22,319

USAEC COMPUTER PROGRAM SUMMARIES

Numbers 1 through 54

U of C-AUA-USAEC

ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS

**Prepared for the U.S. ATOMIC ENERGY COMMISSION
under Contract W-31-109-Eng-38**

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Argonne Code Center

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April 1973

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INTRODUCTION

During the past 13 years the Argonne Code Center has served as a U. S. Atomic Energy Commission information center for computer programs developed and used primarily for the solution of problems in nuclear physics, reactor design, reactor engineering and operation. The Center, through a network of registered installations, collects, validates, maintains, and distributes a library of these computer programs and publishes a compilation of abstracts¹ describing them.

In 1972 the scope of the Center's activities was officially expanded to include computer programs developed in all of the U. S. Atomic Energy Commission program areas and the compilation and publication of this report. The Computer Program Summary report contains summaries of computer programs at the specification stage, under development, being checked out, in use, or available at Commission offices, laboratories, and contractor installations. The purpose of the report is to keep the U. S. Atomic Energy Commission, AEC-laboratory and contractor personnel informed as to the existence, status, and availability of computer programs within the agency, thereby minimizing duplication costs and maximizing the value of USAEC computer program development effort and funding.

USAEC and contractor installation personnel responsible for AEC-funded computer program or system development are responsible for completing the standard Computer Program summary form used to produce this report. The form includes the following information:

Author/Contact: the name of the person responsible for the computer program or system described.

Category: a problem/system classification assigned on the basis of the class of physical problem solved, or the data processing activity performed.

Program Identification and Key-Word-In-Context Title: a limited program identification and description for use in the Report Table of Contents listing and Index section.

Contractor: the name and address of the USAEC or contractor installation.

Funding Division: the identification of the AEC-division funding the development.

Status: the current stage of computer program development.

Computer: hardware system requirements for the program or system.

Programming Language(s): the languages utilized in writing the program.

Program Size: an indication of the magnitude or complexity of the program, e.g. number of source statements or size of source decks.

Summary: a brief description of the physical problem solved and the method used for the solution together with the approximations employed and restrictions imposed by the program, or a definition of the data processing activity or system complete with restrictions and input/output data requirements.

References: bibliographic citations to pertinent published literature or technical reports.

Availability: an indication of the availability of the program package material and the source from which this material can be obtained.

Distribution: prescribed distribution limitations.

¹ Argonne Code Center: Compilation of Program Abstracts, Argonne National Laboratory Report ANL-7411 and supplements thereto.

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AEC COMPUTER PROGRAM SUMMARY

DATE: 1.	AUTHOR/CONTACT: 2.	CATEGORY: 3.
PROGRAM IDENTIFICATION AND KWIC TITLE: (fewer than 47 characters) 4.		
AEC/CONTRACTOR: 5.	FUNDING DIVISION: 6.	STATUS: 7. SPECIFICATION ☐ DEVELOPMENT ☐ CHECKOUT ☐ IN USE ☐ PACKAGED ☐
COMPUTER: 8.	PROGRAMMING LANGUAGE(S): 9.	PROGRAM SIZE: 10.
PROGRAM/SYSTEM SUMMARY: 11.		
REFERENCE(S): 12.		
AVAILABILITY: 13.		
DISTRIBUTION: ☐ UNLIMITED ☐ U.S. ONLY ☐ GOVERNMENT CONTRACT APPLICATIONS ONLY 14. ☐ SPECIAL		

GLOSSARY

AEC AND CONTRACTOR IDENTIFICATION

- ALOO — U. S. Atomic Energy Commission
Albuquerque Operations Office
P. O. Box 5400
Albuquerque, New Mexico 87115
- GEPI — General Electric Company
Neutron Devices Department
P. O. Box 11508
St. Petersburg, Florida 33733
- LLL — University of California
Lawrence Livermore Laboratory
P. O. Box 808
Livermore, California 94550
- MHBR — Mason & Hanger--Silas Mason Co., Inc.
P. O. Box 561
Burlington, Iowa 52601
- MHSM — Mason & Hanger--Silas Mason Co., Inc.
P. O. Box 647
Amarillo, Texas 79105
- MLMO — Monsanto Research Corporation
Mound Laboratory
P. O. Box 32
Miamisburg, Ohio 45342
- RFD — Dow Chemical USA
Rocky Flats Division
P. O. Box 888
Golden, Colorado 80401
- SLA — Sandia Laboratories
P. O. Box 5800
Albuquerque, New Mexico 87115
- SLAC — Stanford University
Stanford Linear Accelerator Center
P. O. Box 4349
Stanford, California 94305

AEC PROGRAM DIVISION ABBREVIATIONS

- MA — Division of Military Application
- R — Division of Physical Research
- SNS — Division of Space Nuclear Systems

DEFINITIONS OF SYMBOLS USED IN TABLE OF CONTENTS

MACHINE DESIGNATION		PROGRAMMING LANGUAGES	
210	ASI 210	BAL	Basic Assembly Language
283	Burroughs 283	BASIC	BASIC
360	IBM 360	COBOL, C	COBOL
400	GE 400	COM	COMPASS Assembly Language
435	GE 435	F	FORTRAN
1108	UNIVAC 1108	FTN	FTN FORTRAN
3100	CDC 3100	F36	3600 FORTRAN
3600	CDC 3600	F4	FORTRAN IV
6600	CDC 6600	F63	FORTRAN '63
7040	IBM 7040	LRL	Lawrence Livermore Laboratory's LRLTRAN
7044	IBM 7044	PL/1	PL/1
7600	CDC 7600	QUIK	QUIKTRAN
		R	RPG

STATUS

In the Table of Contents the STATUS heading applies to the summary item's STATUS and DISTRIBUTION. The symbols used for these are:

<u>Status</u>		<u>Distribution</u>	
S	Specification	blank	Unlimited
D	Development	R	U. S. Only
C	Checkout	G	Government contract applications only
U	In use		
P	Packaged		

SUBJECT CLASSIFICATION GUIDE

- A. **Cross Section and Resonance Integral Calculations**—Computation of reaction cross sections from nuclear theory such as the optical or Hauser-Feshbach models, resonance cross sections by Breit-Wigner or multilevel theory, determination of differential scattering cross sections, cross-section evaluation and compilation programs.
- B. **Spectrum Calculations, Generation of Group Constants, Lattice and Cell Problems**—Determination of the slowing-down density or thermal spectrum, weighting and averaging of cross sections and related quantities for the production of group constants, and evaluation of design parameters by lattice and cell calculation.
- C. **Static Design Studies**—Calculation of the reactivity and flux distribution of the reactor system; and adjustment of design parameters to prescribed specifications, i.e., criticality and power distribution search procedures.
- D. **Depletion, Fuel Management, Cost Analysis, and Reactor Economics**—Includes burnup programs, isotope and fission product buildup and decay computations, and optimization studies.
- E. **Space-Independent Kinetics**—Studies of the time-behavior of reactors including delayed neutron effects and feedback mechanisms, and transfer function evaluation.
- F. **Space-Time Kinetics, Coupled Neutronics-Hydrodynamics-Thermodynamics and Excursion Simulations**—Programs which consider spatial design characteristics and accompanying effects in studying the time-behavior of the reactor.
- G. **Radiological Safety, Hazard and Accident Analysis**—Calculation of internal and external dose rates, determination of reactor thermodynamic and hydrodynamic properties following an accident, i.e., release of radioactive materials, coolant system blowdown, steam generator rupture.
- H. **Steady-State and Transient Heat Transfer**—Includes fluid flow studies and calculations of thermodynamic properties.
- I. **Deformation and Stress Distribution Computations, Structural Analysis and Engineering Design Studies**—Includes fuel-element design evaluations, core-configuration studies, and composite structure analysis.
- J. **Gamma Heating and Shield Design Programs**—Computation of heat-generation rates, and penetration analysis and leakage calculations for reactor shields.
- K. **Total Reactor Systems Analysis**—Combinations of programs solving correlated problems in categories A through I.
- L. **Data Preparation**—Generation of program parameters; checking, editing and formatting of problem input information.
- M. **Data Management**—Construction, maintenance and retrieval of data files, e.g., cross-section libraries; management systems such as payroll and personnel systems, accounting and budgeting systems, property and equipment systems, production and inventory control, indexing and retrieval systems, etc.
- N. **Subsidiary Calculations**—Plotting, editing and display routines which process output data from other programs.
- O. **Experimental Data Processing**—Programs designed to process data directly acquired from an experimental situation or to assist experimenter in the design of the experiment.
- P. **General Mathematical and Computing System Routines**—Calculation of mathematical functions, special-language routines with general data-processing capabilities, software systems.
- Q. **Materials**—Measurements and computation of the physical and mechanical properties of materials, simulation of radiation damage processes, corrosion studies, determination of crystallographic functions.

- R. **Meteorology**—Calculations relating to the atmosphere and its phenomena, studies of airborne particulate matter, climatology, etc.
- S. **Space Sciences**—Analysis of orbits and trajectories, astronomy and astrophysics computations, wave propagation studies and the calculation of reentry parameters.
- T. **Electronics and Engineering Equipment**—Automated design of electronic equipment, engineering computations for numerically controlled machine tools and process control programs.
- U. **Chemistry**—Chemical analysis, mass spectroscopy, radiation chemistry, radiolysis studies, etc.
- V. **Particle Accelerators and High Voltage Machines**—Programs relating to the design, development and operation of high-voltage machines and particle accelerators such as Van de Graaff generators, linear accelerators, cyclotrons, synchrotrons, etc.
- Z. **Data**—Data prepared in specific program formats for program testing and evaluation, benchmark studies, or library use.

SUMMARY COLLECTION

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1 C. R. Forrey, Jr. & H. E. Hascall D
**ISOGEN, RADIOACTIVE DECAY GROWTH OF
 NUCLIDES**

Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 IBM 360/40 FORTRAN IV (G) 768 cards

This program is a modified version of "Isogen - A Computer Code for Radioisotope Generation Calculations", HW-83785, September 1964. The purpose of the program is that of extrapolating the quantities of nuclides that are or will be present in radioactive material previously analyzed for isotopic content by radiochemical methods.

Specifically the program can be used:

1. To determine the change in isotopic concentration of an element; hence, to determine the specific activity over extended periods of time.

2. To determine procedures necessary to analyze for any particular element.

3. To determine if nuclides or elements are present in detectable quantities.

4. To predict the isotopic concentration and impurity content of the final product at any given time in the future.

Charles R. Forrey, Jr., A Computer Program for Determining the Growth of Nuclides from Radioactive Decay, RFP-1098, March 25, 1969.

ISOGEN, HW-83785 version, is available from the Argonne Code Center as a UNIVAC 1108 package, ACC No. 367. This IBM 360 package will be packaged and available through the Argonne Code Center, also.

Distribution: U. S. Only.

2 S. W. Key & Z. Bersinger I
SLADE, STATIC ANALYSIS OF THIN SHELLS

Sandia Laboratories MA
 Albuquerque, New Mexico In Use
 CDC 6600 F4-98%, COM-2% 3655 cards

SLADE is a program designed for the static analysis of thin shells. It is a finite element program utilizing a doubly curved arbitrary quadrilateral element. It is designed specifically for reference surfaces which are a portion of axisymmetric surfaces. The program computes static deformation, stresses, and stress resultants occurring within the shell.

The program allows up to five separate layers and up to five separate, elastic, anisotropic materials with temperature-dependent properties. It will handle variable thickness shells and allow thickness discontinuities along element boundaries. Over any portion of the boundary, a choice of thirteen separate boundary conditions is available.

In its current form, the program will accept up to 650 elements and 700 nodal points and requires a 64K word small core memory. A singly dimensioned storage array is used for the total stiffness matrix and for the load vector. If a given problem fits within the limits of this storage array, the program functions as an in-core program. If additional storage is required, the program seeks on-line auxiliary storage which must be randomly accessible.

Samuel W. Key and Zelma E. Bersinger, SLADE: A Computer Program for the Static Analysis of Thin Shells, SC-RR-69-369, November 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

3 C. T. Sigler M
**RALCRTPH, RESOURCE ALLOCATION CRITICAL PATH
 SYSTEM**

Monsanto Research Corporation MA
 Mound Laboratory, Miamisburg, Ohio In Use
 IBM 360/40 F4-80%, C-19%, RPG-1% 6891 cards

The Resource Allocation System provides the project planner with a tool to help schedule resources involved in a project. This system is oriented toward the user who is planning a plant shutdown; however, it has applications in other areas.

The system can be divided into four different sections:

1. EDIT SECTION - The edit section of the system contains a program which edits the input data for looping and syntactical errors. The data edit program will list all beginning and ending nodes and will list each activity card.

2. CRITICAL PATH CALCULATIONS - The program uses a standard forward-backward pass algorithm for calculating the critical path. At the time the critical path is calculated, a report showing the node numbers, early start times, late start times, and other typical critical path data is printed.

3. RESOURCE ALLOCATION PROGRAM - The resource allocation section of the system uses the output of the critical path program sorted by early start time. The activities are scheduled within a resource profile which is imposed on the program by the use of input data cards.

4. REPORT SECTION - The first report is a resource utilization summary which is simply a graphical picture of how each resource was used at each time increment. The second report, a bar graph, is a graphical representation of when an activity is scheduled for work or a float. The third report consists of an activity listing of each project as it progresses.

The programs in this system have been written to run under IBM operating system (OS II, Level 8) on system 360/40 with 128K bytes of memory. Input/output required are card reader, printer, three tapes or disk drives.

C. T. Sigler, Resource Allocation User's Guide, Monsanto Management Information and Systems Department, September 1, 1967.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

4 B. D. Navalesi M
BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS

Sandia Laboratories MA
 Albuquerque, New Mexico In Use
 UNIVAC 1108 COBOL 965 cards
 IBM 360 COBOL 1430 cards

This program is designed to calculate the break-even point of purchase versus lease for data processing equipment. The AEC regulations require that a purchase versus lease analysis be made on each piece of data processing equipment as part of the study preceding the lease or purchase of such equipment. In addition, a purchase versus lease analysis must be prepared annually for each item of data processing equipment leased with AEC funds. An analysis of a specific piece of equipment takes about five seconds on a run of BECOM and should execute as fast on any other large scale machine. It is also considered possible to adapt this program to the analysis of equipment items other than computers.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

5 Susan M. Davenport P
PLOTR, 2-DIMENSIONAL CONTOUR AND AREA CALCULATION
Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN IV 636 cards
w/SC 4020

Often it is necessary to observe the behavior of a function which is defined over a two-dimensional region. Such is the case, for example, with the results obtained using finite-difference techniques to solve a differential equation in two variables. To aid inspection of the function, it is advantageous to be able to produce a contour map in which each line displays the locus of points where the function is equal to a specific value.

This report describes the method and use of PLOTR and the auxiliary routine XYGRD; these programs contour a function defined over a two-dimensional grid and compute the area within the contour. Sample problems illustrate the use of these routines.

Susan M. Milly, PLOTR: A Two-Dimensional Contouring and Area Calculating Routine, SC-RR-69-685, October 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

6 N. A. Smith P
SANDIA SCOPE USERS' MANUAL FOR THE CDC 6600
Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN N/A

This document is the Sandia Laboratories publication containing information on the Control Data 6600 SCOPE operating system and the FORTRAN FTN compiler. It is oriented toward the FORTRAN used in the Sandia environment.

N. A. Smith, Scope Users' Manual for the Control Data 6600, SC-M-70-185, last revised, November 1972.

This manual will be available through the Argonne Code Center.

Distribution: U. S. Only.

