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USAEC COMPUTER PROGRAM SUMMARIES

Numbers 124 through 176

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ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS

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October 1974

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161	PATS, RISOS/ARPA POP-11 OPERATING SYSTEM	LLL	PD11	ASM	ARPA	D U	P	49
162	CUE, PROPERTY INVENTORY & ACCOUNTING SYSTEM	CSCN	6600	COBOL	RLOO	U U	M	50
163	GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	LLL	6600	LRL	MA	U U	U	50
164	GAMANAL LIBRARY AND AUXILIARY ROUTINES	LLL	6600	LRL	MA	U U	U	50
165	NRTS-IGS GRAPHICS SOFTWARE FOR III FR-80 COM	ANC	360	F+BAL	RRD	U U	P	50
166	DISNEL, DIFFUSION SOLUTION 19 ENERGY LEVELS	ANC	360	F4	RRD	U U	C	51
167	FLOOD, CORE REFLOODING RATE CALCULATION ECC	ANC	360	F4	RSR	U U	H	51
168	PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	360	F4	RRD	U U	B	51
169	INCITE LIBRARY, THERMAL X-SECTIONS ENDF/B DATA	ANC	360	RIN	RRD	U U	Z	51
170	SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	360	F4	RRD	U U	B	51
171	SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	360	F4	RRD	U U	C	51
172	QMESH,RENUM, SELF-ORGANIZING MESH GENERATION	SLA	6600	F	MA	P U	I	51
173	INTERACT, INTERACTION OF FISSILE UNITS	DP	360	F4	PMM	U U	C	52
174	COMPUTER PROGRAM FOR LIBRARY BOOK CONTROL	DP	360	COBOL	PMM	U U	M	52
175	TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM	DP	360	F4	PMM	U U	M	52
176	NUBOW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	360	F4	RRD	U U	I	52

APPENDIX A: PROGRAMS BY SUBJECT CATEGORY A-1

APPENDIX B: KWIC INDEX B-1

INTRODUCTION

Since 1960 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 and operating system used.

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 and number of words of memory required.

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	LASL — University of California Los Alamos Scientific Laboratory P. O. Box 1663 Los Alamos, New Mexico 87544
ANC — Aerojet Nuclear Company 550 Second Street Idaho Falls, Idaho 83401	LLL — University of California Lawrence Livermore Laboratory P. O. Box 808 Livermore, California 94550
ANL — Argonne National Laboratory 9700 South Cass Avenue Argonne, Illinois 60439	MHBR — Mason & Hanger-Silas Mason Co., Inc. P. O. Box 561 Burlington, Iowa 52601
BKCD — Bendix Corporation Kansas City Division P. O. Box 1159 Kansas City, Missouri 64141	MHSM — Mason & Hanger-Silas Mason Co., Inc. P. O. Box 647 Amarillo, Texas 79105
BNWL — Battelle-Northwest Pacific Northwest Laboratories P. O. Box 999 Richland, Washington 99352	MLMO — Monsanto Research Corporation Mound Laboratory P. O. Box 32 Miamisburg, Ohio 45342
CSCN — Computer Sciences Corporation 825 Jadwin Avenue Richland, Washington 99352	RFD — Dow Chemical USA Rocky Flats Division P. O. Box 888 Golden, Colorado 80401
DP — E. I. duPont de Nemours Savannah River Laboratory Aiken, South Carolina 29801	SLA — Sandia Laboratories P. O. Box 5800 Albuquerque, New Mexico 87115
EI — Energy Incorporated P. O. Box 736 Idaho Falls, Idaho 83401	SLAC — Stanford University Stanford Linear Accelerator Center P. O. Box 4349 Stanford, California 94305
GA — General Atomic Company P. O. Box 81608 San Diego, California 92138	UILL — University of Illinois 214 Nuclear Engineering Laboratory Urbana, Illinois 61801
GEPI — General Electric Company Neutron Devices Department P. O. Box 11508 St. Petersburg, Florida 33733	

AEC PROGRAM DIVISION ABBREVIATIONS

ANL — Argonne National Laboratory	PMM — Division of Production and Materials Management
ARPA — Advanced Research Projects Agency	R — Division of Physical Research
AT — Division of Applied Technology	RLOO — Richland Operations Office
CTR — Division of Controlled Thermonuclear Research	RRD — Division of Reactor Research and Development
DBER — Division of Biomedical and Environmental Research	RS — Directorate of Regulatory Standards
LLL — Lawrence Livermore Laboratory	RSR — Division of Reactor Safety Research
MA — Division of Military Application	SNS — Division of Space Nuclear Systems

DEFINITIONS OF SYMBOLS USED IN TABLE OF CONTENTS

MACHINE DESIGNATION		PROGRAMMING LANGUAGES OR DATA REPRESENTATION	
210	ASI 210	ALA76	Lawrence Livermore Laboratory's ALA76 (ALGOL-like)
283	Burroughs 283	ANSIF	ANSI FORTRAN
360	IBM 360	ASM	Assembler
400	GE 400	BAL	Basic Assembly Language
435	GE 435	BASIC	BASIC
812	ND812	BIN	Binary
1108	UNIVAC 1108	CHAT	Lawrence Livermore Laboratory's CHAT (FORTRAN-like)
3100	CDC 3100	COBOL, C	COBOL
3600	CDC 3600	COM	COMPASS Assembly Language
6600	CDC 6600	EBCDI	EBCDIC
7040	IBM 7040	F	FORTRAN
7044	IBM 7044	FOCAL	DEC FOrmula CALculation Interpretive Language
7600	CDC 7600	FTN	FTN FORTRAN
GETS	GE Mark II Time-sharing	F36	3600 FORTRAN
MCS4	Intel MCS 4	F4	FORTRAN IV
MCS8	Intel MCS 8	F63	FORTRAN '63
MDCM	Modular Computer Systems MODCOMP III	LRL	Lawrence Livermore Laboratory's LRLTRAN
PDP9	DEC PDP 9	PL/1, P	PL/1
PD10	DEC PDP 10	PUTT	Lawrence Livermore Laboratory's PUTT (FORTRAN-like)
PD11	DEC PDP 11	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	U Unlimited
D Development	R U. S. Only
C Checkout	G Government contract applications only
U In Use	
P Packaged	

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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. **Heat Transfer and Fluid Flow**—Steady state and transient heat transfer computations, 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. **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, statistical analysis, special-language routines with general data-processing capabilities, and 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. **Environmental and Earth Sciences**—Environmental impact studies, geology, seismology, geophysics calculations, hydrology and ground water studies, bioenvironmental systems analyses, meteorological 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.
- W. **Physics**—Calculations relating to theory of atomic or molecular structure or properties, charged particle collision studies that involve phenomena such as charge exchange, excitation, ionization, dissociation, etc., elementary particle theories and models, scattering theory, quantum field theory and quantum electrodynamics studies, general relativity and gravitation theory computations.
- X. **Controlled Thermonuclear Research**—Electric discharge phenomena and plasma physics computations, electrodynamics and magnetic hydrodynamics studies.
- Y. **Biology and Medicine**—Biological, medical and radiological studies of the structure, functions, chemistry, biophysics, reproduction, and heredity of bacteria, plants, laboratory animals, and humans.
- Z. **Data**—Data prepared in specific program formats for program testing and evaluation, benchmark studies, or library use.

SUMMARY COLLECTION

(Pages 11–24 do not appear here, as they are printed in their entirety in ANL-8040; pages 25–39 do not appear here, as they are printed in their entirety in ANL-8040 Supplement 1.)

124 R. M. Bevensee, L-156 T
SOL-HOL CONE, CONICAL MONOPOLE ANTENNA CALC
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 6600 FORTRAN 934 cards

The SOL-HOL CONE Program for the solid and hollow monopoles and the coaxial horn antenna consists of a MAIN Program and seven subroutines. MAIN provides for read-in of data via either the teletype running a program called from tape storage, or a card reader initiating a new program. This is followed by computations of the required number of Legendre indices and functions, which are independent of frequency. The program then computes the spherical Bessel functions over a specified frequency range and solves the linear inhomogeneous equations for the normalized radiation mode amplitudes and the input admittance. It prints the far electric field and power gain in five different elevation directions, the input admittance over the specified frequency range, and information is also printed about the accuracy of the Legendre functions and power checks at discrete frequencies. Before terminating, the program enables one to punch cards of gain and far field in five different directions as well as input admittance, all in the frequency domain.

R. M. Bevensee, Handbook of Conical Antennas & Scatterers, Gordon & Breach, (1973).

A card deck and listing are available from the author on request.

Distribution: U. S. Only.

125 W. P. Ruemmler M
RLTRS, RL MAGNETIC TAPE RESERVATION SYSTEM
 Computer Sciences Corporation RLOO
 Richland, Washington In Use
 CYBER 74 FTN-95%, COM-5% 10,000 statements
 SCOPE 3.4

RLTRS is a collection of control card processors which allow the applications programmer to logically assign tapes in much the same way permanent files are assigned. Individual users have no knowledge of volume serial numbers; they are provided password protection, automatic file cycling and purging, and capabilities to release tapes to scratch and bad-tape pools, or to direct them to a permanent record center. Special features are provided to process CalComp plot tapes. Audits are available by user identification, by account, and by tapeset name.

Several services assist the Computer Center with tape jobs. RLTRS provides a list of tape requirements for a job, stages jobs, assigns tapes for writing, and assigns multi-reel tapes.

This program is available through VIM, Inc., P. O. Box 9080 Annex, Sunnyvale, California 94086.

Distribution: Unlimited.

126 Clifford D. Kern R
NST, 2-1/2 DIMENSION PREDICTION MODEL
 E. I. duPont de Nemours & Co. DBER
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 466 statements
 183,000 bytes

Mesoscale prediction of the u, v components of the wind, potential temperature of the well-mixed boundary layer and the height of the well-mixed layer. Model may use the output of VARSCN as initial conditions. Three versions exist with

large, medium, or small grid spacing for a 33 by 33 array centered on the Savannah River Plant. Forecast wind fields can be used as input to the trajectory program for plume-type calculation of pollution concentration from point sources.

The large grid-spacing version, LRGNST, has grid spacing of approximately 40 km; the medium grid-spacing version, MDMNST, has grid spacing of approximately 10 km; and the small grid-spacing version, SMLNST, has grid spacing of approximately 2.5 km.

The specific reference is in preparation; however, the computation framework is described in "A Mesoscale Numerical Model of Lake-Effect Storm," by R. L. Lavoie in the Journal of Atmospheric Sciences 29, 1025, September 1972.

The programs will be made available through the Argonne Code Center, if requested.

Distribution: Unlimited.

127 Clifford D. Kern R
TRAJ, POINT SOURCE 2D WIND TRAJECTORY PROGRAM
 E. I. duPont de Nemours & Co. DBER
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 210 statements
 110,000 bytes

Two-dimensional trajectories of winds are generated from point source. For after-the-fact cases, linear interpolation in time is accomplished between usual observation data times. Three versions exist with large, medium, and small v-grid spacing on a 33 by 33 array centered on the Savannah River Plant. The input for this program is usually the output from the VARSCN program.

The large v-grid spacing version, TRAJLRG, needs v-grid spacing of approximately 40 km., the medium v-grid spacing version, TRAJMDM, needs v-grid spacing of approximately 10 km., and the small v-grid spacing version, TRAJSM, needs v-grid spacing of approximately 2.5 km.

The programs will be made available through the Argonne Code Center, if requested.

Distribution: Unlimited.

128 Clifford D. Kern R
VARSCN, VARIABLE SCAN RADIUS UPPER AIR STUDY
 E. I. duPont de Nemours & Co. DBER
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 185,000 bytes

Grid point analyzed fields are prepared from synoptic surface data, tower data, and/or synoptic upper air reports of scalar quantities (temperature, pressure, winds broken into u-v components, thickness of well-mixed layer, etc.) for three different 33 by 33 grid nests. These nests, approximately centered on the Savannah River Plant (33 degrees 17 feet north, 81 degrees west), have a grid spacing of approximately 40 km. (1/8 NMC polar-stereographic square grid), 10 km. (1/32 NMC grid) and 2.5 km. (1/128 NMC grid). These analyzed fields are used as input to trajectory and prognostic models. Analysis is performed using a variable scan radius which is related to the data density weighted by an exponential of the inverse square of the distance between observation and grid point. A first guess is required; first guess for winds comes from the pressure analysis (or pressure first guess) using the geostrophic assumption.

A specific reference is not available; however, the philosophy is described in AFGAC Fine-Mesh Upper Air Analysis Model, AFGAC TM 69-2 (AD710203), R. J. Fleming, December 1969.

The program will be made available through the Argonne Code Center, if requested.

Distribution: Unlimited.

129 David W. Hayes **R**
TETRAD, STREAM TRANSPORT DIFFUSION COEF
CALC

E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 270,000 bytes
 JOSHUA System

TETRAD calculates dispersion, travel time, and velocity coefficients for bulk dispersion and statistical stream-river models. By routing from station-to-station in a stream reach, the dosed time-dependent pollutant concentrations, sets of reach coefficients are calculated using nonlinear least squares techniques. These time dependent pollutant concentration data are used as input to a model evaluation program.

The program will be made available through the Argonne Code Center, if requested.

Distribution: Unlimited.

130 R. E. Cooper **R**
MARC, MAN-REM DOSE FROM ATMOSPHERIC
TRANSPORT

E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 260,000 bytes

MARC is a series of computer modules that use meteorological data to estimate annual average dilution factors and gamma dose factors as a function of azimuth and distance, and relate these factors to total off-site man-rem exposure resulting from nuclear operations. Material distributions are derived from assuming Gaussian dispersion confined within sector boundaries according to meteorological data. Dilution factors are compiled by isotopes individually, and gamma dose factors are compiled for a spectrum of energies. These factors are related to a constant population grid according to annual releases and release sources. Multiple source points are allowed.

R. E. Cooper, Integrated Environmental Modeling System for Noble Gas Releases at the Savannah River Plant, DP-MS-73-32, September 1973 (CONF-730915).

MARC will be available through the Argonne Code Center when completed; estimated date is mid-1975.

Distribution: Unlimited.

131 D. W. Hayes & M. R. Buckner **R**
LODIPS, STREAM-RIVER POLLUTANT PREDICTION
PROGRAM

E. I. duPont de Nemours & Co. PMM

Savannah River Lab., Aiken, South Carolina Development

IBM 360/195 FORTRAN IV approx. 300,000 bytes

JOSHUA System

The LODIPS program predicts travel times, concentration, removal rates, and velocities for user-selected pollutant

release situations via coupled-reach routing for streams and rivers. The program includes bulk dispersion, ion exchange, dead zone, and deposition models. Necessary transport coefficients can either be user-supplied or calculated by LODIPS. LODIPS calculates transport coefficients via reach routing of station-to-station time dependent pollutant concentration data using nonlinear least squares techniques.

The program will be made available through the Argonne Code Center in 1975, if requested.

Distribution: Unlimited.

132 M. M. Pendergast **R**
TRAJCLIM, SINGLE TOWER DISPERSION
CLIMATOLOGY

E. I. duPont de Nemours & Co. DBER (50%), PMM (50%)
 Savannah River Lab., Aiken, South Carolina Checkout
 IBM 360/195 FORTRAN IV 225 statements
 70,000 bytes

TRAJCLIM determines a climatology of dispersion using meteorological data obtained at a single tower. Relative dispersion is calculated through use of curved air trajectories derived from sequential wind data and stability categories determined from observed temperature profiles.

T. V. Crawford, et al., Progress Report Dose-To-Man Program, FY-1973, DP-1341, January 1974.

The program will be available through the Argonne Code Center.

Distribution: Unlimited.

133 J. E. Requa, L-60 **P**
TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76
PROGRAM

Lawrence Livermore Laboratory MA

Livermore, California In Use

CDC 7600 ALA76 220 statements

ALA76 is an ALGOL-like language developed at LLL.

The language was used to write a computer program to play

TIC-TAC-TOE. The program should play three games. First

play should alternate between the player and the computer,

with the player getting first move in the first game. After

each game, the results of the game should be printed out.

When all three games have been played, the number of games

won by the player should also be printed out.

The document and program were developed as an

introduction to ALA76 for the FORTRAN programmer and

to illustrate structured programming in ALA76.

J. E. Requa, Structured Programming in ALA76 for the

FORTRAN Programmer, UCID-30093, May 14, 1974.

The reference document contains a program listing.

Distribution: Unlimited.

134 J. A. Leiber & M. L. Wilkins, L-24 **N**
SHEMP, A SERVICE PROGRAM FOR THE HEMP
PROGRAM

Lawrence Livermore Laboratory MA

Livermore, California In Use

CDC 7600 CHAT 2500 cards

29,000 words

HEMP, a computer program which solves the conservation

equations of two-dimensional elastic-plastic flow, producing

as output at specified intervals images of the two-dimensional grids. SHEMP is a computer program that restructures these grids. Restructuring is performed by the insertion, deletion, or remapping of grid elements. The grid is then output for use by the HEMP code. Input-output is accomplished via the accessing of tapes and disk files. Hardcopy output includes printouts and Xerox-Copyflo of 35mm film produced on a dd80 film recorder. In general, SHEMP is accurate to nearly 15 decimal places, the accuracy of the CDC 7600. The typical running time for an average problem is 20 seconds. For an average problem, approximately 10,000 additional words of core and 25,000 words of disk space are allocated.

CHAT is an LLL FORTRAN IV implementation.

E. D. Giroux, HEMP User's Manual, UCRL-51079, Rev. 1, December 17, 1973.

L. A. Leibee, SHEMP--A Service Program for the HEMP Program, UCID-30089, February 19, 1974.

A source tape is available on request from the author.

Distribution: U. S. Only.

135 T. W. Meyer, L-213 W
MAB, SATURATION SPECTROSCOPY DATA REDUCTION
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 7600 FORTRAN IV 831 cards
 135,000 words

The purpose of MAB is to correlate frequency and intensity data files obtained from an experiment, to curve fit this data, and plot the results. The program accepts 4000 point-pairs of data and requires approximately .5 minutes to process the data from an average experimental run. Data is read in from disk using RDK; standard dd80 plotting routines are used for output. The library routines MLR and Curvfit are used to fit the data.

T. W. Meyer, Line Broadening and Collisional Studies of CO₂ Using the Techniques of Saturation Spectroscopy, UCRL-51561, April 9, 1974.

The source listing is included in the reference document.
 Distribution: Unlimited.

136 D. G. West, L-523 T
ALARM, REMOTE ALARM SENSOR MONITORING PROGRAM
 Lawrence Livermore Laboratory DBER
 Livermore, California In Use
 Intel MCS-4 ASSEMBLY 1000 statements

ALARM is a program used to monitor the status of multiple remote alarm sensor units and communicate their status to a central operator. The problem is to provide secure communication of the status of the remote alarm sensors over physically unprotected dedicated telephone lines to a central location. At this central location an operator must be able to change the status of the station concurrent with the change in status at each remote area. The basic technique chosen to solve this problem was a pseudo-random sequence generator. A pseudo-random number is generated at the remote area and transmitted over the telephone lines to the central station. The central station generates a pseudo-random number and compares the two values. Any change in the status of the alarm sensor is used to modify the value of the pseudo-random number generated at the remote area and

thus cause a mismatch with the number generated at the central location. Any tamper of the number while it is being transmitted over the telephone lines will also show as a mismatch and thus an alarm condition. A shift register with nonlinear feedback paths is used to generate this pseudo-random number. The feedback paths determine the nature of the sequence of numbers generated and these paths can be changed at unscheduled intervals and therefore provide a wide range of levels of security. A large number of stages (40) are used in the shift register making the period of the generated sequence so long that it will not repeat under normal operating conditions.

David G. West, Design of a Secure Data Transmission System: An Implementation of Communication Theory Using a Microcomputer, UCRL-51587, May 2, 1974.

The reference contains a program listing.

Distribution: Unlimited.

137 G. D. Sauter, L-340 R
PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION
 Lawrence Livermore Laboratory LLL
 Livermore, California In Use
 CDC 6600/7600 FORTRAN IV 800 statements
 IBM 360 FORTRAN IV 800 statements

Program PAVE (Projection Algorithm for Vehicular Emissions) calculates projected annual vehicular pollutant emissions for an urban area by multiplying appropriate parameters such as new car sales, annual mileage driven, emissions (grams per mile) from individual vehicles, and the degree of emission control. Card input is used for data; results are printed in tabular and graphical form on the line printer. The program running time on the computers listed is less than one minute.

The program has been used to project emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen from automobiles in the San Francisco Bay Area.

G. D. Sauter and W. R. Ott, A Computer Program for Projections of Vehicular Pollutant Emissions in Urban Areas, APCA Journal 24, No. 1, 54-59, January 1974.

The source deck and listing are available from the author on request.

Distribution: Unlimited.

138 R. Quong & J. Baker, L-437 O
NEWP10/PERMEA, PERMEABILITY MEASUREMENTS
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 DEC PDP 9 FOCAL 72 statements

NEWP10/PERMEA is a FOCAL program for a computer-controlled apparatus which measures flow in porous media for determination of permeability. Measurements are made in the Darcy flow regime in small cylindrical samples at variable confining pressures up to 15,000 psi and at water saturations up to 60%. This determines the permeability of materials at simulated *in-situ* conditions. Data acquisition is greatly facilitated through use of a time-shared PDP-9 computer, programmed to control equipment operation and to reduce accumulated data.

R. Quong and J. Baker, Computer-Controlled Apparatus for Permeability Measurements at Confining Pressures up to 1 Kilobar, UCID-30073, May 7, 1974.

The reference contains a program listing.
Distribution: Unlimited.

Curtis M. Geertgens and Edward D. Luebke, Implementing Standard Tape BCD I/O on the MODCOMP Computer, UCID-30085, May 21, 1974.

The assembly language deck is available from the authors upon request.
Distribution: Unlimited.

139 W. W. Bowman & K. W. MacMurdo Z
GAMTAB, RADIOACTIVE DECAY GAMMAS: ENERGY AND ABUNDANCE
E. I. duPont de Nemours & Co. PMM
Savannah River Laboratory, Aiken, South Carolina In Use
IBM 360/195 EBCDIC data 26,871 card-images

The two-part catalog of gamma rays emitted by nuclides in radioactive decay and references presented in the reference are available in machine-readable form. There are three files of EBCDIC 80-character card-image data.

File 1 corresponds to the first part of the catalog; the gamma-ray data are listed in order of increasing energy. The first section of this file covers nuclides with half-lives less than one day. The second section covers nuclides with half-life greater than one day and includes all naturally-occurring radionuclides regardless of length of half-life. Each card-image contains the gamma-ray energy and uncertainty, abundance, half-life, production mode, and the energies of two of the more abundant associated gamma rays.

File 2 corresponds to the second part of the catalog and lists up to 50 of the more abundant gamma rays for each nuclide. The nuclides appear in order of ascending mass number (if equal mass numbers, then ascending atomic number) and the information on successive card images contains for each nuclide the half-life, production mode, possible genetic relationships, and reference keys.

File 3 contains the reference keys as they appear in file 2 together with the associated reference information.

W. W. Bowman and K. W. MacMurdo, Atomic Data and Nuclear Data Tables, 13, 89-292, 1974.

These data are available from the Argonne Code Center as ACC No. 637.

Distribution: Unlimited.

