINING PERFECT INTEGER ACCURACY THROUGHOUT. THE ANSWER IS RETURNED IN 2 FORMS- /1/ A RATIONAL CONSISTING OF AN ORDERED PAIR OF MULTIPLE PRECISION FULL WORD INTEGERS, AND /2/ A VECTOR OF THE ORDERED EXPONENTS OF THE PRIMES IN THE PRIME DECOMPOSITION OF THE RATIONAL.  
SOURCE LANGUAGE- FAP 7090

**7090-1495UMMPLT GENERAL PURPOSE PLOTTING SUBROUTINE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1495UMMPLT

AUTHORS..BRICE CARNAHAN LARRY EVANS

DIRECT INQUIRIES TO..

BRICE CARNAHAN  
UNIVERSITY OF MICHIGAN  
COMPUTING CENTER  
ANN ARBOR, MICHIGAN

RAPID MACHINE PLOTTING OF NUMERIC INFORMATION FOR USE WITH FORTRAN, FAP, OR MAD CALLING PROGRAMS. THE RESULTING GRAPH IS COPIED ONTO ANY DECIMAL OUTPUT TAPE FOR SUBSEQUENT OFF-LINE /OR SIMULATED OFF-LINE/ PRINTING OR PUNCHING. THE SUBROUTINE HAS FOUR MAIN ENTRIES WHICH PERFORM THE FOLLOWING FUNCTIONS. PLOT 1 SETS UP THE DESIRED GRID CONFIGURATION AND THE TOTAL WIDTH /LIMITED TO PAGE OR CARD WIDTH/ AND LENGTH /UNLIMITED/ OF THE GRAPH IMAGE. IT ALSO DETERMINES THE LOCATION OF THE DECIMAL POINTS AND THE MULTIPLYING SCALE FACTORS /POWERS OF TEN/ FOR THE ABSCISSA AND ORDINATE VALUES WHICH MAY BE PRINTED AT THE GRID. PLOT 2 PREPARES THE GRID, EXAMINES THE MAXIMUM AND MINIMUM VALUES OF THE ABSCISSA AND ORDINATE AND ESTABLISHES INTERNALLY A FORMULA FOR COMPUTING THE LOCATION IN THE IMAGE REGION CORRESPONDING TO ANY POINT.

**7090-1496BCEXP FORTRAN FUNCTION FOR OBTAINING PRIMES**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1496BCEXP

AUTHOR...GERALD D. JOHNSON

DIRECT INQUIRIES TO..

DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA COMPUTER CENTER  
201 CAMPBELL HALL  
BERKELEY 4, CALIFORNIA

THIS 7090 SUBROUTINE COMPUTES THE NEXT PRIME GREATER THAN THE ABSOLUTE VALUE OF A GIVEN INTEGER  $I$  WHERE  $I$  IS EITHER A FORTRAN II DECREMENT INTEGER LESS THAN 217 OR A FORTRAN IV FULL WORD INTEGER LESS 235. LANGUAGE FAP-

**7090-1497BEMAT2 MATRIX PACKAGE FOR USE WITH IBM FORTRAN MONITOR**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1497BEMAT2

AUTHORS..H.M. GLADNEY MRS. C. M. KIMME

DIRECT INQUIRIES TO..

MRS. C. M. KIMME  
BELL TELEPHONE LABORATORIES  
MURRAY HILL, NEW JERSEY

BE MAT2 IS A SET OF SUBPROGRAMS TO BE USED WITH A FORTRAN CALLING PROGRAM ON AN IBM 7090 COMPUTER USING THE IB FORTRAN MONITOR. THE PACKAGE CONTAINS SUBROUTINES TO ADD, SUBTRACT, SCALAR MULTIPLY, MATRIX MULTIPLY, INVERT, TRANSPOSE, MOVE, CHANGE THE SIGNS OF, SOLVE FOR THE TRACE AND DETERMINANT OF REAL MATRICES. ALSO INCLUDED ARE SUBPROGRAMS FOR SOLVING SIMULTANEOUS LINEAR EQUATIONS AND FOR STORING THE IDENTITY OF NULL MATRIX. EIGENVALUES AND EIGENVECTORS CAN BE OBTAINED FOR REAL SYMMETRIC MATRICES. FEATURES OF THE PACKAGE ARE A VARIABLE DIMENSION TABLE GENERATOR AND PROVISION FOR INTERNAL DOUBLE PRECISION ARITHMETIC IN SOME OF THE SUBPROGRAMS. LANGUAGE- FAP.

**7090-1499IBMEXP3 FORTRAN II LIBRARY FUNCTION-EXP 3**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1499IBMEXP

AUTHORS..MR. RICHARD V. BERGSTRESSER

IBM CORPORATION  
401 GRAND AVENUE  
OAKLAND, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

THIS IS AN IMPROVED VERSION OF 709/7090 FORTRAN II LIBRARY FUNCTION WHICH PERFORMS EXPONENTIATION OF FLOATING POINT BASE RAISED TO A FLOATING POINT POWER. BY USING 709/7090 FORTRAN II LIBRARY FUNCTIONS EXP AND LOG INSTEAD OF INTERNALLY WRITTEN FUNCTION, EXP /3 /REVISED/ GAINS A 15% IMPROVEMENT IN SPEED, SLIGHT IMPROVEMENT IN ACCURACY AND A REDUCTION OF 98 CELLS OF CORE STORAGE. MOST RECENT VERSIONS OF EXP AND LOG SHOULD BE MAINTAINED IN SYSTEMS LIBRARY BEFORE ADDING EXP /3. MINIMUM MACHINE CONFIGURATION. SOURCE LANGUAGE IS FAP. MAY ALSO BE USED ON THE 709.

**7090-1500SD9137 EQUATION OF STATE 3 /1 COMPONENT/**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1500SD9137

AUTHORS..O. REDLICH A. K. DUNLOP

DIRECT INQUIRIES TO..

A. K. DUNLOP  
SHELL DEVELOPMENT CO  
EMERYVILLE, CALIF.

TO COMPUTE COMPRESSIBILITY FACTORS AND FUGACITY COEFFICIENTS OF A GAS FOR A SET/S/ OF TEMPERATURES AND PRESSURES, KNOWING THE CRITICAL TEMPERATURE AND PRESSURE AND THE AGENTRIC FACTOR,  $w_1$  OF K. S. PITZER ET AL. A/ RESTRICTIONS  
A/ NO MACHINE COMPONENTS BEYOND THOSE NECESSARY FOR THE FORTRAN MONITOR ARE REQUIRED.  
B/ NO OTHER PROGRAMS ARE REQUIRED- THE BINARY DECK CONTAINS ALL NON-LIBRARY ROUTINES NEEDED.  
C/ ANY NUMBER OF PRESSURE-TEMPERATURE SCHEDULES FOR ANY NUMBER OF SUBSTANCES MAY BE CALCULATED- 1-99 TEMPERATURES AND 1-99 PRESSURES MAY BE CONTAINED IN A SINGLE SCHEDULE-THE TEMPERATURES ARE SEPARATED BY ANY CONSTANT INCREMENT AND THE PRESSURES EITHER GENERATED SIMILARLY, OR IN A 1, 2, 5, 10, ETC., RATIO SEQUENCE.  
SOURCE LANGUAGE-FORTRAN 2

**7090-1501SD9138 EQUATION OF STATE 3 /MIXTURES/**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1501SD9138

AUTHORS..O REDLICH A. K. DUNLOP

DIRECT INQUIRIES TO..

A. K. DUNLOP  
SHELL DEVELOPMENT CO  
EMERYVILLE, CALIF.

TO COMPUTE COMPRESSIBILITY FACTORS AND FUGACITY COEFFICIENTS OF COMPONENTS IN GAS MIXTURES FOR A SET/S/ OF TEMPERATURES, PRESSURES, AND COMPOSITIONS, KNOWING THE CRITICAL TEMPERATURE AND PRESSURE AND THE AGENTRIC FACTOR,  $w_1$  OF K. S. PITZER ET AL., A/ OF EACH OF THE COMPONENTS. THE USE OF INTERACTION

CONTINUED FROM PRIOR PAGE--

COEFFICIENTS IS PROVIDED FOR.  
RESTRICTIONS

A/ NO MACHINE COMPONENTS BEYOND THOSE NECESSARY FOR THE FORTRAN MONITOR ARE REQUIRED.  
 B/ NO OTHER PROGRAMS ARE REQUIRED-- THE BINARY DECK CONTAINS ALL NON-LIBRARY ROUTINES NEEDED.  
 C/ ANY NUMBER OF PRESSURE-TEMPERATURE SCHEDULES FOR ANY NUMBER OF MIXTURES /CONTAINING UP TO 7 COMPONENTS/ MAY BE CALCULATED-- 1-99 TEMPERATURES AND 1-99 PRESSURES MAY BE CONTAINED IN A SINGLE T-P SCHEDULE AND 1-99 MIXTURES MAY BE STIPULATED FOR A GIVEN LISTING OF COMPONENTS. THE TEMPERATURES ARE SEPARATED BY ANY CONSTANT /IN A GIVEN SCHEDULE/ INCREMENT AND THE PRESSURES ARE EITHER GENERATED SIMILARLY, OR IN A 1, 2, 5, 10, ETC., RATIO SEQUENCE. THE COMPOSITION FOR EACH MIXTURE IS STIPULATED ON A SEPARATE CARD. SOURCE LANGUAGE--FORTRAN 2

**7090-1502TYFRNF ROUND FLOATING ARITHMETIC IN FORTRAN II**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1502TYFRNF

AUTHOR...DR. W. KAHAN  
 INSTITUTE OF COMPUTER SCIENCE  
 UNIVERSITY OF TORONTO  
 TORONTO, CANADA

DIRECT INQUIRIES TO AUTHOR

CORRECTLY TO ROUND FLOATING ADDITIONS, SUBTRACTIONS AND MULTIPLICATIONS, WHICH WOULD OTHERWISE BE TRUNCATED, IN FORTRAN II PROGRAMS.  
 1. WRITTEN IN 709/90 FAP.  
 2. OPERATES ON REAL, FLOATING-POINT NUMBERS.  
 3. TO BE USED AS A FUNCTION IN A FORTRAN PROGRAM.  
 4. NO OTHER SUB-PROGRAMS ARE USED.  
 5. USES 24 CELLS /30 SUB 8/.

**7090-1503TYSQR8 IMPROVED SQUARE-ROOT FOR FORTRAN II**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1503TYSQR8

AUTHOR...W. KAHAN  
 INSTITUTE OF COMPUTER SCIENCE  
 UNIVERSITY OF TORONTO  
 TORONTO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO CALCULATE THE SQUARE ROOT OF A FLOATING POINT NUMBER.  
 1. WRITTEN IN 709/90 FAP.  
 2. USES REAL, FLOATING-POINT NUMBERS.  
 3. INTENDED AS A SUBSTITUTE FOR THE FORTRAN II SYSTEM/S SORTF.  
 4. NO OTHER SUB-PROGRAMS ARE USED.  
 5. USES 45 CELLS /55 TO THE POWER OF 8/ PLUS ERASABLE COMMON 77774-6.

**7090-1504TYMXMN COMBINED MAXIMIZING, MINIMIZING OPERATIONS**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1504TYMXMN

AUTHOR...W. KAHAN  
 INSTITUTE OF COMPUTER SCIENCE  
 UNIVERSITY OF TORONTO  
 TORONTO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO FIND QUICKLY THE ALGEBRAICALLY OR ABSOLUTELY LARGEST OR SMALLEST OF A SUBSET OF /A SUBSET OF/ THE ELEMENTS OF A FLOATING POINT ARRAY 1 OR A FIXED POINT ARRAY 1.  
 1. WRITTEN IN 709/90 FAP.  
 2. USES EITHER FIXED POINT OR REAL FLOATING-POINT NUMBERS.  
 3. CAN BE USED AS A FUNCTION IN A FORTRAN PROGRAM.  
 4. USES NO OTHER SUBPROGRAMS.  
 5. USES 44 CELLS /54 TO THE POWER OF 8/.

**7090-1506RSGAS1 GENERALIZED ASSEMBLY SYSTEM**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1506RSGAS1

AUTHOR...G. H. MEALY  
 29 LORI STREET  
 PUGHKEEPSIE, NEW YORK

DIRECT INQUIRIES TO AUTHOR

GAS IS AN EXPERIMENTAL ASSEMBLY SYSTEM, IMPLEMENTED FOR THE IBM 7090 AND OPERATING AS AN SOS OBJECT PROGRAM. IT MAY EASILY BE CONVERTED TO OPERATE WITH NON-SOS INPUT-OUTPUT ROUTINES. IF FULLY IMPLEMENTED, GAS WOULD HAVE THE FOLLOWING FEATURES--  
 1. MACRO FACILITIES AT LEAST AS POWERFUL AS THOSE IN BE FAP.  
 2. LIBRARY ITEMS SUBJECT TO PARAMETER SUBSTITUTION ON CALL.  
 3. COMPRESSED DECK AND SYMBOLIC MODIFICATION FACILITIES VIA ALTER.  
 4. ABILITY TO USE GAS AT EXECUTION TIME.  
 5. ABILITY TO MODIFY GAS OVER PART OF AN ASSEMBLY.  
 6. DECK COMBINATION BASED ON USE OF NESTED SETS OF LOCAL SYMBOLS. INTERNALLY, GAS USES A TEXT ENCODING SCHEME SIMILAR TO THAT OF SCAT, CI, AND MAP.

**7090-1507LFAT62 U.S. STANDARD ATMOSPHERE, 1962**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1507LFAT62

AUTHOR...LILLIAN R BONEY  
 NASA-LANGLEY RESEARCH CENTER

CONTINUED FROM PRIOR COLUMN--  
LANGLEY STATION  
HAMPTON, VIRGINIA

DIRECT INQUIRIES TO AUTHOR

FORTRAN II SUBROUTINE TO APPROXIMATE THE U.S. STANDARD ATMOSPHERE, 1962 COMPUTES DENSITY IN SLUGS/FT. MORE THAN 3, PRESSURE IN LBS/FT MORE THAN 2, TEMPERATURES IN DEGREES KELVIN, AND THE VELOCITY OF SOUND IN FT/SEC AT ANY GEOMETRIC ALTITUDE, Z, IN THE RANGE--16,500 FT LESS THAN Z LESS THAN 2,320,000 FEET. THE FOLLOWING ADDITIONAL SUBROUTINES ARE REQUIRED ON THE USER/S FORTRAN LIBRARY TAPE-- /DFAD/, /DFSB/, /DFMP/, /DFDP/, DSIN, DCS, DLOG, SGR1, LOG, EXP.  
 RANGE-- FOR ALTITUDES BELOW--16,500 FEET THE VALUES OF DENSITY, PRESSURE, TEMPERATURE, AND VELOCITY OF SOUND ARE NOT VALID. THE CONCEPT OF THE VELOCITY OF SOUND IN THE ATMOSPHERE BECOMES ESSENTIALLY MEANINGLESS AT ALTITUDES IN EXCESS OF 300,000 FEET. TO POINT OUT THIS LIMITATION, THE VELOCITY OF SOUND AT ALTITUDES ABOVE 300,000 FEET IS SET EQUAL TO THE VELOCITY OF SOUND AT 300,000 FEET. FOR ALTITUDES ABOVE 2,320,000 FEET DENSITY, PRESSURE AND TEMPERATURE ARE SET EQUAL TO THEIR RESPECTIVE VALUES AT 2,320,000 FEET. SOURCE LANGUAGE--FORTRAN II.

**7090-1508ORWST GENERALIZED INTERNAL SORT**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1508ORWST

AUTHOR...E.B. CARTER, JR.  
 UNION CARBIDE NUCLEAR CO  
 OAK RIDGE, TENNESSEE

DIRECT INQUIRIES TO AUTHOR

THIS WRITE-UP DESCRIBES ONLY THE MODIFICATIONS MADE TO WD-SORT /SDA-1249/ TO MAKE IT OPERATE WITHIN THE IB-JOB MONITOR SYSTEM. USERS OF THIS ROUTINE SHOULD CONSULT THE ORIGINAL WRITE-UP FOR ADDITIONAL INFORMATION. OR WST MAY BE CALLED FROM CBL, FTN, OR MAP PROGRAMS.  
 DECK NAME-- CRWST THE LENGTH IS 392 /610/\* WORDS  
 ENTRY POINTS-- SORTAC IS USED TO SORT IN ASCENDING SEQUENCE  
 SORTDC IS USED TO SORT IN DESCENDING SEQUENCE  
 CONTROL SECTIONS-- SORTAB THIS SECTION CONTAINS THE ERASABLE STORAGE AREAS ATAB AND BTAB. AS DISTRIBUTED THIS SECTION IS 119 /167/ WORDS LONG.  
 SORTAL THIS SECTION CONTAINS CODING USED FOR PROCESSING ALGEBRAIC SORTS. IF ALGEBRAIC SORTS ARE NOT REQUIRED A SORT CARD MAY BE USED TO SAVE 32 /40/ LOCATIONS.  
 VIRTUAL NAMES-- /FXEM. CALLING SEQUENCE ERRORS IN THE ORIGINAL PROGRAM GAVE A NORMAL RETURN WITHOUT SORTING. THIS HAS BEEN CHANGED TO CALL /FXEM. /#1249/. ALSO, THIS CALL IS TAKEN IF AN ALGEBRAIC SORT IS REQUESTED AND CONTROL SECTION SORTAL HAS BEEN OMITTED. A RETURN AFTER THIS CALL RETURNS TO THE PROGRAM THAT CALLED OR WST WITHOUT SORTING THE DATA.  
 SYSLOC USUAL USE.

THE CALLING STATEMENTS FOR CR WST ARE THE SAME AS GIVEN FOR WD SORT. THE CHANGES MADE INVOLVE THE INTERPRETATION OF THE ITEMS IN THE CALLING SEQUENCE TO CORRESPOND WITH THE FORWARD STORING OF ARRAYS AS USED IN CBL AND FTN. A PREST DECK IS AVAILABLE FOR REASSEMBLY. THE ASSEMBLY PARAMETERS MAXA AND MAXS MENTIONED ON PAGE 4 OF THE WD SORT WRITE-UP ARE DEFINED ON CARDS 2 AND 3 RESPECTIVELY.

**7090-1512DFDK00 DK00--ONE CARD ON-LINE LOADER FOR ROW BINARY CARDS**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1512DFDK00

AUTHOR...P.A. JACOBY  
 DOUGLAS AIRCRAFT CO., INC. /DF/  
 MISSILE & SPACE SYSTEMS DIVISION, DEPT. A-273  
 3000 OCEAN PARK BLVD.  
 SANTA MONICA, CALIF.

DIRECT INQUIRIES TO AUTHOR

ONE CARD ON-LINE LOADER FOR ABSOLUTE ROW BINARY CARDS. ABSOLUTE ROW BINARY CARDS TO BE LOADED MUST HAVE THE LOCATION IN ROW 9, COLUMNS 22-37., THE WORD COUNT IN ROW 9, COLUMNS 14-18., AND THE CHECKSUM IN ROW 9, COLUMNS 37-72. THESE CARDS MAY BE PRODUCED BY A ROW ABSOLUTE FAP ASSEMBLY. THE TRANSFER CARD OF THE DECK TO BE LOADED MUST BE REMOVED AND REPLACED BY ONE HAVING A TRANSFER INSTRUCTION IN ROW 9, COLUMNS 37-54, AND THE TRANSFER LOCATION IN ROW 9, COLUMNS 58-72. THESE SHOULD BE THE ONLY PUNCHES ON THE CARD.

**7090-1513DFDK01 DK01--DUMP DISK TRACKS**

AVAILABLE 3RD QUARTER 1963.  
 ORDER FROM PROGRAM DISTRIBUTION CENTER  
 SPECIFY FILE NUMBER 7090-1513DFDK01

AUTHOR...P.A. JACOBY  
 DOUGLAS AIRCRAFT CO., INC.  
 MISSILE & SPACE SYSTEMS DIVISION, DEPT. A-273  
 3000 OCEAN PARK BLVD.  
 SANTA MONICA, CALIF.

DIRECT INQUIRIES TO AUTHOR

ON-LINE PROGRAM TO READ DISK TRACKS SPECIFIED BY CONTROL CARDS AND PLACE ON PRINT TAPE IN AN UGAL DUMP FORMAT. USES 1301 DISK. USES LOADER PROGRAM DK00, AND MUST CONFORM TO ITS REQUIREMENTS. THE DECK IS LOADED ON-LINE, PRECEDED BY THE DK00 LOADER /ON CARD/ FOLLOWED BY CONTROL CARDS--ONE FOR EACH TRACK TO BE DUMPED. INFORMATION IS READ FROM THE DISK IN FULL TRACK MODE AND PLACED ON TAPE FOR OFF-LINE PRINTOUT. MAY BE USED ON THE 7094 ALSO. SOURCE LANGUAGE--FAP



**7090-1516MIERRI DOUBLE-PRECISION PROBABILITY INTEGRALS**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1516MIERRI

AUTHORS..MR. KENNETH B. LARSON  
ROOM 4-017  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE 39, MASSACHUSETTS

DIRECT INQUIRIES TO AUTHOR

FOR AN ARGUMENT X, EVALUATES ERROR FUNCTION ERE(X) AND ERROR-FUNCTION COMPLEMENT EREC(X) TO 15-16 SIGNIFICANT DIGITS, AND INTEGRATED ERROR-FUNCTION COMPLEMENT IERIC(X) TO 13-16 SIGNIFICANT DIGITS, DEPENDING ON VALUE OF X WITHIN RANGE 0 TO 10. REQUIRES 2539 LOCATIONS, 0 COMMON. TIMING IS 67 MILLISECONDS MAXIMUM.

**7090-1521ERLPOA LINEAR PROGRAMMING OUTPUT ANALYZER**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1521ERLPOA

AUTHORS..L.J. LARSEN B.G. MCLAUGHLAN MISS J. B. SNEAL

DIRECT INQUIRIES TO..