7 G. D. Lassahn P
NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS
Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
GE 400 FORTRAN IV 150 statements

This program is a time-sharing program for finding the least square fit of a function of one variable and as many as 25 adjustable parameters, to a given set of data. The program can handle functions either linear or non-linear in their adjustable parameters.

A linear approximation iteration scheme is used to find the desired parameter values. The convergence criterion is that the value of each adjustable parameter must change by

0.01% or less in the last iteration, with a maximum of 100 iterations allowed.

Instructions for the use of the program are not included in the documentation but are a part of the comments in the listing of the program in the reference document.

G. D. Lassahn, A Time-Sharing Program for Least Squares Fitting of Functions with Non-linear Parameters, RFP-731, May 12, 1971.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

8 C. R. Heiple P
CONVERSION FROM PAPER TAPE TO CARD OR DISK
Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
IBM 360 F4, BAL 1819 cards
w/IBM 2671

TERMTRANS, source deck translation from GE time-sharing system to IBM 360 FORTRAN IV (G); 176 cards.

KEYPUNCH (ASCII), KEYPUNCH (FLEX), source deck from ASCII paper tape to cards or FRIDEN Flexowriter Tape to card or disk storage; 345 cards.

KEYPUNCH (CPS), paper tape with BASIC source to CPS source deck and disk storage; 135 cards.

TITHT, TITHF, one line from ASCII or FRIDEN Flexowriter paper tape to disk in FORTRAN data format; 240 cards.

FLOHT, FLOHF, INTHT, and INTHF, to translate floating-point and integer data from ASCII or FRIDEN Flexowriter paper tape to disk in FORTRAN format; 533 cards.

FLOTRD, INTRD, reads floating-point or integer numerical data from ASCII-coded paper tape to disk in a FORTRAN-readable format; 390 cards.

These six utility routines are used in translating from ASCII-coded or FRIDEN Flexowriter coded paper tape to IBM 360 FORTRAN source cards or FORTRAN-readable disk storage.

These routines will be available through the Argonne Code Center.

Distribution: U. S. Only.

9 R. W. Loser P
SURFACE AREA AND VOLUME OF A SOLID OF REVOLUTION
Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
GE 400 FORTRAN 79 cards

This is a time-sharing FORTRAN program which computes the surface area and volume of a solid of revolution, a solid which is generated by revolving a plane region about an axis of revolution. Given plane polar coordinate data, the program uses spherical coordinates to calculate the surface area and volume of a solid of revolution. The plane polar coordinate data are described as input data and the surface area and volume are described as output data.

The program is written for the solid of revolution generated by revolving about the y-axis in an xy-plane a region bounded by the coordinate axes and a curve extending from $\Theta=0$ to $\Theta=\pi/2$. The polar angle Θ is incremented and the radius of the curve is measured at each increment. Hence,

the plane polar coordinates (R,θ) are used to determine the surface area and volume.

R. W. Loser and R. L. Murri, A Time-Sharing FORTRAN Program for Computing the Surface Area and Volume of a Solid of Revolution, CPRD 940482-102, July 29, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

**10 Donald C. Coonfield P
POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS**

Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
IBM 360/40 FORTRAN IV (G) 247 cards

This program determines a polynomial approximation to a function by fitting experimentally determined data at a set of discrete points.

Legendre's principle of least squares is used to determine a polynomial approximation to a function by fitting given data to a certain set of discrete points. Crout's reduction is used to calculate the coefficients of the approximating polynomial. Then the interval-halving technique is used to extrapolate the first zero of the function.

The experimentally determined points are input quantities. A maximum of six data points is allowed but the user may modify this to fit experimental needs. Also the program allows three weight-determination methods.

Harold E. Clark, Donald C. Coonfield, and Lynn E. Jackson, Polynomial Curve Fit by Least Squares, RFP-968, 11 July 1967.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

**11 H. J. Saal, J. R. Ehrman, et al. P
IBM 360 UTILITY AND PDP 9/15 ASCII MAGNETIC TAPE READ/WRITE ROUTINES**

Stanford Linear Accelerator Center R
Stanford, California In Use
IBM 360 F4-55%, BAL-45% 780 cards

This package consists of a combination of two utility routines and two PDP 9/15 tape service programs for the IBM 360 computer.

ROUTINE 1: SHF1, Shift Routines for Fullword Operands - This function provides the programmer with the capability of performing arithmetic, logical, and circular shifts of any number of binary positions on any fullword operand.

To perform a shift of a number (NBR) of binary positions on the argument (ARG), use the following:

Arithmetic Right Shift: ANS = SHF1RA (ARG,NBR)
Arithmetic Left Shift: ANS = SHF1LA (ARG,NBR)
Logical Right Shift: ANS = SHF1RL (ARG,NBR)
Logical Left Shift: ANS = SHF1LL (ARG,NBR)
Circular Right Shift: ANS = SHF1RC (ARG,NBR)
Circular Left Shift: ANS = SHF1LC (ARG,NBR)

LANGUAGES FROM WHICH THIS ROUTINE MAY BE CALLED: OS/360; FORTRAN IV, ASSEMBLER.

ROUTINE 2: TCRDT2, FORTRAN-callable Tape Routine to Read Past Permanent Errors and/or End-of-files - This subroutine was written to provide the ability to read

magnetic tape records and allow tape read operations to continue after encountering permanent errors and/or end-of-files. When errors are encountered, the number one is stored in the status indicator for that record.

LANGUAGES FROM WHICH THIS ROUTINE MAY BE CALLED: FORTRAN IV, ASSEMBLER.

ROUTINE 3: CARDMTF, S/360 Cardreader to PDP9/PDP15 ASCII Magnetic Tapes - This program reads in EBCDIC cards and translates them into an ASCII tape format. The cards are read and written on a magnetic tape in a format compatible with a DEC PDP9/15 MTF handler. Several files may be written in one 360 run.

ROUTINE 4: MTFLIST, S/360 Lineprinter Listings from PDP9/PDP15 ASCII Magnetic Tapes - This program enables owners of PDP9/15 systems with the IBM compatible magnetic tape drives to produce listings or punched cards on the IBM 360 computer system. Tapes are assumed to be in standard DEC format, 9-track (dump mode) as written by the MTF handler. As many separate files as desired may be converted to EBCDIC in one run. Output from PIP or any DEC system program normally listed on TTY may be listed on the S/360 printer by assigning the MTF handler to the appropriate DAT slot.

These routines will be available through the Argonne Code Center.

Distribution: Unlimited.

**12 John R. Ehrman P
FORMAT, A TEXT PROCESSING PROGRAM**

Stanford Linear Accelerator Center R
Stanford, California In Use
IBM 360 with FORTRAN IV Source 3312 cards
TN print train Object 1014 cards
Control 27 cards
Sample Data 1755 cards

FORMAT is a computer program designed to meet the need for a rapid method of editing and producing papers, reports, and other finished and reproducible documents directly on the system printer. It has the option of printing upper or lower case and has the capability of using special characters. It has facilities which simplify the task of index construction. Input to the program is free-form card-image text. The document is formatted and controlled according to control cards and command words interspersed throughout the input.

FORMAT requires a minimum memory size of 64K in a standard System/360. No additional devices are required; however, the availability to the program of magnetic tape drives greatly enhances its usefulness.

This program will be available through the Argonne Code Center.

Distribution: Unlimited.

**13 William Fienning P
INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM**

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 3100 COMPASS 4195 cards

In 1965 a telemetry playback facility was installed at Sandia Laboratories. During 1970 several changes were made in the playback system. An examination of the original

executive system indicated that it would not be suitable for modification to accommodate the newly acquired peripheral hardware devices. It was decided that a redesign of the system based upon a reassessment of the operation of the playback station would increase the capacity of the system to process data and to enable more people to become proficient in the use of the computer facility. This decision was based on the fact that working within the framework of the original system would entail considerable effort and limit the innovations which could be made.

In its interface with the computer operator, the new system would be very similar to the original system. It would accept commands from the operator by a question-and-response procedure. However, it was desired that the new system have the following improvements:

- a) The philosophy of the computer interface with the operator should be consistent for all programs.
- b) The messages passing between the computer and the operator should be minimal but sufficient to accomplish the task.
- c) The execution time of frequently used programs should be decreased.

d) The computer should act as a teaching machine when the operator fails to make the proper response. This would eliminate frequent references to an instruction manual.

e) Whenever possible, the computer should diagnose an operational malfunction in the peripheral input/output equipment and request the proper corrective measures be taken by the operator. When appropriate, the attempted operation should be aborted and control returned to the operator for the next request.

To include the above improvements, a new monitor system for the model 3100 computer was developed. The new system is called the Playback Executive System (PLEXS) and has the following capabilities included:

a) Subroutines to communicate with the computer operator via the console typewriter.

b) Subroutines to read and write magnetic tape with concurrent instruction execution and automatic error recovery procedures.

c) Fast interrupt handling logic to permit the interfacing of the synchronizing device for the PCM telemetry tapes.

d) A capability for the computer operator to load programs from a system library tape.

e) A subroutine to read cards from the card reader with concurrent instruction execution and error recovery.

f) A subroutine to punch paper tape with concurrent instruction execution.

g) A subroutine to print lines and position paper on the line printer concurrent with instruction execution and other input or output operations.

h) A capability to load and execute new programs not on the system library tape.

i) A capability to print the contents of the computer memory on the line printer.

j) A capability for the monitor to process interrupts generated by the computer operator.

In general, the program monitors the CDC 3100 computer. It handles the loading of programs from a library tape and processing requests for certain peripheral devices. These devices include magnetic tape, paper tape, console typewriter, card reader and printer.

W. C. Fienning, An Interactive Monitor for a Telemetry Playback System, SC-DR-710211, April 1971.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

14 Clinton R. Heiple P
PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000
 Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 IBM 360/40 FORTRAN IV (G) 1498 cards
 w/GERBER 2000 plotter

PLOT generates the instructions necessary to plot graphs on the Gerber Series 2000 plotter. The program can be used to plot virtually any type of two-dimensional graph with rectangular axes. The capability of rapid, automatic plotting of high quality graphs is of wide general usefulness.

The program receives all of its control parameters and the data points to be plotted from punched cards. A user without any previous computing experience should be able to plot graphs using this.

A maximum of 4000 data points can be plotted for any curve. Up to 99 curves may be drawn on any graph. The data points may be in either rectangular or polar form and each of the coordinate axes may be either linear or logarithmic. The program draws the coordinate axes and draws and labels the tick marks. A set of ten different plotting symbols may be used for multiple curves on the same graph.

Clinton R. Heiple, PLOT, A Computer Program for Automatic Graph Plotting, RFP-1259, March 14, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

15 B. McLaughlin & R. Domres Q
SIMULATION OF STRESS CORROSION CRACKING
 Sandia Laboratories MA
 Albuquerque, New Mexico In Use
 CDC 6600 FORTRAN 353 cards

By assuming that the electrochemical oxidation mechanism of crack propagation is not supplemented by mechanical fracture or plastic deformation during the early stages of crack growth and that the equilibrium rate of a charge transfer half-reaction, occurring at the interface between two phases, is dependent upon the local surface tension at the point of reaction, it is possible to satisfactorily account for the following general aspects of stress corrosion cracking: (1) the existence of an incubation period, (2) the existence of a threshold stress, (3) the variation of incubation time with over potential, (4) the variation of incubation time with applied stress.

Bruce D. McLaughlin, Computer Simulation of Stress Corrosion Cracking, SC-RR-69-828, January 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

16 R. W. Loser & D. T. Larson Q
SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS

Dow Chemical Company
Rocky Flats Division, Golden, Colorado
IBM 360/40 FORTRAN IV 800 cards

This program is for use with ellipsometer measurements to determine the index of refraction of an oxide film, the thicknesses of the oxide film, and the index of refraction of the substrate material.

Robert W. Loser and Donald T. Larson, A FORTRAN IV Program for Ellipsometer Measurements of Surface Films, RFP-1392, October 17, 1969.

This program will be available through the Argonne Code Center.

Distribution: U.S. Only.

17 C. R. Heiple Q
INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING

Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
IBM 360/40 F4(G)-98%, BAL-2% 1427 cards

INDEX is a computer program written to index materials on the basis of their X-ray powder patterns. Crystals belonging to the cubic, hexagonal, tetragonal, and orthorhombic classes can be indexed by supplying the 2Θ reflections, where Θ is the Bragg angle.

C. R. Heiple, A Computer Program for Indexing Crystals from their X-ray Powder Patterns, RFP-1292, March 28, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

18 George J. Werkema Q
CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS

Dow Chemical Company MA
Rocky Flats Division, Golden, Colorado In Use
IBM 360/40 FORTRAN IV 296 cards

The program calculates the values of the interplanar spacing, d , $\sin^2\Theta$ and 2Θ for the crystallographic planes hkl . Planes that are found to be systematically nonreflecting by virtue of the space group symmetry elements coded in the data are omitted from the output list. The calculated results are sorted on increasing 2Θ in blocks of 2000 before listing. These values are necessary in the identification process of polycrystalline materials by means of x-ray diffraction.

George J. Werkema, A Revised FORTRAN IV Program to Calculate Crystallographic Functions, RFP-1329, May 14, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

19 K. D. Hage, et al. R
MODEL B, FALL AND DISPERSION OF PARTICLES IN THE ATMOSPHERE

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 3600 3600 FORTRAN 3533 cards

The MODEL B computer program is designed to calculate the transport, fall, and dispersion of solid spherical particles

from a high-altitude point or line source in a simulated atmospheric wind field. The program is intended for use as a tool in estimating concentrations and deposit densities for aerospace nuclear safety hazards analyses. It can be used for source altitudes up to 90 km and for density 10 particles with diameters from about 3 to 300 microns (or density-size combinations with equivalent terminal velocities). The transport and fallout processes are simulated by trajectories derived from particle terminal velocities and the wind speeds along the particle paths. The dispersion of particles resulting from the interaction of atmospheric turbulence, wind shears, and variations in terminal velocities within a cluster is simulated by subdivision of volumes containing the particles, followed by the generation of new trajectories for each subdivision. Two wind fields can be used in the program: the first consists of a mean east-west flow, and a single sinusoidal wave component, of arbitrary phase speed, amplitude, and vertical variations; the second consists of a mean east-west flow and long or planetary waves that were derived from mean winter data below 30 km in the northern hemisphere. Highly simplified short- or synoptic-scale waves with arbitrary phase speeds, amplitudes, vertical variations, and vertical velocities can be added to the latter wind field if this is desired. Both wind fields are represented in spherical coordinates as continuous functions of space over the globe and as continuous functions of time if a phase speed is specified for the wave components.

With the model, the program calculates estimates of air concentrations of particles of any specified diameter at one specified and at one fixed level in the atmosphere and computes grid point values at the earth's surface of the deposit density (mass per unit area) of particles released in the form of an instantaneous point or line source at a specified location.

K. D. Hage, P. S. Brown, G. Arnason, S. Lazorick, and M. Levits, A Computer Program for the Fall and Dispersion of Particles in the Atmosphere, SC-CR-67-2530, April 1967.

K. D. Hage, Further Development of the Model B Computer Code for Estimating Particle Fall and Dispersion in the Atmosphere, Final Report, SC-CR-67-2645, August 1967.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

20 H. R. Spahr S
HRS017, MULTIPLE REVOLUTION REENTRY

Sandia Laboratories SNS
Albuquerque, New Mexico In Use
IBM 7040 QUIKTRAN 646 cards
CDC 3600 FORTRAN IV 741 cards
CDC 6600 FORTRAN IV 742 cards
UNIVAC 1108 FORTRAN IV 746 cards

This program uses a closed form approximate solution to calculate the trajectory and reentry environment for objects decaying from multiple revolution elliptical orbits.