140 C. M. Geertgens & E. D. Luebke, L-307 P
MODCOMP BCD CHARACTER CODE CONVERSION MODIFICATION
Lawrence Livermore Laboratory LLL
Livermore, California In Use
MODCOMP III ASSEMBLER 182 words

The MODCOMP III Digital Computer System is modified to allow the reading and writing of standard BCD tapes. Tapes written in standard Tape BCD code in even parity at 556 and 800 bpi density can be read by the MODCOMP computer. The MODCOMP FORTRAN callable routine SETMAG sets the tape density and parity. SETMAG must be added to the FORTRAN library. It uses about 21,6 words of core. The character code conversion routine is M3MTBCD. This routine must be added to the system at SYSGEN time. It converts the I/O buffer before it is written on output and before the format is interpreted on input. The conversion table used in M3MTBCD can be easily modified to include or exclude any special printing characters. M3MTBCD uses about 95,6 words of core. The programming changes are written in MODCOMP Assembly language.

141 C. Geertgens, L-307 P
MODCOMP III TEKTRONIX 4010 PLOTTING ROUTINES
Lawrence Livermore Laboratory MA
Livermore, California In Use
MODCOMP III F and ASM 8200 words

The plotting routines allow one to plot data curves and write text on the Tektronix 4010 Display Terminal which is a peripheral to the MODCOMP III computer. The data is generated on the MODCOMP computer and stored in memory, on disk, or magnetic tape. The data can be read by a FORTRAN or MODCOMP Assembly language program and the plotting routines can be called to plot the data on the terminal. Many error diagnostic messages exist to assist the user when mistakes are made in giving the calling sequences. The total plotting package is about 2000,6 words, but the whole package need not reside in core at the same time. Often it is beneficial to make the package an overlay and do the plotting all at one time.

C. M. Geertgens, FORTRAN-Callable Tektronix 4010 Plotting Routines for the MODCOMP III Computer, UCID-30075, September 10, 1973.

A source tape containing the plotting routines is available from the author on request.

Distribution: Unlimited.

142 R. D. Neifert & T. P. Wilcox, L-40 C
MORSE-L, MONTE CARLO MULTIGROUP TRANSPORT CODE
Lawrence Livermore Laboratory MA
Livermore, California In Use
CDC 6600 CHAT 12,000 statements

MORSE-L is a Monte Carlo multigroup transport code designed to solve neutron, gamma and coupled neutron-gamma penetration problems in either the forward or adjoint mode. Time-dependence of the calculated fluence is provided and results may also be obtained for energy and angular dependence. Geometrical descriptions may be made using either a one-dimensional spherical model or a generalized three-dimensional model utilizing quadratic surfaces as the interface between adjoining material media. Anisotropic scattering is provided up to any reasonable P_q expansion of the cross sections. Several different albedo materials may be used within the same problem. Monte Carlo techniques are used to solve the usual multigroup form of the Boltzmann transport equation. Survival weighting is employed in all cases and splitting and Russian roulette may be used. The exponential transform method, with path stretching away from or towards a given point, is available on option. Fluence and/or current results are obtained from the random walk by using estimators based upon reaction, predicted reaction, patch length, boundary crossing and point techniques. For the point estimator, an analytic model may be used to describe Compton scattering of gamma rays. Printed results include the standard deviation of the quantity printed while

total integrated responses also include batch results and a W-Test parameter. Most of the problem input is provided on cards using a special free format designed for this code. Cross sections, and related data, may be read from cards and/or a library tape (or disk file). Problem output is provided on the usual printed page, on punched cards and on pictures drawn by using the standard LLL dd80 routines. Disk files are used to store temporary data during problem setup.

MORSE-L is an outgrowth of the ORNL MORSE code combined with the SAMBO analysis package. CHAT is an LLL FORTRAN IV implementation.

E. A. Straker, P. N. Stevens, D. C. Irving, and V. R. Cain, The MORSE Code--A Multigroup Neutron and Gamma-Ray Monte Carlo Transport Code, ORNL-4585, September 1970.

V. R. Cain, SAMBO, A Collision Analysis Package for Monte Carlo Codes, ORNL-TM-3203, September 1, 1970.

A magnetic tape containing the source program and a source listing are available on request from the authors.

Distribution: Government Contract Applications Only.

143 L. Zucconi, L-60 P
PDP8E: A COMPUTER SIMULATOR
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 7600 PUTT 2000 statements

The DEC PDP-8/E computer is simulated by a program that is run on a CDC 7600 via the LLL Octopus time-sharing system. The user, interacting from an Octopus teletypewriter can make use of the simulator's debug features to debug a PDP-8/E code. It is fully interactive and contains helpful debugging features not available on the real PDP-8/E. The simulated PDP-8/E has a simulated teletype with paper tape, and also has extendable (to 32K) memory. It is easily extendable to handle other peripheral devices. The simulator gives informative error messages and PDP-8/E memory dumps. It has a break-point feature and a memory-relative-usage table.

The source code is written for the PUTT compiler on the LLL 7600s. PUTT compiles a version of FORTRAN that is very close to CDC's FORTRAN IV.

Linda Zucconi, Simulator for the PDP-8/E Computer, UCID-30061, May 23, 1973.

A program listing is available on request from the author.
 Distribution: Unlimited.

144 R. J. Kloepping, L-526 O
LIF/RESPONSE, LITHIUM FLUORIDE GAMMA RESPONSE
 Lawrence Livermore Laboratory LLL
 Livermore, California In Use
 CDC 6600 FORTRAN IV 76 statements
 approximately 12,000 words

This code calculates the response of LiF to gamma radiation relative to a standard material for a specified thickness. The method of solution is the calculation of the energy absorbed in Lithium Fluoride, taking into account attenuation, and ratioing this value with that of the standard material. The data are obtained from punched cards, with cross section data being obtained from a master file. The data output is by teletype. The accuracy of the results is directly dependent on the accuracy of the cross section data. The

average computer time for execution is dependent on the complexity of the standard material.

Roger J. Kloepping, The Scintillation Response of Lithium Fluoride, UCRL-51528, February 11, 1974.

The reference document contains a program source listing.

Distribution: Unlimited.

145 R. J. Kloepping, L-526 O
LIF/PLOT, LITHIUM FLUORIDE SPECTRUM PLOTTING
 Lawrence Livermore Laboratory LLL
 Livermore, California In Use
 PDP 11/20 BASIC 145 statements

This code takes a signal spectrum and a background spectrum, plots a log display of signal minus background, integrates the total spectrum, and gives an option of plotting signal or background alone. The method of solution is the subtraction of background from the signal for each of 256 data points. The resultant values are plotted and the entire set integrated. The accuracy of the code is as good as the input data. This code is limited to input from a 256-channel analyzer. The typical total input through plotting time is five minutes. The average storage required is 12K of 16-bit words.

Roger J. Kloepping, The Scintillation Response of Lithium Fluoride, UCRL-51528, February 11, 1974.

The reference document contains a program source listing.

Distribution: Unlimited.

146 C. F. Bender, L-414 U
RECOG: PATTERN RECOGNITION CODE
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 6600/7600 FORTRAN 4000 cards

The code was designed to carry out pattern recognition analyses on large collections of numerical data from experimental chemistry. It provides a number of tested methods from areas of non-parametric pattern recognition: preprocessing, learning and classification. Preprocessing is numerically operating on the data (measurements) in order to change the representation of the information contained in the data, e.g. scaling, weighting, autocorrelation and Fourier transformation. Learning and classification proceed once the transformation is completed and lead directly to the desired results. Both unsupervised learning and supervised learning methods are included along with visual data display facilities for nonlinear mapping and hierarchical Q-mode clustering techniques.

B. R. Kowalski and C. F. Bender, Pattern Recognition. A Powerful Approach to Interpreting Chemical Data, J. Amer. Chem. Soc. 94, 5632-5639 (1972), UCID-16443.

The source program is available on cards, magnetic tape, or as a listing on request from the author.

Distribution: Unlimited.

147 F. D. Knight P
LINEAR LEAST SQUARES FIT WITH STATISTICS
 E. I. duPont de Nemours & Co. PMM
 Savannah River Laboratory, Aiken, South Carolina In Use

IBM 360/195 FORTRAN IV 1000 cards
OS/MVT 200K bytes

This computer program obtains a least squares fit to K sets of observed values ($Y, X_1, X_2, \dots, X_6$) by fitting the following linear form:

$$H(Y) = \sum_{i=1}^n b_i F_i$$

where $H(Y)$ is a selected function of the dependent variable Y , the b_i are the regression coefficients to be determined, and the F_i are selected functions of the independent variables X_j . The program has upper limits of 6 independent variables, 20 terms, and 500 sets of observed data. The following statistics are calculated: the means, standard deviations, pairwise correlations, and the maximum and minimum values of the dependent and independent variables; the regression coefficients b_i and their standard errors; the multiple correlation coefficient, the standard error of estimate, and the ratios of calculated value to the observed value of the selected function of the dependent variable. A plot of the observed value and the calculated value as a function of the first independent variable is also provided under user control.

The model is defined by options selected on a standard input form. Available options include weighting, simple correlation, plotting and fitting of the model and specified model subsets.

F. Delano Knight, Generalized Linear Regression Analysis, DP-1128, February 1968.

This program can be made available through the Argonne Code Center.

Distribution: Unlimited.

148 W. L. Pillinger & G. R. Caskey Q
XDTRAP, GAS DIFFUSION WITH TRAPPING
E. I. duPont de Nemours & Co. MA
Savannah River Lab., Aiken, South Carolina In Use
IBM 300/195 FORTRAN IV 73 statements
98,862 bytes

Several models for diffusion with concurrent trapping have been proposed, some of which were derived under restrictive assumptions or to treat specific problems. A general trapping model adaptable to most boundary and initial conditions and to coordinate systems of interest has been formulated by McNabb and Foster (reference 1). The resulting nonlinear partial differential equations do not have a general analytic solution, although exact solutions may be obtained under some simplifying assumption. An approximate solution for a plane is possible by use of a finite difference scheme. This solution is generally valid over the entire range of the time and space variables, and appears to be stable for many values of the parameters that define the diffusive and trapping characteristics of the system. The solution has been applied to investigate the effects of trapping on hydrogen permeation and evolution, and is generally valid for diffusion with reversible trapping for boundary conditions corresponding to absorption, permeation, evolution, and, also, to any arbitrary initial distributions of diffusing and trapped diffusant for the condition of a concentration-dependent diffusivity.

A. McNabby and P. K. Foster, A New Analysis of the Diffusion of Hydrogen in Iron and Ferritic Steels, Trans. Met. Soc. AIME 227, 618-627 (1963).

George R. Caskey, Jr. and William L. Pillinger, Effect of Trapping on Hydrogen Permeation, DP-MS-73-80, September 1973.

This program can be made available through the Argonne Code Center.

Distribution: Unlimited.

149 B. Howard, L-307 X
DART, SIMULATION OF A FUSION REACTOR ENERGY CONVERTER
Lawrence Livermore Laboratory CTR
Livermore, California In Use
CDC 7600 CHAT 2117 cards

The DART code simulates the behavior of charged particles which leak out of a fusion reactor and are electrically recovered in a direct energy converter. The code has been used to design a laboratory-scale direct energy converter, and a full-scale reactor converter.

In DART, the ion beam is approximated by a finite set of particles with a distribution of starting conditions. The magnetic field of the expander is defined analytically and the electric force field derived from a potential function with both analytic and tabular regions of definition. Both vacuum and space charge potentials are included.

Each ion trajectory is calculated until termination (usually collection on an electrode), and the efficiency of the energy conversion is then determined. When all particles have been run, the weighted average efficiency of the system is computed.

Barry C. Howard, William L. Barr, Ralph W. Moir, DART: A Simulation Code for a Direct Energy Converter for Fusion Reactors, UCRL-51557, May 13, 1974.

The reference document contains a program source listing; program package to be available from the Argonne Code Center.

Distribution: Unlimited.

150 J. W. Stewart K
GRASS, JOSHUA REACTOR ANALYSIS SUBSYSTEM
E. I. duPont de Nemours & Co. PMM
Savannah River Lab., Aiken, South Carolina Checkout
IBM 360/195 FORTRAN IV 34,050 cards
JOSHUA System

GRASS, the Generalized Reactor Analysis Subsystem of the JOSHUA System, provides four basic types of calculations, namely:

1. Static reactor calculation
2. Power flattening calculation
3. Reactor depletion calculation
4. Transient reactor calculation

Reactor physics and engineering models are provided to treat Savannah River reactors in three-dimensional, hexagonal geometry. Physics models are of general applicability. Engineering models are restricted to Savannah River reactors.

REX is the driver module for the GRASS subsystem and controls the sequence of execution of other modules: BRIP, ELPAH, REAM, FARCE, SEAM, SEAMO, CRABER, GRIP, GRIMHX, TRIMHX, TEAM, GRED, XYGEN, GCHECK.

BRIP is the reactor depletion input processing module. BRIP (1) initializes data required during depletion calculation.

tions, (2) updates cross sections as functions of exposure and engineering state variables, and (3) performs conversions between 2D hex and 3D hex-geometries.

ELPAH is the external loop, plenum and assembly hydraulics module. ELPAH is executed by module SEAM for static calculations and by module TEAM for transient calculations. The hydraulics models and geometry used in ELPAH are restricted to Savannah River reactors.

REAM is the assembly thermal module. REAM is executed by module SEAM for static calculations and by module TEAM for transient calculations. The thermal models and geometry used in REAM are restricted to Savannah River reactors.

FARCE is the moderator thermal/hydraulic module executed by module SEAM for static calculations and by TEAM for transient calculations. FARCE uses an extension of potential flow theory to treat one- and two-phase moderator hydraulics and heat transfer. The models and geometry used in FARCE are restricted to Savannah River reactors.

SEAM is the static engineering analysis module which controls the iterative execution of modules ELPAH, REAM, and FARCE. These three modules contain thermal/hydraulic models which are restricted to Savannah River reactors.

SEAMO is the static engineering initialization module which establishes initial estimates of the engineering state variables for Savannah River reactors.

CRABER is the cross section generation module. Fundamental to the GRASS approach is the use of correlated data to represent the dependence of neutronic parameters (e.g. macroscopic and microscopic cross sections) as functions of "independent" reactor state variables (e.g. engineering state variables, exposure, control). Data are generated by the Generalized Lattice Analysis Subsystem and are correlated by module CRAB. Module CRABER processes these correlated data to reconstruct neutronic parameters during GRASS calculations.

GRIP is the reactor input processing module which reads JOSHUA data records created by the user at alphanumeric terminals and reformats the data in large, list-processed records compatible with efficient processing by other GRASS modules.

GRIMHX is the static neutronics module. Module GRIMHX computes the solution of the static few-group neutron diffusion equation in three-dimensional hex-z geometry. Either the direct or adjoint solution can be computed for the following calculations:

1. Multiplication (k_{eff})
2. External Neutron Source
3. Buckling (B_2) Search

In addition, a power flattening algorithm is provided to compute the spatial distribution of control absorber required to produce (as nearly as possible) a specified reactor power shape (or several other power criteria), constrained both by criticality and physically realizable control configurations.

GRIMHX iteratively computes the solution of the spatial finite-difference form of the static few-group neutron diffusion equations. The traditional power iteration method is used. The outer iteration employs a coarse mesh re-balancing procedure with production overrelaxation and extrapolation. The inner iteration uses successive line relaxation with block inversion.

TRIMHX is the transient neutronics module. TRIMHX computes the solution of the transient few-group neutron diffusion equation in three-dimensional hex-z geometry and

time. Transients initiated by perturbations in neutronics parameters (i.e., cross sections) can be analyzed, as well as transients arising from the addition of either a constant or time-dependent external neutron source.

The equations are first reduced to a semi-discrete set of differential equations in time. A change of variables is then performed by means of an exponential transformation. The transformed equations are time differenced using a fully-implicit approximation. The resulting equations are solved iteratively using a successive line-relaxation, block inversion technique for the inner iteration and a coarse-mesh re-balancing technique with fission source over-relaxation for the outer iteration.

TEAM is the transient engineering analysis module which controls the iterative execution of modules ELPAH, REAM, and FARCE.

GRED is the reactor edit module. GRED generates user-selected edits in the form of printed tables and maps, COM-plots, and JOSHUA data records.

XYGEN is an auxiliary data processing module which collects all the data required to define the state of homogeneous or heterogeneous cross section regions. These state data include variables such as temperature, density, exposure, control, etc. The state data thus collected are used by module CRABER to reconstruct neutronic parameters from correlated data.

GCHECK is a convergence-test module which tests for convergence of the iteration between the neutronic calculation and the engineering calculation for fully-coupled static reactor calculations.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

The GRASS subsystem can be made available through the Argonne Code Center.

Distribution: Unlimited.

151 J. W. Stewart F SCRAM/WIGLE, JOSHUA 1-DIMENSIONAL WEIGHTS AND TRANSIENT NEUTRONICS

E. I. duPont de Nemours & Co.

Savannah River Lab., Aiken, South Carolina

IBM 360/195

FORTTRAN IV

JOSHUA System

PMM

In Use

5100 cards

Module SCRAMW is a JOSHUA module which controls the sequential execution of modules SCRAMI and SCRAMSW to compute regionwise statistical weights.

SCRAMI computes initial conditions for the JOSHUA WIGLE module. SCRAMI computes a direct or adjoint solution of the few-group static neutron diffusion equation in one-dimensional geometry (slab, cylindrical, or spherical coordinates). Either a k_{eff} or fixed source problem may be solved.

SCRAMSW is a JOSHUA module which computes regionwise statistical weights which are defined as

$$S \Psi(\vec{r}) \Phi(\vec{r}) dr$$

Region

where $\Phi(\vec{r})$ is the neutron flux and $\Psi(\vec{r})$ is a weighting function (either the direct or adjoint neutron flux). Model SCRAMSW is used in conjunction with module SCRAMI.

Module WIGLE, a JOSHUA version of WIGLE-40, is a one-dimensional, two-group transient neutronics code for slab geometries. Either zero, one, or six delayed neutron families are treated. Initial conditions may be user-specified

or computed using the JOSHUA module SCRAMI. Arbitrary time-dependent perturbations to the neutronic parameters may be specified. A simple energy feedback model is included.

M. E. Rand, WIGLE-40, A Two-Group, Time-Dependent Diffusion Theory Program for the IBM-7040 Computer, IDO-17125, December 1965.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

These modules can be made available through the Argonne Code Center.

Distribution: Unlimited.

152 J. W. Stewart **E**
SWIFT, JOSHUA POINT KINETICS SOLUTION MODULE
 E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina In Use
 IBM 360/195 FORTRAN IV 1900 cards
 JOSHUA System

SWIFT is a JOSHUA module which computes the solution of the few-group point reactor kinetics equations. A time-dependent external neutron source and an arbitrary number of perturbations can be specified. No feedback model is provided. The equations are integrated using the Runge-Kutta-Gill method.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

These modules can be made available through the Argonne Code Center.

Distribution: Unlimited.

153 J. W. Stewart **F**
DISCO/DISC/DISC, JOSHUA 2-DIMENSIONAL SPACE-TIME FLUX CALCULATIONS
 E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina In Use
 IBM 360/195 FORTRAN IV 5225 cards
 JOSHUA System

DISCO is a JOSHUA module which computes initial conditions for the two-dimensional transient modules DISC and DISCD. Module DISCO may be executed by itself or by modules DISC and DISCD. Either XY or RZ geometry and two energy groups are treated.

DISCD computes a solution to the two-group neutron diffusion equation in two-dimensional XY or RZ geometry. Up to six delayed neutron families, a time-dependent external neutron source, and an arbitrary number of cross section perturbations can be treated. Module DISCD is written in double-precision. An analogous single-precision version is provided as module DISC.

DISC computes a solution to the two-group neutron diffusion equation in two-dimensional XY or RZ geometry. Up to six delayed neutron families, a time-dependent external neutron source, and an arbitrary number of cross section perturbations can be treated. Module DISC is written in single-precision.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

These modules can be made available through the Argonne Code Center.

Distribution: Unlimited.

154 J. W. Stewart **N**
RIFLE, JOSHUA RESONANCE INTEGRAL MODIFICATION FACILITY
 E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina In Use
 IBM 360/195 FORTRAN IV 100 cards
 JOSHUA System

Module RIFLE reads resonance integral values from the JOSHUA RILIB data set, applies user-specified multipliers and edits the results to the RILIB data set.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

RIFLE can be made available through the Argonne Code Center.

Distribution: Unlimited.

155 J. W. Stewart **N**
JOSHUA PRINTED EDIT FACILITIES
 E. I. duPont de Nemours & Co. PMM
 Savannah River Lab., Aiken, South Carolina In Use
 IBM 360/195 FORTRAN IV 6200 cards
 JOSHUA System

This summary covers five JOSHUA modules, NUCED, FINED, MULTED, FEWED, and RILED, developed to edit JOSHUA data sets:

Module NUCED produces a printed edit of the JOSHUA NUCPARAM (nuclear parameter) data set.

Module FINED produces a printed edit of the JOSHUA FINEGRP (cross section) data set.

Module MULTED produces a printed edit of the JOSHUA MULTIGRP (cross section) data set.

Module FEWED produces a printed edit of the JOSHUA FEWGRP (cross section) data set.

Module RILED produces a printed edit of the JOSHUA RILIB (resonance integral) data set.

The JOSHUA System, DPSTM-500, Savannah River Laboratory.

These modules can be made available through the Argonne Code Center.

Distribution: Unlimited.

156 J. A. Landt, L-156 **T**
WT-MBA/LLL1B, TIME-DOMAIN ELECTROMAGNETIC RESPONSE OF THIN-WIRE STRUCTURES
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 7600 FORTRAN IV 2000 cards

The thin-wire time-domain computer code will compute the induced currents on, and the radiated or scattered fields from, an arbitrary thin-wire antenna or scatterer which has been excited with a specified, time-varying electric field. The code solves an electric field integral equation that has been reduced by the subsectional collocation version of the method of moments to a form that can be handled on the digital computer as an initial value problem. The program computes a solution by setting up a geometry-dependent matrix that relates the applied electric field to the induced currents and solves the matrix equation as an initial-value problem in time for the time-dependent induced current distribution. The induced currents are then used to find the time-dependent radiated or scattered fields. For the antenna

case, the current at the source segment is computed to some specified time, beyond which it is extrapolated using a frequency and a damping constant obtained from the computed waveform. The discrete Fourier transform is then used to obtain the spectral characteristics of the input admittance and impedance. For both the antenna and the scatterer, the radiated or scattered fields are similarly extrapolated in time and the antenna gain or radar cross-section, normalized to the square of the wavelength, is then obtained using the Fourier transform.

J. A. Landt, E. K. Miller and M. V. Blaricum, WT-MBA/LLL1B: A Computer Program for the Time-Domain Electromagnetic Response of Thin-Wire Structures, UCRL-51585, May 1974.

The reference document contains a program source listing.

Distribution: Unlimited.

**157 H. L. Griffin & H. L. Carlson M
RENUP/RENORD, LIBRARY JOURNAL ORDERING PROGRAM**

Argonne National Laboratory ANL
Argonne, Illinois In Use
IBM 360/195 PL/1, BAL 9000 cards

This system handles the procedures attendant to ordering and renewal of magazine subscriptions. It produces purchase orders, lists of all subscriptions arranged (by): title, subscriptions by library, requesting division, requesting individual, subscriptions due for renewal by library and by requesting individual, subscriptions for which the first issue is due to be received (by library and by individual), bid list, and lists of vendors by vendor code and by name. It does not handle routing of journals, binding, check-in, or claiming. Titles may be of any length and are not constrained to a fixed field; notes and cross-references of variable length are also accommodated. Renewal notification is based on the cover date of the journal, and provision is made for delayed (or advance) notification in relation thereto. Volume numbering is accommodated. Subscriptions may be directed to be mailed to different addresses.

Program documentation and source tape available on request from the author; program package to be available from the Argonne Code Center as ACC No. 642.

Distribution: Unlimited.