L.J. LARSEN  
ESSO RESEARCH & ENGINEERING CO.  
P.O. BOX 209  
MADISON, NEW JERSEY

TO GENERATE A REPORT FROM THE OUTPUT OF THE CEIR LP/90 LINEAR PROGRAMMING SYSTEM, SHARE DISTRIBUTION NO. 1300. THIS, THE PROGRAM PROVIDES A SOLUTION TO ONE OF THE MAJOR OBSTACLES ENCOUNTERED IN LARGE LINEAR PROGRAMMING APPLICATIONS. THIS PROBLEM IS ONE OF RAPIDLY TRANSFORMING THE LARGE VOLUME OF RESULTS THAT ACCOMPANY THE SOLUTION OF TYPICAL PROBLEMS TO A FORM THAT IS SUITABLE FOR DETAILED ANALYSIS OR MANAGEMENT REVIEW.  
A. MACHINE COMPONENTS REQUIRED WHEN USING ANALYZER 32K 7090, 3 TAPES ON CHANNEL A, 3 TAPES ON CHANNEL B, ON-LINE PRINTER AND CARD READER.  
B. ER LPOA IS DESIGNED TO BE INCLUDED AS PART OF THE CEIR LP/90 LINEAR PROGRAMMING SYSTEM. MINOR MODIFICATIONS ARE REQUIRED TO THE CEIR SYSTEM.  
C. REFER TO THE 7090 LINEAR PROGRAMMING OUTPUT ANALYZER REFERENCE MANUAL FOR THE INPUT/OUTPUT FORMAT AND OTHER REQUIREMENTS.  
D. IN ORDER TO USE THE PUNCH OPTION, THE BCD OUTPUT FROM ER LPOA MUST BE PRINTED ON A 1401 USING A SPECIAL 1401 PROGRAM. SUCH A PROGRAM IS THE ER SIMULATNECUS READ, PRINT, AND PUNCH PROGRAM, WHICH IS BEING RELEASED TO SHARE.  
MACHINE LANGUAGE-SCAT

REQUESTOR MUST SUBMIT ONE TAPE TO OBTAIN BASIC PROGRAM MATERIAL CONSISTING OF SYMBOLIC CARDS FOR COMPILE RUN A AND COMPILE RUN B AND SAMPLE PROBLEM DATA AND AGENDUM.

**7090-1522NBSERFI INVERSE ERROR FUNCTION**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1522NBSERF

AUTHORS..NEALL STRAND GARNEY HARDY

DIRECT INQUIRIES TO..

NEALL STRAND  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER COLORADO

THIS SUBROUTINE COMPUTES THE INVERSE ERROR FUNCTION I. E. GIVEN Y IN THE EQUATION. RESTRICTIONS- THIS SUBROUTINE USES THE SUBROUTINE ERRI69/SHARE IDENTIFICATION C3LAFERRI/ TO CALCULATE THE ERROR FUNCTION.

**7090-1523NBSTAU ROOTS OF RICATTIDIFF EQUATIONS**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1523NBSTAU

AUTHORS..MR. JOHN D. HARPER, JR.  
NATIONAL BUREAU OF STANDARDS  
BOULDER, COLORADO

DIRECT INQUIRIES TO AUTHOR

NBS TAU COMPUTES THE ROOTS OF A RICATTI DIFFERENTIAL EQUATION USED IN THE CALCULATION OF CERTAIN ELECTROMAGNETIC WAVE PROBLEMS EXPRESSED AS A SERIES OF RESIDUES. THE METHOD IS FORMULATED IN NATIONAL BUREAU OF STANDARDS TECHNICAL NOTE 7 DISTRIBUTED BY UNITED STATES DEPARTMENT OF COMMERCE, OFFICE OF TECHNICAL SERVICES, WASHINGTON 25, D.C. IT CONSISTS OF AN ASYMPTOTIC SERIES AND A CONVERGENT SERIES. LIMITATIONS ARE GIVEN UNDER RESTRICTIONS. SEE FLOW CHART FOR LOGIC DETAILS. NBS TAU AS DISTRIBUTED IS A SUBROUTINE WHICH EXPECTS A FORTRAN CALLING SEQUENCE. IT REQUIRES SEVERAL SUBROUTINES NOT INCLUDED.  
MACHINE LANGUAGE- FORTRAN II

**7090-1524NBCKP SAP-F SUBROUTINES COMPLEX ARITHMETIC PACKAGE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1524NBCKP

AUTHOR...JOHN HARPER  
NATIONAL BUREAU OF STANDARDS  
BOULDER, COLORADO

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO AUTHOR

NBS CPK CONTAINS CERTAIN COMPLEX ARITHMETIC SUBPROGRAMS WRITTEN AS SUBROUTINES FOR USE IN PROGRAMS WHERE CHANGEVER TO BUILT-IN COMPLEX ARITHMETIC IS NOT DESIRABLE OR NOT AVAILABLE. ZMPY AND ZDIV ARE PRIMARILY THE SAME AS THE COMPLEX MULTIPLY AND DIVIDE USED IN THE COMPLEX FEATURE OF FORTRAN II. POLR CONVERTS FROM RECTANGULAR TO PCLAR FORM USING TRIGONOMETRIC IDENTITIES TO HELP PRESERVE PRECISION. ZSORT EMPLOYS A METHOD DESCRIBED BY SIDNEY KAPLAN, MTAC, VOL 4, 1950, P. 177.  
7050 SAP-F SUBROUTINES

**7090-1525BCSHFT FAP INSTRUCTION SIMULATOR FOR FORTRAN**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1525BCSHFT

AUTHOR...G.D. JOHNSON  
UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

TO SIMULATE IN FORTRAN PROGRAMS THE EQUIVALENT FAP INSTRUCTIONS ALS, ARS, LLS, LRS, LGL, RQL /SEE FAP MANUAL FOR DESCRIPTION/, AND ALSO TO INTRODUCE A NEW PSEUDO OPERATION ROTATE WHICH, LIKE RQL, ROTATES THE ENTIRE C/AC/ AND C/M/ LEFT, TREATING THEM AS ONE LOGICAL 72 BIT CIRCULAR REGISTER. THE DESIRED FAP INSTRUCTIONS ARE EXECUTED WHEN CALLED FOR BY THIS SUBROUTINE. SOURCE LANGUAGE-FAP-F

**7090-1526BCERPR MATH ERROR PRINTOUT**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1526BCERPR

AUTHORS..J. CAUGHRAN G.D. JOHNSON

DIRECT INQUIRIES TO..

J. CAUGHRAN  
UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

BC LIBRARY ROUTINES PROVIDING AN ERROR INDICATION MAY CALL /ERPR/ TO REPORT THE CONDITION. ERPR DECIDES /USING LINKAGE DIRECTORS, ETC./ IN WHICH SUBROUTINE THE IMPROPER CALL WAS MADE /I.E./, THE SUBROUTINE CALLING THE LIBRARY ROUTINE WHICH CALLED ERPR, AND AT WHICH STATEMENT WITHIN THE ROUTINE THE CALL WAS MADE. SUBROUTINES MAY HAVE ANY NUMBER OF ARGUMENTS OR BE FORTRAN II F-TYPE FUNCTIONS. WRITTEN IN FAP-F

**7090-1527BCFLPT FLOATING POINT TRAP**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1527BCFLPT

AUTHOR...GIO WIEDERHOLD

DIRECT INQUIRIES TO..

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

FLOATING POINT TRAP MONITORING PACKAGE FOR FORTRAN MONITOR. THE FEATURES DESCRIBED HEREIN WILL BE RETAINED IN THE 7090 BC MONITOR WHEN IT BECOMES AVAILABLE.

ENTRY POINT NAMES-

/FPT/ FORTRAN MONITOR FLOATING POINT TRAP ENTRY  
/FTMOPT/ MODIFY STANDARD /FPT/ OPTIONS  
/FMSET/ USER CONTROL OPTION

/FPTC/ PRINTOUT COUNT OF ERROR OCCURRENCES FOR MONITOR  
/QUCT/ LOCATION IN /FPT/ TO SET DIVIDE CHECK RESULT  
ON OUT 7090 ALSO DIVIDE CHECKS-BOTH FIXED AND FLOATING- ARE TRAPPED AS PART OF FLOATING POINT TRAPPING.  
THE FORTRAN STATEMENT IF ACCUMULATOR OVERFLOW, OR IF QUOTIENT OVERFLOW AND IF DIVIDE CHECK WILL STILL ALLOW TESTING OF THESE CONDITIONS. THE DIVIDE CHECK LIGHT WILL REMAIN ON.  
SOURCE LANGUAGE-FAP

**7090-1528BCFPTC ERROR COUNT STORAGE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1528BCFPTC

AUTHOR...GIO WIEDERHOLD

DIRECT INQUIRIES TO..

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

PROVIDE A STORAGE AREA IN MEMORY INTO WHICH ERROR COUNTS GIVEN BY BC LIBRARY PROGRAMS MAY BE ACCUMULATED. SOURCE LANGUAGE-FAP

**7090-1529BCKMER CHARACTER HANDLING ROUTINE GENERATOR**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1529BCKMER

AUTHORS..GIO WIEDERHOLD GARY Y. BREITBARD

DIRECT INQUIRIES TO..

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

A SET OF ROUTINES TO FACILITATE FAST CHARACTER HANDLING IN FORTRAN II. THE ROUTINES DO NOT PROCESS THE CHARACTER STRINGS THEMSELVES, BUT GENERATE ROUTINES AND LISTS. THESE THEN MAY BE TIED TOGETHER TO ALLOW COMPLEX HANDLING OF CHARACTER STRINGS. THIS METHOD HAS BEEN CHOSEN BECAUSE NO /OR LITTLE/ INITIALIZATION

CONTINUED FROM PRIOR PAGE--  
OF THE ACTUAL HANDLING ROUTINES IS REQUIRED DURING THE PROCESSING PHASE. ROUTINES MAY BE GENERATED ACCORDING TO PARAMETERS PRODUCED DURING EXECUTION.  
MACHINE LANGUAGE-FAP

**7090-1530BCIOMC INPUT/OUTPUT MACROS FOR FAP PROGRAMMING**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1530BCIOMC

AUTHORS..MR. WILLIAM SANDERS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIF.

**DIRECT INQUIRIES TO AUTHOR**

TO ALLOW FAP PROGRAMMERS TO WRITE PSEUDO-FORTRAN INPUT/OUTPUT STATEMENTS. A SERIES OF MACROS ARE PROVIDED THAT EXPAND INSTRUCTIONS OF THE FORM READ FMT, /LESS THAN/ INTO APPROPRIATE CALLING SEQUENCES TO FORTRAN I/O ROUTINES.  
USAGE--  
MACRO PACKAGE IS INSERTED AT THE BEGINNING OF EACH FAP PROGRAM AND APPROPRIATE INSTRUCTIONS USED IN THE PROGRAM.  
CALLING SEQUENCE--  
READ FMT, /LESS THAN/, WRITE FMT, /LESS THAN/, PUNCH FMT, /LESS THAN/  
SPACE REQUIRED--  
FUNCTION OF THE COMPLEXITY OF THE I/O LISTS.  
GENERAL COMMENTS--  
THIS PACKAGE PROVIDES THE FACILITY TO DO INPUT/OUTPUT EASILY IN FAP WITHOUT THE REQUIREMENT OF EXTENSIVE MODIFICATIONS TO THE ASSEMBLER. IT HAS BEEN FOUND TO BE ESPECIALLY USEFUL IN TEACHING FAP CODING TO BEGINNERS.  
MACHINE LANGUAGE-FAP

**7090-1531BCNONL SUBROUTINE GAUSS-NON LINEAR REGRESSION SUBROUTINE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1531BCNONL

AUTHOR...R.M. BAER

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
COMPUTER CENTER  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

THE PROCEDURE USED HERE REPLACES THE FUNCTION G BY ITS FIRST ORDER TAYLOR EXPANSION /IN THE B SUB I/, SOLVES FOR THE MINIMUM OF S /WHICH IS BEING APPROXIMATED BY A QUADRATIC/ BY SOLVING THE J LINEAR EQUATIONS WHICH EXPRESS THE FACT THAT THE APPROXIMATION FOR S SHOULD HAVE ZERO GRADIENT. THE PARAMETERS B SUB I ARE CHANGED ACCORDINGLY, AND THE PROCEDURE IS ITERATED UNTIL THE CORRECTIONS FOR THE B SUB I ARE FOUND TO BE NEGLIGIBLE OR UNTIL A LIMIT ON THE NUMBER OF ITERATIONS IS EXCEEDED.  
MACHINE LANGUAGE- FORTRAN II

**7090-1532BCSIMQ SIMULTANEOUS EQUATION SUBROUTINES**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1532BCSIMQ

AUTHOR...J.T. OLSZTYN

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

THIS SUBROUTINE WILL SOLVE THE MATRIX EQUATION AX=BB FOR THE UNKNOWN MATRIX X. THE DIMENSIONS OF THE VARIOUS MATRICES MUST BE-

A- N X N  
B- N X M  
X- N X M

WITH THE RESTRICTION THAT M LESS THAN N. AT THE SAME TIME, THIS SUBROUTINE COMPUTES A SCALED VERSION OF THE DETERMINANT OF THE MATRIX A. THE SOLUTION OF THE MATRIX EQUATION AX=BB IS ACCOMPLISHED BY UPPER TRIANGULARIZING THE A MATRIX USING FOR EACH REDUCTION STEP A MAXIMUM PIVOT. THIS ENTAILS SEARCHING, AT THE KTH STAGE OF THE REDUCTION, THE REDUCED /N-K/ X /N-K/ A MATRIX FOR THE ELEMENT WHOSE ABSOLUTE VALUE IS THE LARGEST. A ROW AND COLUMN INTERCHANGE IS THEN PERFORMED TO BRING THIS ELEMENT INTO THE AKK POSITION. AFTER COMPLETION OF THE TRIANGULARIZATION, BACK SUBSTITUTION IS USED TO OBTAIN THE X MATRIX.  
MACHINE LANGUAGE-FAP

**7090-1533BCINVT MATRIX INVERSION /FORTRAN/**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1533BCINVT

AUTHORS..MR. EDWARD L. WILSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

THIS FORTRAN SUBROUTINE INVERTS A REAL SQUARE MATRIX. THE SUBROUTINE IS CODED INDEPENDENTLY OF DIMENSION STATEMENTS. THE DIMENSION OF THE MATRIX TO BE INVERTED IS AN ARGUMENT IN THE SUBROUTINE/S CALLING SEQUENCE- THEREFORE, IS IT NOT NECESSARY TO RECOMPILE THE SUBROUTINE FOR DIFFERENT PROBLEMS.  
MACHINE LANGUAGE- FORTRAN II

**7090-1534BCROOT FLOATING POINT SQUARE ROOT ROUTINE.**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER

CONTINUED FROM PRIOR COLUMN--  
SPECIFY FILE NUMBER 7090-1534BCROOT

AUTHOR...THOMAS SUMNER J. G. CAUGHRAN G. D. JOHNSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

TO COMPUTE A FLOATING POINT SQUARE ROOT TO FULL ACCURACY IN LEAST TIME. RESTRICTIONS- THE ARGUMENT MUST BE NORMALIZED OR ZERO. MACHINE LANGUAGE- FAP-FORTRAN  
USAGE-

1. CALLING SEQUENCE  
FORTRAN- /PREFERRED/ APPEARANCE OF SQRT/ARG/ IN A FORTRAN ARITHMETIC STATEMENT.  
OPTIONAL- APPEARANCE OF SORTF/ARG/ IN A FORTRAN ARITHMETIC STATEMENT.
2. FAP. CALL SQRT, ARG

**7090-1535BCLOG4 FLOATING POINT NATURAL LOGARITHM**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1535BCLOG4

AUTHOR...G.D. JOHNSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

THIS 7090 SUBROUTINE COMPUTES LOG SUBE X OR LOG SUB 10 X FOR A SINGLE-PRECISION FLOATING-POINT ARGUMENT.  
MACHINE LANGUAGE-FAP-FORTRAN

**7090-1536BCEXP FLOATING POINT EXPONENTIAL SUBROUTINE**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1536BCEXP

AUTHORS..MR. GERALD C. JOHNSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
COMPUTING CENTER  
BERKELEY 4, CALIFORNIA

GIVES ERROR MESSAGE WHEN ARGUMENT EXCEEDS 88.028 BUT RETURNS MAX. VALUE. TIMING APPROX. 0.362MS., 83 LOCATIONS. USES 20 BC ERPR.  
USAGE-

1. CALLING SEQUENCE  
FORTRAN- /PREFERRED/ APPEARANCE OF EXP /ARG/ IN A FORTRAN ARITHMETIC STATEMENT.  
OPTIONAL/ APPEARANCE OF EXPF /ARG/ IN A FORTRAN ARITHMETIC STATEMENT.

WRITTEN IN FAP-F

**7090-1537 BCTANH HYPERBOLIC TANGENT SUBROUTINE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1537 BCTAN

AUTHORS..MR. GERALD D. JOHNSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
COMPUTER CENTER  
BERKELEY 4, CALIFORNIA

THIS SUBROUTINE COMPUTES TANH X FOR ANY SINGLE PRECISION FLOATING POINT ARGUMENT.

USAGE--  
CALLING SEQUENCE--  
FORTRAN- /PREFERRED/ APPEARANCE OF TANH/ARG/ IN A FORTRAN ARITHMETIC STATEMENT.  
OPTIONAL/ APPEARANCE OF TANHF /ARG/ IN A FORTRAN ARITHMETIC STATEMENT.  
FAP- CALL TANH, ARG.  
SPACE REQUIRED- 103 LOCATIONS  
INPUT- NORMALIZED FLOATING X  
OUTPUT- NORMALIZED FLOATING TANH /X/ IN AC  
WRITTEN IN FORTRAN-FAP

**7090-1538BCSIN SINE/COSINE SUBROUTINE**

AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1538BCSIN

AUTHOR...G.D. JOHNSON

**DIRECT INQUIRIES TO..**

MR. DONALD C. HOBBS  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIFORNIA

THIS 7090 SUBROUTINE COMPUTES THE SINE OR THE COSINE RESPECTIVELY OF A SINGLE PRECISION NORMALIZED FLOATING POINT ARGUMENT. THE SINE IS EVALUATED FROM TWO CONTINUED FRACTIONS, WHICH WERE DERIVED ON THE BASIS OF IDEAS OF H.J. MAEFLY AND E.G. KOGGEBLIANTZ MODIFIED IN SOME RESPECTS TO TAKE INTO ACCOUNT MACHINE CHARACTERISTICS.  
USAGE-

1. CALLING SEQUENCE--  
FORTRAN- /PREFERRED/ APPEARANCE OF SIN/ARG/ OR COS/ARG/ IN A FORTRAN ARITHMETIC STATEMENT.  
OPTIONAL/ APPEARANCE OF SINF/ARG/ OR COSF/ARG/ IN A FORTRAN ARITHMETIC STATEMENT.

MACHINE LANGUAGE- FAP- FORTRAN

**7090-1539BCATAN ATAN-FLOATING POINT  
ARCTANGENT SUBROUTINE**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1539BCATAN

AUTHORS...J. CAUGHRAN G.D. JOHNSON

DIRECT INQUIRIES TO...  
DONALD C. HOBBS  
UNIVERSITY OF CALIF.  
BERKELEY, CALIF.

COMPUTATION OF FLOATING POINT ARCTANGENT OF ONE OR TWO  
VARIABLES. FOR TWO VARIABLES, A, B, ARCTANGENT /A/B/ IS  
COMPUTED. THIS SUBROUTINE USES A MODIFICATION OF A METHOD  
DEVELOPED BY DR. H. J. WELBY AND MODIFIED BY DR. E.G.  
KOGRELIANTZ /SBC REPORT #1, APRIL 1957/. FOR FURTHER DETAILS  
SEE THE SBC REPORT OR THE WRITEUP OF B1 IB ATN2.

USAGE- A. CALLING SEQUENCE- 1. FORTRAN- /PREFERRED/  
APPEARANCE OF ATAN /ARG/ OR ATAN2 /ARG 1, ARG 2/ IN A FORTRAN  
ARITHMETIC STATEMENT.  
/OPTIONAL/ APPEARANCE OF ATANF /ARG/ OR ATANZF /ARG 1, ARG2/ IN A  
FORTRAN ARITHMETIC STATEMENT.  
2. FAP- CALL ATAN; ARG OR CALL ATAN2; ARG1, ARG2. MACHINE  
LANGUAGE-FAP-FORTRAN.

**7090-1540BCFACT FACT-FACTORIAL SUBROUTINE**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1540BCFACT

AUTHOR...G.D. JOHNSON

DIRECT INQUIRIES TO...  
DONALD C. HOBBS  
UNIVERSITY OF CALIF.  
BERKELEY 4, CALIF.

COMPUTATION OF MOST ACCURATE NORMALIZED FLOATING POINT FACTORIAL  
IN MINIMUM TIME GIVEN A FORTRAN DECREMENT INTEGER. TABLE LOOK-UP  
USAGE-CALLING SEQUENCE- FORTRAN- APPEARANCE OF FACT/N/ IN A  
FORTRAN FLOATING MODE ARITHMETIC STATEMENT WHERE N IS ANY FIXED  
POINT VARIABLE NAME OR AN INTEGER CONSTANT. FAP- CALL FACT N  
WHERE N IS THE LOCATION /ADDRESS/ OF A DECREMENT INTEGER.  
MACHINE LANGUAGE-FAP-FORTRAN.

**7090-1541BCDFCT DFAC-DOUBLE PRECISION  
FACTORIAL SUBROUTINE**  
AVAILABLE 3RD QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1541BCDFCT

AUTHOR...G.D. JOHNSON

DIRECT INQUIRIES TO...  
DONALD C. HOBBS  
UNIVERSITY OF CALIF.  
BERKELEY 4, CALIF.

COMPUTATION OF MOST ACCURATE DOUBLE-PRECISION NORMALIZED  
FLOATING POINT FACTORIAL IN MINIMUM TIME GIVEN A FORTRAN  
DECREMENT INTEGER. TABLE LOOK-UP. USAGE- CALLING SEQUENCE-  
FORTRAN- APPEARANCE OF DFAC/N/ IN A FORTRAN DOUBLE-PRECISION  
FLOATING MODE ARITHMETIC STATEMENT WHERE N IS ANY SINGLE  
PRECISION FIXED POINT VARIABLE NAME OR AN INTEGER CONSTANT.  
FAP- CALL DFAC N WHERE N IS THE LOCATION /ADDRESS/ OF A  
DECREMENT INTEGER. MACHINE LANGUAGE-FAP-FORTRAN.