The required input data include:

ATMOSPHERIC DATA - (i) geometric altitude in feet above mean sea level, (ii) corresponding atmospheric density in pounds per cubic foot for the altitude (a).

INITIAL ORBIT DATA - (i) geocentric geometric perigee altitude in feet above the spherical Earth, (ii) geocentric geometric apogee radius in feet from the center of the spherical Earth.

OBJECT DATA - (i) hypersonic ballistic coefficient (W/CDA) of the object in pounds per square foot at the perigee altitude, (ii) the product of the thermal accommodation coefficient and the ratio of local to stagnation point free molecule convective aerodynamic heating on the object, (iii) a constant which includes the effects of the square root of the objects' nose radius, shape, and the ratio of local to stagnation point continuum convective aerodynamic heating on the object, (iv) ratio of local pressure on the object to stagnation pressure, (v) enthalpy recovery factor.

The output of the computer program presents the time from the start of the reentry at the initial apogee, the central range angle from perigee, the geocentric geometric altitude above mean sea level on the spherical Earth model, the geocentric inertial reentry angle, the local cold wall continuum convective aerodynamic heating rate to the object, the local cold wall free molecule convective aerodynamic heating rate to the objective, the velocity of the object, the local recovery enthalpy, and the local static pressure at the surface of the object.

H. R. Spahr, Computer Code HRS017--A Code for the Computation of the Trajectory and Reentry Environment for Nuclear Systems Decaying from Multiple Revolution Elliptical Orbits, SC-RR-69-378, January 1970.

These programs will be available through the Argonne Code Center.

Distribution: U. S. Only.

21 R. J. Lawrence S
WONDY IIIA, 1-DIMENSIONAL WAVE PROPAGATION CALCULATION

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN IV 1985 cards

WONDY IIIA is a FORTRAN computer program which solves the finite difference analogs to the Lagrangian equations of motion in 1-dimensional rectangular, cylindrical, and spherical coordinates.

The finite difference technique is an approximate method of solving the non-linear partial differential equations describing 1-dimensional motion. The degree of approximation depends on the mesh sizes and artificial viscosity coefficients which are used.

Considerable effort has been expended to produce a very flexible code. Routines for equations of state or constitutive relations, special boundary routines, radiation energy addition, as well as the initializing routine are written as self-contained subroutines, and new routines are easily written to cover problems not handled by the original set. In this way most problems of motion in 1-dimension may be handled without difficulty.

R. J. Lawrence, WONDY IIIA--A Computer Program for One-Dimensional Wave Propagation, SC-DR-70-315, August 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

22 L. M. Barker S
SWAP9, STRESS WAVE ANALYSIS PROGRAM
Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN IV 2056 cards

SWAP9 (Stress Wave Analyzing Program) has been developed to incorporate and to add to the characteristics of two existing programs, SWAP7 and WONDY. The main new capability of SWAP9 is its ability to solve problems involving gases, detonations, and vaporization due to energy deposition.

The method of characteristics used in SWAP9 represents all wave shapes by a series of shock waves. It is therefore particularly well suited to problems involving actual shock conditions. The advantage of representing wave profiles by weak shocks is that only one set of equations, namely, the shock equations, are used to solve the problem. Since the shock equations become equal to the continuous isentropic flow equations in the limit of small shocks, the uncertainty arising from using weak shocks to represent smooth wave shapes is small and controllable. It is analogous to the uncertainty arising from other finite difference methods used to solve characteristics problems.

The problems which can be solved include those involving gases, liquids, and solids, in which there are several interfaces, shocks, free surfaces, impacts, and spalls. The solution time is determined by the number of shock interactions which must be solved to provide the desired information and by the amount of computer output required.

A typical problem can be run at the rate of 3000 interactions per minute on the CDC 6600. Some problems can be solved in a few interactions, while more complicated problems may involve thousands of interactions.

The basic assumptions about the nature of the problem to be solved are:

1. Only one-dimensional motion in rectilinear coordinates is present, i.e., the components of material velocity in the lateral directions are zero at all times.

2. The materials of the problem are strain-rate independent.

3. The materials obey either hydrodynamic or elastic-plastic theory, assuming either Von Mises' or Tresca's yield criterion. The two are identical under one-dimensional strain conditions.

L. M. Barker, SWAP-9: An Improved Stress Wave Analyzing Program, SC-RR-69-233, August 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

23

Curtis M. Wise

S

SATLOC, GEOGRAPHICAL EVENT POSITION DETECTED BY SATELLITE

Sandia Laboratories

MA

Albuquerque, New Mexico

In Use

CDC 3600 3600 FORTRAN

291 cards

Where there is a satellite in space whose position and orientation with respect to an inertial coordinate system centered in earth is known, this program defines the position of the event on earth. The position is defined in terms of longitude and in terms of earth frame coordinates measured in earth radii. The orientation is defined by nine direction cosines, one direction cosine for each axis of the satellite with respect to each axis of the inertial frame of the earth.

The program first converts the direction cosines of the event vector from the detector's coordinate system into the satellite's body coordinate system. It converts the direction cosines of the event vector from the satellite's coordinate system into the earth's inertial coordinate system. Next, the program writes the equation of a line colinear with the event vector, approximates the earth by a sphere, and finds the intersection of the event vector with the sphere. Finally, it identifies which intersection of line and sphere is appropriate, and it defines that point of intersection in terms of latitude and longitude on the earth.

C. M. Wise, A Non-Matrix Determination of the Geographical Position of an Event Detected by a Satellite, SC-TM-67-379, June 1967.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

24

H. R. Spahr

S

HRS004, OBJECTS DECAYING FROM EARTH ORBIT

Sandia Laboratories

SNS

Albuquerque, New Mexico

In Use

CDC 3600 3600 FORTRAN

655 cards

CDC 6600 FORTRAN IV

655 cards

UNIVAC 1108 FORTRAN IV

671 cards

CDC 3600 3600 FORTRAN

607 cards

CDC 6600 FORTRAN IV

613 cards

UNIVAC 1108 FORTRAN IV

620 cards

IBM 7044 QUIKTRAN

573 cards

The program uses a closed form approximate solution to calculate the initial reentry angle and velocity for objects decaying from earth orbits. This solution includes the planet's rotation, its oblateness, and the second harmonic in its gravitational field. The variables for which the reentry angles and velocity are calculated include altitude, orbital inclination, latitude, and atmospheric models. The ballistic coefficient dependence is eliminated by presenting the product of ballistic coefficient and drag reentry angle.

The only input data required are:

1. Equatorial radius of the planet;
2. Polar radius of the planet;
3. Rotational rate of the planet;
4. Gravitational constant, μ , of the planet;
5. Gravitational constant, e , of the planet;
6. A planetary atmospheric model; and
7. Increments desired in orbital inclination and latitude.

The output of the computer program presents the magnitude of the zero drag reentry angle, the drag reentry angle ballistic parameter product, inertial velocity, and air relative velocity as a function of altitude. The computer

program requires a few minutes of CDC 3600 computer time for each atmospheric model.

Seven versions of this program are available. In the first three versions listed above, the program computes initial conditions for objects decaying from orbit for specified increments in altitude, orbital inclination, and latitude. In the remaining four versions, the program computes initial conditions for objects decaying from orbit for specified triples of altitude, orbital inclination, and latitude.

H. R. Spahr, Computer Code HRS004-A Code for the Computation of the Initial Reentry Angle and Velocity of Objects Decaying from Earth Orbit, SC-RR-67-858, December 1967.

H. R. Spahr, Computer Code HRS004-7-A QUIKTRAN Computer Code for the Computation of Initial Reentry Angle and Velocity of Objects Decaying from Earth Orbit, SC-RR-68-622, December 1968.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

25

H. R. Spahr

S

HRS015, BALLISTIC COEFFICIENT COMPUTATION

Sandia Laboratories

SNS

Albuquerque, New Mexico

In Use

IBM 7040 QUIKTRAN

408 cards

CDC 3600 3600 FORTRAN

413 cards

CDC 6600 FORTRAN IV

412 cards

UNIVAC 1108 FORTRAN IV

411 cards

As a first step in defining the thermal response of a nuclear system reentering after use in space, trajectories must be computed for the pertinent configurations to define the trajectory and reentry environment. Before these trajectories can be computed, the ballistic coefficients of the reentering objects must be determined.

While the ballistic coefficients vary throughout the entire Mach number range, most of the significant events occur in the hypersonic Mach number range. The satellite and launch vehicle configurations disassemble due to reentry heating while at hypersonic Mach numbers, and the nuclear systems and heat sources experience maximum aerodynamic heating and maximum aerodynamic deceleration while at hypersonic Mach numbers.

The required trajectories start at high altitudes where the reentering object is in the free molecule flow regime, subsequently pass through the transition flow regime, and terminate in the continuum flow regime. Thus, the hypersonic ballistic coefficient of the reentering object must be defined in the free molecule, transition, and continuum flow regimes.

This program computes the variation of the hypersonic ballistic coefficient with altitude.

H. R. Spahr, Computer Code HRS015-A QUIKTRAN Computer Code for the Computation of the Transition Flow Hypersonic Ballistic Coefficient of a Blunt Object, SC-RR-68-529, October 1968.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

26

R. E. Jones

P

RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE

Sandia Laboratories
Albuquerque, New Mexico
CDC 6600

MA
Development
F4-95%, COM-5%

RUNKUT is a flexible, general-purpose, variable step size, dual-mesh Runge-Kutta routine for integration of systems of first order ordinary differential equations with initial values. Most systems of higher order differential equations can be written as larger systems of first order equations and hence may be integrated with RUNKUT. However, RUNKUT will not produce satisfactory results on many systems of equations which are inherently unstable. For such unstable systems no classical method is likely to work. However, RUNKUT should be applicable for almost any system of equations for which one would expect a classical method to be appropriate. The current version of RUNKUT is limited to 25 or fewer equations, but it may be easily modified to allow more equations.

R. E. Jones, RUNKUT: Runge-Kutta Integrator of Systems of First Order Ordinary Differential Equations, SC-M-70-724, November 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

27 C. J. Fisk & D. L. Caskey T
ACCEL (MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS

Sandia Laboratories
Albuquerque, New Mexico
UNIVAC 1108

MA
In Use
CUR tape
15 files
F4-99%, BAL-1%

CDC 6600 F4-99%, COM-1% 19,986 cards

ACCEL is a set of computer programs designed to aid in the construction of electronic printed-circuit boards. ACCEL is capable of producing all the design information required by a printed-circuit fabrication shop for construction of the boards.

The circuit designer furnishes input information in the form of a circuit schematic drawing, and information on the parts used in the circuit. This information is then transcribed onto punched cards. The computer output is graphical in the form of several plots, which include (1) a schematic drawing, (2) a parts list, (3) an assembly drawing showing the location of the parts on the printed-circuit board, (4) a hole-drilling coordinate list, and (5) masks to be used in etching the circuit board layers.

Thus, the ACCEL system performs four major tasks. First, it edits the engineer's data, resolves the schematic into a node-component list, looks up physical and electrical data for the parts used in the circuit, and notes any errors in the data. Second, it locates the components on the board by an iterative process. Third, the program lays out the interconnection pattern between the components. Fourth, ACCEL generates the output plots.

Consequently, the use of ACCEL can significantly reduce the time required to produce a finished printed-circuit board.

Clifford J. Fisk and David L. Caskey, User's Manual for ACCEL System (Mod2), SC-M-69-601, November 1969.

Clifford J. Fisk and David L. Caskey, Program Documentation for ACCEL (Mod2), SC-M-69-602, December 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

28 Robert M. Erickson T
CALIBRATION OF SURFACE PLATES
Mason & Hanger
Silas Mason Co., Inc., Burlington, Iowa
IIBM 360/40

MA
In Use
FORTRAN IV
901 cards

This program was designed to calculate linear deviations from the base plane of a surface plate and to print a picture of the surface plate showing these displacements.

The method of solution is based on that described in "How to Calibrate Surface Plates in the Plant" by J. C. Moody of Sandia Corporation, appearing in The Tool Engineer, October 1955.

Each set of autocollimator readings are taken independently. The program adjusts all sets of readings to one datum plane. The lowest reading is found and set to zero. All other readings are translated accordingly. The plane containing the lowest point is known as the base plane and the readings are converted to inches and displacement from the base plane. These displacements are presented in a pictorial form and are used by the technicians in reporting the quality of the surface plate. Disagreement between readings at the center point is printed, indicating the validity of the data.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

29 J. E. Boers T
FFEARS, LA PLACE EQUATION SIMULATION STUDY
Sandia Laboratories
Albuquerque, New Mexico
CDC 6600

MA
In Use
FORTRAN IV
1363 cards

A digital computer program has been written for the general solution of LaPlace's equation and the plotting of equipotential and equifield lines. The program will simulate any rectangular or axisymmetric configuration of dielectrics and small floating electrodes. The potentials are simulated on a large matrix of up to 201 x 201 points. Solutions with errors of less than five percent are easily obtained in less than ten minutes on the CDC 6600, and solutions can generally be obtained in any resolution desired through the blowup subroutine. Although written in the CDC 6600 FORTRAN IV programming language, this program should easily be translated into any other FORTRAN dialect. A description for the different techniques employed on the discrete matrix and some typical problems which have been solved during the design of high voltage devices are included in the program documentation.

Several subroutines and functions necessary to the operation of the plotting portion of this program are not included in this source deck. They are a part of the standard SCORS plotter package for the SC 4020 plotter, and must be furnished by the user.

J. E. Boers, FFEARS--A Digital Computer Program for the Simulation of LaPlace's Equation Including Dielectric Interfaces and Small Ungrounded Electro SC-RR-71-0377, July 1971.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

30 G. J. Werkema U
ERLF, SPECTROPHOTOMETRIC REACTION KINETICS
 Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 IBM 360/40 FORTRAN IV (E) 81 cards

This program reduces spectrophotometric absorbancy data to molar concentrations of reactants and products. At the user's option, the program also calculates the concentrations of species A, B, and C for each datum, and then proceeds to compute the corresponding rate constant time products ($k_1 t$, $k_2 t$, $k_3 t$) using the integrated forms of first-, second-, and third-order rate laws.

George J. Werkema, A FORTRAN IV Program for Reduction of Spectrophotometric Reaction Kinetics Data, RFP-1449, March 11, 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

31 G. J. Werkema U
RADF, RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION
 Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 ASI 210 FORTRAN II 132 cards
 IBM 360/40 FORTRAN IV 170 cards

The RADiolysis Fortran (RADF) code was written to perform the reduction of analytical data arising from gas phase radiolysis experiments. It converts analytical data obtained at several times during the experiments into the molar and molecular quantities that are more useful to the chemist. It is assumed that the radiolytic reaction takes place in a fixed volume and that small samples of the gas mixture are periodically withdrawn for analysis. The results of the chemical analysis, after conversion to molecular quantities, are subsequently plotted to determine a "G-value" for the reaction. The quantities are plotted for each gas, along with the computed radiation dose, as a function of time.

Although the algorithm for the reduction of gas analysis data is trivial, it is a tedious and time-consuming exercise, and is quite subject to errors. For accurate work, accounting for the small amounts of gas that are removed with each sampling increases the complexity of the arithmetic. The old RADF (RADiolysis Fortran) computer code and the new RADF-2, were written to reduce analytical data arising from gas phase radiolysis experiments.

RADF-2 is a modification of RADF written for the ASI 210 computer.

G. J. Werkema, FORTRAN II Data Reduction Program for Gas Phase Radiolysis Studies, RFP-62 3 November 1965.

George J. Werkema, A Modified FORTRAN IV Program for Gas Phase Radiolysis Data Reduction, RFP-1404, October 24, 1969.