**158 L. F. Shampine & M. K. Gordon P
DE/STEP/INTRP, ADAMS INTEGRATOR FOR ODE'S**

Submitted as a private code by Sandia Laboratories
Albuquerque, New Mexico Packaged
ANSI FORTRAN 1100 cards

These codes solve an initial value problem for a system of ordinary differential equations, using a variable-order, variable-step Adams PECE method.

STEP advances the numerical solution of an equation one step. INTRP interpolates the solution and its derivative at output points. DE is a driver to simplify use of the other codes for routine problems. A subroutine MACHIN is used to calculate the unit round off of the machine being used. The only machine-dependent constants are TWOU and FOURU, which are two times and four times the machine's unit round off error U. Because these depend on the machine and the

precision being used, they must be calculated and inserted in DATA statements in STEP and DE before use. ANSI FORTRAN is used in all but two situations.

L. F. Shampine and M. K. Gordon, Computer Solution of Ordinary Differential Equations: The Initial Value Problem, W. H. Freeman & Co., (1974).

The program package will be available from the Argonne Code Center as ACC No. 640.

Distribution: Unlimited.

**159 N. K. Madsen, L-310 P
PDEONE, NONLINEAR PARTIAL DIFFERENTIAL EQUATION INTERFACE**

Lawrence Livermore Laboratory MA
Livermore, California In Use

ANSI FORTRAN 202 statements

PDEONE is a software interface which can eliminate much of the expensive and time-consuming effort involved in the solution of nonlinear partial differential equations. After a user has defined his partial differential equation by writing several additional subroutines, PDEONE provides centered differencing in the spatial variable for time-dependent nonlinear equations. This will yield a system of nonlinear ordinary differential equations which can then be solved by use of general-purpose routines for ordinary differential equations. The routine is portable, efficient, and easy to use.

Niel K. Madsen and Richard F. Sincovec, Software for Nonlinear Partial Differential Equations, UCRL-75658, May 1974.

The program listing is included in the reference report.

Distribution: Unlimited.

**160 J. J. Ratcliffe & M. W. Wells M
JOBSHOP, JOBSHOP ENVIRONMENT SCHEDULING SYSTEM**

Computer Sciences Corporation RLOO
Richland, Washington, Checkout
CDC 6600 FTN 2000 cards

The Jobshop system simulates the operation of a jobshop environment to facilitate the scheduling of the operation. The program takes into account priorities on the tasks to be completed, the time and cost of the separate operators which may perform given operations, operations which may be completed in any order, time periods in which a given operator or job will be available for work, prerequisites for a job (jobs which must be completed before some operation may be performed on a particular job), and returns, costs and profits for each job processed.

Program packages available from author on request.

Distribution: Unlimited.

**161 C. Landau & I. Morvay, L-307 P
RATS, RISOS/ARPA PDP-11 OPERATING SYSTEM**

Lawrence Livermore Laboratory ARPA
Livermore, California Development
DEC PDP-11/45 ASSEMBLER 15,000 statements

RATS is an operating system for the PDP-11/45 designed to solve the problem of controlled sharing of computer resources. It includes a scheduler, for sharing the central

processor among several processes, and a memory and file manager, for sharing storage. Users access the system via interactive terminals connected to the computer either directly or via telephone lines, and they may make use of all of the peripherals attached to the computer. RATS is composed of the following separately assembled programs: the RATS supervisor, a Terminal Handler, a Phone Handler, a Paper Tape Reader Handler, a Line Printer Handler, and a program called EXEC which communicates with the interactive terminals.

RISOS is an ARPA project for Research in Secure Operating Systems.

Charles R. Landau, An Introduction to RATS, UCRL-51582, March 1, 1974.

Documentation, source tape and listing are available from Ivan Morvay.

Distribution: Unlimited.

162 J. R. Lewis M
CUE, PROPERTY ACCOUNTING SYSTEM
 Computer Sciences Corporation RLOO
 Richland, Washington In Use
 CDC 6600 COBOL 6000 statements

The Property Accounting System is designed to provide an inventory of property, and maintain monthly depreciation and use tax accruals and records of rental and maintenance charges on property items. A variable report writing module is available to allow the user flexibility in preparing reports from the data base. This is accomplished through the use of a minimal number of parameter cards.

This package will be available from the Argonne Code Center as ACC No. 644.

Distribution: Unlimited.

163 R. Gunnink & J. B. Niday U
GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 6600 LRLTRAN 5878 cards

The GAMANAL program is primarily intended for complete computer analysis of high-resolution gamma-ray spectra obtained from mixtures of radioactive species such as fission products. For this purpose it examines the pulse-height data for "background" and "peak" regions, fits these peaks with the proper shape functions, and corrects for the effects of geometry, attenuation, and detector efficiency in evaluating the photon emission rate for nonlinearities in the equipment in setting up an energy scale.

These intermediate results are listed and plotted and, if no further data reduction is requested, the program goes on to the next spectrum. Otherwise, it proceeds to search a "library" of decay scheme information in order to make tentative assignments for each of the peaks. This collection of "candidates" is examined for interactions between all the photopeaks of the proposed nuclides and is divided into sets of species which interfere with each other at any point. A least-squares solution of each of the corresponding sets of simultaneous equations is made, and the amounts of various components originally present are calculated and listed, along with their estimated errors.

R. Gunnink and J. B. Niday, Computerized Quantitative Analysis by Gamma-Ray Spectrometry, UCRL-51061, Vol. I A Description of the Gamanal Program, March 1, 1972; Vol. II Source Listing of the Gamanal Program, December 6, 1971; Vol. III A User's Guide to Gamanal, July 8, 1971; and Vol. IV Auxiliary Programs for Gamanal, June 1, 1972.

Source listing is included in Volume II of UCRL-51061.
 Distribution: Unlimited.

164 R. Gunnink & J. B. Niday U
GAMANAL LIBRARY & AUXILIARY ROUTINES
 Lawrence Livermore Laboratory MA
 Livermore, California In Use
 CDC 6600 LRLTRAN 842 cards
 70,000 words

Four small auxiliary programs are used to prepare the decay scheme "library" and to determine the various parameters used to describe the linearity and the efficiency of a system.

1. The EFFICIENCY program fits a polynomial equation to a set of efficiency data for a Ge(Li) detector. The coefficient of the resulting polynomial can then be used to describe the intrinsic efficiency of the detector.

2. The LIBETP program generates a decay-scheme library suitable for GAMANAL and records it on magnetic tape.

3. The LINEARITY program is used to determine the coefficients of the polynomial that best describes the non-linearity of a counting system. The input data can be either pulser-voltages or gamma-ray energies along with the corresponding peak positions in a pulse-height spectrum.

4. The XDET program is used to experimentally determine or to certify the distance from the detector surface to the window.

R. Gunnink and J. B. Niday, Computerized Quantitative Analysis by Gamma-Ray Spectrometry, UCRL-51061, Vol. I A Description of the GAMANAL Program, March 1, 1972; Vol. II Source Listing of the GAMANAL Program, December 6, 1971; Vol. III a User's Guide to Gamanal, July 8, 1971; and Vol. IV Auxiliary Programs for Gamanal, June 1, 1972.

Source listings are included in Volume IV of the reference document.

Distribution: Unlimited.

165 A. J. Smith P
NRTS-IGS GRAPHICS SOFTWARE FOR III FR-80 COM
 Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360/75 F4 and BAL 50K bytes

NRTS-IGS is a graphics software package which is a modification of the SD-4060 IGS and the IGS developed by the Naval Weapons Center at China Lake, California. This package includes polar coordinate 3-D plotting, bar-graphing, and conventional plotting and graphics capabilities. The package allows for all FR-80 capabilities i.e. 64 character sizes, 8 line rotations, 8 line intensities, and 8 line widths. Output is written in FR-80 data format to provide more efficient processing with the FR-80 COM recorder. (The package

currently is incomplete; Aerojet Nuclear Company expects to have the NRTS-IGS package complete and filed at the Argonne Code Center some time in 1975.

Distribution: Unlimited.

166 J. F. Fune C
DISNEL, DIFFUSION ITERATIVE SOLUTION FOR 19 ENERGY LEVELS

Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360/75 FORTRAN IV 256K bytes

DISNEL is a relatively versatile reactor design and analysis code using one-dimensional diffusion theory. As such, it is unsophisticated, and is recommended principally for conceptual design calculations and for relatively routine pre-analysis work for support of reactor operations efforts. The code is a one pass calculation of a reactor, in which the only input required is a description of the reactor. Cross sections are a part of the program, stored on disk. The user, however, also has the option of using his own set of cross sections for some or all the elements, as he chooses.

Distribution: Unlimited.

167 R. W. Shumway H
FLOOD, CORE REFLOODING RATE CALCULATION CODE

Aerojet Nuclear Company RSR
 Idaho Falls, Idaho In Use
 IBM 360/75 FORTRAN IV 200K bytes

FLOOD/MOD1 solves the reactor core reflooding rate by emergency core coolant following a break in the primary coolant system. The rate is determined by equating the hydraulic driving head and the flow pressure drop and placing the resultant equation in the continuity equation. MOD1 version requires that the reactor plan must have 2, 3, or 4 parallel loops.

FLOOD/MOD2 allows one to calculate the core reflooding rate for reactor plants having 2 core vessel outlet legs and 4 core vessel inlet legs.

Distribution: Unlimited.

168 R. L. Curtis B
PHROG2, MULTI-GROUP CROSS SECTIONS, FAST SPECTRUM CALC

Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360 FORTRAN IV 8000 cards
 300K bytes

PHROG2 is a modified version of the PHROG code (ACC Abstract No. 520). The major modification is the calculation in the resolved resonance region. The Nordheim treatment is modified to include overlapping effects between neighboring resonances of a single isotope. The background scatter matrix from the ENDF/B files is stored as separate records on the PHROG library file and to this is added the self-shielded P. and P. scatter matrix calculated from the resonance parameters. The associated library contains a mixture of ENDF/B versions with some data derived from other sources. The library format is not compatible with read statements in the original PHROG code.

R. L. Curtis, F. J. Wheeler, G. L. Singer, R. A. Grimesey, PHROG--A Fortran IV Program to Generate Fast Neutron Spectra and Average Multigroup Constants, IN-1435, April 1971.

Distribution: Unlimited.

169 R. L. Curtis Z
INCITE, THERMAL CROSS SECTIONS - ENDF/B DATA
 Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360 FORTRAN IV 300K bytes

A library for the INCITE code (ACC Abstract No. 565) was prepared with data for several of the ENDF/B isotopes processed by the FLANGE code. This binary data library contains data for 101 energy groups to an upper energy cut-off of 238 eV.

R. L. Curtis and R. A. Grimesey, INCITE--A Fortran IV Program to Generate Thermal Neutron Spectra and Multigroup Constants Using Arbitrary Scattering Kernels, IN-1062, November 1967.

Distribution: Unlimited.

170 R. L. Curtis B
SCRABLE, MULTI-GROUP FAST CONSTANTS - RESONANCE

Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360 FORTRAN IV 5000 cards
 500K bytes

SCRABLE is a modified version of the RABBLE code (ACC Abstract No. 281) for thermal reactors. Inclusion of the DANCOFF JR. code (ACC Abstract No. 150) and the AFCUR code allows a treatment of the unresolved range using average resonance parameters. The code uses the PHROG library tape to obtain input resonance parameters and background cross sections. A maximum of 68 broad groups is allowed.

P. H. Kier and A. A. Robba, RABBLE, A Program for Computation of Resonance Absorption in Multiregion Reactor Cells, ANL-7326, April 1967.

Distribution: Unlimited.

171 G. E. Putnam C
SCAMP, MULTI-GROUP S_n NEUTRON TRANSPORT CODE

Aerojet Nuclear Company RRD
 Idaho Falls, Idaho In Use
 IBM 360 FORTRAN IV 7000 cards
 750K bytes

SCAMP is derived from the TOPIC and MIST codes and performs a multigroup S_n calculation in spherical, cylindrical or slab geometry. Upscatter is allowed in a user-specified number of thermal groups. SCAMP optionally allows a calculation of coalesced broad-group cross sections over specified sets of continuous energy groups and spatial regions. Variable dimensioning in the coding enables one to readily modify the current restrictions of 97 groups, 6 materials, 20 regions and 100 space points.

G. E. Putnam and D. M. Shapiro, MIST--(Multigroup Internuclear Slab Transport), IDO-16856, May 10, 1963.

G. E. Putnam, TOPIC--A FORTRAN Program for Calculating Transport of Particles in Cylinders, IDO-16968, April 1964.

Distribution: Unlimited.

172 R. E. Jones, Div. 2642 I
QMESH/RENUM, SELF-ORGANIZING MESH GENERATION PROGRAM
 Sandia Laboratories MA
 Albuquerque, New Mexico Packaged

CDC 6600 FORTRAN 6300 cards
w/SD4020 plotter 42,000 words
Scope 3.3

QMESH with its companion program, RENUM, is a two-dimensional mesh-generation program intended for use with finite element analysis programs using quadrilateral elements. Bodies to be analyzed are described to QMESH using a flexible, hierarchical system of regions, sides of regions, line segments, and points. Each region of the body is defined by the sequence of nodes on its boundary. A mesh is developed for each region separately, beginning with an initial mesh which is a transformation of a regular grid on the unit square. This initial mesh is then smoothed using one of several techniques, some of which are new, and specially developed automatic "restructuring" techniques are applied to structurally modify the mesh where appropriate to produce improved element shapes. The resulting mesh descriptions for the individual regions are melded into an integrated mesh by the companion program, RENUM, which also performs bandwidth minimization using the Cuthill-McKee algorithm. The result is a tape file, complete with flags for use in applying boundary conditions, in a form suitable for use by finite element analysis programs. Numerous user options are provided for printed and plotted output.

R. E. Jones, QMESH: A Self-Organizing Mesh Generation Program, SLA-73-1088, July 1974.

R. E. Jones, Users Manual for QMESH, a Self-Organizing MESH Generation Program, SLA-74-0239, July 1974.

W. J. Gordon and C. A. Hall, "Construction of Curvilinear Co-ordinate Systems and Applications to Mesh Generation", Intl. J. for Numerical Methods in Engineering, 7, 461-477 (1973).

Alan M. Winslow, 'Equipotential' Zoning of Two-Dimensional Meshes, UCRL-7312, June 1963.

E. Cuthill and J. McKee, Reducing the Bandwidth of Sparse Symmetric Matrices, AML-40-69, June 1969.

R. E. Jones, "A Self-Organizing Mesh Generation Program", ASME J. of Pressure Vessel Technology, August 1974.

This program package will be available from the Argonne Code Center as ACC No. 652.

Distribution: Unlimited.

173 H. K. Clark C
INTERACT, INTERACTION OF FISSILE UNITS
E. I. duPont de Nemours & Co. PMM
Savannah River Laboratory, Aiken, South Carolina In Use
IBM 360/65 FORTRAN IV Approx. 1000 cards

INTERACT computes k_{eff} for groups of fissile units (slabs, cylinders, or spheres) surrounded by a reflector. The required input consists of dimensions and spacings of units, the reflector albedo, the material buckling, the bare extrapolation distance, and the migration area. The program can be limited solely to the calculation of the probability of transfer from one unit to another. These probabilities are calculated on the assumption that the current leaving a surface is uniform and has a cosine angular distribution. Correlated with experimental data, the program is satisfactory for criticality safety evaluations.

H. K. Clark, Interaction of Fissile Units, DP-1031, June 1966.

The source deck is available from the author upon request. The FORTRAN II listing is included in the reference report.

Distribution: Unlimited.

174 M. S. Feldman, H. F. Wren & N. A. Buhl M
COMPUTER PROGRAM FOR LIBRARY BOOK CONTROL
E. I. duPont de Nemours & Co. PMM
Savannah River Laboratory, Aiken, South Carolina In Use
IBM 360/195 COBOL Approx. 5000 cards

This program is a revision of an earlier program published in the reference report, DP-1113. The program generates edits for use in ordering and circulating books and provides bibliographic book lists with cross references. Library data are stored on magnetic tape and read into temporary disk files at execute time. These disk files utilize the COBOL relative organization feature. As many as 29 different report options are available.

N. A. Buhl and Margaret S. Feldman, Computer Programs for Ordering, Listing, and Circulating Library Books, DP-1113, September 1967.

This program package will be made available through the Argonne Code Center.

Distribution: Unlimited.

175 C. R. Tharin M
TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM
E. I. duPont de Nemours & Co. PMM
Savannah River Laboratory, Aiken, South Carolina In Use
IBM 360/195 FORTRAN 3000 cards

TAFI assists in the regulation and inventory control of radioactive fission products that are stored in waste tanks at the Savannah River Plant. The inventories and heat generation rates are computed for isotopes in each waste tank. The program prepares a report that summarizes the data and provides an up-to-date status of the conditions in the waste tanks.

C. R. Tharin, TAFI-II, A Computer Code for Management of Radioactive Waste, DP-966, August 1965.

Distribution: Unlimited.

176 G. A. McLennan I
NUBOW, STRUCTURAL ANALYSIS BOWED REACTOR CORES
Argonne National Laboratory RRD
Argonne, Illinois Packaged
IBM 360/195 FORTRAN IV 721 cards

NUBOW is a new FORTRAN IV computer program for the two-dimensional elastic analysis of reactor core systems, subjected to thermal or mechanical bowing. This program calculates the mechanical equilibrium configuration of the core treating the ducts as elastic beam members. Clearance and local flexibility are allowed at each contact. Required input includes system geometry, contact stiffness, temperature and thermal gradient data. Prebowed shapes may be included as input. Included in the output from the program are the support and contact forces, the final deflected shapes of the beams and the structural reactivity change resulting from the radial fuel displacement. The solution technique utilizes a block relaxation process, adjusting nodal positions until mechanical equilibrium is achieved. The code as written is limited to reactors of up to 16 rows with up to 25 nodes per row.

G. A. McLennan, NUBOW: A FORTRAN IV Program for the Static Elastic Analysis of Bowed Reactor Cores, ANL-8068, April 1974.

This program will be available through the Argonne Code Center as ACC No. 657.

Distribution: Unlimited.

APPENDIX A
PROGRAMS BY SUBJECT CATEGORY

A. CROSS SECTION AND RESONANCE INTEGRAL CALCULATIONS

119	MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS	LASL	7600	F4	MA	U	U	A
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B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS

81	MCN, NEUTRON TRANSPORT MONTE CARLO CODE	LASL	7600	F4	MA	U	U	B
168	PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	360	F4	RRD	U	U	B
170	SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	360	F4	RRD	U	U	B

C. STATIC DESIGN STUDIES

77	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	6600	F	RRD	U	U	C
77	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	360	F	RRD	U	U	C
77	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	7600	F	RRD	U	U	C
142	MORSE-L, MONTE CARLO MULTIGROUP TRANSPORT CODE	LLL	6600	CHAT	MA	U	R	C
166	DISNEL, DIFFUSION SOLUTION 19 ENERGY LEVELS	ANC	360	F4	RRD	U	U	C
171	SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	360	F4	RRD	U	U	C
173	INTERACT, INTERACTION OF FISSILE UNITS	DP	360	F4	PMM	U	U	C

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS

1	ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD	360	F4	MA	U	R	C
102	GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	UILL	360	F4		P	U	C

E. SPACE-INDEPENDENT KINETICS

152	SWIFT, JOSHUA POINT-KINETICS SOLUTION MODULE	DP	360	F4	PMM	U	U	E
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F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS

151	SCRAM./WIGLE, 1D TRANSIENT NEUTRONICS MODULES	DP	360	F4	PMM	U	U	F
153	DISC., JOSHUA 2D SPACE-TIME FLUX CALC MODULES	DP	360	F4	PMM	U	U	F

G. RADIOLOGICAL SAFETY, HAZARD AND ACCIDENT ANALYSIS

80	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	360	F4	MA	U	U	G
80	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	6600	F4	MA	U	U	G
84	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	360	F4	MA	U	U	G
84	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	7600	F4	MA	U	U	G
106	GRONK, DOSE TO MAN FROM REACTOR GAS RELEASES	BNWL	1108	BASIC	RS	U	U	G
107	CRITR, INTERNAL INGESTION DOSE TO ORGANISMS	BNWL	1108	BASIC	RS	U	U	G
108	ARRRG, DOSE TO MAN FROM REACTOR LIQUID RELEASE	BNWL	1108	BASIC	RS	U	U	G
114	COWBACR, WHOLE BODY & CHEST RADIOACTIVITY CALC	DP	812	BASC	PMM	U	U	G

H. HEAT TRANSFER AND FLUID FLOW

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
79	SMAC, INCOMPRESSIBLE FLUID FLOW CALCULATION	LASL	6600	F4	MA	U U H
94	YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL	7600	F4	MA	U U H
123	6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	360	F4	L	P U H
167	FLOOD, CORE REFLOODING RATE CALCULATION ECC	ANC	360	F4	RSR	U U H

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES

2	SLADE, STATIC ANALYSIS OF THIN SHELLS	SLA	6600	F+COM	MA	U R I
98	SLADE D, FINITE ELEMENT DYNAMIC SHELL RESPONSE	SLA	6600	F4	MA	P U I
110	CHILES, LINEAR ELASTIC FINITE ELEMENT ANALYSIS	SLA	6600	F4	MA	U U I
172	QMESHER, SELF-ORGANIZING MESH GENERATION	SLA	6600	F	MA	P U I
176	NUROW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	360	F4	RRD	U U I

J. GAMMA HEATING AND SHIELD DESIGN

82	MCG, GAMMA TRANSPORT MONTE CARLO CODE	LASL	7600	F4	MA	U U J
93	MCP, PHOTON TRANSPORT MONTE CARLO CODE	LASL	7600	F4	MA	U U J

K. REACTOR SYSTEMS ANALYSIS

121	REALLY, GAS TURBINE HTGR TRANSIENT MODEL	GA	1108	F5	RRD	D U K
150	GRASS, THE JOSHUA REACTOR ANALYSIS SUBSYSTEM	DP	360	F4	PMM	C U K

M. DATA MANAGEMENT

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	ALOO	8283	COBOL	MA	U R M
43	MPR PRODUCT RECORD FILE SYSTEM	MHSM	360	C+BAL	MA	U R M
96	MAPPER, PREDICTING MANUFACTURING REQUIREMENTS	GEPI	GETS	BASIC	MA	P U M
99	SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA	1108	F+BAL	MA	P R M
113	FUELPIN, FUEL PIN DATA MANAGEMENT SYSTEM	LASL	7600	F4	MA	D U M
120	MIRROR, INFORMATION RETRIEVAL & REPORTS SYSTEM	MLMO	360	PL/1	MA	P R M
125	RLTRS, RL MAGNETIC TAPE RESERVATION SYSTEM	CSCN	6600	F+COM	RL00	U U M
157	RENUP/RENORD, LIBRARY JOURNAL ORDERING PROGRAM	ANL	360	P+BAL	ANL	U U M
160	JOBSHOP, JOBSHOP ENVIRONMENT SCHEDULING SYSTEM	CSCN	6600	FTN	RL00	U U M
162	CUE, PROPERTY INVENTORY & ACCOUNTING SYSTEM	CSCN	6600	COBOL	RL00	U U M
174	COMPUTER PROGRAM FOR LIBRARY BOOK CONTROL	DP	360	COBOL	PMM	U U M
175	TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM	DP	360	F4	PMM	U U M

N. SUBSIDIARY CALCULATIONS

134	SHEMP, HEMP PROGRAM 2D GRID PROCESSING ROUTINE	LLL	7600	CHAT	MA	U R N
154	RIFLE, JOSHUA RESONANCE INTEGRAL MODIFICATIONS	DP	360	F4	PMM	U U N
155	EDIT MODULES, JOSHUA PRINTED EDIT FACILITIES	DP	360	F4	PMM	U U N