**7090-1544RSSIMS SIMSCRIPT - A SIMULATION  
PROGRAMMING LANGUAGE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1544RSSIMS

AUTHORS...H. MARKOWITZ B. HAUSNER H. KARR

DIRECT INQUIRIES TO...  
B. HAUSNER  
THE RAND CORPORATION  
1700 MAIN STREET  
SANTA MONICA, CALIFORNIA

SIMSCRIPT IS A LANGUAGE DESIGNED TO EASE THE PROGRAMMING OF A  
DIGITAL SIMULATION. ALTHOUGH IT WAS DEVELOPED FOR SIMULATION  
PROBLEMS, IT IS ACTUALLY A PROGRAMMING SYSTEM THAT IS ALSO  
READILY USABLE FOR NON-SIMULATION PROBLEMS.

RESTRICTIONS-

1. THIS VERSION OF SIMSCRIPT RUNS ONLY UNDER THE 709/7090 FORTRAN  
MONITOR /FORTRAN II, VERSION 2/.  
A. CONVERSION TO THE 704 WOULD REQUIRE A MINIMUM CONFIGURATION  
OF TWO TAPES OVER THE FORTRAN MINIMUM AND AN ON-LINE  
PRINTER.

B. SIMSCRIPT HAS NOT BEEN MODIFIED TO RUN UNDER IBSYS,  
PRIMARILY BECAUSE OF PRESENT HIGH LOCATING ORIGINS.  
ANY DIGITAL SIMULATION CONSISTS OF A NUMERICAL DESCRIPTION OF THE  
STATUS OF THE SIMULATED SYSTEM, WHICH IS DEFINED IN TERMS OF WHAT  
ARE CALLED ENTITIES, ATTRIBUTES OF ENTITIES, AND SETS OF  
ENTITIES. THIS STATUS DESCRIPTION IS MODIFIED AT VARIOUS POINTS  
IN SIMULATED TIME BY EVENTS. SIMSCRIPT PROVIDES A MAIN TIMING  
ROUTINE TO KEEP TRACK OF SIMULATED TIME AND THE OCCURRENCE  
OF EVENTS. AN EVENT ROUTINE IS WRITTEN FOR EACH TYPE OF EVENT,  
DESCRIBING HOW THE STATUS IS TO CHANGE.

THIS SIMSCRIPT LANGUAGE IS SPECIFICALLY DESIGNED TO FACILITATE  
THE FORMULATION AND PROGRAMMING OF THESE EVENT ROUTINES. ONE MAY  
ACCOMPLISH EACH OF THE FOLLOWING OPERATIONS IN THE SINGLE SOURCE-  
LANGUAGE STATEMENT- ALLOCATE OR RETURN STORAGE SPACE FOR  
TEMPORARY VARIABLES; FILE ITEMS INTO SETS; REMOVE ITEMS FROM  
SETS; ACCUMULATE INFORMATION ACROSS SIMULATED TIME; SUMMARIZE  
INFORMATION AT A POINT IN TIME; OR FIND MINIMUMS OR MAXIMUMS  
OVER COLLECTIONS OF ITEMS MEETING SPECIFIED CONDITIONS.  
SOURCE LANGUAGE - 7090 FORTRAN II

**7090-1546NRIOPK COMFORT II - INPUT-OUTPUT  
AND DATA PROCESSING PACKAGE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1546NRIOPK

AUTHOR...R.H. CIANCI  
ROCKETDYNE, DIVISION OF NORTH AMERICAN AVIATION  
6633 CANOGA AVE  
CANOGA PARK, CALIF.

DIRECT INQUIRIES TO AUTHOR

AN INPUT-OUTPUT AND DATA PROCESSING SET OF ROUTINES, COMPATIBLE  
WITH FORTRAN AND THE NAA OR IBM MONITOR SYSTEM, HAS BEEN  
DEVELOPED AT ROCKETDYNE DIVISION AND PUT ON THE FORTRAN LIBRARY  
TAPE.

AMONG THE VALUABLE FEATURES NOT AVAILABLE IN OUR STANDARD FORTRAN  
SYSTEM IS THE USE OF BUFFERING TECHNIQUES FOR INPUT-OUTPUT.  
ENGINEERS WITH LARGE DATA PROCESSING PROBLEMS WOULD DO WELL TO  
INVESTIGATE THE POSSIBILITY OF USING THIS TIME-SAVING MEASURE.  
ESPECIALLY USEFUL FOR MANY APPLICATIONS ARE ROUTINES WHICH PERMIT  
THE EMPLOYMENT OF FULL-WORD INTEGER ARITHMETIC. ALSO NOTEWORTHY  
ARE THE PROVISIONS FOR READING AND/OR WRITING FIXED OR VARIABLE  
LENGTH RECORDS INTO OR OUT OF SINGLE OR MULTIPLE ARRAYS. ALL  
SUBROUTINES ARE USED BY VARIABLE LENGTH CALL STATEMENTS.  
SOURCE LANGUAGE-FAP

REQUESTER MUST SUBMIT ONE REEL OF MAGNETIC TAPE TO OBTAIN DTLPLT  
LISTING, BINARY OBJECT DECK AND SYMBOLIC INPUT AS FILES 1, 2 AND 3  
RESPECTIVELY.

**7090-1547SIINGE INCOMPLETE GAMMA FUNCTION**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1547SIINGE

AUTHOR...RUDELPH LOESER  
SMITHSONIAN ASTROPHYSICAL OBSERVATORY  
60 GARDEN STREET  
CAMBRIDGE 38, MASS.

DIRECT INQUIRIES TO AUTHOR

THE CALCULATION USES INFINITE SERIES, TABLE LOOK-UP AND A  
RECURSION RELATION- THEY ARE ALL DESCRIBED IN DETAIL IN THE  
APPENDIX.

THE THREE ARGUMENTS ARE DOUBLE PRECISION CONSTANTS, WHOSE MOST  
SIGNIFICANT AND LEAST SIGNIFICANT PARTS OCCUPY CONSECUTIVE CELLS,  
THE CELL FOR THE MOST SIGNIFICANT PART HAVING THE HIGHER  
ADDRESS. X AND P ARE INPUT ARGUMENTS- THE ANSWER RETURNS IN F,  
AND HAS 14 OR MORE SIGNIFICANT DECIMAL DIGITS.

THERE ARE NO ERROR STOPS- INGE ALWAYS USES THE ABSOLUTE VALUES OF  
THE GIVEN ARGUMENTS, AND ALWAYS ROUNDS THE GIVEN P TO THE NEAREST  
INTEGRAL ODD MULTIPLE OF 1/2. NOTICE, PLEASE, THAT THE INPUT  
ARGUMENT IS P, AND NOT P & 1.

INGE IS CODED IN FAP, AND USES 2506 SUB 8 CELLS. IT  
REQUIRES NO ADDITIONAL SUBROUTINES AND CAN THEREFORE BE USED  
UNDER BOTH FMS AND BELL- MODIFIED VERSIONS OF THE FMS LIBRARY  
ROUTINES DEXP AND DSQRT HAVE BEEN ASSEMBLED DIRECTLY INTO THE  
ROUTINE. THE CODE UTILIZES A /PRIMITIVE/ SET OF MACROS FOR  
DOUBLE PRECISION ARITHMETIC AND WORD TRANSMISSION, WHICH BY  
ITSELF MAY PROVE USEFUL TO SOME PROGRAMMERS. INGE USES MANY  
PRECALCULATED TABLES TO REDUCE COMPUTATION TIME. WRITTEN IN FAP

**7090-1548UMKAY MULTIPLE K-STATISTICS**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1548UMKAY

AUTHOR...ESTER SCHAEFFER  
106 RACHHAM BUILDING  
ANN ARBOR, MICHIGAN

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM COMPUTES MULTIPLE K-STATISTICS AND MOMENTS OF K/S OR  
THEIR ESTIMATES.

THE MULTIPLE K-STATISTICS WITH SINGLE SUBSCRIPTS WERE FIRST  
DEVELOPED BY R.A. FISHER AS ESTIMATES OF THE CUMULANTS  
OF POPULATION DISTRIBUTIONS. THE IDEA WAS EXTENDED TO MULTIPLE-  
SUBSCRIPT K/S /CALLED POLYKAYS/ BY TURKEY/ BY P. DRESSEL /2/ TO  
OBTAIN ESTIMATES OF PRODUCTS OF CUMULANTS FOR INFINITE  
POPULATIONS AND LATER BY TURKEY /3/ TO OBTAIN THE CORRESPONDING  
K-PARAMETERS FOR FINITE POPULATIONS. THE DEVELOPMENT OF  
K-STATISTICS IS PRESENTED IN AN ARTICLE BY SCHAEFFER AND DWYER  
/1/ WHICH ALSO GIVES METHODS FOR COMPUTING THE K... AND THEIR  
MOMENTS OR ESTIMATES OF MOMENTS. THIS PROGRAM IS BASED ON THE  
COMPUTATIONAL PROCEDURES PRESENTED THERE.

THE MULTIPLE K-STATISTICS ARE COMPUTED BY GETTING THE POWER SUMS  
OF DEVIATES FROM THE MEAN AND MULTIPLYING THEM BY THE APPROPRIATE  
DRESSEL/S COEFFICIENTS, ALSO COMPUTED BY THE PROGRAM.  
SUBSTITUTION PRODUCTS, FOR WHICH FORMULAE ARE PRESENTED IN THE  
ARTICLE BY SCHAEFFER AND DWYER, ARE NEXT COMPUTED AND THEN THE  
MOMENTS OR THEIR ESTIMATES ARE CALCULATED USING THE SUBSTITUTION  
PRODUCTS.

SOURCE LANGUAGE-FORTRAN II

**7090-1549HUESA HARVARD MULTIPLE-PATH  
ENGLISH SYNTACTIC ANALYZER**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1549HUESA

AUTHORS...ANTHONY G. GETTINGER

DIRECT INQUIRIES TO...  
COMPUTATION LABORATORY  
HARVARD UNIVERSITY  
33 OXFORD STREET  
CAMBRIDGE 38, MASSACHUSETTS  
ATTN. MR. SUSUMU KUNC

CONTINUED FROM PRIOR PAGE--

THE ENTIRE PACKAGE INCLUDES THE CURRENT GRAMMER AND DICTIONARY TAPES, THE ANALYZER AND EDITING PROGRAMS AND SERVICE ROUTINES TO ASSIST IN UPDATING THE DICTIONARY AND THE GRAMMER. THE MAIN PROGRAMS ARE RELOCATABLE BINARY DECKS, DESIGNED TO OPERATE UNDER THE FORTRAN II MONITOR SYSTEM ON AN IBM 7090 WITH 32,768 WORDS OF CORE STORAGE, TWO CHANNELS /A AND B/ WITH FIVE TAPE UNITS PER CHANNEL. SOURCE PROGRAMS ARE WRITTEN IN FAP. THE AUXILIARY ROUTINES ARE CONDENSED OBJECT DECKS PRODUCED BY THE IBM 1401 AUTOCODER, DESIGNED TO OPERATE ON AN IBM 1401 WITH 8,000 WORDS OF STORAGE, FOUR TAPE UNITS, AND THE HIGH, LOW, ECLAL COMPARE FEATURE AND STORE ADDRESS REGISTER FEATURE. THE GENERAL AND LINGUISTIC BACKGROUND NECESSARY FOR THE USE OF THIS SYSTEM IS GIVEN IN REPORTS NO. NSF-8 AND NSF-9. DETAILED OPERATING INSTRUCTIONS AND OTHER TECHNICAL INFORMATION PERTAINING TO THE OPERATION OF THE SYSTEM ARE SUPPLIED WITH THE PROGRAM PACKAGE. IN ADDITION, A SAMPLE PROGRAM, INCLUDING TEXT INPUT CARDS AND NECESSARY CONTROL CARDS, WITH A PRINTOUT OF THE EXPECTED RESULTS IS PROVIDED FOR CHECKING THE COMPATIBILITY OF THE USER'S SYSTEM. WRITTEN IN FAP LANGUAGE

**7090-1550A2GNAP NETWORK AUTO PLOT /NAP/**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1550A2GNA

AUTHORS...MR. WILLIAM S. PECK-DEPT. 91  
INTERNATIONAL AIRPORT  
LOS ANGELES 9, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

NAP IS A SET OF FORTRAN AND FAP CODED ROUTINES WRITTEN FOR THE IBM 7090/94. THESE ROUTINES WILL ACCEPT PERT DATA, FROM A PERT COMPUTER RUN, IN A PRESCRIBED FORMAT AND PRODUCE PERT NETWORK CHARTS VIA THE GENERAL DYNAMICS/ ELECTRONICS CATHODE RAY TUBE COMPUTER, SC4020. THIS SC4020 PRODUCES A SERIES OF PICTURES THAT MUST BE JOINED TOGETHER TO PRODUCE A COMPLETE NETWORK CHART. ALTHOUGH THE NAP SYSTEM REQUIRES ITS INPUT IN A RIGID FORMAT, ALL THE DATA IS AVAILABLE FROM ANY PERT COMPUTER RUN. SINCE THE ONLY INPUT TO NAP IS PERT DATA, IT MAY BE USED AS A POST PROCESSOR TO ANY PERT COMPUTER SYSTEM THAT WILL PRODUCE THE REQUIRED INPUT. THE SYSTEM THAT IS DESCRIBED HERE IS A PROTOTYPE SYSTEM, AND IT IS LIMITED IN BUFFER CAPACITY AND FLEXIBILITY. IT IS ONLY BEING RELEASED FOR EXPERIMENTAL PURPOSES AND IN NO WAY IS INTENDED TO BE A COMPLETE OR POLISHED SYSTEM.

NAP REQUIREMENTS--  
HARDWARE-- IBM 7090/94 WITH 2 TAPE CHANNELS, AT LEAST 5 TAPES ON EACH CHANNEL. SC4020 TO BE OPERATED OFF-LINE.  
SOFTWARE--FORTRAN II SYSTEM WITH CHAIN LINK JOB CAPABILITY.

THE NAP SYSTEM CONSISTS OF THREE FORTRAN CHAIN LINKS /50, 51, AND 52/, HENCE THE USE OF A CHAIN TAPE. THE INPUT TAPE IS TO BE IN BCD, AND EACH NETWORK THAT IS INPUT MUST BE PRECEDED BY A HEADER RECORD. EACH ACTIVITY WITHIN A NETWORK WILL APPEAR AS A RECORD OF 120 CHARACTERS ON THE TAPE. THE FORMATS OF THE HEADER AND ACTIVITY RECORDS ARE DEFINED IN THE LONG WRITE-UP OF NAP. WRITTEN IN FORTRAN II

**7090-1551NUSCOP LINEAR SURFACE MINIMIZATION ROUTINE**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1551NUSCOP

AUTHOR...MR. MELVIN SOBOL  
AEC COMPUTING AND APPLIED MATHEMATICS CENTER  
COURANT INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO MINIMIZE A FUNCTION OF SEVERAL /1 TO 24/ PARAMETERS. A SIMPLIFIED DESCRIPTION OF THE MINIMIZATION PROCEDURE IS AS FOLLOWS-- TESTS ARE MADE TO DETERMINE THE BEHAVIOR OF THE FUNCTION AS EACH PARAMETER IS VARIED SEPARATELY. THE PARAMETERS ARE THEN ALL VARIED SIMULTANEOUSLY IN DIRECTIONS SUCH THAT EACH SEPARATELY WOULD DECREASE THE FUNCTION. THE LAST BEST VALUES ARE WRITTEN OUT, AND THE ENTIRE CYCLE IS REPEATED. THE APPROACH TO THE MINIMUM IS MADE VIA A ZIG-ZAG PATH. UNLIKE CONVENTIONAL METHODS, WHICH GO DOWN THE STEEPEST LINEAR DIRECTION, GRADIENTS ARE NEVER COMPUTED. THUS THE FUNCTION NEED ONLY BE PIECEWISE CONTINUOUS. DURING THE SERIES OF TESTS AT THE BEGINNING OF EACH CYCLE, THE INDIVIDUAL INCREMENTS ARE SEPARATELY ADJUSTED. THE ROUTINE, THEREFORE, RETAINS ITS EFFECTIVENESS IF THE FUNCTIONAL SURFACE IS STEEP IN SOME PARAMETERS AND SHALLOW IN OTHERS. WRITTEN IN FORTRAN II.

**7090-1552TYQBRT CUBE ROOT FOR SINGLE PRECISION FLOATING NUMBERS**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1552TYQBRT

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO CALCULATE CUBE ROOTS OF SINGLE PRECISION NUMBERS. WRITTEN IN 709/50 FAP. USES REAL, FLOATING-POINT NUMBERS. CAN BE USED AS A FUNCTION IN A FORTRAN PROGRAM. NO OTHER SUB-PROGRAMS ARE USED. USES 56 CELLS /708/ PLUS ERASABLE COMMON 77774-7.

**7090-1553TYQDRT CUBE ROOT FOR DOUBLE PRECISION FLOATING NUMBERS**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1553TYQDRT

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE

CONTINUED FROM PRIOR COLUMN--  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO CALCULATE CUBE ROOTS OF DOUBLE-PRECISION FLOATING POINT NUMBERS. 1. WRITTEN IN 709/90 FAP.  
2. CAN BE USED AS A FUNCTION IN A FORTRAN II PROGRAM.  
3. NO OTHER SUB-PROGRAMS ARE USED.  
4. USES 89 CELLS /131 SUB B/ PLUS ERASABLE COMMON 77773-7.

**7090-1554TYDSQT SQUARE ROOT FOR DOUBLE PRECISION FLOATING NUMBERS**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1554TYDSQT

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO CALCULATE SQUARE ROOTS OF DOUBLE-PRECISION FLOATING-POINT NUMBERS. 1. WRITTEN IN 709/90 FAP.  
2. CAN BE USED AS A FUNCTION IN A FORTRAN II PROGRAM.  
3. NO OTHER SUB-PROGRAMS ARE USED.  
4. USES 74 CELLS /112 SUB B/ PLUS ERASABLE COMMON 77774-7.

**7090-1556LRJOLD JOLD PLOTTING SYSTEM**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1556LRJOLD

AUTHORS...LOIS DELLNER BETTY JO MOORE

DIRECT INQUIRIES TO...

LOIS DELLNER  
NASA LEWIS RESEARCH CENTER  
2100 BROOKPARK ROAD  
CLEVELAND, OHIO

THE JOLD PLOTTING SYSTEM OFFERS THE USER PRINTED PLOTS WITH MINIMUM PROGRAMMING EFFORT. AFTER WRITING A TITLE FOR THE PLOT ON THE OUTPUT TAPE, HE WRITES CALL PLOTXY OR CALL PLOTXY /FOR MULTIPLE CURVES/. THE ARGUMENTS, OR CALL LIST, INCLUDE THE NAMES OF THE ARRAYS TO BE PLOTTED AND SPECIFY THE NUMBER OF POINTS PER CURVE AND THE NUMBER OF CURVES. THE PROGRAMMER THEN WRITES A LEGEND TO BE PRINTED AT THE BOTTOM OF THE PLOT. THE PLOT OR PLOTS CAN THEN BE PRINTED AS PART OF HIS REGULAR OUTPUT LISTING. IF HE IS USING PLOTXY, THE VALUES OF THE VARIABLE TO BE PLOTTED IN THE X-DIRECTION MUST BE IN SEQUENCE. IF THEY ARE NOT, THE SUBROUTINE SORTXY IS SUPPLIED TO BE USED BEFORE CALLING PLOTXY. FOR EITHER PLOTXY OR PLOTXY, IF THE SIZE OF THE ELEMENTS IN /YR THE TOTAL RANGE OF ANY ARRAY IS NOT KNOWN TO BE WITHIN CERTAIN LIMITS, THE PROGRAMMER SHOULD CALL THE SUBROUTINE SCALE FOR EACH ARRAY BEFORE CALLING THE PLOTTING SUBROUTINE. SCALE WILL TRANSFORM THE ARRAY TO SUIT PLOTXY AND PLOTXY ONLY IF IT IS NECESSARY. TO THE SYSTEM PROGRAMMER, THE SYSTEM CONSISTS OF A SET OF FORTRAN II SUBROUTINES /PLOTXY, PLOTXY, PLOTXY, SCALE, AND SORTXY/, TWO OF WHICH WRITE INFORMATION-PACKED RECORDS ON THE OUTPUT TAPE, AND INCORPORATED INTO A STANDARD TAPE-TO-PRINTER PROGRAM, ONE 1401 SPS SUBROUTINE /PLOT/ WHICH DECODES THE OUTPUT RECORDS AND GENERATES THE PLOT ONE LINE AT A TIME, PREPARING THE NEXT LINE AS THE CURRENT LINE IS BEING PRINTED. WRITTEN IN FORTRAN II.