These programs will be available through the Argonne Code Center.

Distribution: U. S. Only.

32 Robert W. Loser U
GAS-GAS AND GAS-SOLID REACTION DATA REDUCTION

Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 IBM 360/40 FORTRAN IV (E) 134 cards

This program was written for rapid and concise reduction of gas-pressure data from a gas-gas or gas-solid reaction. The program is applicable to any experiment utilizing a reaction chamber containing reactant gases and a quantity of solid material (for a gas-solid reaction). The gas-pressure data obtained from the reaction consist of gas analyses by percent by volume, pressure, temperature, and the time of the reaction. With the volume of the reaction chamber and the names of the gases fed into a computer, the program produces the following information:

1. The initial total pressure of the gases in the reaction chamber at time (zero hours).

2. The initial concentration in moles of each gas in the reaction chamber.

3. The reaction number and the time of the reaction.

4. An indication as to whether the total pressure of the gases in the reaction chamber increased, decreased, or remained unchanged since the previous timed reaction, and if applicable, an indication of how much the total pressure changed.

5. The concentration in moles of each gas in the reaction chamber after the reaction.

6. The rate of change in the concentration of each gas in moles per liter per second, with and without loss due to sampling, and the total sample loss in moles of each gas for each sample obtained.

A general application of the ideal gas law is made to reduce the gas pressure data.

Robert W. Loser, Mole Reaction--FORTRAN IV Data Reduction Program for Gas-Gas and Gas-Solid Reactions, RFP-1107, May 21, 1968.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

33 R. W. Loser, C. A. Chambers, et al. U
DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY
 Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 GE 400 FORTRAN 180 cards

This program is used for the dynamic analysis of gases by fast scanning mass spectrometry. Although this program was written for data obtained from a Bendix Model 12-107 Time-of-Flight (TOF) Mass Spectrometer, it may be applied to any type of mass spectrometer.

The program processes mass spectral data to determine the rate at which gases evolve from a solid sample and the total quantity of gas evolved. Calibration data and mass-peak measurements are described as input data. Gas flow rate and gas quantity are described as output data.

Robert W. Loser, Carey A. Chambers, Evain D. Ruby, A Time-Sharing FORTRAN Program for the Dynamic Analysis of Gases by Time-of-Flight Mass Spectrometry, RFP-1400, November 7, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

34 J. H. Doyle U
CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO ANALYSIS

Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 GE 400 BASIC 153 statements

A computer technique has been developed to determine chemical diffusivities using the Boltzman-Matano analysis. This method has been used for several years to determine chemical diffusivities, and is generally used where the diffusivity varies as a function of concentration for a given diffusion couple.

The major advantages in using this program over hand calculations are (1) increased speed of calculation and (2) reduction of error possibility in locating the Matano interface and determining the slope of the concentration-distance line at specific concentrations.

This computer program was written in the BASIC language on a time-sharing computer and the document contains the program listing.

Joe H. Doyle, Computer Programs to Determine Chemical Diffusivities Using the Boltzman-Matano Analysis, RFP-1544, January 20, 1971.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

35 Robert W. Loser U
STICKING PROBABILITY OF GASES ON SOLID SURFACES

Dow Chemical Company MA
 Rocky Flats Division, Golden, Colorado In Use
 IBM 360/40 FORTRAN IV 157 cards

This program computes the sticking probability of a gas being adsorbed by a solid surface. The sticking probability is defined as the ratio of the number of molecules of gas sticking to a substrate to the number striking the substrate. In general, the sticking probability is a function of the fraction of surface area covered by gas molecules previously adsorbed. Sticking probabilities are commonly determined in conjunction with investigations of the chemisorption of gases by solid surfaces. The program was written specifically for the chemisorption of various gases on plutonium.

The experiment for which the program was developed consists of measuring the rate of adsorption of various gases by a freshly evaporated film of plutonium.

Robert W. Loser, A FORTRAN IV Program for Computing the Sticking Probability of Gases on Solid Surfaces, RFP-1317, March 19, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

36 W. B. Herrmannsfeldt V
SLAC ELECTRON GUN DESIGN PROGRAM

Stanford Linear Accelerator Center R
 Stanford, California In Use
 IBM 360 PL/1 300K bytes

This program was specifically written to solve electron trajectories in electrostatic focusing systems and to solve for magnetic fields. The program combines the three basic applications: 1) Laplace equation solving, 2) Electron optics

using fixed starting conditions, 3) Electron optics using the Child-Langmuir formulation at a space-charge limited spherical cathode.

In addition, a general cathode version of the Child-Langmuir problem is included.

W. B. Herrmannsfeldt, Poisson Equation Solving Program, SLAC-51, September 1965.

W. B. Herrmannsfeldt, User's Notes for SLAC Electron Gun Design Program, SLAC-TN-67-36, November 1967.

This program is available from the author upon request.
 Distribution: Unlimited.

37 Arthur L. Edwards H
TRUMP, TRANSIENT AND STEADY STATE FLUID FLOW

Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 3600 FORTRAN IV 10,471 cards
 CDC 6600 FORTRAN IV 10,471 cards
 CDC 7600 FORTRAN IV 10,471 cards

TRUMP solves a general nonlinear parabolic partial differential equation describing flow in various kinds of potential fields, such as fields of temperature, pressure, and electricity and magnetism; simultaneously, it will solve two additional equations representing, in thermal problems, heat production by decomposition of two reactants having rate constants with a general Arrhenius temperature dependence. Steady-state and transient flow in one, two, or three dimensions are considered in geometrical configurations having simple or complex shapes and structures. Problem parameters may vary with spatial positions, time, or primary dependent variables--temperature, pressure, or field strength. Initial conditions may vary with spatial position; and among the criteria that may be specified for ending a problem are upper and lower limits on the size of the primary dependent variable, upper limits on the problem time or on the number of time steps or on the computer time, and attainment of steady state. Solutions may be obtained by use of explicit or implicit-difference equations, or by an optimized combination of both. TRUMP is primarily written in FORTRAN IV, is subdivided into modular subroutines, and is readily adaptable to most computer systems. The amount of computer time required varies with the user's equipment and needs, but averages from 0.3 to 2 msec per time step for each nodal point and connection between nodal points.

A. L. Edwards, TRUMP Computer Program: Calculation of Transient Laminar Fluid Flow in Porous Media, UCRL-50664, May 1969 and errata January 8, 1971.

A. L. Edwards, TRUMP: A Computer Program for Transient and Steady-State Temperature Distributions in Multidimensional Systems, UCRL-14754, Rev. II, July 1, 1969 and errata dated February 4, 1971, August 27, 1971 and February 18, 1972.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

38 A. L. Edwards M
TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION

Lawrence Livermore Laboratory
Livermore, California
CDC 6600 F4-90%, LRL-10% 5488 cards

The TRUMP/XB2 computer program was developed for processing the TRUMP Thermal Property Data Compilation. The data include densities, transition temperatures, heats of transition, and tables of specific heat and thermal conductivity versus temperature, for over 1000 materials. An alphabetical material index, list of data sources, material-classification system, data-quality indicator system, and the data themselves are on computer cards and magnetic tapes. The data are in the format used for material property input data in the TRUMP program. Processing options available with the TRUMP/XB2 program include (a) reading the material data, checking for various types of format errors, calculating table slopes, calculating enthalpies from specific-heat tables, and writing out the input data, error diagnostics, and calculated data; (b) conversion of the material data to any desired unit system; (c) producing a secondary material data list from the master data list, including all the materials or only the materials on a material selection list; (d) producing graphs of specific heat and thermal conductivity versus temperature; and (e) any combination of these.

Use of TRUMP/XB2 requires a computer with 8K core memory, and up to 32K if the plotting option is included. In addition to tape, disk, or other input and output files used by the computer system, two separate input files are required, one for the program and data decks, another for the material data list. Up to three output files are required: one for normal output, another for a secondary material data list, and another for output used as input to plotting equipment, if plotting is not done "in-line". The program uses LRLTRAN for producing graphical output with the DD80 system and for obtaining fast buffered input and output, and bit manipulation and testing, required for searching the material data list for the identification numbers of materials selected for a secondary data list.

A. L. Edwards, TRUMP/XB2: A Computer Program for Processing the TRUMP Thermal Property Data Compilation, UCRL-50663, May 9, 1969.

A. L. Edwards, A Compilation of Thermal Property Data for Computer Heat-Conduction Calculations, UCRL-50589, February 24, 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

39 E. T. Henry M
GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM
General Electric Company MA
Neutron Devices Department, St. Petersburg, Florida In Use
GE 435 COBOL 16K bytes

This package of programs provides for the following:

1. Auditing of all input data—comprehensive claims, sickness and accident claims and Doctor/Hospital master data.
2. File maintenance to the Doctor/Hospital master file.
3. Generation of paychecks in payment for approved claims in conjunction with the Doctor/Hospital master and the Payroll master for addresses of claimants.
4. Payment history file maintenance.
5. Report generation (register listings).
6. Check reconciliation.
7. Issuance of 1099 MED forms to claimant doctors and hospitals at year end.

This program is available through the Argonne Code Center.

Distribution: U. S. Only. This package is only applicable to GE Operating Departments.

40 E. R. Orner M
TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM
USAEC Albuquerque Operations Office MA
Albuquerque, New Mexico In Use
Burroughs 283 COBOL 520 cards

This program is a method of controlling tape usage. A tape librarian needs some method to identify a reel of magnetic tape, identify the contents or data stored on a tape, and know the tape's availability for usage.

Input is a tape log, a file containing a record for each existing tape in the library. Output is an updated tape log, all updates having been audited.

Updating transactions include adding new tapes, deleting old tapes, modifying and replacing existing tape data. Special action to be taken by the librarian regarding cleaning or certifying of a reel of tape is denoted.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

41 J. L. McGregor T
ELEMENTAL MOMENT OF INERTIA
Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360/40 FORTRAN IV (E) 75 cards

This program computes the moment of inertia (M.I.) for any one of eight elementary geometric shapes relative to a given axis.

Input consists of the equation set for the particular geometric element and the specific parameters required by the selected equation set. Output information is printed with four decimal places.

The sum of the elemental moments of inertia is obtained relative to the transfer axis in both pound inches squared and slug feet squared. The sum of the elemental masses is also computed.

The concept of negative density is used to account for elemental voids in the composite body. Calculations are made in double precision.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

42 J. L. McGregor Q
MASS DETERMINATION BY TRANSPOSITION METHOD
Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360/40 FORTRAN IV (E) 132 cards

This program calculates the true mass of the weight being calibrated, either metric or avoirdupois, and the apparent mass of the weight versus brass when given: scale readings, true mass of the standard being used, sensitivity weight used, density of air, density of weight, density of the standard, and the volume of one gram of the weight. There are fifteen scale readings obtained from three weighings of the weight being

calibrated. The transposition method of mass determination is used.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

43 W. W. Rowell, B. D. Boyd, et al. M

MPR PRODUCT RECORD FILE SYSTEM

Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360/40 COBOL-98%, BAL-2% 1889 cards
w/IBM 1012

MPREDITC, Product Record Edit reads and checks 8-channel paper tape messages for parity errors and records data in disk Work File; 201 cards.

MPRENGRE, Product Record Engineering Report processes Product Record File editing those records with E in note code field and with no D in delete field; 510 cards.

MPRRCAUD, Product Record Request Card Audit reads request cards comparing Product Record Number with those in Product Record File, preparing audit report indicating missing cards and missing File entries; 168 cards.

MPRCORRC, Product Record File Correction routine sorts input correction cards to replace existing data in Product Record File or add new entries; 303 cards.

MPRDAAUD, Product Record Design Agency Audit compares an audit file tape with the disk Product Record File, editing discrepancies, and transferring questionable entries to work storage areas; 707 cards.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

44 J. L. McGregor Q

UNIVERSAL DENSITY CONTROL PROGRAM

Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360/40 FORTRAN IV (E) 143 cards

This program takes the wet and dry weights of individual cores of a lot and calculates the density of each using the CTE and Standard Temperature from a table. It checks to see if the density is within the limits set up for each program and shape. If the density is outside the limits, it puts a reject code of 800 into the printed report. It then calculates the standard deviation of the individual densities, the range of the three-place densities and the average of the five-place densities.

The input consists of table cards followed by header cards and data cards. Output is a printed report listing the lot number, core number, three-place density, reject code, dry weight, wet weight, water temperature, piece temperature, lab factor and five-place density. It also prints the standard deviation, range of three-place densities and the average of the five-place densities.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

45 J. L. McGregor T
WHEATSTONE BRIDGE RESISTANCE CALIBRATION

Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360/40 FORTRAN IV (E) 83 cards

This program calculates the resistance decade calibration using the Wheatstone Bridge. It adds the corrections from a table giving the corrections and corrected multipliers of the Wheatstone Bridge. The residual resistance then calculates the corrected value of the readings. It calculates the resistance from the corrected value and the corrected multiplier and obtains the difference between this calculated resistance and the check point.

If there is an allowable deviation, it will printout the check point, the calculated resistance, the difference and accept or reject. If no allowable deviation is given, the accept or reject is omitted. Output consists of identification of the instrument calculated and the bridge used.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

46 F. Honea & T. R. Birch U
TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM

Mason & Hanger MA
Silas Mason Co., Inc., Amarillo, Texas In Use
IBM 360 FORTRAN IV 294 cards

The mixing and chemical reactions of materials which generate an exothermic heat of reaction can create conditions of hazardous, high temperature operation known as thermal runaway. If the heat generated is sufficient, the reacting materials may vaporize and give off toxic fumes or explosive vapors which in turn may ignite. Because this dangerous potential exists, adequate controls must be provided and analysis must be made to assure that temperature rise is held to a safe level. In addition, the control of temperature rise may be desirable to optimize the yield at nearly isothermal conditions.

The conditions for thermal runaway to exist can be controlled by means of any one of several parameters such as the reactant feed rate, the agitator shape and speed, the concentration of reactants, and the coolant flow rate and temperature. This computer program is designed so that all of these parameters may be entered as input data for the calculation of the batch temperature as a function of time. A proper selection of operating parameters will lead to the desired control of the batch temperature and will effectively indicate safe operating conditions for the chemical reactor.

F. I. Honea and T. R. Birch, Chemical Reactor Analysis Program TCHREACT, MHSMP-71-26, March 1971.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

47 L. D. Bertholf & S. Benzley S
TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 3600 3600 FORTRAN 4086 cards

TOODY II is a FORTRAN code for computing wave propagation in two dimensions in rectangular or cylindrical coordinates. The code is based on the conventional finite

difference analogs to the Lagrangian equations of motion. The finite difference technique is an approximate method of solving the non-linear partial differential equations describing two-dimensional motion. The degree of approximation depends on the mesh sizes, mesh shape, and artificial viscosity coefficients which are used.

Four types of boundary conditions are considered. These are (1) a free surface, (2) a surface with an applied stress acting on it, (3) a symmetry plane, and (4) a rigid non-sliding boundary.

This code is a modification of TOODY. The essential differences between the two codes are summarized by stating the capabilities of TOODY II that are not available in TOODY:

1. Intermediate tape storage is used. The values of properties computed are written on these tapes after they have been computed. After the computation has proceeded and these values are again required, they are read from these tapes. This allows values to be stored outside of the computer memory when they are not being used in the calculations. Thus the maximum number of meshes can be extended from 2260 to approximately 166,800 when a CDC 3600 computer is used.

2. A sliding interface option is included. This option yields a more accurate description of the problem when the motion of two adjacent meshes is very different. Further, this allows more convenient zoning when more than one material is involved. Eight sliding interfaces can be used per problem and the interface friction can be specified as zero, infinite or finite.