O. EXPERIMENTAL DATA PROCESSING

95	CONFOLD, UNFOLDING SMOOTH CONTINUOUS SPECTRA	LASL	6600	F4	MA	U	U	O
138	NEWPIO/PERMEA, PERMEABILITY MEASUREMENTS	LLL	PDP9	FOCAL	MA	U	U	C
144	LIF/RESPONSE, LITHIUM FLOURIDE GAMMA RESPONSE	LLL	6600	F4	LLL	U	U	O
145	LIF/PLOT, LITHIUM FLOURIDE SPECTRUM PLOTTING	LLL	PD11	BASIC	LLL	U	U	C

P. GENERAL MATHEMATICAL AND COMPUTING SYSTEM ROUTINES

5	PLOT, 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+RAL	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
56	FINDMAP, COMPLEX GREEN'S FUNCTION SUBROUTINE	LASL	6600	F+COM	MA	U	U	P
59	I401, LOAD FORTRAN FORMAT-FREE INPUT DATA	LASL	6600	F4	MA	U	U	P
60	Q409, EXTENDED CORE STORAGE I/O DATA TRANSFER	LASL	6600	F4	MA	U	U	P
61	ARITHMETIC SUBROUTINES CATEGORY A	LASL	6600	F4	MA	U	U	P
62	ELEMENTARY FUNCTION SUBROUTINES CATEGORY B	LASL	6600	COM	MA	U	U	P
63	SUBROUTINES FOR SPECIAL FUNCTIONS CATEGORY C	LASL	6600	F4	MA	U	U	P
64	D301, TRUNCATED BUNEMAN POISSON EQUATION SOLVR	LASL	6600	F	MA	U	U	P
65	SUBROUTINES FOR INTERPOLATION CATEGORY E1	LASL	6600	F4	MA	U	U	P
66	LEAST SQUARES & SMOOTHING ROUTINES CATEGORY E2	LASL	6600	F4	MA	U	U	P
67	VECTOR & MATRIX OPERATION ROUTINES CATEGORY F1	LASL	6600	F4	MA	U	U	P
68	EIGENVALUE & EIGENVECTOR ROUTINES CATEGORY F2	LASL	6600	F4	MA	U	U	P
69	SIMULTANEOUS LINEAR SYSTEMS CATEGORY F4	LASL	6600	F4	MA	U	U	P
70	SPECTRAL ANALYSIS OF TIME SERIES CATEGORY G6	LASL	6600	F4	MA	U	U	P
71	DATA HANDLING & SORTING SUBROUTINES CATEGORY M	LASL	6600	F4	MA	U	U	P
72	N103, ERROR TERMINATION MESSAGE W/COUNT CONTRL	LASL	6600	F4	MA	U	U	P
73	FILE CODE GENERATOR, 6-CHARACTER ALPHANUMERIC	BKCD	360	F4	MA	U	R	P
74	HISTOGRAMS, QUALITY ASSURANCE STATISTICAL CODE	BKCD	360	F4	MA	U	R	P
75	GROUPS COMPARISON, QUALITY CONTROL PROGRAM	BKCD	360	F4	MA	U	R	P
76	GRAPH, REGRESSION & CONFIDENCE INTERVAL CALC.	BKCD	360	F4	MA	U	R	P
97	PICTURE, 3D PLOTTING WITH HIDDEN LINES REMOVED	LASL	6600	F4	MA	U	U	P
101	SETS, SET EQUATION TRANSFORMATION SYSTEM	SLA	6600	FTN	MA	P	R	P
115	DYNSDK, OPTIMAL DISK DATA SET RE-ORDERING	DP	360	F+BAL	PMM	U	U	P
116	SUB/STACKLIB, FORTRAN VECTOR FUNCTION ROUTINES	LLL	7600	F+COM	MA	U	U	P
117	PROM, READ-ONLY MEMORY PROGRAMMING LANGUAGE	LLL	MCS8	ASM	MA	U	U	P
133	TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76	LLL	7600	ALA76	MA	U	U	P
140	MDCOMP BCD CHARACTER CODE CONVERSION FACILITY	LLL	MDCM	ASM	LLL	U	U	P
141	MDCOMP TEKTRONIX 4010 PLOTTING ROUTINES	LLL	MDCM	F+ASM	MA	U	U	P
143	PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600	LLL	7600	PUTT	MA	U	U	P
147	LINEAR LEAST SQUARES FIT WITH STATISTICS	DP	360	F4	PMM	U	U	P
158	DE/STEP/INTRP, ADAMS INTEGRATOR FOR ODE'S	SLA		ANSIF		U	U	P
159	PDEONE, NONLINEAR PARTIAL DIFFERENTIAL EQN AID	LLL		ANSIF	MA	U	U	P
161	RATS, RISOS/ARPA PDP-11 OPERATING SYSTEM	LLL	PD11	ASM	ARPA	D	U	P
165	NRTS-IGS GRAPHICS SOFTWARE FOR III FR-80 COM	ANC	360	F+BAL	RRO	U	U	P

Q. MATERIALS

15	SIMULATION OF STRESS CORROSION CRACKING	SLA	6600	F	MA	U	R	C
16	SURFACE FILM ELLIPSONETER MEASUREMENT ANALYSIS	RFD	360	F4	MA	U	R	C
17	INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD	360	F+BAL	MA	U	R	C
18	CALCULATION OF CRYSTALLOGRAPHIC FUNCTIONS	RFD	360	F4	MA	U	R	C
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
57	INDX, X-RAY POWDER PATTERN INDEXING	LASL	6600	F4	MA	U	U	Q
91	UNFOLD, X-RAY DIFFRACTION PROFILE ANALYSIS	LASL	6600	F4	MA	U	U	Q
100	ISOTAB, PU POWER CALCULATION OF MIXED ISOTOPES	MLMD	360	F4	MA	P	R	C
148	XOTRAP, GAS DIFFUSION WITH TRAPPING	DP	360	F4	MA	U	U	Q

R. ENVIRONMENTAL AND EARTH SCIENCES

19	MODEL-B, FALL AND DISPERSION OF PARTICLES	SLA	3600	F36	MA	U	R	R
109	LEACH, KINETICS OF IN-PLACE LEACHING MODEL	LLL	7600	F	AT	U	R	R
126	NST, 2-1/2 DIMENSION PREDICTION MODELS	DP	360	F4	DBER	C	U	R
127	TRJ, PCINT SOURCE 2D WIND TRAJECTORY PROGRAM	DP	360	F4	DBER	C	U	R
128	VARSCN, VARIABLE SCAN RADIUS UPPER AIR STUDY	DP	360	F4	DBER	C	U	R
129	TETRAD, STREAM TRANSPORT DIFFUSION COEF CALC	DP	360	F4	PMM	C	U	R
130	MARC, MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP	360	F4	PMM	C	U	R
131	LODIPS, STREAM-RIVER POLLUTANT PREDICTION	DP	360	F4	PMM	D	U	R
132	TRAJCLIM, SINGLE TOWER DISPERSION CLIMATOLOGY	DP	360	F4	PMM	C	U	R
137	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	6600	F4	LLL	U	U	R
137	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	360	F4	LLL	U	U	R

S. SPACE SCIENCES

20	HRS017, MULTIPLE REVOLUTION REENTRY	SLA	7040	QUIK	SNS	U	R	S
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	1108	F4	SNS	U	R	S
21	WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA	6600	F4	MA	U	R	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	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	3600	F36	SNS	U	R	S
24	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	6600	F4	SNS	U	R	S
24	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	1108	F4	SNS	U	R	S
24	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA	7044	QUIK	SNS	U	R	S
25	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	7040	QUIK	SNS	U	R	S
25	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	3600	F36	SNS	U	R	S
25	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	6600	F4	SNS	U	R	S
25	HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA	1108	F4	SNS	U	R	S
47	TODDY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA	3600	F36	MA	U	R	S

T. ELECTRONICS AND ENGINEERING EQUIPMENT

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
124	SOL-HOL CONF, CONICAL MONOPOLE ANTENNA CALC	LLL	6600	F	MA	U	R	T
136	ALARM, REMOTE ALARM SENSOR MONITORING PROGRAM	LLL	MCS4	ASM	DBER	U	U	T
156	WT-MBA/LLL18, ELECTROMAGNETIC RESPONSE CALC	LLL	7600	F4	MA	U	U	T

U. CHEMISTRY

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	R	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	U
46	TCHREACT, CHEMICAL REACTOR ANALYSIS PROGRAM	MHSM	360	F4	MA	U	R	U
55	TDF-A, COMPUTING THERMODYNAMIC FUNCTIONS	LASL	6600	F+COM	MA	U	U	U
122	UNICALB, PDP-11 BASIC SPECTROCHEMICAL ANALYSIS	LASL	PD11	BASIC	MA	U	U	U
146	RECOG, PATTERN RECOGNITION ANALYSES	LLL	6600	F	MA	U	U	U
163	GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	LLL	6600	LRL	MA	U	U	U
164	GAMANAL LIBRARY AND AUXILIARY ROUTINES	LLL	6600	LRL	MA	U	U	U

V. PARTICLE ACCELERATORS AND HIGH VOLTAGE MACHINES

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86	HANJON, ELECTRON ENERGY DISTRIBUTION CALC.	LASL	7600	F4	MA	U	U	W
88	CORCOUP, NILSSON CORIOLIS COUPLING PROGRAM	LASL	6600	F4	MA	U	U	W
89	DEGAA, POLYNOMIAL SOLN OF SCHRRODINGER EQUATION	LASL	7600	F4	MA	U	U	W
92	HELGA, ELECTRON & PROTON SCATTERING BY HELIUM	LASL	6600	F4	MA	U	U	W
93	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	7600	F4	MA	U	U	W
93	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	6600	F4	MA	U	U	W
103	LEVEL, ATOMIC-ENERGY-LEVEL VALUES CALCULATION	LASL	6600	F4	MA	P	U	W
104	CALOR, WAVE NUMBERS DERIVED FROM LEVEL VALUES	LASL	6600	F4	MA	P	U	W
105	IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL	6600	F4	MA	U	U	W
111	APW, ENERGY BANDS VIA AUGMENTED PLANE WAVES	LASL	6600	F+COM	MA	U	U	W
112	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	6600	F4	MA	U	U	W
112	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	7600	F4	MA	U	U	W
135	MAB, SATURATION SPECTROSCOPY DATA REDUCTION	LLL	7600	F4	MA	U	U	W

X. CONTROLLED THERMONUCLEAR RESEARCH

85	CBMEXP, CO2 GAS LASER AMPLIFICATION STUDIES	LASL	7600	F4	MA	U	U	X
87	HII, CONTINUITY EQUATION SOLN IN DENSE PLASMA	LASL	7600	F4	MA	U	U	X
118	TIBRO-GENERAL, CHARGED-PARTICLE TRAJECTORIES	LLL	7600	F400	CTR	U	U	X
149	DART, FUSION REACTOR ENERGY CONVERTER MODEL	LLL	7600	CHAT	CTR	U	U	X

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78	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL	6600	F4	MA	U	U	Y
90	ABIGAIL3, ANTIBODY PRODUCTION SIMULATION	LASL	6600	F4	MA	U	U	Y

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				ENERGY CONVERTER MODEL LLL 7600 CHAT CTR U U X \$ DART, FUSION REACTOR	111
				ENERGY DISTRIBUTION CALC. LASL 7600 F4 MA U U W \$ HANJON, ELECTRON	149
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				ENERGY LEVELS AND SPECTRA LASL 6600 F4 MA U U W \$ RCG, ATOMIC	166
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F+BAL MA	P R M \$	SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA 1108	99
F+BAL MA	U R P \$	CONVERSION FROM PAPER TAPE TO CARD OR DISK	RFD 360	8
F+BAL MA	U R Q \$	INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD 360	17
F+BAL PMM	U U P \$	DYNSK, OPTIMAL DISK DATA SET RE-ORDERING	DP 360	115
F+BAL R	U U P \$	IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC 360	11
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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
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F+COM MA	U U P \$	FINDMAP, COMPLEX GREEN'S FUNCTION SUBROUTINE	LASL 6600	56
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F+COM MA	U U U \$	TDF-A, COMPUTING THERMODYNAMIC FUNCTIONS	LASL 6600	55
F+COM MA	U U W \$	APW, ENERGY BANDS VIA AUGMENTED PLANE WAVES	LASL 6600	111
F+COM MA	U U W \$	LASL LENS DESIGN PROGRAM VERSION 2.2	LASL 6600	58
F+COM RLOO	U U M \$	RLTRS, RL MAGNETIC TAPE RESERVATION SYSTEM	CSCN 6600	125
F+LRL MA	U R M \$	TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION	LLL 6600	38
FACILITIES	DP 360	F4 PMM U U N \$ EDIT MODULES, JOSHUA PRINTED EDIT		155
FACILITY	LLL MDCM	ASM LLL U U P \$ MODCOMP BCD CHARACTER CODE C/CONVERSION		140
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FINITE ELEMENT ANALYSIS	SLA 6600	F4 MA	U U I \$ CHILES, LINEAR ELASTIC	110
FINITE ELEMENT DYNAMIC SHELL RESPONSE	SLA 6600	F4 MA	P U I \$ SLADE D,	98
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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
FLOW CALCULATION	LASL 6600	F4 MA	U U H \$ SMAC, INCOMPRESSIBLE FLUID	79
FLUID DYNAMICS	LASL 7600	F4 MA	U U H \$ YAQUI, LAGRANGIAN-EULERIAN	94
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
FLUID FLOW CALCULATION	LASL 6600	F4 MA	U U H \$ SMAC, INCOMPRESSIBLE	79
FLUX CALC MODULES	DP 360	F4 PMM U U F \$	DISC., JOSHUA 2D SPACE-TIME	153
FOCAL MA	U U O \$	NEWPIO/PERMEA, PERMEABILITY MEASUREMENTS	LLL POP9	138
FORMAT-FREE INPUT DATA	LASL 6600	F4 MA	U U P \$ I401, LOAD FORTRAN	59
FORMAT, A TEXT PROCESSING PROGRAM	SLAC 360	F4 R	U U P \$	12
FORTRAN FORMAT-FREE INPUT DATA	LASL 6600	F4 MA	U U P \$ I401, LOAD	59
FORTRAN VECTOR FUNCTION ROUTINES	LLL 7600	F+COM MA	U U P \$ SUB/STACKLIB,	116
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FUEL	CYCLE	ECONOMICS UILL 360 F4	P U D \$ GEM, ANALYSIS OF NUCLEAR		102
FUEL	PIN	DATA MANAGEMENT SYSTEM	LASL 7600 F4	MA D U M \$ FUELPIN,	113
FUELPIN,	FUEL	PIN DATA MANAGEMENT SYSTEM	LASL 7600 F4	MA D U M \$	113
FULL-TEXT	STORAGE,	SEARCH & RETRIEVAL	SLA 1108 F+BAL MA	P R M \$ SPIRAL,	99
FUSION	REACTOR	ENERGY CONVERTER MODEL	LLL 7600 CHAT CTR U U X \$ DART,		149
F1	LASL	6600 F4	MA U U P \$ VECTOR & MATRIX OPERATION ROUTINES CATEGORY		67
F2	MA	U R U \$ RADF, GAS PHASE RADIOLYSIS DATA REDUCTION	RFD	210	31
F2	LASL	6600 F4	MA U U P \$ EIGENVALUE & EIGENVECTOR ROUTINES CATEGORY		68
F36	MA	U R R \$ MODEL-8, 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 \$ TOODY2, 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		P I I D \$ GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	UILL	360	102
F4	LASL	6600 F4	MA U U P \$ SIMULTANEOUS LINEAR SYSTEMS CATEGORY		69
F4	DBER	C U R \$ NST, 2-1/2 DIMENSION PREDICTION MODELS	DP	360	126
F4	DBER	C U R \$ TRJ, POINT SOURCE 2D WIND TRAJECTORY PROGRAM	DP	360	127
F4	DBER	C U R \$ VARSCN, VARIABLE SCAN RADIUS UPPER AIR STUDY	DP	360	128
F4	L	P U H \$ 6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	360	123
F4	LLL	U U O \$ LIF/RESPONSE, LITHIUM FLOURIDE GAMMA RESPONSE	LLL	6600	144
F4	LLL	U U R \$ PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	360	137
F4	LLL	U U R \$ PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	6600	137
F4	MA	D R P \$ BES, CYLINDRICAL BESSEL FUNCTION EVALUATION	SLA	6600	53
F4	MA	D R P \$ GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	SLA	PD10	52
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	D U M \$ FUELPIN, FUEL PIN DATA MANAGEMENT SYSTEM	LASL	7600	113
F4	MA	P R Q \$ ISOTAB, PU POWER CALCULATION OF MIXED ISOTOPES	MLMO	360	100
F4	MA	P U I \$ SLADE D, FINITE ELEMENT DYNAMIC SHELL RESPONSE	SLA	6600	98
F4	MA	P U W \$ CALOR, WAVE NUMBERS DERIVED FROM LEVEL VALUES	LASL	6600	104
F4	MA	P U W \$ LEVEL, ATOMIC-ENERGY-LEVEL VALUES CALCULATION	LASL	6600	103
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, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	6600	51
F4	MA	U R P \$ FILE CODE GENERATOR, 6-CHARACTER ALPHANUMERIC	BKCD	360	73
F4	MA	U R P \$ GRAPH, REGRESSION & CONFIDENCE INTERVAL CALC.	BKCD	360	76
F4	MA	U R P \$ GROUPS COMPARISON, QUALITY CONTROL PROGRAM	BKCD	360	75
F4	MA	U R P \$ HISTOGRAMS, QUALITY ASSURANCE STATISTICAL CODE	BKCD	360	74
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	MA	U U A \$	MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS	LASL	7600	119
F4	MA	U U B \$	MCN, NEUTRON TRANSPORT MONTE CARLO CODE	LASL	7600	81
F4	MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	360	84
F4	MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	7600	84
F4	MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	360	80
F4	MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	6600	80
F4	MA	U U H \$	SMAC, INCOMPRESSIBLE FLUID FLOW CALCULATION	LASL	6600	79
F4	MA	U U H \$	YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL	7600	94
F4	MA	U U I \$	CHILES, LINEAR ELASTIC FINITE ELEMENT ANALYSIS	SLA	6600	110
F4	MA	U U J \$	MCG, GAMMA TRANSPORT MONTE CARLO CODE	LASL	7600	82
F4	MA	U U J \$	MCP, PHOTON TRANSPORT MONTE CARLO CODE	LASL	7600	83
F4	MA	U U O \$	CONFOLD, UNFOLDING SMOOTH CONTINUOUS SPECTRA	LASL	6600	95
F4	MA	U U P \$	ARITHMETIC SUBROUTINES CATEGORY A	LASL	6600	61
F4	MA	U U P \$	DATA HANDLING & SORTING SUBROUTINES CATEGORY M	LASL	6600	71
F4	MA	U U P \$	EIGENVALUE & EIGENVECTOR ROUTINES CATEGORY F2	LASL	6600	68
F4	MA	U U P \$	I401, LOAD FORTRAN FORMAT-FREE INPUT DATA	LASL	6600	59
F4	MA	U U P \$	LEAST SQUARES & SMOOTHING ROUTINES CATEGORY E2	LASL	6600	66
F4	MA	U U P \$	N103, ERROR TERMINATION MESSAGE W/COUNT CONTRL	LASL	6600	72
F4	MA	U U P \$	PICTURE, 3D PLOTTING WITH HIDDEN LINES REMOVED	LASL	6600	97
F4	MA	U U P \$	Q409, EXTENDED CORE STORAGE I/O DATA TRANSFER	LASL	6600	60
F4	MA	U U P \$	SIMULTANEOUS LINEAR SYSTEMS CATEGORY F4	LASL	6600	69
F4	MA	U U P \$	SPECTRAL ANALYSIS OF TIME SERIES CATEGORY G6	LASL	6600	70
F4	MA	U U P \$	SUBROUTINES FOR INTERPOLATION CATEGORY E1	LASL	6600	65
F4	MA	U U P \$	SUBROUTINES FOR SPECIAL FUNCTIONS CATEGORY C	LASL	6600	63
F4	MA	U U P \$	VECTOR & MATRIX OPERATION ROUTINES CATEGORY F1	LASL	6600	67
F4	MA	U U Q \$	INDX, X-RAY POWDER PATTERN INDEXING	LASL	6600	57
F4	MA	U U Q \$	UNFOLD, X-RAY DIFFRACTION PROFILE ANALYSIS	LASL	6600	91
F4	MA	U U Q \$	XDTRAP, GAS DIFFUSION WITH TRAPPING	DP	360	148
F4	MA	U U T \$	WT-MBA/LLL1B, ELECTROMAGNETIC RESPONSE CALC	LLL	7600	156
F4	MA	U U W \$	CORCOUP, NILSSON CORIOLIS COUPLING PROGRAM	LASL	6600	88
F4	MA	U U W \$	DEGAA, POLYNOMIAL SOLN OF SCHRODINGER EQUATION	LASL	7600	89
F4	MA	U U W \$	HANJON, ELECTRON ENERGY DISTRIBUTION CALC.	LASL	7600	86
F4	MA	U U W \$	HELGAS, ELECTRON & PROTON SCATTERING BY HELIUM	LASL	6600	92
F4	MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	6600	93
F4	MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	7600	93
F4	MA	U U W \$	IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL	6600	105
F4	MA	U U W \$	MAB, SATURATION SPECTROSCOPY DATA REDUCTION	LLL	7600	135
F4	MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	6600	112
F4	MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	7600	112
F4	MA	U U X \$	CBMEXP, CO2 GAS LASER AMPLIFICATION STUDIES	LASL	7600	85
F4	MA	U U X \$	HII, CONTINUITY EQUATION SOLN IN DENSE PLASMA	LASL	7600	87
F4	MA	U U Y \$	ABIGAIL3, ANTIBODY PRODUCTION SIMULATION	LASL	6600	90
F4	MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL	1108	78
F4	MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL	6600	78
F4	PMM	C U K \$	GRASS, THE JOSHUA REACTOR ANALYSIS SUBSYSTEM	DP	360	150
F4	PMM	C U R \$	MARC, MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP	360	130
F4	PMM	C U R \$	TETRAD, STREAM TRANSPORT DIFFUSION COEF CALC	DP	360	129
F4	PMM	C U R \$	TRAJCLIM, SINGLE TOWER DISPERSION CLIMATOLOGY	DP	360	132
F4	PMM	D U R \$	LODIPS, STREAM-RIVER POLLUTANT PREDICTION	DP	360	131
F4	PMM	U U C \$	INTERACT, INTERACTION OF FISSILE UNITS	DP	360	173
F4	PMM	U U E \$	SWIFT, JOSHUA POINT-KINETICS SOLUTION MODULE	DP	360	152
F4	PMM	U U F \$	DISC., JOSHUA 2D SPACE-TIME FLUX CALC MODULES	DP	360	153
F4	PMM	U U F \$	SCRAM./WIGLE, 1D TRANSIENT NEUTRONICS MODULES	DP	360	151
F4	PMM	U U M \$	TAFI, RADICACTIVE WASTE MANAGEMENT PROGRAM	DP	360	175
F4	PMM	U U N \$	EDIT MODULES, JOSHUA PRINTED EDIT FACILITIES	DP	360	155
F4	PMM	U U N \$	RIFLE, JOSHUA RESONANCE INTEGRAL MODIFICATIONS	DP	360	154
F4	PMM	U U P \$	LINEAR LEAST SQUARES FIT WITH STATISTICS	DP	360	147
F4	R	U U P \$	FORMAT, A TEXT PROCESSING PROGRAM	SLAC	360	12
F4	RRD	U U B \$	PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	360	168