**7090-1557GRSRT FORTRAN II CALLABLE SORT SYSTEM**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1557GRSRT

AUTHOR...MR. JOHN E. FEDAKO  
GULF RESEARCH & DEVELOPMENT CO.  
P.O. BOX 2038  
PITTSBURGH, PA.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE SORTING CAPABILITIES WITHIN THE FORTRAN II SYSTEM. THIS SYSTEM USES A MAXIMUM OF FOUR UTILITY TAPES FOR MERGING PURPOSES AND AN INPUT TAPE WHICH MUST BE CREATED AT EXECUTION TIME. THE INPUT TAPE IS A BLOCKED BINARY TAPE WITH THE BLOCKING FACTOR SPECIFIED BY THE PROGRAMMER AT EXECUTION TIME. A GET-AND-FILE SCHEME IS INCLUDED IN THE SORT SYSTEM ALONG A BCD TO COLLATOR SEQUENCE CONVERTER FOR SORTING ALPHABETIC INFORMATION. CORE IS SAVED ON THE FORTRAN II SYSTEM PUNCH TAPE AND RESTORED WHEN SORTING IS COMPLETED. TWO OPTIONAL TYPES OF OUTPUT TAPE CAN BE CREATED-- A STANDARD FORTRAN II BINARY TAPE OR A PACKED RECORD BINARY TAPE WHICH CAN ONLY BE READ BY THE SYSTEM GET ROUTINE. GR SRT IS COMPOSED OF FIVE SUBROUTINES. SUBROUTINE RECSIZ PROVIDES THE SORT, GET, AND FILE ROUTINES WITH THE SIZE OF THE RECORDS, THE BUFFER SIZE, THE TAPE NUMBER, AND THE NAME OF THE FILE. UP TO FIVE FILES MAY BE CREATED IN ANY ONE PROGRAM. THE ORDER OF THE DATA IN THE RECORDS IS THE SORT ORDER. SUBROUTINE SORT HAS BUFFERED OUTPUT BUT NOT BUFFERED INPUT. SUBROUTINE KGEN PROVIDES ABILITY TO CONVERT STANDARD BCD TO COLLATOR SEQUENCE DATA. THIS SORT ROUTINE IS ONLY APPLICABLE FOR SINGLE REELS OF INPUT INFORMATION. THERE MUST BE TWO TAPES ON ONE CHANNEL, AND ONE OR TWO ON THE OTHER CHANNEL. THE SORT GENERATOR IS TO BE USED ON A 7090/94 WITH AT LEAST TWO CHANNELS AND IN THE MULTIPLE TAG MODE.

**7090-1558GRGTFL FORTRAN II CALLABLE SORT SYSTEM-GET AND FILE ROUTINE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1558GRGTFL

AUTHOR...MR. JOHN E. FEDAKO  
GULF RESEARCH AND DEVELOPMENT CO.  
P.O. DRAWER 2038  
PITTSBURGH 30, PA.

CONTINUED FROM PRIOR PAGE--

DIRECT INQUIRIES TO AUTHOR

A GET AND FILE ROUTINE FOR READING AND WRITING BINARY TAPES. THIS ROUTINE IS USED TO CREATE INPUT SORT TAPE FOR GR SRT /SDA 1557/. IT CONTAINS ENTRY RECSIZ, AND HAS BUFFERED OUTPUT. WRITTEN IN FAP.

**7090-1559GRKGEN FORTRAN II CALLABLE SORT SYSTEM-BCD TO COLLATOR CONVERSION**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1559GRKGEN

AUTHOR...MR. JOHN E. FEDAKO  
GULF RESEARCH & DEVELOPMENT CO.  
P.O. BOX 2038  
PITTSBURGH 3C, PA.

DIRECT INQUIRIES TO AUTHOR

A BCD TO COLLATOR SEQUENCE CONVERSION ROUTINE FOR USE WITH GR SRT /SDA 1557/. WRITTEN IN FAP.

**7090-1561URBWN PLOTTING ROUTINE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1561URBWN

AUTHOR...H.G. REICHENBACK

DIRECT INQUIRIES TO...  
H.G. REICHENBACK  
405 HILGARD AVE.  
LOS ANGELES 24, CALIF.

ROUTINE FOR GRAPHICAL PRINTOUT OF FUNCTIONS OF ONE OR TWO INDEPENDENT VARIABLES. THE ROUTINE CREATES A PRINTOUT ON TAPE, USING AS INPUT A SET OF POINT VALUES. EACH POINT HAS AN X-VALUE, A Y-VALUE, AND A THIRD QUANTITY WHICH IS EITHER A Z-VALUE OR A SYMBOL. ON THE PRINTOUT THE POINT WILL BE REPRESENTED BY A BCD DIGIT. THE DIGIT IS PRINTED IN A COLUMN WHICH CORRESPONDS TO THE X-VALUE OF ONE POINT, AND A ROW WHICH CORRESPONDS TO THE Y-VALUE OF THE POINT. THE DIGIT IS DETERMINED BY THE THIRD QUANTITY THAT IS ASSOCIATED WITH THE POINT. THE ROUTINE ALSO PRINTS TABLE-MARGIN INFORMATION SUCH AS THE X-VALUES OF COLUMNS, AND Y-VALUES OF ROWS. IT HAS A NUMBER OF OPTIONS THAT ARE USEFUL FOR CURVE-REPRESENTATION. TBN CAN BE HELPFUL TO ANYONE CONCERNED WITH OUTPUT OF INTRICATE ARRANGEMENTS OF BCD INFORMATION. IT CREATES SHORT CUTS IN THE CODE FOR THIS WORK. THE ROUTINE IS WRITTEN FOR 709/7090 COMPUTER. IT IS WRITTEN AS TWO SUBROUTINES, ONE IN FAP AND ONE IN FORTRAN. USER WILL COMPILER THEM WITH HIS OWN CODE. THERE IS ALSO AN AUXILIARY ROUTINE /TOD/ FOR THOSE WHO HAVE DATA ON CARDS, AND WANT TO RUN A PROGRAM WITHOUT WRITING A CODE. THESE ROUTINES IN BINARY RELOCATABLE FORM, AND THE PRESENT MANUSCRIPT, ARE AVAILABLE FROM THE AUTHOR. WRITTEN IN FAP.

**7090-1563ALCRIS POST MORTEM DUMP ROUTINE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1563ALCRIS

AUTHORS...M.K. CHARTZ V.L. SORENSON

DIRECT INQUIRIES TO...

MARCELLINE K. CHARTZ  
AMES RESEARCH CENTER  
MOFFETT FIELD, CALIF.

ALLOWS THE PROGRAMMER TO SYMBOLICALLY SPECIFY AREAS OF DATA TO BE PRINTED AT THE CONCLUSION OF A JOB AND PRINTS THESE AREAS WITH APPROPRIATE IDENTIFICATION. ALL DUMPS ARE RELATIVE AND ARE IN THE G-FORMAT. TO SPECIFY AREAS TO BE DUMPED. CALL CRISIS /SS,FS,..../, WHERE SS EQUALS STARTING LOCATION OF THE DUMP REGION FS EQUALS TERMINAL LOCATION OF THE DUMP REGION  
ANY NUMBER OF PAIRS OF ARGUMENTS, SS AND FS, MAY BE USED. BY JUDICIOUS USE OF THE FORTRAN STORAGE MAP, ALL PROGRAM DATA CAN BE BRACKETED BY THE USE OF ONE PAIR OF SYMBOLS. AT THE NORMAL CONCLUSION OF A JOB, THE DUMP OUTPUT MAY BE OBTAINED BY CALL POST, FROM FORTRAN OR FAP PROGRAMS. CGCED IN FAP.

**7090-1565NBSDPER DOUBLE PRECISION ERROR FUNCTION SUBROUTINE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1565NBSDEP

AUTHORS...NEALL STRAND GARNEY HARDY

DIRECT INQUIRIES TO...

GARNEY HARDY  
NATIONAL BUREAU OF STANDARDS  
BOULDER LABORATORIES  
BOULDER, COLORADO

THE ROUTINE WILL ACCEPT POSITIVE AND NEGATIVE VALUES OF X. USING DOUBLE PRECISION INPUT OF X, RESULTS WERE CHECKED AGAINST EXISTING TABLES AND FOUND TO BE ACCURATE TO 61 IN THE 15TH DECIMAL PLACE. FOR REPRESENTATIVE VALUES X, EXECUTION TIME IS APPROXIMATELY 4.33 MS/VALUE. STORAGE REQUIREMENT IS 4754 DECIMAL LOCATIONS. WRITTEN IN FORTRAN II.

**7090-1567ANXTPT CHARACTERON MICROFILM RECORDED PRINTED OUTPUT ROUTINE**  
AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1567ANXTPT

AUTHORS...MR. DAVID F. TEMPLETON  
DEPT. OF THE NAVY  
DAVID TAYLOR MODEL BASIN  
WASHINGTON 7, D.C.

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO AUTHOR

AM XTPT IS A FAP SUBROUTINE DESIGNED FOR USE WITH AM PLOT\* FOR MICROFILM RECORDING OF PRINTED OUTPUT EDITED BY FORTRAN FORMAT STATEMENTS. MICROFILM RECORDING IS DONE WITH AN OFF-LINE SC 4020. COMMANDS FOR THE SC 4020 ARE WRITTEN ON TAPE. THE MINIMUM 7090, AND AN OFF-LINE SC 4020 ARE REQUIRED HARDWARE. USE OF THE BELL SYSTEM, BE SYS 3, IS ASSUMED. THE SUBROUTINE AM PLOT\*, DISTRIBUTION NO. 1146, IS NEEDED AND MUST BE REASSEMBLED WITH THE ADDITIONAL ENTRY CARDS, ENTRY TAPER AND ENTRY ALITAP. MANY SYMBOLIC NAMES ARE USED WITHIN THE PROGRAM AND THE USE OF SOME SIX CHARACTER NAMES PREVENTS THEIR HEADING. AM XTPT WILL CAUSE UP TO 64 LINES OF 120 CHARACTER EDITED OUTPUT TO BE PLACED ON TAPE. THE /IOH/ SECTION OF THE BELL SYSTEM IS USED FOR INTERPRETATION OF THE FORTRAN FORMAT STATEMENT GIVEN IN THE CALLING SEQUENCE AND FOR CONVERSION OF ANY GIVEN DATA. WRITTEN FAP LANGUAGE.

**7090-1568NUMSEM SETS AND SENSES BITS OF A WORD OR ARRAY**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1568NUMSEM

AUTHOR...MR. ARNOLD LAPIOUS

AEC COMPUTING & APPLIED MATHEMATICS CTR.  
COURANT INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

TO SET AND SENSE INDIVIDUAL BITS OF A FORTRAN VARIABLE OR ARRAY. USAGE- NU MSENS IS USED AS A FORTRAN FUNCTION MSENS #A,M,ND WHERE-

A IS A FORTRAN VARIABLE OR THE FIRST WORD OF AN ARRAY  
M IS THE BIT POSITION OF THE VARIABLE A /IF LESS THEN MLESS THEN 32767/

N IS AN INTEGER WHICH ALTERS THE BIT AS FOLLOWS-

IF N EQUALS 1 THE BIT IS TURNED ON AFTER TESTING

IF N EQUALS 2 THE BIT IS TURNED OFF AFTER TESTING

IF N EQUALS 3 THE BIT IS REVERSED AFTER TESTING

IF N EQUALS OTHER THE BIT IS IGNORED AFTER TESTING

\*NU MSENS TREATS THE VARIABLE A LIKE THE FIRST WORD OF A FORTRAN ARRAY. BITS 1,2,...,36 ARE IN A/1/- BITS 37,38,...,72 ARE IN A/2/- ETC. NU MSENS USES NU INDIC AS A SUBROUTINE. INDIC

PERFORMS THE ACTUAL TESTING AND MODIFICATION. MSENS LOCATES AND PLACES THE WORD SO THAT INDIC CAN OPERATE ON IT AND THEN RESETS INDIC. 7090 FORTRAN FUNCTION, FAP CODED.

**7090-1569NUPOWR POWER SERIES PACKAGE**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1569NUPOWR

AUTHORS...J. LEAVITT F. RAGUSA

DIRECT INQUIRIES TO...

J. LEVITT  
AEC COMPUTING & APPLIED MATHEMATICS CTR.  
COURANT INSTITUTE OF MATHEMATICAL SCIENCES  
NEW YORK UNIVERSITY  
NEW YORK 3, NEW YORK

TO EVALUATE OR TO FORM THE PRODUCT OR QUOTIENT OF TWO POWER SERIES IN TWO VARIABLES OR TO DIFFERENTIATE OR INTEGRATE SUCH A POWER SERIES OR TO FIND A POINT ALONG A LEVEL LINE DEFINED BY THE POWER SERIES. TO FIND THE RESULTING SERIES BY TAKING THE SINE, COSINE, LOGARITHM, EXPONENTIAL OR POWER OF A POWER SERIES IN ONE VARIABLE. EACH ROUTINE HAS BEEN COMPILED FROM A SOURCE DECK WITH A DIMENSION STATEMENT FOR THE MATRICES OR VECTORS INVOLVED OF SIZE 25 X 25 AND 25 RESPECTIVELY. THERE ARE NO RESTRICTIONS WITHIN THE ROUTINES LIMITING THE DIMENSION SIZE- THEREFORE, IF LARGER OR SMALLER MATRICES ARE DESIRED BY THE USER THE SOURCE DECKS OF THE FUNCTIONS AND SUBROUTINE SHOULD BE RECOMPILED AND THE DIMENSION STATEMENTS CHANGED ACCORDINGLY. WHEN THE BINARY DECKS FOR THESE ROUTINES ARE USED THE CALLING PROGRAM MUST SET ITS DIMENSION STATEMENT FOR THESE MATRICES AT 25 X25.

**7090-1570NULINT LAGRANGE POLYNOMIAL INTERPOLATION**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1570NULINT

AUTHOR...MR. NORMAN POLLOCK

N.Y.U. UNIVERSITY  
4 WASHINGTON PLACE  
NEW YORK 3, N.Y.

DIRECT INQUIRIES TO AUTHOR

GIVEN THE VALUES OF AN UNDETERMINED FUNCTION F(X) AT A FINITE NUMBER OF EQUALLY SPACED POINTS, THIS SUBROUTINE WILL GIVE AN APPROXIMATION FOR F(XBAR/). ALSO, THERE IS AN APPROXIMATION OF F(PRIME/XBAR/ AND DOUBLE PRIME/XBAR/). WRITTEN IN FORTRAN II.

**7090-1571XYZFRSL FORECASTING SALES BY EXPONENTIALLY WEIGHTED MOVING AVERAGES**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1571XYZFRS

AUTHORS...MR. BERNARD P. DZIELINSKI

IBM-ASDD  
2651 STRANG BLVD.  
YORKTOWN HEIGHTS, NEW YORK

DIRECT INQUIRIES TO AUTHOR

THE PROGRAM WILL, FOR INDIVIDUAL PRODUCTS, EVALUATE THE ACCURACY OF A FORECAST WHICH IS A FUNCTION OF PAST AND CURRENT SALES, CERTAIN INITIAL VALUES AND WEIGHTS /AVERAGE, SEASONAL, TREND/ AND, FOR VARIOUS SETS OF WEIGHTS, DETERMINE THE OPTIMAL SET OF WEIGHTS FOR EACH PRODUCT. THESE WEIGHTS ARE THEN USED

CONTINUED FROM PRIOR PAGE--  
TO MAKE FORECASTS OF FUTURE SALES. MACHINE-BASIC IBM 7090/54; NO SPECIAL FEATURES ARE REQUIRED; THE PROGRAM USES THREE TAPE UNITS. SOURCE LANGUAGE-FORTRAN, WITH SIX PLACE ACCURACY.

**7090-1572RECOTP CARD TO TAPE SIMULATOR IBSYS SYSTEM /CRDTP/**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1572RECOTP

AUTHOR...MR. HERB VAN BRINK  
REPUBLIC AVIATION  
FARMINGDALE, NEW YORK

DIRECT INQUIRIES TO AUTHOR

THIS ROUTINE PROVIDES A MEANS FOR RUNNING ON-LINE THOSE IBSYS SUBSYSTEMS WHICH CANNOT ACCEPT CARD READER INPUT. RECOGNIZES 7-8 PUNCH END-OF-FILES AND ADDS LOOK-AHEAD BITS. RESTRICTIONS-REQUIRES THE IBSYS SYSTEM. CRDTP IS A MODIFICATION TO THE FORTRAN 2 VERSION 2 CARD-TO-TAPE SIMULATOR. IT INCLUDES ITS OWN INPUT/OUTPUT CODING EXCEPT FOR ON-LINE PRINTING, FOR WHICH IT USES THE IOX ROUTINE. CRDTP MUST BE PLACED ON ANY OF THE IBSYS SYSLB TAPES BY USE OF IBDT. IT MUST APPEAR AS A SEPARATE SUBSYSTEM. /HOWEVER, REASSEMBLY IF IBSUP MAY INCORPORATE IT INTO IBSUP IF A MEANS OF GETTING TO THE ROUTINE IS ADDED/. THE TAPE ASSEMBLED AS SYSINI WILL BE WRITTEN ON. AT THE CONCLUSION OF THE CARD-TO-TAPE OPERATION, A CLEAR AND LOAD TAPE ON A1 IS SIMULATED. SOURCE LANGUAGE-FAP.

**7090-1575XYZLCSA LIAPUNOV CYCLE STABILITY ANALYSIS PROGRAM**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1575XYZLCS

AUTHORS..MR. RONALD I. FRANK MR. OKAN GUREL

DIRECT INQUIRIES TO..

MR. RONALD I. FRANK  
IBM CORPORATION  
MATH & APPLICATIONS DEPT.  
1271 AVE. OF THE AMERICAS  
NEW YORK 20, NEW YORK

THE PURPOSE OF THIS PROGRAM IS TO- 1. TRACE A TRAJECTORY OF A REAL AUTONOMOUS SECOND ORDER DIFFERENTIAL SYSTEM AND DETERMINE IF THE TRAJECTORY IS CLOSED- 2. IF IT IS-FIND THE COEFFICIENTS OF THE FOURIER SERIES REPRESENTING THE TRAJECTORY IN A SUITABLE COORDINATE SYSTEM- 3. TO EXAMINE THE TRAJECTORY FOR STABILITY BY A NOVEL TECHNIQUE ANALOGOUS TO LIAPUNOV'S SECOND METHOD FOR CRITICAL POINTS. THE METHODS EMPLOYED ARE FOR- 1. INTEGRATION AND A SIMPLE COMPARISON- 2. STANDARD FOURIER METHODS- SEE THE SECOND SECTION OF THE PROGRAM DESCRIPTION- 3. A NOVEL TECHNIQUE WHICH IS COMPLETELY DESCRIBED IN THE PROGRAM DESCRIPTION SECTION. THE RANGE RESTRICTIONS ARE NOTED IN THE WRITE-UP. THE ACCURACY IS LIMITED TO NO MORE THAN 6 SIGNIFICANT DIGITS IN FLOATING POINT COMPUTATIONS. THE SOURCE LANGUAGE OF THE PROGRAM IS FORTRAN II, AND THE PROGRAM RUNS ON A STANDARD 709C UNDER THE FORTRAN MONITOR SYSTEM.

**7090-1576XYZAPWF COMPUTE THE AGGREGATE PRODUCTION AND WORK FORCE COEFFICIENTS OF A LINEAR DECISION RULE**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1576XYZAPWF

AUTHORS..MR. BERNARD P. DZIELINSKI  
IBM-ASDD  
2651 STRANG BLVD.  
YORKTOWN HEIGHTS, N.Y.

DIRECT INQUIRIES TO AUTHOR

OPTIMAL DECISION RULES HAVE BEEN DERIVED FOR SCHEDULING AGGREGATE WORK FORCE AND PRODUCTION LEVELS. LINEAR AND QUADRATIC COST FUNCTIONS ARE FITTED TO FACTORY COST DATA. THE PROGRAM DERIVES THE COST COEFFICIENTS INVOLVED IN THE DECISION RULES FROM THESE FUNCTIONS. BASIC IBM 7090/94- NO SPECIAL FEATURES. PROGRAM USES TWO TAPES A2 /BCD INPUT/ AND A3 /BCD OUTPUT/. LANGUAGE-PROGRAM WAS WRITTEN IN FORTRAN, AND OPERATES UNDER THE FMS-II MONITOR SYSTEM INDEPENDENT OF IBSYS.

**7090-1579GRDST MULTICOMPONENT DISTILLATION PROGRAM**

AVAILABLE 4TH QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1579GRDST

AUTHORS..JAMES M. CATTLEY ROBERT T. ARMSTRONG

DIRECT INQUIRIES TO..

JAMES M. CATTLEY  
GULF RESEARCH & DEVELOPMENT CO.  
P.O. BOX 2038  
PITTSBURGH, PA. 15230

THIS PROGRAM IS A 7090/94 VERSION OF THE IB DST2 MULTICOMPONENT DISTILLATION PROGRAM FOR A 704, WHICH MAY BE RUN UNDER FORTRAN MONITOR CONTROL RATHER THAN THE 704 COMPATIBILITY PACKAGE. OPERATION OF THIS PROGRAM REQUIRES A 32K CORE MACHINE WITH 6 TAPE UNITS IN ADDITION TO FORTRAN MONITOR SYSTEM TAPES. ALL NONSYSTEM SUBROUTINES REQUIRED BY THE PROGRAM ARE CONTAINED ON THE SYMBOLIC TAPE WHICH IS SUBMITTED. THOSE WHICH DEViate FROM THE SYMBOLIC DISCUSSED IN THE ORIGINAL 704 PROGRAM WRITEUP ARE NOTED IN THE EXTENDED WRITEUP. THE FORTRAN SYSTEM CHAIN FEATURE IS USED TO SIMULATE A PROGRAM TAPE TECHNIQUE. DATA INPUT FORMATS ARE ALSO GIVEN IN THE ORIGINAL WRITEUP AND MODIFICATIONS ARE DISCUSSED IN THE EXTENDED WRITEUP. THE PRESENT PROGRAM IS ESSENTIALLY A FAP EQUIVALENT OF THE ORIGINAL SAP PROGRAM WITH SUITABLE CHANGES IN INPUT-OUTPUT INSTRUCTIONS AND OTHER ALLOWABLE MACHINE CODED OPERATIONS. WRITTEN IN FAP, FORTRAN II.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL.

**7090-1581TYFPT IMPROVED SYSTEMS ROUTINE, FLOATING POINT TRAP**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1581TYFPT

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO DEAL WITH OVER/UNDERFLOW IN THE AC AND MQ REGISTERS AUTOMATICALLY WHEN USING FORTRAN II WITH MONITOR. WRITTEN IN FAP. CHECKS ON THE RESULTS OF FLOATING-POINT OPERATIONS. RECOMMENDED TO REPLACE THE /FPT/ SUBPROGRAM ON THE CURRENT 709/90 FORTRAN II VERSION 2 SYSTEMS TAPE. USES 31 CELLS /37 SUB 8/ PLUS LOCATIONS 0,8 AND 77462 SUB 8. THE ACTION IN ANY GIVEN CIRCUMSTANCES MAY BE MODIFIED READILY. SEE LS AND EXAMPLE BELOW. USAGE /FPT/- THIS PROGRAM IS USED AUTOMATICALLY BY ALL FORTRAN II PROGRAMS. /SEE 709/90 FORTRAN REFERENCE MANUAL C28-6054-2, P. 23./ FAP PROGRAMMERS CAN ARRANGE THAT IT BE USED BY WRITING CLA S /FPT/ STO 8 IN THEIR MAIN PROGRAM.