The code can treat up to 19 different materials per problem.

L. D. Bertholf and S. E. Benzley, TOODY II, A Computer Program for Two-Dimensional Wave Propagation, SC-RR-68-41, November 1968.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

48 William R. Gavin P SEVER, SYMMETRIC MATRIX EIGENVALUES AND EIGENVECTORS

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN (FUN) 360 cards

Subroutine SEVER computes a complete eigensystem with error bounds for a real symmetric matrix. Housholder's method is used to reduce the matrix to a tridiagonal form. The eigenvalues and eigenvectors of the tridiagonal matrix are computed by the QR algorithm. The computed eigenvalues are subjected to one Rayleigh quotient correction using the computed eigenvectors. Upper bounds on the absolute errors of the computed eigensystem are calculated.

W. R. Gavin, SEVER: A Routine for Computing Symmetric Matrix Eigenvalues and Eigenvectors with Error Bounds, SC-M-70-26, March 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

49 W. D. Sundberg H SANPIC, PARTICLE-IN-CELL PROGRAM

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 F4 and COM 6163 cards

The Sandia Particle-in-Cell computer program uses the Particle-in-Cell method for the solution of transient, two-dimensional, inviscid, compressible fluid dynamics problems. A single-material version and a multiple-material version, with a maximum of four materials, are available. Either Cartesian or cylindrical coordinates may be used. The "metal" equation of state is used in the current versions, but it is relatively easy to change to a different equation of state. Several boundary conditions are included. These boundaries are empty cell, free output, and four forms of wall boundaries. Provisions have been made for adding other boundary conditions. Detailed information for changing the array dimensions, and thus the size and shape of the computational area and the maximum number of particles, has been included. The output from the program consists of particle position plots, velocity vector plots, prints of any of several fluid properties, and pictorial plots of the three-dimensional property surface.

W. D. Sundberg, Sandia Particle-in-Cell Computer Program, SC-DR-70-458, July 1970.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

50 Rondall E. Jones P AVINT, INTEGRATION OF TABULATED DATA

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 3600 FORTRAN 63 203 cards
CDC 6600 FORTRAN (RUN or FUN) 203 cards

The principal use of AVINT is to integrate tabulated data only. Integration of functions described by formulae can be done more precisely with routines written for that purpose. The program thoroughly checks the input data for violations of the program restrictions, makes use of one data point outside the range of integration in either direction and uses double precision arithmetic internally.

The method used is based on overlapping parabolas. This technique gives the effect of smoothing the data since four data values are used in computing the integral between each pair of points.

R. E. Jones, AVINT: Approximate Integrator of Functions Tabulated at Arbitrarily Spaced Abscissas, SC-M-69-335, July 1969.

This program will be available through the Argonne Code Center.

Distribution: U. S. Only.

51 J. E. Vogel/C. B. Bailey P ERF, ERFC, ERROR AND COMPLEMENTARY ERROR FUNCTIONS

Sandia Laboratories MA
Albuquerque, New Mexico In Use
CDC 6600 FORTRAN (FUN) 130 cards

ERF and ERFC are two routines which are a part of the Sandia Laboratories Mathematical Program Library. These are high-accuracy, high-speed routines for computing the error function and complementary error function

respectively. They may also be used to compute various other related functions such as the normal probability integrals.

J. E. Vogel, ERF and ERF: Mathematical Routines for Computing the Error Function and Complementary Error Function, SC-M-70-275, May 1970.

These routines will be available through the Argonne Code Center.

Distribution: U. S. Only.

52 P. W. Plomp/T. I. Ristine P
GERBER SERIES 1200 AND 2000 PLOTTING PACKAGE
Sandia Laboratories MA
Albuquerque, New Mexico Development
PDP 10 FORTRAN IV
CDC 6600 FORTRAN IV
UNIVAC 1108 FORTRAN IV

This package of FORTRAN subroutines was assembled to fill a need for very accurate graphical presentation of computer-produced data. The machine for which they were intended is the Gerber Series 1200 and 2000 Automatic Drafting Machine. The machine is slow, in terms of electronic speeds; but the actual operation is quite flexible, thereby permitting optimum results.

The drafting machine will accept three types of input. They are: (1) Magnetic tape (compatible with IBM 727, 729 or 7330 Series Tape Units at 200, 556, or 800 bpi); (2) Punched Mylar tape (EIA, 8-channel Mylar); (3) Punched cards. The machine plotting modes are (a) Light head; (b) Ball-point pen; (c) Scribes.

P. W. Plomp, Gerber FORTRAN Plotting Package, SC-M-69-465, August 1969.

P. W. Plomp, Gerber FORTRAN Plotting Package System Description Manual, SC-M-69-466, August 1969.

Distribution: U. S. Only.

53 R. D. Halbgewachs P
BES, CYLINDRICAL BESSEL FUNCTION EVALUATION
Sandia Laboratories MA
Albuquerque, New Mexico Development
CDC 6600 FORTRAN IV

BES was developed to provide an accurate, clearly defined, multifunction routine which will compute Bessel functions for real arguments and integer orders. The routine is not limited to specific ranges of application or to orders of zero and one, but it organizes the most commonly used functions into the one routine.

The routine evaluates the Bessel functions $J_n(x)$, $Y_n(x)$, $I_n(x)$, and $K_n(x)$ for real arguments and integer orders. The functions $J_n(x)$ and $I_n(x)$ may have positive or negative arguments, while the functions $Y_n(x)$ and $K_n(x)$ are restricted to positive arguments. The order for each of the functions may be positive or negative. In addition, the Hankel functions $H_n^{(1)}(x)$ and $H_n^{(2)}(x)$ may be determined through the use of this routine.

R. D. Halbgewachs, BES: A Routine for the Evaluation of Cylindrical Bessel Functions, SC-M-69-336, October 1969.

Distribution: U. S. Only.

54 C. B. Bailey P
ERRCHK, ERRGET, ERRSET, SYSTEM ERROR ROUTINES

Sandia Laboratories MA
Albuquerque, New Mexico Development
CDC 6600 F (FUN) and COM

Sandia CDC 6600 system Mathematical Program Library error check routine which provides several options for the processing of diagnostics and warning messages.

C. B. Bailey, A Guide to the Sandia Mathematical Program Library, SC-M-69-337, January 1970.

Distribution: U. S. Only.

PROGRAMS BY SUBJECT CATEGORY

- D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS - includes burn-up programs, isotope and fission product build-up and decay computations, and optimization studies.

1 ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES RFD 360 F4 MA U R D

- H. STEADY-STATE AND TRANSIENT HEAT TRANSFER - includes fluid flow studies and calculations of thermodynamic properties.

37 TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 3600 F4 MA U R H
 37 TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 6600 F4 MA U R H
 37 TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 7600 F4 MA U R H
 49 SANPIC, PARTICLE-IN-CELL PROGRAM SLA 6600 F+COM MA U R H

- I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS AND ENGINEERING DESIGN STUDIES - includes fuel-element design evaluations, core-configuration studies, and composite structure analysis.

2 SLADE, STATIC ANALYSIS OF THIN SHELLS SLA 6600 F+COM MA U R I

- M. DATA MANAGEMENT - construction, maintenance and retrieval of data files, e.g., cross section libraries; management systems such as payroll and personnel systems, accounting and budgeting systems, property and equipment systems, production and inventory control, indexing and retrieval systems, etc.

3 RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH MLMO 360 F+C+R MA U R M
 4 BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS SLA 1108 COBOL MA U R M
 4 BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS SLA 360 COBOL MA U R M
 38 TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION LLL 6600 F+LRL MA U R M
 39 GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM GEPI 435 COBOL MA U R M
 40 TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM ALOD 8283 COBOL MA U R M
 43 MPR PRODUCT RECORD FILE SYSTEM MHSM 360 C+BAL MA U R M

- P. GENERAL MATHEMATICAL AND COMPUTING SYSTEM ROUTINES - calculation of mathematical functions, special-language routines with general data-processing capabilities, software systems.

5 PLOTR, 2-D CONTOUR AND AREA CALCULATION SLA 6600 F4 MA U R P
 6 SANDIA SCOPE USERS' MANUAL FOR THE CDC6600 SLA 6600 FTN MA U R P
 7 NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS RFD 400 F4 MA U R P
 8 CONVERSION FROM PAPER TAPE TO CARD OR DISK RFD 360 F+BAL MA U R P
 9 SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION RFD 400 F MA U R P
 10 POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS RFD 360 F4 MA U R P
 11 IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W SLAC 360 F+BAL R U U P
 12 FORMAT, A TEXT PROCESSING PROGRAM SLAC 360 F4 R U U P
 13 INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM SLA 3100 COM MA U R P
 14 PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000 RFD 360 F4 MA U R P
 26 RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE SLA 6600 F+COM MA D R P
 48 SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS SLA 6600 F4 MA U R P
 50 AVINT, INTEGRATION OF TABULATED DATA SLA 3600 F63 MA U R P
 50 AVINT, INTEGRATION OF TABULATED DATA SLA 6600 F4 MA U R P
 51 ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION SLA 6600 F4 MA U R P
 52 GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA PD10 F4 MA D R P
 52 GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA 6600 F4 MA D R P
 52 GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA 1108 F4 MA D R P
 53 BES, CYLINDRICAL BESSEL FUNCTION EVALUATION SLA 6600 F4 MA D R P
 54 ERRCHK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES SLA 6600 F+COM MA D R P

- Q. MATERIALS - measurements and computation of the physical and mechanical properties of materials, simulation of radiation damage processes, corrosion studies, determination of crystallographic functions.

15	SIMULATION OF STRESS CORROSION CRACKING	SLA	6600	F	MA	U R	Q
16	SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS	RFD	360	F4	MA	U R	Q
17	INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD	360	F+BAL	MA	U R	Q
18	CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	RFD	360	F4	MA	U R	Q
42	MASS DETERMINATION BY TRANSPOSITION METHOD	MHSM	360	F4	MA	U R	Q
44	UNIVERSAL DENSITY CONTROL PROGRAM	MHSM	360	F4	MA	U R	Q

- R. METEOROLOGY - calculations relating to the atmosphere and its phenomena, studies of airborne particulate matter, climatology, etc.

19	MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA	3600	F36	MA	U R	R
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- S. SPACE SCIENCES - analysis of orbits and trajectories, astronomy and astrophysics computations, wave propagation studies and the calculation of reentry parameters.

20	HR017, MULTIPLE REVOLUTION REENTRY	SLA	7040	QUIK	SNS	U R	S
20	HR017, MULTIPLE REVOLUTION REENTRY	SLA	3600	F4	SNS	U R	S
20	HR017, MULTIPLE REVOLUTION REENTRY	SLA	6600	F4	SNS	U R	S
20	HR017, MULTIPLE REVOLUTION REENTRY	SLA	1108	F4	SNS	U R	S
21	WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA	6600	F4	MA	U P	S
22	SWAP9, STRESS WAVE ANALYSIS PROGRAM	SLA	6600	F4	MA	U R	S
23	SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36	MA	U R	S
24	HR004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600	F36	SNS	U R	S
24	HR004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600	F4	SNS	U R	S
24	HR004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108	F4	SNS	U R	S
24	HR004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044	QUIK	SNS	U R	S
25	HR015, BALLISTIC COEFFICIENT COMPUTATION	SLA	7040	QUIK	SNS	U R	S
25	HR015, BALLISTIC COEFFICIENT COMPUTATION	SLA	3600	F36	SNS	U R	S
25	HR015, BALLISTIC COEFFICIENT COMPUTATION	SLA	6600	F4	SNS	U R	S
25	HR015, BALLISTIC COEFFICIENT COMPUTATION	SLA	1108	F4	SNS	U R	S
47	TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA	3600	F36	MA	U R	S

- T. ELECTRONICS AND ENGINEERING EQUIPMENT - automated design of electronic equipment, engineering computations for numerically controlled machine tools and process control programs.

27	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	6600	F4	MA	U R	T
27	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	1108	F4	MA	U R	T
28	CALIBRATION OF SURFACE PLATES	MHBR	360	F4	MA	U R	T
29	FFEARS, LAPLACE EQUATION SIMULATION STUDY	SLA	6600	F4	MA	U R	T
41	ELEMENTAL MOMENT OF INERTIA CALCULATION	MHSM	360	F4	MA	U R	T
45	WHEATSTONE BRIDGE RESISTANCE CALIBRATION	MHSM	360	F4	MA	U R	T

- U. CHEMISTRY - chemical analysis, mass spectroscopy, radiation chemistry, radiolysis studies, etc.

30	ERLF, SPECTROPHOTOMETRIC REACTION KINETICS	RFD	360	F4	MA	U R	U
31	RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210	F2	MA	U R	U
31	RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	360	F4	MA	U R	U
32	GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	RFD	360	F4	MA	U R	U
33	DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD	400	F	MA	U P	U
34	CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400	BASIC	MA	U R	U
35	STICKING PROBABILITY OF GASES ON SOLID SURFACE	RFD	360	F4	MA	U R	L
46	TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM	360	F4	MA	U R	U

- ✓. PARTICLE ACCELERATORS AND HIGH VOLTAGE MACHINES - programs relating to the design, development and operation of high-voltage machines and particle accelerators such as Van de Graaff generators, linear accelerators, cyclotrons, synchrotrons, etc.