F4	RRD	U U B	\$ SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	360	170
F4	RRD	U U C	\$ DISNEL, DIFFUSION SOLUTION 19 ENERGY LEVELS	ANC	360	166
F4	RRD	U U C	\$ SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	360	171
F4	RRD	U U I	\$ NJBOW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	360	176
F4	RSR	U U H	\$ FLOOD, CORE REFLOODING RATE CALCULATION ECC	ANC	360	167
F4	SNS	U R 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
F400	CTR	U U X	\$ TIBRO-GENERAL, CHARGED-PARTICLE TRAJECTORIES	LLL	7600	118
F5	RRD	D U K	\$ REALLY, GAS TURBINE HTGR TRANSIENT MODEL	GA	1108	121
F63	MA	U R P	\$ AVINT, INTEGRATION OF TABULATED DATA	SLA	3600	50
GA	1108	F5	RRD U U K \$ REALLY, GAS TURBINE HTGR TRANSIENT MODEL			121
			GAMANAL LIBRARY AND AUXILIARY ROUTINES	LLL	6600	LRL MA U U U \$
			GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	LLL	6600	LRL MA U U U \$
			GAMMA RAY CATALOG DP 360 EBCDI PMM U U Z \$ GAMTAB, RADIOACTIVE DECAY			139
			GAMMA RESPONSE LLL 6600 F4 LLL U U O \$ LIF/RESPONSE, LITHIUM FLUORIDE			144
			GAMMA TRANSPORT MONTE CARLO CODE LASL 7600 F4 MA U U J \$ MCG,			82
			GAMMA-RAY SPECTRA LLL 6600 LRL MA U U U \$ GAMANAL, INTERPRETATION OF			163
			GAMTAB, RADIOACTIVE DECAY GAMMA RAY CATALOG DP 360 EBCDI PMM U U Z \$			139
			GAS DIFFUSION WITH TRAPPING DP 360 F4 MA U U Q \$ XDTRAP,			148
			GAS LASER AMPLIFICATION STUDIES LASL 7600 F4 MA U U X \$ CBMEXP, CO2			85
			GAS PHASE RADIOLYSIS DATA REDUCTION RFD 210 F2 MA U R U \$ RADF,			31
			GAS PHASE RADIOLYSIS DATA REDUCTION RFD 360 F4 MA U R U \$ RADF-2,			31
			GAS RELEASES BNWL 1108 BASIC RS U U G \$ GRONK, DOSE TO MAN FROM REACTOR			106
			GAS TURBINE HTGR TRANSIENT MODEL GA 1108 F5 RRD D U K \$ REALLY,			121
			GAS-GAS & GAS-SOLID REACTION DATA REDUCTION RFD 360 F4 MA U R U \$			32
			GAS-SOLID REACTION DATA REDUCTION RFD 360 F4 MA U R U \$ GAS-GAS &			32
			GASES BY MASS SPECTROMETRY RFD 400 F MA U R U \$ DYNAMIC ANALYSIS OF			33
			GASES ON SOLID SURFACE RFD 360 F4 MA U R U \$ STICKING PROBABILITY OF			35
			GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM GEPI 435 COBOL MA U R M \$			39
			GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS UILL 360 F4 P U D \$			102
			GENERATOR, 6-CHARACTER ALPHANUMERIC BKCD 360 F4 MA U R P \$ FILE CODE			73
			GEOGRAPHIC EVENT POSITIONING SLA 3600 F36 MA U R S \$ SATLOC, SATELLITE			23
			GEPI 435 COBOL MA U R M \$ GE MEDICAL INSURANCE REIMBURSEMENT SYSTEM			39
			GEPI GETS BASIC MA P U M \$ MAPPER, PREDICTING MANUFACTURING REQUIREMENTS			96
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA PD10 F4 MA D R P \$			52
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA 1108 F4 MA D R P \$			52
			GERBER SERIES 1200 & 2000 PLOTTING PACKAGE SLA 6600 F4 MA D R P \$			52
			GERBER 2000 RFD 360 F4 MA U R P \$ PLOT, AUTOMATIC PLOTTING FOR THE			14
			GETS BASIC MA P U M \$ MAPPER, PREDICTING MANUFACTURING REQUIREMENTS GEPI			96
			GRAPH, REGRESSION & CONFIDENCE INTERVAL CALC. BKCD 360 F4 MA U R P \$			76
			GRAPHICS SOFTWARE FOR III FR-80 COM ANC 360 F+BAL RRD U U P \$ NRTS-IGS			165
			GRASS, THE JOSHUA REACTOR ANALYSIS SUBSYSTEM DP 360 F4 PMM C U K \$			150
			GREEN'S FUNCTION SUBROUTINE LASL 6600 F+COM MA U U P \$ FINDMAP, COMPLEX			56
			GRID PROCESSING ROUTINE LLL 7600 CHAT MA U P N \$ SHEMP, HEMP PROGRAM 2D			134
			GRONK, DOSE TO MAN FROM REACTOR GAS RELEASES BNWL 1108 BASIC RS U U G \$			106
			GROUPS COMPARISON, QUALITY CONTROL PROGRAM BKCD 360 F4 MA U R P \$			75
			GROWTH OF NUCLIDES RFD 360 F4 MA U R D \$ ISOGEN, RADIOACTIVE DECAY			1
			GUN DESIGN PROGRAM SLAC 360 PL/1 R U U V \$ SLAC ELECTRON			36
			G6 LASL 6600 F4 MA U U P \$ SPECTRAL ANALYSIS OF TIME SERIES CATEGORY			70
			HANDLING & SORTING SUBROUTINES CATEGORY M LASL 6600 F4 MA U U P \$ DATA			71
			HANJON, ELECTRON ENERGY DISTRIBUTION CALC. LASL 7600 F4 MA U U W \$			86
			HEATUP CODE FOR BWR/6 ANALYSIS EI 360 F4 L P U H \$ 6KILER, CORE			123
			HELGAS, ELECTRON & PROTON SCATTERING BY HELIUM LASL 6600 F4 MA U U W \$			92
			HELIUM LASL 6600 F4 MA U U W \$ HELGAS, ELECTRON & PROTON SCATTERING BY			92
			HEMP PROGRAM 2D GRID PROCESSING ROUTINE LLL 7600 CHAT MA U R N \$ SHEMP,			134
			HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE LASL 6600 F4 MA U U W \$ HERSKL,			93
			HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE LASL 7600 F4 MA U U W \$ HERSKL,			93

HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL 6600 F4	MA	U U W \$	93
HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL 7600 F4	MA	U U W \$	93
HIDDEN LINES REMOVED	LASL 6600 F4	MA	U U P \$ PICTURE, 3D PLOTTING WITH	97
HII, CONTINUITY EQUATION SOLN IN DENSE PLASMA	LASL 7600 F4	MA	U U X \$	87
HISTOGRAMS, QUALITY ASSURANCE STATISTICAL CODE	BKCD 360 F4	MA	U R P \$	74
HR5004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA 1108 F4	SNS	U R S \$	24
HR5004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA 3600 F36	SNS	U R S \$	24
HR5004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA 6600 F4	SNS	U R S \$	24
HR5004, REENTRY PARAMETERS OF DECAYING OBJECTS	SLA 7044 QUIK	SNS	U R S \$	24
HR5015, BALLISTIC COEFFICIENT COMPUTATION	SLA 1108 F4	SNS	U R S \$	25
HR5015, BALLISTIC COEFFICIENT COMPUTATION	SLA 3600 F36	SNS	U R S \$	25
HR5015, BALLISTIC COEFFICIENT COMPUTATION	SLA 6600 F4	SNS	U R S \$	25
HR5015, BALLISTIC COEFFICIENT COMPUTATION	SLA 7040 QUIK	SNS	U R S \$	25
HR5017, MULTIPLE REVOLUTION REENTRY	SLA 1108 F4	SNS	U R S \$	20
HR5017, MULTIPLE REVOLUTION REENTRY	SLA 3600 F4	SNS	U R S \$	20
HR5017, MULTIPLE REVOLUTION REENTRY	SLA 6600 F4	SNS	U R S \$	20
HR5017, MULTIPLE REVOLUTION REENTRY	SLA 7040 QUIK	SNS	U R S \$	20
HTGR TRANSIENT MODEL	GA 1108 F5	RRD	D U K \$ REALLY, GAS TURBINE	121
HYDRODYNAMIC CALCULATIONS	LASL 360 F4	MA	U U G \$ SIN, ONE-DIMENSIONAL	80
HYDRODYNAMIC CALCULATIONS	LASL 6600 F4	MA	U U G \$ SIN, ONE-DIMENSIONAL	80
I/O DATA TRANSFER	LASL 6600 F4	MA	U U P \$ Q409, EXTENDED CORE STORAGE	60
IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC 360 F+BAL R	U U P \$		11
III FR-80 COM	ANC 360 F+BAL	RRD	U U P \$ NRTS-IGS GRAPHICS SOFTWARE FOR	165
IN-PLACE LEACHING MODEL	LLL 7600 F	AT	U R R \$ LEACH, KINETICS OF	109
INCITE LIBRARY, THERMAL X-SECTIONS ENDF/B DATA	ANC 360 BIN	RRD	U U Z \$	169
INCOMPRESSIBLE FLUID FLOW CALCULATION	LASL 6600 F4	MA	U U H \$ SMAC,	79
INDEX, X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD 360 F+BAL	MA	U R Q \$	17
INDEXING	LASL 6600 F4	MA	U U Q \$ INDX, X-RAY POWDER PATTERN	57
INDEXING	RFD 360 F+BAL	MA	U R Q \$ INDEX, X-RAY POWDER PATTERN CRYSTAL	17
INDX, X-RAY POWDER PATTERN INDEXING	LASL 6600 F4	MA	U U Q \$	57
INERTIA CALCULATION	MHSM 360 F4	MA	U R T \$ ELEMENTAL MOMENT OF	41
INFORMATION RETRIEVAL & REPORTS SYSTEM	MLMO 360 PL/1	MA	P R M \$ MIRROR,	120
INGESTION DOSE TO ORGANISMS	BNWL 1108 BASIC RS	U U G \$	CRITR, INTERNAL	107
INPUT DATA	LASL 6600 F4	MA	U U P \$ I401, LOAD FORTRAN FORMAT-FREE	59
INSURANCE REIMBURSEMENT SYSTEM	GEPI 435 COBOL	MA	U R M \$ GE MEDICAL	39
INTEGRATION OF TABULATED DATA	SLA 3600 F63	MA	U R P \$ AVINT,	50
INTEGRATION OF TABULATED DATA	SLA 6600 F4	MA	U R P \$ AVINT,	50
INTEGRATION ROUTINE	SLA 6600 F+COM	MA	D R P \$ RUNKUT, RUNGE-KUTTA ODE	26
INTEGRATOR FOR ODE'S	SLA	ANSIF	U U P \$ DE/STEP/INTRP, ADAMS	158
INTERACT, INTERACTION OF FISSILE UNITS	DP 360 F4	PMM	U U C \$	173
INTERACTION MODELING	LASL 1108 F4	MA	U U Y \$ BIOTA2, BIOME POPULATION	78
INTERACTION MODELING	LASL 6600 F4	MA	U U Y \$ BIOTA2, BIOME POPULATION	78
INTERACTION OF FISSILE UNITS	DP 360 F4	PMM	U U C \$ INTERACT,	173
INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA 3100 COM	MA	U R P \$	13
INTERACTIVE SIMULATOR ON THE CDC7600	LLL 7600 PUTT	MA	U U P \$ PDP-8E,	143
INTERNAL INGESTION DOSE TO ORGANISMS	BNWL 1108 BASIC RS	U U G \$	CRITR,	107
INTERPOLATION CATEGORY E1	LASL 6600 F4	MA	U U P \$ SUBROUTINES FOR	65
INTERPRETATION OF GAMMA-RAY SPECTRA	LLL 6600 LRL	MA	U U U \$ GAMANAL,	163
INTERVAL CALC.	BKCD 360 F4	MA	U R P \$ GRAPH, REGRESSION & CONFIDENCE	76
INVENTORY & ACCOUNTING SYSTEM	CSCN 6600 COBOL	RLOO	U U M \$ CUE, PROPERTY	162
ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD 360 F4	MA	U R D \$	1
ISOTAB, PU POWER CALCULATION OF MIXED ISOTOPES	MLMO 360 F4	MA	P R Q \$	100
ISOTOPES	MLMO 360 F4	MA	P R Q \$ ISOTAB, PU POWER CALCULATION OF MIXED	100
IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL 6600 F4	MA	U U W \$	105
ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL 6600 F4	MA	U U W \$ IT,	105
I401, LOAD FORTRAN FORMAT-FREE INPUT DATA	LASL 6600 F4	MA	U U P \$	59
JOBSHOP ENVIRONMENT SCHEDULING SYSTEM	CSCN 6600 FTN	RLOO	U U M \$ JOBSHOP,	160
JOBSHOP, JOBSHOP ENVIRONMENT SCHEDULING SYSTEM	CSCN 6600 FTN	RLOO	U U M \$	160
JOSHUA POINT-KINETICS SOLUTION MODULE	DP 360 F4	PMM	U U E \$ SWIFT,	152
JOSHUA PRINTED EDIT FACILITIES	DP 360 F4	PMM	U U N \$ EDIT MODULES,	155
JOSHUA REACTOR ANALYSIS SUBSYSTEM	DP 360 F4	PMM	C U K \$ GRASS, THE	150
JOSHUA RESONANCE INTEGRAL MODIFICATIONS	DP 360 F4	PMM	U U N \$ RIFLE,	154

JOSHUA 2D SPACE-TIME FLUX CALC MODULES	DP	360	F4	PMH	U U F \$ DISC.,	153
JOURNAL ORDERING PROGRAM ANL	360	P+BAL	ANL	U U M \$	RENUP/RENORD, LIBRARY	157
KINETICS	RFD	360	F4	MA	U R U \$ ERLF, SPECTROPHOTOMETRIC REACTION	30
KINETICS OF IN-PLACE LEACHING MODEL	LLL	7600	F	AT	U R R \$ LEACH,	109
LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL	7600	F4	MA	U U H \$ YAQUI,	94
LANGUAGE	LLL	MCS8	ASM	MA	U U P \$ PROM, READ-ONLY MEMORY PROGRAMMING	117
LAPLACE EQUATION SIMULATION STUDY	SLA	6600	F4	MA	U R T \$ FFEARS,	29
LASER AMPLIFICATION STUDIES	LASL	7600	F4	MA	U U X \$ CBMEXP, CO2 GAS	85
LASL	360	F	RRD	U U C \$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	77
LASL	360	F4	MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	84
LASL	360	F4	MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	80
LASL LENS DESIGN PROGRAM VERSION 2.2	LASL	6600	F+COM	MA	U U W \$	58
LASL PD11 BASIC	MA	U U U \$	UNICALB, PDP-11 BASIC SPECTROCHEMICAL ANALYSIS			122
LASL	1108	F4	MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	78
LASL	6600	COM	MA	U U P \$	ELEMENTARY FUNCTION SUBROUTINES CATEGORY B	62
LASL	6600	F	MA	U U P \$	D301, TRUNCATED BUNEMAN POISSON EQUATION SOLVR	64
LASL	6600	F	RRD	U U C \$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	77
LASL	6600	F+COM	MA	U U P \$	FINDMAP, COMPLEX GREEN'S FUNCTION SUBROUTINE	56
LASL	6600	F+COM	MA	U U U \$	TDF-A, COMPUTING THERMODYNAMIC FUNCTIONS	55
LASL	6600	F+COM	MA	U U W \$	APW, ENERGY BANDS VIA AUGMENTED PLANE WAVES	111
LASL	6600	F+COM	MA	U U W \$	LASL LENS DESIGN PROGRAM VERSION 2.2	58
LASL	6600	F4	MA	P U W \$	CALOR, WAVE NUMBERS DERIVED FROM LEVEL VALUES	104
LASL	6600	F4	MA	P U W \$	LEVEL, ATOMIC-ENERGY-LEVEL VALUES CALCULATION	103
LASL	6600	F4	MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	80
LASL	6600	F4	MA	U U H \$	SMAC, INCOMPRESSIBLE FLUID FLOW CALCULATION	79
LASL	6600	F4	MA	U U O \$	CONFOLD, UNFOLDING SMOOTH CONTINUOUS SPECTRA	95
LASL	6600	F4	MA	U U P \$	ARITHMETIC SUBROUTINES CATEGORY A	61
LASL	6600	F4	MA	U U P \$	DATA HANDLING & SORTING SUBROUTINES CATEGORY M	71
LASL	6600	F4	MA	U U P \$	EIGENVALUE & EIGENVECTOR ROUTINES CATEGORY F2	68
LASL	6600	F4	MA	U U P \$	I401, LOAD FORTRAN FORMAT-FREE INPUT DATA	59
LASL	6600	F4	MA	U U P \$	LEAST SQUARES & SMOOTHING ROUTINES CATEGORY E2	66
LASL	6600	F4	MA	U U P \$	N103, ERROR TERMINATION MESSAGE W/COUNT CONTRL	72
LASL	6600	F4	MA	U U P \$	PICTURE, 3D PLOTTING WITH HIDDEN LINES REMOVED	97
LASL	6600	F4	MA	U U P \$	Q409, EXTENDED CORE STORAGE I/O DATA TRANSFER	60
LASL	6600	F4	MA	U U P \$	SIMULTANEOUS LINEAR SYSTEMS CATEGORY F4	69
LASL	6600	F4	MA	U U P \$	SPECTRAL ANALYSIS OF TIME SERIES CATEGORY G6	70
LASL	6600	F4	MA	U U P \$	SUBROUTINES FOR INTERPOLATION CATEGORY E1	65
LASL	6600	F4	MA	U U P \$	SUBROUTINES FOR SPECIAL FUNCTIONS CATEGORY C	63
LASL	6600	F4	MA	U U P \$	VECTOR & MATRIX OPERATION ROUTINES CATEGORY F1	67
LASL	6600	F4	MA	U U Q \$	INDX, X-RAY POWDER PATTERN INDEXING	57
LASL	6600	F4	MA	U U Q \$	UNFOLD, X-RAY DIFFRACTION PROFILE ANALYSIS	91
LASL	6600	F4	MA	U U W \$	CORCOUP, NILSSON CORIOLIS COUPLING PROGRAM	88
LASL	6600	F4	MA	U U W \$	HELGA, ELECTRON & PROTON SCATTERING BY HELIUM	92
LASL	6600	F4	MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	93
LASL	6600	F4	MA	U U W \$	IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	105
LASL	6600	F4	MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	112
LASL	6600	F4	MA	U U Y \$	ABIGAIL3, ANTIBODY PRODUCTION SIMULATION	90
LASL	6600	F4	MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	78
LASL	7600	F	RRD	U U C \$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	77
LASL	7600	F4	MA	D U M \$	FUELPIN, FUEL PIN DATA MANAGEMENT SYSTEM	113
LASL	7600	F4	MA	U U A \$	MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS	119
LASL	7600	F4	MA	U U B \$	MCN, NEUTRON TRANSPORT MONTE CARLO CODE	81
LASL	7600	F4	MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	84
LASL	7600	F4	MA	U U H \$	YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	94
LASL	7600	F4	MA	U U J \$	MCG, GAMMA TRANSPORT MONTE CARLO CODE	82
LASL	7600	F4	MA	U U J \$	MCP, PHOTON TRANSPORT MONTE CARLO CODE	83
LASL	7600	F4	MA	U U W \$	DEGAA, POLYNOMIAL SOLN OF SCHRODINGER EQUATION	89
LASL	7600	F4	MA	U U W \$	HANJON, ELECTRON ENERGY DISTRIBUTION CALC.	86
LASL	7600	F4	MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	93
LASL	7600	F4	MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	112
LASL	7600	F4	MA	U U X \$	CBMEXP, CO2 GAS LASER AMPLIFICATION STUDIES	85
LASL	7600	F4	MA	U U X \$	HII, CONTINUITY EQUATION SOLN IN DENSE PLASMA	87

LEACH, KINETICS OF IN-PLACE LEACHING MODEL	LLL 7600 F	AT U R R \$	109
LEACHING MODEL	LLL 7600 F	AT U R R \$ LEACH, KINETICS OF IN-PLACE	109
LEASE ANALYSIS	SLA 360 COBOL MA	U R M \$ BECOM, AEC PURCHASE VERSUS	4
LEASE ANALYSIS	SLA 1108 COBOL MA	U R M \$ BECOM, AEC PURCHASE VERSUS	4
LEAST SQUARES & SMOOTHING ROUTINES CATEGORY E2	LASL 6600 F4	MA U U P \$	66
LEAST SQUARES ANALYSIS RFD	360 F4	MA U R P \$ POLYNOMIAL CURVE FIT BY	10
LEAST SQUARES FIT WITH STATISTICS	DP 360 F4	PMM U U P \$ LINEAR	147
LEAST SQUARES FITTING OF FUNCTIONS RFD	400 F4	MA U R P \$ NON-LINEAR	7
LEAST-SQUARES CROSS SECTIONS	LASL 7600 F4	MA U U A \$ MULTI, R-MATRIX	119
LENS DESIGN PROGRAM VERSION 2.2	LASL 6600 F+COM MA	U U W \$ LASL	58
LEVEL VALUES	LASL 6600 F4	MA P U W \$ CALOR, WAVE NUMBERS DERIVED FROM	104
LEVEL, ATOMIC-ENERGY-LEVEL VALUES CALCULATION	LASL 6600 F4	MA P U W \$	103
LEVELS	ANC 360 F4	RRD U U C \$ DISNEL, DIFFUSION SOLUTION 19 ENERGY	166
LEVELS AND SPECTRA	LASL 6600 F4	MA U U W \$ RCG, ATOMIC ENERGY	112
LEVELS AND SPECTRA	LASL 7600 F4	MA U U W \$ RCG, ATOMIC ENERGY	112
LIBRARY AND AUXILIARY ROUTINES	LLL 6600 LRL	MA U U U \$ GAMANAL	164
LIBRARY BOOK CONTROL	DP 360 COBOL PMM	U U M \$ COMPUTER PROGRAM FOR	174
LIBRARY JOURNAL ORDERING PROGRAM	ANL 360 P+BAL ANL	U U M \$ RENUP/RENORD,	157
LIBRARY MANAGEMENT PROGRAM	ALOO B283 COBOL MA	U R M \$ TRAMP, TAPE	40
LIBRARY, THERMAL X-SECTIONS ENDF/B DATA	ANC 360 BIN	RRD U U Z \$ INCITF	169
LIF/PLOT, LITHIUM FLOURIDE SPECTRUM PLOTTING	LLL PD11 BASIC	LLL U U O \$	145
LIF/RESPONSE, LITHIUM FLOURIDE GAMMA RESPONSE	LLL 6600 F4	LLL U U O \$	144
LINEAR ELASTIC FINITE ELEMENT ANALYSIS	SLA 6600 F4	MA U U I \$ CHILES,	110
LINEAR LEAST SQUARES FIT WITH STATISTICS	DP 360 F4	PMM U U P \$	147
LINEAR SYSTEMS CATEGORY F4	LASL 6600 F4	MA U U P \$ SIMULTANEOUS	69
LINES REMOVED	LASL 6600 F4	MA U U P \$ PICTURE, 3D PLOTTING WITH HIDDEN	97
LIQUID RELEASE BNWL 1108	BASIC RS	U U G \$ ARRRG, DOSE TO MAN FROM REACTOR	108
LITHIUM FLOURIDE GAMMA RESPONSE	LLL 6600 F4	LLL U U O \$ LIF/RESPONSE,	144
LITHIUM FLOURIDE SPECTRUM PLOTTING	LLL PD11 BASIC	LLL U U O \$ LIF/PLOT,	145
LLL	ANSIF MA	U U P \$ PDEONE, NONLINEAR PARTIAL DIFFERENTIAL EQN AID	159
LLL 360 F4	LLL U U R \$	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	137
LLL MCS4 ASM	DBER U U T \$	ALARM, REMOTE ALARM SENSOR MONITORING PROGRAM	136
LLL MCS8 ASM	MA U U P \$	PROM, READ-ONLY MEMORY PROGRAMMING LANGUAGE	117
LLL MDCM ASM	LLL U U P \$	MODCOMP BCD CHARACTER CODE CONVERSION FACILITY	140
LLL MDCM F+ASM	MA U U P \$	MODCOMP TEKTRONIX 4010 PLOTTING ROUTINES	141
LLL PDP9 FOCAL	MA U U O \$	NEWPIO/PERMEA, PERMEABILITY MEASUREMENTS	138
LLL PD11 ASM	ARPA D U P \$	RATS, RISOS/ARPA PDP-11 OPERATING SYSTEM	161
LLL PD11 BASIC	LLL U U O \$	LIF/PLOT, LITHIUM FLOURIDE SPECTRUM PLOTTING	145
LLL U U O \$	LIF/PLOT, LITHIUM FLOURIDE SPECTRUM PLOTTING	LLL PD11 BASIC	145
LLL U U O \$	LIF/RESPONSE, LITHIUM FLOURIDE GAMMA RESPONSE	LLL 6600 F4	144
LLL U U P \$	MODCOMP BCD CHARACTER CODE CONVERSION FACILITY	LLL MDCM ASM	140
LLL U U R \$	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL 360 F4	137
LLL U U R \$	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL 6600 F4	137
LLL 3600 F4	MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	37
LLL 6600 CHAT	MA U R C \$	MORSE-L, MONTE CARLO MULTIGROUP TRANSPORT CODE	142
LLL 6600 F	MA U R T \$	SOL-HOL CONE, CONICAL MONOPOLE ANTENNA CALC	124
LLL 6600 F	MA U U U \$	RECOG, PATTERN RECOGNITION ANALYSES	146
LLL 6600 F+LRL	MA U R M \$	TRUMP/XB2, THERMAL PROPERTY DATA COMPILATION	38
LLL 6600 F4	LLL U U O \$	LIF/RESPONSE, LITHIUM FLOURIDE GAMMA RESPONSE	144
LLL 6600 F4	LLL U U R \$	PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	137
LLL 6600 F4	MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	37
LLL 6600 LRL	MA U U U \$	GAMANAL LIBRARY AND AUXILIARY ROUTINES	164
LLL 6600 LRL	MA U U U \$	GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	163
LLL 7600 ALA76	MA U U P \$	TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76	133
LLL 7600 CHAT	CTR U U X \$	DART, FUSION REACTOR ENERGY CONVERTER MODEL	149
LLL 7600 CHAT	MA U R N \$	SHEMP, HEMP PROGRAM 2D GRID PROCESSING ROUTINE	134
LLL 7600 F	AT U R R \$	LEACH, KINETICS OF IN-PLACE LEACHING MODEL	109
LLL 7600 F+COM	MA U U P \$	SUB/STACKLIB, FORTRAN VECTOR FUNCTION ROUTINES	116
LLL 7600 F4	MA U R H \$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	37
LLL 7600 F4	MA U U T \$	WT-MBA/LLL1B, ELECTROMAGNETIC RESPONSE CALC	156
LLL 7600 F4	MA U U W \$	MAB, SATURATION SPECTROSCOPY DATA REDUCTION	135
LLL 7600 F400	CTR U U X \$	TIBRO-GENERAL, CHARGED-PARTICLE TRAJECTORIES	118