**7090-1582TYFPTC SYSTEMS ROUTINE TO SAVE INFORMATION AFTER /FPT/**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1582TYFPTC

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO DEAL WITH OVER/UNDERFLOW IN THE AC AND MQ REGISTERS IN SUCH A WAY AS TO PREVENT THE LOSS OF INFORMATION WHICH OCCURS WHEN OVER/UNDERFLOW IN THE AC AND MQ ARE DEALT WITH BY /FPT/. WRITTEN IN FAP. TO BE USED IN CONNECTION WITH FORTRAN II VERSION 2 SYSTEMS ROUTINE /FPT/. USES 48 CELLS /60 SUB 8/, PLUS LOCATIONS 0 AND 8. USAGE OF /FPTC-FPCT /1/- 1 IS THE NAME OF A FIXED POINT VARIABLE IN WHICH OVERFLOWS AND UNDERFLOWS ARE COUNTED AFTER THE EXECUTION OF THE STATEMENT CALL /FPCT /1/. OVER/UNDERFLOW MUST OCCUR WHENEVER ONE ATTEMPTS TO CALCULATE A NON-ZERO NUMBER WHOSE MAGNITUDE WOULD BE GREATER THAN 2 TO THE 127TH POWER /-2 MINUS 27TH POWER/ OR LESS THAN 2 MINUS 129TH POWER. OVERFLOW IN THE AC AFTER ADDITION, SUBTRACTION OR MULTIPLICATION CAUSES I TO BE INCREASED BY 1- THE TRUE /OVERFLOWED/ VALUE IN THE AC IS MULTIPLIED BY 2 256TH POWER, AND LEFT IN THE AC. UNDERFLOW IN THE AC CAUSES I TO BE DECREASED BY 1 AND THE VALUE UNDERFLOW IN THE AC IS MULTIPLIED BY 2 256TH POWER. AFTER ADDITION, SUBTRACTION AND MULTIPLICATION THE CONTENTS OF THE MQ ARE LEFT UNALTERED EVEN IF ITS CHARACTERISTIC OVERFLOWS OR UNDERFLOWS.

**7090-1583TYJCPM ZERO OF A GIVEN FUNCTION BETWEEN TWO POINTS /SP/**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1583TYJCPM

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO

DIRECT INQUIRIES TO AUTHOR

TO SOLVE THE EQUATION FCN/X,P1,P2,...,PL/ EQUALS 0.0 FOR X. MORE PRECISELY, GIVEN A FUNCTION SUBPROGRAM FCN/X,P1,P2,...,PL/ AND VALUES A AND B SUCH THAT FCN /A,P1,P2,...,PL/ AND FCN /B,P1,P2,...,PL/ HAVE OPPOSITE SIGNS, THE PROGRAM JCPM FINDS A VALUE OF X BETWEEN A AND B AT WHICH FCN /X,P1,P2,...,PL/ CHANGES SIGN. WRITTEN IN FAP. USES 109 CELLS /155 SUB 8/ PLUS ERASABLE COMMON /77777/ SUB 8. USES SINGLE-PRECISION FLOATING POINT NUMBERS. A DOUBLE-PRECISION VERSION IS AVAILABLE. SEE TY-JCPD. /FPT/ IS EXPECTED TO BE AVAILABLE AS IN FORTRAN II, VERSION 2 /SEE TY /FPT/ SD 1581/. NO OTHER SUBPROGRAMS ARE EXPECTED BESIDES FCN. USAGE-JCPM /FCN/A,P1,P2,...,PL,B/- FCN IS THE NAME OF A FLOATING POINT F-LESS FUNCTION FCN /X,P1,P2,...,PL/ OF A FLOATING POINT ARGUMENT X AND THE PARAMETERS P1,P2,...,PL. THERE CAN BE ANY NUMBER OF PARAMETERS, OR NONE- THEY MAY BE OF ANY TYPE /NAMES OR EXPRESSIONS/ OR NONE- THEY MAY BE OF ANY TYPE /NAMES OR EXPRESSIONS/ OR NONE- THEY MAY BE OF ANY TYPE. THE PROGRAM JCPM MERELY PASSES THOSE OF ITS ARGUMENTS BETWEEN ITS SECOND AND ITS LAST DIRECTLY TO FCN AS PARAMETERS. FOR FURTHER DETAILS, REFER TO THE PA.

**7090-1584TYJCPD ZERO OF A GIVEN FUNCTION BETWEEN TWO POINTS**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1584TYJCPD

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

TO SOLVE THE EQUATION DFCN /X,P1,P2,...,PL/ EQUALS 0.0 FOR X. THIS IS A DOUBLE-PRECISION VERSION OF TY-JCPM. WRITTEN IN FAP. USES 154 CELLS /232 SUB 8/ PLUS ERASABLE COMMON /77777-6/ SUB 8. USES DOUBLE-PRECISION FLOATING-POINT NUMBERS. /FPT/ IS EXPECTED TO BE AVAILABLE, AS IN FORTRAN II VERSION 2. NO OTHER SUBPROGRAMS ARE EXPECTED BESIDES DFCN. JCPD EXPECTS THE VALUE OF DFCN TO BE IN DOUBLE-PRECISION AC VIZ. /77777,77776/. USAGE-JCPMD /DFCN/DA,P1,P2,...,PL,DB/- DFCN IS THE NAME OF A DOUBLE-PRECISION FLOATING POINT F-LESS FUNCTION DFCN /DX,P1,P2,...,PL/ OF A DOUBLE-PRECISION FLOATING POINT ARGUMENT DX AND THE PARAMETERS P1,P2,...,PL. /REMEMBER TO PUT A D IN COL. 1 OF DFCNS RETURN STATEMENT./ DA AND DB ARE NAMES OF DOUBLE-PRECISION FLOATING POINT VARIABLES. JCPMS WRITE-UP APPLIES, MUTATIS MUTANDIS, TO JCPMD. THEREFORE REQUEST THE PA FOR JCPM IS USING THIS ROUTINE.

**7090-1585TYVABS SQUARE ROOT OF SUMS OF SQUARES**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1585TYVABS

AUTHOR...DR. W. KAHAN  
INSTITUTE OF COMPUTER SCIENCE  
UNIVERSITY OF TORONTO  
TORONTO, ONTARIO, CANADA

DIRECT INQUIRIES TO AUTHOR

WRITTEN IN FAP. INTENDED TO REPLACE 1 ABS F ON THE CURRENT 7090/90 FORTRAN II VERSION 2 SYSTEMS TAPE, AND EXTEND ITS FUNCTION. USES 23 SUB 10 CELLS /17 SUB 8/ PLUS ERASABLE COMMON /77774 TO 7/ SUB 8/. USES SYSTEMS SUBPROGRAM SORT F. WHEN X OR Y ARE NOT NORMALIZED, AS WHEN CODING IN FAP, VABS MAY HANG UP.

**7090-1586AMPLOF FORTRAN GRAPH PLOT**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1586AMPLOF

AUTHOR...SHARON E. GOOD  
DEPT. OF THE NAVY  
DAVID TAYLOR MODEL BASIN  
WASHINGTON, D.C.

DIRECT INQUIRIES TO AUTHOR

WRITES LOG-DENSITY BINARY TAPE FOR SC 4020 TO LABEL ONE FRAME OF FILM WITH ID- FOR SUCCEEDING FRAMES TO PLOT CURVES COMPLETE WITH AXES, GRID LINES AND HEADINGS AND TO ALLOW MORE THAN ONE CURVE PER PLOT. THIS FAP CODED SUBPROGRAM USES PARAMETERS SUPPLIED TO MAKE UP THE CALLING SEQUENCES FOR THE FAP PLOTTING ROUTINES /AM PLOT, 1146/. PLOT WILL USE POSITIONS 96-992 IN X DIRECTION, 0 TO 896 IN Y DIRECTION. PLOT WILL BE HEAVY, GRID LINES LIGHT. OFF-SCALE VALUES WOULD CAUSE AN ERROR DUMP.

**7090-1587CAFDP1 FAP DISASSEMBLY PROGRAM**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1587CAFDP1

AUTHOR...ROBERT C. FCSTER  
GENERAL DYNAMICS/ASTRONAUTICS  
P.O. BOX 1128  
SAN DIEGO 12, CALIF.

DIRECT INQUIRIES TO AUTHOR

THE FAP DISASSEMBLY PROGRAM IS A SYMBOLIC PROGRAM WRITTEN FOR THE IBM 7090/94 AND ASSEMBLED UNDER THE FORTRAN MONITOR SYSTEM /FMS/, VERSION III. THE PURPOSE OF THE PROGRAM IS /1/ TO RECOVER A PROGRAM SOURCE DECK FROM A PROGRAM OBJECT DECK, /2/ TO DE-RELATIVIZE A PROGRAM, AND /3/ TO PROVIDE A SYMBOLIC CARD LISTING AND/OR SOURCE DECK WHICH WILL AUTOMATICALLY INTEGRATE DESIRED OCTAL CORRECTIONS INTO THE DISASSEMBLY. THE PROGRAM DATA CONSISTS OF ONLY THE OBJECT DECKS FOR WHICH SOURCE DECKS AND/OR SYMBOLIC CARD LISTINGS ARE REQUIRED. ANY NUMBER OF PROGRAMS AND SUBPROGRAMS MAY BE INCLUDED BUT THE DECKS MUST BE RELOCATABLE COLUMN BINARY ASSEMBLED UNDER FMS II OR FMS III.

REQUESTOR MUST SUBMIT ONE TAPE TO OBTAIN LISTINGS & SYMBOLIC DECK ON TAPE AS ONE FILE

**7090-1588NUMLEW EIGENVALUE-EIGENVECTOR ROUTINE REAL SYMMETRIC MATRICES FAP CODED-7090**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1588NUMLEW

AUTHOR...SAM GREENSFAR  
AEC COMPUTING AND APPLIED MATH CTR.  
COURTANT INST. OF MATHEMATICAL SCIENCES  
NEW YORK 3, NEW YORK

DIRECT INQUIRIES TO AUTHOR

COMPUTES ALL THE EIGENVALUES AND VECTORS OF A REAL SYMMETRIC MATRIX. HOUSEHOLDERS METHOD IS USED TO REDUCE THE MATRIX TO TRIANGULAR FORM. THE EIGENVALUES ARE THEN ISOLATED USING STURM SEQUENCING AND FINALLY THE VECTORS ARE FOUND BY WILKINSONS METHOD. SEE THE APPENDIX FOR FURTHER DETAILS.

THE EIGENVALUES  $EIG(I,1)$ , /1/ EQUALS  $1/M$  WILL APPEAR IN THE FIRST COLUMN OF  $EIG$  IN DECREASING ALGEBRAIC ORDER. THE EIGENVECTOR CORRESPONDING TO THE LARGEST /ALGEBRAIC/ EIGENVALUE IS COMPUTED FIRST, THE VECTOR ASSOCIATED WITH THE NEXT LARGEST EIGENVALUE SECOND, AND SO ON. WHEN  $MLEW$  IS CALLED, THE EIGENVECTORS WILL BE STORED BY COLUMNS /WITH  $M$  ELEMENTS PER COLUMN/ IN  $V$ . WHEN  $MLEW$  IS CALLED, THE EIGENVECTORS WILL BE WRITTEN ON TAPE IN  $M$  LOGICAL RECORDS OF  $M$  WORDS EACH. EACH EIGENVECTOR IS NORMALIZED TO UNITY. DUPLICATE EIGENVALUES HAVE IDENTICAL EIGENVECTORS ASSIGNED TO THEM. MACHINE LANGUAGE-FAP.

**7090-1590BCTD TAPE DUMP**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1590BCTD

AUTHOR...GIO WIEDERHOLD  
UNIVERSITY OF CALIF. COMPUTER CENTER  
BERKELEY 4, CALIF.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN OCTAL OR BCD PRINT OF A TAPE UNDER FORTRAN MONITOR. THIS ROUTINE PRINTS ANY NUMBER OF RECORDS OR FILES FROM A TAPE OF INTERPERSED BINARY AND BCC RECORDS. OPERATIONAL CONTROL IS BY CONTROL CARDS FOLLOWING THE PROGRAM. OUTPUT IS ON THE MONITOR OUTPUT TAPE. BINARY RECORDS MAY BE PRINTED IN EITHER OCTAL OR DECIMAL- BCC RECORDS MAY BE PRINTED EITHER 72 CHARACTERS PER LINE OR AS OCTAL OR DECIMAL WORDS. THIS ROUTINE PROVIDES

CONTINUED FROM PRIOR COLUMN--

FOR THE SKIPPING OF ANY NUMBER OF RECORDS OR FILES, FORWARD OR BACKWARD, AND FOR THE OPTICAL REWINDING OF THE INPUT TAPE BEFORE PRINT-OUT BEGINS. A HEADING LINE IS PRINTED AT THE BEGINNING OF EACH PRINT-OUT AND FOR EACH FILE AND RECORD.

**7090-1591BCDIAT DIATOMIC MOLECULAR INTEGRAL PROGRAM**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1591BCDIAT

AUTHORS...DR. E. MOORE G. WIEDERHOLD

DIRECT INQUIRIES TO..

G. WIEDERHOLD  
COMPUTER CENTER  
UNIVERSITY OF CALIF.  
BERKELEY, CALIF.

MODIFICATION, BY DR. EMMET MOORE OF BUEING SCIENTIFIC RESEARCH LABORATORIES, SEATTLE, WASHINGTON, AND GIO WIEDERHOLD OF THE UNIVERSITY OF CALIFORNIA BERKELEY COMPUTER CENTER, OF AN ORIGINAL WRITUP, DI MI DIAT, WRITTEN BY A.C. SWITENDICK, F.J. CORBATO, OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. THIS IS A 709C VERSION OF THE ORIGINAL 704 PROGRAM SD 849 01 BC DIAT

DIATOMIC MOLECULAR INTEGRAL PROGRAM FOR THE 7090. PROGRAM CALCULATES ANY OR ALL 1 AND 2 ELECTRON 1 AND 2 CENTER INTEGRALS BETWEEN SETS OF BASIS FUNCTIONS BY NUMERICAL INTEGRATION USING THE BARNETT-COULSON METHOD FOR THE 2 CENTER INTEGRALS. THE BASIS SET MAY CONSIST OF UP TO 20 FUNCTIONS PER CENTER. A FUNCTION CONSISTS OF A LINEAR COMBINATION OF SLATER ORBITALS /16 TERMS MAXIMUM/. INDICATIONS OF INTEGRAL AND SUM CONVERGENCE ARE GIVEN. PUNCHED/PRINTED/BINARY OUTPUT.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE TO OBTAIN FORTRAN CARDS /1 FILE/.

**7090-1593XYZWOM WORK MEASUREMENT SAMPLING**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1593XYZWOM

AUTHORS...A.H. RHODES A. LENSZ DR. M.D. SCHMID  
W.C. LINDSTROM

DIRECT INQUIRIES TO..

NORMAN TARNOFF  
IBM CORP.  
MWRD, 618 S. MICHIGAN AVE.  
CHICAGO 5, ILLINOIS

WORK MEASUREMENT SAMPLING IS A STATISTICAL SAMPLING TECHNIQUE DESIGNED TO ESTABLISH JOB STANDARDS OF COMPARATIVELY LONG CYCLE. AN OBSERVER RECORDS AT RANDOM INTERVALS A JOB POSITION AND ASSOCIATED TIME. DATA IS KEYPUNCHED, SORTED, TIME ADJUSTMENTS MADE, AND MEDIAN TIME AND ASSOCIATED FACTORS FOR THE JOB CALCULATED. THE PROGRAM CAN HANDLE UP TO FOUR SHIFTS A DAY, TWENTY JOBS AT A TIME, FOR UP TO TWENTY TO DIFFERENT JOB STANDARDS. UP TO TWO HELPERS WITH TWO DIFFERENT ACTIVITY CODES MAY BE CONSIDERED. PARALLEL STUDIES OF CREWS OR DEPARTMENTS CAN BE HANDLED. MACHINE CONFIGURATION SEVEN TAPES AND 16K CORE 7090. PROGRAMMED IN FORTRAN, IT MAY BE ADAPTED TO OTHER COMPUTERS FOR WHICH A COMPILER IS AVAILABLE. SOURCE LANGUAGE- FORTRAN FOR THE 7090.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL

**7090-1594XYZSSCP STUDENT SECTIONING PROGRAM**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1594XYZSSC

AUTHORS...W.H. BOSSERT M.L. BULLOCK J.B. HARMON

DIRECT INQUIRIES TO..

J.B. HARMON  
IBM CORP.  
LIASON OFFICE  
77 MASSACHUSETTS AVE.  
CAMBRIDGE 39, MASS.

THE 7090/90/94 STUDENT SECTIONING PROGRAM ASSIGNS COLLEGE OR UNIVERSITY STUDENTS TO NONCONFLICTING SECTIONS WITHIN COURSES THAT THEY HAVE SELECTED. THE SCHEDULES PRODUCED GIVE EACH FOR LUNCH HOUR EACH DAY. A STUDENT MAY REQUEST UP TO 15 DIFFERENT COURSES FROM A MASTER COURSE AND SECTION DATA FILE WHICH MAY CONTAIN UP TO 1,000 COURSES AND 2,500 SECTIONS. THE PROGRAM WILL KEEP SECTION SEATING EVENLY BALANCED THROUGHOUT THE COMPUTER RUN. THE INPUT CONSISTS OF THE COURSE AND SECTION DATA FILE AND A FILE OF ANY NUMBER OF STUDENTS REQUESTING ASSIGNMENT. THE OUTPUT CONSISTS OF THE FINAL COURSE AND SECTION DATA STATUS, COMPLETED STUDENT SCHEDULES, AND A LIST OF STUDENTS WHO CANNOT BE SCHEDULED FOR ONE REASON OR ANOTHER. IT WILL PRODUCE ABOUT 6,000 SCHEDULES PER HOUR OF 7090 TIME AND CAN ACCOMMODATE A LARGER SCHOOL FASTER THAN IS POSSIBLE ON A SMALLER MACHINE OR ON A DECIMAL MACHINE. IT WAS COMPILED WITH FORTRAN/FAP MONITOR SYSTEM, VERSION II, MODIFICATION LEVEL 18 WITHOUT THE STANDARD ERROR OPTION. BECAUSE OF CORE LIMITATIONS, IT CANNOT BE USED IN THE COMPILE AND EXECUTE MODE. THE 7090/90/94 CONFIGURATION REQUIRED IS TWO CHANNELS, TWO TAPE DRIVES ON EACH CHANNEL, CARD READER AND PRINTER ON CHANNEL A. SPECIAL FEATURES ARE NOT USED, AND THEY SHOULD BE OFF WHEN THIS PROGRAM IS RUN. PHASE II OF THE PROGRAM USES 32,741 MEMORY LOCATIONS WHILE PHASE I USES 250 LOCATIONS LESS THAN THAT. ALTHOUGH MOST OF THE PROGRAM WAS WRITTEN IN FORTRAN, EACH PHASE CONTAINS SUBROUTINES WRITTEN IN FAP.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE TO OBTAIN FILE 1 /BINARY CARDS/, FILE 2 /SYMBOLIC CARDS/, AND FILE 3 /TEST DECKS/ FOR BASIC PROGRAM MATERIAL

**7090-1597BC704 SIMULATE A 32K 704 ON A 65K 7090**

AVAILABLE 1ST QUARTER 1964.

CONTINUED FROM PRIOR COLUMN--  
FOR THE 1401. THE ASSEMBLED DECK IS WRITTEN OUT ON BCD TAPE & FOR OFF-LINE PUNCHING. D. LIAR IS WRITTEN IN FORTRAN II AND CAN BE EASILY MODIFIED TO ADD ADDITIONAL PSEUDO OPS OR DIAGNOSTICS.

**7090-3010ASBBJ11 RK53 - FORTRAN FLOATING POINT RUNGE-KUTTA INTEGRATION**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-3010ASBBJ11

AUTHORS...D. SCHERMERHORN C. FENCALL

DIRECT INQUIRIES TO...  
D. SCHERMERHORN  
AEROSPACE CORP.  
P.O. BOX 1308  
SAN BERNARDINO, CALIFORNIA

FIXED INTERVAL OR VARIABLE INTERVAL OPTIMIZED BY A SIMPSONS RULE CHECK USING DERIVATIVES ALREADY FORMED IN THE 4TH ORDER RUNGE-KUTTA PROCESS. INTEGRATES A SYSTEM OF N FIRST ORDER DIFFERENTIAL EQUATIONS WITH ACCURACY CONTROLLABLE BY RELATIVE AND/OR ABSOLUTE CRITERIA FOR EACH EQUATION. COMMUNICATES WITH USER-SUPPLIED DERIVATIVE AND CONTROL SUBROUTINES. USES DOUBLE PRECISION INTERNALLY TO INCREMENT THE VARIABLES. SPACE REQUIRED-- 318 WORDS AND 9N PLUS 6 CELLS OF WORKING STORAGE. WRITTEN IN FORTRAN II.

**7090-3011PNLAMI MATRIX INVERSION WITH SOLUTION OF LINEAR EQUATIONS**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-3011PNLAMI

AUTHOR...BJORN A. KLEIST  
FOA4 STOCKHOLM 80 SWEDEN

DIRECT INQUIRIES TO AUTHOR

A FORTRAN SUBROUTINE WHICH SOLVES THE MATRIX EQUATION AX=B FOR VERY LARGE SYSTEMS USING FORTRAN DOUBLE PRECISION ARITHMETIC. A IS A REAL, SQUARE COEFFICIENT MATRIX AND B IS A MATRIX OF CONSTANT VECTORS. THE INVERSE MATRIX AND DETERMINANT ARE ALSO OBTAINED. A IS DESTROYED IN THE INVERSION. PROGRAM USES FOUR TAPE UNITS, TWO ON EACH OF TWO DATA CHANNELS. TIMING 7.288 / NEM/615.8 / N/N MILLISECONDS, WHERE N IS ORDER OF A AND M IS NUMBER OF CONSTANT VECTORS. REQUIRES 4276 CELLS PLUS 86/NM/61633 IN COMMON.