36 SLAC ELECTRON GUN DESIGN PROGRAM

SLAC 360 PL/1 R U U V

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ACCEL(MOD2)

DATA

ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	1108	F4	MA	U R T \$	27
ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	6600	F4	MA	U R T \$	27
AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	360	COBOL	MA	U R M \$ BECOM,	4
AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	1108	COBOL	MA	U R M \$ BECOM,	4
ALLOCATION BY CRITICAL PATH MLMO	360	F+C+R	MA	U R M \$ RALCRTPH, RESOURCE		3
ALOO B283 COBOL MA	U R M \$ TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM					40
AREA & VOLUME OF A SOLID OF REVOLUTION	RFD	400	F	MA	U R P \$ SURFACE	9
AREA CALCULATION	SLA	6600	F4	MA	U R P \$ PLOTR, 2-D CONTOUR AND	5
ASCII MAG TAPE R/W	SLAC	360	F+BAL	R	U U P \$ IBM360 UTILITY AND PDP9/15	11
AUTOMATIC PLOTTING FOR THE GERBER 2000	RFD	360	F4	MA	U R P \$ PLOT,	14
AVINT, INTEGRATION OF TABULATED DATA	SLA	3600	F63	MA	U R P \$	50
AVINT, INTEGRATION OF TABULATED DATA	SLA	6600	F4	MA	U R P \$	50
BALLISTIC COEFFICIENT COMPUTATION	SLA	1108	F4	SNS	U R S \$ HRS015,	25
BALLISTIC COEFFICIENT COMPUTATION	SLA	3600	F36	SNS	U R S \$ HRS015,	25
BALLISTIC COEFFICIENT COMPUTATION	SLA	6600	F4	SNS	U R S \$ HRS015,	25
BALLISTIC COEFFICIENT COMPUTATION	SLA	7040	QUIK	SNS	U R S \$ HRS015,	25
BASIC MA	U R U \$ CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400			34
BECON, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	360	COBOL	MA	U R M \$	4
BECON, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	1108	COBOL	MA	U R M \$	4
BES, CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA	6600	F4	MA	D R P \$	53
BESSEL FUNCTION EVALUATION	SLA	6600	F4	MA	D R P \$ BES, CYLINDRICAL	53
BOARDS SLA 1108 F4	MA	U R T \$ ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT				27
BOARDS SLA 6600 F4	MA	U R T \$ ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT				27
BOLTZMAN-MATANO	RFD	400	BASIC	MA	U R U \$ CHEMICAL DIFFUSIVITIES BY	34
BRIDGE RESISTANCE CALIBRATION	MHSM	360	F4	MA	U R T \$ WHEATSTONE	45
3283 COBOL MA	U R M \$ TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM	ALOO				40
C+BAL MA	J R M \$ MPR PRODUCT RECORD FILE SYSTEM	MHSM	360			43
CALIBRATION	MHSM	360	F4	MA	U R T \$ WHEATSTONE BRIDGE RESISTANCE	45
CALIBRATION OF SURFACE PLATES	MHBR	360	F4	MA	U R T \$	28
CARD OR DISK	RFD	360	F+BAL	MA	U R P \$ CONVERSION FROM PAPER TAPE TO	8
COC6600	SLA	6600	FTN	MA	U R P \$ SANDIA SCOPE USERS' MANUAL FOR THE	6
CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400	BASIC	MA	U R U \$	34
CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM	360	F4	MA	U R U \$ TCHREACT,	46
COBOL MA	U R M \$ BECON, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	360			4
COBOL MA	U R M \$ BECON, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	1108			4
COBOL MA	U R M \$ GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI	435			39
COBOL MA	U R M \$ TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM	ALOO	B283			40
COEFFICIENT COMPUTATION	SLA	1108	F4	SNS	U R S \$ HRS015, BALLISTIC	25
COEFFICIENT COMPUTATION	SLA	3600	F36	SNS	U R S \$ HRS015, BALLISTIC	25
COEFFICIENT COMPUTATION	SLA	6600	F4	SNS	U R S \$ HRS015, BALLISTIC	25
COEFFICIENT COMPUTATION	SLA	7040	QUIK	SNS	U R S \$ HRS015, BALLISTIC	25
CJM	MA	U R P \$ INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA	3100		13
COMPILATION	LLL	6600	F+LRL	MA	U R M \$ TRUMP/XB2, THERMAL PROPERTY DATA	38
COMPLEMENTARY ERROR FUNCTION	SLA	6600	F4	MA	U R P \$ ERF,ERFC, ERROR &	51
COMPUTATION	SLA	1108	F4	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT	25
COMPUTATION	SLA	3600	F36	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT	25
COMPUTATION	SLA	6600	F4	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT	25
COMPUTATION	SLA	7040	QUIK	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT	25
CONTOUR AND AREA CALCULATION	SLA	6600	F4	MA	U R P \$ PLOTR, 2-D	5
CONTROL PROGRAM	MHSM	360	F4	MA	U R Q \$ UNIVERSAL DENSITY	44
CONVERSION FROM PAPER TAPE TO CARD OR DISK	RFD	360	F+BAL	MA	U R P \$	8
CORROSION CRACKING	SLA	6600	F	MA	U R Q \$ SIMULATION OF STRESS	15
CRACKING	SLA	6600	F	MA	U R Q \$ SIMULATION OF STRESS CORROSION	15
CRITICAL PATH MLMO	360	F+C+R	MA	U R M \$ RALCRTPH, RESOURCE ALLOCATION BY		3
CRYSTAL INDEXING	RFD	360	F+BAL	MA	U R Q \$ INDEX, X-RAY POWDER PATTERN	17
CRYSTALLOGRAPHIC FUNCTIONS	RFD	360	F4	MA	U R Q \$ CALCULATION OF	18
CURVE FIT BY LEAST SQUARES ANALYSIS	RFD	360	F4	MA	U R P \$ POLYNOMIAL	10
CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA	6600	F4	MA	D R P \$ BES,	53
DATA	SLA	3600	F63	MA	U R P \$ AVINT, INTEGRATION OF TABULATED	50
DATA	SLA	6600	F4	MA	U R P \$ AVINT, INTEGRATION OF TABULATED	50
DATA COMPILATION	LLL	6600	F+LRL	MA	U R M \$ TRUMP/XB2, THERMAL PROPERTY	38
DATA REDUCTION	RFD	210	F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS	31

DATA REDUCTION	RFD	360	F4	MA	U R U \$ GAS-GAS & GAS-SOLID REACTION	32
DATA REDUCTION	RFD	360	F4	MA	U R U \$ RADF-2, GAS PHASE RADIOLYSIS	31
DECAY GROWTH OF NUCLIDES	RFD	360	F4	MA	U R D \$ ISOGEN, RADIOACTIVE	1
DECAYING OBJECTS	SLA	1108	F4	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF	24
DECAYING OBJECTS	SLA	3600	F36	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF	24
DECAYING OBJECTS	SLA	6600	F4	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF	24
DECAYING OBJECTS	SLA	7044	QUIK	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF	24
DENSITY CONTROL PROGRAM				MHSM	360 F4 MA U R Q \$ UNIVERSAL	44
DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	1108	F4	MA	U R T \$ ACCEL(MOD2),	27
DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	6600	F4	MA	U R T \$ ACCEL(MOD2),	27
DESIGN PROGRAM	SLAC	360	PL/1 R		U U V \$ SLAC ELECTRON GUN	36
DETERMINATION BY TRANSPOSITION METHOD				MHSM	360 F4 MA U R Q \$ MASS	42
DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400		BASIC MA	U R U \$ CHEMICAL	34
DISK	RFD	360	F+BAL MA	U R P \$ CONVERSION FROM PAPER TAPE TO CARD OR		8
DISPERSION OF PARTICLES	SLA	3600	F36	MA	U R R \$ MODEL-B, FALL AND	19
DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD	400	F	MA	U R U \$	33
EIGENVALUES & VECTORS	SLA	6600	F4	MA	U R P \$ SEVER, SYMMETRIC MATRIX	48
ELECTRON GUN DESIGN PROGRAM				SLAC	360 PL/1 R U U V \$ SLAC	36
ELFMENTAL MOMENT OF INERTIA CALCULATION				MHSM	360 F4 MA U R T \$	41
ELLIPSOMETER MEASUREMENT ANALYSIS	RFD	360	F4	MA	U R Q \$ SURFACE FILM	16
ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	6600	F4	MA	U R P \$	51
ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	6600	F4	MA	U R P \$ ERF,	51
ERLF, SPECTROPHOTOMETRIC REACTION KINETICS	RFD	360	F4	MA	U R U \$	30
ERRCHK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES	SLA	6600	F+COM MA	D R P \$		54
ERRGET,ERRSET, SYSTEM ERROR ROUTINES	SLA	6600	F+COM MA	D R P \$ ERRCHK,		54
ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	6600	F4	MA	U R P \$ ERF,ERFC,	51
ERROR FUNCTION	SLA	6600	F4	MA	U R P \$ ERF,ERFC, ERROR & COMPLEMENTARY	51
ERROR ROUTINES	SLA	6600	F+COM MA	D R P \$ ERRCHK,ERRGET,ERRSET, SYSTEM		54
ERRSET, SYSTEM ERROR ROUTINES	SLA	6600	F+COM MA	D R P \$ ERRCHK,ERRGET,		54
EVENT POSITIONING	SLA	3600	F36	MA	U R S \$ SATLOC, SATELLITE GEOGRAPHIC	23
F+BAL MA	U R P \$ CONVERSION FROM PAPER TAPE TO CARD OR DISK	RFD	360			8
F+BAL MA	J R Q \$ INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD	360			17
F+BAL R	U U P \$ IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC	360			11
F+C+R MA	U R M \$ RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO	360			3
F+COM MA	D R P \$ ERRCHK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES	SLA	6600			54
F+COM MA	D R P \$ RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA	6600			26
F+COM MA	U R H \$ SANPIC, PARTICLE-IN-CELL PROGRAM	SLA	6600			49
F+COM MA	U R I \$ SLADE, STATIC ANALYSIS OF THIN SHELLS	SLA	6600			2
F+LRL MA	U R M \$ TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION	LLL	6600			38
FALL AND DISPERSION OF PARTICLES	SLA	3600	F36	MA	U R R \$ MODEL-B,	19
FFEARs, LAPLACE EQUATION SIMULATION STUDY	SLA	6600	F4	MA	U R T \$	29
FILE SYSTEM				MHSM	360 C+BAL MA U R M \$ MPR PRODUCT RECORD	43
FILM ELLIPSOMETER MEASUREMENT ANALYSIS	RFD	360	F4	MA	U R Q \$ SURFACE	16
FIT BY LEAST SQUARES ANALYSIS	RFD	360	F4	MA	U R P \$ POLYNOMIAL CURVE	10
FITTING OF FUNCTIONS	RFD	400	F4	MA	U R P \$ NON-LINEAR LEAST SQUARES	7
FLOW	LLL	3600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE FLUID	37
FLOW	LLL	6600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE FLUID	37
FLOW	LLL	7600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE FLUID	37
FLUID FLOW	LLL	3600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE	37
FLUID FLOW	LLL	6600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE	37
FLUID FLOW	LLL	7600	F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE	37
FORMAT, A TEXT PROCESSING PROGRAM				SLAC	360 F4 R U U P \$	12
FTN	MA	J R P \$ SANDIA SCOPE USERS' MANUAL FOR THE CDC6600	SLA	6600		6
F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210		31
F36	MA	U R R \$ MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA	3600		19
F36	MA	U R S \$ SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600		23
F36	MA	U R S \$ TODDY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA	3600		47
F36	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600		24
F36	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	3600		25
F4	MA	D R P \$ BES, CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA	6600		51
F4	MA	D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	PD10		51
F4	MA	D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	1108		52

F4	MA	D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	6600	52
F4	MA	U R D \$	ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD	360	1
F4	MA	U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL	3600	37
F4	MA	U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL	6600	37
F4	MA	U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL	7600	37
F4	MA	U R P \$	AVINT, INTEGRATION OF TABULATED DATA	SLA	6600	50
F4	MA	U R P \$	ERF, ERFC, EKKUK & COMPLEMENTARY ERROR FUNCTION	SLA	6600	51
F4	MA	U R P \$	NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS	RFD	400	7
F4	MA	U R P \$	PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000	RFD	360	14
F4	MA	U R P \$	PLOTR, 2-D CONTOUR AND AREA CALCULATION	SLA	6600	5
F4	MA	U R P \$	POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS	RFD	360	10
F4	MA	U R P \$	SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS	SLA	6600	48
F4	MA	U R Q \$	CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	RFD	360	18
F4	MA	U R Q \$	MASS DETERMINATION BY TRANSPOSITION METHOD	MHSM	360	42
F4	MA	U R Q \$	SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS	RFD	360	16
F4	MA	U R Q \$	UNIVERSAL DENSITY CONTROL PROGRAM	MHSM	360	44
F4	MA	U R S \$	SWAP9, STRESS WAVE ANALYSIS PROGRAM	SLA	6600	22
F4	MA	U R S \$	WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA	6600	21
F4	MA	U R T \$	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	1108	27
F4	MA	U R T \$	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	6600	27
F4	MA	U R T \$	CALIBRATION OF SURFACE PLATES	MHBR	360	28
F4	MA	U R T \$	ELEMENTAL MOMENT OF INERTIA CALCULATION	MHSM	360	41
F4	MA	U R T \$	FFEARS, LAPLACE EQUATION SIMULATION STUDY	SLA	6600	29
F4	MA	U R T \$	WHEATSTONE BRIDGE RESISTANCE CALIBRATION	MHSM	360	45
F4	MA	U R U \$	ERLF, SPECTROPHOTOMETRIC REACTION KINETICS	RFD	360	30
F4	MA	U R U \$	GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	RFD	360	32
F4	MA	U R U \$	RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	360	31
F4	MA	U R U \$	STICKING PROBABILITY OF GASES ON SOLID SURFACE	RFD	360	35
F4	MA	U R U \$	TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM	360	46
F4	R	U U P \$	FORMAT, A TEXT PROCESSING PROGRAM	SLAC	360	12
F4	SNS	U P S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108	24
F4	SNS	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600	24
F4	SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	1108	25
F4	SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	6600	25
F4	SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	1108	20
F4	SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	3600	20
F4	SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	6600	20
F63	MA	U R P \$	AVINT, INTEGRATION OF TABULATED DATA	SLA	3600	50
			GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210 F2	31
			GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	360 F4	31
			GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	RFD	360 F4	32
			GAS-SOLID REACTION DATA REDUCTION	RFD	360 F4	32
			GASES BY MASS SPECTROMETRY	RFD	400 F	33
			GASES ON SOLID SURFACE	RFD	360 F4	35
			GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI	435 COBOL MA	39
			GEOGRAPHIC EVENT POSITIONING	SLA	3600 F36	23
			GEPI 435 COBOL MA	U R M \$	GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM	39
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	PD10 F4	52
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	1108 F4	52
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	6600 F4	52
			GERBER 2000	RFD	360 F4	14
			GROWTH OF NUCLIDES	RFD	360 F4	1
			SUN DESIGN PROGRAM	SLAC	360 PL/1 R	36
			HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108 F4	24
			HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600 F36	24
			HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600 F4	24
			HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044 QUIK	24
			HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	1108 F4	25
			HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	3600 F36	25
			HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	6600 F4	25
			HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	7040 QUIK	25
			HRS017, MULTIPLE REVOLUTION REENTRY	SLA	1108 F4	20

HRS017, MULTIPLE REVOLUTION REENTRY	SLA 3600 F4	SNS U R S \$	20
HRS017, MULTIPLE REVOLUTION REENTRY	SLA 6600 F4	SNS U R S \$	20
HRS017, MULTIPLE REVOLUTION REENTRY	SLA 7040	QUIK SNS U R S \$	20
IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC 360	F+BAL R U P \$	11
INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD 360	F+BAL MA U R Q \$	17
INDEXING RFD 360 F+BAL MA U R Q \$ INDEX, X-RAY POWDER PATTERN CRYSTAL			17
INERTIA CALCULATION	MHSM 360 F4	MA U R T \$	41
INSURANCE REIMBURSEMENT SYSTEM	GEPI 435	COBOL MA U R M \$	39
INTEGRATION OF TABULATED DATA	SLA 3600 F63	MA U R P \$	50
INTEGRATION OF TABULATED DATA	SLA 6600 F4	MA U R P \$	50
INTEGRATION ROUTINE	SLA 6600 F+COM	MA D R P \$	26
INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA 3100	COM MA U R P \$	13
ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD 360 F4	MA U R D \$	1
KINETICS RFD 360 F4 MA U R U \$	ERLF, SPECTROPHOTOMETRIC REACTION		30
LAPLACE EQUATION SIMULATION STUDY	SLA 6600 F4	MA U R T \$	29
LEASE ANALYSIS	SLA 360	COBOL MA U R M \$	4
LEASE ANALYSIS	SLA 1108	COBOL MA U R M \$	4
LEAST SQUARES ANALYSIS RFD 360 F4	MA U R P \$	POLYNOMIAL CURVE FIT BY	10
LEAST SQUARES FITTING OF FUNCTIONS RFD 400 F4	MA U R P \$	NON-LINEAR	7
LIBRARY MANAGEMENT PROGRAM	ALOO B283	COBOL MA U R M \$	40
LLL 3600 F4 MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW		37
LLL 6600 F+LRL MA U R M \$	TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION		38
LLL 6600 F4 MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW		37
LLL 7600 F4 MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW		37
MA D R P \$	BES, CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA 6600 F4	53
MA D R P \$	ERRCHK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES	SLA 6600 F+COM	54
MA D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA PD10 F4	52
MA D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA 1108 F4	52
MA D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA 6600 F4	52
MA D R P \$	RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA 6600 F+COM	26
MA U R D \$	ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD 360 F4	1
MA U R H \$	SANPIC, PARTICLE-IN-CELL PROGRAM	SLA 6600 F+COM	49
MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL 3600 F4	37
MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL 6600 F4	37
MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL 7600 F4	37
MA U R I \$	SLADE, STATIC ANALYSIS OF THIN SHELLS	SLA 6600 F+COM	2
MA U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA 360 COBOL	4
MA U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA 1108 COBOL	4
MA U R M \$	GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI 435 COBOL	39
MA U R M \$	MPR PRODUCT RECORD FILE SYSTEM	MHSM 360 C+BAL	43
MA U R M \$	RALCRPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO 360 F+C+R	3
MA U R M \$	TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM	ALOO B283 COBOL	40
MA U R M \$	TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION	LLL 6600 F+LRL	38
MA U R P \$	AVINT, INTEGRATION OF TABULATED DATA	SLA 3600 F63	50
MA U R P \$	AVINT, INTEGRATION OF TABULATED DATA	SLA 6600 F4	50
MA U R P \$	CONVERSION FROM PAPER TAPE TO CARD OR DISK	RFD 360 F+BAL	8
MA U R P \$	ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA 6600 F4	51
MA U R P \$	INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA 3100 COM	13
MA U R P \$	NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS	RFD 400 F4	7
MA U R P \$	PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000	RFD 360 F4	14
MA U R P \$	PLOTR, 2-D CONTOUR AND AREA CALCULATION	SLA 6600 F4	5
MA U R P \$	POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS	RFD 360 F4	10
MA U R P \$	SANDIA SCOPE USERS' MANUAL FOR THE CDC6600	SLA 6600 FTN	6
MA U R P \$	SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS	SLA 6600 F4	48
MA U R P \$	SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION	RFD 400 F	9
MA U R Q \$	CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	RFD 360 F4	18
MA U R Q \$	INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD 360 F+BAL	17
MA U R Q \$	MASS DETERMINATION BY TRANSPOSITION METHOD	MHSM 360 F4	42
MA U R Q \$	SIMULATION OF STRESS CORROSION CRACKING	SLA 6600 F	15
MA U R Q \$	SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS	RFD 360 F4	11
MA U R Q \$	UNIVERSAL DENSITY CONTROL PROGRAM	MHSM 360 F4	41
MA U R R \$	MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA 3600 F36	19