LLL	7600	PUTT	MA	U U P \$	PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600		143
		LOAD	FORTRAN	FORMAT-FREE	INPUT DATA	LASL 6600 F4	59
		LODIPS,	STREAM-RIVER	POLLUTANT	PREDICTION	DP 360 F4 PMM D U R \$	131
LRL	MA	U U U \$	GAMANAL	LIBRARY	AND AUXILIARY ROUTINES	LLL 6600	164
LRL	MA	U U U \$	GAMANAL,	INTERPRETATION	OF GAMMA-RAY SPECTRA	LLL 6600	163
MA	D R P \$	BES,	CYLINDRICAL	BESSEL	FUNCTION EVALUATION	SLA 6600 F4	53
MA	D K 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	D U M \$	FUELPIN,	FUEL	PIN	DATA MANAGEMENT SYSTEM	LASL 7600 F4	113
MA	P R M \$	MIRROR,	INFORMATION	RETRIEVAL	& REPORTS SYSTEM	MLMO 360 PL/1	120
MA	P R M \$	SPIRAL,	FULL-TEXT	STORAGE,	SEARCH & RETRIEVAL	SLA 1108 F+BAL	99
MA	P R P \$	SETS,	S&T	EQUATION	TRANSFORMATION SYSTEM	SLA 6600 FTN	101
MA	P R Q \$	ISOTAB,	PU	POWER	CALCULATION OF MIXED ISOTOPES	MLMO 360 F4	100
MA	P U I \$	QMESH,RENUM,	SELF-ORGANIZING	MESH	GENERATION	SLA 6600 F	172
MA	P U I \$	SLADE D,	FINITE	ELEMENT	DYNAMIC SHELL RESPONSE	SLA 6600 F4	98
MA	P U M \$	MAPPER,	PREDICTING	MANUFACTURING	REQUIREMENTS	GEPI GETS BASIC	96
MA	P U W \$	CALOR,	WAVE	NUMBERS	DERIVED FROM LEVEL VALUES	LASL 6600 F4	104
MA	P U W \$	LEVEL,	ATOMIC-ENERGY-LEVEL	VALUES	CALCULATION	LASL 6600 F4	103
MA	U R C \$	MORSE-L,	MONTE	CARLO	MULTIGROUP TRANSPORT CODE	LLL 6600 CHAT	142
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 \$	RALCRTPH,	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/X82,	THERMAL	PROPERTY	DATA COMPILATION	LLL 6600 F+LRL	38
MA	U R N \$	SHEMP,	HEMP	PROGRAM	2D GRID PROCESSING ROUTINE	LLL 7600 CHAT	134
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 \$	FILE	CODE	GENERATOR,	6-CHARACTER ALPHANUMERIC	BKCD 360 F4	73
MA	U R P \$	GRAPH,	REGRESSION	&	CONFIDENCE INTERVAL CALC.	BKCD 360 F4	76
MA	U R P \$	GROUPS	COMPARISON,	QUALITY	CONTROL PROGRAM	BKCD 360 F4	75
MA	U R P \$	HISTOGRAMS,	QUALITY	ASSURANCE	STATISTICAL CODE	BKCD 360 F4	74
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	16
MA	U R Q \$	UNIVERSAL	DENSITY	CONTROL	PROGRAM	MHSM 360 F4	44
MA	U R R \$	MODEL-B,	FALL	AND	DISPERSION OF PARTICLES	SLA 3600 F36	19
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

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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 \$	SOL-HOL CONE, CONICAL MONOPOLE ANTENNA CALC	LLL	6600	F	124
MA	U R T \$	WHEATSTONE BRIDGE RESISTANCE CALIBRATION	MHSM	360	F4	45
MA	U R U \$	CHEMICAL DIFFUSIVITIES BY BOLTZMAN-MATANO	RFD	400	RASIC	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
MA	U U A \$	MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS	LASL	7600	F4	119
MA	U U B \$	MCN, NEUTRON TRANSPORT MONTE CARLO CODE	LASL	7600	F4	81
MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	360	F4	84
MA	U U G \$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	7600	F4	84
MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	360	F4	80
MA	U U G \$	SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	6600	F4	80
MA	U U H \$	SMAC, INCOMPRESSIBLE FLUID FLOW CALCULATION	LASL	6600	F4	79
MA	U U H \$	YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL	7600	F4	94
MA	U U I \$	CHILES, LINEAR ELASTIC FINITE ELEMENT ANALYSIS	SLA	6600	F4	110
MA	U U J \$	MCG, GAMMA TRANSPORT MONTE CARLO CODE	LASL	7600	F4	82
MA	U U J \$	MCP, PHOTON TRANSPORT MONTE CARLO CODE	LASL	7600	F4	83
MA	U U O \$	CONFOLD, UNFOLDING SMOOTH CONTINUOUS SPECTRA	LASL	6600	F4	95
MA	U U O \$	NEWPIO/PERMEA, PERMEABILITY MEASUREMENTS	LLL	PDP9	FOCAL	138
MA	U U P \$	ARITHMETIC SUBROUTINES CATEGORY A	LASL	6600	F4	61
MA	U U P \$	DATA HANDLING & SORTING SUBROUTINES CATEGORY M	LASL	6600	F4	71
MA	U U P \$	D301, TRUNCATED BUNEMAN POISSON EQUATION SOLVR	LASL	6600	F	64
MA	U U P \$	EIGENVALUE & EIGENVECTOR ROUTINES CATEGORY F2	LASL	6600	F4	68
MA	U U P \$	ELEMENTARY FUNCTION SUBROUTINES CATEGORY B	LASL	6600	COM	62
MA	U U P \$	FINDMAP, COMPLEX GREEN'S FUNCTION SUBROUTINE	LASL	6600	F+COM	56
MA	U U P \$	I401, LOAD FORTRAN FORMAT-FREE INPUT DATA	LASL	6600	F4	59
MA	U U P \$	LEAST SQUARES & SMOOTHING ROUTINES CATEGORY E2	LLL	6600	F4	66
MA	U U P \$	MODCOMP TEKTRONIX 4010 PLOTTING ROUTINES	LLL	MDCM	F+ASM	141
MA	U U P \$	N103, ERROR TERMINATION MESSAGE W/COUNT CONTRL	LASL	6600	F4	72
MA	U U P \$	PDEONE, NONLINEAR PARTIAL DIFFERENTIAL EQN AID	LLL		ANSIF	159
MA	U U P \$	PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600	LLL	7600	PUTT	143
MA	U U P \$	PICTURE, 3D PLOTTING WITH HIDDEN LINES REMOVED	LASL	6600	F4	57
MA	U U P \$	PROM, READ-ONLY MEMORY PROGRAMMING LANGUAGE	LLL	MCS8	ASM	117
MA	U U P \$	Q409, EXTENDED CORE STORAGE I/O DATA TRANSFER	LASL	6600	F4	60
MA	U U P \$	SIMULTANEOUS LINEAR SYSTEMS CATEGORY F4	LASL	6600	F4	69
MA	U U P \$	SPECTRAL ANALYSIS OF TIME SERIES CATEGORY G6	LASL	6600	F4	70
MA	U U P \$	SUB/STACKLIB, FORTRAN VECTOR FUNCTION ROUTINES	LLL	7600	F+COM	116
MA	U U P \$	SUBROUTINES FOR INTERPOLATION CATEGORY E1	LASL	6600	F4	65
MA	U U P \$	SUBROUTINES FOR SPECIAL FUNCTIONS CATEGORY C	LASL	6600	F4	63
MA	U U P \$	TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76	LLL	7600	ALA76	133
MA	U U P \$	VECTOR & MATRIX OPERATION ROUTINES CATEGORY F1	LASL	6600	F4	67
MA	U U Q \$	INDX, X-RAY POWDER PATTERN INDEXING	LASL	6600	F4	57
MA	U U Q \$	UNFOLD, X-RAY DIFFRACTION PROFILE ANALYSIS	LASL	6600	F4	91
MA	U U Q \$	XOTRAP, GAS DIFFUSION WITH TRAPPING	DP	360	F4	148
MA	U U T \$	WT-MBA/LLL1B, ELECTROMAGNETIC RESPONSE CALC	LLL	7600	F4	156
MA	U U U \$	GAMANAL LIBRARY AND AUXILIARY ROUTINES	LLL	6600	LRL	164
MA	U U U \$	GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	LLL	6600	LRL	163
MA	U U U \$	RECOG, PATTERN RECOGNITION ANALYSES	LLL	6600	F	146
MA	U U U \$	TDF-A, COMPUTING THERMODYNAMIC FUNCTIONS	LASL	6600	F+COM	55
MA	U U U \$	UNICALB, PDP-11 BASIC SPECTROCHEMICAL ANALYSIS	LASL	PD11	RASIC	122
MA	U U W \$	APW, ENERGY BANDS VIA AUGMENTED PLANE WAVES	LASL	6600	F+COM	111
MA	U U W \$	CORCOUP, NILSSON CORIOLIS COUPLING PROGRAM	LASL	6600	F4	88

MA	U U W \$	DEGAA, POLYNOMIAL SOLN OF SCHRODINGER EQUATION	LASL 7600	F4	89
MA	U U W \$	HANJON, ELECTRON ENERGY DISTRIBUTION CALC.	LASL 7600	F4	86
MA	U U W \$	HELGA, ELECTRON & PROTON SCATTERING BY HELIUM	LASL 6600	F4	92
MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL 6600	F4	93
MA	U U W \$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL 7600	F4	93
MA	U U W \$	IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL 6600	F4	105
MA	U U W \$	LASL LENS DESIGN PROGRAM VERSION 2.2	LASL 6600	F+COM	58
MA	U U W \$	MAB, SATURATION SPECTROSCOPY DATA REDUCTION	LLL 7600	F4	135
MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL 6600	F4	112
MA	U U W \$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL 7600	F4	112
MA	U U X \$	CBMEXP, CO2 GAS LASER AMPLIFICATION STUDIES	LASL 7600	F4	85
MA	U U X \$	HII, CONTINUITY EQUATION SOLN IN DENSE PLASMA	LASL 7600	F4	87
MA	U U Y \$	ABIGAIL3, ANTIBODY PRODUCTION SIMULATION	LASL 6600	F4	90
MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL 1108	F4	78
MA	U U Y \$	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL 6600	F4	78
MAB,	SATURATION SPECTROSCOPY DATA REDUCTION	LLL 7600	F4	MA U U W \$	135
MAG TAPE R/W	SLAC 360	F+BAL R U U P \$	IBM360 UTILITY AND PDP9/15 ASCII		11
MAGNETIC TAPE RESERVATION SYSTEM	CSCN 6600	F+COM	RLOO U U M \$	RLTRS, RL	125
MAN FROM REACTOR GAS RELEASES	BNWL 1108	BASIC RS	U U G \$	GROMK, DOSE TO	106
MAN FROM REACTOR LIQUID RELEASE	BNWL 1108	BASIC RS	U U G \$	ARRRG, DOSE TO	108
MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP 360	F4	PMM C U R \$	MARC,	130
MANAGEMENT PROGRAM	ALOO B283	COBOL MA	U R M \$	TRAMP, TAPE LIBRARY	40
MANAGEMENT PROGRAM	DP 360	F4	PMM U U M \$	TAFI, RADIOACTIVE WASTE	175
MANAGEMENT SYSTEM	LASL 7600	F4	MA D U M \$	FUELPIN, FUEL PIN DATA	113
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MANUFACTURING REQUIREMENTS	GEPI GETS	BASIC MA	P U M \$	MAPPER, PREDICTING	96
MAPPER, PREDICTING MANUFACTURING REQUIREMENTS	GEPI GETS	BASIC MA	P U M \$		96
MARC, MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP 360	F4	PMM C U R \$		130
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
MATRIX OPERATION ROUTINES CATEGORY F1	LASL 6600	F4	MA U U P \$	VECTOR &	67
MCG, GAMMA TRANSPORT MONTE CARLO CODE	LASL 7600	F4	MA U U J \$		82
MCN, NEUTRON TRANSPORT MONTE CARLO CODE	LASL 7600	F4	MA U U B \$		81
MCP, PHOTON TRANSPORT MONTE CARLO CODE	LASL 7600	F4	MA U U J \$		83
MCS4 ASM	DBER U U T \$	ALARM, REMOTE ALARM SENSOR MONITORING PROGRAM	LLL		136
MCS8 ASM	MA U U P \$	PROM, READ-ONLY MEMORY PROGRAMMING LANGUAGE	LLL		117
MDCM ASM	LLL U U P \$	MODCOMP BCD CHARACTER CODE CONVERSION FACILITY	LLL		140
MDCM F+ASM	MA U U P \$	MODCOMP TEKTRONIX 4010 PLOTTING ROUTINES	LLL		141
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MEASUREMENTS	LLL PDP9	FOCAL MA U U O \$	NEWPIO/PERMEA, PERMEABILITY		138
MEDICAL INSURANCE REIMBURSEMENT SYSTEM	GEPI 435	COBOL MA U R M \$	GE		39
MEMORY PROGRAMMING LANGUAGE	LLL MCS8	ASM MA U U P \$	PROM, READ-ONLY		117
MESH GENERATION	SLA 6600	F MA P U I \$	QMES,RENUM, SELF-ORGANIZING		172
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MESH MULTI-GP TRANSPORT	LASL 6600	F RRD U U C \$	TRIPLET, TRIANGULAR		77
MESH MULTI-GP TRANSPORT	LASL 7600	F RRD U U C \$	TRIPLET, TRIANGULAR		77
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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
MIRROR, INFORMATION RETRIEVAL & REPORTS SYSTEM	MLMO 360	PL/1 MA P R M \$			120
MIXED ISOTOPES	MLMO 360	F4 MA P R Q \$	ISOTAB, PU POWER CALCULATION OF		100
MLMO 360	F+COM MA U R M \$	RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH			3
MLMO 360	F4 MA P R Q \$	ISOTAB, PU POWER CALCULATION OF MIXED ISOTOPES			100
MLMC 360	PL/1 MA P R M \$	MIRROR, INFORMATION RETRIEVAL & REPORTS SYSTEM			120
MODCOMP BCD CHARACTER CODE CONVERSION FACILITY	LLL MDCM	ASM LLL U U P \$			140
MODCOMP TEKTRONIX 4010 PLOTTING ROUTINES	LLL MDCM	F+ASM MA U U P \$			141

MODEL-B

PATH

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MODELING LASL 6600 F4 MA U U Y \$ BIOTA2, BIOME POPULATION INTERACTION		78
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MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS SLA 6600 F4 MA U R T \$ ACCEL		27
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MONTE CARLO CODE LASL 7600 F4 MA U U J \$ MCP, PHOTON TRANSPORT		83
MONTE CARLO CODE LASL 7600 F4 MA U U B \$ MCN, NEUTRON TRANSPORT		81
MONTE CARLO MULTIGROUP TRANSPORT CODE LLL 6600 CHAT MA U R C \$ MORSE-L		142
MORSE-L, MONTE CARLO MULTIGROUP TRANSPORT CODE LLL 6600 CHAT MA U R C \$		142
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MULTI-GP TRANSPORT LASL 360 F RRD U U C \$ TRIPLET, TRIANGULAR MESH		77
MULTI-GP TRANSPORT LASL 6600 F RRD U U C \$ TRIPLET, TRIANGULAR MESH		77
MULTI-GP TRANSPORT LASL 7600 F RRD U U C \$ TRIPLET, TRIANGULAR MESH		77
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MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS LASL 7600 F4 MA U U A \$		119
MULTIGROUP TRANSPORT CODE LLL 6600 CHAT MA U R C \$ MORSE-L, MONTE CARLO		142
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
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MULTIPLE REVOLUTION REENTRY ANC 360 F4 RRD U U C \$ SCAMP, MULTI-GP SN		171
NEUTRON TRANSPORT CODE LASL 7600 F4 MA U U B \$ MCN,		81
NEUTRON TRANSPORT MONTE CARLO CODE LASL 7600 F4 MA U U B \$ MCN,		151
NEUTRONICS MODULES DP 360 F4 PMM U U F \$ SCRAM./WIGLE, 1D TRANSIENT		153
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NUMBERS DERIVED FROM LEVEL VALUES LASL 6600 F4 MA P U W \$ CALOR, WAVE		104
N103, ERROR TERMINATION MESSAGE W/COUNT CONTRL LASL 6600 F4 MA U U P \$		72
ODE INTEGRATION ROUTINE SLA 6600 F+COM MA D R P \$ RUNKUT, RUNGE-KUTTA		26
ODE'S SLA ANSIF U U P \$ DE/STEP/INTRP, ADAMS INTEGRATOR FOR		158
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ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS LASL 6600 F4 MA U U G \$ SIN,		80
OPERATING SYSTEM LLL PC11 ASM ARPA D U P \$ RATS, RISOS/ARPA PDP-11		161
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OPTIMAL DISK DATA SET RE-ORDERING DP 360 F+BAL PMM U U P \$ DYNSDK,		115
ORDERING PROGRAM ANL 360 P+BAL ANL U U M \$ RENUP/RENORD, LIBRARY JOURNAL		157
ORGANISMS BNWL 1108 BASIC RS U U G \$ CRITR, INTERNAL INGESTION DOSE TO		107
P+BAL ANL U U M \$ RENUP/RENORD, LIBRARY JOURNAL ORDERING PROGRAM ANL 360		157
PAPER TAPE TO CARD OR DISK RFD 360 F+BAL MA U R P \$ CONVERSION FROM		8
PARTIAL DIFFERENTIAL EQN AID LLL ANSIF MA U U P \$ PDEONE, NONLINEAR		159
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