**7090-7090NUCL01 AETRA**

AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL01

AUTHOR...R. A. BLAINE  
P. O. BOX 309  
CANOGA PARK, CALIF.

DIRECT INQUIRIES TO AUTHOR

/INDICATED STATUS, IF KNOWN/ TO ADJUST CROSS-SECTION DATA BASED ON DATA FROM A CRITICAL EXPERIMENT INVOLVING FISSION FOILS AND OSCILLATOR MEASUREMENTS. IN USE, AVAILABLE.

**7090-7090NUCL02 AIMFIRE**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL02

AUTHOR...R. A. BLAINE  
P. O. BOX 309  
CANOGA PARK, CALIF.

DIRECT INQUIRIES TO AUTHOR

THE BASIC PURPOSE OF THIS CODE IS TO COMPARE THE COSTS OF VARIOUS FUEL CYCLES. AIMFIRE USES NON-SPATIAL TWO-GROUP THEORY TO PREDICT K TO THE SUB EFF AS A FUNCTION OF BURNUP. OPTIONS ARE AVAILABLE BY WHICH CHANGES IN CERTAIN HETEROGENEOUS EFFECTS WITH BURNUP CAN BE TAKEN INTO ACCOUNT. THE CODE CONTAINS A LIBRARY OF FAST AND THERMAL MICROSCOPIC CROSS-SECTIONS, DECAY CONSTANTS, AND FISSION YIELDS FOR 40 ISOTOPES. THE PRESENT VERSION IS DESIGNED TO INVESTIGATE URANIUM FUEL SYSTEMS. ABOUT 2 SECONDS PER CYCLE, EACH CYCLE DIVIDED INTO THREE PARTS.

**7090-7090NUCL03 AIM-6**

AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL03

AUTHORS...D. C. BALLER H. P. FLAT

DIRECT INQUIRIES TO...  
R. A. BLAINE  
P. O. BOX 309  
CANOGA PARK, CALIF.

AIM-6 IS A ONE-DIMENSIONAL DIFFUSION THEORY CODE WITH OPTIONS SIMILAR TO THOSE OF FCG, EXCEPT FOR THE BUCKLING ITERATION PROGRAM. A LIBRARY OF MICROSCOPIC CROSS SECTION DATA IS UTILIZED TO FORM THE MACROSCOPIC CROSS SECTIONS. IN ADDITION TO THE SEARCHES AVAILABLE TO FCG, A CONCENTRATION SEARCH ON ONE OR TWO ELEMENTS IS PERMITTED. AN EXTENSIVE DATA EDIT IS AVAILABLE. THERE MUST BE NO MORE THAN 101 SPACES NOR MORE THAN 18 ENERGY GROUPS. ONLY DOWNSCATTERING IS PERMITTED, BUT CAN BE FROM A GIVEN GROUP TO ANY LOWER GROUP. FOR A 16 GROUP, 101 MESH POINT PROBLEM, 3 MINUTES WOULD BE A TYPICAL TIME FOR A SINGLE PROBLEM, ALTHOUGH TIMES MAY BE AS LOW AS 30 SECONDS.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM

CONTINUED FROM PRIOR PAGE--  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1597BC704

AUTHOR...GIO WIEDERHOLD  
UNIVERSITY OF CALIFORNIA  
BERKELEY 4, CALIF.

DIRECT INQUIRIES TO AUTHOR

THIS PROGRAM ALLOWS SIMULATION OF NEARLY ANY PROGRAM THAT WILL RUN ON A 32K 704 ON A 7090 OR 7094 HAVING--  
1/ 32K ADDITIONAL CORE STORAGE RPO W 98514  
2/ 7 INDEX REGISTERS /IF 7090- RPO W 98513/  
3/ IT IS ALSO CAPABLE OF SIMULATING A 704 PRINTER CLOCK WITH THE 7090 CORE STORAGE CLOCK RPO W 98509 /MILLISECOND/, OR THE DELCO CLOCK /SEE TIMEH ROUTINE/. THE PRINTER CLOCK IS ASSUMED WIRED INTO COLUMNS 1-6.  
4/ FLOATING POINT TRAP MODE MAY BE SIMULATED.  
5/ TRAPPING DUE TO DIVIDE CHECK TRAP FEATURE RPO W 01490 IS SIMULATED TO BE IGNORED.  
6/ ON-LINE PUNCHING IS SIMULATED ONTC TAPE. /NO ON-LINE PUNCH REQUIRED/.  
A PLUGBOARD WIRED AS FOLLOWS IS ASSUMED-- NO SENSEPUNCH INSTRUCTION-- PUNCH INTO COLS. 1-72 SPU 1-- RESET CONSECUTIVE NUMBER PUNCHING COUNTER FROM COLS. 69-72 OF CARD IMAGE, SET IDENTIFICATION IN COLS. 73-76 FROM COLUMNS SPU 1 FOLLOWED BY SPU 2-- CONSECUTIVE RENUMBERING AND 10 PUNCHING SPU 1 FOLLOWED BY SPU 2-- RESET COUNTER TO ZERO AND CLEAR LABEL FILED.  
7/ ALL PRINTER ECHOS ARE ARTIFICIALLY CREATED SO THAT ON-LINE PRINTING IS NOT CHECKED.  
8/ AS MANY TAPES AVAILABLE ON CHANNEL A AS THE 704 PROGRAM REQUIRES. A PROGRAM TAPE AND A PUNCH OUTPUT TAPE ON CHANNEL B WRITTEN IN FAP LANGUAGE.

REQUESTOR MUST SUBMIT ONE REEL OF MAGNETIC TAPE FOR BASIC PROGRAM MATERIAL

**7090-1598WHCAM CAN CYLINDER ANALYSIS PROGRAM**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-1598WHCAM

AUTHOR...WILLIAM P. KUNKEL  
A.S.-E.-CA. DEPT.  
WESTINGHOUSE ELECTRIC CORP.  
EAST PITTSBURGH, PA.

DIRECT INQUIRIES TO AUTHOR

CAN IS A PROGRAM USED TO CALCULATE THE STRESSES IN CYLINDRICAL GEOMETRIES CAUSED BY IMPOSED LOADS. INTERNAL PRESSURES, EXTERNAL PRESSURES AND VARIOUS EXTERNAL FORCES MAY BE SPECIFIED. THE PROGRAM CAN CONSIDER AS MANY AS FIFTY /50/ CYLINDRICAL SUBDIVISIONS /CYLINDERS/. IT SOLVES THE SYSTEM OF INTERNAL RESTRAINTS BY USING THE SHORT CYLINDER COEFFICIENTS DEVELOPED IN THE THEORY OF BEAMS ON ELASTIC FOUNDATIONS. THE PROGRAM CALCULATES THE DEFLECTIONS, ROTATIONS AND THREE PRINCIPAL STRESSES AT A NUMBER OF STATIONS THROUGHOUT THE LENGTH OF THE GEOMETRY. THE STRESS COMPONENTS ARE COMBINED TO GIVE THE THREE STRESS DIFFERENCES. CAN WAS WRITTEN FOR THE IBM 7094 WITH THE FOLLOWING HARDWARE. MEMORY-16K ON-LINE TAPE UNITS-2 OFF-LINE CARD-TO-TAPE OFF-LINE TAPE-TO-PRINTER WRITTEN IN FORTRAN II LANGUAGE.

**7090-3001RSROKT ROCKET - OMNIBUS CALCULATED KINEMATICS OF TRAJECTORIES**

AVAILABLE 1ST QUARTER 1964.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-3001RSROKT

AUTHOR...BARRY W. BOEHM  
THE RAND CORP.,  
1700 MAIN ST.  
COMPUTER SCIENCES DEPT.  
SANTA MONICA, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

ROCKET IS A FORTRAN II PROGRAM WHICH MATHEMATICALLY SIMULATES THE FLIGHT OF AEROSPACE VEHICLES BY NUMERICAL INTEGRATION OF THEIR EQUATIONS OF MOTION. A SPECIAL-PURPOSE INPUT FORM ENABLES THE USER TO SPECIFY THE CHARACTERISTICS OF HIS VEHICLE AND ITS FLIGHT PLAN, BOTH OF WHICH CAN VARY THROUGH A WIDE RANGE OF CHOICES, WITH COMPARATIVELY LITTLE EFFORT. THE PROGRAM REQUIRES THE USE OF A FORTRAN COMPILER, READS INPUT FROM TAPE 5, AND WRITES OUTPUT ON TAPE 6. IT OCCUPIES ABOUT 25,000 WORDS OF CORE-TYPICAL TRAJECTORIES TAKE THIRTY SECONDS TO RUN ON A 7090.

REQUESTOR MUST SUBMIT ONE TAPE TO OBTAIN BOTH BINARY AND BCD FILES AND ALSO THE PROGRAM LISTINGS.

**7090-3002LRLIAR ASSEMBLY ROUTINE OF 1401 SPS PROGRAMS**

AVAILABLE 2ND QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-3002LRLIAR

AUTHORS...G. R. EBBERT MARTHA PETRUS

DIRECT INQUIRIES TO...  
G. R. EBBERT  
NATL. AERONAUTICS & SPACE ADMIN.  
LEWIS RESEARCH CENTER  
21000 BROOKPARK RD.  
CLEVELAND 35, OHIO

THIS ASSEMBLY ROUTINE IS FOR USE ON THE IBM 7090 TO ALLOW ASSEMBLY OF 1401 PROGRAMS WRITTEN IN THE SPS LANGUAGE. THE TIMING FOR INSTRUCTION EXECUTION AND TOTAL PROGRAM RUNNING TIME IS AVAILABLE. DIAGNOSTICS AND THE TOTAL NUMBER OF 1401 LOCATIONS REQUIRED ARE PRINTED OUT ALONG WITH THE PROGRAM LISTING. A CROSS REFERENCE SYMBOL TABLE IS ALSO PRINTED. A. THIS ROUTINE RUNS ON A 32K 7090 WITH FOUR TAPES. B. THE ROUTINE EXPECTS INPUT FROM TAPE 7-- HOWEVER, BY RECOMPILING A SMALL SUBROUTINE, INPUT MAY BE FROM CARDS. C. THE LANGUAGE OF SPS IS AS DESCRIBED IN IBM BULLETIN J28-0200-2, PRELIMINARY SPECIFICATION OF SPS



CONTINUED FROM PRIOR PAGE--  
MATERIAL.

**7090-7090NUCL04 AIREK-II**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL04

AUTHOR...A. SCHWARTZ

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

THE AIREK CODE IS DESIGNED TO SOLVE THE REACTOR KINETICS EQUATIONS WITH RESPECT TO TIME. THE MATHEMATICAL METHOD USED IS THAT DEVELOPED BY E. R. COHEN /SOME TOPICS IN REACTOR KINETICS - SEC. GENEVA CONF., P. 629, 1958/. THE MAXIMUM NUMBER OF DIFFERENTIAL EQUATIONS THAT CAN BE SOLVED SIMULTANEOUSLY IS 50.

**7090-7090NUCL05 CLOUD**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL05

AUTHOR...D. S. DUNCAN

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

THE CLOUD CODE CALCULATES THE EXTERNAL GAMMA-RAY DOSE RATE AND TOTAL INTEGRATED DOSE RESULTING FROM THE CONTINUOUS RELEASE OF RADIOACTIVE MATERIALS TO THE ATMOSPHERE. METEOROLOGICAL PARAMETERS SUCH AS WIND VELOCITY, LATERAL AND VERTICAL DIFFUSION PARAMETERS, STABILITY PARAMETERS AND THE PRESENCE OF PHYSICAL BOUNDARIES SUCH AS A GROUND SURFACE AND A TEMPERATURE INVERSION LAYER, ARE CONSIDERED. DECAY OF THE SOURCE MATERIAL IS DESCRIBED EITHER BY THE USE OF A SIMPLE PARENT-DAUGHTER DECAY SCHEME OR BY A WAY-WIGNER TYPE RELATIONSHIP. A 32K MEMORY IS REQUIRED.

**7090-7090NUCL06 EQUIPOISE - 3**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL06

AUTHORS..T. B. FOWLER M. L. TOBIAS

DIRECT INQUIRIES TO..  
T. B. FOWLER  
UNION CARBIDE CORP.  
OAK RIDGE, TENNESSEE

EQUIPOISE - 3 IS AN IBM-7090 FORTRAN PROGRAMMED CODE FOR THE SOLUTION OF TWO-GROUP, TWO-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS. A MAXIMUM OF 2100 MESH POINTS MAY BE USED, AND THE CODE WILL SOLVE PROBLEMS IN EITHER RECTANGULAR OR CYLINDRICAL GEOMETRY. LOGARITHMIC DERIVATIVE BOUNDARY CONDITIONS ARE ALLOWED, AND REMOVAL OF NEUTRONS FROM BOTH GROUPS IS PERMITTED.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL07 FOG**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL07

AUTHOR...H. P. FLATT

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

THE FOG CODES ARE ONE-DIMENSIONAL NEUTRON DIFFUSION THEORY CODES. THE DIFFERENCE EQUATIONS USED ARE DESIGNED IN CONSERVE NEUTRONS IN CYLINDRICAL AND SPHERICAL GEOMETRY. THE PRINCIPAL OPTIONS AVAILABLE INCLUDE CALCULATION OF THE ADJOINT FLUX, FIVE DIFFERENT CRITICALITY SEARCHES, AND CHOICE OF ONE OF NINE POSSIBLE SETS OF BOUNDARY CONDITIONS /INCLUDING ENERGY-DEPENDENT EXTRAPOLATION LENGTHS/. IN ADDITION, AN AUTOMATIC CALCULATION OF EXTRAPOLATION PARAMETERS IS PERMITTED, AND THERE IS AVAILABLE A BUCKLING ITERATION PROGRAM FOR A FULLY-REFLECTED, RIGHT CIRCULAR CYLINDER. ONLY MACROSCOPIC INPUT DATA IS PERMITTED. FROM ONE TO FOUR ENERGY GROUPS ARE PERMITTED, AND UP TO 239 MESH POINTS AND 40 REGIONS. SCATTERING IS PERMITTED ONLY TO THE NEXT LOWER GROUP. VARIES WIDELY, BUT EXECUTION TIME MAY GENERALLY BE EXPECTED TO BE LESS THAN 30 SECONDS.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL08 FORM**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL08

AUTHOR...D. J. MC GOFF

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

CONTINUED FROM PRIOR COLUMN--

THE FORM, OR FORTRAN-MUFF, CODE IS A FOURIER TRANSFORM SLOWING-DOWN CODE QUITE SIMILAR TO THE MUFF-4 CODE, BUT CONTAINING SOME ADDITIONAL OPTIONS, INCLUDING THE OPTION OF CHANGING CROSS SECTIONS IN THE 54 GROUP LIBRARY AT EXECUTION TIME. LIBRARY EDITING ROUTINES ARE INCLUDED AS AUXILIARY CODES. A 32K MEMORY AND 2 TAPE UNITS ARE REQUIRED. ABOUT 5-6 SECONDS.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL09 FORTRAN SNG**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL09

AUTHORS..B. CARLSON B. J. LEMKE

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIFORNIA

THIS CODE IS A REVISION OF AN EARLIER CODE WRITTEN BY ARGONNE NATIONAL LABORATORY /REF. 480/AMDI07 BY J. E. DENES/. THE PRINCIPAL CHANGES THAT WERE MADE WERE TO ELIMINATE USE OF DRUMS AND ANY ON-LINE PRINTING, AS WELL AS TO INCREASE THE SIZE OF THE DIMENSION STATEMENTS. IN ADDITION TO THE REGULAR FLUX CALCULATIONS IN PLANE, SPHERICAL, AND CYLINDRICAL GEOMETRY, VARIOUS CRITICALITY SEARCHES ARE PERMITTED. A 32K MEMORY IS REQUIRED. UP TO 100 SPACE INTERVALS AND 20 ENERGY GROUPS MAY BE USED.

**7090-7090NUCL10 FUGUE**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL10

AUTHOR...H. J. RICHARDSON

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

THE FUGUE CODE COMPUTER STEADY-STATE WALL AND BULK FLUID TEMPERATURE, VOID FRACTION, AND LOCAL PRESSURE IN LIQUID-COOLED CLOSED CHANNELS IN WHICH THE HEATING RATE IS SPECIFIED. THE REQUIRED RELATIONSHIPS ARE EXPRESSED IN GENERAL, NON-DIMENSIONAL FORM AND COMBINED IN AN INTERNALLY CONSISTENT MANNER TO ALLOW PREDICTIONS FOR A VARIETY OF COOLANTS AND SPECIFIED OPERATING CONDITIONS. A MAXIMAL PROBLEM REQUIRES ABOUT 1 MINUTE ON THE 7090.

**7090-7090NUCL11 GAM-1**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL11

AUTHORS..G. C. JOANOU J. S. DUDEK

DIRECT INQUIRIES TO..  
B. H. MOUNT  
P. O. BOX 1468  
PITTS., PA.

/INDICATION OF STATUS, IF KNOWN/ CALCULATES FEW-AND MULTI-GROUP CROSS-SECTIONS USING THE P SUB 1 EQUATIONS. A FULL SCATTERING MATRIX IS INCLUDED FOR BOTH P SUB 0 AND P SUB 1 SCATTERING TERMS. RESONANCE ABSORPTION IS TREATED BY THE METHODS DEVELOPED BY L. W. MORDHEIM.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL12 GRACE-I**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL12

AUTHORS..D.S. DUNCAN A.B. SPEIR

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIF.

GRACE-I IS A MULTIGROUP, MULTIREGION, GAMMA-RAY ATTENUATION CODE DESIGNED PRIMARILY FOR COMPUTING GAMMA-RAY HEATING AND GAMMA-RAY DOSE RATES IN MULTIREGION FINITE OR SEMI-INFINITE SLAB SHIELDS. A DIFFERENT BUILDUP FACTOR MAY BE SPECIFIED FOR EACH SOURCE REGION CONSIDERED. IF A 704 IS USED, AT LEAST AN 8K MEMORY IS REQUIRED. AS MANY AS 30 REGIONS, 10 MESH POINTS PER REGION, 20 GAMMA-RAY ENERGY GROUPS, 10 SHIELD MATERIALS, AND 5 MATERIAL BUILDUP FACTORS MAY BE INCLUDED IN A SINGLE CALCULATION. A SAMPLE PROBLEM INVOLVING 1 SOURCE REGION, 9 MESH POINTS AND 1 ENERGY GROUP REQUIRED .65 MINUTES ON THE 709.

**7090-7090NUCL13 GRACE-II**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL13

AUTHORS..D.S. DUNCAN A.B. SPEIR

DIRECT INQUIRIES TO..  
R. H. BLAINE  
P. O. BOX 309  
CANGGA PARK, CALIFORNIA

CONTINUED FROM PRIOR PAGE--

GRACE-II IS A MULTIGROUP, MULTIREGION, GAMMA-RAY ATTENUATION CODE WHICH COMPUTES THE TOTAL DOSE RATE OR HEAT GENERATION RATE FROM EITHER A SPHERICAL OR A CYLINDRICAL SOURCE. THE SOURCE, WHICH MAY BE LOCATED IN EITHER THE CENTRAL REGION OF THE SYSTEM OR IN A CONCENTRIC SHELL REGION SURROUNDING IT, MAY BE UNIFORM, EXPONENTIAL, OR HAVE A POLYNOMIAL VARIATION IN THE RADIAL DIRECTION. IN THE CASE OF CYLINDRICAL GEOMETRY, IT MAY ALSO HAVE A POLYNOMIAL VARIATION IN THE AXIAL DIRECTION. IF USED ON THE 704, AT LEAST A 16K MEMORY IS REQUIRED. AS MANY AS 22 REGIONS, 10 MESH POINTS PER REGION, 20 GAMMA-RAY ENERGY GROUPS, 20 SHIELD MATERIALS, AND 20 MATERIAL BUILDUP FACTORS MAY BE INCLUDED IN A SINGLE CALCULATION. A SAMPLE PROBLEM REQUIRED 3.64 MINUTES ON THE 709.

**7090-7090NUCL14 PERT**  
AVAILABLE 1ST QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL14

AUTHOR...H. P. FLATT

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

THE PERT CODE IS A PERTURBATION THEORY CODE DESIGNED FOR USE WITH THE AIM-5, AIM-6, AND FOG CODES. PUNCHED CARD OUTPUT FROM THESE CODES IS USED AS INPUT TO THE PERT CODE. USING CROSS SECTION DATA, FLUXES, AND ADJOINT FLUXES, THE RELATION CHANGE IN K TO THE SUB EFF MAY BE CALCULATED. CROSS SECTIONS MAY BE WEIGHTED WITH THE ADJOINT FLUX AND/OR FLUX. THE NEUTRON LIFETIME FOR THE DELAY GROUPS MAY ALSO BE CALCULATED. A LINEAR PERTURBATION THEORY IS USED FOR THE CALCULATIONS OF THE RELATIVE CHANGE IN K TO THE SUB EFF. GENERALLY LESS THAN 30 SECONDS FOR AN 16 GROUP PROBLEM.