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MA	U R S \$ SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36	23
MA	U R S \$ SWAP9, STRESS WAVE ANALYSIS PROGRAM	SLA	6600	F4	22
MA	U R S \$ TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA	3600	F36	47
MA	U R S \$ WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA	6600	F4	21
MA	U R T \$ ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	1108	F4	27
MA	U R T \$ ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA	6600	F4	27
MA	U R T \$ CALIBRATION OF SURFACE PLATES	MHBR	360	F4	28
MA	U R T \$ ELEMENTAL MOMENT OF INERTIA CALCULATION	MHSM	360	F4	41
MA	U R T \$ FFEARS, LAPLACE EQUATION SIMULATION STUDY	SLA	6600	F4	29
MA	U R T \$ WHEATSTONE BRIDGE RESISTANCE CALIBRATION	MHSM	360	F4	45
MA	U R U \$ CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400	BASIC	34
MA	U R U \$ DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD	400	F	33
MA	U R U \$ ERLF, SPECTROPHOTOMETRIC REACTION KINETICS	RFD	360	F4	30
MA	U R U \$ GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	RFD	360	F4	32
MA	U R U \$ RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	360	F4	31
MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210	F2	31
MA	U R U \$ STICKING PROBABILITY OF GASES ON SOLID SURFACE	RFD	360	F4	35
MA	U R U \$ TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM	360	F4	46
MAG TAPE R/W	SLAC 360 F+BAL R U U P \$ IBM360 UTILITY AND PDP9/15 ASCII				11
MANAGEMENT PROGRAM	ALOO B283 COBOL MA U R M \$ TRAMP, TAPE LIBRARY				40
MANUAL FOR THE CDC6600	SLA 6600 FTN MA U R P \$ SANDIA SCOPE USERS'				6
MASS DETERMINATION BY TRANSPOSITION METHOD	MHSM 360 F4 MA U R Q \$				42
MASS SPECTROMETRY RFD	400 F MA U R U \$ DYNAMIC ANALYSIS OF GASES BY				33
MATRIX EIGENVALUES & VECTORS	SLA 6600 F4 MA U R P \$ SEVER, SYMMETRIC				48
MEASUREMENT ANALYSIS RFD	360 F4 MA U R Q \$ SURFACE FILM ELLIPSOMETER				16
MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI 435 COBOL MA U R M \$ GE				39
MHBR 360 F4	MA U R T \$ CALIBRATION OF SURFACE PLATES				28
MHSM 360 C+BAL	MA U R M \$ MPR PRODUCT RECORD FILE SYSTEM				43
MHSM 360 F4	MA U R Q \$ MASS DETERMINATION BY TRANSPOSITION METHOD				42
MHSM 360 F4	MA U R Q \$ UNIVERSAL DENSITY CONTROL PROGRAM				44
MHSM 360 F4	MA U R T \$ ELEMENTAL MOMENT OF INERTIA CALCULATION				41
MHSM 360 F4	MA U R T \$ WHEATSTONE BRIDGE RESISTANCE CALIBRATION				45
MHSM 360 F4	MA U R U \$ TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM				46
MLMO 360 F+C+R	MA U R M \$ RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH				3
MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA 3600 F36 MA U R R \$				19
MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA 1108 F4 MA U R T \$ ACCEL				27
MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA 6600 F4 MA U R T \$ ACCEL				27
MOMENT OF INERTIA CALCULATION	MHSM 360 F4 MA U R T \$ ELEMENTAL				41
MONITOR TELEMETRY PLAYBACK SYSTEM	SLA 3100 COM MA U R P \$ INTERACTIVE				13
MPR PRODUCT RECORD FILE SYSTEM	MHSM 360 C+BAL MA U R M \$				43
MULTIPLE REVOLUTION REENTRY	SLA 1108 F4 SNS U R S \$ HRS017,				20
MULTIPLE REVOLUTION REENTRY	SLA 3600 F4 SNS U R S \$ HRS017,				20
MULTIPLE REVOLUTION REENTRY	SLA 6600 F4 SNS U R S \$ HRS017,				20
MULTIPLE REVOLUTION REENTRY	SLA 7040 QUIK SNS U R S \$ HRS017,				20
NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS	RFD 400 F4 MA U R P \$				7
NUCLIDES RFD	360 F4 MA U R D \$ ISOGEN, RADIOACTIVE DECAY GROWTH OF				1
ODE INTEGRATION ROUTINE	SLA 6600 F+COM MA D R P \$ RUNKUT, RUNGE-KUTTA				26
PAPER TAPE TO CARD OR DISK	RFD 360 F+BAL MA U R P \$ CONVERSION FROM				8
PARTICLE-IN-CELL PROGRAM	SLA 6600 F+COM MA U R H \$ SANPIC,				49
PARTICLES	SLA 3600 F36 MA U R R \$ MODEL-B, FALL AND DISPERSION OF				19
PATH MLMO 360 F+C+R	MA U R M \$ RALCRTPH, RESOURCE ALLOCATION BY CRITICAL				3
PATTERN CRYSTAL INDEXING	RFD 360 F+BAL MA U R Q \$ INDEX, X-RAY POWDER				17
PDP9/15 ASCII MAG TAPE R/W	SLAC 360 F+BAL R U U P \$ IBM360 UTILITY AND				11
PJ10 F4	MA D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA			52
PHASE RADIOLYSIS DATA REDUCTION	RFD 210 F2 MA U R U \$ RADF, GAS				31
PHASE RADIOLYSIS DATA REDUCTION	RFD 360 F4 MA U R U \$ RADF-2, GAS				31
PL/1 R U U V \$ SLAC ELECTRON GUN DESIGN PROGRAM	SLAC 360				36
PLATES	MHBR 360 F4 MA U R T \$ CALIBRATION OF SURFACE				28
PLAYBACK SYSTEM	SLA 3100 COM MA U R P \$ INTERACTIVE MONITOR TELEMETRY				13
PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000	RFD 360 F4 MA U R P \$				14
PLOT, 2-D CONTOUR AND AREA CALCULATION	SLA 6600 F4 MA U R P \$				5
PLOTTING FOR THE GERBER 2000	RFD 360 F4 MA U R P \$ PLOT, AUTOMATIC				14

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RFD

PLOTTING PACKAGE	SLA	PD10	F4	MA	D R P \$ GERBER SERIES 1200 & 2000	52
PLOTTING PACKAGE	SLA	1108	F4	MA	D R P \$ GERBER SERIES 1200 & 2000	52
PLOTTING PACKAGE	SLA	6600	F4	MA	D R P \$ GERBER SERIES 1200 & 2000	52
POLYNOMIAL CURVE FIT BY LEAST SQUARES	ANALYSIS	RFD	360	F4	MA	U R P \$
POSITIONING	SLA	3600	F36	MA	U R S \$ SATLOC, SATELLITE GEOGRAPHIC EVENT	23
POWDER PATTERN CRYSTAL INDEXING	RFD	360	F+BAL	MA	U R Q \$ INDEX, X-RAY	17
PRINTED-CIRCUIT BOARDS	SLA	1108	F4	MA	U R T \$ ACCEL(MOD2), DESIGN OF	27
PRINTED-CIRCUIT BOARDS	SLA	6600	F4	MA	U R T \$ ACCEL(MOD2), DESIGN OF	27
PROBABILITY OF GASES ON SOLID SURFACE	RFD	360	F4	MA	U R U \$ STICKING	35
PROCESSING PROGRAM	SLAC	360	F4	R	U U P \$ FORMAT, A TEXT	12
PROPAGATION CALCULATION	SLA	6600	F4	MA	U R S \$ WONDY3A, 1-D WAVE	21
PROPAGATION PROGRAM	SLA	3600	F36	MA	U R S \$ TOODY2, 2-DIMENSIONAL WAVE	47
PROPERTY DATA COMPILATION	LLL	6600	F+LRL	MA	U R M \$ TRUMP/XB2, THERMAL	38
PURCHASE VERSUS LEASE ANALYSIS	SLA	360	COBOL	MA	U R M \$ BECOM, AEC	4
PURCHASE VERSUS LEASE ANALYSIS	SLA	1108	COBOL	MA	U R M \$ BECOM, AEC	4
QUIK	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044		24
QUIK	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	7040		25
QUIK	SNS	U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY	SLA	7040		20
R/W	SLAC	360	F+BAL	R	U U P \$ IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE	11
RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	360	F4	MA	U R U \$	31
RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210	F2	MA	U R U \$	31
RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD	360	F4	MA	U R D \$ ISOGEN,	1
RADIOLYSIS DATA REDUCTION	RFD	210	F2	MA	U R U \$ RADF, GAS PHASE	31
RADIOLYSIS DATA REDUCTION	RFD	360	F4	MA	U R U \$ RADF-2, GAS PHASE	31
RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO	360	F+C+R	MA	U R M \$	3
REACTION DATA REDUCTION	RFD	360	F4	MA	U R U \$ GAS-GAS & GAS-SOLID	32
REACTION KINETICS	RFD	360	F4	MA	U R U \$ ERLF, SPECTROPHOTOMETRIC	30
RECORD FILE SYSTEM	MHSM	360	C+BAL	MA	U R M \$ MPR PRODUCT	43
REDUCTION	RFD	210	F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA	31
REDUCTION	RFD	360	F4	MA	U R U \$ GAS-GAS & GAS-SOLID REACTION DATA	32
REDUCTION	RFD	360	F4	MA	U R U \$ RADF-2, GAS PHASE RADIOLYSIS DATA	31
REENTRY	SLA	1108	F4	SNS	U R S \$ HRS017, MULTIPLE REVOLUTION	20
REENTRY	SLA	3600	F4	SNS	U R S \$ HRS017, MULTIPLE REVOLUTION	20
REENTRY	SLA	6600	F4	SNS	U R S \$ HRS017, MULTIPLE REVOLUTION	20
REENTRY	SLA	7040	QUIK	SNS	U R S \$ HRS017, MULTIPLE REVOLUTION	20
REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108	F4	SNS	U R S \$ HRS004,	24
REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600	F36	SNS	U R S \$ HRS004,	24
REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600	F4	SNS	U R S \$ HRS004,	24
REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044	QUIK	SNS	U R S \$ HRS004,	24
REIMBURSEMENT SYSTEM	GEPI	435	COBOL	MA	U R M \$ GE MEDICAL INSURANCE	39
RESISTANCE CALIBRATION	MHSM	360	F4	MA	U R T \$ WHEATSTONE BRIDGE	45
RESOURCE ALLOCATION BY CRITICAL PATH	MLMO	360	F+C+R	MA	U R M \$ RALCRTPH,	3
REVOLUTION REENTRY	SLA	1108	F4	SNS	U R S \$ HRS017, MULTIPLE	20
REVOLUTION REENTRY	SLA	3600	F4	SNS	U R S \$ HRS017, MULTIPLE	20
REVOLUTION REENTRY	SLA	6600	F4	SNS	U R S \$ HRS017, MULTIPLE	20
REVOLUTION REENTRY	SLA	7040	QUIK	SNS	U R S \$ HRS017, MULTIPLE	20
REVOLUTION	RFD	400	F	MA	U R P \$ SURFACE AREA & VOLUME OF A SOLID OF	9
RFD	210	F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	31	
RFD	360	F+BAL	MA	U R P \$ CONVERSION FROM PAPER TAPE TO CARD OR DISK	8	
RFD	360	F+BAL	MA	U R Q \$ INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	17	
RFD	360	F4	MA	U R D \$ ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	1	
RFD	360	F4	MA	U R P \$ PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000	14	
RFD	360	F4	MA	U R P \$ POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS	10	
RFD	360	F4	MA	U R Q \$ CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	18	
RFD	360	F4	MA	U R Q \$ SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS	16	
RFD	360	F4	MA	U R U \$ ERLF, SPECTROPHOTOMETRIC REACTION KINETICS	30	
RFD	360	F4	MA	U R U \$ GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	32	
RFD	360	F4	MA	U R U \$ RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	31	
RFD	360	F4	MA	U R U \$ STICKING PROBABILITY OF GASES ON SOLID SURFACE	35	
RFD	400	BASIC	MA	U R U \$ CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	3	
RFD	400	F	MA	U R P \$ SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION		
RFD	400	F	MA	U R U \$ DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	33	