POLYNOMIAL

PATTERN CRYSTAL INDEXING	RFD	360	F+BAL	MA	U R Q \$ INDEX, X-RAY POWDER	17
PATTERN INDEXING	LASL	6600	F4	MA	U U Q \$ INDX, X-RAY POWDER	57
PATTERN RECOGNITION ANALYSES	LLL	6600	F	MA	U U U \$ RECOG,	146
PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	360	F4	LLL	U U R \$	137
PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	6600	F4	LLL	U U R \$	137
PDEONE, NONLINEAR PARTIAL DIFFERENTIAL EQN AID	LLL			ANSIF	MA U I I P \$	159
PDP-11 BASIC SPECTROCHEMICAL ANALYSIS	LASL	PD11	BASIC	MA	U U U \$ UNICALB,	122
PDP-11 OPERATING SYSTEM	LLL	PD11	ASM	ARPA	D U P \$ RATS, RISOS/ARPA	161
PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600	LLL	7600	PUTT	MA	U U P \$	143
PDP9 FOCAL	MA	U U O \$ NEWPIO/PERMEA,	PERMEABILITY MEASUREMENTS	LLL		138
PDP9/15 ASCII MAG TAPE R/W	SLAC	360	F+BAL	R	U U P \$ IBM360 UTILITY AND	11
PD10	F4	MA	D R P \$ GERBER SERIES 1200 & 2000	PLOTTING PACKAGE	SLA	52
PD11	ASM	ARPA	D U P \$ RATS, RISOS/ARPA	PDP-11 OPERATING SYSTEM	LLL	161
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PD11 BASIC	MA	U U U \$ UNICALB, PDP-11 BASIC SPECTROCHEMICAL ANALYSIS	LASL			122
PERMEABILITY MEASUREMENTS	LLL	PDP9	FOCAL	MA	U U O \$ NEWPIO/PERMEA,	138
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
PHOTON TRANSPORT MONTE CARLO CODE	LASL	7600	F4	MA	U U J \$ MCP,	83
PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	360	F4	RRD	U U B \$	168
PICTURE, 3D PLOTTING WITH HIDDEN LINES REMOVED	LASL	6600	F4	MA	U U P \$	97
PIN DATA MANAGEMENT SYSTEM	LASL	7600	F4	MA	D U M \$ FUEL PIN, FUEL	113
PL/1	MA	P R M \$ MIRROR, INFORMATION RETRIEVAL & REPORTS SYSTEM	MLMO	360		120
PL/1	R	U U V \$ SLAC ELECTRON GUN DESIGN PROGRAM	SLAC	360		36
PLANE WAVES	LASL	6600	F+CON	MA	U U W \$ APW, ENERGY BANDS VIA AUGMENTED	111
PLASMA	LASL	7600	F4	MA	U U X \$ HII, CONTINUITY EQUATION SOLN IN DENSE	87
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
PLOTR, 2-D CONTOUR AND AREA CALCULATION	SLA	6600	F4	MA	U R P \$	5
PLOTTING	LLL	PD11	BASIC	LLL	U U O \$ LIF/PLOT, LITHIUM FLOURIDE SPECTRUM	145
PLOTTING FOR THE GERBER 2000	RFD	360	F4	MA	U R P \$ PLOT, AUTOMATIC	14
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
PLOTTING RCUTINES	LLL	MDCM	F+ASM	MA	U U P \$ MDCOMP TEKTRONIX 4010	141
PLOTTING WITH HIDDEN LINES REMOVED	LASL	6600	F4	MA	U U P \$ PICTURE, 3D	97
PMM	C U K \$ GRASS, THE JOSHUA REACTOR ANALYSIS SUBSYSTEM	DP	360	F4		150
PMM	C U R \$ MARC, MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP	360	F4		130
PMM	C U R \$ TETRAD, STREAM TRANSPORT DIFFUSION COEF CALC	DP	360	F4		129
PMM	C U R \$ TRAJCLIM, SINGLE TOWER DISPERSION CLIMATOLOGY	DP	360	F4		132
PMM	D U R \$ LODIPS, STREAM-RIVER POLLUTANT PREDICTION	DP	360	F4		131
PMM	U U C \$ INTERACT, INTERACTION OF FISSILE UNITS	DP	360	F4		173
PMM	U U E \$ SWIFT, JOSHUA POINT-KINETICS SOLUTION MODULE	DP	360	F4		152
PMM	U U F \$ DISC., JOSHUA 2D SPACE-TIME FLUX CALC MODULES	DP	360	F4		153
PMM	U U F \$ SCRAM/WIGLE, 1D TRANSIENT NEUTRONICS MODULES	DP	360	F4		151
PMM	U U G \$ COWBACR, WHOLE BODY & CHEST RADIOACTIVITY CALC	DP	812	BASC		114
PMM	U U M \$ COMPUTER PROGRAM FOR LIBRARY BOOK CONTROL	DP	360	COBOL		174
PMM	U U M \$ TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM	DP	360	F4		175
PMM	U U N \$ EDIT MODULES, JOSHUA PRINTED EDIT FACILITIES	DP	360	F4		155
PMM	U U N \$ RIFLE, JOSHUA RESONANCE INTEGRAL MODIFICATIONS	DP	360	F4		154
PMM	U U P \$ DYNSDK, OPTIMAL DISK DATA SET RE-ORDERING	DP	360	F+BAL		115
PMM	U U P \$ LINEAR LEAST SQUARES FIT WITH STATISTICS	DP	360	F4		147
PMM	U U Z \$ GAMTAB, RADIOACTIVE DECAY GAMMA RAY CATALOG	DP	360	EBCDI		139
POINT SOURCE 2D WIND TRAJECTORY PROGRAM	DP	360	F4	DBER	C U R \$ TRJ,	127
POINT-KINETICS SOLUTION MODULE	DP	360	F4	PMM	U U E \$ SWIFT, JOSHUA	152
POISSON EQUATION SOLVR	LASL	6600	F	MA	U U P \$ D301, TRUNCATED BUNEMAN	64
POLLUTANT EMISSION PROJECTION	LLL	360	F4	LLL	U U R \$ PAVE, VEHICULAR	137
POLLUTANT EMISSION PROJECTION	LLL	6600	F4	LLL	U U R \$ PAVE, VEHICULAR	137
POLLUTANT PREDICTION	DP	360	F4	PMM	D U R \$ LODIPS, STREAM-RIVER	131
POLYNOMIAL CURVE FIT BY LEAST SQUARES ANALYSIS	RFD	360	F4	MA	U R P \$	10
POLYNOMIAL SOLN OF SCHRODINGER EQUATION	LASL	7600	F4	MA	U U W \$ DEGAA,	89

POPULATION

RECOGNITION

POPULATION INTERACTION MODELING	LASL 1108 F4	MA	U U Y \$ BICTA2, BIOME	78
POPULATION INTERACTION MODELING	LASL 6600 F4	MA	U U Y \$ RIOTA2, BIOME	78
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
POWDER PATTERN INDEXING	LASL 6600 F4	MA	U U Q \$ INDX, X-RAY	57
POWER CALCULATION OF MIXED ISOTOPES	MLMO 360 F4	MA	P R Q \$ ISOTAB, PU	100
PREDICTING MANUFACTURING REQUIREMENTS	GEPI GETS	BASIC MA	P U M \$ MAPPER,	96
PREDICTION DP 360 F4	PMM	D U R \$ LODIPS, STREAM-RIVER POLLUTANT		131
PREDICTION MODELS DP 360 F4	DBER	C U R \$ NST, 2-1/2 DIMENSION		126
PRINTED EDIT FACILITIES DP 360 F4	PMM	U U N \$ EDIT MODULES, JOSHUA		155
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
PROCESSING ROUTINE LLL 7600 CHAT	MA	U R N \$ SHEMP, HEMP PROGRAM 2D GRID		134
PROFILE ANALYSIS LASL 6600 F4	MA	U U Q \$ UNFOLD, X-RAY DIFFRACTION		91
PROGRAMMING IN ALA76 LLL 7600 ALA76	MA	U U P \$ TIC-TAC-TOE, STRUCTURED		133
PROGRAMMING LANGUAGE LLL MCS8 ASM	MA	U U P \$ PROM, READ-ONLY MEMORY		117
PROJECTION LLL 360 F4	LLL	U U R \$ PAVE, VEHICULAR POLLUTANT EMISSION		137
PROJECTION LLL 6600 F4	LLL	U U R \$ PAVE, VEHICULAR POLLUTANT EMISSION		137
PROM, READ-ONLY MEMORY PROGRAMMING LANGUAGE	LLL MCS8 ASM	MA	U U P \$	117
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
PROPERTIES OF EXPLOSIVES LASL 360 F4	MA	U U G \$ BKW, DETONATION		84
PROPERTIES OF EXPLOSIVES LASL 7600 F4	MA	U U G \$ BKW, DETONATION		84
PROPERTY DATA COMPILATION LLL 6600 F+LRL	MA	U R M \$ TRUMP/XB2, THERMAL		38
PROPERTY INVENTORY & ACCOUNTING SYSTEM	CSCN 6600	COBOL RLOO U U M \$ CUE,		162
PROTON SCATTERING BY HELIUM LASL 6600 F4	MA	U U W \$ HELGAS, ELECTRON &		92
PU POWER CALCULATION OF MIXED ISOTOPES	MLMO 360 F4	MA	P R Q \$ ISOTAB,	100
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
PUTT MA U U P \$ PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600	LLL 7600			143
QMESH,RENUM, SELF-ORGANIZING MESH GENERATION	SLA 6600 F	MA	P U I \$	172
QUALITY ASSURANCE STATISTICAL CODE BKCD 360 F4	MA	U R P \$ HISTOGRAMS,		74
QUALITY CONTROL PROGRAM BKCD 360 F4	MA	U R P \$ GROUPS COMPARISON,		75
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
Q409, EXTENDED CORE STORAGE I/C DATA TRANSFER	LASL 6600 F4	MA	U U P \$	60
R-MATRIX LEAST-SQUARES CROSS SECTIONS	LASL 7600 F4	MA	U U A \$ MULTI,	119
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 GAMMA RAY CATALOG DP 360	EBCDI PMM	U U Z \$ GAMTAB,		139
RADIOACTIVE DECAY GROWTH OF NUCLIDES RFD 360 F4	MA	U R D \$ ISOGEN,		1
RADIOACTIVE WASTE MANAGEMENT PROGRAM DP 360 F4	PMM	U U M \$ TAFI,		175
RADIOACTIVITY CALC DP 812	BASC PMM	U U G \$ COWBACR, WHOLE BODY & CHEST		114
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
RADIUS UPPER AIR STUDY DP 360 F4	DBER	C U R \$ VARSCN, VARIABLE SCAN		128
RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO 360 F+C+R	MA	U R M \$	3
RATS, RISOS/ARPA PDP-11 OPERATING SYSTEM	LLL PD11 ASM	ARPA D U P \$		161
RAY CATALOG DP 360	EBCDI PMM	U U Z \$ GAMTAB, RADIOACTIVE DECAY GAMMA		139
RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL 6600 F4	MA	U U W \$	112
RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL 7600 F4	MA	U U W \$	112
RE-ORDERING DP 360 F+BAL	PMM	U U P \$ DYNSK, OPTIMAL DISK DATA SET		115
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
READ-ONLY MEMORY PROGRAMMING LANGUAGE	LLL MCS8 ASM	MA	U U P \$ PROM,	117
REALLY, GAS TURBINE HTGR TRANSIENT MODEL	GA 1108 F5	RRD D U K \$		121
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RECOGNITION ANALYSES	LLL 6600 F	MA	U U U \$ RECOG, PATTERN	146

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	LLL	7600 F4	MA	U U W \$	MAB, SATURATION SPECTROSCOPY DATA		135
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
REFLOODING RATE CALCULATION	ECC	ANC 360 F4	RSR	U U H \$	FLOOD, CORE		167
REGRESSION & CONFIDENCE INTERVAL CALC.	BKCD	360 F4	MA	U R P \$	GRAPH,		76
REIMBURSEMENT SYSTEM	GEPI	435 COBOL MA	U R M \$	GE MEDICAL INSURANCE			39
RELEASE BNWL 1108	BASIC RS	U U G \$	ARRRG, DOSE TO MAN FROM REACTOR LIQUID				108
RELEASES	BNWL 1108	BASIC RS	U U G \$	GRONK, DOSE TO MAN FROM REACTOR GAS			106
REMOTE ALARM SENSOR MONITORING PROGRAM	LLL MCS4 ASM	DBER U U T \$	ALARM,				136
REMOVED LASL 6600	F4 MA	U U P \$	PICTURE, 3D PLOTTING WITH HIDDEN LINES				97
RENUM, SELF-ORGANIZING MESH GENERATION	SLA 6600 F	MA P U I \$	QMESH,				172
RENUP/RENORD, LIBRARY JOURNAL ORDERING PROGRAM	ANL 360 P+BAL	ANL U U M \$					157
REPORTS SYSTEM	MLMO 360 PL/1 MA	P R M \$	MIRROR, INFORMATION RETRIEVAL &				120
RESERVATION SYSTEM	CSCN 6600 F+COM	RLCC U U M \$	RLTRS, RL MAGNETIC TAPE				125
RESISTANCE CALIBRATION	MHSM 360 F4	MA U R T \$	WHEATSTONE BRIDGE				45
RESONANCE	ANC 360 F4	RRD U U B \$	SCRABLE, MULTI-GP FAST CONSTANTS				170
RESONANCE INTEGRAL MODIFICATIONS	DP 360 F4	PMM U U N \$	RIFLE, JOSHUA				154
RESOURCE ALLOCATION BY CRITICAL PATH	MLMO 360 F+C+R	MA U R M \$	RALCRTPH,				3
RESPONSE	LLL 6600 F4	LLL U U O \$	LIF/RESPONSE, LITHIUM FLOURIDE GAMMA				144
RESPONSE CALC	LLL 7600 F4	MA U U T \$	WT-MBA/LLL18, ELECTROMAGNETIC				156
RESPONSE	SLA 6600 F4	MA P U I \$	SLADE D, FINITE ELEMENT DYNAMIC SHELL				98
RETRIEVAL	SLA 1108 F+BAL	MA P R M \$	SPIRAL, FULL-TEXT STORAGE, SEARCH &				99
RETRIEVAL & REPORTS SYSTEM	MLMO 360 PL/1 MA	P R M \$	MIRROR, INFORMATION				120
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				34
RFD	400 F	MA U R P \$	SURFACE AREA & VOLUME OF A SOLID OF REVOLUTION				9
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
RIFLE, JOSHUA	RESONANCE INTEGRAL MODIFICATIONS	DP 360 F4	PMM U U N \$				154
RISOS/ARPA POP-11	OPERATING SYSTEM	LLL PD11 ASM	ARPA D U P \$	RATS,			161
RL MAGNETIC TAPE	RESERVATION SYSTEM	CSCN 6600 F+COM	RLOO U U M \$	RLTRS,			125
RLOO U U M \$	CUE, PROPERTY INVENTORY & ACCOUNTING SYSTEM	CSCN 6600 COBOL					162
RLOO U U M \$	JOBSHOP, JOBSHOP ENVIRONMENT SCHEDULING SYSTEM	CSCN 6600 FTN					160
RLOO U U M \$	RLTRS, RL MAGNETIC TAPE RESERVATION SYSTEM	CSCN 6600 F+COM					125
RLTRS, RL MAGNETIC TAPE	RESERVATION SYSTEM	CSCN 6600 F+COM	RLOO U U M \$				125
RRD D U K \$	REALLY, GAS TURBINE HTGR TRANSIENT MODEL	GA 1108 F5					121

RRD

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RRD	U U B	\$	PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	360	F4	168
RRD	U U B	\$	SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	360	F4	170
RRD	U U C	\$	DISNEL, DIFFUSION SOLUTION 19 ENERGY LEVELS	ANC	360	F4	166
RRD	U U C	\$	SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	360	F4	171
RRD	U U C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	360	F	77
RRD	U U C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	6600	F	77
RRD	U U C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	7600	F	77
RRD	U U I	\$	NUROW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	360	F4	176
RRD	U U P	\$	NRTS-IGS GRAPHICS SOFTWARE FOR III FR-80 COM	ANC	360	F+BAL	165
RRD	U U Z	\$	INCITE LIBRARY, THERMAL X-SECTIONS ENDF/B DATA	ANC	360	BIN	169
RSR	U U H	\$	FLOOD, CORE REFLOODING RATE CALCULATION ECC	ANC	360	F4	167
			RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA	6600	F+COM MA D R P \$	RUNKUT,
			RUNKUT, RUNGE-KUTTA ODE INTEGRATION ROUTINE	SLA	6600	F+COM MA D R P \$	
			S&T EQUATION TRANSFORMATION SYSTEM	SLA	6600	FTN MA P R P \$	SETS,
			SANDIA SCOPE USERS' MANUAL FOR THE CDC6600	SLA	6600	FTN MA U R P \$	
			SANPIC, PARTICLE-IN-CELL PROGRAM	SLA	6600	F+COM MA U R H \$	
			SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36 MA U R S \$	SATLOC,
			SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	SLA	3600	F36 MA U R S \$	
			SATURATION SPECTROSCOPY DATA REDUCTION	LLL	7600	F4 MA U U W \$	MAB,
			SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	360	F4	RRD U U C \$
			SCAN RADIUS UPPER AIR STUDY	DP	360	F4	DBER C U R \$
			SCATTERING BY HELIUM	LASL	6600	F4	MA U U W \$
			SCHEDULING SYSTEM	CSCN	6600	FTN	RLOO U U M \$
			SCHRODINGER EQUATION	LASL	7600	F4	MA U U W \$
			SCOPE USERS' MANUAL FOR THE CDC6600	SLA	6600	FTN MA U R P \$	SANDIA
			SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	360	F4	RRD U U B \$
			SCRAM./WIGLE, 1D TRANSIENT NEUTRONICS MODULES	DP	360	F4	PMM U U F \$
			SEARCH & RETRIEVAL	SLA	1108	F+BAL MA P R M \$	SPIRAL, FULL-TEXT STORAGE,
			SECTIONS	LASL	7600	F4	MA U U A \$
			SELF-ORGANIZING MESH GENERATION	SLA	6600	F	MA P U I \$
			SENSOR MONITORING PROGRAM	LLL	MCS4	ASM	DBER U U T \$
			SETS, S&T EQUATION TRANSFORMATION SYSTEM	SLA	6600	FTN MA P R P \$	
			SEVER, SYMMETRIC MATRIX EIGENVALUES & VECTORS	SLA	6600	F4	MA U R P \$
			SHELL RESPONSE	SLA	6600	F4	MA P U I \$
			SHELLS	SLA	6600	F+COM MA U R I \$	SLADE, STATIC ANALYSIS OF THIN
			SHEMP, HEMP PROGRAM 2D GRID PROCESSING ROUTINE	LLL	7600	CHAT MA U R N \$	
			SIMULATION	LASL	6600	F4	MA U U Y \$
			SIMULATION OF STRESS CORROSION CRACKING	SLA	6600	F	MA U R Q \$
			SIMULATION STUDY	SLA	6600	F4	MA U R Y \$
			SIMULATOR ON THE CDC7600	LLL	7600	PUTT MA U U P \$	PDP-8E, INTERACTIVE
			SIMULTANEOUS LINEAR SYSTEMS CATEGORY	F4	LASL	6600	F4
			SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	360	F4	MA U U G \$
			SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	6600	F4	MA U U G \$
			SINGLE TOWER DISPERSION CLIMATOLOGY	DP	360	F4	PMM C U R \$
			SLA	ANSIF	U U P \$	DE/STEP/INTRP, ADAMS INTEGRATOR FOR ODE'S	
			SLA	360	COBOL MA U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	
			SLA	PD10	F4 MA D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	
			SLA	1108	COBOL MA U R M \$	BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	
			SLA	1108	F+BAL MA P R M \$	SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	
			SLA	1108	F4 MA D R P \$	GERBER SERIES 1200 & 2000 PLOTTING PACKAGE	
			SLA	1108	F4 MA U R T \$	ACCEL(MOD2), DESIGN OF PRINTED-CIRCUIT BOARDS	
			SLA	1108	F4	U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS
			SLA	1108	F4	SNS U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION
			SLA	1108	F4	SNS U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY
			SLA	3100	COM MA U R P \$	INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	
			SLA	3600	F36 MA U R R \$	MODEL-B, FALL AND DISPERSION OF PARTICLES	
			SLA	3600	F36 MA U R S \$	SATLOC, SATELLITE GEOGRAPHIC EVENT POSITIONING	
			SLA	3600	F36 MA U R S \$	TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	
			SLA	3600	F36	SNS U R S \$	HRS004, REENTRY PARAMETERS OF DECAYING OBJECTS
			SLA	3600	F36	SNS U R S \$	HRS015, BALLISTIC COEFFICIENT COMPUTATION
			SLA	3600	F4	SNS U R S \$	HRS017, MULTIPLE REVOLUTION REENTRY
			SLA	3600	F63	MA U R P \$	AVINT, INTEGRATION OF TABULATED DATA

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SLA 6600	F	MA	P U I \$ QMESH,RENUM, SELF-ORGANIZING MESH GENERATION	172
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	P R P \$ SETS, S&T EQUATION TRANSFORMATION SYSTEM	101
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	P U I \$ SLADE D, FINITE ELEMENT DYNAMIC SHELL RESPONSE	98
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	MA	U U I \$ CHILES, LINEAR ELASTIC FINITE ELEMENT ANALYSIS	110
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				
SLADE D, FINITE ELEMENT DYNAMIC SHELL RESPONSE	SLA 6600	F4	MA P U I \$	98
SLADE, STATIC ANALYSIS OF THIN SHELLS	SLA 6600	F+COM	MA U R I \$	2
SMAC, INCOMPRESSIBLE FLUID FLOW CALCULATION	LASL 6600	F4	MA U U H \$	79
SMOOTH CONTINUOUS SPECTRA	LASL 6600	F4	MA U U O \$ CONFOLO, UNFOLDING	95
SMOOTHING ROUTINES CATEGORY E2	LASL 6600	F4	MA U U P \$ LEAST SQUARES &	66
SN NEUTRON TRANSPORT CODE	ANC 360	F4	RRD U U C \$ SCAMP, MULTI-GP	171
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
SNS U R S \$ HRS015, BALLISTIC COEFFICIENT COMPUTATION	SLA 1108	F4		25
SNS 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	QUIK		25
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	QUIK		20
SOFTWARE FOR III FR-80 COM	ANC 360	F+BAL	RRD U U P \$ NRTS-IGS GRAPHICS	165
SOL-HOL CONE, CONICAL MONOPOLE ANTENNA CALC	LLL 6600	F	MA U R T \$	124
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
SOLVR LASL 6600	F	MA	U U P \$ D301, TRUNCATED BUNEMAN POISSON EQUATION	64
SORTING SUBROUTINES CATEGORY M	LASL 6600	F4	MA U U P \$ DATA HANDLING &	71
SOURCE 2D WIND TRAJECTORY PROGRAM	DP 360	F4	DBER C U R \$ TRJ, POINT	127
SPACE-TIME FLUX CALC MODULES	DP 360	F4	PMH U U F \$ DISC., JOSHUA 2D	153
SPECIAL FUNCTIONS CATEGORY C	LASL 6600	F4	MA U U P \$ SUBROUTINES FOR	63
SPECTRA	LASL 6600	F4	MA U U W \$ RCG, ATOMIC ENERGY LEVELS AND	112
SPECTRA	LASL 7600	F4	MA U U W \$ RCG, ATOMIC ENERGY LEVELS AND	112
SPECTRA	LASL 6600	F4	MA U U O \$ CONFOLO, UNFOLDING SMOOTH CONTINUOUS	95
SPECTRA	LLL 6600	LRL	MA U U U \$ GAMANAL, INTERPRETATION OF GAMMA-RAY	163
SPECTRAL ANALYSIS OF TIME SERIES CATEGORY G6	LASL 6600	F4	MA U U P \$	70