**7090-7090NUCL15 SAIL**  
AVAILABLE 4TH QUARTER 1961.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL15

AUTHORS..B. J. LEMKE      B. CARLSON

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

THE MONOENERGETIC NEUTRON TRANSPORT EQUATION IS SOLVED USING THE DISCRETE S TO THE SUB N METHOD FOR A ONE-DIMENSIONAL PLANE CELL. VARIOUS CELL PROPERTIES ARE COMPUTED. EMPHASIS IS PLACED UPON EASE IN RUNNING MULTIPLE CASES, AND, IN CASE OF LACK OF CONVERGENCE WITHIN THE SPECIFIED NUMBER OF ITERATIONS, UPON RESTARTING A PROBLEM AT A LATER DATE. THE CODE IS LIMITED TO A SINGLE ENERGY GROUP, 100 REGIONS, 100 INTERVALS, AND PLANE GEOMETRY. THE ORDER OF APPROXIMATION MUST BE 2, 4, 6, OR 8. THE RUNNING TIME IS GENERALLY LESS THAN ONE MINUTE. A SAMPLE S TO THE SUB 4 PROBLEM INVOLVING 7 MESH POINTS REQUIRED 21 SECONDS, INCLUDING LOADING THE PROGRAM INTO MEMORY.

**7090-7090NUCL16 SIZZLE**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL16

AUTHORS..D. P. SATKUS      H. P. FLATT

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

/INDICATION OF STATUS, IF KNOWN/ ONE-SPACE DIMENSION, 18 GROUP DIFFUSION THEORY CALCULATION. AFTER CALCULATION AT T EQUALS 0, NUMBER OF GROUPS MAY BE REDUCED TO 1 TO 6 GROUPS. FIRST VERSION OF CODE WAS PRIMARILY INTENDED FOR FAST REACTOR CALCULATIONS, BUT LATER VERSIONS HAVE APPEARED FOR THERMAL CALCULATIONS. IN PRODUCTION, AVAILABLE.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL17 SUMMIT**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL17

AUTHOR...JOAN BELL  
GENERAL ATOMIC DIVISION OF  
GENERAL DYNAMICS  
JOHN JAY HOPKINS LABORATORY  
PO BOX 608  
SAN DIEGO 12, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

DESCRIPTION OF CODE PROGRAM FOR THE COMPUTATION OF CRYSTALLINE SCATTERING KERNELS. THIS IS THE MOST RECENT CODE FOR THIS PURPOSE. CODES WHICH CONTRIBUTED TO THE DEVELOPMENT OF SUMMIT /SOME OF WHICH ARE INCORPORATED WITH MODIFICATIONS IN THIS CODE/ ARE PHONON 150, PHONON-2 PHONON-1, FACET, NETIC AND PHISON.

**7090-7090NUCL18 S SUB 4 CYLINDRICAL GEOMETRY CELL CODE**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL18

AUTHOR...J. S. TEMPLE

CONTINUED FROM PRIOR COLUMN--

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

THIS CODE SOLVES THE ONE-DIMENSIONAL MONOENERGETIC BOLTZMANN EQUATION IN CYLINDRICAL GEOMETRY, USING THE S SUB 4 APPROXIMATION. IN ADDITION TO THE FLUX DISTRIBUTION, CELL-AVERAGED PARAMETERS ARE COMPUTED. AN INPUT GUES TO THE FLUX MAY BE USED OR A DIFFUSION CALCULATION MAY BE PERFORMED TO PROVIDE AN INITIAL GUESS. IN ADDITION, WHEN RUNNING MULTIPLE CASES, THE CONVERGED FLUX FROM THE PREVIOUS CASE MAY BE USED. THE PRESENT RESTRICTIONS ARE 100 REGIONS AND 400 INTERVALS. WITH THESE DIMENSIONS, A 32K MEMORY IS REQUIRED. ABOUT 15 SECONDS FOR A 50 MESH POINT PROBLEM.

**7090-7090NUCL19 TEMPEST**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL19

AUTHORS..J. S. SHUDDER      J. DYER

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

THERMAL CROSS-SECTION, WIGNER-WILKINS OR WIGNER EQUATIONS. IN USE, AVAILABLE.

**7090-7090NUCL20 TEMPEST-II**  
AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL20

AUTHOR...R. H. SHUDDER

DIRECT INQUIRIES TO..

R. H. BLAINE  
P. O. BOX 309  
CANGA PARK, CALIF.

TEMPEST-II IS A NEUTRON THERMALIZATION CODE BASED UPON THE WIGNER-WILKINS APPROXIMATION FOR LIGHT MODERATORS AND THE WILKINS APPROXIMATION FOR HEAVY MODERATORS. A MAXWELLIAN DISTRIBUTION MAY ALSO BE USED. THE MODEL USED MAY BE SELECTED AS A FUNCTION OF ENERGY. THE SECOND-ORDER DIFFERENTIAL EQUATIONS ARE INTEGRATED DIRECTLY RATHER THAN TRANSFORMING TO THE RICCATI EQUATION. THE CODE PROVIDES MICROSCOPIC AND MACROSCOPIC CROSS-SECTION AVERAGES OVER THE THERMAL NEUTRON SPECTRUM. A 32K MEMORY IS REQUIRED. ABOUT 15-20 SECONDS.

**7090-7090NUCL21 TWENTY GRAND**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL21

AUTHORS..T. B. FOWLER      M. L. TOBIAS

DIRECT INQUIRIES TO..

UNION CARBIDE CORP.  
T. B. FOWLER  
OAK RIDGE NAT. LAB.  
OAK RIDGE, TENN.

THE TWENTY GRAND PROGRAM FOR THE IBM 7090 IS CAPABLE OF SOLVING NEUTRON DIFFUSION PROBLEMS IN CYLINDRICAL OR SLAB GEOMETRY FOR ONE TO SIX GROUPS. UP TO 3000 MESH POINTS MAY BE USED. NEUTRON TRANSFER FROM ANY GROUP TO ANY OTHER GROUP IS PERMITTED. LEAKAGE IN THE THIRD DIMENSION IN X-Y GEOMETRY MAY BE TREATED BY A BUCKLING WHICH CAN VARY WITH REGION AND GROUP. THREE TYPES OF SYMMETRY CONDITIONS MAY BE HANDLED AUTOMATICALLY. THE ZERO FLUX, ZERO DERIVATIVE, AND LOGARITHMIC BOUNDARY CONDITIONS ARE AVAILABLE.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL22 WHIRLAWAY**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL22

AUTHORS..M. L. TOBIAS      T. B. FOWLER

DIRECT INQUIRIES TO..

UNION CARBIDE CORP.  
M. L. TOBIAS  
OAK RIDGE NAT. LAB.  
OAK RIDGE, TENN.

BY MAKING CERTAIN CHANGES IN TWO OF THE CHAIN LINKS OF THE WHIRLAWAY CODE, IT MAY BE USED TO CALCULATE THE FLUX DISTRIBUTION WITH A FIXED SOURCE IN ONE REGION. THE EIGENVALUE IS KEPT AT UNITY. WHILE REGIONS WITH FLUX-DEPENDENT SOURCES ARE PERMITTED, THEY MUST NOT BE ADJACENT TO THE ONE FIXED-SOURCE REGION. CORRECTED VALUES FOR THE SAMPLE PROBLEM GIVEN IN ORNL-3150 ARE ALSO INCLUDED.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.      OBTAIN BASIC PROGRAM

**7090-7090NUCL23 ZUT AND TUZ**  
AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090NUCL23

AUTHOR...G. F. KUNCIR  
GENERAL ATOMIC DIVISION OF  
GENERAL DYNAMICS

CONTINUED FROM PRIOR PAGE--

JOHN JAY HOPKINS LABORATORY  
PC BOX 608  
SAN DIEGO 12, CALIFORNIA

DIRECT INQUIRIES TO AUTHOR

DESCRIPTION OF CODE ZUT COMPUTES THE RESONANCE INTEGRALS FROM THE RESONANCE PARAMETERS FOR A WIDE VARIETY OF TEMPERATURES, COMPOSITIONS, AND GEOMETRIES FOR THE RESOLVED RESONANCES. TUZ DOES THE SAME FOR THE UNRESOLVED RESONANCES. A 32K MEMORY IS REQUIRED.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

7090-7090UCL24 2DXY

AVAILABLE 2ND QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL24

AUTHORS..J. BENGSTON S. T. PERKINS T. W. SHEHEEN  
D. W. THOMPSON

DIRECT INQUIRIES TO..

G. A. LINENBERGER  
SAN RAMON, CALIF.

THE 2DXY PROGRAM SOLVES THE HOMOGENEOUS OR INHOMOGENEOUS MULTI-GROUP TRANSPORT EQUATION IN XY GEOMETRY. VACUUM, SURFACE SOURCE, OR REFLECTING BOUNDARY CONDITIONS ARE AVAILABLE AS OPTIONS. IN THE HOMOGENEOUS CASE THE USER MAY REQUEST THE COMPUTATION OF REACTIVITY, PERIOD, CRITICAL CONCENTRATIONS OF SOME COMPOSITION OR THE CRITICAL THICKNESS OF A ZONE. THE S SUB N APPROXIMATION IS USED. SCATTERING MUST BE ISOTROPIC. ONE AND ONE-HALF HOURS FOR 6 GROUP, 1000 MESH POINTS ON THE 7090 /USING THE BINARY EDITOR/.

7090-7090UCL25 9-NIOBE /UNC-90-2/

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL25

AUTHORS..D. YETMAN B. EISENMAN G. RABINOWITZ

DIRECT INQUIRIES TO..

D. YETMAN  
UNITED NUCLEAR CORP.  
DEVELOPMENT DIV.-NDA  
WARREN, MICHIGAN

9-NIOBE SOLVES THE TIME INDEPENDENT MULTIENERGY NEUTRON OR GAMMA RAY TRANSPORT EQUATION IN A FINITE MULTILAYERED SPHERICAL CONFIGURATION. THE CODE ALLOWS FOR BOTH DISCRETE ENERGY LEVELS AS WELL AS A CONTINUUM OF ENERGY LEVELS WHEN THE LEVELS ARE VERY CLOSE.

A 32K MEMORY AND 10 TAPE UNITS ARE REQUIRED. A MAXIMUM OF FIVE MATERIALS IS PERMITTED IN EACH REGION, AND UP TO FIFTY REGIONS MAY BE HANDLED. A MAXIMUM OF 200 ENERGY GROUPS MAY BE USED.

A TYPICAL PROBLEM HAVING 85 RADIAL MESHPOINTS, 81 ENERGY VALUES, AND 8 ANGULAR RAYS REQUIRED 2-1/2 HOURS ON THE IBM-7090.

7090-7090UCL26 TET

AVAILABLE 3RD QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL26

AUTHOR...CHARLES W. DAWSON  
DAVID TAYLOR MODEL BASIN  
PITTSBURG, PA.

DIRECT INQUIRIES TO AUTHOR

THE THERMAL ENERGY TRANSPORT CODE TET IS A SLAB-GEOMETRY TRANSPORT CODE DESIGNED FOR THE SOLUTION OF THERMAL PROBLEMS. THE ANGULAR INTERVAL MAY BE DIVIDED INTO AS MANY AS FIVE SUB-INTERVALS. WITH THIS SUBDIVISION, AS MANY AS 39 ENERGY GROUPS MAY BE USED. BOUNDARY CONDITIONS PERMITTED ARE A FREE BOUNDARY, A REFLECTING BOUNDARY, OR A PERIODIC BOUNDARY CONDITION. UP TO 70 REGIONS ARE PERMITTED.

DIMENSION STATEMENTS IN THIS CODE MAY BE INCREASED TO ALLOW FOR 56 ENERGY GROUPS AND 90 REGIONS FOR A PSUB 1 CALCULATION, 43 GROUPS AND 80 REGIONS FOR A PSUB 2 CALCULATION, AND 41 GROUPS AND 70 REGIONS FOR A PSUB 3 CALCULATION.

A 32K MEMORY AND 6 TAPE UNITS ARE REQUIRED.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

7090-7090UCL27 MIST /MULTIGROUP

INTERNUCLEAR SLAB TRANSPORT/  
AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL27

AUTHORS..T. L. GALLAGHER M. J. HALL Y. S. KIM  
R. J. NEUHOLD G. E. PUTNAM O. M. SHAPIRO

DIRECT INQUIRIES TO..

PHILLIPS PETROLEUM COMPANY  
ATOMIC ENERGY DIVISION

A DESCRIPTION IS GIVEN OF A SET OF CODES DESIGNED TO SOLVE THE ONE DIMENSIONAL BOLTZMANN EQUATION IN SLAB GEOMETRY FOR UP TO SIX ENERGY GROUPS, TWO HUNDRED AND FIFTY SPACE POINTS AND FORTY REGIONS.

CONTINUED FROM PRIOR COLUMN--

THE BOUNDARY CONDITIONS FOR EACH GROUP CAN BE INDEPENDENTLY SPECIFIED AND THE BOUNDARY CONDITIONS PERMIT VERY GENERAL SPECIFICATIONS WITH REGARD TO -  
A/ PERFECT MIRROR REFLECTION OR SYMMETRY  
B/ ANISOTROPIC DIFFUSE SOURCES /BY INPUT OF LEGENDRE POLYNOMIAL COEFFICIENTS OR A SHORT TABLE DESCRIBING A KNOWN ANGULAR DISTRIBUTION OF THE FLUX/  
C/ ISOTROPIC /LAMBERT SURFACE/ REFLECTION

INDEPENDENT SPECIFICATION OF AN ISOTROPIC VOLUME SOURCE IN EACH GROUP IS ALSO ALLOWED.

ALTHOUGH SCATTERING FROM ONE GROUP TO ANOTHER IS ASSUMED TO BE ISOTROPIC, THE SCATTERING FUNCTION WITHIN EACH GROUP CAN BE A SECOND ORDER LEGENDRE POLYNOMIAL SERIES

THE METHOD USED TO SOLVE FOR THE ANGULAR DEPENDENT FLUX IN EACH GROUP IS NOT ITERATIVE - HENCE, FEW GROUP PROBLEMS REQUIRE NO MORE THAN A FEW OUTER ITERATIONS--EXACTLY AS IN THE COMMON MULTIGROUP DIFFUSION CODES.

THE NUMERICAL APPROXIMATION TO THE BOLTZMANN EQUATION IS A LINEAR ONE WHICH CAN BE DESCRIBED AS AN EXTENSION AND GENERALIZATION OF METHODS USED IN THE ORIGINAL SN CODES. IT IS SIGNIFICANT THAT THE PHYSICALLY UNREALISTIC NON-SYMMETRICAL NATURE OF THE FORMER SN APPROXIMATION IN SLAB CASES WITH REGARD TO FLUXES IN THE FORWARD AND BACKWARD HEMISPHERES HAS BEEN REMOVED.

THE MIST PROGRAM IS THE FIRST APPLICATION OF THE NEW FORMULATION WITH A NON-ITERATIVE METHOD OF SOLUTION FOR THE FLUXES IN EACH ENERGY GROUP OF A SLAB GEOMETRY MODEL. THE COUPLING OF THE GROUPS IS BY WAY OF DOWNSCATTERING AND FISSION. THE PROGRAM IS DIVIDED INTO FOUR SEPARATE CODES IN ORDER TO PROVIDE THE MAXIMUM NUMBER OF SPACE POINTS FOR EACH ORDER OF THE ANGULAR APPROXIMATION. THE LIMITS ON THE NUMBER OF MESH POINTS IN EACH CODE IS AS FOLLOWS -

CODE	MAXIMUM NUMBER OF ANGULAR INTERVALS	MAXIMUM NUMBER OF SPACE POINTS
MIST 4	4	250
MIST 6	6	150
MIST 8	8	100
MIST 10	10	70

THE MIST PROGRAM IS PRESENTLY WRITTEN FOR AN IBM 7090 WITH 32K STORAGE. IT IS IN THE FORTRAN LANGUAGE WHICH ALLOWS FOR RELATIVELY EASY MODIFICATION AND ADAPTATION TO OTHER COMPUTING SYSTEMS.

7090-7090UCL28 EQUIPOISE 3A

AVAILABLE 1ST QUARTER 1963.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL28

AUTHOR...C. W. NESTOR JR.  
OAK RIDGE NATIONAL LABORATORY  
OAK RIDGE, TENNESSEE

DIRECT INQUIRIES TO AUTHOR

EQUIPOISE 3A IS A SLIGHTLY EXPANDED VERSION OF EQUIPOISE 3. THE TWO ADDITIONS ARE A SECTION OF THE INPUT ROUTINE WHICH PRODUCES A PICTURE OF THE ARRANGEMENT OF MATERIALS WITHIN THE REACTOR, AND A SECTION OF THE OUTPUT ROUTINE WHICH CALCULATES FIRST-ORDER PERTURBATION THEORY ESTIMATES OF NEUTRON LIFETIME AND OF THE REACTIVITY RESULTING FROM A UNIT INCREASE IN EACH OF THE GROUP CONSTANTS IN EACH REGION OF THE REACTOR. THE LATTER OUTPUT WILL BE PROVIDED WHEN THE ADJUNCT FLX OPTION IS USED. THE ONLY ADDITIONAL INPUT DATA REQUIRED ARE THE AVERAGE NEUTRON SPEEDS FOR THE TWO GROUPS. A FORTRAN SOURCE DECK AND A BINARY DECK ARE ON FILE.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

7090-7090UCL29 ZORCH - THE ANALYSIS OF SIMULATED TRANSIENTS WITH A SIMPLIFIED SPACE DEPENDENT KINETICS MODEL

AVAILABLE 4TH QUARTER 1962.  
ORDER FROM PROGRAM DISTRIBUTION CENTER  
SPECIFY FILE NUMBER 7090-7090UCL29

AUTHOR...C. W. NESTOR JR.  
OAK RIDGE NATIONAL LABORATORY  
OAK RIDGE, TENNESSEE

DIRECT INQUIRIES TO AUTHOR

THE PROGRAM DESCRIBED IN THIS REPORT IS AN EXTENDED AND REVISED VERSION OF THE POINT-MODEL KINETICS PROGRAM MURGATROYD. IN THE MODEL USED IN THE PRESENT PROGRAM, THE AXIAL SPACE DEPENDENCE OF THE FUEL AND GRAPHITE TEMPERATURES IS CALCULATED, AND THE EFFECT ON REACTIVITY OF DEVIATIONS FROM THE STEADY STATE VALUES IS ASSUMED TO BE GIVEN BY THE PRODUCT OF AN APPROPRIATE TEMPERATURE COEFFICIENT OF REACTIVITY TIMES THE DEVIATIONS FROM THE STEADY STATE VALUE OF THE NUCLEAR AVERAGE TEMPERATURE /NAT/ THE NAT IS COMPUTED USING A SINE-SQUARED WEIGHTING FUNCTION IN THE AXIAL DIRECTION AND USING AN INPUT WEIGHTING FACTOR IN THE RADIAL DIRECTION.

THE SHAPE OF THE POWER DENSITY IS TAKEN TO BE TIME-INDEPENDENT IN CONTRAST TO THE SHAPES OF THE TEMPERATURE DISTRIBUTIONS, WHICH ARE TIME-DEPENDENT IN THE CALCULATION. THIS PROGRAM IS INTENDED TO BE USED IN SURVEYS OF REACTOR BEHAVIOR UNDER A WIDE RANGE OF CONDITIONS. IT IS THEREFORE BASED ON A SIMPLIFIED MODEL IN ORDER TO REDUCE COMPUTING TIME, BUT SHOULD PROVIDE A BETTER APPROXIMATION TO REACTOR BEHAVIOR THAN DOES A PURELY SPACE-INDEPENDENT CALCULATION

THIS REPORT CONSISTS OF A DERIVATION OF THE EQUATIONS USED IN THE PROGRAM, INSTRUCTIONS FOR ITS USE AND SAMPLE INPUT AND OUTPUT FOR A TEST CASE. A FORTRAN SOURCE DECK AND A BINARY OBJECT DECK ARE ON FILE.

**7090-7090NUCL30 DDB - A TWO DIMENSIONAL REACTOR DIFFUSION CODE WITH CRITICALITY SEARCH AND BURNOUT OPTIONS AVAILABLE 1ST QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7090-7090NUCL30**

AUTHORS...J. H. ALEXANDER C. CYL-CHAMPLIN J. E. GRATTEAU  
P. C. KAESTNER E. J. LESHAN M. H. MERRILL  
W. A. GROWDEN

**DIRECT INQUIRIES TO..**

J. H. ALEXANDER  
GENERAL ATOMIC DIVISION  
GENERAL DYNAMICS CORPORATION  
JOHN JAY HOPKINS LABORATORY  
FOR PURE AND APPLIED SCIENCE  
P. O. BOX 608  
SAN DIEGO 12, CALIFORNIA

DUO-DIMENSIONAL BURNOUT /DCB/ IS A FIVE-GROUP, TWO-SPACE-DIMENSIONAL REACTOR DIFFUSION CODE WITH BURNOUT OPTIONS. A MAXIMUM OF FOUR THOUSAND MESH POINTS ARE ALLOWED- DOWN SCATTERING TWO GROUPS FROM THE THIRD GROUP AND UPSCATTERING ONE GROUP FROM THE FIFTH GROUP IS ALLOWED. DCB MAY BE USED TO PERFORM STATIC CALCULATIONS WITH OR WITHOUT A CRITICALITY SEARCH TO OBTAIN FLUX AND POWER DISTRIBUTIONS. DDB IS WRITTEN IN THE FORTRAN 7090 LANGUAGE TO FACILITATE MODIFICATION. THE DIFFUSION PORTION OF DDB IS BASICALLY A TRANSLATION INTO FORTRAN OF THE UCRL PROGRAM ANGLE. A SET OF SPECIAL TAPE SUBROUTINES ARE USED TO TAKE MAXIMUM ADVANTAGE OF THE IBM 7090'S ABILITY TO DO MULTIPLE TAPE OPERATIONS WHILE PERFORMING CALCULATIONS. OPERATING EXPERIENCE INDICATES THAT THE DIFFUSION CALCULATIONS RUNNING TIME COMPARES QUITE FAVORABLY WITH ANGLE.

REQUESTOR MUST SUBMIT 4 TAPES TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL31 GE-HAPO S-X AVAILABLE 1ST QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7090-7090NUCL31**

AUTHOR...B. H. DUANE  
HANFORD ATOMIC PRODUCTS OPERATION  
GENERAL ELECTRIC COMPANY  
RICHLAND, WASHINGTON

**DIRECT INQUIRIES TO AUTHOR**

COMPUTER FOR WHICH CODE IS DESIGNED- IBM-7090 PROGRAMMING SYSTEM-FLOCO-V

NATURE OF PROBLEM SOLVED-THE PROGRAM CONSTRUCTS NEUTRON AND PHOTON DOUBLE SN TRANSPORT APPROXIMATION SOLUTIONS FOR A SLAB, CYLINDER, OR SPHERE. LATTICE DETAIL IN GEOMETRY, ENERGY, AND MOMENTUM ANGLES IS FLEXIBLE.