RFD	400	F4	MA	U R P \$	NON-LINEAR LEAST SQUARES FITTING OF FUNCTIONS	7
RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA	6600	F+COM MA	D R P \$	RUNKUT,	26
RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA	6600	F+COM MA	D R P \$		26
SANDIA SCOPE USERS' MANUAL FOR THE CDC6600	SLA	6600	FTN MA	U R P \$		6
SANPIC, PARTICLE-IN-CELL PROGRAM	SLA	6600	F+COM MA	U R H \$		49
SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36 MA	U R S \$	SATLOC,	23
SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36 MA	U R S \$		23
SCOPE USERS' MANUAL FOR THE CDC6600	SLA	6600	FTN MA	U R P \$	SANDIA	6
SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS	SLA	6600	F4 MA	U R P \$		48
SHELLS	SLA	6600	F+COM MA	U R I \$	SLADE, STATIC ANALYSIS OF THIN	2
SIMULATION OF STRESS CORROSION CRACKING	SLA	6600	F	MA	U R Q \$	15
SIMULATION STUDY	SLA	6600	F4 MA	U R T \$	FFEARs, LAPLACE EQUATION	29
SLA 360 COBOL MA	U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS			4	
SLA PD10 F4 MA	D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE			52	
SLA 1108 COBOL MA	U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS			4	
SLA 1108 F4 MA	D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE			52	
SLA 1108 F4 MA	U R T \$	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS			27	
SLA 1108 F4 SNS	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS			24	
SLA 1108 F4 SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION			25	
SLA 1108 F4 SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY			20	
SLA 3100 COM MA	U R P \$	INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM			13	
SLA 3600 F36 MA	U R R \$	MODEL-B, FALL AND DISPERSION OF PARTICLES			19	
SLA 3600 F36 MA	U R S \$	SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING			23	
SLA 3600 F36 MA	U R S \$	TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM			47	
SLA 3600 F36 SNS	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS			24	
SLA 3600 F36 SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION			25	
SLA 3600 F4 SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY			20	
SLA 3600 F63 MA	U R P \$	AVINT, INTEGRATION OF TABULATED DATA			50	
SLA 6600 F	MA	U R Q \$	SIMULATION OF STRESS CORROSION CRACKING		15	
SLA 6600 F+COM MA	D R P \$	ERRCHK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES			54	
SLA 6600 F+COM MA	D R P \$	RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE			26	
SLA 6600 F+COM MA	U R H \$	SANPIC, PARTICLE-IN-CELL PROGRAM			49	
SLA 6600 F+COM MA	U R I \$	SLADE, STATIC ANALYSIS OF THIN SHELLS			2	
SLA 6600 FTN MA	U R P \$	SANDIA SCOPE USERS' MANUAL FOR THE CDC6600			6	
SLA 6600 F4 MA	D R P \$	BES, CYLINDRICAL BESSEL FUNCTION EVALUATION			53	
SLA 6600 F4 MA	D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE			52	
SLA 6600 F4 MA	U R P \$	AVINT, INTEGRATION OF TABULATED DATA			50	
SLA 6600 F4 MA	U R P \$	ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION			51	
SLA 6600 F4 MA	U R P \$	PLOTR, 2-D CONTOUR AND AREA CALCULATION			5	
SLA 6600 F4 MA	U R P \$	SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS			48	
SLA 6600 F4 MA	U R S \$	SWAP9, STRESS WAVE ANALYSIS PROGRAM			22	
SLA 6600 F4 MA	U R S \$	WONDY3A, 1-D WAVE PROPAGATION CALCULATION			21	
SLA 6600 F4 MA	U R T \$	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS			27	
SLA 6600 F4 MA	U R T \$	FFEARs, LAPLACE EQUATION SIMULATION STUDY			29	
SLA 6600 F4 SNS	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS			24	
SLA 6600 F4 SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION			25	
SLA 6600 F4 SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY			20	
SLA 7040 QUIK SNS	U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION			25	
SLA 7040 QUIK SNS	U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY			20	
SLA 7044 QUIK SNS	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS			24	
SLAC 360 F+BAL R	U U P \$	IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W			11	
SLAC 360 F4 R	U U P \$	FORMAT, A TEXT PROCESSING PROGRAM			12	
SLAC 360 PL/1 R	U U V \$	SLAC ELECTRON GUN DESIGN PROGRAM			36	
SLAC ELECTRON GUN DESIGN PROGRAM	SLAC	360	PL/1 R	U U V \$		36
SLADE, STATIC ANALYSIS OF THIN SHELLS	SLA	6600	F+COM MA	U R I \$		2
SNS U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108	F4		24
SNS U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600	F36		24
SNS U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600	F4		24
SNS U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044	QUIK		24
NS U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	1108	F4		25
NS U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	3600	F36		25
SNS U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	6600	F4		25

SNS U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA 7040	QUICK	20
SNS U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY	SLA 1108	F4	20
SNS U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY	SLA 3600	F4	20
SNS U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY	SLA 6600	F4	20
SNS U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY	SLA 7040	QUICK	20
SOLID OF REVOLUTION RFD 400 F MA U R P \$ SURFACE AREA & VOLUME OF A			9
SOLID SURFACE RFD 360 F4 MA U R U \$ STICKING PROBABILITY OF GASES ON			35
SPECTROMETRY RFD 400 F MA U R U \$ DYNAMIC ANALYSIS OF GASES BY MASS			33
SPECTROPHOTOMETRIC REACTION KINETICS RFD 360 F4 MA U R U \$ ERLF,			30
STATIC ANALYSIS OF THIN SHELLS SLA 6600 F+COM MA U R I \$ SLADE,			2
STEADY-STATE FLUID FLOW LLL 3600 F4 MA U R H \$ TRUMP, TRANSIENT AND			37
STEADY-STATE FLUID FLOW LLL 6600 F4 MA U R H \$ TRUMP, TRANSIENT AND			37
STEADY-STATE FLUID FLOW LLL 7600 F4 MA U R H \$ TRUMP, TRANSIENT AND			37
STICKING PROBABILITY OF GASES ON SOLID SURFACE RFD 360 F4 MA U R U \$			35
STRESS CORROSION CRACKING SLA 6600 F MA U R Q \$ SIMULATION OF			15
STRESS WAVE ANALYSIS PROGRAM SLA 6600 F4 MA U R S \$ SWAP9,			22
SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION RFD 400 F MA U R P \$			9
SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS RFD 360 F4 MA U R Q \$			16
SURFACE PLATES MHBR 360 F4 MA U R T \$ CALIBRATION OF			28
SURFACE RFD 360 F4 MA U R U \$ STICKING PROBABILITY OF GASES ON SOLID			35
SWAP9, STRESS WAVE ANALYSIS PROGRAM SLA 6600 F4 MA U R S \$			22
SYMMETRIC MATRIX EIGENVALUES & VECTORS SLA 6600 F4 MA U R P \$ SEVER,			48
TABULATED DATA SLA 3600 F63 MA U R P \$ AVINT, INTEGRATION OF			50
TABULATED DATA SLA 6600 F4 MA U R P \$ AVINT, INTEGRATION OF			50
TAPE LIBRARY MANAGEMENT PROGRAM ALGO B283 COBOL MA U R M \$ TRUMP,			40
TAPE R/W SLAC 360 F+BAL R U U P \$ IBM360 UTILITY AND POP9/15 ASCII MAG			11
TAPE TO CARD OR DISK RFD 360 F+BAL MA U R P \$ CONVERSION FROM PAPER			8
TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM MHSM 360 F4 MA U R U \$			46
TELEMETRY PLAYBACK SYSTEM SLA 3100 COM MA U R P \$ INTERACTIVE MONITOR			13
TEXT PROCESSING PROGRAM SLAC 360 F4 R U U P \$ FORMAT, A			12
THERMAL PROPERTY DATA COMPILATION LLL 6600 F+LRL MA U R M \$ TRUMP/XB2,			38
THIN SHELLS SLA 6600 F+COM MA U R T \$ SLADE, STATIC ANALYSIS OF			2
TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM SLA 3600 F36 MA U R S \$			47
TRUMP, TAPE LIBRARY MANAGEMENT PROGRAM ALGO B283 COBOL MA U R M \$			40
TRANSIENT AND STEADY-STATE FLUID FLOW LLL 3600 F4 MA U R H \$ TRUMP,			37
TRANSIENT AND STEADY-STATE FLUID FLOW LLL 6600 F4 MA U R H \$ TRUMP,			37
TRANSIENT AND STEADY-STATE FLUID FLOW LLL 7600 F4 MA U R H \$ TRUMP,			37
TRANSPOSITION METHOD MHSM 360 F4 MA U R Q \$ MASS DETERMINATION BY			42
TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION LLL 6600 F+LRL MA U R M \$			38
TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 3600 F4 MA U R H \$			37
TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 6600 F4 MA U R H \$			37
TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW LLL 7600 F4 MA U R H \$			37
UNIVERSAL DENSITY CONTROL PROGRAM MHSM 360 F4 MA U R Q \$			44
USERS' MANUAL FOR THE CDC6600 SLA 6600 FTN MA U R P \$ SANDIA SCOPE			6
UTILITY AND POP9/15 ASCII MAG TAPE R/W SLAC 360 F+BAL R U U P \$ IBM360			11
VECTORS SLA 6600 F4 MA U R P \$ SEVER, SYMMETRIC MATRIX EIGENVALUES &			48
VOLUME OF A SOLID OF REVOLUTION RFD 400 F MA U R P \$ SURFACE AREA &			9
WAVE ANALYSIS PROGRAM SLA 6600 F4 MA U R S \$ SWAP9, STRESS			22
WAVE PROPAGATION CALCULATION SLA 6600 F4 MA U R S \$ WONDY3A, 1-D			21
WAVE PROPAGATION PROGRAM SLA 3600 F36 MA U R S \$ TOODY2, 2-DIMENSIONAL			47
WHEATSTONE BRIDGE RESISTANCE CALIBRATION MHSM 360 F4 MA U R T \$			45
WONDY3A, 1-D WAVE PROPAGATION CALCULATION SLA 6600 F4 MA U R S \$			21
X-RAY POWDER PATTERN CRYSTAL INDEXING RFD 360 F+BAL MA U R Q \$ INDEX,			17
1-D WAVE PROPAGATION CALCULATION SLA 6600 F4 MA U R S \$ WONDY3A,			21
1108 COBOL MA U R M \$ BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS SLA			4
1108 F4 MA D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA			52
1108 F4 MA U R T \$ ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS SLA			27
1108 F4 SNS U R S \$ HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS SLA			24
1108 F4 SNS U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION SLA			25
1108 F4 SNS U R S \$ HRS017, MULTIPLE REVOLUTION REENTRY SLA			2
1200 & 2000 PLOTTING PACKAGE SLA PD10 F4 MA D R P \$ GERBER SERIES			5
1200 & 2000 PLOTTING PACKAGE SLA 1108 F4 MA D R P \$ GERBER SERIES			52

1200 & 2000 PLOTTING PACKAGE	SLA	6600	F4	MA	D R P \$ GERBER SERIES	52
2-D CONTOUR AND AREA CALCULATION	SLA	6600	F4	MA	U R P \$ PLOTR,	5
2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA	3600	F36	MA	U P S \$ TOODY2,	47
2000 RFD 360 F4	MA	U R P \$ PLOT, AUTOMATIC PLOTTING FOR THE GERBER				14
2000 PLOTTING PACKAGE	SLA	PD10	F4	MA	D R P \$ GERBER SERIES 1200 &	52
2000 PLOTTING PACKAGE	SLA	1108	F4	MA	D R P \$ GERBER SERIES 1200 &	52
2000 PLOTTING PACKAGE	SLA	6600	F4	MA	D R P \$ GERBER SERIES 1200 &	52
210 F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD			31
3100 COM	MA	U R P \$ INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA			13
360 C+BAL	MA	U R M \$ MPR PRODUCT RECORD FILE SYSTEM	MHSM			43
360 COBOL	MA	U R M \$ BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA			4
360 F+BAL	MA	U R P \$ CONVERSION FROM PAPER TAPE TO CARD OR DISK	RFD			8
360 F+BAL	MA	U R Q \$ INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD			17
360 F+BAL	R	U U P \$ IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC			11
360 F+C+R	MA	U R M \$ RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO			3
360 F4	MA	U R D \$ ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD			1
360 F4	MA	U R P \$ PLOT, AUTOMATIC PLOTTING FOR THE GERBER 2000	RFD			14
360 F4	MA	U R P \$ POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS	RFD			10
360 F4	MA	U R Q \$ CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	RFD			18
360 F4	MA	U R Q \$ MASS DETERMINATION BY TRANSPOSITION METHOD	MHSM			42
360 F4	MA	U R Q \$ SURFACE FILM ELLIPSOMETER MEASUREMENT ANALYSIS	RFD			16
360 F4	MA	U R Q \$ UNIVERSAL DENSITY CONTROL PROGRAM	MHSM			44
360 F4	MA	U R T \$ CALIBRATION OF SURFACE PLATES	MHRP			28
360 F4	MA	U R T \$ ELEMENTAL MOMENT OF INERTIA CALCULATION	MHSM			41
360 F4	MA	U R T \$ WHEATSTONE BRIDGE RESISTANCE CALIBRATION	MHSM			45
360 F4	MA	U R U \$ FRLF, SPECTROPHOTOMETRIC REACTION KINETICS	RFD			30
360 F4	MA	U R U \$ GAS-GAS & GAS-SOLID REACTION DATA REDUCTION	RFD			32
360 F4	MA	U R U \$ RADF-2, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD			31
360 F4	MA	U R U \$ STICKING PROBABILITY OF GASES ON SOLID SURFACE	RFD			35
360 F4	MA	U R U \$ TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM			46
360 F4	R	U U P \$ FORMAT, A TEXT PROCESSING PROGRAM	SLAC			12
360 PL/1	P	U U V \$ SLAC ELECTRON GUN DESIGN PROGRAM	SLAC			36
3600 F36	MA	U R R \$ MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA			19
3600 F36	MA	U R S \$ SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA			23
3600 F36	MA	U R S \$ TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA			47
3600 F36	SNS	U R S \$ HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA			24
3600 F36	SNS	U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA			25
3600 F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL			37
3600 F4	SNS	U R S \$ HPS017, MULTIPLE REVOLUTION REENTRY	SLA			20
3600 F63	MA	U R P \$ AVINT, INTEGRATION OF TABULATED DATA	SLA			50
400 BASIC	MA	U R U \$ CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD			34
400 F	MA	U R P \$ SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION	RFD			9
400 F	MA	U R U \$ DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD			33
400 F4	MA	U R P \$ NON-LINER LEAST SQUARES FITTING OF FUNCTIONS	RFD			7
435 COBOL	MA	U R M \$ GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI			39
6600 F	MA	U R Q \$ SIMULATION OF STRESS CORROSION CRACKING	SLA			15
6600 F+COM	MA	D R P \$ ERPCBK,ERRGET,ERRSET, SYSTEM ERROR ROUTINES	SLA			54
6600 F+COM	MA	D R P \$ RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA			26
6600 F+COM	MA	U R H \$ SANPIC, PARTICLE-IN-CELL PROGRAM	SLA			49
6600 F+COM	MA	U R I \$ SLADF, STATIC ANALYSIS OF THIN SHELLS	SLA			2
6600 F+LRL	MA	U R M \$ TRUMP/XR2, THERMAL PROPERTY DATA COMPILATION	LLL			38
6600 FTN	MA	U R P \$ SANDIA SCOPE USERS' MANUAL FOR THE CDC6600	SLA			6
6600 F4	MA	D R P \$ BES, CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA			53
6600 F4	MA	D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA			52
6600 F4	MA	U R H \$ TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL			37
6600 F4	MA	U R P \$ AVINT, INTEGRATION OF TABULATED DATA	SLA			50
6600 F4	MA	U R P \$ ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA			51
6600 F4	MA	U R P \$ PLOTR, 2-D CONTOUR AND AREA CALCULATION	SLA			5
6600 F4	MA	U R P \$ SFVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS	SLA			48
600 F4	MA	U R S \$ SWAP9, STRESS WAVE ANALYSIS PROGRAM	SLA			22
600 F4	MA	U R S \$ WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA			21
6600 F4	MA	U R T \$ ACCFL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	SLA			27

6600

7600

6500	F4	MA	U R T	\$	FFEARS, LAPLACE EQUATION SIMULATION STUDY	SLA	29
6600	F4	SNS	U R S	\$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	24
6600	F4	SNS	U R S	\$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	25
6600	F4	SNS	U R S	\$	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	20
7040	QUIK	SNS	U R S	\$	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	25
7040	QUIK	SNS	U R S	\$	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	20
7044	QUIK	SNS	U R S	\$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	24
7600	F4	MA	U R H	\$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL	37