SPECTROCHEMICAL ANALYSIS	LASL PD11	BASIC MA	U U U \$ UNICALB, PDP-11	BASIC	122
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
SPECTROSCOPY DATA REDUCTION	LLL 7600 F4	MA	U U W \$ MAB, SATURATION		135
SPECTRUM CALC ANC	360 F4	RRD U U B \$ PHROG2, MULTI-GP X-SECTIONS FAST			168
SPECTRUM PLOTTING	LLL PD11	BASIC LLL U U O \$ LIF/PLOT, LITHIUM FLOURIDE			145
SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA 1108 F+BAL MA	P R M \$			99
STATIC ANALYSIS OF THIN SHELLS	SLA 6600 F+COM MA	U R I \$ SLADE,			2
STATISTICAL CODE BKCD	360 F4	MA	U R P \$ HISTOGRAMS, QUALITY ASSURANCE		74
STATISTICS	DP 360 F4	PMM U U P \$ LINEAR LEAST SQUARES FIT WITH			147
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
STORAGE I/O DATA TRANSFER	LASL 6600 F4	MA	U U P \$ Q409, EXTENDED CORE		60
STORAGE, SEARCH & RETRIEVAL	SLA 1108 F+BAL MA	P R M \$ SPIRAL, FULL-TEXT			99
STREAM TRANSPORT DIFFUSION COEF CALC	DP 360 F4	PMM C U R \$ TETRAD,			129
STREAM-RIVER POLLUTANT PREDICTION	DP 360 F4	PMM D U R \$ LODIPS,			131
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
STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL 360 F4	RRD U U I \$ NUROW,			176
STRUCTURE	LASL 6600 F4	MA	U U W \$ HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC		93
STRUCTURE	LASL 7600 F4	MA	U U W \$ HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC		93
STRUCTURED PROGRAMMING IN ALA76	LLL 7600 ALA76 MA	U U P \$ TIC-TAC-TOE,			133
STUDIES	LASL 7600 F4	MA	U U X \$ CBMEXP, CO2 GAS LASER AMPLIFICATION		85
SUB/STACKLIB, FORTRAN VECTOR FUNCTION ROUTINES	LLL 7600 F+COM MA	U U P \$			116
SUBROUTINE	LASL 6600 F+COM MA	U U P \$ FINDMAP, COMPLEX GREEN'S FUNCTION			56
SUBROUTINES CATEGORY A	LASL 6600 F4	MA	U U P \$ ARITHMETIC		61
SUBROUTINES CATEGORY B	LASL 6600 COM MA	U U P \$ ELEMENTARY FUNCTION			62
SUBROUTINES CATEGORY M	LASL 6600 F4	MA	U U P \$ DATA HANDLING & SORTING		71
SUBROUTINES FOR INTERPOLATION CATEGORY E1	LASL 6600 F4	MA	U U P \$		65
SUBROUTINES FOR SPECIAL FUNCTIONS CATEGORY C	LASL 6600 F4	MA	U U P \$		63
SUBSYSTEM	DP 360 F4	PMM C U K \$ GRASS, THE JOSHUA REACTOR ANALYSIS			150
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
SWIFT, JOSHUA POINT-KINETICS SOLUTION MODULE	DP 360 F4	PMM U U E \$			152
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
TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM	DP 360 F4	PMM U U M \$			175
TAPE LIBRARY MANAGEMENT PROGRAM	ALOO B283	COBOL MA	U R M \$ TRAMP,		40
TAPE R/W	SLAC 360 F+BAL R	U U P \$ IBM360 UTILITY AND PDP9/15 ASCII MAG			11
TAPE RESERVATION SYSTEM	CSCN 6600 F+COM	RLOO U U M \$ RLTRS, RL MAGNETIC			125
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
TDF-A, COMPUTING THERMODYNAMIC FUNCTIONS	LASL 6600 F+COM MA	U U U \$			55
TEKTRONIX 4010 PLOTTING ROUTINES	LLL MDCM F+ASM MA	U U P \$ MODCOMP			141
TELEMETRY PLAYBACK SYSTEM	SLA 3100 COM MA	U R P \$ INTERACTIVE MONITOR			13
TERMINATION MESSAGE W/COUNT CNTRL	LASL 6600 F4	MA	U U P \$ N103, ERROR		72
TETRAD, STREAM TRANSPORT DIFFUSION COEF CALC	DP 360 F4	PMM C U R \$			129
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
THERMAL X-SECTIONS ENDF/B DATA ANC	360 BIN	RRD U U Z \$ INCITE LIBRARY,			169
THERMODYNAMIC FUNCTIONS	LASL 6600 F+COM MA	U U U \$ TDF-A, COMPUTING			55
THIN SHELLS	SLA 6600 F+COM MA	U R I \$ SLADE, STATIC ANALYSIS OF			2
TIBRO-GENERAL, CHARGED-PARTICLE TRAJECTORIES	LLL 7600 F400 CTR	U U X \$			118
TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76	LLL 7600 ALA76 MA	U U P \$			133
TIME SERIES CATEGORY G6	LASL 6600 F4	MA	U U P \$ SPECTRAL ANALYSIS OF		70
TOODY2, 2-DIMENSIONAL WAVE PROPAGATION PROGRAM	SLA 3600 F36	MA	U R S \$		47

TOWER

WAVE

TOWER DISPERSION CLIMATOLOGY DP	360	F4	PMM	C	U	R	\$	TRAJCLIM, SINGLE	132			
TRAJCLIM, SINGLE TOWER DISPERSION CLIMATOLOGY DP	360	F4	PMM	C	U	R	\$		132			
TRAJECTORIES LLL	7600	F400	CTR	U	U	X	\$	TIBRO-GENERAL, CHARGED-PARTICLE	118			
TRAJECTORY PROGRAM DP	360	F4	DBER	C	U	R	\$	TRJ, POINT SOURCE 2D WIND	127			
TRAMP, TAPE LIBRARY MANAGEMENT PROGRAM								ALCO B283 COBOL MA	40			
TRANSFER LASL	6600	F4	MA	U	U	P	\$	Q409, EXTENDED CORE STORAGE I/O DATA	60			
TRANSFORMATION SYSTEM SLA	6600	FTN	MA	P	R	P	\$	SETS, SET EQUATION	101			
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			
TRANSIENT MODEL GA	1108	F5	RRD	D	U	K	\$	REALLY, GAS TURBINE HTGR	121			
TRANSIENT NEUTRONICS MODULES DP	360	F4	PMM	U	U	F	\$	SCRAM./WIGLE, ID	151			
TRANSPORT LASL	360	F	RRD	U	U	C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP	77			
TRANSPORT LASL	6600	F	RRD	U	U	C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP	77			
TRANSPORT LASL	7600	F	RRD	U	U	C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP	77			
TRANSPORT DP	360	F4	PMM	C	U	R	\$	MARC, MAN-REM DOSE FROM ATMOSPHERIC	130			
TRANSPORT CODE ANC	360	F4	RRD	U	U	C	\$	SCAMP, MULTI-GP SN NEUTRON	171			
TRANSPORT CODE LLL	6600	CHAT	MA	U	R	C	\$	MORSE-L, MONTE CARLO MULTIGROUP	142			
TRANSPORT DIFFUSION COEF CALC DP	360	F4	PMM	C	U	R	\$	TETRAD, STREAM	129			
TRANSPORT MONTE CARLO CODE			LASL	7600	F4	MA	U	U	J	\$	MCG, GAMMA	82
TRANSPORT MONTE CARLO CODE			LASL	7600	F4	MA	U	U	J	\$	MCP, PHOTON	83
TRANSPORT MONTE CARLO CODE			LASL	7600	F4	MA	U	U	B	\$	MCN, NEUTRON	81
TRANSPPOSITION METHOD MMSM	360	F4	MA	U	R	Q	\$	MASS DETERMINATION BY	42			
TRAPPING DP	360	F4	MA	U	U	Q	\$	XDTRAP, GAS DIFFUSION WITH	148			
TRIANGULAR MESH MULTI-GP TRANSPORT LASL	360	F	RRD	U	U	C	\$	TRIPLET,	77			
TRIANGULAR MESH MULTI-GP TRANSPORT LASL	6600	F	RRD	U	U	C	\$	TRIPLET,	77			
TRIANGULAR MESH MULTI-GP TRANSPORT LASL	7600	F	RRD	U	U	C	\$	TRIPLET,	77			
TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT LASL	360	F	RRD	U	U	C	\$		77			
TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT LASL	6600	F	RRD	U	U	C	\$		77			
TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT LASL	7600	F	RRD	U	U	C	\$		77			
TRJ, POINT SOURCE 2D WIND TRAJECTORY PROGRAM DP	360	F4	DBER	C	U	R	\$		127			
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			
TRUNCATED BUNEMAN POISSON EQUATION SOLVR LASL	6600	F	MA	U	U	P	\$	D301,	64			
TURBINE HTGR TRANSIENT MODEL GA	1108	F5	RRD	D	U	K	\$	REALLY, GAS	121			
UILL 360 F4			P	U	D	\$	GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	102				
UNFOLD, X-RAY DIFFRACTION PROFILE ANALYSIS LASL	6600	F4	MA	U	U	Q	\$		91			
UNFOLDING SMOOTH CONTINUOUS SPECTRA LASL	6600	F4	MA	U	U	O	\$	CONFOLD,	95			
UNICALB, PDP-11 BASIC SPECTROCHEMICAL ANALYSIS LASL	PD11	BASIC	MA	U	U	U	\$		122			
UNITS DP	360	F4	PMM	U	U	C	\$	INTERACT, INTERACTION OF FISSILE	173			
UNIVERSAL DENSITY CONTROL PROGRAM MMSM	360	F4	MA	U	R	Q	\$		44			
UPPER AIR STUDY DP	360	F4	DBER	C	U	R	\$	VARSCN, VARIABLE SCAN RADIUS	128			
USERS' MANUAL FOR THE CDC6600 SLA	6600	FTN	MA	U	R	P	\$	SANDIA SCOPE	6			
UTILITY AND PDP9/15 ASCII MAG TAPE R/W SLAC	360	F+BAL	R	U	U	P	\$	IBM360	11			
VALUE CALC. LASL	6600	F4	MA	U	U	W	\$	IT, ITERATIVE ATOMIC-ENERGY-LEVEL	105			
VALUES LASL	6600	F4	MA	P	U	W	\$	CALOR, WAVE NUMBERS DERIVED FROM LEVEL	104			
VALUES CALCULATION LASL	6600	F4	MA	P	U	W	\$	LEVEL, ATOMIC-ENERGY-LEVEL	103			
VARIABLE SCAN RADIUS UPPER AIR STUDY DP	360	F4	DBER	C	U	R	\$	VARSCN,	128			
VARSCN, VARIABLE SCAN RADIUS UPPER AIR STUDY DP	360	F4	DBER	C	U	R	\$		128			
VECTOR & MATRIX OPERATION ROUTINES CATEGORY F1 LASL	6600	F4	MA	U	U	P	\$		67			
VECTOR FUNCTION ROUTINES LLL	7600	F+COM	MA	U	U	P	\$	SUB/STACKLIB, FORTRAN	116			
VECTORS SLA	6600	F4	MA	U	R	P	\$	SEVER, SYMMETRIC MATRIX EIGENVALUES &	48			
VEHICULAR POLLUTANT EMISSION PROJECTION LLL	360	F4	LLL	U	U	R	\$	PAVE,	137			
VEHICULAR POLLUTANT EMISSION PROJECTION LLL	6600	F4	LLL	U	U	R	\$	PAVE,	137			
VERSION 2.2 LASL	6600	F+COM	MA	U	U	W	\$	LASL LENS DESIGN PROGRAM	58			
VIA AUGMENTED PLANE WAVES LASL	6600	F+COM	MA	U	U	W	\$	APW, ENERGY BANDS	111			
VOLUME OF A SOLID OF REVOLUTION RFD	400	F	MA	U	R	P	\$	SURFACE AREA &	9			
W/COUNT CONTRL LASL	6600	F4	MA	U	U	P	\$	N103, ERROR TERMINATION MESSAGE	72			
WASTE MANAGEMENT PROGRAM CP	360	F4	PMM	U	U	M	\$	TAFI, RADIOACTIVE	175			
WAVE ANALYSIS PROGRAM SLA	6600	F4	MA	U	R	S	\$	SWAP9, STRESS	22			

WAVE NUMBERS DERIVED FROM LEVEL VALUES	LASL 6600 F4	MA P U W \$ CALOR,	104
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
WAVES	LASL 6600 F+COM MA	U U W \$ APW, ENERGY BANDS VIA AUGMENTED PLANE	111
WHEATSTONE BRIDGE RESISTANCE CALIBRATION		MHSM 360 F4 MA U R T \$	45
WHOLE BODY & CHEST RADIOACTIVITY CALC DP	812 BASC PMM	U U G \$ COMBACR,	114
WIND TRAJECTORY PROGRAM	DP 360 F4	DBER C U R \$ TRJ, POINT SOURCE 2D	127
WONDY3A, 1-D WAVE PROPAGATION CALCULATION	SLA 6600 F4	MA U R S \$	21
WT-MBA/LLL18, ELECTROMAGNETIC RESPONSE CALC	LLL 7600 F4	MA U U T \$	156
X-RAY DIFFRACTION PROFILE ANALYSIS	LASL 6600 F4	MA U U Q \$ UNFOLD,	91
X-RAY POWDER PATTERN CRYSTAL INDEXING	RFD 360 F+BAL MA	U R Q \$ INDEX,	17
X-RAY POWDER PATTERN INDEXING	LASL 6600 F4	MA U U Q \$ INDX,	57
X-SECTIONS ENDF/B DATA ANC	360 BIN RRD	U U Z \$ INCITE LIBRARY, THERMAL	169
X-SECTIONS FAST SPECTRUM CALC ANC	360 F4 RRD	U U B \$ PHROG2, MULTI-GP	168
XDTRAP, GAS DIFFUSION WITH TRAPPING	DP 360 F4	MA U U Q \$	148
YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL 7600 F4	MA U U H \$	94
1-D WAVE PROPAGATION CALCULATION	SLA 6600 F4	MA U R S \$ WONDY3A,	21
1D TRANSIENT NEUTRONICS MODULES DP	360 F4	PMM U U F \$ SCRAM./WIGLE,	151
1108 BASIC RS	U U G \$ ARRRG, DOSE TO MAN FROM REACTOR LIQUID RELEASE	BNWL	108
1108 BASIC RS	U U G \$ CRITR, INTERNAL INGESTION DOSE TO ORGANISMS	BNWL	107
1108 BASIC RS	U U G \$ GRONK, DOSE TO MAN FROM REACTOR GAS RELEASES	BNWL	106
1108 COBOL MA	U R M \$ BECOM, AEC PURCHASE VERSUS LEASE ANALYSIS	SLA	4
1108 F+BAL MA	P R M \$ SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA	99
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	MA U U Y \$ BIOTA2, BIOME PCULATION INTERACTION MODELING	LASL	78
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	20
1108 F5	RRD D U K \$ REALLY, GAS TURBINE HTGR TRANSIENT MODEL	GA	121
1200 & 2000 PLOTTING PACKAGE	SLA PD10 F4	MA D R P \$ GERBER SERIES	52
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 \$ GERRER SERIES	52
19 ENERGY LEVELS	ANC 360 F4 RRD	U U C \$ DISNEL, DIFFUSION SOLUTION	166
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 R S \$ TOODY2,	47
2-1/2 DIMENSION PREDICTION MODELS	DP 360 F4	DBER C U R \$ NST,	126
2D GRID PROCESSING ROUTINE	LLL 7600 CHAT	MA U R N \$ SHEMP, HEMP PROGRAM	134
2D SPACE-TIME FLUX CALC MODULES	DP 360 F4	PMM U U F \$ DISC., JOSHUA	153
2D WIND TRAJECTORY PROGRAM	DP 360 F4	DBER C U R \$ TRJ, POINT SOURCE	127
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
3D PLOTTING WITH HIDDEN LINES REMOVED	LASL 6600 F4	MA U U P \$ PICTURE,	97
3100 COM	MA U R P \$ INTERACTIVE MONITOR TELEMETRY PLAYBACK SYSTEM	SLA	13
360 BIN	RRD U U Z \$ INCITE LIBRARY, THERMAL X-SECTIONS ENDF/B DATA	ANC	169
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 COBOL PMM	U U M \$ COMPUTER PROGRAM FOR LIBRARY BOOK CONTROL	DP	174
360 EBCDI PMM	U U Z \$ GAMTAB, RADIOACTIVE DECAY GAMMA RAY CATALOG	DP	139
360 F	RRD U U C \$ TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	77
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 PMM	U U P \$ DYNDISK, OPTIMAL DISK DATA SET RE-ORDERING	DP	115
360 F+BAL R	U U P \$ IBM360 UTILITY AND PDP9/15 ASCII MAG TAPE R/W	SLAC	11
360 F+BAL RRD	U U P \$ NRTS-IGS GRAPHICS SOFTWARE FOR III FR-80 COM	ANC	165
360 F+C+R MA	U R M \$ RALCRTPH, RESOURCE ALLOCATION BY CRITICAL PATH	MLMO	3
360 F4	P U D \$ GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	UILL	102
360 F4	DBER C U R \$ NST, 2-1/2 DIMENSION PREDICTION MODELS	DP	126
360 F4	DBER C U R \$ TRJ, POINT SOURCE 2D WIND TRAJECTORY PROGRAM	DP	127

360	F4	DBER	C U R	\$ VARSCN, VARIABLE SCAN RADIUS UPPER AIR STUDY	DP	128
360	F4	L	P U H	\$ 6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	123
360	F4	LLL	U U R	\$ PAVE, VEHICULAR POLLUTANT EMISSION PROJECTION	LLL	137
360	F4	MA	P R Q	\$ ISOTAB, PU POWER CALCULATION OF MIXED ISOTOPES	MLMO	100
360	F4	MA	U R D	\$ ISOGEN, RADIOACTIVE DECAY GROWTH OF NUCLIDES	RFD	1
360	F4	MA	U R P	\$ FILE CODE GENERATOR, 6-CHARACTER ALPHANUMERIC	BKCD	73
360	F4	MA	U R P	\$ GRAPH, REGRESSION & CONFIDENCE INTERVAL CALC.	BKCD	76
360	F4	MA	U R P	\$ GROUPS COMPARISON, QUALITY CONTROL PROGRAM	BKCD	75
360	F4	MA	U R P	\$ HISTOGRAMS, QUALITY ASSURANCE STATISTICAL CODE	BKCD	74
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	MHBR	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	\$ ERLF, 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	MA	U U G	\$ BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	84
360	F4	MA	U U G	\$ SIN, ONE-DIMENSIONAL HYDRODYNAMIC CALCULATIONS	LASL	80
360	F4	MA	U U Q	\$ XDTRAP, GAS DIFFUSION WITH TRAPPING	DP	148
360	F4	PMM	C U K	\$ GRASS, THE JOSHUA REACTOR ANALYSIS SUBSYSTEM	DP	150
360	F4	PMM	C U R	\$ MARC, MAN-REM DOSE FROM ATMOSPHERIC TRANSPORT	DP	130
360	F4	PMM	C U R	\$ TETRAD, STREAM TRANSPORT DIFFUSION COEF CALC	DP	129
360	F4	PMM	C U R	\$ TRAJCLIM, SINGLE TOWER DISPERSION CLIMATOLOGY	DP	132
360	F4	PMM	D U R	\$ LODIPS, STREAM-RIVER POLLUTANT PREDICTION	DP	131
360	F4	PMM	U U C	\$ INTERACT, INTERACTION OF FISSILE UNITS	DP	173
360	F4	PMM	U U E	\$ SWIFT, JOSHUA POINT-KINETICS SOLUTION MODULE	DP	152
360	F4	PMM	U U F	\$ DISC., JOSHUA 2D SPACE-TIME FLUX CALC MODULES	DP	153
360	F4	PMM	U U F	\$ SCRAM./WIGLE, 1D TRANSIENT NEUTRONICS MODULES	DP	151
360	F4	PMM	U U M	\$ TAFI, RADIOACTIVE WASTE MANAGEMENT PROGRAM	DP	175
360	F4	PMM	U U N	\$ EDIT MODULES, JOSHUA PRINTED EDIT FACILITIES	DP	155
360	F4	PMM	U U N	\$ RIFLE, JOSHUA RESONANCE INTEGRAL MODIFICATIONS	DP	154
360	F4	PMM	U U P	\$ LINEAR LEAST SQUARES FIT WITH STATISTICS	DP	147
360	F4	R	U U P	\$ FORMAT, A TEXT PROCESSING PROGRAM	SLAC	12
360	F4	RRD	U U B	\$ PHROG2, MULTI-GP X-SECTIONS FAST SPECTRUM CALC	ANC	168
360	F4	RRD	U U B	\$ SCRABLE, MULTI-GP FAST CONSTANTS RESONANCE	ANC	170
360	F4	RRD	U U C	\$ DISNEL, DIFFUSION SOLUTION 19 ENERGY LEVELS	ANC	166
360	F4	RRD	U U C	\$ SCAMP, MULTI-GP SN NEUTRON TRANSPORT CODE	ANC	171
360	F4	RRD	U U I	\$ NUBOW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	176
360	F4	RSR	U U H	\$ FLOOD, CORE REFLOODING RATE CALCULATION ECC	ANC	167
360	P+BAL	ANL	U U M	\$ RENUP/RENORD, LIBRARY JOURNAL ORDERING PROGRAM	ANL	157
360	PL/1	MA	P R M	\$ MIRROR, INFORMATION RETRIEVAL & REPORTS SYSTEM	MLMO	120
360	PL/1	R	U U V	\$ SLAC ELECTRON GUN DESIGN PROGRAM	SLAC	36
3600	F36	MA	U R R	\$ MODEL-R, 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	\$ HRS017, 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-LINEAR LEAST SQUARES FITTING OF FUNCTIONS	RFD	7
4010	PLOTTING ROUTINES	LLL	MDCM	F+ASM MA U U P \$ MODCOMP TEKTRONIX		141

6600	F4	MA	U U W	\$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	93
6600	F4	MA	U U W	\$	IT, ITERATIVE ATOMIC-ENERGY-LEVEL VALUE CALC.	LASL	105
6600	F4	MA	U U W	\$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	112
6600	F4	MA	U U Y	\$	ABIGAIL3, ANTIBODY PRODUCTION SIMULATION	LASL	90
6600	F4	MA	U U Y	\$	BIOTA2, BIOME POPULATION INTERACTION MODELING	LASL	78
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
6600	LRL	MA	U U U	\$	GAMANAL LIBRARY AND AUXILIARY ROUTINES	LLL	164
6600	LRL	MA	U U U	\$	GAMANAL, INTERPRETATION OF GAMMA-RAY SPECTRA	LLL	163
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	ALA76	MA	U U P	\$	TIC-TAC-TOE, STRUCTURED PROGRAMMING IN ALA76	LLL	133
7600	CHAT	CTR	U U X	\$	DART, FUSION REACTOR ENERGY CONVERTER MODEL	LLL	149
7600	CHAT	MA	U R N	\$	SHEMP, HEMP PROGRAM 2D GRID PROCESSING ROUTINE	LLL	134
7600	F	AT	U R R	\$	LEACH, KINETICS OF IN-PLACE LEACHING MODEL	LLL	109
7600	F	RRD	U U C	\$	TRIPLET, TRIANGULAR MESH MULTI-GP TRANSPORT	LASL	77
7600	F+COM	MA	U U P	\$	SUB/STACKLIB, FORTRAN VECTOR FUNCTION ROUTINES	LLL	116
7600	F4	MA	D U M	\$	FUELPIN, FUEL PIN DATA MANAGEMENT SYSTEM	LASL	113
7600	F4	MA	U R H	\$	TRUMP, TRANSIENT AND STEADY-STATE FLUID FLOW	LLL	37
7600	F4	MA	U U A	\$	MULTI, R-MATRIX LEAST-SQUARES CROSS SECTIONS	LASL	119
7600	F4	MA	U U B	\$	MCN, NEUTRON TRANSPORT MONTE CARLO CODE	LASL	81
7600	F4	MA	U U G	\$	BKW, DETONATION PROPERTIES OF EXPLOSIVES	LASL	84
7600	F4	MA	U U H	\$	YAQUI, LAGRANGIAN-EULERIAN FLUID DYNAMICS	LASL	94
7600	F4	MA	U U J	\$	MCG, GAMMA TRANSPORT MONTE CARLO CODE	LASL	82
7600	F4	MA	U U J	\$	MCP, PHOTON TRANSPORT MONTE CARLO CODE	LASL	83
7600	F4	MA	U U T	\$	WT-MBA/LLL1B, ELECTROMAGNETIC RESPONSE CALC	LLL	156
7600	F4	MA	U U W	\$	DEGAA, POLYNOMIAL SOLN OF SCHRODINGER EQUATION	LASL	89
7600	F4	MA	U U W	\$	HANJCN, ELECTRON ENERGY DISTRIBUTION CALC.	LASL	86
7600	F4	MA	U U W	\$	HERSKL, HERMAN-SKILLMAN-ZARE ATOMIC STRUCTURE	LASL	93
7600	F4	MA	U U W	\$	MAB, SATURATION SPECTROSCOPY DATA REDUCTION	LLL	135
7600	F4	MA	U U W	\$	RCG, ATOMIC ENERGY LEVELS AND SPECTRA	LASL	112
7600	F4	MA	U U X	\$	CBMEXP, CO2 GAS LASER AMPLIFICATION STUDIES	LASL	85
7600	F4	MA	U U X	\$	H11, CONTINUITY EQUATION SOLN IN DENSE PLASMA	LASL	87
7600	F400	CTR	U U X	\$	TIRRO-GENERAL, CHARGED-PARTICLE TRAJECTORIES	LLL	118
7600	PUTT	MA	U U P	\$	PDP-8E, INTERACTIVE SIMULATOR ON THE CDC7600	LLL	143
812	BASC	PMM	U U G	\$	COMBACR, WHOLE BODY & CHEST RADIOACTIVITY CALC DP	LLL	114