METHOD OF SOLUTION- THE METHOD IS A LOGICAL EXTENSION OF IDEAS ORIGINATED BY B. G. CARLSON IN THE LOS ALAMOS SN CODES. THE PROGRAM USES DISCRETE-POINT AND PIECEWISE-LINEAR DIGITAL REPRESENTATION, AS WELL AS SELECTED PORTIONS OF HIS INTEGRATION METHOD. NUCLEAR ANALYSIS CAPABILITIES NOT PREVIOUSLY AVAILABLE INCLUDE-  
1/ SIMULTANEOUS CALCULATION OF BOTH ADJOINT AND FLUX, COMBINED WITH FIRST-ORDER-PERTURBATION-THEORY CONVERGENCE ACCELERATION APPLIED TO EIGENVALUE, ISOTROPIC ADJOINT FIELD OR SOURCE, AND CURRENT FIELD OR SOURCE, WITH EIGENVALUE ACCELERATION CHAIN-COMPOUNDED CONTINUALLY TO ANY SPECIFIED ORDER.

2/ ISOTROPIC AND ANISOTROPIC SCATTER-TRANSFER, BOTH EXOTHERMIC AND ENDOTHERMIC, THROUGH AN UNLIMITED ENERGY RANGE.

3/ FLEXIBLE ARRAY OF MEASURABLE EIGENVALUES, INCLUDING CRITICAL FUEL LOADING, CRITICAL MODERATOR LOADING, CRITICAL POISON LOADING, AND REACTOR PERIOD WITH INCLUSION OF ANY NUMBER OF DELAYED PRODUCTION GROUPS.

4/ NEUTRON MODERATION HEATING, PHOTON PRODUCTION, PHOTON ENERGY DEPOSITION, AND BIOLOGICAL DOSE DEPOSITION.

5/ PERFORMANCE TRENDS, PROVIDED AS FIRST-ORDER-PERTURBATION-THEORY DERIVATIVES SPANNING COUPLED VARIATION OF ALL EIGENVALUES AND REACTOR MATERIAL LOADINGS.

6/ VARIATIONAL OPTIMUM SPACE-ENERGY CELL-HOMOGENIZATION, WEIGHTED WITH THE PRODUCT OF ADJOINT AND FLUX, PROVIDING COMPLETE QUASI-CONSTANT INPUT FOR CROSS DIFFUSION AND KINETIC ANALYSES.

TYPICAL RUNNING TIME- 5-20 MINUTES FOR 4-FIGURE EIGENVALUE FROM FLAT-FIELD START.

MATERIAL AVAILABLE THRU ARGONNE CODE CENTER-

1. CODE ABSTRACT
2. PROGRAM DESCRIPTION DECK /TAPE/
3. FLOCO-V OBJECT DECK /TAPE/
4. PROGRAM S SOURCE DECK-TABLE-8 /TAPE/
5. PROGRAM S OBJECT DECK /TAPE/
6. INPUT INSTRUCTION DECK-TABLE-4 /TAPE/
7. SAMPLE PROBLEM INPUT DECK-TABLE-7 /TAPE/
8. REFERENCE REPORT
9. PROGRAM S REVISIONS, APRIL 1962 MONTHLY PROGRESS REPORT.

REQUESTOR MUST SUBMIT 1 TAPE TO OBTAIN BASIC PROGRAM MATERIAL.

**7090-7090NUCL32 FARSE AVAILABLE 1ST QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7090-7090NUCL32**

AUTHORS...K. L. ROONEY M. A. BOLING

**DIRECT INQUIRIES TO..**

K. L. ROONEY  
ATOMIC INTERNATIONAL  
A DIVISION OF NORTH AMERICAN AVIATION

CONTINUED FROM PRIOR COLUMN--

THE FARSE CODE IS A TOOL DESIGNED TO INVESTIGATE THE EFFECT OF COMPLEX SHIELD GEOMETRICS ON OVERALL SHIELD WEIGHT AND PAYLOAD DOSE PROFILE FOR SNAP REACTOR SYSTEMS. IT IS SPECIFICALLY TAILORED TO SNAP GEOMETRICS. FARSE ENABLES ONE TO INVESTIGATE MANY SHIELD SHAPES AND SIZES WITHOUT CONSIDERABLE LOSS OF TIME IN PREPARATION OF INPUT ON MACHINE UTILIZATION. THE RESULTS ARE NOT INTENDED TO BE THE FINAL ANSWER TO SHIELD DESIGN. THE CODE IS A RANGE-FINDING DEVICE TO BE USED TO DETERMINE SEVERAL POSSIBLE SHIELD CONFIGURATIONS WHICH MAY BE MORE THOROUGHLY EVALUATED BY USE OF THE MONTE CARLO METHOD.

**7090-7090NUCL33 PREP AVAILABLE 4TH QUARTER 1961. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7090-7090NUCL33**

AUTHORS...HARVEY J. AMSTER L. M. CULPEPPER

**DIRECT INQUIRIES TO..**

B. H. MOUNT  
P. O. BOX 1468  
PITT., PA.

ELASTIC SCATTERING TRANSFER CROSS-SECTIONS ARE CALCULATED USING MASS NO., LETHARGY SPECTRUM, AND LEGENDRE EXPANSION COEFFICIENTS FOR DIFFERENTIAL ELASTIC SCATTERING CROSS-SECTIONS. THE COMPUTED CROSS-SECTIONS FOR A GIVEN ELEMENT ARE PLACED ON A LIBRARY TAPE UPON WHICH AS MANY AS 30 ELEMENTS MAY BE ACCUMULATED. A MAXIMUM OF 99 GROUPS AND 30 ELEMENTS ARE ALLOWED. 1 HOUR.

## 7094

**7094-NUCL01 APWRC /ARMY PRESSURIZED WATER REACTOR CODE FOR THE 709/90/94 AVAILABLE 3RD QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-NUCL01**

AUTHOR...T. M. OLSEN  
MARTIN MARIETTA CORP.  
BALTIMORE 3, MARYLAND

**DIRECT INQUIRIES TO AUTHOR**

APWRC IS INTENDED FOR CRITICALITY, FLUX DISTRIBUTION AND BURNUP STUDIES, AT THE SURVEY AND INTERMEDIATE DESIGN LEVELS OF SOPHISTICATION, PRIMARILY FOR PRESSURIZED WATER REACTORS. APWRC CONSISTS OF FOUR BASIC PROGRAMS WHICH ARE ARBITRARILY USED INDIVIDUALLY OR IN AUTOMATED COMBINATION, TO PERFORM FOUR TYPES OF REACTOR ANALYSIS.

CELCOR MULTIGROUP CELL HETEROGENEITY CORRECTIONS.  
SYNFAR-02 MULTIGROUP-MULTIREGION MODERATION CALCULATIONS WITH COUPLED FEW-GROUP SPATIAL TRANSPORT SOLUTION FOR FLUX DISTRIBUTION AND REACTIVITY /STATIC OR DYNAMIC/.

GAMICO FEW-GROUP MICROSCOPIC BURNUP CROSS SECTION LIBRARY.  
SYBURN FEW-GROUP SPATIAL TRANSPORT BURNUP.

8 FIFTH-ORDER PROGRAM GROUP IS INCLUDED IN APWRC FOR AUTOMATIC GENERATION OF THE VARIOUS MULTIGROUP CROSS-SECTION LIBRARY FILES, USED BY THE OTHER FOUR APWRC PROGRAMS, FROM LEVEL WIDTHS AND SECTION VERSUS ENERGY DATA.

SYNFAR-02 23 SLOWING-DOWN GROUPS. P1 OR B1 THEORY. EFFECTIVE TEMPERATURE OF THERMAL GROUP-68-2580 F. INHOMOGENEOUS SLOWING-DOWN OPTION FOR REFLECTOR REGIONS.  
REDUCTION TO 3 BROAD, FAST GROUPS; 2 FAST & THERMAL, OR 1 FAST & THERMAL GROUP.  
THERMAL CUTOFF AT 0.683 EV. /FIXED/  
15 NUCLIDES/REGION.

EXPLICIT RESONANCE CORRECTIONS /A LA GAM/ NOT INCLUDED  
2 OR 3 SPATIAL TRANSPORT GROUPS, SPHERE OR SYNTHESIS.  
R-Z OR X-Y GEOMETRY.

P1, CSN ORDERS 2, 4, 6, 8 OR 16. NO CYLINDER S16-GEOMETRY CONSTANTS BUILT IN. FLUX OR FLUX & ADJOINT SOLUTION

199 SPACE INTERVALS/DIRECTION  
24 MATERIAL REGIONS/DIRECTION  
50 AVERAGING REGIONS/DIRECTION  
6 DELAY GROUPS /FIXED, CROSS & MEASURABLE DYNAMIC SOLUTION. STATIC SOLUTION OPTIONAL.

MULTIPLE CORE REGIONS IN ONE SYNTHESIS DIRECTION ONLY  
3-THERMAL GROUP OPTION WITH INHOMOGENEOUS SOURCE TERM  
NEUTRON LIFETIME AND EFFECTIVE DELAY FRACTION.  
ANISOTROPIC P1 SCATTERING FOR CSN SOLUTIONS ONLY. NON RE-ENTRANT OR ZERO-CURRENT BOUNDARY CONDITIONS.

GAMICO /ADAPTATION OF GENERAL ATOMIC GAM-1, PRESERVING ALL FEATURES OF GAM-1. INCLUDES 3 ADDED APWRC FEATURES. /ADLER-NORDHEIM RESONANCE CORRECTIONS /U-238 & TH-232/. P0 AND P1 TRANSFER MATRICES IN SLOWING DOWN CALCULATION. 130 NUCLIDES IN 68-GROUP LIBRARY. INELASTIC SCATTERING AND /N,2N/ PROCESSES ALLOWED. AGE BY MOMENTS METHOD, SLAB GEOMETRY, INFINITE MEDIUM. SAME THERMAL GROUP LOGIC AS IN CELCOR AND SYNFAR-02. INHOMOGENEOUS SOLUTION FOR REFLECTOR REGIONS. BROAD GROUP AVERAGE CELL CORRECTIONS FOR USE IN SYBURN.

SYBURN REGIONWISE OR INTERVALWISE DEPLETION. 99 INTERVALS IN CORE. P1 OR CSN THEORY.  
SLAB, CYLINDER OR SPHERE GEOMETRY.  
55 ISOTOPES IN THE CORE.

26 ISOTOPES IN THE CORE IF MOVABLE ROD FOLLOWERS USED  
FIVE PRECURSORS/ISOTOPE /3-MEMBER LINEAR DECAY CHAIN/.  
NINE TABLES /OPTIONAL/ OF RADIALLY AVERAGED CORE CONSTANTS IN AXIAL BURNUP. /GENERATED BY A RADIAL CASE/. SIX ISOTOPES WITH SIGNIFICANT FISSION YIELD.  
TEN TIME STEPS AT WHICH MAXIMUM XENON OVERKICK TEST IS USED.

POISON, ROD BANK OR BUCKLING SEARCH.  
SAME SPATIAL TRANSPORT RESTRICTIONS AS SYNFAR-02  
HOMOGENEOUS STATIC THEORY SOLUTION.

CSDP SINGLE-LEVEL BRETT-WINGER FORMULA.  
ENERGIES FROM 0.001 TO 1.4e 6 DT EV.  
20 DIFFERENT NUCLEAR PARAMETERS /NU, SIGMA-ABS, X1 ETC./  
1000 GROUPS IN BASIC LIBRARY, 100 IN MATRIX LIB.

Section B

CONTINUED FROM PRIOR PAGE--

DISCRETE LEVEL AND CONTINUUM ALLOWED IN INELASTIC SCATTERING CALCULATIONS. MAXWELL-BOLTZMANN THERMAL AVERAGES AT 20 TEMPERATURES. 38 NUCLIDES IN PRESENT 1000 GROUP LIBRARY.

MACHINE REQUIREMENTS--32K CORE, 10 TAPE UNITS. NO READER OR PUNCH. UNUSUAL FEATURES OF THE CODE--APWRC ALLOWS VARIOUS AUTOMATED COMBINATIONS OF THE INDIVIDUAL PROGRAMS, WITH APPROPRIATE DATA TRANSFERRED AUTOMATICALLY FROM ONE PROGRAM TO THE NEXT -- CELCOR--SYNFAR-02, CELCOR--GAMICO--SYBURN, GAMICO--SYBURN ETC. EACH PROGRAM CAN BE USED SEPARATELY. IF DESIRED, AND INDIVIDUAL SECTIONS OF ANY PROGRAM CAN BE USED SEPARATELY /SEE THE SEPARATE ABSTRACTS FOR THE INDIVIDUAL PRG./.. ALL NECESSARY INPUT DATA ARE CHECKED BEFORE ANY CALCULATIONS ARE DONE. APWRC IS USED WITH A PROGRAM LIBRARY TAPE TO AVOID REPEATED HANDLING OF LARGE PROGRAM DECKS. EACH PROGRAM CAN STILL BE USED SEPARATELY IN DECK FROM WITH NO CHANGES. A CROSS SECTION LIBRARY TAPE IS USED. THE CROSS SECTION DATA PROGRAM /CSDP/ MINIMIZES LABOR AND HUMAN ERRORS BY ACCEPTING BASIC CROSS-SECTION DATA IN CARD FORM PUNCHED AUTOMATICALLY BY BENSONLEHNER EQUIPMENT FROM BN1-325 TYPE CURVES. THE OVERALL AUTOMATED FEATURES OF APWRC ALLOW REACTOR ANALYSIS PROBLEMS TO BE SOLVED IN ONE TRIP TO THE COMPUTER, WHEREAS MANY DAYS WOULD BE REQUIRED WITHOUT IT. WRITTEN IN FORTRAN II, FAP.

7094-1440ARDP DOUBLE PRECISION PACKAGE AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1440ARDP

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL ST. WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE PACKAGE OF DOUBLE PRECISION ROUTINES UTILIZING THE DOUBLE PRECISION HARDWARE INSTRUCTIONS ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THE ROUTINES INCLUDED IN THE PACKAGE ARE MODIFICATIONS OF THE EXISTING DOUBLE PRECISION ROUTINES ON THE FMS TAPE. THE CALLING SEQUENCES HAVE REMAINED THE SAME, THUS IT IS POSSIBLE TO SUBSTITUTE THESE ROUTINES WITHOUT REASSEMBLING. SOME DOUBLE PRECISION ROUTINES HAVE NOT BEEN INCLUDED IN THE PACKAGE. THE ROUTINES INCLUDED ARE AVAILABLE AS SEPARATE ROUTINES, SHARE DISTRIBUTION NUMBERS 1441 THROUGH 1447.

7094-1441ARDATN DOUBLE PRECISION ARCTANGENT SUBROUTINE

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1441ARDATN

AUTHOR...N.F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL ST. WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE ARCTANGENT IN DOUBLE PRECISION UTILIZING THE HARDWARE DOUBLE PRECISION OPERATION ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THIS ROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1442ARDEX3 DOUBLE PRECISION EXPONENTIAL FUNCTION

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1442ARDEX3

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE EXPONENTIAL IN DOUBLE PRECISION UTILIZING THE HARDWARE DOUBLE PRECISION OPERATION ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. REQUIRES DOUBLE PRECISION LOG AND EXPONENTIAL SUBROUTINES. THIS SUBROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1443ARDSC DOUBLE PRECISION SINE COSINE SUBROUTINE

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1443ARDSC

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE SINE COSINE IN DOUBLE PRECISION UTILIZING THE HARDWARE DOUBLE PRECISION OPERATIONS ON THE 7094. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THIS ROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1444ARDSRT DOUBLE PRECISION SQUARE ROOT SUBROUTINE

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1444ARDSRT

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE SQUARE ROOT FUNCTION IN DOUBLE PRECISION UTILIZING THE MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THIS ROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1445ARDMOD DOUBLE PRECISION MODULUS FUNCTION

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1445ARDMOD

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE MODULUS FUNCTION IN DOUBLE PRECISION UTILIZING THE HARDWARE DOUBLE PRECISION OPERATIONS ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THIS ROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1446ARDLQG DOUBLE PRECISION LOGARITHM SUBROUTINE

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1446ARDLQG

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE SUBROUTINE FOR COMPUTING THE LOGARITHM /BASE 10 AND BASE E/ OF A VALUE IN DOUBLE PRECISION UTILIZING THE HARDWARE DOUBLE PRECISION OPERATIONS ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THE ROUTINE IS PART OF ARDP, SHARE DISTRIBUTION 1440.

7094-1447ARDPB DOUBLE PRECISION BASIC ROUTINES

AVAILABLE 2ND QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1447ARDPB

AUTHOR...NIEL F. DOHERTY AVCC CORP. RAD MATHEMATICS SECTION 201 LOWELL STREET WILMINGTON, MASS.

DIRECT INQUIRIES TO AUTHOR

TO PROVIDE AN UP-TO-DATE ROUTINE FOR DOUBLE PRECISION ADD, MULTIPLY, SUBTRACT, AND DIVIDE UTILIZING THE HARDWARE DOUBLE PRECISION OPERATIONS ON THE 7094. 1. MACHINE MUST HAVE HARDWARE DOUBLE PRECISION INSTRUCTIONS. 2. PROGRAM MUST BE COMPILED WITH THE FMS TAPE. THIS ROUTINE IS PART OF ARDP SHARE DISTRIBUTION 1440.

7094-1560URHIST PRINTER PLOT ROUTINE FOR ONE PAGE /VERTICAL/ HISTOGRAMS

AVAILABLE 4TH QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1560URHIST

AUTHORS..MR. JOHN R.B. WHITTLESEY NEUROPSYCHIATRIC AND BRAIN RESEARCH INSTITUTES UCLA MEDICAL CENTER LOS ANGELES 24, CALIF.

DIRECT INQUIRIES TO AUTHOR

PLCTS HISTOGRAMS AS SHOWN IN ILLUSTRATION ON NEXT PAGE. NXT# NUMBER OF COLUMNS OR /BINS/. NXT MUST NOT EXCEED 210. IF NXT EXCEEDS 35, COLUMNS MAY BE PLOTTED AS STRINGS OF XS INSTEAD OF THREE-CHARACTER-WIDE COLUMNS /UNLESS AN OPTICON IS USED FOR COMBINING PAIRS OF COLUMNS/. IF NXT EXCEEDS 70, COLUMNS MUST BE PLOTTED AS STRINGS OF XS, AND IF NXT EXCEEDS 106, EVEN THE XS WILL REPRESENT PAIRS OF COLUMNS. HISTOGRAM VALUES SHOULD NOT BE NEGATIVE. REQUIRES 1305 WORDS IN MEMORY PLUS SYSTEM SUBROUTINES. WRITTEN IN FORTRAN II.

7094-1564MFOAS DIGITAL ANALOG SIMULATOR

AVAILABLE 4TH QUARTER 1963. ORDER FROM PROGRAM DISTRIBUTION CENTER SPECIFY FILE NUMBER 7094-1564MFOAS

AUTHORS..MR. JOHN HARRIS MR. DON FISCHER

CONTINUED FROM PRICR PAGE--

DIRECT INQUIRIES TO--  
MR. DON FISCHER  
MARTIN MARIETTA CORP.  
ORLANDO, FLA.

TO ALLOW AN ENGINEER TO QUICKLY WRITE PROGRAMS FOR DIGITAL SOLUTION OF PROBLEMS IN DYNAMIC ANALYSIS USING ANALOG COMPUTER TECHNIQUES. DAS INTERPRETS THE ENGINEER'S DATA CARDS DESCRIBING THE SYSTEM TO BE STUDIED, AND PRODUCES A MAP PROGRAM. THIS MAP PROGRAM IS ASSEMBLED BY THE AMP ASSEMBLER AND EXECUTED, USING DATA CARDS PROVIDED BY THE ENGINEER. DAS USES RECTANGULAR INTEGRATION. TO BE RUN UNDER IBSYS MONITOR. SOME FORMAT ERRORS ARE DETECTED AND NOTED IN ERROR MESSAGES. SEE LONG WRITE-UP FOR AVAILABLE COMPONENTS AND FORMATS. TIMING VARIES DIRECTLY WITH NUMBER OF COMPONENTS USED BY THE ENGINEER IN DESCRIBING HIS SYSTEM. MACHINE LANGUAGE--FORTRAN II AND MAP.

File No. 20

Re: Form No. C20-1604-0

This Newsletter No. N20-0020-0

Date June 4, 1964

Previous Newsletter Nos. None

ERRATA TO THE CATALOG OF PROGRAMS FOR IBM 704, 709, 7040, 7044,  
7090, AND 7094 DATA PROCESSING SYSTEMS, FORM NUMBER C20-1604-0

- I. The following program titles in both the KWIC Index and the abstract listing contain extraneous data. The correct file numbers and titles are listed below:
  - 7090-1363GC0012 - Explicit Double Precision Solution of the General Cubic with Real Coefficients and Single Precision I/O.
  - 7090-1364GC0013 - Explicit Double Precision Solution of the General Cubic with Real Coefficients and Double Precision Input.
  - 7090-1365GC0014 - Explicit Double Precision Solution of the General Quartic with Real Coefficients and Double Precision Input.
  - 7090-1366GC0016 - Explicit Double Precision Solution of the General Quartic with Real Coefficients and Single Precision Input.
  
- II. The two columns of abstract listings on page 083 should be read in reverse order.
  
- III. Nuclear Code abstracts for the IBM 7090 Data Processing System can be found in two places in the Catalog. Nuclear Codes 01 through 33 can be found on pages 083 through 087; Nuclear Codes 34 through 64 can be found on pages 057 through 061.



**International Business Machines Corporation**  
**Data Processing Division**  
**112 East Post Road, White Plains, N. Y. 10601**